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FACTORS INFLUENCING COMPLIANCE OF PRESCRIBERS WITH MALARIA TEST-BASED CASE MANAGEMENT POLICY IN EFFUTU MUNICIPALITY.

BY

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DECLARATION

I, Alexander Asamoah, 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.

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DEDICATION

Dedicated to my wife Mavis Asamoah and son Ellis-Roi Kofi Asamoah.

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ABSTRACT

Introduction: Malaria remains a major public health preventable and treatable mosquito-borne ailment. A test-based case management of malaria and targeted use of Artemisinin-based Combination Therapy (ACT) for treatment has proven to reduce over-diagnosis and overtreatment and therefore recommended as the main control strategy. But compliance by prescribers is still low. Most districts still manage malaria presumptively with treatment of negative test results with ACT. This study was to determine factors that influence the compliance of prescribers with the test-based malaria case management policy in Effutu Municipal.

Methods: A cross sectional study was conducted to extract both qualitative and quantitative data from health facility records and prescriber interviews as well as assess prescribers' malaria management of patients. Univariate analyses of categorical variables were expressed as frequencies and proportions. Bivariate analysis was used to show associations between selected independent variables and patient testing as well as treating patients according to test results.

Results: Of 175 patients and 25 prescribers assessed for compliance, 125 (71.4%) and 13 (52%) were females respectively. Prescribers complied with the policy for 15 (8.6%) patients suspected of uncomplicated malaria. Factors identified to influence testing included patient age 13 - 45 years OR=1.26(95%CI =0.50-3.20), and measured temperature of ≥37.5^{o}C 2.40(0.66-8.76), patient NHIS status 3.54(0.44-27.99), prescriber age ≤35 years 1.52(0.68-3.42), prescriber female sex 1.74(0.81-3.73), prescriber cadre as physician assistant 2.08(0.79-5.44) and years of experience <6 years 1.71(0.69-4.23), health facility factors such as mission/religious operating authority 5.08(1.67-15.45) and having a functional laboratory

or five microscopists. Factors identified to influence treating according to test results included patient age >45 years 1.50(0.17-13.22), and measured temperature of 37.5^{o}C or more 1.23(0.15-9.97), prescriber age ≤35 years 2.15(0.45-10.29), prescriber male sex 2.04(0.51-8.23), prescriber cadre as medical officer and years of experience < 6years 2.17(0.28-25.87), health facility factors such as lower health facility types 6.00(1.33-27.05), government operating authority 8.40(1.27-55.40) having a functional laboratory 1.56(0.13-18.95) and five microscopists 1.22(0.14-10.48).

Conclusion: The prescriber compliance with the malaria test-based case management policy in the Effutu Municipal at patient level was low. From this study, prescribers at Mission/Religious operating health facility significantly tested more patients before treatment than those in private hospitals. However, prescribers at government operating health facilities and lower health facility types significantly treated patients according to test results than those in private hospital and hospital facilities respectively.

Key words: Malaria, prescribers, compliance, test-based management

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LIST OF ABBREVIATIONS

AA	Artesunate-Amodiaquine
ACT	Artemisinin-based Combination Therapy
AL	Artemeter Lumefantrine
CHPS	Community-based Health and Planning Services
CHAG	Christian Health Association of Ghana
DHIMS	District Health Information Management System
IMCI	Integrated Management of Childhood Illness
IPT	Intermittent Preventive Treatment
IRS	Indoor Residual Spraying
ITNs	Insecticides Treated Nets
LQAS	Lot's Quality Assurance Sampling
NHIA	National Health Insurance Authority
NHIS	National Health Insurance Scheme
NMCP	National Malaria Control Programme
OPD	Outpatient Department
OTSS	Outreach Training Supportive Supervision
PMI	Presidents Malaria Initiative
RDT	Rapid Diagnostic Test
WHO	World Health Organisation

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background

Malaria is a preventable and treatable mosquito-borne disease, whose main victims are children under five years of age and pregnant women mostly in Africa (WHO, 2012b). It is an ailment of major public health concern and has been estimated to cause over one million deaths worldwide with 90% occurring in sub-Saharan Africa. The disease is also directly responsible for 20% (one in five) of childhood deaths in Africa, and indirectly contributes to illness and deaths from respiratory infections, diarrhoeal diseases and malnutrition. In Ghana, malaria used to be hyper-endemic and it is estimated to account for 40% of all out patient attendance and over 25% of under-five mortality. To control malaria, the strategy in Ghana used to be case management based on prompt recognition and presumptive treatment as its main focus, using artemisinin based combinational therapy (ACT) Artesunate Amodiaquine as the first line drug (Ghana Ministry of Health, 2009).

