

**SCHOOL OF PUBLIC HEALTH  
COLLEGE OF HEALTH SCIENCES  
UNIVERSITY OF GHANA**



**ASSESSMENT OF RATIONAL PRESCRIPTION AND THE USE OF  
ARTEMISININ-BASED COMBINATION THERAPY AMONG  
PRESCRIBERS AND PATIENTS AT BECHEM GOVERNMENT HOSPITAL**

**BY**

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**DECLARATION**

I, **Augustine Kumi**, hereby declare that, apart from the cited literature, this dissertation is the result of my own research and this has not been presented elsewhere in any way for purposes of the award of another degree.

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(Student)

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Signature

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Date

**Dr. Augustine Adomah-Afari**

(Supervisor)

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Signature

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Date

## **DEDICATION**

This research is dedicated to the memory of my late father, James Oteng, whose expectation was for me to attain the highest level of education, and to my wife, Ms. Sarah Boateng for supporting and motivating me to achieve the dream and to my siblings and uncle, Mr. Andrews Owusu Peprah for their prayers and support.

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## ABSTRACT

**Background:** Rational prescribing is to ensure safe and effective use of medicine. However, widespread irrational use of medicine is a problem at the various levels of health care, and leads to increased mortality, morbidity, poor health outcomes and waste of scarce resources.

**Objective:** To assess the factors (predisposing, enabling and need) associated with rational prescription and use of Artemisinin Based Combination Therapy (ACT) among prescribers and patients at the Bechem Government Hospital.

**Methods:** The World Health Organization core indicators of rational drug/ medicine use, prescribing tool was used to collect data from 120 outpatients' records from January, 2018 to December, 2018. The Andersen's behavioural model was used to investigate the use of medicines. A designed questionnaire was used to collect data on predisposing, enabling and need factors from 120 outpatients and 11 health providers/prescribers who were purposively sampled for interview. Associations between rational use of ACT among prescribers and patients (dependent variable) and prescribed or dispensed ACT, patients understanding of medicine information etc. (independent variables) were established using the Chi square test where the level of significance was set at  $p < 0.05$ .

**Results:** The rational use of ACT among patients in this study was 34.5%. This implies that 3 out of every 10 patients would have rational use of ACT. An average number of drugs per encounter was 2.8. The prescribers that followed the recommended procedure for ACT prescription was 14.2%. The predisposing factor associated with rational use of ACT was age. The enabling factors associated with rational use of ACT were recommended prescription and use of NHIS and cash for health services. The need factors

associated with rational use of ACT were advice and counseling and use of RDT for malaria test.

Conclusion: the rationale use of ACT among patient was very low and needs a special attention. The number of drugs prescribed per patient encounter was good, notwithstanding, prescribers that follow recommended malarial treatment protocols was very low and could have negative influence on rational use of ACT. Moreover prescribers and patients should be encouraged to adhere to the recommended ACT use and treatment guidelines.

## LIST OF ACRONYMS

A/A	Artesunate / Amodiaquine
A/L	Artemether / Lumefantrine
ACT	Artemisinin-based Combination Therapy
BA	Brong Ahafo
BGH	Bechem Government Hospital
CHPS	Community Based and Health Planning and Services
ECDC	European Centre For Disease Prevention and Control
EDC	Essential Drug List
EMEA	Europe, Middle East and Africa
EML	Essential Medicine List
ENT	Ear, Nose and Throat department
GHS	Ghana Health Service
INRUD	International Network for Rational Use of Drugs
MHD	Municipal Health Directorate
MOH	Ministry of Health
OPD	Outpatient Department
OT	Operation Theatre
RHD	Regional Health Directorate
RUD/RUM	Rational USE of Drug / Rational Use of Medicine
SIAPS	System for improved Access to Pharmaceuticals Services
STG	Standard Treatment Guideline
TB	Tuberculosis
TSM	Tano South Municipal
WHO	World health Organisation

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## CHAPTER ONE

### INTRODUCTION

#### 1.0. Background to the study

Rational prescribing is to ensure safe and effective utilisation of medicine. It involves tasks requiring a diagnostic skill, skills in medicines, expertise in the clinical pharmacology, communication skills, appreciation of risk and unpredictability (Maxwell, 2009). In order to ensure safety, accessibility and efficacy of medicines, prescription must fit individual patient and should emphasize on the diagnosis, age, sex, weight, drug, and food interaction as well as vital features, socioeconomic, spiritual beliefs and background of the patient (Agabna, 2014). Rational prescription establishes that there is no misuse of medicines and increases patient compliance with medication and may reduce undesirable drug- drug interactions (Appolinary & Richard, 2013).

Half of the world medicines are prescribed inappropriately. Out of that, half of all the patient fail to use the medicine as prescribed (Lee et al.; 2016, Agabna, 2014 ). Irrational use of medicines is a major health problem, as it is costly and detrimental both to the individual and the world population. It also contributes to increase morbidity and mortality and their consequential social, medical and economic burdens (SIAPS, 2015). In Europe it is estimated that 2500 patients perish every year by reason of irrational use of medicine with its associated cost exceeding 1.5 billion EUR annually (ECDC & EMEA, 2009). China being the second largest consumer of medicine utilised about 30 % to 50% consumption of all medicines and has an average of 14738000 incidents of moderate to severe adverse drug reactions with approximately 150000 patients dying from this events (Ding et al., 2016). According to Ding et al. ( 2016) more than 390000 (51%) people die from unsafe injection annually. In U.S.A Institute of Medicine (2006), indicates that 1.5 million people in America are affected annually by medication errors.

According to Choi, Lee, Nwokike (2011) more than 80 children in Nigeria died with others hospitalized after being given “MY Pickin Baby Teething Mixture” a syrup known to contain high concentrated diethyl glycol. In their neighbour Niger a wholesome 60000 people were irrationally given vaccine resulting in 3000 deaths. The problem extended to Uganda, where 45 children crippled by poorly administration of injections(Choi et al., 2011).

Irrational drug use is known to be serious problem in developing countries as a results of prescribers attitudes, inadequate training of prescribers, improper procurement, inadequate funds and patients perceptions with their effects including reduction in quality of drug therapy, increased drug related morbidity, mortality, cost of therapy, risks of unwanted drug effects leading to poor patient outcomes and significant wastage of scarce resources (George & Shanmugapandiyan, 2014).

In Africa the problem of non-rational use of medicine is perceived differently, because of the inadequate resources to monitor safety of medicines. Notwithstanding, a study conducted indicates irrational drug practices such as polypharmacy, noncompliance to clinical guild line, short dispensing time and poor communication do not promote rational prescribing practices (Pirankar SB, Ferreira AM, Perni SG, Kulkarni MS, 2013).

In Ghana, according to Ghana News Agency (2018), irrational use of medicine led to the death of three patients from New Senchi Health Centre at Akrade in Eastern Region. A study pointed out that Ghana ranks the highest (4.4) in terms of polypharmacy or average quantity of medicines per prescription and also among the countries with highest prescription of injection (over 60%) (WHO, 2004).

Bechem Government hospital with its service delivery has achieved a remarkable growth over the years, from restructuring to infrastructure expansion and also very dedicated towards improving health care in the Tano South Municipality (Agyei-Darko, 2017, Agyeman, 2018). The facility is committed to routine reporting on rational use of medicine, however it happens to be the most frequently reported case of malaria (with a record of 43.04% mortality) and frequently heard criticism on rational prescription and use of medicine, so far as the municipality is concerned (GHS/RHD-BA, 2016)

### **1.1. Statement of Problem**

Medical intervention is cost effective but sometimes the role of prescribers and dispensers who are the active players in the intervention may not perform as the health profession requires from them and as a result huge budgets are spent on medicines (Lee et al., 2016). It is on record that proportion of health budget spent on medicines as a result of irrational use of medicine is between 20% and 40% in developing countries and between 10% and 20% in developed countries (World Health Organization, 2002).

According to Bosu (1996), Ghana had spent up to 40% of its recurrent budget to ensure the availability of drugs in the health system, whiles GNDP (Ghana-National Drug Policy) (2004) is also with the fact that medicine constitute 60 to 80 percent of the total health cost in Ghana. However, irrational prescribing has led to a wastage in drug supply, absence of safety of the therapy and extension of treatment and ineffectiveness in treatment. A rational use of medicines requires that patients receive medication appropriate to their clinical needs in doses that meet their own medical requirements for an adequate period of time at the lowest cost to them and their community. When this is not achieved it may head to misuse of medicine, drug resistance and other related issues.

Globally malaria control program was threatened by growing resistance of plasmodium falciparum to the monotherapies and seemingly unsuccessful interventions (WHO, 2018) . Managing of malaria requires appropriate use of Antimalarial medicines in the right formulation, dose, frequency and duration (MOH/GHS, 2010) . As a result of the ineffectiveness coupled with resistance of antimalarial medicines in most endemic and developing nations, the World Health Organisation (WHO) recommended that malaria management plan should change from monotherapy to Artemisinin Based Combination Therapies (GHS, 2009). With respect to this, Ghana replaced its malaria treatment policy in 2004, changing it with A/A as first line therapy for uncomplicated malaria. However, challenges such as irrational prescription, adverse drug reaction, lack of other treatment options and safety concerns gave rise to the selection of Artemether Lumefantrine(A/L) and Dihydroartemisinin Piperazine as additional ACT drugs for treatment of uncomplicated malaria (GHS, 2009).

Considering its public health relevance, prescribers and patients' role in the use of the recommended (ACT) needs to be assessed and rationalized to ensure the drug maintains its potency. In Ghana, malaria is the number one source of morbidity in children below five years, a serious cause of adult morbidity and notable cause of absenteeism at work (GHS, 2009).

From public health view the rational prescription and use of medicine (ACT) can be traced from the integrated framework involving the prescriber, patients, diverse factors and medicines. The prescriber is the first case who initiates the use of medicines. The patient is the final utiliser and the diverse factors serve as a vehicle that drives the use of medicine and utilisation of the health service as a whole. The Andersen's behavioural model encapsulates these into enabling, predisposing and need factors representing a conceptual frame of the study shown in figure 2.1.

## **1.2. Justification of the study**

In Ghana the resistance to antimalarial drugs especially ACT has not been much demonstrated with irrational use of medicine to persuade policy makers, politicians and development partners to focus on the needed attention. The WHO indicators for assessing rational use of medicine mainly stress on antibiotics as a drug much prone to resistant related issue (WHO, 2004). Considering sub-Saharan Africa where malaria prescription outnumbers any other drug prescription at the outpatient department (OPD), prescription of ACTs needs much consideration and rationalization at the micro level. It is observed that not much studies have been conducted at Bechem government Hospital to integrate the use of ACT into rational use of medicine (WHO, 1993, Irunde, Minzi, & Moshiro, 2017).

It is very imperative to study enabling; predisposing and need factors so as to understand the context of irrational prescription and use of medicines specifically ACT among the prescribers and patients. However, it appears that either previous studies have examined them minimally or have not examined them. Therefore, this study will help fill the gaps as well as contribute to literature on the topic.

The motivation for the conduct of the study is that the researcher is a health provider in Ghana's health sector. Thus, the experiences accumulated overtime will be brought to bear on the discussion of the topic and the way forward in addressing the niggling challenges confronting the health sector's attempts at ensuring a quality healthcare provision to the populace.

It is desired that the results of the investigation will be functional to the decision makers of Bechem Government Hospital as well as Tano south Municipal health directorate and Ghana Health Service as a whole for the improvement of appropriate use of medicine. It

will serve as an informational material for researchers interested in health care industry and want to improve on primary health care services.

### **1.3. Objectives of the study**

Based on rationale behind the study, the following objectives will be explored.

#### **1.3.1. General objectives**

To assess factors (predisposing, enabling and need) associated with rational prescription and use of ACT among prescribers and patients at the BGH.

#### **1.3.2. Specific objectives**

Further to general objectives, the research pursued the following specific objectives.

1. To assess the predisposing (socio-demographic characteristics) factors associated with rational prescription and use of ACT among prescribers and patients
2. To assess the enabling factors associated with rational prescription and use of ACT among prescribers and patients at BGH.
3. To examine the need factors associated with rational prescription and use of ACT among prescribers and patients

#### **1.3.3. Research questions**

1. Among the questions that highlight the study objectives are as follows:
2. What are the predisposing factors associated with rational prescription and use of ACT among prescribers and patients at the BGH?
3. What are the enabling factors associated with rational prescription and use of ACT among prescribers and patients at the BGH?

What are the need factors associated with rational prescription and use of ACT among prescribers and patients at the BGH?

#### **1.4. Outline of the dissertation**

The chapter 1 (one) enfolds the background, problem statement, justification, objectives and research questions. Whereas chapter 2 (two) review literature and conceptual framework. Chapter 3(three) spells out the project methodology, chapter 4 (four) involves results with discussion at chapter five then conclusion and recommendations consist of chapter six follow by the references and appendices.

## CHAPTER TWO

### LITERATURE REVIEW AND CONCEPTUAL FRAMEWORK

#### 2.0. Introduction

Rational drug prescription or prescribing and use of ACT among prescribers and patients is multifactorial. In addition, the incidence of malaria in outpatient department and the huge demand of ACT in the primary healthcare facility with challenge in providing quality health services to the population is a matter of research. The chapter demonstrates the study of literature in relation to the concepts underpinning the research. The review of these factors focuses on the issues presented in ten (10) sections. Section one underscores quality of care in relation to prescription and use of medicines. It extends to identifying quality indicators and ways to measure them.

