

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



**SEVERE MALARIA CASE MANAGEMENT IN SELECTED HEALTH  
FACILITIES IN THE TAMALE METROPOLIS, NORTHERN REGION**

**BY**

**ENOCH OPOKU ANTOH**

**(10552623)**

**THIS THESIS IS SUBMITTED TO THE UNIVERSITY OF GHANA,  
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**DECLARATION**

I, Enoch Opoku Antoh, declare that except for other people's investigations which have been duly acknowledged, this thesis is the result of my own original research undertaken under supervision and that it has neither in whole nor in part been presented for another degree in this university or elsewhere.

Author:

ENOCH OPOKU ANTOH

.....

Date.....

MPhil Resident, School of Public Health, College of Health Sciences, University of

Ghana, Legon

Academic Supervisor:

DR. FRANCIS ANTO

.....

Date.....

Co-Supervisor:

DR. EDWIN ALFRED YAWSON

.....

Date.....

Department of Epidemiology and Disease Control, School of Public Health, College of

Health Sciences, University of Ghana, Legon

## **DEDICATION**

This piece of work is dedicated to Opoku Antoh family and friends for their cooperation and Understanding.



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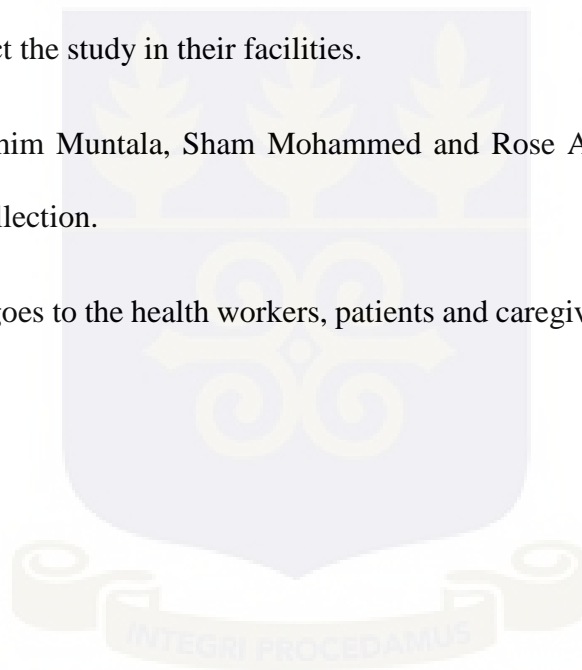
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## ABSTRACT

**Introduction:** Severe malaria is a medical emergency that requires appropriate management to prevent death. Effective case management of severe malaria is expensive and requires appropriate clinical assessment, laboratory proof of the disease prior to treatment with an effective antimalarial. Despite Ghana's adoption of treatment with Artemisinin based Combination Therapy (ACT), the mortality of children due to severe malaria still remains unacceptably high especially in the Northern part of the country. This study sought to assess the case management of severe malaria in the Tamale Metropolis.

**Methods:** The study employed a descriptive cross-sectional approach to assess severe malaria case management practices. Both qualitative and quantitative data were extracted from health facility records of admitted patients, health workers involved in malaria case management and patient/caregivers of children. Data were presented as frequencies and proportions. Bivariate analysis was performed to identify the associations between selected independent variables and appropriate malaria case management.

**Result:** Of the 404 health facility record reviewed, 225 (55.7%) were males. Temperature and weight were checked for 97.0% and 98.8% of patients. About 298 (73.7%) were tested for parasitemia either by microscopy or rapid diagnostic test but only 99 (33.2%) were positive for malaria. All the cases were treated with antimalarial whether tested positive or negative for malaria parasite. About 71.3% of patient were treated with IV Artesunate and 46% with Arthemeter lumefantrine as first and second line of treatment. Quality assurance system was not in place in all the health facilities. About 44.3% (27/61) of the health worker have had training on integrated management of childhood illness. Drugs were purchased by 45% (18/40) patients and medical supplies by 60% (24/40) (patients. Age and fever were associated with conformity with the standard treatment guideline.

**Conclusion:** Case management of severe malaria in the Tamale metropolis was sub-optimal. There were several disregards for negative diagnostic test as well as inappropriate treatment practices. Significant improvement is needed in the area of appropriate diagnosis and treatment, quality assurance system, training and supervision and availability of drugs and supplies.



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### LIST OF ABBREVIATIONS

AA	Artesunate-Amodiaquine
ACT	Artemisinin-based Combination Therapy
AL	Artemether-Lumefantrine
IMCI	Integrated Management of Childhood Illnesses
NHIS	National Health Insurance Scheme
NMCP	National Malaria Control Programme
OPD	Outpatient Department
QHP	Quality Health Partners
QA	Quality Assurance
RDT	Rapid Diagnostic Test
SP	Sulphadoxine-Pyrimethamine
WHO	World Health Organisation



## CHAPTER ONE

### 1.0 INTRODUCTION

#### 1.1 Background

Malaria is a life-threatening disease caused by a parasite called *Plasmodium*, which is transmitted via the bites of infected female *Anopheles* mosquitoes. The course and severity of the disease largely depends on the species of the infecting parasite, state of immunity, genetic makeup as well as the age, patients' nutritional status and general health and the effects of any chemotherapy or chemoprophylaxis that has been used. (Ameme et al., 2014)

Although *Plasmodium vivax* and *Plasmodium knowlesi* can also cause severe malaria but *Plasmodium falciparum* is most responsible for severe malaria cases. When there is a delay in treatment or treatment failure in an uncomplicated malaria case, then severe malaria can rapidly set in. It affect pregnant women, non-immune individuals and mostly children less than five (5) years of age. Most common complication of severe malaria responsible for most deaths particularly in children less than 5 years of age are; cerebral malaria, severe anemia, hypoglycemia and severe dehydration (Ghana Health Service, 2014).

Severe malaria is associated with high mortality and many children die before reaching a health facility (World Health Organization, 2014). Globally, there were about 214 million malaria cases and 438,000 deaths of this preventable and treatable disease in 2015. The Africa region accounted for the most global cases of malaria of about 88% with 90% of the deaths occurred in Africa. (World Malaria Report, 2015). Globally, severe malaria incidence can be estimated at about 2 million cases annually (World Health Organization, 2014). Malaria has a devastating economic impact on Africa causing an economic loss of \$12.5 billion per year and 1.3% reduction in economic growth in endemic countries(Malaria Consortium - World malaria report 2012,).

In Ghana approximately 10.1 million cases of Outpatients Department (OPD) malaria cases were recorded in 2015 which means that in all health facilities approximately 27,671 cases were recorded per day. The 2015 under-five years case fatality rate for Ghana was 0.51% (NMCP, 2015). In Ghana, active people missed nine economically working day as a result of malaria while more than five workdays were lost by their caretakers (Asenso-Okyere, 2003)

Effective case management of severe malaria is multifaceted and entails initial stabilization of the patient, prompt recognition of clinical manifestations of severe malaria, initiation of appropriate treatment, monitoring of disease progression, and management of co-morbidities (Shah et al., 2016).

Malaria treatment before the inception of the anti-malarial drug policy had been the monotherapy drugs such as Chloroquine, Artesunate, Amodiaquine, Sulphadoxine-Pyrimethamine (SP) being the main stay of malaria treatment. For over 50 years, chloroquine which is inexpensive has been the most used drug to cure malaria.

Currently, there has been an introduction of more efficacious and relatively expensive Artemisinin-based Combination Therapy (ACT) as well as universal parasitological confirmation being the cornerstone of this transformation. Since 2005, Ghana has changed its treatment policy for management of malaria and now uses Artemisinin-based combination therapy (ACT) in treating uncomplicated malaria and Quinine for the management of severe or complicated malaria. In Ghana, though IV/IM Quinine remains the recommended first line ACT for treating severe malaria, but the revised malaria case management guidelines, 2014 have also made provision for IV/IM Artesunate and IM Artemeter.

Despite these guidelines for case management of severe malaria, its management relies on availability of health system resources such as proper infrastructures, diagnostic equipment and supplies, drugs and a satisfactory organizational health services.

## **1.2 Problem Statement**

Severe malaria can be described as a life threatening medical emergency that necessitates for appropriate management and is a leading cause of death in many developing countries especially African countries. Severe malaria has a high mortality as many children die before reaching a health facility. Hospital studies report that severe malaria case fatality rates are between 10-20% despite antimalarial treatment, with the majority of deaths occurring within the first 24 hours of admission (Thwing, Eisele, & Steketee, 2011).

Effective case management of severe malaria requires appropriate clinical assessment, laboratory confirmation of the disease prior to treatment with an effective antimalarial (Assembly et al., 2011).

Severe malaria management is relatively difficult and costly, so well-resourced health facilities with availability of health system resources such as diagnostic and treatment supplies and adequately trained health workers are capable of managing it appropriately (Achan et al., 2011). A common practice in Ghana is the use of presumptive diagnosis for malaria without laboratory confirmation and that impede effective management of malaria. (Fenny, Hansen, Enemark, & Asante, 2014).

In line with this and in consistent with WHO recommendations, Ghana adopted the use of highly effective ACTs in 2004 for treatment of uncomplicated malaria (NMCP, 2015). Consequently, malaria case management guidelines were developed and have subsequently been revised to reflect current trends in case management. Training and supervision of

health workers in malaria case management are also being done regularly (NMCP, 2015). Unfortunately health facilities in both public and private hospitals are of doubtful quality, with delay in receiving care, erroneous diagnosis, inappropriate prescription and treatment, and numerous drug stock-outs. For more than a decade after adoption of the ACTs in Ghana, health workers' conformity to recommended guidelines still remains suboptimal.

Moreover, a study conducted by the National Malaria Control Programme reviews that Northern region recorded the highest case fatality ratio (0.8%) of malaria in Ghana. The Tamale metropolis recorded 55,581 case of malaria in 2015 with severe malaria constituting 24% of malaria cases and 166 deaths due to severe malaria in that year. This high mortality in the Metropolis cast doubts on the quality of severe malaria case management (NMCP, 2016).

The burden of severe malaria remains significant despite the availability of preventive methods and effective treatment of uncomplicated malaria. Information on the determinant of quality severe malaria management is not conclusive. The aim of the study was to investigate severe malaria case management in the health facilities in the Tamale metropolis and to assess the factors that influence these practices.

### **1.2.1 Conceptual Framework**

Several health care system factors contribute to appropriate case management of severe malaria. However, the framework of severe malaria case management are influenced by factors that have been characterized into patient factors, health facility factors and health workers factors.

The health facility factors includes the availability of amenities, equipment, drugs and medical supplies, trained personnel and supervision. The provision of these resources enable the health worker perform to its task because case management of severe malaria practices

are comparatively under the control of the health workers. This is measured by their adherence to the standard treatment guidelines.

Patient contributing factors are also necessary because they serve as the intermediate factor between the health facility and the health workers. Patient satisfaction with the service delivery that a particular health facility provides help improve the case management of severe malaria. These factors act together differently to influence the case management of severe malaria and would be useful in the development of appropriate policy interventions that will contribute to effective malaria case management.



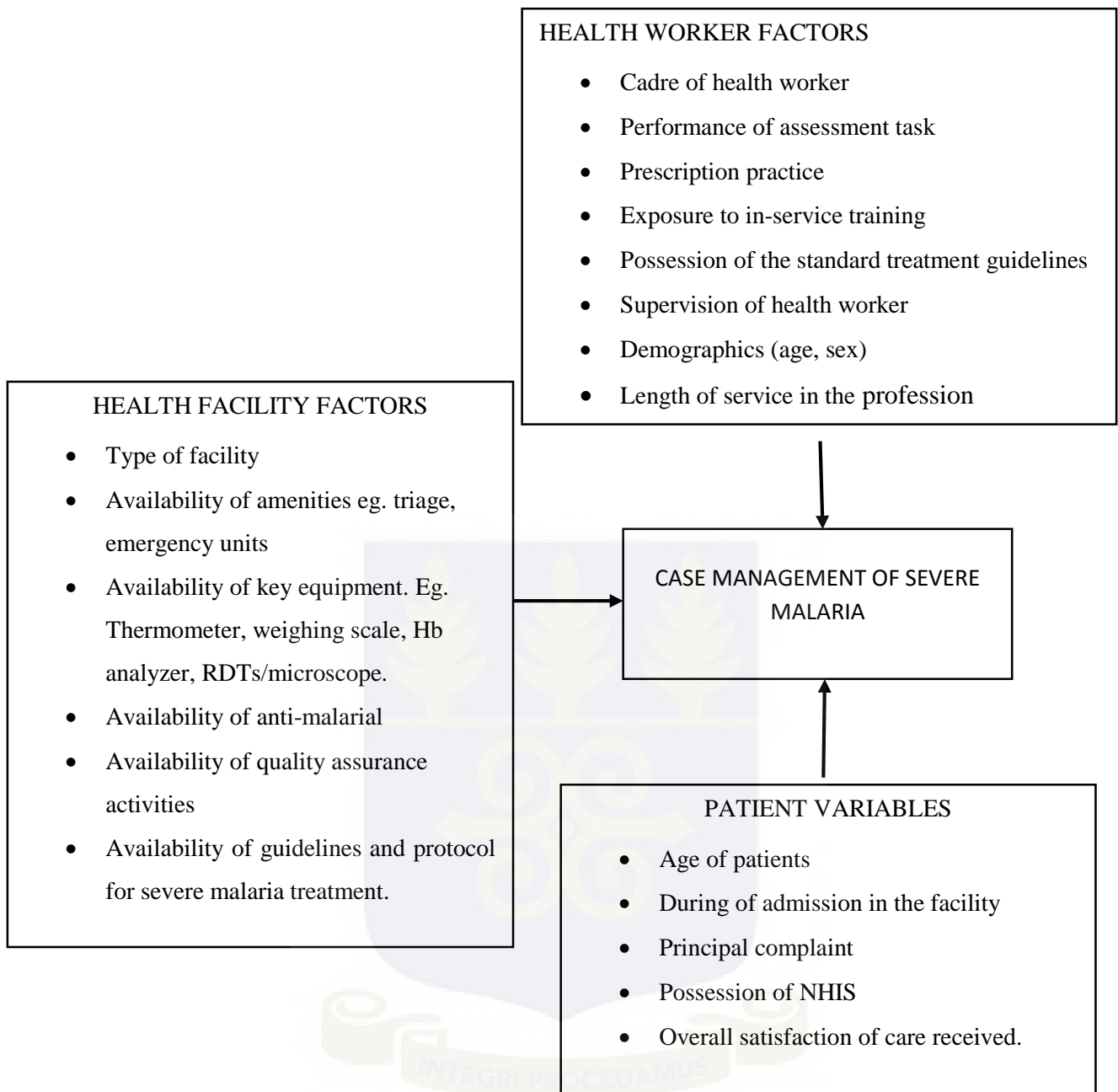


Figure 1: Conceptual framework; Severe Malaria Case Management

### **1.3 Justification**

In 2015, Ghana recorded about 10.1 million OPD malaria cases, which represent a 20.2% increase on 2014 figures. There was an increase in the number of cases recorded per day in all health facilities in the country from 23,299 malaria cases per day in 2014 to 27,671 cases in 2015. The total number of deaths attributable to malaria in 2015 was 2,133 representing a reduction of about 3.0% to the 2014 figures.