For this reason numerous interventions such as Intermittent Preventive Treatment (IPT) for pregnant women, use of Insecticide Treated Nets (ITNs), Indoor Residual Spraying (IRS) for malaria prevention as well as the use of Artemisinin based combinational therapy (ACTs) for treatment, malaria diagnosis and pharmaceutical management and drug quality for malaria case management as reported in President's Malaria Initiative document, (FY2012) have been implemented and therefore expecting malaria cases to decrease. However, higher numbers of malaria cases are still being recorded. The National Malaria Control Programme (NMCP) in its annual report (2010) confirms the increasing cases of malaria from about 3.1 million cases in 2007 to about 3.8 million in 2010. The proportion of malaria to total OPD cases also increased from 32.5% in 2009 to 34% in 2010 as reported in the Ghana Health Service annual report for year 2010.

Meanwhile, some researchers have discovered over-diagnosis and overtreatment of malaria as one of the main reasons for the higher cases (Nanyingi, 2008; Okebe *et al*, 2010 and Abdelgader *et al*, 2012) despite the provisions of laboratory kits and the recommendation of test-based management of malaria by WHO. The concern for possible resistance of the Plasmodium parasites to the artemisinin based combination therapy due to overtreatment has been raised by some researchers and WHO has reported resistance in the countries Cambodia, Myanmar, Thailand and Vietnam. In Ghana, over-diagnosis is further affirmed by the National Malaria Control Programme (NMCP) in its 2010 annual report stating that "cases were predominantly presumptively diagnosed and most febrile illnesses were wrongly captured as malaria and therefore reinforced the need to confirm all cases by laboratory tests through microscopy or rapid diagnostic tests (RDTs)".

Nonetheless, the cost of using Artemisinin-based Combinational Therapies (ACT) in treating malaria is very expensive compared to that of Chloroquine used in the past and the global fund for AIDS, TB and malaria is spending millions to fund the use of the ACTs across Africa. As such, over-diagnosis of malaria coupled with its attendant overtreatment of cases greatly increases the economic burden to control the disease.

Following the evidence of over-diagnosis and overtreatment with the high cost implication and possible resistance factors against the highly effective ACTs, WHO recommended a test-based diagnosis and management of malaria across all age groups (WHO, 2010). The policy requires that, malaria tests be conducted for suspected cases and also treat cases according to test results by treating only cases with positive test results for uncomplicated malaria. Ghana through the NMCP and Ghana Health Service has adopted this policy to test all suspected of malaria before treatment (WHO, 2012; MOH, 2009; NMCP, 2010) and therefore expects prescribers, patients and other stakeholders to adhere to it to

achieve the desired outcome. Testing could be done in the laboratory using microscopy or Rapid Diagnostic Tests kits (RDT).

Recent studies conducted in Sudan and Uganda by Abdelgader *et al*, (2012) and Nanyingi, (2008) respectively showed a low adherence to the recommended test-based malaria case management policy. The 2010 NMCP annual report also stated that only about 31% of cases suspected to be malaria were tested in the year under review. Also, the current urban malaria study (2013) revealed that, the proportion of children living in Accra and Kumasi (which are urban areas in Ghana) and tested positive for malaria after reporting fever in the last two weeks was less than 7%. The study therefore recommended that health care professionals should be educated to perform malaria tests on all suspected cases, and also current practices for diagnosis and treatment of fever should be modified to reflect the low prevalence of malaria in most city neighborhoods to help avoid over-diagnosis and overtreatment. The lower rates recorded for malaria cases that are tested notwithstanding the proportion of the cases tested that are treated according to test results shows a lower adherence to the policy of testing all suspected cases before treatment and according to test results. There is therefore a need to investigate the factors that necessitate a suspected malaria case to be tested and also treated according to test results.