Prescribing, patient and facility indicators forms section two. Section three covers the health system. It clarifies the system and how it promotes rational use of medicine. Section four provides an introduction to professional role in rational prescribing. It gives a clear picture of various professionals and how they contribute to rational and irrational use of medicine. Essential medicine list is the focus of section five. Section six looks at the implementation of artemisinin-based combination therapy in Ghana. It describes the various types of ACT used in Ghana and the prescriber and patient perspective about the use of the medicine. Section seven shifts our attention to enhancing rational use of medicine.

It tries to outline activities that will promote rational use of medicine. Section eight seeks to throw light on enhancing rational use of medicine. Factors influencing prescribing and utilisation of medicines/ACT is the main idea of section nine. The tenth section is conceptual framework. The section expresses the main theme of the study base on the

study objectives and point out the predisposing, enabling and need factors with their associated variables used to measure them. The chapter herein ends with a summary of the main ideas and expected outcome of the next chapter.

## **2.1. Quality of care**

Rational prescribing and using of medicines are hallmark of quality care since inappropriate use of drug is wasteful. Rational prescribing is indispensable bit in achieving a standard care for patients' population. the extent to which service for individual or population increase the likelihood of desired health outcome and are dependable with current professional expertise, indicates quality of care (Mainz, 2003).

Generally, prescription communicate medicine information from the prescriber to the patient through pharmacist. Quality prescription involves evidence based treatment outcome of the patient (Hassan, Ismail, Naing, Conroy, & Abdul Rahman, 2010). the quality of care is compromised and subtle when medicines are prescribed without appropriate indication such as correct dose, route of administration, frequency, schedule or duration of treatment and duplicate therapeutic agents and medication of potential drug-drug interactions or adverse reactions (Suthar & Patel, 2014) .

### **2.1.1. Measuring quality of care**

The measurement of the identified service indicators involve in a particular performance of work. There are categories of clinical indicators for quality improvement of healthcare which involve indicators that assess health structures, process and outcome as described by Donabedian ( 2015) . It may become difficult surveilling health care quality in the absence of these measures. Herein, indicators for performance and outcome measurements

permit quality work to be addressed. The indicators can be worked out by designing standard indicators that relate prescribing activities that should take place for specific client or related prognosis and evaluating whether client's care is in consistent with the indicators by evidence-based standards.

A rate based and sentinel measures are used to quantify the quality of care (Mainz, 2003). Rate based indicators measure a number of patients undergone a particular treatment or service and failed to meet the expected out come as the numerator whereas the denominator includes the total number of patients undergone the treatment or received services within the time period under review. Sentinel indicator also measure the number of patients who die during or around within treatment or receiving services. The results then can be compared with the benchmark or existing records for informed decisions as to quality of care (Campbell, 2002).

Now providers are interested in evidence-based medicine, clients (patients) are also started to rely on the productive health care in providing health results, hence working out the quality of prescribing is essential to providers, regulators and care givers (Mainz, 2003).

## **2.2. Prescribing, patient and facility indicators**

Rational utilisation of medicines expect patients to take treatment suitable to their clinical demands in dosage that bear their own requirements, for an ample period of time and at minimum cost to them and their family (World Health Organization, 2002). The International Network for the Rational use of Drugs (INRUD) and World Health Organization(WHO) established indicators for right use of drugs based on 3 main medicine using areas namely, Prescribing, Patient and Facility indicator (Ogunleye, 2015). Following the WHO meeting in Nairobi on the use of drugs rationally in 1985, there have been a great effort to improve medicine utilisation practices. The indicators are to serve as

supervising instrument to observe problems in performance by providers or health facilities (Green & Gammouh, 2012).

The various investigations that measure medicine use differ from setting to setting depending on many variables which include specific information requirements of health managers, the type of record storage systems available in health centres, the type of care givers whose behaviour is to be specified and resources accessible to carry out the work (WHO, 1993). The indicator of a particular study can be either retrospective or prospective. Retrospective data report medicine use during patient visits that happened in the past one-year period ideally. Prescribing encounter can be collected by either retrospective or prospective. Patient care encounter is always carried out by collecting data from current patients as they present for treatment on the day of the study visit (WHO, 1993).

### **2.2.1. Prescribing indicators**

The manner of using prescribing medicines may be due to lack of training, education inappropriate role models, lack of objective, drug information and misleading beliefs about drug efficiency (World Health Organization, 2002). Prescribing indicators work out the activities of providers in key areas related to the correct use of medicine. Indicators refer to observe encounters taking place at outpatient departments which involve quantities of medicines per encounter, percentage of medicines prescribed by generic name, percentage of encounters with antibiotic prescribed, percentage of encounters with an injection prescribed and percentage of medicines prescribed from essential medicine list or formulary (Green & Gammouh, 2012).

### **2.2.2. Patient care measures**

Patient Care Measures address vital features of what patients experience at the clinic and how well they deal with the prescriptions and dispensed medicines (Green & Gammouh, 2012). Their way of utilizing medicines is influenced by drug misinformation, misleading beliefs and patient demands or expectation (WHO, 2015). Patients encounter with prescribers outline quality of diagnosis and treatment. Patients should have well labeled medications and should make out drug instructions. Patients' indicators measurements include the following, percentage of medicines dispensed, percentage of medicines adequately labeled, average consultation and dispensing time, patients knowledge of correct dosage and among others (Ogunleye, 2015) .

Consultation time is the moment that providers have with patients throughout consultation or prescribing. It is the period linking going in and exiting the consultation room omitting the waiting time, whereas average consulting time is worked out by division of the time for consultation over number of observations (Gray et al., 1996). According to WHO (2015) 18 countries covering 50% of the world's population had a reported average of five minutes or less consultation time with patients. In India doctors see patients for barely 2 minutes (Iyer, 2017).

### **2.2.3. Average dispensing time**

Average time for dispensing is the mean time that a health worker dispenses medicines to patients. That is the period between reaching the dispensary outlet and leaving (Ogunleye, 2015). A study carried out in health facilities in Ethiopia found that patients used to spend an average of 61.12 seconds (Sisay, Mengistu, Molla, Amare, & Gabriel, 2017). Whereas in Ghana, a study conducted in a police hospital showed an average of 1.52 minutes (Afriyie & Tetteh, 2014).

#### **2.2.4. Medicine adequately labelled**

This is to work out the extent to which dispensers record vital data on the medicine package (Lee et al., 2016). Percentage of medicines adequately labelled is determined by division of the number of medicine envelopes having at least medicine name, patient name and length the medicine should be used over the total number of medicine dispensed, multiplying by hundred (WHO, 2015). A study showed patients knowledge of dispensed medicines in a community pharmacies in Ghana recorded 98%, 99%, 55%, 54%, 6%, 2% for labelling of name, quantity, dosage, frequency, duration of therapy and route of administration respectively (Marfo, Owusu-Daaku, & Kyerewaa-Akromah, 2013).

#### **2.2.5. Knowledge of correct dosage**

This determines the appropriateness of the information clients receive on the dosage schedule of the drugs. (Ogunleye, 2015). It is work out by division of the number of clients who can adequately reiterate the dosage schedule for all drugs, over the total number of clients interviewed, multiplied by hundred (WHO, 2015). A study carried out in Sri Lanka revealed that less than 50% of clients were able to reiterate the correct instructions on dispensed medicines (Manchanayake, Bandara, & Samaranayake, 2018).

#### **2.2.6. Facility indicators**

Health facility's structure and the manner in which activities are carried out contribute immensely to Irrational use of drugs through Cultural factors, workforce, the supply system and pharmaceutical industry (WHO, 2015). Other influences come from drug information, regulation, and misinformation. Integration of these factors affect the use of drugs. The workforce Pressure emanating from workplace may affect the way drugs are used through pressure to prescribe, heavy patient load, insufficient staffing and lack of adequate laboratory capacity (WHO, 2013). Unreliable supplies, medicine shortage and experience drugs supply are some of the medicine supply system factors leading to the use

of drug. In considering drug regulation; Non-essential drug available, informal prescribers, lack of guidelines and regulation enforcement affect the use of medicines. It is observed that pharmaceutical industries entice health providers through Promotional activities resulting in bias prescription hence affecting the way medicines are used (WHO, 2013).

The degree to which health facilities are able to provide the medicines which were prescribed and are found in essential drug list or formulary is worked out by division of the number of medicines dispensed at the clinic over the total number of medicines prescribed, multiply by hundred (WHO, 2015) . In Nigeria 91.7% of prescribed drugs were dispensed at health facility (Tamuno & Fadare, 2012).

### **2.3. Health system**

Rational use of medicine as part of health system strengthening is an integrated approach to two or more of the health system functional blocks to promote efficient use of medicines that are available and accessible in developing countries (WHO, 2013). According to the World Health Organization ( WHO, 2012) the system comprises of all the organizations, institutions and resources that are devoted to undertake activities, whether in private healthcare, public health services or inter sectoral , whose main purpose is to support health (World Health Organization, 2012) . Health system involves six building blocks thus, health workforce service delivery, medical products vaccines and technologies, information, financing, leadership and governance Aside these, Africa focuses on three additional major areas, namely community involvement for health development and research for health to promote African health system(World Health Organization, 2012).

Malaria is among the major global public health drawbacks menacing the health system in Africa (Asante & Asenso-Okyere, 2003). This called for various antimalarial use to prevent and treat malaria (WHO, 2010). However, the bottlenecks of the health systems such as unavailability of regular updated standard treatment guidelines, irregular or inadequate supply of ACT, lack of sufficient capacity, regulatory and monitoring systems, training of health workers and inappropriate education on rational use of medicine hinder health system strengthening among the middle and low income countries and threatening public health gains at the micro system level where the prescriber and patient use ACT (SIAPS, 2015).

Inappropriate using of medicines is often observed in healthcare systems throughout the world mainly in developing countries (WHO, 2003b). Diverse forms of inappropriate prescribing happen at the micro level of the health system which are unaware by decision makers until it start to generate problems(WHO, 2013). It is stated by the WHO (2013) that healthcare managers are only concerned with financial reasons associated with the health system and give less attention to promote appropriate use of drugs (WHO, 2013).

#### **2.4. Professional role in rational prescribing**

The responsibility of health care professionals in prescribing the right medicines plays a great significant role in ensuring that patients take the right medicine appropriately. The pharmacist is a master in drug use (Amir, 2014). The role of the pharmacist expands from community pharmacies, hospital, homebased care services, nursing homes, clinics and any other setting where medicines are prescribed and used (Adams & Blouin, 2017). right use of medicinal devices, participation in the therapeutic decision making team, consulting, selection of drugs, drug information, formulation and preparation, research,

clinical trials, dispensing and many others are some of the pharmacy activities, training and supervising supportive pharmacy staff compliment the effort of rational use of medicine (Amir, 2014). Activities of some pharmacists oppose rational use of medicine when they try to replace a prescribed brand without any proof of equal therapeutic response (SIAPS, 2015). Dispensing of drug should not be a rush and hash as some pharmacy professionals do. Sufficient time is needed for enough information to be given for the understanding of the patient (Adams & Blouin, 2017).

Moreover, doctors' role cannot be underestimated when it comes into prescribing drugs for patients' use. A doctor is the initial point of contact with the healthcare system for patients in their attempt to receive clinical care (Muttam, 2018). Most of the patients' impression about the use of medicines start from their encounter with a doctor. Doctors have responsibilities over their own actions and their supportive clinicians such as physician assistant, medical students and nurses in order to make sure standard procedures for achieving reasonable use of medicines are followed (World Health Organization, 2002).

Duties of doctors include diagnosis and treatment of patients through available procedures and follow up to ascertain the progress of their patients(Khanr, 2011). However, many clinicians are not used to prescribing from the essential medicine list (EML) and also standard treatment guideline (MOH/GHS, 2010). Some doctors' prescriptions are controlled by pharmaceutical companies who encourage doctors to prescribe their brand. doctors prescribe in diverse situations most often without evidence based judgement (World Health Organization, 2002). This may lead to non-rational use of medicine and in turn leads to treatment failure.

## **2.5. Essential medicine list**

The essential medicines list (EML) involve stock of medicines that address pressing global health concerns (WHO, 2014). The essential medicines are derived through an evidence-based process and has passed quality, safety, efficacy and cost effectiveness selection criteria (WHO, 2003). Essential medicine list is revised every two years to reflect current global health challenges (SIAPS, 2015). About 208 Essential medicines were identified for the first time to fight global diseases from 1977 and Currently there are about 340 medicines to treat priority conditions including malaria (WHO, 2014). EML strengthening rational prescribing through accordance to standard guidelines. About 67% of the global population have means to essential medicines. 50% of all medicines is prescribed inappropriately. 40 percent of all patients are treated in line with clinical guidelines (SIAPS, 2015). According to antimalarial treatment policy for Ghana (GHS, 2009), the cost implication of ACT made it possible to incorporate all ACTs into the National Health Insurance Drug List to make it affordable and accessible.

## **2.6. Implementation of ACT in Ghana**

ACT is for handling malaria in children and adult, following the development of drug resistance to monotherapy, a policy was enacted to initiate the use of ACT in Ghana from 2002 (GHS, 2009). Artesunate Amodiaquine was the first medicine for the treatment of uncomplicated malaria, due to adverse drug reactions following its use, irrational prescribing and safety concerns resulted into the introduction of alternative; Dihydroartemisinin piperazine and Artemether lumefantrine (GHS, 2009). However, A/A remains the ideal ACT for the management of uncomplicated malaria in Ghana. According to WHO (2018), treatment of malaria approach should be changed if the total

case management failure rate is  $\geq 10\%$  and adopt a new antimalarials with parasitological cure rate of  $>95\%$  (World Health Organisation, 2018).