Despite the decrease in death due to malaria in the country in 2015, Northern region recorded the highest case fatality ratio of 0.8%. Identifying the factors that influence severe malaria case management package at all levels in the health system is the key to achieve a reduced mortality due to severe malaria. The results of this study will be useful to Tamale Metropolis, the Northern Region, the NMCP and the country as a whole. These findings could be used for evaluation of the implementation of existing guidelines on severe malaria case management and identify areas to inform policy interventions.

This study gathered information on health facility capacity to manage severe malaria, the percentage of health workers who were complying with the standard treatment guideline as well as the proportion of malaria cases that are being managed appropriately. The study will be beneficial to reform lessons taught in severe malaria case management training workshops and supervision structures whereby these lessons could be transform into practice.

### **1.4 General Objective**

To assess case management practices of severe malaria in selected health facilities in the Tamale metropolis.

#### **1.4.1 Specific objective**

1. To assess health facility factors that influence the management of severe malaria
2. To assess health worker factors that influence the management of severe malaria
3. To assess patient related factors that influence the management of severe malaria



## CHAPTER TWO

### 2.0 LITERATURE REVIEW

#### 2.1 Definition of severe malaria

Malaria is a disease caused by a parasite genus *Plasmodium* and transmitted by Anopheles mosquitoes. *Plasmodium falciparum*, *vivax*, *ovale*, *knowlesi*, and *malariae* are the Plasmodium species that infect humans. *P. falciparum* and *P. vivax* are the most common species that cause malaria in humans. *P. falciparum* is the most dangerous in terms of mortality and it is the most common in Ghana. (Ghana Health Service, 2014)

Severe malaria can be defined from the clinical perspective as the presence of a continuum from asymptomatic malaria to uncomplicated illness through to severe and fatal malaria (World Health Organization, 2014). This occurs when *P. falciparum* infections are complicated by serious organ failures or abnormalities in the patient's blood or metabolism.

Severe malaria is associated with an increased in the risk of death combined with the presence of *P. falciparum* parasitemia. Altered consciousness, severe anaemia and respiratory distress predominantly occur in young children (Anstey & Price, 2007). Severe malaria can be clinically imperceptible from other common infections including pneumonia, meningitis and sepsis (Gwer, 2009). Severe malaria is a medical emergency that necessitates for urgent and aggressive management (CDC, 2015).

Severe falciparum malaria causes no less than one million deaths annually, most of which occur in African children under 5 years of age (Sachs & Malaney, 2002). The case fatality of *P. falciparum* malaria is around 1 per cent and this accounts for more than half a million deaths per year all over the world; 80% of these deaths are caused by cerebral malaria (Srinivas, 2015). It affects all age groups, even though the reported death differs

considerably depending upon clinical complications, immunity, the age, and access to appropriate treatment.

## **2.2 Epidemiology of Malaria**

Malaria remains a devastating global health problem. It is caused by parasites of the plasmodium species and is spread from person to person through the bite of the female anopheles mosquitoes. Human can be affected with one of these five species namely; *Plasmodium falciparum*, *Plasmodium vivax*, *Plasmodium ovale*, *Plasmodium malariae* and *Plasmodium knowlesi*. *P. falciparum* is by far the most deadly type of malaria infection and most prevalent in Africa.

Approximately, there were 212 million of new cases of malaria reported worldwide in 2015. The Africa region accounted for 90% of the global cases of malaria, followed by the South-East Asia region of 7% and the Eastern Mediterranean region of 2%. Estimated death of 429,000 recorded worldwide with Africa accounting for 92% of this deaths.

In Africa, children under 5 years are particularly susceptible to malaria illness, infection and death. Due to this that Africa alone recorded 292,000 death out of global estimate of 303,000 deaths that occurred in children under 5 years. Though malaria mortality rate among children under 5 fell by an estimate of 35%, yet remains a major killer of children under 5 years, claiming the life of 1 child every 2 minutes (World Health Organisation, 2016).

### **2.2.1 The life cycle of malaria**

When the infected female anopheles mosquito takes a blood meal from man, sporozoites are inoculated into the bloodstream. Within an hour sporozoites enter hepatocytes of man and begin to divide into exoerythrocytic merozoites (tissue schizogony) within 5-16 days.

For *P. vivax*, and *P. ovale*, dormant forms called hypnozoites typically remain quiescent in the liver until a later time but *P. falciparum* does not produce hypnozoites.

As soon as the merozoites leave the liver into the bloodstream, they invade erythrocytes and develop into early trophozoites, a ring shaped, vacuolated and uninucleated over 1-3 days depending on the species of malaria parasite. It is at this stage that fever and illness occur in the individual. Once the parasite begins to divide, the trophozoites are called schizonts, consisting of many daughter merozoites. Some of the merozoites develop into sexualforms, the male and female gametocytes which circulate in the bloodstream. Some of the sporozoites enter the liver remaining dormant and causing relapse weeks to months later, mostly in *P. falciparum* and *P. ovale*.

When a female mosquito bites man to take a blood meal, it ingests these gametocytes, which develop in the guts of the mosquitoes going through several stages to produce the oocysts. These oocysts burst to release the sporozoites, which invade the salivary gland of the mosquito. The cycle of infecting man restarts when such a mosquito bites man.

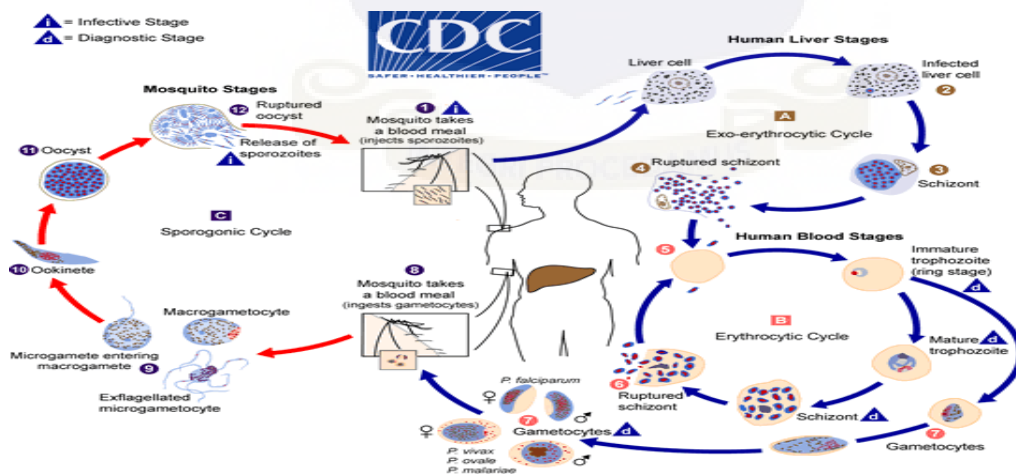


Figure 2: The life cycle of malaria

### **2.2.2 Challenges in identification of severe malaria cases**

An accurate description of the incidence and distribution of severe malaria requires identification of cases, and several factors make this challenging. Such challenges includes;

- Malaria is most prevalent where there is poverty and where methods of disease identification, documentation and reporting are weakest.
- A large proportion of severe malaria illnesses and deaths occur in people's homes without coming to the attention of a formal health service
- Even when severe malaria is documented in a health facility, the diagnosis may be missed or wrongly applied to patients without malaria (World Health Organization, 2014)

### **2.2.3 Clinical presentation of severe malaria**

The clinical manifestation of malaria vary with geography, epidemiology, immunity, and age. In a highly endemic areas, groups at highest risk include young children (mainly 6-36 months), who can develop severe illness and pregnant women, who are at risk for anemia and delivering low birth weight newborns.

The symptoms of malaria are predominantly as a result of the rupture of the schizont and destruction of erythrocytes. The clinical presentation of malaria oftentimes similar to those of common viral infections sometimes leading to a delay in diagnosis. Majority of patients, 92% experience fever, 79% chills, 70% headache and diaphoresis of 64% (Genton, 2001). Additional symptoms which commonly affects patient includes vomiting, diarrhea, dry cough dizziness, malaise, myalgia, abdominal pain, nausea. Other physical signs include fever, jaundice, pallor, orthostatic hypotension, tachycardia, hepatomegaly and splenomegaly.

With regards to severe malaria, the principal complications include cerebral malaria, pulmonary edema, acute renal failure, severe anaemia and/or bleeding. Metabolic complications such as acidosis and hypoglycemia are most common. These complication may be deadly within hours or days if not treated rapidly. (Trampuz, Jereb, Muzlovic, & Prabhu, 2003)

#### **2.2.4 Differences in clinical features of severe malaria between adults and children.**

In parts of the world where the transmission of *P. falciparum* is intense and stable, severe malaria is mainly a disease of children from the first few months of life to the age of about 5 years, becoming less common in older children and adults as specific acquired immunity gives increasing (although always incomplete) protection (World Health Organization, 2014) . According to Black et al. (2010), about 90% of the world's severe and fatal malaria is estimated to affect young children in sub-Saharan Africa.

The signs and symptoms of severe malaria differs between children and adults. It is uncertain whether these differences reflect mainly the age of affected individuals or other differences between populations in the characteristics of host, parasite, pattern of exposure or provision of health services. There are few data on the pattern of clinical disease in children outside (“World Malaria Report,” 2015).

**Table 1: Differences in the Clinical Presentation of Severe Malaria in Adults and Children**

Sign or symptom	Adult	Children
Duration of illness	5–7 days	Shorter (1–2 days)
Respiratory distress/deep breathing (acidosis)	Common	Common
Convulsions	Common (12%)	Very common (30%)
Posturing (decorticate/decerebrate and opisthotonic rigidity)	Uncommon	Common
Prostration/obtundation	Common	Common
Resolution of coma	2–4 days	Faster (1–2 days)
Neurological sequelae after cerebral malaria	Uncommon (1%)	Common (5-30%)
Jaundice	Common	Uncommon
Hypoglycaemia	Less common	Common
Metabolic acidosis	Common	Common
Pulmonary oedema	Uncommon	Rare
Renal failure	Common	Rare
CSF opening pressure	Usually normal	Usually raised
Bleeding/clotting disturbances	Up to 10%	Rare
Invasive bacterial infection (co-infection)	Uncommon (<5%)	Common (10%)

Derived from studies in south-east Asian adults and children, and African children.

## 2.3 Management of Severe Malaria

### 2.3.1 Diagnosis of severe malaria

The diagnosis of malaria is based on a comprehensive history taking, examination and confirmation with laboratory testing for the detecting of asexual forms parasites in the blood smear stained with either Giemsa, Field's stain or the use of Rapid diagnostic test (RDT) to detect the presence of *P falciparum* antigen. Patient is likely to have experienced some of

the typical symptoms of malaria including chills, rigors, headache, body aches, sweating, nausea/vomiting, loss of appetite, and/or abdominal pain (Ghana Health Service, 2014).

In cases where the laboratory diagnosis is unavailable or unreliable, a history of exposure within the last year, particularly within the preceding 10 weeks and the suggestive clinical picture should prompt the physician to start anti-malarial treatment (Pw, Crjc, Newton, & Box, 2004).

The differential diagnosis of severe malaria is wide but the conditions that should be actively considered and excluded are: septicaemia, pyelonephritis, typhoid fever, meningitis, Reyes syndrome, lobar pneumonia, viral hepatitis, encephalitis, poisoning and drug effects.

Microscopy is the 'gold standard' and preferred choice for diagnosing malaria. In nearly all cases, examination of thick and thin blood films will reveal malaria parasites. Thick films are more sensitive than thin films for detecting low-density malaria parasitaemia. Broadly, the greater the parasite density in the peripheral blood, the higher the likelihood that severe disease is present or will develop, especially among 'non-immune' patients.

Where microscopy is not available or impracticable, a rapid diagnostic test (RDT) must be used (World Health Organization, 2014). RDT antigen based (HRP2 antigen) test is more reliable and informative than antibody based test because they have a very high negative predictive value, so a properly tested negative test does rule out malaria (Anand TUL). RDTs does not offers evidence on the stage of malaria parasites or parasite density, an important indicator in monitoring a hospitalized patient being treated for severe malaria

### **2.3.2 Treatment for severe malaria**

The treatment for severe malaria encompasses the initial stabilization of the patient, detection of complications and the start of parenteral anti-malarials (Pw et al., 2004). Subsequent to a rapid clinical assessment and parasitological confirmation of the diagnosis,

full parenteral doses of an appropriate anti-malarial should be started without delay to provide adequate blood-serum concentrations of the drugs in the patient.

The available parental treatment of choice in the order of preference includes; IV/IM Artesunate, IM Artemether, IV/IM Quinine. The artesunate must be reconstituted since it is dispensed as a powder of artesunic acid in vials of 30mg, 60mg, or 120mg and in a pack usually containing sodium bicarbonate solution and normal saline.

Quinine should be given either by IV in dextrose infusion or IM until patient can swallow, then treatment shall be continued with oral Quinine. It should always be given by slow rate-controlled infusion. The dose are; Quinine Hydrochloride salt at 10mg per kg body weight (maximum dose 600mg) 8 hourly in 5-10ml/kg of dextrose saline or in 5% dextrose over 4-8 hours or deep IM injection at 10 mg/kg body weight (maximum dose 600 mg) 8 hourly.

Parenteral treatment should continue until patient is well enough to swallow, and for at least 24 hours even if the patient is well enough to swallow before 24hours. Treatment should then be completed by giving a full 3-day course of an oral ACT (ArtesunateAmodiaquine, Artemether-Lumefantrine, Dihydroartemisinin-Piperaquine) (Ghana Health Service, 2014).