Meanwhile numerous researches in adherence studies have mostly focused on characteristics and factors of patients that influence adherence of a clinical guideline, the provider they encounter and the organizational setting of the facility they visit (Feldman *et al*, 1997; Mckinlay *et a*l, 1998 and Mckinlay et al, 2002) with less consideration of the prescriber's characteristics and attitudes involved. Studies by Mckinlay *et al* (2007) have shown that the adherence of prescribers in the case of Physicians with guidelines varies with different types of "patient" and with the length of clinical experience at a lower rate of less than 20% following another third of a set of guidelines. Also, a research on perceived barriers

affecting prescribers adherence to clinical guidelines in Holland with a group of Dutch general practitioners showed that a lack of agreement with guidelines, lack of evidence as well as lack of knowledge relating to guidelines by some prescriber together with other barriers (Lugtenberg *et al*, 2009) work together to influence medical decisions as against the signs and symptoms of the problem itself.

These are among few studies that have focussed on a set of guidelines considering the variety of barriers that should be addressed to improve guideline adherence (Cabana et al, 1999). In addition, guideline studies often focus on barriers regarding the guideline as a whole, rather than on barriers operating at the level of the individual recommendations within the guidelines (Boivin A, Legare and Gagnon 2008; Kasje, Denig and Haaijer-Ruskamp 2002; Smith, Walker and Gilhooly 2004; Cranney, Warren, Barton, Gardner and Walley, 2001). As different recommendations within the same guideline can have different barriers, it might be more useful to focus on barriers of individual recommendations to optimize the strategies needed for implementation of guidelines in practice.

1.2 Problem Statement

As the over-diagnosis and over treatment of malaria persists, compliance of prescribers with the policy of universal laboratory diagnosis has been found to be low though varied compliance among prescribers in various settings to this policy guideline exists.

In Ghana, the urban malaria study showed that only less than 7% of urban malaria cases were tested as opposed to the malaria case management policy. Analysis of DHIMS data by Bonku (2012) showed that proportion of confirmed cases was still low. Also, analysis of DHIMS data for the Effutu Municipal area showed that, only 15% of all uncomplicated malaria cases were tested to be positive. For cases 5 years and above, the confirmed OPD uncomplicated malaria cases were 8.4%, 3.2%, 18.7% and 14.8% for the period 2009, 2010, 2011 and 2012

respectively. That of 2013 (July) was 20.7%. Also for 2013 half year, total uncomplicated malaria cases confirmed was 22%. In the first quarter of 2013, only 4609 (23%) out of 20123 cases of OPD uncomplicated malaria were tested with 2008 (43.6%) such cases testing positive. However, 14018 (70%) of the cases were treated with ACTs aside cases treated with other anti-malarials.

Meanwhile in an effort to implement the policy successfully, the NMCP report in 2010 indicates that education training for prescribers has been done and diagnostic services have been improved through the supply of microscopes with the support of the Global Fund and the United States- President Malaria Initiative (US–PMI). In addition, capacity building among laboratory staff has also been enhanced. The 2012 PMI malaria operational plan report indicates that, over 7015 clinicians have been trained to accurately treat malaria with RDT's as well as reaching about 240 clinical laboratories through their Outreach Training & Supportive Supervision (OTSS) in the year 2011. Moreover, in the 2012 funding year, PMI 7 proposes to procure additional laboratory equipment, as necessary, and continue to build capacity for microscopy and RDT use.

With all these progress made, compliance rate to the policy is still low and therefore medical decisions by some prescriber to comply with the new policy might be influenced by factors other than what is stated in the policy guidelines as well as the training and logistics provided. The factors prescribers seek or barriers to overcome to readily request a laboratory test to confirm suspected malaria cases and also wait to treat according to the results as key guideline components in the malaria test-based case management policy, is yet to be thoroughly studied.

Therefore this study aims to determine the factors that influence the compliance of prescribers with the test-based malaria case management policy.