The alternative Artemether lumefantrine (A/L) was devised through the antimalarial drug policy of Ghana to be taken by patients who cannot tolerate the artesunate amodiaquine (A/A) (GHS, 2009). ACTs are not convenient for use on the first trimester but could be used when considered to be lifesaving and when other antimalarial are deemed to be unsuitable (MOH/GHS, 2010). It is therefore the responsibility of prescribers to improve patient approval of artemisinin based combination therapy to ensure appropriate and safe use of the drug to propagate public confidence in the implementation of the policy (GHS, 2009). It is observed that Artemether lumefantrine is the commonly prescribe ACT against the backdrop that artesunate amodiaquine is the first drug of treatment in Ghana(GHS, 2009).

In Ghana there is a persistent patients' complaints about the use of A/A, some patients mistake other drugs for A/A when those drugs are in yellow color just as amodiaquine component of A/A and therefore refuse it and do not even comply with the use of the drug, especially patients who have experienced the adverse drug reaction or side effects of the amodiaquine component before (Aspinall, 2015). As a matter of concern prescribers then listen to the demands of the patients as to the choice of medicine than the appropriateness of the medicine (World Health Organization, 2002). This contributes to irrational prescribing and may lead to treatment failure.

### **2.6.1. The use of artemisinin-based combination therapy**

Malaria parasites invade the body and remain in the body in the red blood cells or the liver (WHO, 2011). The medicine used to eradicate the malaria parasites occupying the red blood cells is the ACT, particularly artemether lumefantrine (A/L) (MOH/GHS, 2014). Patients should tell their doctor about all current medicines especially when taking other medicines since drug interactions can occur (Saifi, 2014). Since there are a number of ACTs, it must be assessed for possible allergy to avoid use (GHS, 2009). Medicines that interact with artemether lumefantrine should not be used or the treatment plan can be changed for a safe kind of ACT. It must be inquired if patients have ever had heart complications, long QT syndrome, liver or kidney conditions, poor levels of potassium or magnesium in the blood, pregnant or plan to become pregnant (MOH/GHS, 2014).

Patients should find out how medications would be taken and follow directions on their prescription label. Medicines should not be taken in larger or small amount for longer than recommendation. A/L must be taken with food like oatmeal and milk (Kerler, Ziegler, Schmid, & Bacher, 1990). The tablet of A/L can be crushed and mixed with one or two teaspoons of water for easier swallowing. The crushed tablets can also be mixed with infant formula when the medication is to be given to a child. The drug is absorbed properly when taken with meal. In case a patient vomits within one hour after taken the drug, another dose can be taken. Patients need to contact the doctor if the vomit persists (MOH/GHS, 2010).

A study conducted in rural Tanzania indicated that 78.5% of patients had correct dosing by age alone (Masanja et al., 2013). It is therefore imperative to emphasize on the dosing to ensure rational use of ACT following evidence-based prescription. Artemether lumefantrine is usually given as a total of six doses over a period of 3 days. ACT doses

are based on weight and age. The recommended doses are as follows based on doctors' advice (MOH/GHS, 2010).

For children younger than 16 years old and between 15 and 25 kg should take 2 tablets as initial dose, take 2 more tabs 8 hours later, then 2 tabs in the morning and evening for the next 2 days.

For children younger than 16 years' old who weigh between 5 and 15kg should take one tab as initial dose, take 1 tab eight hours later follow with 1 tab in the morning and evening in the next 2 days.

For children younger than 16 years old and between 25 and 35kg, should take tabs for initial dose, 3 more tabs 8 hours later than 3 tabs in the morning and 3 tabs in the evening for the next 2 days.

For people over 16 years old with at least 35kg, take 4 tabs as an initial dose, take 4 more tabs 8 hours later than 4 tabs in the morning and 4 tabs in the evening for the next 2 days (MOH/GHS, 2010)

Patients should avoid taking other antimalarial medications. Grape fruit and grape juice should be avoided since they may interact with A/L. Allergies including swelling face, lips tongue, fast heart rate, difficult breathing, vomiting, loss of appetite and hives, should be reported to a doctor. Antibiotics, antifungals and TB medications, antidepressant, antipsychotic, birth control pills, cancer medicines, heart or blood pressure medicines, anti-emetic, anti-asthma and antiretroviral interact with A/L leading to adverse effect and poor absorption (Maponga et al., 2011).

## **2.7. Enhancing rational use of medicine**

Improving rational use of medicine is a multifaceted task involving an aspect of ACT use.

The core strategies to enhance the use of ACT are as follows (Embrey, 2012);

Establishing required several discipline national bodies to coordinate medicine use policies. Since appropriate use of medicine entails a number of activities, a national body should be strengthened to organise these activities among stakeholders in both public and private sectors. It is very necessary for consumer groups, health professionals, pharmaceutical industry, academia, government and the national regulatory authority to come on board to accept the implementation of the mandate.

Carrying out procedure for advancement, applying and revising standard treatment guidelines (STG). This is a strategy that make sure STG is used as a guide to restrict the prescriber from prescribing outside the guideline.

Carrying out protocols for developing and appraising an essential medicine list formulary; pharmaceutical management are made easier by EML. It helps in procurement, storage, distribution, prescribing and dispensing since the list is made up of few items.

Setting up a therapeutics committee in hospitals with clarified responsibilities for surveilling rational use of medicine; this committee is also referred to as the Pharmacy and therapeutic committee, their duty ensures safe and effective taken of medicines in the facility. The committee members should come from administration and different major specialties.

Apply problem-solving learning in pharmacotherapy through national STG in tertiary education courses with standard training of students will enhance future dispensing practices. Pursuing in-service medical education as licensure requirement and target educational programmes by professional societies, universities and the government; a

problem based in-service training must be supported by health facilities (government), professional association and universities to impact practical skills.

using strategic attempt to enhance prescription in the individual practice via regulations and collaborations with professional associations; in the developing countries most of the effort to improve the use of medicines focus on the public sector and overlook the private sector who provides greater access to pharmaceuticals. Strategies should be formed to enhance rational use of ACT by involving all sectors and licensing regulations with enforcement, accreditation and continuing education through professional associations and financial incentives.

Surveilling group processes to support appropriate medicine use; monitoring is one of the inactive processes in the developing countries especially Ghana. Effective forms of supervision including prescription audit and feedback and peer review will change prescribing behaviour (Lee et al., 2016).

Educating pharmacists to offer beneficial advice to consumers and provide independent medicine information.

## **2.8. The impact of irrational use of medicine**

The appropriate utilization of medicine requires a strict adherence to procedures, if these procedures are not fulfilled, it will result into a lessening in the quality of drug therapy leading to increase mortality and morbidity (WHO, 2012). There is also misuse of resources following a reduced availability of vital drugs and increased cost. Multiple risk of undesirable effects such as adverse medicine reaction and the emergence of medicine resistance especially antimalaria. Last but not least is the when patient come to believe

there is a therapeutic solution for every disease. in local parlance ‘yadea biara wo aduro’  
'this may transcend to apparent increase demand for medicines (WHO, 2013).

## **2.9. Factors influencing prescribing and use of medicines/act**

A number of factors drive irrational use of drugs (WHO, 2003). The factors are grouped according to the study objectives below.

### **2.9.1. Predisposing factors (socio-demographic characteristics) associated with rational prescription and use of ACT**

The predisposing factors seek to measure the following patient related variables; age, sex, education, and economic status (Babitsch et al., 2012, Ogunleye, 2015). A related research was carried out in United State to determine which predisposing, enabling and need factors that affect access to preventive health care for children under 18 years. The study reviewed that age, education and sex were some of the predisposing factors that influenced preventive health care seeking behaviour of the people (Lo & Fulda, 2008). The uniqueness of this study is the consideration of the demographic and economic factors as part of the predisposing factors against the use of medicine.

### **2.9.2. Enabling factors associated with rational prescription and use of ACT**

The enabling factors may be referred to as the substance of the study since it covers a number of indicators or variables comprising of patients' medical security /insurance, availability of essential medicines/ACT, availability of formulary, monitoring, feedback, information and communication, pharmacy/ medicine promotion, consulting time, labelled drugs, prescribed medicines, dispense medicines and patient's understanding of dosage (Andersen & Newman, 1995, Ogunleye, 2015). A study conducted in Germany to revisit

Andersen behaviour model reviewed that individual financing and organizational structures, were some of the indicators that influenced health provision. The individual financing involves income, ability to pay for health services and individual health insurance status (Babitsch et al., 2012). For this study organizational structures will be considered differently to determine whether they contribute to rational use of medicine. Individual's ability to pay is also considered as part of enabling factors but at this time it is subtly known to influence rational use of medicine.

### **2.9.3. Need factors associated with rational prescription and use of ACT**

The need factors include variables such as drug per patient encounter, generic medicines prescribed, essential medicines and existing patient diseases (chronic illness) or infection (Andersen, Davidson, & Baumeister, 2013) . The aforementioned indicators influence prescribing and use of medicines at different settings of the health system (Management Sciences for Health, 2012). Looking at a research conducted in Korea to assess the factors influencing health services utilization using Andersen's behavioral model, chronic illness was adjudged among the need factors as having the significant effects on health service utilization experience (Kim & Lee, 2016). the need factor in the case study will be applied in this study to determine the outcome of the study's dependent variable (the use of medicine) unlike the health service utilisation.

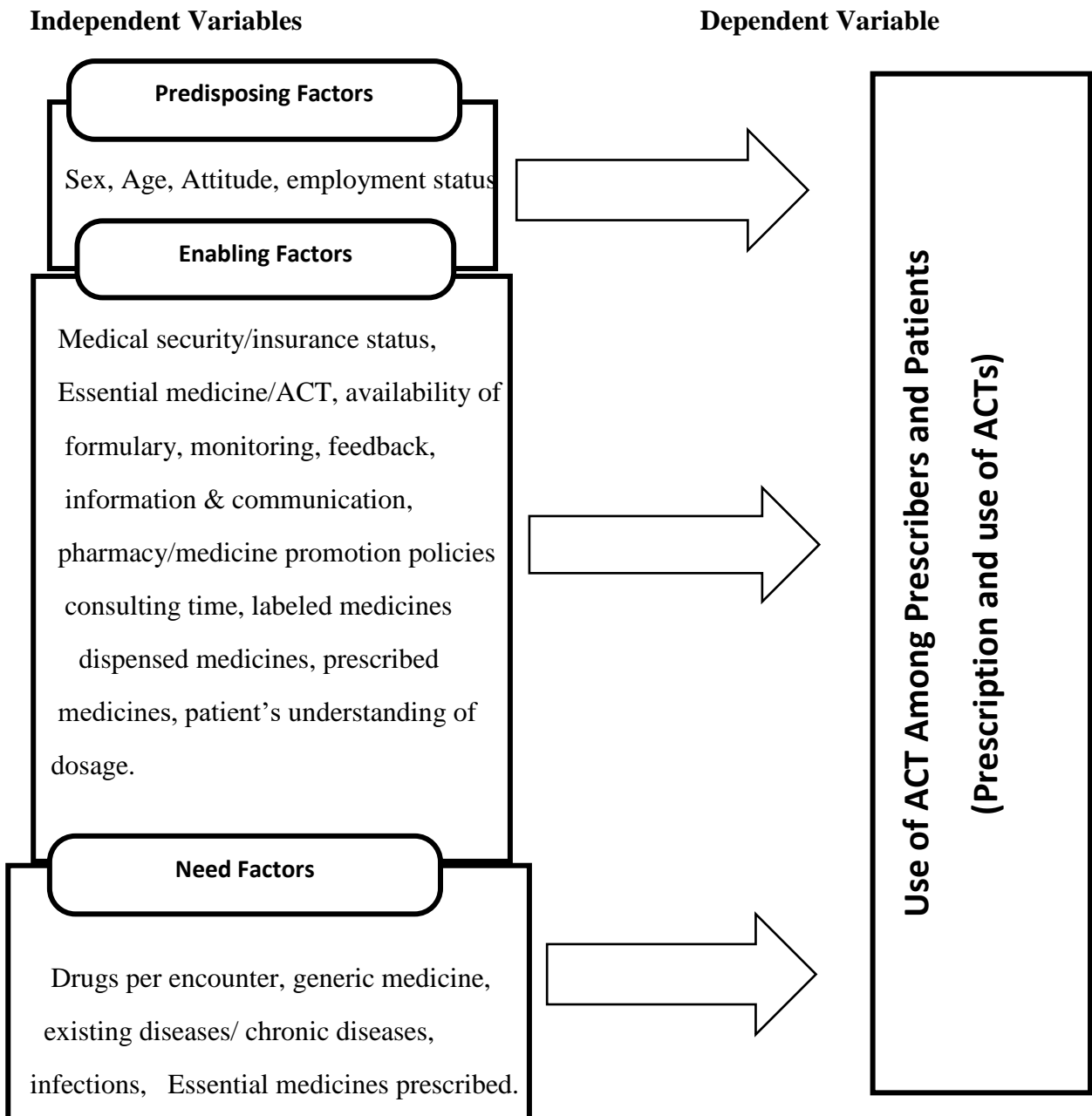
### **2.10. Conceptual framework**

This section presents the conceptual framework of the study as summarised in figure 2.1.