Parenteral artesunate reduces mortality in patients with severe malaria by over a third compared with quinine. Although, artesunate and quinine are active against the more pathological cytoadhering stages that sequester in the venules and capillaries of vital organs but Artesunate kills circulating ring-stage parasites, which can then be removed by the spleen, whereas quinine does not. (South East Asian Quinine Artesunate Malaria Trial (SEAQUAMAT) group, 2005)

### **2.3.3 Case management of severe malaria**

Severe malaria cases can be diagnosed and treated based on the following classifications: a suspected severe malaria case with at least one sign or symptom especially history of fever, appropriate diagnosis with malaria test proofing positive based on the WHO criteria (World Health Organization, 2015); rapid management of severe malaria patient within 30 minutes of visiting the health facility by given the patient a correct dose and dosing regimen of initial parenteral antimalarial drugs prescribed such as IV/IM artesunate, quinine or artemether (Achan et al., 2011)

Case management practices have been extensively studied mostly to evaluate health worker performance in the implementation of the new drug policies and guidelines. Most studies used health facilities structures, retrospective patient health record review while others used direct observation of health worker-patient interactions methods to assess case management practices on either children, adults or in all age groups.

The coverage indicators for malaria case management in most sub-Saharan African countries lag far behind coverage indicators for its prevention, relatively because the delivery of effective case management of both uncomplicated and severe disease is quite complex and comprises not only procurement of the drugs, but supply chain management, health worker training and supervision, revision of payment schemes to remove financial barriers, extending this care to more peripheral levels of the health care system, and working to encourage use of these services by the population (Thwing et al., 2011).

### **2.3.4 Health facility contribution to severe malaria case management**

In Uganda, health staff shortages was acknowledged and several health facilities struggled to provide high-quality services. To that effect a clinical audit was introduced to enable a review of operational, logistical, financial, human resource, management and coordination

aspects which together impact on the effective case management of malaria through either improved or reduced health facility functionality.(K4Health, 2010)

A study done in Uganda revealed that severe malaria management in health facilities was poor, because most health facilities studied were not fully conforming to the Uganda's treatment guidelines as well as the international guideline for managing severe malaria. Appropriate management of severe malaria was appreciated in only 27% of the patient. Majority, 70.4% of patient had a correct dose and regimen of quinine, but only 18% had it administered in the correct volumes of 5% dextrose. More than a few doses of quinine was given in one single 500 ml bottle of 5% dextrose in most patients 80.1% (Achan et al., 2011).

Shah et al., (2016) observed that majority of patients diagnosed with severe malaria received the recommended IV therapy in accordance with national treatment guidelines in Malawi. Among 906 patient record reviewed, 42 % had a severe malaria admission diagnosis and 50 % had at least one severe malaria sign or symptom documented. Severe malaria patients defined by admission diagnosis 93, were more likely to be treated correctly compared to patients defined by a severe sign that is 82. Among uncomplicated malaria patients, 26 % were correctly treated and 53 % were adequately treated with IV quinine alone or in combination with an ACT or oral quinine.

A study conducted in Tanzania demonstrates some deficiencies in quality of care in public health facilities in terms of presumptive malaria diagnosis, short consultation time, little physical examination and high chloroquine prescribing in cases without a firm malaria diagnosis. (Nsimba et al., 2002).

Achan et al. (2011) observed in their study in Uganda that patient triaging system, assessment and diagnosis were awfully deficient. Few of the health facilities studied had a well practice triaging system and a small number of the health facilities had a detached

queues for adults and children in the OPD. Most of the patients were children under 5 years of age. In the study, they recorded stock-out of basic care package for severe malaria most health facilities thereby allowing most of the patient forced to purchase medications and supplies needed for their management. This they say reveal the weakness in management, drugs and supplies procurement, and distribution practices.

In the Republic of Sudan, Abdelgader et al., (2012) evaluated 244 facilities and observed that only 5% of health facilities studied had chloroquine available, recommended artesunate and sulfadoxine/pyrimethamine was stocked by 73% of the health facilities, 51% of the health facilities had the capacity to perform parasitological diagnosis for malaria.

In Ghana according to Abuaku, Koram, & Binka, (2005), before the introduction of the new anti-malarial policy, the average number of drugs per patient was observed to be 5.4 and 3.7 in the private and government facilities respectively. The level of inappropriate dosing was very high both in the private and public health facilities. Only 9.8% and 54% of prescriptions in the private and public health facilities were of the appropriate doses respectively.

In an observation method of assessment, 66.8 % of patients diagnosed with uncomplicated malaria received the recommended first line ACT, with government health facilities leading the way in this regard. Very few suspected severe malaria cases had a laboratory confirmation of the condition at admission, and even so this was more likely to be done in the Regional hospitals (Quality Health Partners, 2008)

A study conducted by Ameme et al., (2014), observed that only three of the health facilities out of seven health facilities assessed demonstrated evidence of the existence of quality assurance systems in place. None of the facilities recorded stock out of either AA or AL in the past six months. All the six facilities had supervisors visiting in the last six months. Both adult and paediatric weighing scales as well as standard treatment guidelines were present

in all the six health facilities. Treatment charts were present in the consulting rooms of four health facilities

Pariyo, Gouws, Bryce, & Burnham, (2005) emphasized the importance of follow-up visits, finding that the quality of care was higher at health facilities with at least one supervision visit every six months compared with other facilities”. Moreover, a retrospective assessment done by Masika et al. (2006) “found a significant decrease in malaria over-diagnosis associated with a sustained training and supportive supervision effort in the health facilities in Tanzania.

An impact of IMCI training survey study conducted in Uganda documented a significant associations between training and health workers’ demonstrated ability to correctly classify children ’s illnesses, to provide correct treatment of those requiring an antibiotic or antimalarial, and to effectively counsel caregivers (Pariyo et al., 2005). Nevertheless, prospective study done by Biai et al. (2007) in Guinea-Bissau established that there was a reduction in mortality after the implementation and training of standardized guidelines for management malaria in the health facilities.

### **2.3.5 Health workers severe malaria case management practices**

The performance of the health care providers was generally poor in a study conducted in Tanzania district, with inadequate physical examination and short consultation time. This may perhaps be related to shortage of staff, lack of supervision, poor motivation and drug shortage. Health provider made diagnosis on the clinical ground and treated fevers as malaria causing over-diagnosing and over-use of chloroquine. Majority, 60% of patient diagnosed with malaria were negative for malaria parasites (Nsimba et al., 2002).

Health worker performance in malaria case management in Angola was suboptimal with only 60% of malaria diagnoses and 49 % of malaria treatment being done correctly. They

observed that only 30.7% of suspected malaria cases were tested contrary to recommended universal testing of suspected malaria cases. There was a high rate of distrust of negative test results culminating in over diagnosis and over treatment of case patients (Rowe, Claessens, Corrigan, & Arman, 2009)

Chanda-Kapata et al., (2014) concluded in their study conducted in Zambia that case management of malaria was characterized by poor conformity to treatment guidelines. They observed that of the 2,247 malaria cases which includes both complicated and uncomplicated reported, those that were parasitologically confirmed was 71% while those clinically diagnosed (unconfirmed) were 29%. Approximately 56% of the reported cases of malaria were treated with artemether-lumefantrine (AL), 35% with sulphadoxine-pyrimethamine, 8% with quinine and only 1% did not receive any anti-malarial. About 30% of patients who were tested negative for malaria parasites were still prescribed an anti-malarial, which is not in conformity to the guideline.

According to Abdelgader et al., (2012) it was revealed that health workers had received in-service training on ACTs was 53%; about 24% were trained in the correct use of malaria Rapid Diagnostic Tests, and 19% health workers had received a supervisory visit including malaria case-management in the previous six months. The study again shows that 46% of febrile patients were parasitologically tested in all the health facilities. About 35% of patients were appropriately tested and treated according to diagnostic result. Moreover, 66% of febrile patients were tested at health facilities where AS+SP and malaria diagnostics were available. Also 64% of patient that tested positive were treated with AS+SP but 24% were treated with artemether monotherapy. Those patients that tested negative, only 17% were treated with antimalarial. Most of the ACT dispensing and counseling practices were suboptimal

A study in Uganda documented that majority of antimalarial prescriptions in this rural hospital conformed to the 2005 antimalarial treatment policy. Although the level of conformity was high, a small proportion of health service providers were still using CQ, and SP as mono-therapy or in combination with other antimalarial drugs. There were also some prescribers using AL for treating complicated malaria. Even more surprising was the use of SP alone for the treatment of complicated malaria in two of the cases (2.6%) (Ucakaon, Achan, Kutwabami, Ar, & Nj, 2011).

In Africa, a number of studies have stated that below 50% of patients who are suspected of having malaria go through diagnostic testing although laboratory services are often available. In making treatment decisions there has been an irrational failure by the health providers to use the results of diagnostic testing (Ssekabira et al., 2008)

Hamer et al. (2007) reported in their study conducted in Zambia that 63% of health facilities had RDTs available for use and more than 73% of health facilities had either RDTs or microscopy available for malaria diagnosis, yet 27% of febrile patients presenting to these facilities had a parasitological diagnostic test performed. More than 35% of patients were prescribed an antimalarial even when the diagnostic tests performed are reported negative for *P falciparum*.

A study done in Uganda reviews that, majority of training programme predominantly emphasize on the management of uncomplicated malaria, so prescribers were more likely to conform to the antimalarial treatment policy when the diagnosis made was uncomplicated malaria than severe malaria since little emphasis are made on severe malaria management (Ucakaon et al., 2011)

### **2.3.6 Patient's contribution to severe malaria management**

Case management of severe malaria is not always the task for the health facilities and the health workers but patient forms major contribution to their wellbeing at the hospital. Factors including the time patient reported to the hospital, possession of NHIS, the capacity to purchase medical drug and supply when the need arise and more, help aid in appropriate treatment at the health facility.

In a study in Uganda, 43.3% of patient well-thought-out that they had delayed for long before any health worker attending to them. In the same study, 21.3% of inpatient suggested the health facilities must ensure sufficient medicines at health units, 11.6% proposed improvement in the readiness of drugs and supplies and increasing in staff strength (8.3%), providing more beds and beddings (7.6%) and health workers attitudes towards patients and attendants (7.1%) Again, patients were ask to buy medication and medical supplies required for treatment by 44% and 70.6% respectively (Achan et al., 2011). Similar study reveal this same finding that due to non-availability of drugs, patient were given prescription to buy antimalarial drugs if they do not get it at the hospital (Ucakacon et al., 2011).

A study done in Tanzania revealed that majority of children managed in primary health centers had received prior medication before presentation at the health facilities. Fifty-four per cent of the children received medication at home, most commonly antipyretics and chloroquine, 20% had been taken to another health facility and 3% to traditional healers before coming to the health facilities. There was a significantly higher use of antipyretics among home treated children compared with those taken previously to health facilities (Nsimba et al., 2002).

## CHAPTER THREE

### 3.0 METHODS

#### 3.1 Study design

The study employed a descriptive cross-sectional approach to assess severe malaria case management practices in the Tamale metropolis. It involved four purposively selected health facilities made up of both public and private facilities in Tamale metropolis that admit patients with malaria. In the selected facilities, an evaluation of supplies and capacity such as staffing, equipment and logistics supplies was done. Both retrospective record review and prospective data collection involving admitted patients with severe malaria were undertaken. Interviews were conducted with health workers involved in malaria case management to assess their malaria case management practices. Interviews were also conducted with care givers of children admitted for severe malaria to assess their waiting time before receiving medical care, possession of the NHIS cards and their satisfaction with the quality of care they are receiving at the health facilities. Data obtained was analysed using univariate and bivariate methods of analysis to assess severe malaria case management and determine the factors that influence them.

#### 3.2 Study area

##### 3.2.1 Demography

The Tamale Metropolitan Assembly was established by legislative instrument (LI 2068) which elevated the then Municipal Assembly into a Metropolis in 2004. At present, it is one of the six Metropolitan Assemblies in the country and the only Metropolis in the three Northern regions namely: Upper East, Upper West and Northern regions. It has Tamale as the Metropolitan capital city and at the same time the regional capital of the Northern Region

with a population of 360,579 according to the 2010 census. Male constitute 49.7 percent and female represent 50.3 percent.

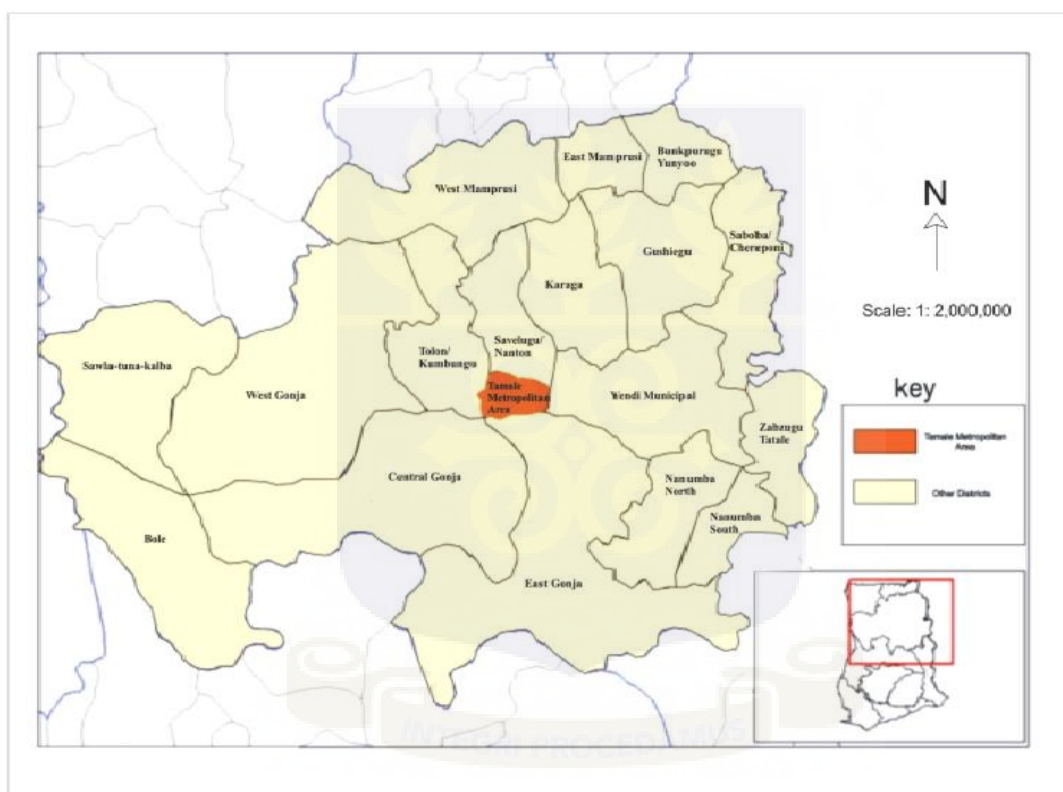
Tamale Metropolis is among the 26 districts within the Northern Region with 115 communities in the Metropolis. It is located in the central part of the Region and shares boundaries with the Sagnarigu District to the west and north, Mion District to the east, East Gonja to the south and Central Gonja to the south-west. The Metropolis has a total estimated land size of 646.90180 sqkm. Geographically, the Metropolis lies between latitude 9°16 and 9° 34 North and longitudes 0° 36 and 0° 57 West (GSS, 2010). There are four sub-districts in the Tamale metropolis namely; Bilpeila, Nyohini, Tamale central and Vitting sub-districts.