1.3 Conceptual Framework

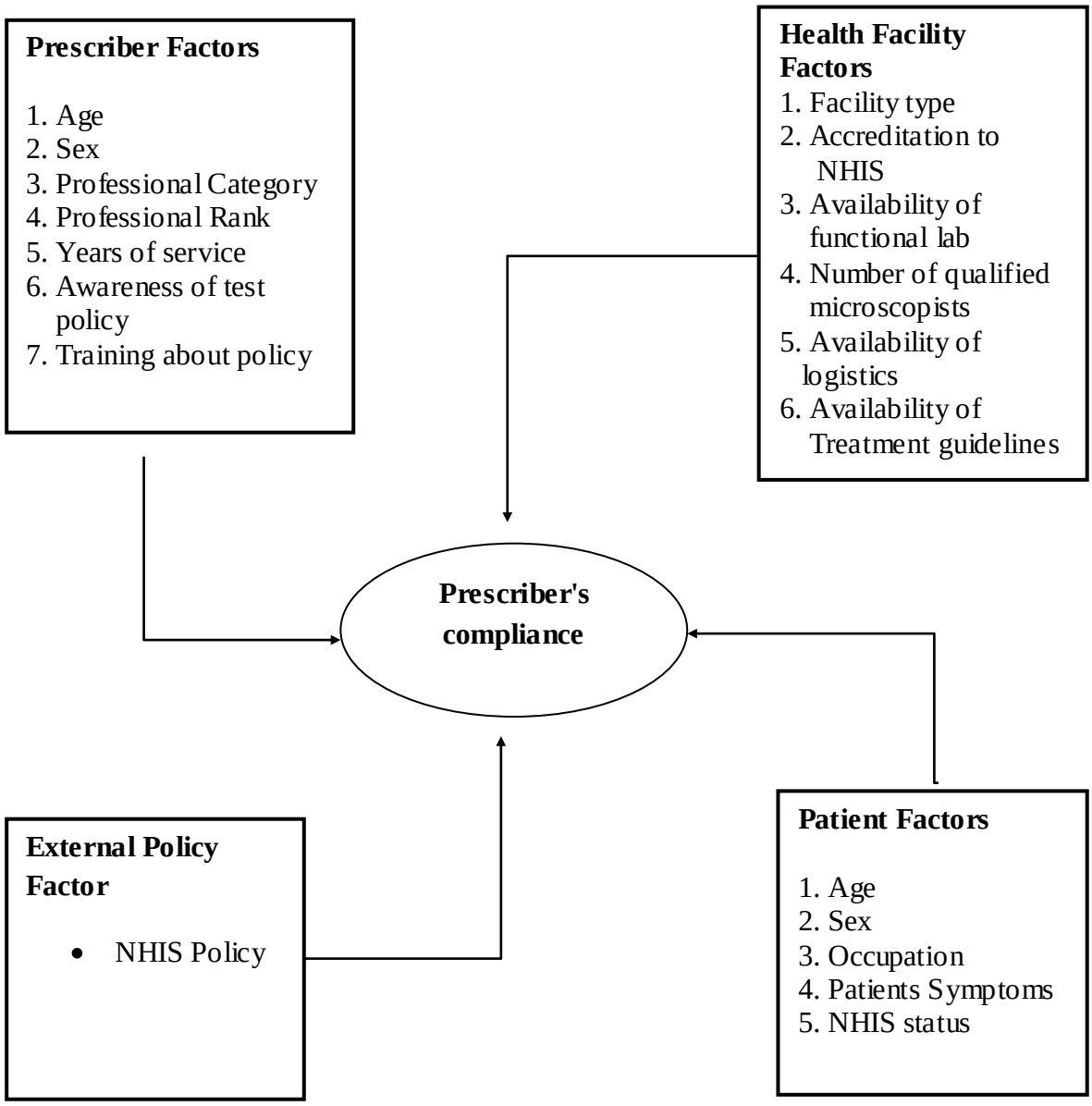


Figure 1. Conceptual framework: factors influencing prescriber's compliance

1.3.1 Explanation of Conceptual Framework

Several factors could lead to influence prescriber's medical decision. However, the factors that would be studied for its influence on prescribers' medical decision to comply with the malaria test policy or not have been classified as Health facility factors, Patient Factors,

Prescriber factors and External policy factor. These factors are presumed to influence the prescribers' compliance with the test-based policy either positively or negatively.