The dependent variable in the study is the use of medicine/ACT. According to the framework the use of medicine is influenced by the experience of rational prescription per patient's and prescribers' encounter emanating from the independent variables. The study

engaged Andersen's behavioural approach which is used for verifying the utilisation of medicine, the model consists of enabling, need and predisposing factors (Andersen et al., 2013). Prescribers and patients' roles are not the only reasons that influence rational use of medicine. An application of the Andersen's (1968) behaviour model that integrates both individual and contextual determinants of health service use also predicts three vital factors influencing the rational prescribing and use of ACT. The model includes predisposing, enabling and need factors (Babitsch, Gohl, & Von Lengerke, 2012). Ofori-Asenso & Agyeman (2016) opines that Predisposing elements refer to demographic and sociocultural features that exist prior to one's disease. e.g. gender, age, education, attitudes, knowledge towards health and social network. Enabling factors are the logistical aspects of obtaining care and how to access the health services. It involves financing and organizational factors considered to impede or facilitate service utilization e.g. Source of care, NHIS, waiting time and procurement, essential medicines, facility indicators, monitoring and feedback, information and communication, pharmaceutical and drug promotion and policies.

Need elements are the greatest expeditious effect of health services utilisation, from performance and health challenges that result into the demand for wellness. it includes recognised needs (How people see their own useful state, symptoms of illness, pains and worries about their health and the urgency to seek professional help) and evaluated need which is professional judgement about people health status and need for medical care (Andersen, Ronald & Newman, 1995). These factors integrate and influence the prescriber and the patients at the meso level, making it complex to recognize and deal with a factor as a singular influence on rational prescribing and use of medicines (ACT).



**Figure 2.1: Conceptual framework of rational prescribing and use of ACT**

Source: Researcher's conceptualization (2019).

### **2.11. Chapter summary**

This chapter has explained the concepts and policy framework as well as the factors influencing the prescription and use of ACT among prescribers and patients based on existing literature. The next chapter presents the methods applied to gather data for analysis in the study.

## CHAPTER THREE

### METHODS

#### 3.0. Introduction

This section presents the methodology, which underpins how study objectives were achieved through comprehensive elaboration of the research design, location, population, sampling and data collection techniques, study variables, ethical considerations and quality control.

#### 3.1. Study design

As the study seeks to address a particular situation or phenomenon among small group of people in a small area (a facility) at a point of time, prospective and retrospective cross sectional descriptive study was employed to work out prescribing practices under Enabling, Predisposing and Need factors for the use of ACT Therapy and using patients' folders from January to December 2018 respectively. Cross-sectional study consists of both descriptive and analytical study. Since descriptive cross sectional study characterises the prevalence of health outcome of a specialised population(Alexander, Lopes, Ricchetti-masterson, & Yeatts, 2015), the descriptive cross-sectional study was employed.

#### 3.2. Study area

The study was conducted at the Outpatient Department (OPD) of Bechem Government Hospital in Tano South Municipality (TSM) in Ahafo Region. It is among the administrative Municipalities of the Ahafo Region established by a legislative instrument in 2018. The Municipal capital Bechem, is on the Sunyani-Kumasi first class road (asphalt) and about 54 km from Sunyani and 76 km from Kumasi. The municipality has a land size of about 700sq km. TSM is joined by Ahafo Ano South and North

districts/municipalities in Ashanti Region, then to south west, Tano North Municipality to the north and Offinso District (Ashanti Region) to the east.

### **Demography**

The population of the municipality according to the 2010 population and housing census stands at 78,129 with 38,299 males and 39,830 females (Ghana Districts Repository, 2018).

### **Economic Activities**

The major economic activities of the people are farming/agriculture and trading. Agricultural activities in the district is a subsistence which involve crops. It uses about 64% of the possible labour force. 48% of these are females and 52% are males. The main plant crops grown are maize, cassava, plantain and cocoyam. Major vegetables grown are tomatoes, garden eggs, okro and pepper. Cash crops grown include cocoa, oil palm, coffee and cashew. There are quite a number of public and civil servants employed in various institutions and industries such as food processing (Gari), banks, health, education etc. in the municipality.

### **Healthcare Provision**

The municipal health directorate (MHD), which is an administrative arm of the TSM, is responsible for health administration. The MHD is also situated at Bechem and is responsible for health service delivery in the municipality. There are six health amenities, these include a municipal/district hospital, three health centers and two CHPS Compound.

### **3.2.1. Bechem Government Hospital**

The Bechem government Hospital is a 70-bed capacity facility, which was started as a maternity home in 1950 by the Presbyterian Church and it was handed over to the Bechem community and it was finally handed over to the ministry of health on 1<sup>st</sup> July 1978. It serves as Government Hospital and provides inpatient, outpatient, emergency and other specialised service to the population in the municipality and other adjoining communities in Ahafo Ano North district/municipality in the Ashanti Region. It is well equipped and has operation theatre (OT), general medicine, ophthalmology, Radiology, ENT, consulting, casualty and emergency, laboratory, x-ray, ambulance and pharmacy. The hospital also offers some health check packages, apart from the outpatient facilities that are available 24-hours daily. The facility has a total of 298 staff which comprises of 117 nurses of different categories, 3 medical doctors, 3 physician assistants, 2 pharmacists, 3 pharmacy technicians and 170 other supporting staff (Agyei-Darko, 2017).

### **3.3. Study population**

This is the collection of all the possible study units in the facility (Vaughan & Morrow, 2000). The population in this study involves patients and prescribers at BGH . The subjects of the study were chosen irrespective of age, sex, socio economic status or demographic factors. According to Agyei-Darko ( 2017), the annual OPD attendance is 56964 out of which 23.26% (5970) were Malaria cases and 94% were NHIS validated patients .

#### **3.3.1 Inclusion criteria**

All patients receiving malaria treatment at the OPD during the time of the study were eligible to participate. All OPD prescribers including medical doctor, physician assistants,

pharmacists and pharmacy technologists/ technicians on duty were eligible to partake in the study.

### **3.3.2. Exclusion criteria**

Inpatients, outpatients or inpatients' nurses, midwives as well as other special clinics or departments such as maternity, psychiatric and mental care, ear, nose and throat (E.N.T.) were excluded from the study.

### **3.4. Sampling Technique**

Purposive sampling was the technique used to select prescribers and patients with malaria due to their small number, as justified that purposive sampling is used when it is perceived that a particular subject is source of special characteristics and are few in their number. Hence purposive technique was more suitable to use, as compare with convenience sampling which may be an alternative but herein there were other prescribers as well as patients who could also participate in the study just that the sampling frame was not large enough. It was not difficult for the researcher to also locate participants of interest to partake in the study purposively (Howlett, Bernadette, Rogo, 2013). The study therefore, included all professional prescribers and patients with malaria present at the facility at the time of the study.

Consulting and dispensing time of patients were obtained irrespective of the patients' disease condition. Systematic sampling technique was employed to obtain retrospective data from patients' folders in order to make sure each folder has an equal chance of being selected. This was done by identifying annual number of OPD malaria cases (6096) as the study frame during the period under review (Jan.-Dec.2018). Individual folders were selected at regular intervals from the study frame.

The interval was determined by dividing the annual malaria cases by the number of folders to be studied (120), thus approximately an interval of 1 to 50. Then a number was selected as index unit to indicate where to start selecting the folders from the list. The index unit was randomly selected and was within the interval. A piece of paper was numbered from 1 to 50 and blindly picked one out of the pieces of paper. number 15 was picked then every folder was covered in the sample, commencing with the number 15 until 120 folders were picked

#### **3.4.1. Sampling size determination**

WHO/INRUD (1993) recommends the use of at least 100 patients records in a single health facility for drug utilisation studies. A number of 120 patients were investigated prospectively, also Medical records of 120 patients who utilised the OPD within the study period (2018) were randomly collected from the health records unit and extracted their respective prescribing data on the WHO indicator form retrospectively. The mean number of drugs per prescription, percentage of drugs prescribed by generic names, percentage of prescriptions containing antimalaria, antibiotics and injectables, percentage of drugs prescribed by brand name, percentage of drugs prescribed from national essential drug list (EDL/EML) and percentage of prescribed drugs dispensed to patients were covered.

The sample size was under the guiding principle that; individual prescribers tend to show consistent practices over time, hence a sample drawn at one point in time will provide basically the same results as sample that covers a longer period (WHO, 1993). Then also, above a certain number of encounters adding additional encounters to a sample within a facility adds very little new information. The sample size of 100 stated measures facility specific percentage indicators with 95% confidence interval of plus or minus 10%. Therefore, based on the mentioned guidelines 120 retrospective encounters at the hospital

was extracted from patients' folders for study, as well as 120 prospective patients encounter.

The sample size confirmed with that obtained by calculation and the formula;

$$n = Z^2 P(1-P) / d^2$$

where d = sample margin error tolerated (0.05), Z= normal standard value at confidence interval of 95%=1.96, n =sample size, P = estimated proportion of prescription with non-rational pattern= 0.5, since there is no study finding regarding estimate of inappropriate medicine prescribing in a single facility.

the sample size=

$$n = (1.96)^2 0.5(1-0.5) / (0.01)^2$$

the sample size for a lone facility at the 95 percent confidence interval of 10 percent from the calculation above is 96. Even smaller sample size than that suggested by calculation is actually needed as prescribing practices tend to be consistent within a facility. notwithstanding, a sample size of 120 was selected to accommodate any encounters that may need to be rejected.

### **3.5. Study variables**

The key characteristics in the study that picked different values and helped in achieving the study objectives were categorised as follows.

#### **Dependent Variable**

The rational use of ACT among prescribers and patients.

### **Independent Variables**

This underscores the factors that influenced the problem under study, they were categorized into:

Predisposing factors include age, sex, attitude and employment status.

Enabling factors include medical security/insurance status, essential medicine/ACT, availability of official books, monitoring and feedback, information and communication, pharmacy /medicine promotion policies, consulting time, labeled medicines, dispensed medicines, prescribed medicines and patients understanding of dosage.

Need factors include drugs per encounter, generic medicines, existing diseases, injections, and essential medicines prescribed.

The analytical frame of the research based on the above variables and their measurements is presented in table 3.1 below.

**Table 3.1: Analytical framework of the study - Study variables and measurement**

Specific Objectives	Research Variables	Data Collection Technique/Tool	Respondent	Measurement
To determine Predisposing factors (socio-demographic characteristics) associated with rational prescription and use of ACT among prescribers and Patients.	Age, sex, attitude, employment status	Checklist/ Questionnaire	Patients	Nominal
To determine Enabling factors associated with rational prescription and use of ACT among prescribers and patients.	Medical security/insurance status, patients' understanding of dosage, labeled medicine	Checklist/questionnaire	Patients	Nominal
	Availability of essential medicine, formulary, monitoring, advice and counselling	Checklist/WHO indicator form	Prescribers	Nominal
	Consulting time, Dispensed medicine, Prescribed Medicine,	Available Information using WHO Format/checklist	Patients	Ratio
To determine Need factors associated with rational prescription and use of ACT among prescribers and patients.	Medicine per encounter, Generic medicine, Existing diseases/infection, Essential medicine prescribed	Available information using WHO format/checklist and Standard treatment guideline	Patients	Nominal

Source: Researcher's Analytical Framework (2019).

### **3.6. Data collection technique**

Data for the study were collected in the month of June, 2019. The WHO medicine use indicators for out Patient facilities was used to address the prescribing and dispensing procedures. Patients encounter was observed prospectively. A structured interview technique was employed. A structured interview was chosen as the main data collection procedure for patients using a checklist and interview administered questionnaires. Since it is acceptable for both literates and illiterates, in study area which is blended with illiterates and literates, it also permits explanation of questions and a higher feedback rate than the self-administered questionnaire. WHO indicator form/checklist was used for prescribers in collecting prescribing indicators. These procedures allow in depth assessment of the problem at stake (Varkevisser, M., Pathmanathan, & Brownlee, 2003). Gathering the study data for analysis was based on the 3 major factors below.

**Section A:** Predisposing factors. These were derived from patients and assessed by an interview using checklist and questionnaire.

**Section B:** Enabling factors: The enabling factors including medical security/insurance status, labeling and patients understanding of dosage were derived from patients through a structured interview with the use of a questionnaire. Whereas consulting time, dispensed medicine and prescribed medicines were obtained from prescribers by review of folders using WHO (1993) recommended format. Each encounter with patients took at most 10 minutes. The level of use of the national standard treatment guidelines at the hospital was determined by formulating a data collection instrument to obtain information on the availability of key essential drugs. To assess the level of availability, 30 key drugs required for the management of the top 10 outpatient diseases was developed. Prescribers

will then be asked to select 20 medicines from the list based on their relevance in the management of common OPD cases. Prescribers' rating of the 20 most essential medicines will be ascertain and used in the development of an essential medicine list model for the study.

**Section C:** Need factors. The WHO (1993) recommended format as well as checklist and questionnaire were used to determine the number of medicines per encounter, generic medicine, existing disease/infection and essential medicines prescribed.

**Section D:** Rational prescription of ACT. The National treatment guideline recommendation was used to determine the prescription of the various ACTs and their right use in respect to age, diagnosis and existing conditions.