### **3.2.2 Health services and facilities**

There are four levels of health services delivery in the Tamale metropolis namely the hospital, health centres/clinics, reproductive and child health centres, and the community clinics (CHPS compounds). There are 6 major hospitals with the Tamale Teaching Hospital serving as the referral point for the other health facilities in the metropolis. But there are several health centres and clinics in the metropolis. The high level of illiteracy and poverty as well as limited access to safe drinking water and poor sanitation have combined to expose many people to health hazards which accounts for the low standard of living of the people. Malaria and diarrhea are among the top five diseases in the metropolis and these have severe effect on the lives of the people. Malaria alone contributes about 25 percent of total 39 deaths in the metropolis (ghanadistricts, 2010).

### 3.2.3 Educational Infrastructure

There are 240 nursery, 300 primary, 112 Junior High, and 11 Senior High schools in the Tamale metropolis. In addition to these, there are two vocational and Technical schools, one polytechnic and two campus of the University for Development Studies located in Tamale and one in nearby Nyankpala. The total primary school enrolment in 2005/2006 was 53,889 comprising 29,303 males and 24,586 females. The pupil-teacher ratio was 1:33 for the primary and 1:21 for the Junior High schools (ghanadistricts, 2010).



**Figure 3: Map of the Tamale Metropolis**

Source: Ghana Statistical Service, GIS

### 3.3 Variables

**Table 2. Definition of Variables and their Scale of Measurement**

Variables	Operational Definition	Type of Variable	Scale of Measurement
<b>Health facility</b>	<b>How the activities of the health facilities contribute to the severe malaria case management practices</b>	<b>Independent</b>	<b>Categorical</b>
Type of facility	Type of health facility that admit patients with severe malaria.	Independent	Categorical
Availability of key equipment	Functional diagnostic equipment that are available at the health facility	Independent	Categorical
Availability of anti-malarial	Anti-malarial drugs available in the health facilities during the study period	Independent	Categorical
Availability of quality assurance activities	Available activities in place that provides quality assurance to case management of malaria.	Independent	Categorical
Availability of guidelines and protocol for severe malaria treatment	This is defined as whether the hospitals have in any form the guideline and protocol for treatment of malaria.	Independent	Categorical
<b>Health worker</b>	<b>How the activities of the health workers contribute to the severe malaria case management practices</b>	<b>Independent</b>	<b>Categorical</b>
Performance of assessment task	Identifying health worker diagnostic practices according to the guidelines and protocols.	Independent	Categorical
Prescription practice	How health workers prescribe treatment to patients with accordance to the guidelines.	Independent	Categorical
Exposure to in-Service training	Defined as whether health worker has received any training on malaria case management.	Independent	Categorical
Supervision of health worker	Whether staff has undergone any form of supervision on management of malaria	Independent	Categorical
<b>Patients</b>	<b>How the activities of the patients contribute to the severe malaria case management practices</b>	<b>Independent</b>	<b>Categorical/Continuous/Binary</b>
Age	Age in years of patients diagnosed with severe malaria	Independent	Continuous
Principal complaint	Why patient visited the hospital	Independent	Categorical

Possession of a valid NHIS card	Defined as whether patient possess a valid NHIS card	Independent	Binary
Overall satisfaction of care received.	How patients think of the services provided at the facility.	Independent	Categorical

### 3.4 Study population

The study population was made up of the health facilities, health workers involved in severe malaria case management, hospital records of severe malaria cases and patients/caregivers of children diagnosed with severe malaria and admitted during the study period in the selected health facilities in the Tamale metropolis.

### 3.5 Sample size

A total of four health facilities with inpatient capacity were selected from two of the four sub-districts in the Tamale metropolis.

Sixty-one (61) health workers involved in severe malaria case management who were on duty on the days of visit were included in the study. Forty (40) patients/caregivers of children admitted with severe malaria were also interviewed at these selected health facilities.

A total of 404 health facility records of patients with severe malaria were selected for the study. The sample size was obtained using statistical population proportion method,

$$n = \frac{z^2 p(1-p)}{d^2} \quad \text{Where, } n = \text{estimated sample size}$$

P = sample proportion (the proportion of the sample that is assumed to have severe malaria managed correctly = 50% or 0.5)

d = the probability that the desired sample size will not be representative of the study population (5%)

Z = level of confidence that the chosen sample will be representative of the population (95%)

Below is the sample size calculation;

$$n = \frac{1.96^2 \times 0.5 (1- 0.5)}{0.05^2}$$

$$n = \frac{3.8416 \times 0.5 \times 0.5}{0.0025}$$

$$n = \frac{0.9604}{0.0025}$$

$$n = 384.16$$

$$n = 384$$

Allowing for the loss of information in 5% of the records,

$$n = 1.05 \times 384$$

$$n = 403.2$$

### **3.6 Sampling procedure**

#### **Health facilities**

Four health facilities, the Tamale Central Hospital, Tamale West Hospital, SDA Hospital and Kabsad Scientific Hospital are the only health facilities that admit and manage severe malaria cases in the Tamale metropolis aside the Tamale Teaching Hospital. These consist of two Government facilities (the Tamale Central Hospital and Tamale West Hospital), one faith-based hospital (SDA Hospital) and one private hospital (Kabsad Scientific Hospital). All the four facilities were included in the study.

### **Patient health records**

All folders of severe malaria cases from November 2016 to April 2017 were collected and a simple random sampling method was used in selecting a sample of 404 cases registered with severe malaria in all the selected health facilities. A number of health records reviewed was apportioned to each health facility based on severe malaria caseload for the preceding year. Based on the data provided by the health facilities on severe malaria caseload for the previous year, the number of patients health records that were reviewed were apportioned as 40%, 30%, 20% and 10% for Tamale Central Hospital, Tamale West Hospital, SDA Hospital and Kabsad Scientific Hospital respectively.

### **Health worker and patients**

A total of sixty-one (61) Health workers who are involved in the management of severe malaria patients and available during the period of the survey were purposively selected and interviewed. All health workers at the wards and consulting rooms were eligible for inclusion based on their availability during the day of the survey. A structured questionnaire was taken to the various ward and consulting rooms in the health facilities and these health workers upon obtaining their consent, were asked to fill out the questionnaire at their own pace.

Moreover, having obtained patient/caregivers' consent, purposive sampling method was used to select patients who were admitted with severe malaria during the survey day. The questionnaires were taken to the wards and were administered to the patients or caregivers of children who were eligible for inclusion in a language they understand.

### **3.7 Data collection and tools**

A triangulation approach was used to collect data with the following methods: health facility assessments and health worker interviews at inpatient facilities as well as inpatient/caregiver interviews and review of patient's health facility records at inpatient facilities. The study adopted the WHO hospital care assessment tools as the survey instruments. A health facility audit checklist was administered to the Administrators or Directors of the selected health facilities to assess the health facilities variables such as key equipment and drug supplies, number of trained staff at the health facilities, availability of treatment guidelines and quality assurance activities.

A structured questionnaire was administered to the patients/caregivers to collect data on their principal complaints, time taken before receiving care, correct assessment and diagnosis, laboratory investigations and treatment prescribed. Patients/caregivers were requested to rate their satisfaction with services delivery on an ordinal scale (good, improvement needed or poor) and to recommend areas that needs improvement.

Health facility records review was done using a checklist: The health facility records of patients who had been managed for severe malaria in the past six months were randomly selected and reviewed for information on documentation of assessment tasks, diagnoses, treatment and dosages of drugs.

An interview was conducted using a Health worker self-administered structured questionnaire. This interview collected information on the health worker's knowledge in severe malaria, performance of assessment tasks, prescribing practices, training and support supervision.

### **3.8 Training**

Four research assistants were trained by the Principal Investigator to administer the questionnaires. The content of the training included an introduction to the main objective and specific objectives of the study, data collection techniques, data collection and ethical issues so that he/she can translate the questionnaire into the local language to the clients.

### **3.9 Pre-testing**

The questionnaire which was used for this research was pre-tested at the Rabito clinic in the Tamale metropolis. This health facility was not part of the study. The pre-testing was done to assess the authenticity of the questionnaires and how valid it would be when administering it.

### **3.10 Data management and analysis**

Data were entered in Microsoft Excel version 13 and analyzed using EPI-info software program version 7. Data cleaning and verification was done to ensure good quality data. For each variable on which analysis was done, the frequencies were run to identify the number of missing variables and incorrectly entered data. Analyses were done on variables for which data was entered. Missing data was excluded from the analyses when necessary. Where an input was to be corrected, the variables were listed with the “allow update” function enabled and the necessary corrections done.

Results from all selected health facility was combined and a descriptive analysis was done at health facility, patients and health worker levels. Data were presented as proportions, tables, graphs and frequencies. Bivariate analyses was used to analyze differences in proportions. Two tailed p values and a 5% significance level was used.

### **3.11 Quality control**

In order to ensure quality in the data collection, the Principal Investigator was part of the team during interviews to ensure that the relevant information was collected and to detect any errors. Data were checked for completeness and internal inconsistencies. Double entry programmes were used to reduce possible errors.

### **3.12 Ethical consideration**

Ethical approval was sought from the Ghana Health Service Ethical Review Committee of the Ministry of Health before commencement of the study. The ethical clearance number was GHS-ERC: 58/12/2016

#### **Study area approval**

Permission was obtained from the Northern Regional Health Directorate for the study to be carried out in the region. A letter recommending the study from the Regional Director of Health Services was sent to the Tamale Metropolitan Health Directorate for their permission. Permission was also sought from the Health Managers and In-charges of the various health facilities that were included in the study to allow their facilities, staff and their health records to be reviewed for the study.

#### **Inclusion criteria**

Health workers who were involved in severe malaria case management and on duty on the days of visit were included in the study. Patients diagnosed and admitted for severe malaria and consented to participate in the study were also included in the study.

### **Exclusion criteria**

Health workers who were not on duty on the day of visit even though are involved in severe malaria case management and patients diagnosed and admitted for severe malaria but decline consent to participate were excluded from the study.

### **Consenting process**

Participants were fully informed about the purpose, procedures, risks and benefits of participating in the study. Consent was sought from the Healthcare providers and clients/relatives. For participants who cannot read, the consent form was read and explained to them in a language they understand. Those who agreed to participate were asked to sign or thumb-print an informed consent form.

### **Confidentiality/Data storage**

Participants were assured that their responses would be kept confidential and data collected was not going to be disclosed to anyone but rather kept safely for the purpose of the study. The information was securely stored without the participant's name, in a file which will only be accessible to the research team. After data were analyzed and reports written, hardcopies was burnt whilst softcopies was deleted from the computer.

### **Voluntary withdrawal**

Participants were informed that participation in the study was voluntary and they could withdraw from the study at any time without attracting any penalty.

### **Risk/benefit of the study.**

There were no direct harm to the study participants except for possible minor discomforts in answering certain questions for which they may choose not to answer and the taking of

their time. Participants were also informed that they may not benefit directly or receive compensation for participation.



## CHAPTER FOUR

### 4.0 RESULTS

#### 4.1 Study population characteristics

A total of 61 nurses and prescribers from the four hospitals and 40 in-patients admitted for severe malaria participated in the study. Four hundred and four patient record books or folders were also reviewed. Nobody declined to participate in the study.

#### 4.1.1 Health facility characteristics

Two of the health facility are located in the Central sub-district. Triaging system was practiced in only one of the health facilities. Only one health facility had separate queues for adults and children at the outpatient department. There were treatment aide memoirs in the consultation rooms and wards as well as separate weighing scales for both adults and paediatrics at the OPD in all the health facilities.

None of the health facilities could demonstrate evidence of existence of quality assurance systems practiced at their various facilities. An average of 3 thermometers could be counted at the OPD unit likewise a functional microscope in all the facilities. Rapid diagnostic test (RDT) kits for malaria were available at three of the four health facilities. Two of the facilities reported that they obtain their supply of RDTs from the regional medical store for free and the other facility said they purchase them from the open market. Full blood count/haemoglobin measurement equipment were available in three of the health facilities. The fourth facility had a haematology analyzer; however it was not functioning as it was under repairs. All the health facilities demonstrated an evidence of supervisory visit by the National malaria control programme (NMCP) in the last six months (Table 3).

**Table 3. Distribution of health facility characteristics**

Characteristics	N=4	
	No.	Percentage (%)
<b>Type of health facility</b>		
Government hospital	2	50
Faith based (CHAG) hospital	1	25
Private hospital	1	25
<b>Facility level indicators</b>		
Health facilities with defined triage system	1	25
Presence of separate lines for adults and children in OPD	1	25
Availability of Treatment aide memoirs in wards	4	100
Availability of weighing scales (Adults)	4	100
Availability of weighing scales (Paediatrics)	4	100
Availability of functional quality assurance system	0	0
Availability of standard treatment guidelines	4	100
Availability of functional thermometer	4	100
Availability of a functional microscope	4	100
RDT available	3	75
Functional FBC/Hb measurement analyzer	3	75
Supervisory visit in last 6 months	4	100

The health facility assessment revealed that, there was no stock out of any of the following antimalarials; IV/IM quinine, IV/IM artesunate, artesunate/amodiaquine or Artemeter/lumefantrine, 5% dextrose and IV giving sets. However, there was stock out of rectal artesunate and IM arthemeter in all the health facilities. Blood for transfusion was available in two health facilities. The remaining two did not have some available since they

received from the Tamale teaching hospital whenever they need some. Blood transfusion set and 50% dextrose were available in two of the facilities (Table 4).