1.4 Justification

According to the Ghana malaria control strategic plan for 2008 – 2015, the control programme hopes to reduce malaria burden by 75% by 2015 and also to have all uncomplicated cases follow the test treat track (T3) policy adopted to help attain their goal. Part of these strategies is to improve early diagnosis and effective management of malaria in all health facilities. Therefore these factors when identified would help make recommendations to the National Malaria Control Programme to strengthen, improve and optimize control strategies needed to improve compliance of prescribers with the test-based malaria policy towards the attainment of their goal.

1.5 General Objective

To determine factors influencing compliance of prescribers with malaria test-based case management policy.

1.6 Specific Objectives

1. To determine the level of compliance among prescribers with the test-based policy
2. To identify factors that influence prescribers' decision to test cases
3. To determine factors that influence prescribers' decision to treat cases according to test results.

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Malaria Case Management and Burden

Malaria case management has over the past been presumptive where patients with fever or history of fever are quickly diagnosed of malaria and treated with Chloroquine which was inexpensive. Following the report on Chloroquine resistance to malaria parasites, more expensive but highly effective ACTs were recommended. Considering the cost of malaria treatment and the presumptive requirement for malaria diagnoses, the economic burden involved in managing malaria therefore became unnecessarily huge. Therefore researchers significantly proved over-diagnosis using presumptive diagnosis of malaria and showed the possibility of unnecessary overtreatment and ACT drug resistance to malaria parasites. Subsequently, a test-based management of malaria was recommended to ensure effective use of ACTs for patients who test positive to malaria. Most countries have adopted this recommendation but are experiencing non compliance among the prescribers in spite of numerous interventions made.

Malaria is one of the world's major public health concerns, contributing to 219 million clinical cases of malaria in 2010 and an estimated 660,000 deaths. India has the highest malaria burden in South East Asia accounting for an estimated 24 million cases per year followed by Indonesia and Myanmar. However about 90% of all malaria deaths occur in Africa which is also the most affected continent with Nigeria, Democratic Republic of the Congo, United Republic of Tanzania, Uganda, Mozambique and Cote d'Ivoire accounting for 47% of malaria cases (WHO, 2012a)

For centuries, malaria has impaired productivity, economic growth, child development and learning, and health status on a large scale. The disease also takes a high toll on households and health care systems. As per the estimates of the World Health

Organization, malaria reduces GDP growth by approximately one percentage point per year (WHO, 2008). In Ghana, malaria used to be hyper-endemic and it is estimated to account for 40% of all out patient attendance and over 25% of under-five mortality (Ghana Ministry of Health, 2009).

2.2 Prescriber compliance with malaria test-based management recommendation

Effective case management practice using universal parasitological testing of malaria has become the target of most control strategies and interventions in Africa. This owes to the fact that presumptive diagnosis and treatment in the era of Chloroquine administration was less effective and would be more costly in the era of Artemisinin-based combinational therapy and hence recommend a laboratory diagnosis and treatment of malaria. Several studies therefore have extensively confirmed over-diagnosis and hence overtreatment in most settings due to presumptive treatment using varied methods (Nanyingi, 2008; Okebe *et al*, 2010, Chandler, Whitty and Ansah, 2010 and Abdelgader *et al*, 2012). In Gambia, a cross-sectional survey was carried out in two urban primary health facilities by Okebe et al (2010) during and outside the malaria transmission season and the results showed that only 33.2% of patients enrolled mostly children (0-15yrs) were tested during the wet season (p=0.003). Also, more children under five years were tested than older children (p = 0.022) which also showed that a positive test result was 4.4 times more likely in the older children (p = 0.010) than in the under fives. As such the claim that children under five years are more susceptible to malaria and therefore often diagnosed as such were found to be most significantly misdiagnosed and wrongly treated compared to the other age groups in both seasons. Meanwhile only 4.7% (10/215) and 12.5% (37/297) of patients tested positive for malaria parasites in the dry and wet seasons respectively. As much as most of the cases that tested negative were treated for malaria, the research findings showed that extrapolation of the

proportion of cases unnecessarily treated for malaria suggested that 7,636 (95% CI: 7,586 - 7,686) of the 8,410 may have received anti-malarials for illnesses other than malaria. The results further showed that, in both seasons, the negative predictive value of a primary health facility slide was above 97%. This study therefore provides evidence for over-diagnosis and overtreatment of malaria and further non compliance with the recommended test-based malaria management policy by prescribers.