Data gathering for all variables took place within a period of 3 weeks in the month of June, 2019. Data were collected by the researcher and supported by 3 research assistants.

### **3.6.1. Data Management and Analysis**

After completing the process of data collection, data were cleaned and validated before it was entered using excel software application, which was then exported to Stata version 15 for statistical test analysis. The WHO (1993) method for analysing drug use was employed and its standard indicators were used as benchmark. Indicators like average drug prescribed was analysed by calculating the total number of drugs prescribed per total number of encounters. For the purpose of the study, frequency and proportion of a categorised variables such as level of interpreting dosage and understanding of dispensed ACT was generated and compared with the WHO benchmark. Chi square test was used based on categorised and multiple data set from prescriptions. A mean dispensing and

consulting time were considered aside 1 sample t-test. This helped in making appropriate decision as to the comparison between sample variables with that of the WHO standard with p-values  $<0.05$  being considered statically significant ( Filho et al., 2013).

### **3.6.2. Pre-testing**

Data collection tools of the study was pre-tested at the Techimantia Polyclinic, a sister health facility to the Bechem Government Hospital, which comprises of 7 prescribers that made up 1 doctor, 2 physician assistants, 1 pharmacist and 1 pharmacy technician and then 2 nurses. Two people were picked as research assistants and train them for a day on the rudiments, relevant and the use of study instruments in the study before they carried out the pretest and then the main study. The error identified after the study was corrected and implemented in the main study.

### **3.6.3. Quality assurance**

Quality assurance of the study involves the validity and reliability. The term validity refers to how well the measuring instruments in the study satisfy the demand to measure what it purports to measure (Taherdoost, 2018). The researcher's weak memory may affect the validity of the study. To avoid this problem as much as possible, the investigators recorded and took notes during encounter with patient. Just after the interview the investigator compiled a data from the questionnaire/checklist and transformed them into a rightful quantitative information. The researcher presented the results for the respondents to see if it correctly purports the chosen answers. Moreover, the validity of the results was talked about with the research supervisor with his feedback and was continued during the study.

Reliability is a measure of how well the study actually measures what it intends to measure and expresses absence of random errors (Taherdoost, 2018). This could be measured by conducting the study again in order to see if the same results will be obtained, because of the lack of time. The researcher could not have the possibility to conduct the study more than once. Therefore, it was difficult to draw any conclusions on the reliability of this study. Notwithstanding the study ensured due diligence and integrity ruled through every aspect of the study, ensuring all instruments were standardized with the WHO (1993) benchmark, and research assistants were educated to know why there was a need to collect or measure a data. The researcher was ever ready to let some respondents read through or know the background of the thesis and heard their suggestion about the interpretation of some conceptions or ideas.

### **3.7. Ethical considerations**

Ethical clearance received from the Ghana Health Service Ethics Review Committee before the start of this study. Also, permission was sought from Bechem Government Hospital for approval.

#### **Ethical Approval**

An introductory letter was sought from the University of Ghana, School of Public Health to Bechem Government Hospital to seek approval for retrieval of data from prescribers and from patient's folder to be used in this study.

### **Participant consent**

Consent of the patients and prescribers was also sought before inclusion in the study (Whicher et al., 2015).

Procedures: The study required to review prescribers' indicators from folders and engage patients using and checklist/questionnaire respectively which was assisted to fill by myself or research assistant.

### **Description of subjects involved in the study**

The study employed 2 subjects, which included Outpatients who visited the facility and the Outpatient Prescribers who attended to the patients during the study. The major variables in relation to patients involve employment status, understanding to dosage and patient's health information in their folders. Only patients who were diagnosed and treated with anti-malaria were selected as a subject in the study for questioning. The prescribers of the study included doctors, pharmacist, physician assistance and pharmacy technician/technologist. All prescribers were included in the study based on the fact that they do prescribe or dispense. Among the major variables that influenced them were availability of essential medicine, information and communication, pharmacy/ medicine promotion,

### **Potential Risk and Benefit**

The research posed minimum risk to Bechem Government Hospital as well as patients. The findings would inform the hospital and Ghana Health Service as a whole on effective and rational use of antimalaria. The results would also influence policy in tandem with effective utilization of medicine and also to strengthen the implementation of Antimalaria Drug Policy as well as Ghana National Drug Policy.

### **Privacy and Confidentiality**

The data derived from the prescriber or patient's folder during the study was protected under seal and only available to the chief investigator. Anytime a person involved with the work wants to access the data, a request would be sent to the principal investigator. Under no situation would information collected be shared with a third party. Personal data like name, contact and medical history in the patient's folder were not included in the extracted data.

### **Data storage and usage**

Secondary data received for the study was stored on external hard disk drive. Softcopies and hardcopies were burnt and deleted from all storage devices after the data has been analysed.

### **Description of the consenting process**

A different consent form was prepared for prescribers (doctor, physician assistant and pharmacist) and patients who received antimalaria medications at dispensary. Should the patient or prescriber agree to take part in the study, he or she would be guarded to complete and sign or stamp the consent form. For patient who in case unable to read and write or with visual disturbance, the family relative who would agree on behalf of the patient would be served as witness and would be asked to complete and sign the consent form.

### **Voluntary participation and withdrawal**

Participants willing to be included in the study was sought. Those who would wish to opt out the study would be agreed with the chance to refuse participation in the study and to draw out at any time they feel uncomfortable. Patients were guaranteed that their draw out would not affect their right to obtain a medical care in any way.

### **Compensation**

There was no offering of compensation to research participants.

### **Protocol Amendment**

After the ethics approval any tampering to the protocol which may thwart the conduct of the study, affects participants safety, has likely benefit of the patients and prescribers and also reform of the objectives, study procedures, Study population, study design, sample sizes and administrative issues was to be notified and subjected to a precise amendment to the protocol at the Ghana Health Service Ethical Committee.

### **Data ownership and conflict of interest**

The principal investigator had no conflict of interest. The principal investigator engaged actively in the preparation and carrying out data analysis. Under no circumstances was the collected data being manipulated or controlled.

### **Funding information**

The entire study was solely funded by the principal investigator.

## **3.8. Summary of the chapter**

This chapter has presented the methods that were applied to collect data for analysis in this study. It has shown the study design, ethical considerations and data collection among others. The following chapter will present the results of the study.

## CHAPTER FOUR

### RESULTS

#### 4.1 Introduction

This chapter present analysis and detailed description of results based on study aims. The reason of the investigation was to assess factors (enabling, predisposing and need) associated with rational prescription and use of ACT among prescribers and patients at the Bechem Government Hospital. This section presents the demographic characteristics of patients, use of ACTs, enabling, predisposing and need factors influencing the rational use of ACT among patients. The results are presented in tables and graphs.

#### 4.2 Background characteristics of Patients

Table 4.1 presents the background characteristics of Patients sampled from the Bechem Government Hospital to assess their rational use of ACT and (predisposing, enabling and need) influencing use. A total number of 120 patients were sampled. Most (65.8%) of the patients were females. Most of the patients were aged <12 years. Slightly half were employed. Most (59.2%) of the patients had attained primary education, followed by secondary (33.3%) and then tertiary education (7.5%). Slightly more than half (55.8%) used their National Health Insurance Scheme to access health care. The malaria test done was mainly tested using rapid diagnostic test (87.5%)

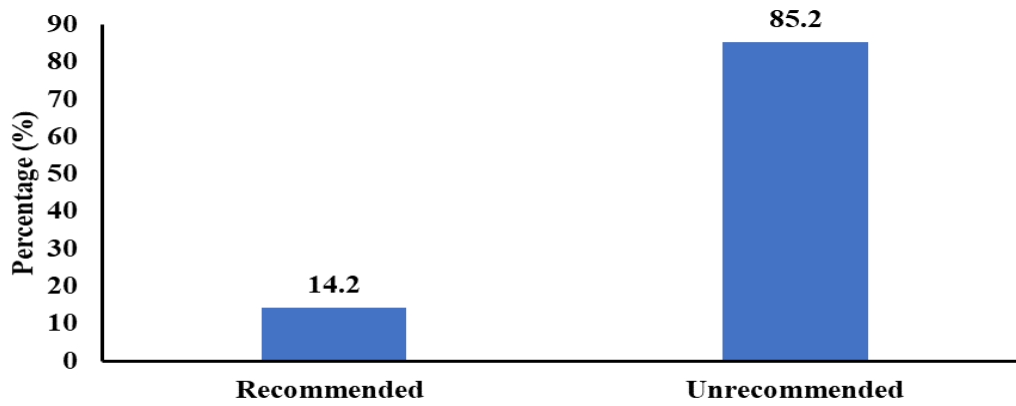
**Table 4.1: Background characteristics of Patients**

	<b>Frequency</b> N=[120]	<b>Percentage (%)</b>
<b>Sex</b>		
Male	41	34.2
Female	79	65.8
<b>Age</b>		
<12	73	60.8
≥12	47	39.2
<b>Occupation</b>		
Employed	38	31.7
Unemployed	82	68.3
<b>Level of education</b>		
Primary	71	59.2
Secondary	40	33.3
Tertiary	9	7.5
<b>Insurance status</b>		
NIHS	67	55.8
Both NHIS & Cash	53	44.2
<b>Test</b>		
Microscopy	15	12.5
RDT	105	87.5

*SOURCE: Field Study, June 2019.*

### 4.3 Recommended prescription of ACT by Prescribers

The prescribers have a recommended procedure ( malaria diagnosing test protocols) to follow in prescribing ACT. The prescribers that followed the recommended procedure for ACT prescription was 14.2% as shown in figure 4.1

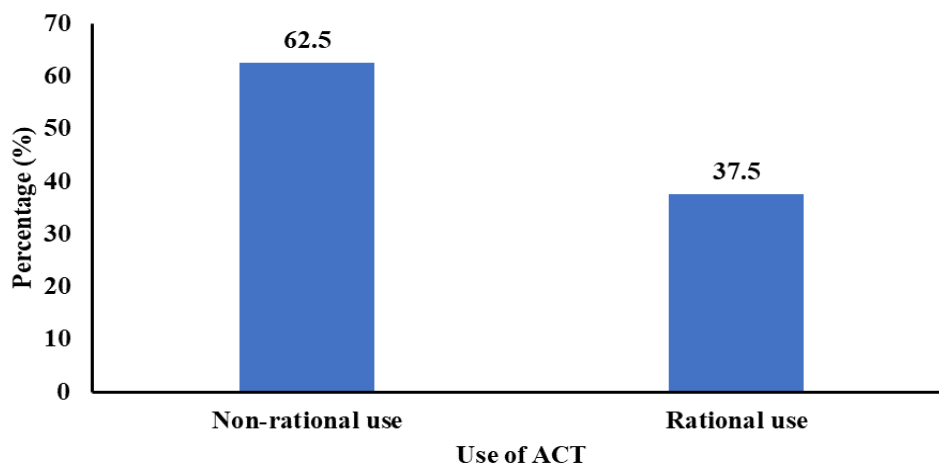


**Figure 4.1 Prescription of ACT.**

*Source: Field Study, June 2019.*

### 4.4 Use of ACT among Patients

Patients were assessed for the rational utilisation of ACT. The use of ACT rationally among patients in this study was 37.5% as shown in figure 4.2

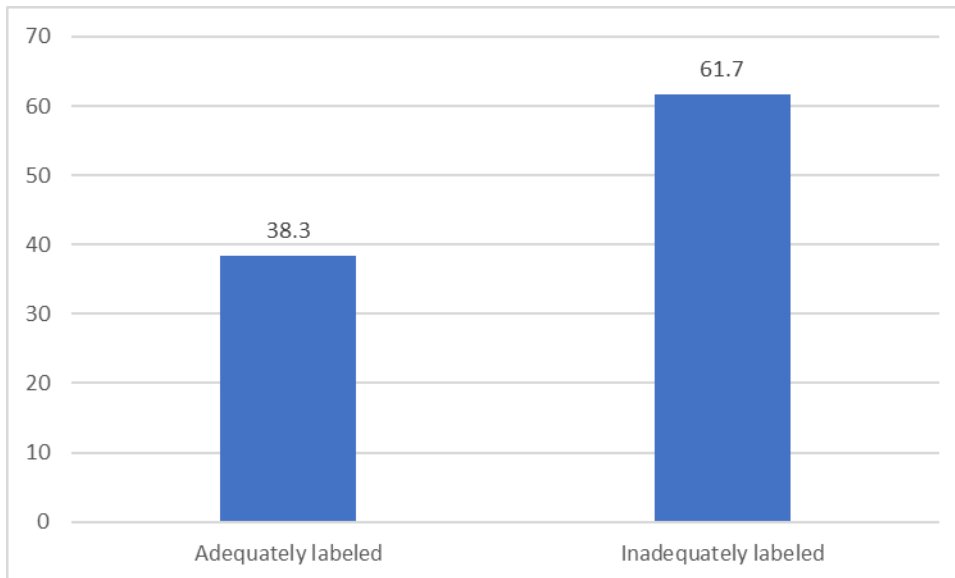


**Figure 4.2 Use of ACT among patients**

*Source: Field Study, June 2019.*

#### 4.5 Adequacy of information on dispensed medicines

This depicts adequacy of information on dispensed medicines. Of all the prescribed medicines only 61.7% had adequate information while 38.3% had inadequate information as shown in fig 4.3



**Figure 4.3 number of medicines adequately labeled**

Source: Field study, June 2019.