**Table 4. Availability and stock out of anti-malarial and supplies at the facility level**

Drugs	Health facility			
	Tamale central	Tamale west	SDA hospital	Kabsad hospital
IV/IM Quinine	√	√	√	√
Quinine syrup/tablet	√	X	√	√
IV/IM Artesunate	√	√	√	√
Rectal Artesunate	X	X	X	X
IM Arthemeter	X	X	X	X
Artesunate Amodiaquine	√	√	√	√
Arthemeter lumefantrine	√	√	√	√
<b>Supplies</b>				
5% dextrose	√	√	√	√
50% dextrose	√	√	X	X
Blood for transfusion	√	√	X	X
Blood transfusion sets	√	√	X	X
IV giving sets	√	√	√	√

√ - anti-malarial and supplies available

X – anti-malarial and supplies out of stock/ unavailable

#### 4.1.2 Health workers characteristics

Majority of the health workers 45 (69.2%) were nurses/midwives. Most of the nurses (46.7%, 21/45) were Enrolled nurses. There were 16 prescribers made up of six (37.5%) Physician Assistance, five (31.3%) Medical officers, three (18.8%) Clinical officers and a Medical herbalist and a Specialist. Females represented the majority of the health workers 39 (64%). The median duration of service at the current post was 1 year 8 months.

Less than half, 27 (44.3%) of the health workers indicated that they have received training on integrated management of childhood illness (IMCI). Most of the health workers reported that they provide counselling to their patients on the following; correct dosage of drugs 52 (92.9%), prevention of disease 40 (71.4%), the etiology of diseases 15 (26.8%) and the need for follow-up 26 (46.4%). Forty-two (68.9%) of the health workers indicated that they own the standard treatment guideline 2010, 6<sup>th</sup> edition.

Of the 16 prescribers, nine (56.3%) reported they have been supervised by colleague both within and outside their health facilities in the last six months on case management of malaria. According to 12 (75.0%) of the prescribers, severity of the disease and age of the patient were the factors they considered most before requesting laboratory test for malaria. These were followed by the possession of NHIS card before the preference of the patient six (37.5%) and two (12.5%) respectively. Regarding factors that influence the dosage of drugs prescribed, 15 (93.8%) prescribers mentioned the weight of patients, 12 (75.0%) also consider the cost of drug, and age of patient and possession of NHIS card as 10 (62.5%) and 7 (43.8%) respectively.

All the nurses that were interviewed said they record suspected adverse reactions of any of the drugs used in their facility in the nurse's notes and report to the immediate in-charge of the ward. A fewer health workers, 26 (42.6%), reported of using Glasgow coma scale to

routinely monitor unconscious patient with severe malaria. It was also revealed in all the health facilities that inpatient blood for laboratory investigation were taken by the nurses. Such samples were given to patient relatives to be taken to the laboratory for investigation and results returned to the ward (Table 5).

**Table 5. Characteristics of health workers by health facility**

Characteristics of health workers	Health facilities		Total N=61 (%)
	Government hosp. N=53 (%)	Private hosp. N = 8 (%)	
<b>Sex</b>			
Male	20 (91)	2 (9)	22 (36.1)
Female	33 (84.6)	6 (15.4)	39 (63.9)
<b>Categories</b>			
Medical doctor	4 (80)	1 (20)	5 (8.2)
Clinical officer	3 (100)	0	3 (4.9)
Physician assistance	5 (83.3)	1 (16.7)	6 (9.8)
Medical Herbalist	1 (100)	0	1 (1.6)
Specialist	1(100)	0	1 (1.6)
Staff Nurse	16 (88.9)	2 (11.1)	18 (29.5)
Midwife	2 (100)	0	2 (3.3)
Enrolled nurse	17 (85.0)	3 (15.0)	20 (32.7)
Nursing assistance	0	1 (100)	1 (1.6)
Students nurses	4 (100)	0	4 (6.6)
<b>Duration of service</b>			
In service at current post for <12 months	18 (81.8)	4 (18.2)	22 (36)
Health worker ever undergone IMCI training	27 (100)	0	27 (44.3)
Possession of malaria treatment guidelines	39 (92.9)	3 (7.1)	42 68.9)

#### 4.1.3 Patient characteristics

The majority 241 (59.7%) of patients records reviewed were aged < 5 years, most of them 225 (55.7%) males. The median age of these patients was 3 years (Table 6).

**Table 6. Distribution of patients in records review sample by type of health facility.**

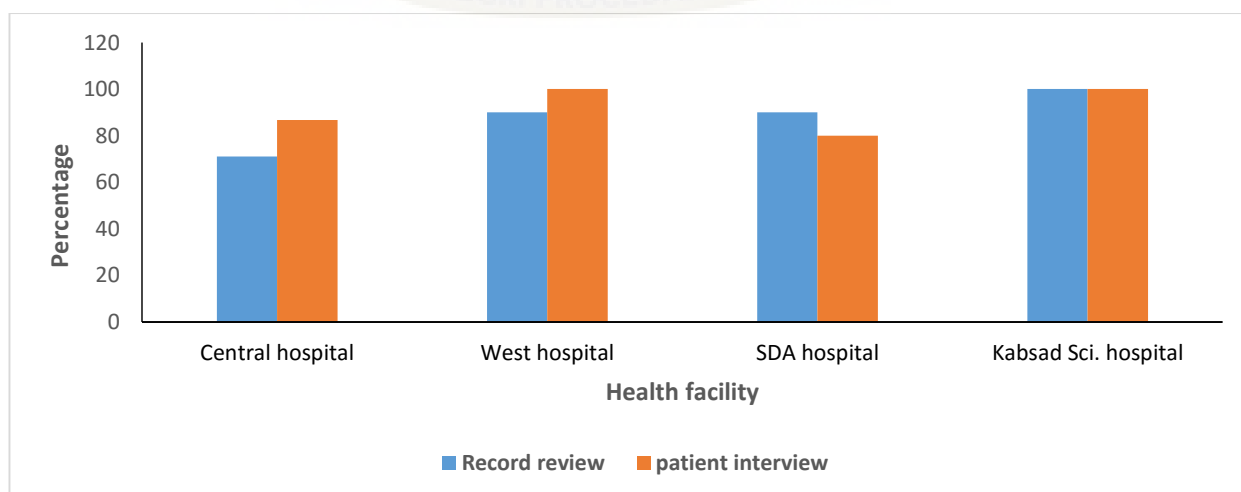
Patient Characteristics		Health facility				Overall
		Tamale central n (%)	Tamale west n (%)	SDA hospital n (%)	Kabsad Sci. hospital n (%)	
<b>Age</b>	0-4 years	77 (48.1)	89 (74.2)	47 (58.7)	28 (63.6)	241 (59.7)
	5-12 years	31 (19.4)	13 (10.8)	6 (7.5)	6 (13.6)	56 (13.9)
	>12 years	52 (32.5)	18 (15)	27 (33.8)	10 (22.7)	107 (26.5)
<b>Sex</b>	Male	77 (48.1)	82 (68.3)	38 (47.5)	28 (63.6)	225 (55.7)
	Female	83 (51.9)	38 (31.7)	42 (52.5)	16 (36.4)	179 (44.3)
<b>Total</b>		160 (100)	120 (100)	80 (100)	44 (100)	404 (100)

Out of 40 patients interviewed, 23 (57.5%) were males and 24 (60%) were below the age of five years. The median age of the patients was 9 years and 28 (70%) had their biological mothers taking care of them at the ward. The median waiting time before a patient received care at the health facility was 45 minutes. About 15 (37.5%) of patients reported they received care in less than 30 minutes and 18 (45%) within 1 hour of visiting the facility. However 7 patients (17.5%) waited for more than an hour before receiving any care. Majority of the cases on admission at the health facilities were fever, 39 (97.5%). Among these 40 interviewed patients, patients age, body temperature and weight were assessed for all the hospitalized patients with only 3 (7.5%) who had their blood pressure measured. The mean duration of patient admitted at the time of interview was 2 days with 27 patients (67.5%) admitted for  $\leq$  2 days, and 8 (20%) for more than 3 days (Table 7).

**Table 7. Characteristics of patient interviewed by type of health facility**

Patient Characteristics		Health facility				Overall
		Tamale central	Tamale west	SDA hospital	Kabsad Sci. hospital	
		n (%)	n (%)	n (%)	n (%)	
<b>Age</b>	0-4 years	8 (53.3)	5 (50)	7 (70)	4 (80)	24 (60)
	5-12 years	4 (26.7)	4 (40)	2 (20)	1 (20)	11 (27.5)
	>12 years	3 (20)	1 (10)	1 (10)	0	5 (12.5)
<b>Sex</b>	Male	8 (53.3)	4 (40)	7 (70)	4 (80)	23 (57.5)
	Female	7 (46.7)	6 (60)	3 (30)	1 (20)	17 (42.5)
<b>Total</b>		15 (100)	10 (100)	10 (100)	5 (100)	40 (100)

The records for patients who possess valid NHIS card were 350 (86.6%), out of which majority were males 204 (58.3%). All patients who attended Kabsad Scientific hospital possessed a valid NHIS card. From the interview, patients’ hospitalized with a diagnosis of severe malaria who had a valid NHIS card were 36 (90%) with most of them being male 21(58.3%) (Figure 4).



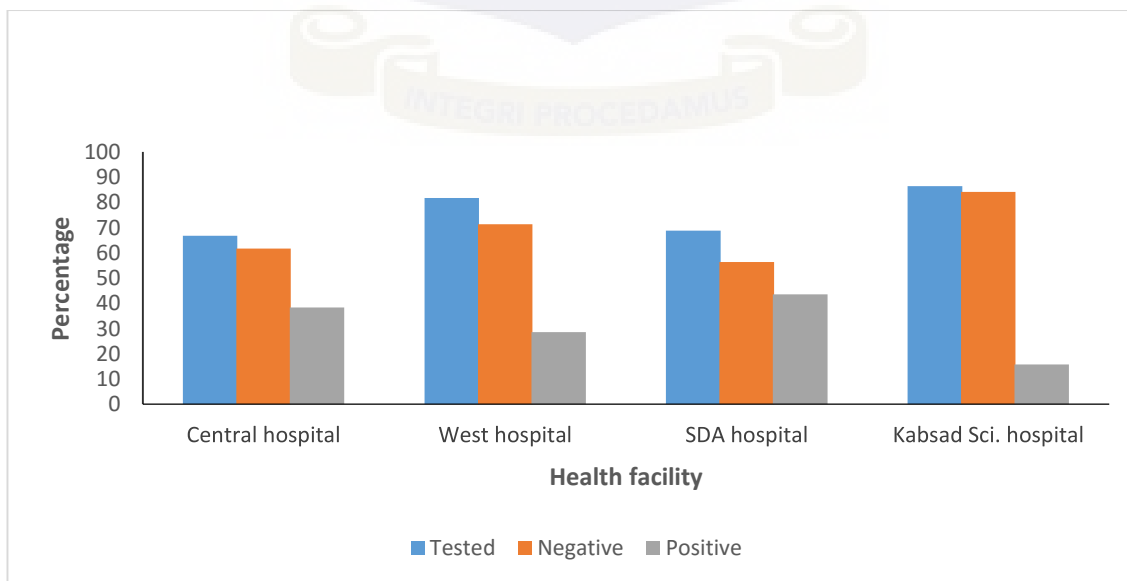
**Figure 4: Distribution of patients with NHIS by health facility**

## 4.2 Case management practice

### 4.2.1 Performance of assessment tasks

Out of 404 patients record reviewed, history of fever was the commonest principal complaint 372 (92.1%). Body temperature and weight were assessed in 392 (97.0%) and 399 (98.8%) of patients respectively. Glucose test was done for only 15 (3.7%) patients and 232 (57.4%) patients had their respiratory rate checked. Severe malaria alone was the diagnosis documented in 336 (83.2%) patients recorded. Severe malaria with anaemia and severe malaria with other diagnosis were documented in 43 (10.6%) and 25 (6.2%) respectively.

Rapid diagnostic test (RDT) were used to test for malaria for patients in three of the hospitals with the exception of Tamale central hospital, who perform blood smear for microscopy. Laboratory diagnostic test for malaria were requested for 298 (73.8%) patients. Presumptive treatment of malaria was done in the rest of the patients since every patient included in this sample was diagnosed and treated for severe malaria. Among those tested, 99 (33.2%) tested positive for both the blood smear and RDTs (Figure 5).



**Figure 5: Proportion of Severe malaria patients tested (microscope or RDT) by Health facility**

Full blood count/haemoglobin level were requested for 246 (60.9%) patients for the diagnosis of anemia. Thirty patients received blood transfusion, mostly male 20 (66.7%) and below the age of 5 years 25 (83.3%). Table 8. Shows the haemoglobin concentration for diagnosis of anaemia by age.

**Table 8. Haemoglobin concentration for diagnosis of anaemia by age**

Population	Non-anemia	Mild	Moderate	Severe	Overall
6-59 months	37 (>11.0g/dl)	19 (10.0-10.9g/dl)	73 (7.0-9.9g/dl)	22 (<7.0g/dl)	151
5-11 years	12 (>11.5g/dl)	2 (11.0-11.4g/dl)	12 (8.0-10.9g/dl)	4 (<8.0g/dl)	30
12-14 years	3 (>12.0g/dl)	0 (11.0-11.9g/dl)	1 (8.0-10.9g/dl)	0 (<8.0g/dl)	4
Female adult	17 (>12.0g/dl)	6 (11.0-11.9g/dl)	13 (8.0-10.9g/dl)	2 (<8.0g/dl)	38
Male adult	10 (>13.0g/dl)	7 (11.0-12.9g/dl)	4 (8.0-10.9g/dl)	2 (<8.0g/dl)	23
Total	79	34	103	30	246

From the record review, all the hospitalized patients received antimalarial for both tested positive and negative for malaria. The proportion of in-patients with a negative blood smear or RDT but received antimalarial treatment was 199 (66.8%) out of 298 tests requested. The disregard for the negative test result was more frequent in the Kabsad Scientific hospital as they treated 84.2% (32/38) of patients who tested negative.

Majority 288 (71.3%) of the 404 patients were given IV Artesunate whilst 74 (18.3%) received IV Quinine as an initial parenteral antimalarial drug, with correct recommended dose and dosing regimen. From the records reviewed, Artemeter Lumefantrine was the most prescribed anti-malarial for 186 (46.0%) patient with severe malaria as a second line of treatment. A total of 379 (93.8%) of all prescriptions included analgesics (paracetamol suppository/tablet, diclofenac), and 310 (76.7%) antibiotics. Other prescriptions included, 91(22.5%) Iron/multivitamin, 65 (16.1%) Zinc tab, 39 (9.7%) ORS and others such as

antihelminthics, diazepam and cough syrups. Each patient was given at least three drugs. As many as 385 (95.3%) received prescriptions covering more than four drugs. Overall, only 96 (23.8%) of the patients were appropriately diagnosed (parasitologically confirmed) and treated in accordance to the national treatment guideline for severe malaria (Table 9).