#### 4.6 Prescribing indicators

This measures the extent to which ACT and its supported medications are prescribed from the essential medicine list. Average number of medicines per encounter was 2.8, antibiotic received aside ACT was 30% whilst injection was as low as 9.2%. prescription which forms part of essential medicine list and generic were 100% as shown in the table 4.2 below.

**Table 4.2: Prescribing indicators**

Prescribing Indicators	Number	Average/	WHO
		Percentage	Ideal Value
Average number of drugs per encounter	341	2.8	1.6-1.8
Percentage of encounter with antibiotics	36	30.0%	20-26.8
Percentage of encounter with injection	11	9.2 %	13.4-24.1
Percentage of drugs prescribed by generic	120	100%	100
Percentage of drugs from essential drug list	120	100%	100
Percentage of encounter with test	82	68.3%	-
Percentage of encounter without test	38	31.7%	-
Percentage encounter with review schedule	14	11.7%	-
Percentage encounter without review schedule	106	88.3%	-

Source: Field Study, June 2019.

#### 4.7 Number of medicines prescribed

This indicates a total number of drugs prescribed for each patient. Approximately 49.2% received less than 3 dispensed drugs while about half (50.8%) received 3 or more drugs as shown in figure 4.4

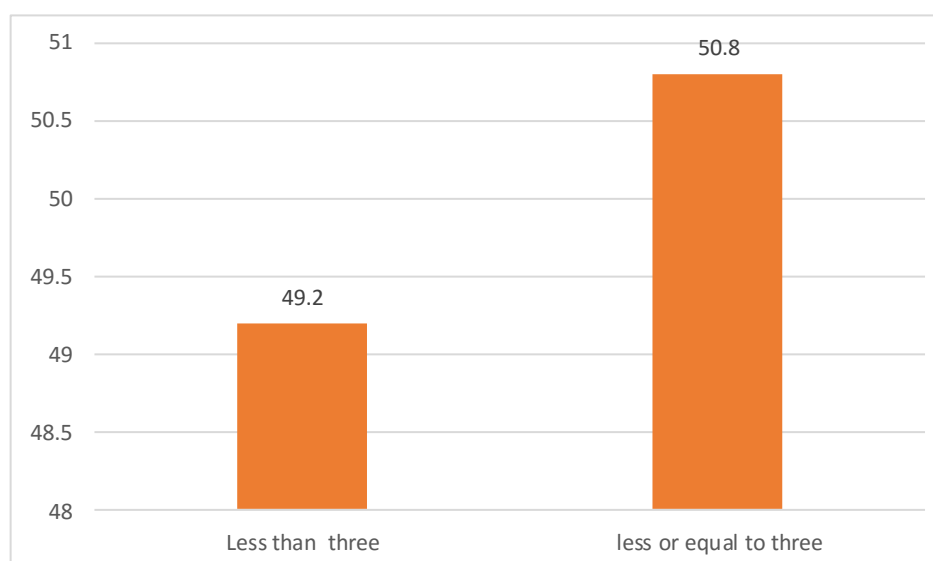


Figure 4.4 number of medicines prescribed

Source: Field study, June 2019.

#### 4.8 Association between predisposing factors and the rational use of ACTs

There was a significant association between age and rational use of ACT ( $\chi^2 = 88.66$ ,  $p < 0.001$ ,  $\alpha = 0.05$ ). Significantly, there was association between level of education and rational use of ACT ( $\chi^2 = 8.90$ ,  $p = 0.012$ ,  $\alpha = 0.05$ ). There was however no significant association between sex, occupation and rational use of ACT as shown in Table 4.3

**Table 4.3: Association between predisposing factors and the rational use of ACTs**

Variable	Non-rational use N=[75]	Rational use N=[45]	Chi-square (p-Value)
Sex			
Male	22 (29.3)	19 (42.2)	2.07 (0.150)
Female	53 (70.7)	26 (57.8)	
Age			
<12	70 (93.3)	3 (6.7)	88.66 (<0.001)
≥12	5 (6.7)	42 (93.3)	
Occupation			
Employed	36 (48.0)	22 (48.9)	0.08 (0.925)
Unemployed	29 (52.0)	23 (51.1)	
Level of education			
Primary	52 (69.3)	19 (42.2)	8.905 (0.012)
Secondary	18 (24.0)	22 (48.9)	
Tertiary	5 (6.7)	4 (8.9)	

*Source: Field Study, June 2019.*

#### 4.9 Association between enabling factors and the rational use of ACTs

There was a significant association between prescription and rational use of ACT ( $\chi^2 = 9.25$ ,  $p=0.002$ ,  $\alpha=0.05$ ). There was no significant association between NHIS status, knowledge on diagnosis and rational use of ACT ( $\chi^2 = 3.78$ ,  $p=0.052$ ,  $\alpha=0.05$ ) and ( $\chi^2 = 1.05$ ,  $p=0.304$ ,  $\alpha=0.05$ ) respectively as shown in Table 4.4

**Table 4.4: Association between enabling factors and the rational use of ACTs**

Variable	Non-rational use N=[75]	Rational use N=[45]	Chi-square (p-Value)
Insurance status			
NIHS	47 (62.7)	20 (44.4)	3.78 (0.052)
Both NHIS & Cash	28 (37.3)	25 (55.6)	
Knowledge on diagnosis			
Was told	68 (90.7)	38 (84.4)	1.05 (0.304)
Was not told	7 (9.3)	7 (15.6)	
Prescription			
Recommended	70 (93.3)	33 (73.3)	9.25 (0.002)
Not-recommended	5 (6.7)	12 (26.7)	

*Source: Field Study, June 2019.*

#### 4.10 Association between need factors and the rational use of ACTs

There was a significant association between test and rational use of ACT ( $\chi^2 = 6.22$ ,  $p=0.013$ ,  $\alpha=0.05$ ). There was no significant association between advice and counselling and rational use of ACT ( $\chi^2 = 2.94$ ,  $p=0.086$ ,  $\alpha=0.05$ ) as shown in Table 4.5

**Table 4.5: Association between needing factors and the rational use of ACTs**

Variable	Non-rational use N=[75]	Rational use N=[45]	Chi-square (p-Value)
<b>Advice and counselling</b>			
No	8 (10.7)	10 (22.2)	2.94 (0.086)
Yes	67 (89.3)	35 (77.8)	
<b>Test</b>			
Microscopy	5 (6.7)	10 (22.2)	6.22 (0.013)
RDT	70 (93.3)	35 (77.8)	

*Source: Field Study, June 2019.*

#### 4.11 Predisposing factors associated with rational use of ACT (Unadjusted logistic regression analysis)

Patients aged 12 years or more were 9 times more likely to have rational use of ACT and was statistically significant [COR=9.61 (95% CI: 4.44-18.62);  $p<0.001$ ]. Patients who have attained secondary education were 3 times more likely to have rational use of ACT as compared to those with primary education [COR=3.34 (95.0% CI: 1.48-7.55);  $p=0.004$ ]. Females were 44% less likely to have rational use of ACT and was not statistically significant as shown in Table 4.6

#### 4.12 Predisposing factors associated with rational use of ACT (Adjusted logistic regression analysis)

Patients aged 12 years or more were 2 times more likely to have rational use of ACT and was statistically significant [AOR=2.01 (95% CI: 1.22-9.49);  $p < 0.001$ ]. Patients who have attained secondary education were 2 times more likely to have rational use of ACT as compared to those with primary education and was not statistically significant after adjusting [AOR=2.38 (95% CI: 0.47-11.93);  $p = 0.289$ ]. Patients who have attained tertiary education were 45% less likely to have rational use of ACT and was not statistically significant as shown in Table 4.6.

**Table 4.6: Predisposing factors associated with rational use of ACT**

Variable	Unadjusted COR (95% CI) p-Value	Adjusted AOR (95% CI) p-Value
<b>Sex</b>		
Male		
Female	0.56 (0.26-1.23) 0.151	
<b>Age</b>		
<12		
≥12	9.61 (4.44-18.62) <0.001	2.01 (1.22-9.49) <0.001
<b>Occupation</b>		
Employed		
Unemployed	0.96 (0.46-2.02) 0.925	
<b>Level of education</b>		
Primary		
Secondary	3.34 (1.48-7.55) 0.004	2.38 (0.47-11.93) 0.289
Tertiary	2.18 (0.53-9.02) 0.278	0.55 (0.05-5.73) 0.620

Source: Field Study, June 2019.

#### **4.13 Enabling factors influencing the rational use of ACTs (Unadjusted logistic regression analysis)**

Patients who use both NHIS and cash to access health care services were 2 times more likely have rational use of ACT and was statistically significant [COR=2.09 (95% CI: 0.98-4.44); p=0.003]. Patients who had knowledge on diagnosis (were told by prescribers) were 1.78 times more likely to have rational use of ACT as compared to those who were not told and was however not statistically significant [COR=1.78 (95% CI: 0.58-5.48); p=0.309]. Patients who had recommended prescription of ACTs were 5 times more likely to have rational use of ACT and was statistically significant [COR=5.25 (95% CI: 1.67-16.46); p=0.004] as shown in Table 4.7.

#### **4.14 Enabling factors influencing the rational use of ACTs (Adjusted logistic regression analysis)**

Patients who use both NIHS and cash to access health care services were 2 times more likely have rational use of ACT and was not statistically significant [AOR=2.16 (95% CI: 0.98-4.75); p=0.053]. Patients who had recommended prescription of ACTs were 5 times more likely to have rational use of ACT and was statistically significant [AOR=5.25 (95% CI: 1.67-16.46); p=0.004] as shown in Table 4.7

**Table 4.7: Enabling factors influencing the rational use of ACTs**

Variable	Unadjusted	Adjusted
	COR (95% CI) p-Value	AOR (95% CI) p-Value
Insurance status		
NIHS		
Both NHIS & Cash	2.09 (0.98-4.44) 0.003	2.16 (0.98-4.75) 0.053
<b>Knowledge on diagnosis</b>		
Was told		
Was not told	1.78 (0.58-5.48) 0.309	
<b>Prescription</b>		
Not-recommended		
Recommended	5.25 (1.67-16.46) 0.004	5.25 (1.67-16.46) 0.004

*Source: Field Study, June 2019.*

Need factors influencing the use of ACTs (Unadjusted logistic regression analysis)

Patients who were given advice and counselling were 1.42 times more likely have rational use of ACT and was statistically significant [COR=1.42 (95% CI: 1.15-11.15); p=0.019].

Patients who tested malaria using RDT were 75% less likely to have rational use of ACT as compared to those who used microscopy and was statistically significant [COR=0.25 (95% CI: 0.07-0.78); p=0.018] as shown in Table 4.8

#### **4.15 Need factors influencing the use of ACTs (Adjusted logistic regression analysis)**

Patients who were given advice and counselling were 2 times more likely have rational use of ACT and was statistically significant [AOR=2.29 (95% CI: 1.18-11.58); p=0.026].

Patients who tested malaria using RDT were 71% less likely to have rational use of ACT

as compared to those who used microscopy and was statistically significant [AOR=0.29 (95% CI: 0.08-0.95); p=0.041] as shown in Table 4.8.

**Table 4.8: Need factors influencing the use of ACTs**

<b>Variable</b>	<b>Unadjusted COR (95% CI) p-Value</b>	<b>Adjusted AOR (95% CI) p-Value</b>
<b>Advice and counselling</b>		
No		
Yes	1.42 (1.15-11.15) 0.019	2.29 (1.18-11.58) 0.026
<b>Test</b>		
Microscopy		
RDT	0.25 (0.07-0.78) 0.018	0.29 (0.08-0.95) 0.041

*Source: Field Study, June 2019.*

#### 4.15 Chapter Summary

The chapter has presented statistical analysis of the study, the results indicate proportion of 68.8% of the patient were mostly females. Most of the patients were aged less than 12 years and slightly half of the respondents were employed whilst 59.2% attained primary education. More than half (55.8%) used the National Health Insurance Scheme to access healthcare. The malaria test done was mainly RDT (87.5%). Average number of medicines per prescription was 2.8. Medicines that well adequately labeled was 38.3%. With regard to association between predisposing factors and the rational use of ACT, there was significant association between age and rational use of ACT ( $X^2=88.66$ ,  $P=0.001$ ,  $\alpha=0.05$ ).

For association between enabling factors and the rational use of ACTs there was a significant association between prescription and rational use of ACT ( $X^2=9.25$ ,  $P=0.002$ ,  $\alpha=0.05$ ).

Considering need factors influencing the use of ACTs with the adjusted logistic regression analysis, patients who were given advice and counselling were 2 times more likely to have rational use of ACT and was statistically significant [AOR=2.29(95% CI: 0.18-1.58)  $p=0.026$ ]. Aside this and other results is the use of ACT among patients in the study which was 34.5%. The following chapter presents detail discussion of the results.

## CHAPTER FIVE

### DISCUSSION

#### 5.0 Introduction

This chapter presents the discussion and explains the findings under five main sections of the study and juxtapose it to related studies. The first and second sections outline rational use of ACT and predisposing factors associated with rational use of ACT, respectively. Whereas third and fourth section involves enabling factors associated with rational use of ACT and need factors associated with rational use of ACT. The fifth section present the summary of the chapter.