**Table 9. Anti-malarials prescribed according to malaria classification by health facility**

Antimalarial drug prescribe	Health facility				Overall
	Tamale central	Tamale west	SDA hospital	Kabsad hospital	
IV Quinine	13	2	58	1	<b>74</b>
IM Quinine	9	6	0	0	<b>15</b>
Quinine syrup/tablet	5	4	54	0	<b>63</b>
IV Artesunate	126	103	17	42	<b>288</b>
IM Artesunate	4	0	0	0	<b>4</b>
Rectal Artesunate	0	0	0	0	<b>0</b>
IM Arthemeter	0	0	0	0	<b>0</b>
Artesunate Amodiaquine	4	2	0	0	<b>6</b>
Arthemeter lumefantrine	98	34	20	34	<b>186</b>
<b>Total</b>	<b>259</b>	<b>151</b>	<b>149</b>	<b>77</b>	<b>636</b>

Of the 40 in-patients interviewed, drugs required for treatment were bought by 18 (45%) and medical supplies by 24 (60%) patients at a mean cost of Gh 20.0 and Gh 10.0 respectively. Half of the patient/caretakers 20 (50%), reported that the health workers explain the diagnosis and treatment to them and that they are satisfied with the service delivery.

#### 4.2.2 Factors associated with the conformity of the malaria treatment policy

The factors that were retained in the bivariate analysis as independent predictors of conformity to the severe malaria treatment policy in the record review were; sex, patient age, possession of NHIS, history of fever, measured fever, malaria diagnosis, and weight. The bivariate analysis shows positive association between conformity of severe malaria treatment policy and factors such as age of patient less than 12 years (OR=1.2, 95% CI=0.74, 2.12), age of patient less than 5 years (OR=1.1, 95% CI=0.69, 1.77), possession of valid NHIS card (OR=1.3, 95% CI=0.62, 2.54) and history of fever (OR=1.7, 95% CI=0.65, 4.67). Statistically, all the differences were not significant ( $P \geq 0.05$ ) (Table 10).

**Table 10. Factors associated with conformity to the 2014 treatment policy for severe malaria**

Factor	Conformity N (%)	Unadjusted OR (95% CI)	P-value
<b>Sex</b>			
Male (n= 225 )	54 (24.0)	1.0 (0.64 -1.63)	0.90
Female (n= 179 )	42 (23.5)		
<b>Age</b>			
< 5 years (n= 241)	59 (24.5)	1.1 (0.69-1.77)	0.68
≥ 5 years (n= 163)	37 (22.7)		
≤ 12years (n= 294 )	73 (24.8)	1.2 (0.74-2.12)	0.41
>12 years (n= 110 )	23 (20.9)		
<b>Possession of NHIS card</b>			
Yes (n= 350)	85 (24.3)	1.3 (0.62-2.54)	0.53
No (n= 54)	11 (20.4)		
<b>History of fever</b>			
Yes (n= 372)	91 (24.5)	1.7 (0.65-4.67)	0.26
No (n= 32)	5 (15.6)		
<b>Measured fever</b>			
≥ 38.5°C (n= 234)	50 (21.4)	0.7 (0.44-1.12)	0.14
<38.5°C (n= 158 )	44 (27.8)		
<b>Measured weight</b>			
≤30 Kg (n= 290)	69 (23.8)	1.0 (0.62-1.77)	0.86
>30 Kg (n= 109)	25(23.0)		
<b>Malaria diagnosis</b>			
Severe malaria alone (n=336)	68 (20.2)	0.4 (0.21-0.63)	0.63
Severe malaria + other diagnosis (n=68)	28 (41.2)		

Moreover, there was no association between conformity of severe malaria treatment policy and factors including sex (OR=1.0, 95% CI=0.64, 1.63) and that of weight of patients (OR=1.0, 95% CI=0.62, 1.77). Measured temperature of 38.5 °C or more (OR=0.7, 95% CI=0.44, 1.12) and patients having additional diagnosis to severe malaria (OR=0.4, 95% CI=0.21, 0.63) are factors that were negatively associated with conformity to the severe malaria treatment policy (Table 11).

**Table 11. Signs and symptoms among Positive and Negatives cases of severe malaria**

<b>Symptoms</b>	<b>Positive (N=99) n (%)</b>	<b>Negative (N=199) n (%)</b>	<b>Unadjusted OR</b>	<b>95% CI</b>	<b>P-value</b>
Fever	94 (94.9)	181 (91)	1.9	0.7-5.2	0.22
Vomiting	90 (91)	169 (84.9)	1.7	0.8-3.9	0.15
Diarrhoea	73 (73.7)	151 (75.9)	0.9	0.5-1.6	0.69
Dry cough	64 (64.6)	136 (68.3)	0.8	0.5-1.41	0.52
Headache	20 (20.2)	47 (23.6)	0.8	0.45-1.48	0.50
Loss of appetite	36 (36.4)	75 (37.7)	0.9	0.57-1.56	0.82
<b>Signs</b>					
Convulsion	2 (2.0)	2 (1.0)	2.03	0.28-14.63	0.47
Jaundice	41 (41.4)	63 (31.7)	1.5	0.93-2.51	0.09
Generalized weakness	9 (9.1)	17 (8.5)	1.07	0.46-2.50	0.87
Pallor	87 (87.9)	170 (85.4)	1.2	0.60-2.54	0.56
Febrile	80 (80.8)	152 (76.4)	1.3	0.72-2.37	0.39
Fast breathing	2 (2.0)	5 (2.5)	0.8	0.15-4.20	0.79

Fever was the most common symptom among both the positive and negative cases of severe malaria (94.9% vs 91%, OR=1.9  $P=0.22$ ). There were positive association between positive severe malaria and fever and vomiting (91% vs 84.9, OR=1.7  $P=0.15$ ). Negative association was recorded between positive case of severe malaria and diarrhea, dry cough,

headache and loss of appetite (OR=0.9, 0.8, 0.8, 0.9 respectively). All the symptoms were statistically insignificant ( $P \geq 0.05$ ).

With respect to the sign of severe malaria, there were positive association between the severe malaria and jaundice (OR=1.5  $P=0.09$ ), generalized weakness (OR=1.07  $P=0.87$ ), pallor (OR=1.2  $P=0.56$ ) and being febrile (OR=1.3  $P=0.39$ ). Negative association was only seen in fast breathing (OR=2.03  $P=0.47$ ). There were no significant difference with respect to all the sign of severe malaria.



## CHAPTER FIVE

### 5.0 DISCUSSION

The study aimed at evaluating case management of severe malaria. From the results, severe malaria case management in the Tamale metropolis was sub-optimal, because there were several disregard to negative results for malaria and inappropriate treatment practices therefore the health facilities were not entirely conforming to the national treatment guidelines for severe malaria. The study observed that most of the health facilities do not practice patient triaging system and only one health facility had detached queues for children and adults at the OPD.

None of the four health facilities could demonstrate any indication of well-designed quality assurance practices in their facilities. This compares with findings by Ameme et al. (2014) where only three out of 17 health facilities demonstrated a functional quality assurance. All the health facilities possess a functional microscope but malaria microscopy was done in only one facility; the other three facilities use RDT kits. A similar finding to what Hamer et al. (2007) and Pulford et al. (2013) reported in Zambia and Papua New Guinea respectively. The low capacity of the health facilities to diagnose malaria using the microscopy may be related to unreliable electricity supply, reagents and slides and inadequate training for the laboratory personnel (Landman et al., 2015).

The four health facilities reported of having been supervised in the last 6 months by the National Malaria Control Programme (NMCP). This finding was in agreement with what was reported in the NMCP bulletin (2015) that supervision was their core mandate. This finding is however not consistent with that of a study in Uganda where less than 50% of health facilities received at least one routine supervisory visit during previous 6 months (Pariyo et al., 2005). These supervised visits by personnel's outside the health facility are likely to positively affect the performance of health facilities in terms of service delivery.

Haemoglobin measurement equipment were available in three of the health facilities; this finding is higher than what Achan et al. (2011) found in Uganda where 41 out of 105 of the facilities own haemoglobin analyzer. The haemoglobin measurement enable clinicians to assess patient for the diagnosis of anemia and other differential diagnosis such as sepsis, bleeding disorder etc.

A major challenge confronting these health facilities was stock-out of a number of items encompassed in the basic care package for management of severe malaria. In all the four facilities, there were stock-out of antimalarial such as rectal artesunate, IM arthemeter but 50% dextrose and blood for transfusion were only available in two health facilities. These stock-outs undermine quality case management of severe malaria. Comparable studies reveal similar finding where almost one third of public health facilities documented stock out of antimalarial (Abdelgader et al., 2012; Kangwana et al., 2009). These stock-out can be related to weaknesses in drug and medical supplies procurement, management and distribution practices (Achan et al., 2011). Patients were requested to buy medicine and medical supplies whenever these facilities were out of stock of these items. Similar findings was revealed by Ucacon et al. (2011) where patients were given prescription to buy antimalarial drug whenever the hospitals have stock-out of drug.

The proportion of health workers that had received in-service training on IMCI in their various health facilities were less than 50%. Training of health workers has been made known to be critical for case management improvement but this finding is likely to impede the provision of quality case management of severe malaria patients. Also, more than half of the health workers interviewed own the standard treatment guideline. This finding is similar to a study in Uganda by Pariyo et al. (2005) and Biai et al. (2007) in Guinea Bissau where they established a reduction in mortality after the implementation and training of standardized guidelines for management malaria in the health facilities. Contrary to what

was found in Zambia, Kenya and Malawi, where in service training on malaria management and possession of guideline were not associated with treatment quality of malaria case management (Chanda-Kapata et al., 2014; Osterholt et al., 2006; Zurovac et al., 2004).

In Ghana, the standard treatment guideline and malaria treatment guideline highlights the need for systematic laboratory testing but undoubtedly this has not been adhered to in all the health facilities. Generally, there has been reported improvement in the percentage of OPD malaria cases tested using microscopy from 29.6% in 2014 to 30.2% in 2015 (NMCP, 2015). However, severe malaria diagnosis has been characterized with presumptive diagnosis whereby prescribers only use clinical features of patient to give treatment without any diagnostic test. This phenomenon is not only restricted to Ghana as several studies have identified low rate of the use of diagnostic test for optimal treatment of patients.

From the result, a greater number 298 (73.8%) of the suspected malaria cases were tested but only 99 (24.5%) were positive to both microscopy and RDTs. Therefore, based on presumptive diagnosis, 75.5% of the patients with fever were diagnosed as malaria and therefore treated with antimalarial. This finding supports a study by Abdelgader et al. (2012) where 67% of patients were parasitologically diagnosed in Sudan. Another similar findings was revealed by Landman et al. (2015) where almost one third of patients not tested for malaria were treated with an anti-malarial in Haiti. Comparable studies have been reported in other parts of Africa including Uganda, Zambia and Tanzania (Achan et al., 2011; Chanda et al., 2011; Nsimba et al., 2002).

According to Chandler et al. (2008) clinicians treat patients based on presumptive diagnosis because of influence from peers and the pressure to conform to perceived expectations from colleagues as well as patients. The need for confirmation of malaria diagnosis using the microscope which is the Gold standard cannot be overemphasized. However, there is the

need for an effective, easy to use and quick laboratory test in order for clinicians to appropriately diagnose malaria (Malm, 2011). Sometimes the expertise to handle these microscopes are limited (Bell et al., 2006).

The results also show that the proportion of IV Artesunate as an initial parenteral antimalarial medicine for the severe malaria patient was higher 71.3% as compare to IV Quinine 18.3%. This finding contradict that found in Uganda by Achan et al. (2011) and Ucakon et al. (2011) where 75% and 84.6% of patient were correctly treated with IV Quinine respectively. Prescriber preference might be that Artesunate kills circulating ring-stage parasites, which can then be removed by the spleen, whereas quinine does not (SEAQUAMAT, 2005). Although presumptive diagnosis as well as prescribing antimalarial for patients who tested negative for malaria were quite common, compliance of the health worker to severe malaria treatment guideline for the positive cases was quite high, as 97% (96/99) of patients that tested positive received appropriate treatment that were in accordance with the standard treatment guideline.

In terms of the recommended second line treatment of severe malaria, 46% of patients were given the recommended Arthemeter Lumefantrine. The use of Arthemeter Lumefantrine as against Artesunate Amodiaquine as second line treatment where only six patients were given may be due to the earlier adverse reactions that accompanied its use in the early stages of its administration. The disregard for the negative test result was seen frequently in the private hospital as 84.2% of patients that tested negative were treated. The under-utilization of diagnostic results and inappropriate prescription of anti-malarials reported in this study has also been reported among private clinics in Kenya (Abuya et al., 2004)

In the bivariate analyses, history of fever was positively associated with conformity of severe malaria treatment policy. This means that, compared to those who do not have fever,

patients with fever were more likely to have been treated appropriately in accordance to the severe malaria treatment policy. This is comparable to findings by Zurovac et al. (2004) in their study where principal complaint of fever was associated with treatment quality. There is an impression that health workers have high index of suspicion for malaria when a patient's temperature is 37.5 °C or more. Such patients would therefore be treated more meticulously and in conformity to guidelines (Ameme et al., 2014).

### **5.1 Limitation of the study**

1. Using a self-administered questionnaire for the health workers, they may report what is desirable rather than what is really practiced. However, this has been catered for by triangulation of data using different approaches and data sources.
2. There is the possibility of recall bias as patients or mother/caretakers answered some of the questions from memory.
3. There was paucity of published information on current severe malaria management practices in sub-Saharan Africa, as most of the studies focuses on case management of uncomplicated malaria but the situation in many areas may not be very different from what has been observed in this study

## CHAPTER SIX

### 6.0 CONCLUSIONS AND RECOMMENDATIONS

#### 6.1 Conclusion

The case management of severe malaria in the Tamale metropolis was sub-optimal, with most facilities not fully conforming to the national and international treatment guidelines for severe malaria. There were substantial disregard for negative diagnostic test as most patients that tested negative for malaria were treated using antimalarials. This really affect accurate assessment for non-malarial causes of fever. The use of IV Artesunate and IV Quinine as a parenteral first line treatment as well as Arthemeter lumefantrine as second line for patients that tested positive for malaria were appropriate and in accordance with the national treatment guideline for severe malaria.