#### 5.1. Rational use of ACT

The inappropriate use of ACT can lead to increase resistance of antimalarial and it can cause irrational patient demand and lead to reduce access and attendance rates due to medicine shortages and loss of patient confidence in the health system (Gray et al., 1996). Malaria remains a serious health challenge in most of the countries in sub-Saharan Africa of which Ghana is part (Awine, Malm, Bart-Plange, & Silal, 2017). The results of this research showed that the rational use of ACT among patients was 34.5%. Which was lower than the findings of a study conducted in western Kenya (O'Meara et al., 2018). O'Meara et al. (2018) used cluster-randomized controlled trial in 32 community clusters and at baseline found that the rational use of ACT among the population sampled was 41.7%. Another research carried out in Kenya revealed that the rational use of ACT was 42.1% and 57.9% among individuals above 13 and less than 13 years, respectively which were higher compared with the results of this present study (Onyango et al., 2012). In 2002, Ghana initiated the process of using ACTs following WHO recommendations for all countries experiencing resistance to mono-therapies in the treatment of falciparum

malaria. The drug policy guidelines instruct that one needs to be tested, given treatment and tracked for uncomplicated malaria done by health professional. The current study revealed that even as 31.7% unconfirmed malaria test were encountered, ACT was initiated. Comparatively, this was lower as a study in Democratic Republic of Congo showed as 37% (Ntamabyaliro et al., 2018). A brief and undocumented interview with prescribers showed that managerial and systemic approaches were being followed to ensure rational utilisation of medicines (personal communication with prescribers of BGH, 2019). Beside the study recorded a satisfactory score including essential medicine list (100%) and almost equal number of medicines prescribed (2.8) compare with WHO benchmark of 2 medicines per encounter. However, the results of this study indicated a reduced rational use of ACT and this could be due to the fact that such ACTs could easily be accessed from retail pharmacy shops and taken inappropriately. Findings of a study in Ghana that assessed ACT use found that most homes had left over ACTs which resulted in irrational use and drug overdose (Abuaku, Koram, & Binka, 2004). Findings from the current study also confirmed inadequacy of information (38.3%) on labels of dispensed medicines which also pronounced the likelihood of irrational use of medicine. Comparatively, this may be lower than a study in Sudan, which showed as high as 97.1% inadequate labeling practice (Elmannan et al., 2015). The current investigations showed that labeling of prescribed medicines was inadequate and information to patients about their treatment too was scanty. Ghana National Drug Policy (GNDP) recommended that an adequate drug information on packages or labels should contain at least the name of the patient, the generic name of the drug and the dosage regiment (GNDP, 2004). Patient information is a requirement for promoting adherence and better use of medicine.

## **5.2. Predisposing factors associated with rational use of ACT**

This current study found that patients aged 12 years and more were 2 times more likely to have rational use of ACT as compared with those aged <12 years. These findings were consistent with the results of a study in Kenya which showed that the lower age group was less likely to have rational use of ACT (Onyango et al., 2012). The result of a research in Kenya revealed that the utilisation of ACT was more appropriate among children as compared with adults (Abuya et al., 2007). The reason why children may use ACT irrationally could be that their parents/guardians who take care of them may not have appropriate knowledge of the use of ACT which could be detrimental to the health of the child. Moreover, the study showed most children were to start the ACT at home against the National malarial treatment guideline proposition that all children (<12 years) need to start first dose of ACT in the facility with the supervision of health worker (MOH/GHS, 2014). Even though not statistically significant, patients who had attained tertiary education were less likely to have rational use of ACT as compared with those with no education ( $p < 0.05$ ). The results of this study are congruent with the findings of a study which found that those with higher education were less likely to use ACT medications rationally (Chaudhari, Mali, Dawari, & Nishandar, 2017). Even as higher education may relate to increase knowledge, the findings of this study showed that those with higher education were not having good practice deserving of the knowledge that they should have had of ACT use. In addition, it could be that those with higher education did not have adequate knowledge of rational use of ACT.

## **5.3. Enabling factors associated with rational use of ACT**

Responsibility of health care professionals in prescribing the right medicines plays a significant role in ensuring that patients take the right medicine appropriately. the

pharmacist is a master in drug use (Amir, 2014). The outcome of this current investigation indicated that patients who had recommended prescription of ACTs were more likely to have rational use of ACT as compared with those who did not. In addition to this result, only 14.2% of the prescribers followed the recommended procedure for prescribing ACT. A study showed that, some health workers could not appropriately prescribe the ACTs (Selemani et al., 2013). The results of this study where those with recommended ACT prescription would have rational use of ACT could be explained that, patients would respond to treatment which will be fast and adequate and would not need to seek other alternatives for treatment. The results again showed that patients who used both NHIS and cash to access health care services were more likely to have rational use of ACT. A study in Germany revealed that individual financing and organizational structures, were some of the indicators that influenced health service use. The individual financing involved income, ability to pay for health provision and individual health insurance status (Babitsch et al., 2012). This could be because those with cash in addition to their NHIS could afford the medications needed for their treatment by accessing appropriate health facility and personnel.

#### **5.4. Need factors associated with rational use of ACT**

Good communication in health care makes it more likely to benefit from treatment and ensure that care is patient-centered (Amponsah, Vosper, & Marfo, 2015). Patients who were given advice and counselling were more likely to have rational use of ACT. This could be due to the fact that the patient knew how to take the medication appropriately which in turn worked effectively to ensure quality health. The test of malaria could be done using RDT or microscopy. The results of this study showed that patients who tested malaria using RDT were likely to have irrational use of ACT as compared with those who

used microscopy. This finding could be assigned to the fact that even though the diagnosis given to be malaria by the RDT was false, ACT medications were prescribed for the patient. So, the medication not being effective could make the patient to inappropriately use the ACT. Furthermore, prescribers also performed RDT test for malaria review less than a month, meanwhile the current malaria case management suggests microscopy test is the most relevant in such instance since it detects the live parasite whereas even as the RDT detects the antigens of the parasite, can give false positive test within 28 days irrespective of the extinction of the parasite in the blood. Hence resulting in prescription of ACT inappropriately. Review schedule is very important as it promotes supportive treatment, follow up and helps prescribers to appreciate rational prescription and use of medicine. The investigation showed minimum adherence to follow up as indicated by percentage review of 11.7%. This showed abysmal adherence to the supportive treatment policy enshrined in the national malarial case management (MOH/GHS, 2014).

### **5.5. Summary of the chapter**

The rational use of ACT among patients in this study was 34.5%. This implies that 3 out of every 10 patients would have rational use of ACT. The prescribers that followed the recommended procedure for ACT proscription was 14.2%. The predisposing factor associated with rational use of ACT was age. The enabling factors associated with rational use of ACT were recommended prescription and use of NHIS and cash for health services. The need factors associated with rational use of ACT were advice and counselling and use of RDT for malaria test.

The follow up chapter presents a summary of the research, conclusion statement on findings, recommendations and limitations of the study.

## CHAPTER SIX

### SUMMARY, CONCLUSION AND RECOMMENDATION

#### 6.0 Introduction

The chapter present six sections that encapsulate the study objectives, methods and general findings. The sections present the summary to the study, conclusions, Contribution to knowledge, Recommendation for policy makers, study limitations and areas for further research.

#### 6.1 Summary of the study

The study was conducted to assess the factors (predisposing, enabling and need) associated with rational prescription and use of Artemisinin Based Combination Therapy (ACT) among prescribers and patients at the Bechem Government Hospital. Quantitative approach was employed to work out the factors such as prescribing indicators, rational use of ACT and many others. The World Health Organization core indicators of rational drug use prescribing tool such as checklist and data extraction form were used to collect data on prescribing indicators from 120 outpatients' records from January, 2018 to December, 2018 retrospectively. Prospective data such as background characteristics of patients, recommended procedure for ACT prescription, use of ACT among patients and Adequacy of information on dispensed medicines were collected from patients' folders. Andersen's behavioural model was used to investigate the use of medicines. Data was collated with excel software and analysed with STATA-15 software programme. Associations between the dependent and independent variables were established using the Chi square test where the level of significance was accepted as  $p < 0.05$ . The study's conclusion was that rational prescription and use of medicines among patients and prescribers was 34.5%.

## **6.2. Conclusion of the study**

This section presents the conclusion of the study based on the specific objectives. The findings relating to these have been presented below.

### **6.2.1. Association between predisposing (socio-demographic characteristics) factors and rational prescription and use of ACT among prescribers and patients.**

The predisposing factor, which was associated with rational use of ACT was age. These investigations were consistent with the results of a study in Kenya which showed that the lower age group was less likely to have rational use of ACT (Onyango et al., 2012).

### **6.2.2. Association between enabling factors and rational prescription and use of ACT among prescribers and patients.**

The study concludes that there was a significant association between prescription and rational use of ACT ( $X^2=9.25$ ,  $P=0.002$ ,  $\alpha=0.05$ ) in respect of enabling factors. In support a study pointed out that, some health workers could not appropriately prescribe the ACTs (Selemani et al., 2013).

### **6.2.3. Association between need factors and rational prescription and use of ACT among prescribers and patients.**

Considering the need factors influencing the use of ACTs with the adjusted logistic regression analysis, the study concludes that patients who were given advice and counselling were 2 times more likely to have rational use of ACT and was statistically significant [AOR=2.29(95% CI: 0.18-1.58)  $p=0.026$ ]. In support, a study in Turkey showed that 11.3% patients who had inadequate information could not meet rational use of medicine requirements (Basaran & Akici, 2012)

#### **6.2.4. Level of utilisation of ACT among patients.**

The use of ACT among patients in the study was 34.5%. Which was lower (41.7%) than the findings of a study in western Kenya (O'Meara *et al.*, 2018). The study showed that age, inadequacy of information on prescribed medicines, low review schedule, wrong choice of diagnostic test performed and initiating treatment without malaria test. All these were contributory factors, which defied the purpose of national malaria treatment policy and Ghana National Drug Policy which is to ensure effective malaria case management and rational use of medicine respectively (MOH/GHS, 2014,GNDP, 2004 )

### **6.3. Contribution to knowledge**

The research's contribution to existing knowledge in the area of the study has been elaborated below.

#### **6.3.1. Contribution to policy and practice**

Contributory factors of rational use of ACT from the study's findings may threaten the success of malaria case management and prudent use of medicine in Ghana for this reason the study may be relevant to policy makers associated with Ghana malaria control programme as well as the Ghana National Drug policy and health institutions. This would assist them to put together resources for training and development of staff and coming out with a blue print for educating the public on appropriate use of ACT. The findings of the study would import concern to strengthen clinical and pharmacological case management of malaria under the National malaria control programme (MOH/GHS, 2014). The findings of this research would help to bridge the gap remaining in the interventions such

as coordinating essential medicine use policies spearheaded by Ghana national drug policy (GNDP, 2004).

### **6.3.2. Contribution to methodology**

The quantitative approach applied in the study helped to quantify the responses unlike a qualitative method. Herein the study will link up with several studies with diverse methods to give strong evidence base findings. The findings were similar to results achieved by a study which assessed drug use pattern by using WHO core drug use indicators at public Hospital in Ethiopia (Mensa, Tadesse, & Ayele, 2017)

### **6.4. Recommendation of the study**

Aside the results of the study, the following recommendations have been earmarked towards promoting rational use of ACT among prescribers and patients. These are outlined with the key stakeholders below.

**Recommendation to Ministry of Health/ Ghana Health Service.**

The findings of the study proposed elements of irrational use of ACT. These have serious public health connotation so when nothing is done to adhere to national treatment recommendation guideline it would result in waste of resources, ACT resistance and increase in morbidity and mortality rate. There is a need for the Municipal health directorate through MOH/GHS to enforce policies and ensure that pharmacies and chemical shops are trained on how to prescribe ACTs.

#### **Recommendation to Bechem Government Hospital**

An effort to enhance rational use of medicine is not a singular effort it requires a multidisciplinary and multifactorial approach thus from regulations, managerial, development and systemic approaches. For this reason, the decision makers of the Bechem

government Hospital and their stakeholders should strategically plan around the study findings and work out things by solving problems related to irrational prescribing and use of medicines. Prescribers are the masters of treatment and therefore, there is a need for them to adhere to recommended guidelines and ensure availability of resources and make good use of them.

### **Recommendation to patients**

Patients are the most vulnerable in irrational use of ACT. Patients suffer from treatment failure, extension of treatment, high cost of treatment and adverse drug effect. Patients are therefore entreated to ask more questions about their treatment and medications. Patients are also to insist on being tested malaria positive before taking ACT.

### **6.5. Limitations to the study**

Both prospective and retrospective data were gathered for the study to reduce Hawthorne effect (Sedgwick & Greenwood, 2015) since there may be element of bias when prescribers or patients realized they were being investigated. Data collection tool blended with a checklist, questionnaire and patients' folders were used. A sample size of 120 was used throughout the study. Moreover, there was a thorough training of the research assistants who were professional health workers with background in health information and pharmacy.

### **6.6. Further research**

The study proposes further research incorporating a number of health facilities in the municipality, using qualitative study and a cohort event monitoring among patient who were given ACT for treatment of either confirmed or presumed malaria.

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## **APPENDICES**

### **APPENDIX A: PARTICIPANT INFORMATION SHEET FOR MALARIA DIAGNOSED PATIENTS AT BECHEM GOVERNMENT HOSPITAL.**

#### **TITLE OF RESEARCH: ASSESSMENT OF RATIONAL PRESCRIPTION AND THE USE OF ARTEMISININ-BASED COMBINATION THERAPY AMONG PRESCRIBERS AND PATIENTS AT BECHEM GOVERNMENT HOSPITAL.**

#### **INTRODUCTION:**

My name is Augustine Kumi, a Master of Public Health student of the University of Ghana, School of Public Health. This study aims to assess rational prescription and the use of ACT among prescribers and patients at Bechem Government Hospital. Health personnel who consult/prescribe at the OPD in selected facilities will be involved in this study. You are being asked to take part in this study because you are a health worker in this facility for this study.