Lack of well design and practiced quality assurance was seen in all the health facilities. Less than half of the health workers interviewed had received training on IMCI. Patient/caretakers were requested to purchase drugs and other medical supplies due to stock out of these medical items. There was an association between appropriate treatment in accordance with the national treatment guideline of severe malaria and age (less than or equal to 12 years) and history of fever (OR = 1.2, 95% CI = 0.74, 2.12 and AOR = 1.7, 95% CI = 0.65, 4.67 respectively).

#### 6.2 Recommendation

The Ministry of Health

1. The ministry should intensify its efforts to promote confirmation of suspected malaria before treatment, by making available laboratory equipment and supplies like microscopy and rapid diagnostic tests kits for malaria diagnosis.

### Health facility management

1. Regular refresher training must be organized for the health workers and emphasis must be placed on proper assessment of patients, usage of diagnostic testing, appropriate decision to treat in accordance to the national and international treatment guideline for severe malaria. This training will ensure the health workers gain understanding of the causes of non-malaria fever thereby assuring them the reliability of the RDTs and microscopy methods of diagnosis and the effectiveness of the antimalarial drugs use for the treatment of severe malaria.
2. There should be functional quality assurance system in place in the health facilities encompassing of QA team, action plans, and capacity to implement their recommendations.
3. Stringent measures should be put in place to reduce the stock-outs of drugs and medical supply in the health facilities where patient are made to purchase these items outside the health facility.

### Future Researchers

1. Case management of severe malaria by health workers may change over time, so there is the need for follow up study with this study serving as a baseline. Moreover, future researchers may involve more health facility to depict the situation happening in the metropolis and the region in terms of severe malaria case management.

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## APPENDICES

### PARTICIPANT INFORMATION AND CONSENT FORM

<b>STUDY TITLE</b>	Severe malaria case management in selected Health facilities in the Tamale Metropolis, Northern region.
<b>INVESTIGATOR</b>	Enoch Opoku Antoh
<b>SUPERVISOR</b>	Dr. Francis Anto, Department of Epidemiology, School of Public Health

The purpose of this study is to assess the case management of severe malaria in the Tamale Metropolis. The study will involve health managers, health workers and patients in selected health facilities in the Metropolis. It is expected that the results will be used in planning health care delivery in the Metropolis. As part of this study, you have been selected to help in obtaining information for this study. Before agreeing to participate, it is important that you read the following explanation of the study.

**Voluntary participation:** Participation is voluntary and you are free to withdraw from the study at any time without being penalized in any way.

#### **Possible Risks and Discomforts**

The research will not pose any risks to you. You may however experience some minor discomfort when answering certain questions. You may refuse to answer any question if you feel uncomfortable about it.

#### **Possible Benefits**

“You may not benefit directly from this study but the findings would benefit the Metropolitan Health Management Team and the Ghana Health Service in planning health

delivery services. Your participation may therefore be helping in improving severe malaria case management in the Tamale Metropolis.”

### **Confidentiality**

“All the information obtained from this study will be confidential and used for the purpose indicated for the study. The information will be securely stored without your name, in a file which will be only be accessible to the research team. A number linked to a particular name will be kept confidential. The results of this study will be disseminated in such a way that no information will be linked to your identity.”

### **Contact Numbers**

If you have any questions, you may ask them now. You may also contact the following people if you have any challenges relating to your participation in the study:

Dr. Francis Anto

Enoch Opoku Antoh

**Hannah Frimpong**

Supervisor

Student

**GHS-ERC Administor**

Tel: 0244577063

Tel: 0243424581

**Tel: 0243235225/0507041223**

E-mail: [fanto@ug.edu.gh](mailto:fanto@ug.edu.gh)

E-mail: [enozia2003@yahoo.com](mailto:enozia2003@yahoo.com)

**[Hannah.Frimpong@ghsmail.org](mailto:Hannah.Frimpong@ghsmail.org)**

**PARTICIPANT AGREEMENT**

I have read the written information (or **have had the information read and adequately explained to me in a language I understand**) for the study “**SEVERE MALARIA CASE MANAGEMENT IN SELECTED HEALTH FACILITIES IN THE TAMALE METROPOLIS, NORTHERN REGION.**” “I have been given ample opportunity to have any questions I may have, answered to my satisfaction. I have also been given time and opportunity to consider taking part in this study. I therefore agree to participate in this study.

.....”

Signature or Thumbprint of Participant

Date

If a participant cannot read the document, then a Witness is needed:

I was present during the reading and explanation of the consent document to the participant.

All questions from the participant were duly answered and the participant agreed to participate in the study.

.....

Signature of Witness/parent/caretaker

Date

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

Name of officer conducting interview.....

Date.....

## DATA COLLECTION TOOLS

### Form A: Severe malaria survey tool - Checklist for each Health Facility

*“My name is Opoku Antoh Enoch, a student of the University Of Ghana, School Of Public Health. As part of my MPhil dissertation, I am collecting data on the quality of case management of severe malaria in the metropolis. The information generated will be useful to you, your facility, and the Metropolitan health services in planning your health service delivery.*

*All information collected from this survey will be confidential and using records for this survey will be voluntary. You can refuse to let me use any record. No names of patients will be collected in this study. I am asking for your assistance to ensure accurate information is collected. Should there be any person who is most appropriate in providing me any other information; I would appreciate you introducing me to that person.*

*Do you have any questions for me? Can we begin now?”*

1. Practising of triaging system YES  NO
2. Queues for adult and children YES  NO
3. Functional microscope in the laboratory YES  NO
4. RDT availability YES  NO
5. Source of the RDTs \_\_\_\_\_
6. Functional weighing scale for adult YES  NO
7. Functional weighing scale for children YES  NO
8. Thermometer available at OPD YES  NO  NUMBER \_\_\_\_\_
9. Thermometer available at ward YES  NO
10. Practise of quality assurance system YES  NO
11. Fbc/Hb analyser functional YES  NO
12. Type \_\_\_\_\_
13. Supervisory visit in the last 6 months YES  NO
14. Supervised by \_\_\_\_\_
15. Availability and stock out of anti-malarial and supplies at the facility level

	Number (%) available	Number (%) with stock out in last 3 months
Drugs		
IV Quinine		
IM Quinine		

Quinine syrup/tablet		
IV Artesunate		
IM Artesunate		
Rectal Artesunate		
IM Arthemeter		
Artesunate Amodiaquine		
Arthemeter lumefantrine		
Dihydroartemisinin-Piperaquine		
Supplies		
5% dextrose		
50% dextrose		
Blood for transfusion		
Blood transfusion sets		
IV giving sets		



**Form B: Severe malaria survey tool for Inpatient Interview**

Date \_\_\_/\_\_\_/\_\_\_

*“My name is Opoku Antoh Enoch, a student of the University Of Ghana, School Of Public Health. As part of my MPhil dissertation, I am collecting data on the quality of case management of severe malaria in the metropolis. The information generated will be useful to you, your facility, the Metropolitan health services in planning your health service delivery. This part of the study will interview you on how health worker manages patients with severe malaria.*

*All information collected from this survey will be confidential and using records for this survey will be voluntary. You can refuse to let me use any record. No names of patients will be collected in this study. I am asking for your assistance to ensure accurate information is collected. Should there be any person who is most appropriate in providing me any other information; I would appreciate you introducing me to that person.*

*Do you have any questions for me? Can we begin now?”*

**A. Geographic and Demographic information (GD)**

1. Patient’s age: \_\_\_\_\_ 2. Sex:  Male  Female
3. Caretaker characteristics (circle one): M (Male), F (Female)
- 4 Caretaker relationship to patient: (circle one)
1. Biological mother
  2. Biological father
  3. Spouse
  4. Other relative (Specify)\_\_\_\_\_ -  
\_\_\_\_\_

**B. Medical History (MH)**

1. Why did you come to the health facility (complaints at admission)
- |  |   |
|--|---|
| <input type="checkbox"/> Fever or h/o fever                      | <input type="checkbox"/> Loss of appetite   |
| <input type="checkbox"/> Diarrhoea                               | <input type="checkbox"/> Child convulsing   |
| <input type="checkbox"/> vomiting                                | <input type="checkbox"/> General body pains |
| <input type="checkbox"/> Fast breathing/ difficulty in breathing | <input type="checkbox"/> Headache           |
| <input type="checkbox"/> Loss of consciousness                   | Other (Specify)                             |

2. How long did the patient wait before receiving medical care? \_\_\_\_\_ (hours)?

3 Was your patient immediately assessed and given priority treatment over others? (triage).....(Y/N)

4 For how long have you/your patient been on the ward?\_\_\_\_\_ (days)

**C. Examination and Investigations (EI)**

1) Did any HW ask/record patient’s age during this visit? (Y / N)

- 2) Did any HW **measure weight**? (Y / N)
- 3) Did any HW **measure temperature**? (Y / N)
- 4) Did any HW take the patient's pulse? (Y / N)
- 5) Did any HW take the patients pressure? (Y / N)

6. Was the patient sent to the laboratory for investigations (Y / N)

What specimen (samples) were taken

- a) blood
- b) urine
- c) stool
- d) CSF ( water off the back)

#### D. Communication and counseling

Answer Yes or No for all the questions below

- 1. Did the HW offer you or your patient reassurances? (Y/N) [ ]
- 2. Did they explain the diagnosis [ ]
- 3. Did they explain to you the treatment given (Y/N) [ ]
- 4. Did the HW tell you how often to take the medicine [ ]
- 5. Were you told who to call when the patients condition worsened [ ]
- 6. Did they seek consent for the tests? (Y/N) [ ]
- 7. Did they interpret results to the patient and care givers? (Y/N) [ ]
- 8. Did the HW ask you to return immediately if you or your child **becomes sicker**? [ ]
- 9. Were you or your patient given any injectable antimalarials?
  - 1. Yes
  - 2. No
  - 3. Doesn't know
  - a. How was the injection given? [ ]
    - i. Intravenous (In a drip) (Y/N)
    - ii. On the buttocks (Y/N)
    - iii. On the thighs (Y/N)
    - iv. Not sure (Y/N)
  - b. How many injections were you given per day? [ ]
    - i. One (Y/N)
    - ii. Two (Y/N)
    - iii. Three (Y/N)
    - iv. Other, Specify\_\_\_\_\_

- c. For how many days were the injections given?
- i. One (Y/N)
  - ii. Two (Y/N)
  - iii. Three (Y/N)
  - iv. Four (Y/N)
  - v. Five (Y/N)
  - vi. Other, Specify \_\_\_\_\_

Did you buy any medicines that were not available in the hospital? [ ]

What medicine did you buy \_\_\_\_\_

How much did you spend on these medicines? \_\_\_\_\_

Did you buy any medical supplies [ ]

List what you bought \_\_\_\_\_

How much did this cost you? \_\_\_\_\_

---

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**E. Satisfaction with care given**

1. What do you think of the services provided at this facility? (read all options to the patient/caretaker)

- a. Good as they are
- b. Should be improved. If this option chosen, list what should be improved
  - i. \_\_\_\_\_
  - ii. \_\_\_\_\_
  - iii. \_\_\_\_\_
  - iv. \_\_\_\_\_
- c. Doesn't know

2. What do you think about the time you had to wait to see the health worker on the day you/your patient was admitted? (read all options to the patient/caretakers)

- d. Definitely too long
- e. Long
- f. Acceptable
- g. Short
- h. Doesn't know

3. While on the ward, how often were you/your patient examined by the health workers? (read all options to the patient/caretakers)

- i. Once every day
- j. Twice daily
- k. Three times daily
- l. On alternate days
- m. Once in three days
- n. Never seen

o. Others, Specify \_\_\_\_\_

4. What type of medication did the health worker give or prescribe for you or your patient?

- p. Injectables
- q. Oral medication
- r. Both

---

**D Patient triage (PT)**

1. How long did the patient wait before receiving medical care?.....?

2. Was your patient immediately assessed and given priority treatment over others?(triage).....(Y/N)

3. Were there health workers look out for very sick patients and getting them quick attention (Y/N)

---

**F. Referral History**

1. Were you referred to this facility from a lower health centre? (Y/N)[

2. What type of facility \_\_\_\_\_

3. Were you given any pre-referral medication (Y / N)

4. What were the reasons why you were referred?

i. Lack of blood for transfusion at the facility (Y / N)

ii. Poor response to treatment given (Y / N)

iii. Lack of I.V fluids (Y / N)

iv. Lack of Oxygen (Y / N)

v. No beds available to admit patient (Y / N)

vi. Others, specify \_\_\_\_\_

5. Were you given any support to get to this health facility? (Y/N)

**Form C: Record reviews for the patient:**

**Medical record number:** \_\_\_\_\_

**Section 1: History**

Is the clinical history documented in the medical record? <i>Please indicate if the symptom is commented on in the medical record, not whether the symptom was present or absent.</i>			
History / Symptom/sign	Recorded?	History / Symptom/sign	Recorded?
Age	<input type="checkbox"/> Yes <input type="checkbox"/> No	Loss of consciousness	<input type="checkbox"/> Yes <input type="checkbox"/> No
Sex	<input type="checkbox"/> Yes <input type="checkbox"/> No	Loss of appetite	<input type="checkbox"/> Yes <input type="checkbox"/> No
Fever	<input type="checkbox"/> Yes <input type="checkbox"/> No	Vomiting	<input type="checkbox"/> Yes <input type="checkbox"/> No
Weakness	<input type="checkbox"/> Yes <input type="checkbox"/> No	Diarrhea	<input type="checkbox"/> Yes <input type="checkbox"/> No
Pallor	<input type="checkbox"/> Yes <input type="checkbox"/> No	Cough	<input type="checkbox"/> Yes <input type="checkbox"/> No
Jaundice	<input type="checkbox"/> Yes <input type="checkbox"/> No	Fast breathing	<input type="checkbox"/> Yes <input type="checkbox"/> No
Convulsions	<input type="checkbox"/> Yes <input type="checkbox"/> No	Headache	<input type="checkbox"/> Yes <input type="checkbox"/> No

**Section 2: Physical examination**

Is the physical exam documented in the medical record? <i>Please indicate whether the physical exam is recorded, not whether the findings were normal or abnormal.</i>			
Exam finding	Recorded?	Exam finding	Recorded?
Temperature	<input type="checkbox"/> Yes <input type="checkbox"/> No	Respiratory rate	<input type="checkbox"/> Yes <input type="checkbox"/> No
If yes, record temperature	_ _ _ _ · _ _ _  °C	Pulse rate	<input type="checkbox"/> Yes <input type="checkbox"/> No
Weight	<input type="checkbox"/> Yes <input type="checkbox"/> No	Inability to sit or stand	<input type="checkbox"/> Yes <input type="checkbox"/> No
If yes, record weight	_ _ _ _  kg	Comment on mental status	<input type="checkbox"/> Yes <input type="checkbox"/> No
Evidence of pallor/anemia	<input type="checkbox"/> Yes <input type="checkbox"/> No	Comment on chest indrawing	<input type="checkbox"/> Yes <input type="checkbox"/> No
Evidence of jaundice	<input type="checkbox"/> Yes <input type="checkbox"/> No	Abdominal exam	<input type="checkbox"/> Yes <input type="checkbox"/> No

**Section 3: Investigations**

<b>Are laboratory and radiology investigations documented in the medical record?</b> <i>Please indicate whether the tests were ordered, and if results were recorded, not if the tests were abnormal.</i>				
Investigation	Ordered?	Investigation	Recorded?	What was the result?
Blood smear & RDTs	<input type="checkbox"/> Yes <input type="checkbox"/> No	If BS ordered, is result recorded?	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Hemoglobin (Hb)	<input type="checkbox"/> Yes <input type="checkbox"/> No	If Hb ordered, is result recorded?	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Complete blood count	<input type="checkbox"/> Yes <input type="checkbox"/> No	If CBC ordered, is result recorded?	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Glucose	<input type="checkbox"/> Yes <input type="checkbox"/> No	If glucose ordered, is result recorded?	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Chest X-ray	<input type="checkbox"/> Yes <input type="checkbox"/> No	If CXR ordered, is result recorded?	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Other X-ray	<input type="checkbox"/> Yes <input type="checkbox"/> No	If Xray ordered, is result recorded?	<input type="checkbox"/> Yes <input type="checkbox"/> No	

**Section 4: Impression**

<b>Is the impression of the suspected diagnosis documented in the medical record?</b> <i>What diagnoses were recorded? Tick all that apply.</i>			
Impression	Recorded?	Impression	Recorded?
Malaria	<input type="checkbox"/> Yes <input type="checkbox"/> No	Pneumonia	<input type="checkbox"/> Yes <input type="checkbox"/> No
Severe malaria	<input type="checkbox"/> Yes <input type="checkbox"/> No	Diarrhea / Dysentery	<input type="checkbox"/> Yes <input type="checkbox"/> No
Cerebral malaria	<input type="checkbox"/> Yes <input type="checkbox"/> No	Malnutrition / PEM	<input type="checkbox"/> Yes <input type="checkbox"/> No
Severe anemia	<input type="checkbox"/> Yes <input type="checkbox"/> No	Measles	<input type="checkbox"/> Yes <input type="checkbox"/> No
Meningitis	<input type="checkbox"/> Yes <input type="checkbox"/> No	Other:	<input type="checkbox"/> Yes <input type="checkbox"/> No
Final diagnosis on face sheet	<input type="checkbox"/> Yes <input type="checkbox"/> No	If yes, please indicate Dx:	
Final diagnosis in notes	<input type="checkbox"/> Yes <input type="checkbox"/> No	If yes, please indicate Dx:	
Outcome / disposition	<input type="checkbox"/> Yes <input type="checkbox"/> No	If yes, please indicate:	<input type="checkbox"/> Discharged <input type="checkbox"/> Died <input type="checkbox"/> Ran away



**Form D: Severe malaria survey tool - For Health worker interview (NURSES)**

*“My name is Opoku Antoh Enoch, a student of the University Of Ghana, School Of Public Health. As part of my MPhil dissertation, I am collecting data on the quality of case management of severe malaria in the metropolis. The information generated will be useful to you, your facility, and the Metropolitan health services in planning your health service delivery.*

*All information collected from this survey will be confidential and using records for this survey will be voluntary. You can refuse to let me use any record. No names of patients will be collected in this study. I am asking for your assistance to ensure accurate information is collected. Should there be any person who is most appropriate in providing me any other information; I would appreciate you introducing me to that person.*

*Do you have any questions for me? Can we begin now?”*

**A. Demographic information**

1. Name of health facility: \_\_\_\_\_ 2. Sex Male   
Female

3. Cadre to be interviewed:

- i. Nursing Aid / Asst
- iii. Nursing Officer
- iv. Enrolled Nurse
- v. Midwife only
- vi. Community health nurse
- x. Other \_\_\_\_\_

4. Duration you have been at current post? \_\_\_\_\_

---

**B. Provider knowledge and Experience on severe malaria and its management**

1. Do you personally provide care for patients with severe malaria? YES  NO
2. Do you record and report suspected adverse reactions of any of the drugs that you use in your facility? ( Y / N )
3. If Y, were do you record \_\_\_\_\_
4. Who do you report to \_\_\_\_\_
5. If N, why not? \_\_\_\_\_
6. Do you think that qualified nurses are competent enough to start patients with severe malaria on treatment with IV quinine without waiting for the clinical officer or doctor to prescribe? ( Y / N )
7. Do you routinely monitor unconscious patients with severe malaria?
8. i. Glasgow coma scale ( Y / N )
9. ii. Blantyre coma scale ( Y / N )

**Care and monitoring**

**(CM)**

1. What cadre of staff are always available on the ward.

Staff	Number
Nursing Aid / Asst	
Registered Nurse	
Enrolled Nurse	
Community health nurse	
Doctor/Physician Assistant	

2. How often do you measure the following parameters in patients with severe malaria on the first day of admission?

Parameter	Frequency (hourly)
i. Temperature	
ii. Pulse	
iii. Blood pressure	
iv. Respiratory rate	
v. Unconsciousness	
vi. Blood glucose	
vii. Convulsions	
viii. Haemoglobin concentration	
ix. Parasitaemia	

**Investigations**

**(IG)**

1. List the investigations that can routinely be carried out on patients with severe malaria in your health facility?

- i. \_\_\_\_\_
- ii. \_\_\_\_\_
- iii. \_\_\_\_\_
- iv. \_\_\_\_\_

2. In severe malaria patients, do you routinely repeat the blood smear for malaria parasites to monitor parasite clearance?

3. If Y, how often? \_\_\_\_\_

4. If N, why not? \_\_\_\_\_

3. Who routinely takes the blood specimens from the patients? \_\_\_\_\_

4. Who routinely takes the specimens to the laboratory? \_\_\_\_\_

5. Are urgent laboratory requests marked in any special way? (Y / N)

6. If Y, in what way? \_\_\_\_\_

7. If Y, does the laboratory process them urgently? (Y / N)

8. If Y, what is the average time to get them back? \_\_\_\_ (hours)

9. Who routinely collects the lab results from the laboratory? \_\_\_\_\_

---

1. What specific aspects of care are weak in your health facility?

i. \_\_\_\_\_

ii. \_\_\_\_\_

iii. \_\_\_\_\_

3. What specific aspects of care are done very well in your health facility?

i. \_\_\_\_\_

ii. \_\_\_\_\_

iii. \_\_\_\_\_

4. What suggestions do you have to improve the quality of care given to patients with severe malaria in your health facility?

i. \_\_\_\_\_

ii. \_\_\_\_\_

iii. \_\_\_\_\_

iv. \_\_\_\_\_

5. Do you have a copy of the following?

National Malaria Drug policy

Malaria Treatment Guidelines

Standard Treatment Guidelines

Malaria Counselling Card

None

Nurses Dictionary

6. Have you had the opportunity to improve your skills at malaria case management in the last 12 months? ( Y / N )

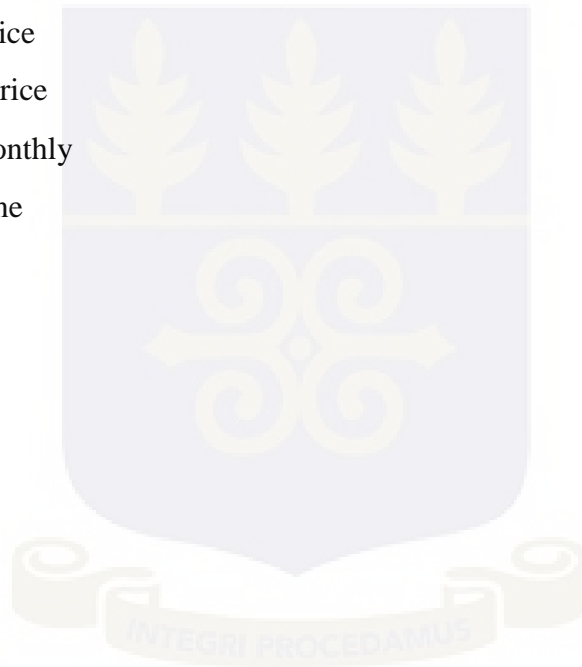
12a. If Y, how?

- i. At workshops
- ii. Teaching by a colleague/senior from within the health facility
- iii. Teaching by someone from outside the health facility
- iv. Reading printed material / self teaching
- v. Other, specify \_\_\_\_\_

7. Have you ever undergone IMCI training? ( Y / N )

8. How often have you been supervised in the last 6 months?

- i. Once
- ii. Twice
- iii. Thrice
- iv. Monthly
- v. None



**Form E: Severe malaria survey tool - For Health worker interview (PRESCRIBERS)**

*“My name is Opoku Antoh Enoch, a student of the University Of Ghana, School Of Public Health. As part of my MPhil dissertation, I am collecting data on the quality of case management of severe malaria in the metropolis. The information generated will be useful to you, your facility, and the Metropolitan health services in planning your health service delivery.*

*All information collected from this survey will be confidential and using records for this survey will be voluntary. You can refuse to let me use any record. No names of patients will be collected in this study. I am asking for your assistance to ensure accurate information is collected. Should there be any person who is most appropriate in providing me any other information; I would appreciate you introducing me to that person.*

*Do you have any questions for me? Can we begin now?”*

**A. Demographic information**

1. Name of health facility: \_\_\_\_\_ 2. Sex Male

Female

3. Cadre to be interviewed:

i. Medical Officer

iv. Nursing officer

ii. Senior Medical officer

vi.

iii. Physician Assistance

Other \_\_\_\_\_

v. Consultant

4. Duration you have been at current post? \_\_\_\_\_

---

**B. Provider knowledge and Experience on severe malaria and its management**

16. Do you personally provide care for patients with malaria? YES

NO

2. Do you usual make a **final** diagnosis based on:

i. clinical features only (presumptive) [ ]

ii. clinical features and diagnostic tests (confirmatory) [ ]

3. Do you routinely order laboratory test for patients with fever/ suspected malaria? YES

NO

If yes what laboratory tests do you routinely ask for?

Blood film for malaria parasites  RDT

Haemoglobin  Other, Specify.....

4. What factors do you consider before requesting laboratory test for malaria parasites?

- Severity of the disease
- Age of the patient
- Patient's preference
- Other, Specify.....
- Possession of NHIS
- Patient's educational status
- Patient's occupation

6. What antimalarial drugs do you **routinely** give severe malaria cases (as treatment)?

- Quinine
- Chloroquine
- Artemether
- Artemether-lumefantrine
- Amodiaquine
- Artesunate
- Chloroquine / SP tablets
- Other \_\_\_\_\_
- Referred without treatment

7. What route do you routinely use to give the antimalarial

- IM injection
- IV infusion
- Oral tablets or syrup
- Rectal
- Not applicable

8. What factors influence the dosage of the drugs you prescribe?

- Age of patient
- Weight of the patient
- Standard Treatment Guidelines
- Other, Specify \_\_\_\_\_
- Cost of drug
- Side effects of treatment
- NHIS

9. Are children weighed before an antimalarial is prescribed? ( Y / N )

10. If you counsel your patients, what do you counsel them on?

---

11. What problems do you face in managing severe malaria cases?

- a) \_\_\_\_\_
- b) \_\_\_\_\_
- c) \_\_\_\_\_
- d) \_\_\_\_\_

12. Do you have a copy of the following?

- National Malaria Drug policy
- Malaria Treatment Guidelines

- Standard Treatment Guidelines                       Malaria Counselling Card
- None     Nurses Dictionary

13. Do you routinely ask the patient to come for follow-up visit? ( Y / N )

14. Have you had the opportunity to improve your skills at malaria case management in the last 12 months? ( Y / N )

14a. If Y, how?

- i. At workshops
- ii. Teaching by a colleague/senior from within the health facility
- iii. Teaching by someone from outside the health facility
- iv. Reading printed material / self teaching
- v. Other, specify \_\_\_\_\_

15. Have you ever undergone IMCI training? ( Y / N )

### Referral system

*(Do not complete this section if the health facility does not refer patients or if the interviewee is not involved in referring patients)*

1. Do you often refer patients with severe malaria ( Y / N )

2. What are the reasons why you decide to refer patients with severe malaria?

- i. Lack of blood for transfusion at the facility ( Y / N )
- ii. Poor response to treatment given ( Y / N )
- iii. Lack of I.V fluids ( Y / N )
- iv. Lack of Oxygen ( Y / N )
- v. No beds available to admit patient ( Y / N )
- vi. Others, specify \_\_\_\_\_

3. When you refer to another health facility do you give any pre-referral medications (Y / N)

4. If Y, what do you give?

Generic name

Route of administration

- i. \_\_\_\_\_
- ii. \_\_\_\_\_

5. If N, why not? \_\_\_\_\_

6. Do you give a referral note? ( Y / N )
7. Where do you refer the patients to (*name*)?
- i. \_\_\_\_\_ approx distance from unit \_\_\_\_\_ km
- ii. \_\_\_\_\_ approx distance from unit \_\_\_\_\_ km
8. Do you have a method of finding out the outcome of the referral? ( Y / N )
- 8a. If N, would you like to know the outcome? ( Y / N )

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**Supervision on Malaria Case Management**

(SU)

1. Have you undergone any form of supervision on the management of malaria in the last six months? ( Y / N )
2. If Y, were you comfortable with the process? ( Y / N )
3. Who has supervised you in the last six months?
- Within the health facility
- i. Colleague [ ]
- ii. Immediate senior [ ]
- iii. Head of unit [ ]
- iv. Head of health facility [ ]
- From outside the health facility
- v. Malaria focal person [ ]
- vi. Malaria zonal coordinator [ ]
- vii. Staff from health sub-district [ ]
- viii. Consultant from the nearest referral hospital [ ]
- ix. Ministry of Health technical staff [ ]
- x. Health worker from abroad [ ]
4. How often have you been supervised in the last 6 months
- i. Once
- ii. Twice
- iii. Thrice
- iv. Monthly
- v. None