#### **BACKGROUND AND PURPOSE OF THE STUDY**

This study is part of my academic work which seeks to assess factors (predisposing, enabling and need) associated with rational prescription and use of ACT among prescribers and patients at BGH. This direct policy and come out with strategies to improve upon and strengthening rational use of medicine, especially ACT among prescribers and patients. The research would form part of my work for the award of master's degree in public health

The information that would be gathered will be made available to the hospital Management and concern agencies for the purpose of planning and streamlining rational prescription and use of ACT.

#### **NATURE OF THE STUDY:**

The study will use systematic sampling approach to retrieve and review folders of all cases of uncomplicated malaria in the year 2018 that will be available in the health facility

records. Interviews will be conducted with prescribers involved in malaria case management who will be available within the study period.

#### PARTICIPANT INVOLVEMENT:

Duration/What is involved in the study:

If you agree to participate in this research, I will conduct an interview with you at a time and location of your choice. The interview will involve questions on rational use of Antimalaria. With your permission you will answer a questionnaire/checklist with few explanations which will be assisted by myself or research assistant.

Potential Risks:

In participating in this study, I will be asking you to share some personal views and experiences concerning the rational prescription. You do not have to answer every question. Also, you may withdraw from the study at any time that you wish. You have an opportunity at the end of the interview or questions to review your responses to suit your desired response. This study will pose no risk to you or your work.

Possible Benefits:

The outcome of the study will provide useful information that can lead to improvement in malaria case management. The data would benefit you in the near future as it will generate the interest of policy makers and the management of the facility to pay more attention to the long-term effects of irrational prescription and use of medicine

Costs:

You bear no financial obligation to take part in this research and no compensation shall be paid to you for participating.

Compensation:

In participating in this work, no compensation shall be paid to you.

**Confidentiality:**

All information picked from you shall be strictly confidential. Every information gathered from this study will be used for the sole purpose of the research and the interview will be conducted in privacy at your convenience. In presenting the data in the thesis and manuscript for publication, your name or any personal identifiable information shall not be quoted.

**Voluntary Participation/ Withdrawal:**

Your participation in this study is voluntary and you have the choice to withdraw from the study at any time without any penalty. I will give you a consent form to sign if you are interested in participating in the study or refuse to sign if you are not interested in the study

**Outcome and Feedback:**

The findings of this study will first be reported in a thesis form as part of the partial fulfilment of a Masters of Public Health, Monitoring and Evaluation degree at the University of Ghana School of Public. The Ministry of Health and its agencies such as the Ghana Health Service through the National Malaria Control Programme will also be beneficiaries of the findings from this study through presentations that will be made locally especially at the 2019 Half Year review of the study facility (BGH).

**Funding information:**

The study was planned along my academic work and the entire cost involved in the study will be taken care of by the Principal investigator.

**Sharing of Participant Information:**

The data that would be gathered will be shared with the University of Ghana for academic purpose, the Ghana Health Services Ethics Review Committee, and the BGH will be briefed and questioned on the findings in presentation session so as to update them on the situation on the ground.

**Provision of information and consent for participants:**

A copy of the information sheet and consent form will be given to you after it has been signed or thumb-printed for you to keep.

If you have any questions, you can ask them now or later. If you wish to ask questions later, you may contact me Augustine kumi, School of Public Health, University of Ghana on the following number 0243876035 or [leakagez@yahoo.ca](mailto:leakagez@yahoo.ca)

My supervisor: Dr. Augustine Adomah-afari (Tel: 0265435294, [augustineafari@yahoo.uk](mailto:augustineafari@yahoo.uk))

You can also contact the GHS-ERC Administrator, Madam Hannah Frimpong on 0507041223 for any clarifications on this research.

## CONSENT FORM FOR PATIENTS AT BECHEM GOVERNMENT HOSPITAL

### PARTICIPANTS' STATEMENT

I acknowledge I have read the purpose and the content of the Participants' Information Sheet read and all questions have been satisfactory explained to me in the language I understand ( English [ ])( Twi [ ]). I fully understand the content 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 voluntary agree to be part of this research.

Name or Initial of Participant.....ID Code.....

Participants' signature..... OR Thumb Print.....

### INTERPRETERS' STATEMENT (where applicable)

I interpreted the purpose and contents of the Participants' Information Sheet to the afore named participant to the best of my ability in the (.....*name of language*) language to his proper understanding.

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

Name of Interpreter.....

Signature of Interpreter.....

Date:.....

STATEMENT OF WITNESS (where applicable)

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 (...*name of language*)

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 has been addressed.

Researcher's name..... Signature.....

Date .....

Participant's ID Code..... Place.....

**APPENDIX B: PARTICIPANT INFORMATION SHEET FOR MALARIA PRESCRIBERS AT BECHEM GOVERNMENT HOSPITAL.**

**TITLE OF RESEARCH: ASSESSMENT OF RATIONAL PRESCRIPTION AND THE USE OF ARTEMISININ-BASED COMBINATION THERAPY AMONG PRESCRIBERS AND PATIENTS AT BECHEM GOVERNMENT HOSPITAL.**

**INTRODUCTION:**

My name is Augustine Kumi, a Master of Public Health student of the University of Ghana, School of Public Health. This study aims to assess rational prescription and the use of ACT among prescribers and patients at Bechem Government Hospital. Health personnel who consult/prescribe at the OPD in selected facilities will be involved in this study. You are being asked to take part in this study because you are a health worker in this facility for this study.

**BACKGROUND AND PURPOSE OF THE STUDY**

This study is part of my academic work which seeks to assess factors (predisposing, enabling and need) associated with rational prescription and use of ACT among prescribers and patients at BGH. This direct policy and come out with strategies to improve upon and strengthening rational use of medicine, especially ACT among prescribers and patients. The research would form part of my work for the award of master's degree in public health

The information that would be gathered will be made available to the hospital Management and concern agencies for the purpose of planning and streamlining rational prescription and use of ACT.

**NATURE OF THE STUDY:**

The study will use systematic sampling approach to retrieve and review folders of all cases of uncomplicated malaria in the year 2018 that will be available in the health facility records. Prescribers indicators will be reviewed from patient folders for the study.

**PARTICIPANT INVOLVEMENT:**

Duration/What is involved in the study:

If you agree to participate in this research. You may be contacted to clarify prescribers' indicators from folders that may be difficult to understand by the investigator.

**Potential Risks:**

In participating in this study, I will be asking you to share some personal views and experiences concerning the rational prescription. You do not have to answer every question. Also, you may withdraw from the study at any time that you wish. You have an opportunity at the end of the interview to review your responses to suit your desired response. This study will pose no risk to you or your work.

**Possible Benefits:**

The outcome of the study will provide useful information that can lead to improvement in malaria case management. The data would benefit you in the near future as it will generate the interest of policy makers and the management of the facility to pay more attention to the long-term effects of irrational prescription and use of medicine

**Costs:**

You bear no financial obligation to take part in this research and no compensation shall be paid to you for participating.

**Compensation:**

In participating in this work, no compensation shall be paid to you.

**Confidentiality:**

All information picked from you shall be strictly confidential. Every information gathered from this study will be used for the sole purpose of the research and the interview will be conducted in privacy at your convenience. In presenting the data in the thesis and manuscript for publication, your name or any personal identifiable information shall not be quoted.

**Voluntary Participation/ Withdrawal:**

Your participation in this study is voluntary and you have the choice to withdraw from the study at any time without any penalty. I will give you a consent form to sign if you are interested in participating in the study or refuse to sign if you are not interested in the study

**Outcome and Feedback:**

The findings of this study will first be reported in a thesis form as part of the partial fulfilment of a Masters of Public Health, Monitoring and Evaluation degree at the University of Ghana School of Public. The Ministry of Health and its agencies such as the

Ghana Health Service through the National Malaria Control Programme will also be beneficiaries of the findings from this study through presentations that will be made locally especially at the 2019 Half Year review of the study facility (BGH).

Funding information:

The study was planned along my academic work and the entire cost involved in the study will be taken care of by the Principal investigator.

Sharing of Participant Information:

The data that would be gathered will be shared with the University of Ghana for academic purpose, the Ghana Health Services Ethics Review Committee, and the BGH will be briefed and questioned on the findings in presentation session so as to update them on the situation on the ground.

Provision of information and consent for participants:

A copy of the information sheet and consent form will be given to you after it has been signed or thumb-printed for you to keep.

If you have any questions, you can ask them now or later. If you wish to ask questions later, you may contact me Augustine kumi, School of Public Health, University of Ghana on the following number 0243876035 or [leakagez@yahoo.ca](mailto:leakagez@yahoo.ca)

My supervisor: Dr. Augustine Adomah-afari (Tel: 0265435294, [augustineafari@yaoouk](mailto:augustineafari@yaoouk))

You can also contact the GHS-ERC Administrator, Madam Hannah Frimpong on 0507041223 for any clarifications on this research.

**CONSENT FORM FOR PRESCRIBERS AT BECHEM GOVERNMENT HOSPITAL  
PARTICIPANTS' STATEMENT**

I acknowledge I have read the purpose and the content of the Participants' Information Sheet read and all questions have been satisfactory explained to me in the language I understand ( English [ ] ). I fully understand the content 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 voluntary agree to be part of this research.

Name or Initial of Participant.....ID Code.....

Participants' signature.....

**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 has been addressed.

Researcher's name..... Signature.....

Date .....

Participant's ID Code..... Place.....



COU NT								
TOTA L								
AVER AGE								

**APPENDIX D: PRESCRIBING INDICATOR FORM**

LOCATION.....

INVESTIGATOR.....DATE.....

NO.	Folder	Date of RX	Age (years)	# Drug	#Generics	Antibiotics (I/O)	Antimalaria (I/O)	Inj (I/O)	#EML	Diagnosis (I/O)	Review (I/O)
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											
11											
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21											
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23											
24											
25											
26											
27											
28											
29											
30											
TOTAL											
AVERAGE											
PERCENTAGE											

\*I= YES

0=NO



Enabling factors (the logistical aspect of obtaining care and how to access the health services).

How did you pay for your antimalaria medicines? a. NHIS [ ] b. Paid cash [ ]

c. Both (NHIS &paid) [ ] d. Couldn't pay [ ] e. Other (specify).....

Where were you asked to start the antimalaria medications?

Right in the hospital with health worker supervision [ ]

Right in the hospital without supervision [ ]

At home [ ]

Indicate the type of antimalaria you have been dispensed.

Tab. Artemether Lumefantrine [ ] b. Tab Artesunate Amodiaquine[ ]

Tab. Dihydroartemisinin Piperaquine [ ] c. Tab. Quinine[ ]

Other (specify) [ ] .....

What is the time interval you are supposed to take the antimalaria after the start dose?

Eight hourly [ ] b. Twelve hourly[ ] c. twenty-four hourly[ ] d. Don't know [ ]

Need factors (the most immediate cause of health services (medicine) use thus perceived and evaluated need)

What were you told about your diagnosis and the type of medicine dispensed?

Was not told [ ] b. Specify if they were told..... c. was told but forgotten [ ].

Indicate the malaria diagnosing test performed on you.

Rapid Diagnosing Test (RDT) [  ] b. Microscopy [  ] c. No test performed [  ]

What about your encounter or medications that may cause you to discontinue the dose or lose interest in the medicine?

Received an unexpected medicine [  ] b. The drug formulation [  ]

c. Unclear instructions [  ] d. Too many medicines received (polypharmacy) [  ]

d. lack of confidence in the prescriber or dispenser [  ] e. Other (specify) [  ].....

What pieces of advice were you given, concerning the antimalaria medication?

Return to the clinic if vomit persists [  ]

Give or take extra fluids such as breast milk (for child), drinking water and fresh fruit juices and ORS. [  ]

Eat or feed the patient before [  ]

Take the drug with food(fat) e.g. diary product (if taken Artemether Lumefantrine) [  ]

In case of severe itching see the doctor [  ]

You are to come for review [  ]

Preventive measures such as the use of LLINs [  ]

Complete the dose even when feeling better [  ]

Avoid taken with fat containing meal (if taken Dihydroartemisinin Piperaquine) [  ]

Other (specify other) [  ] .....

**APPENDIX F: 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  
GPS Address: GA-050-3303  
Tel: +233-302-681109  
Fax: +233-302-685424  
Email: [ghsere@gmail.com](mailto:ghsere@gmail.com)  
15<sup>th</sup> July, 2019

MyRef: GHS/RDD/ERC/Adm/APP/19/221  
Your Ref. No.

Augustine Kumi  
P.O. Box X129  
F.N.T Kumasi

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

GHS-ERC Number	<b>GHS-ERC 077/04/19</b>
Project Title	Assessment of Rational Prescription and the use of Artemisinin-based Combination Therapy (ACT) among Prescribers and Patients at Bechem Government Hospital
Approval Date	15 <sup>th</sup> July, 2019
Expiry Date	14 <sup>th</sup> July, 2020
GHS-ERC Decision	<b>Approved</b>

**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.....  
DR. CYNTHIA BANNERMAN  
(GHS-ERC CHAIRPERSON)

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