In Ghana a randomised control open label clinical trial conducted by Ansah et al, (2009) in four districts also confirmed over-diagnosis and overtreatment of malaria. In this study the researchers randomly assigned patients suspected of uncomplicated malaria into either rapid diagnostic tests in one arm or microscopy or clinical diagnosis in another arm. The results showed that 51.6% of the 1400 patients who tested negative were treated for malaria in the rapid diagnostic test arm in a microscopy setting compared with 55.0% of the 1389 patients in the microscopy arm (adjusted odds ratio 0.87, 95% CI 0.71 to 1.1; P=0.16). Also in the clinical setting, 53.9% of the 1072 patients in the rapid diagnostic test arm who tested negative were treated for malaria compared with 90.1% of the 1090 patients with negative slides in the clinical diagnosis arm (odds ratio 0.12, 95% CI 0.04 to 0.38; P=0.001). Here presumptive treatment of malaria is clearly shown to greatly misdiagnose and over treat malaria. This further portrays a non compliance of prescribers with the universal parasitological confirmation and management of malaria.

In Uganda, a study considering compliance of prescribers with ACT prescriptions by Sears et al, (2013) as part of a sentinel site malaria surveillance programme collected and analysed data on patient visits in six health facility over a two-year period after providing training in malaria test-based case management practice. In this study laboratory confirmed malaria cases were analysed in two groups. Patients visit with uncomplicated malaria diagnosis were considered as ACT candidates and those with other forms of malaria who may

not have been considered as ACT candidates. Out of 46,265 patients classified as ACT candidates, 94.5% were correctly prescribed ACT. Artemether-lumefantrine prescriptions formed 97.3% of ACT prescribed. Meanwhile ACT candidates who did not receive Artemether-lumefantrine were prescribed artemisinin-naphthoquine (AN, n = 870, 2.0%), dihydroartemisinin-piperaquine (DP, n = 326, 0.7%), and a single patient was prescribed artesunate plus sulphadoxine pyrimethamine (SP). However the findings that young children and woman of childbearing age had higher odds of failure to receive an ACT prescription could suggest severe forms of malaria confirming reports that show higher susceptibility of malaria in those groups (WHO, 2012b). Though the study revealed significant differences across the sites of study in the proportion of patients who were not prescribed ACT, higher rates of compliance with prescribe ACT achieved cannot be overemphasized. Also, the fact that the researchers provided training for prescribers before the studies to achieve these results makes it imperative that higher rates of compliance could be duly expected in settings where training have been provided.

In Malawi, Chinkhumba et al (2010) in a cross sectional studies also assessed prescribers compliance with malaria RDT test results after providing a cadres-specific training in malaria RDT test-based case management for health care workers. Their results showed that, prescribers accurately treated positive cases (98%) with anti-malarials but however felt reluctant to refrain from treating 58% of patients who tested negative to RDT with anti-malarials contrary to the training provided. The study however did not indicate the type of anti-malarials prescribed by the prescriber to the patients.

In Sudan, a cross sectional cluster sample survey conducted by Abdelgader *et al*, (2012) in public health facilities also showed that, only 46% of the 1,643 consultations for febrile outpatients were parasitologically tested and 35% of the febrile patients were however both tested and treated according to test results. Among patients who tested positive, 64%

were treated with ACT while 24% were treated with artemether monotherapy. Nevertheless, only 17% of those who tested negative were treated for malaria. The study however indicated important gaps in the availability of ACTs, diagnostic capacities and coverage with malaria case management activities as well as a variable readiness among health facilities and health workers to successfully implement the recommended malaria policy.

Meanwhile, a follow-up study conducted in Sierra Leone by Gerstl, Dunkley, Mukhtar, Baker and Maikere in 2010 showed that prescribers' positive adherence to ACT treatment is not enough though necessary. This is because their study to measure patients adherence to ACT therapy showed that, of 118 patients, 22.9% did not take one or more tablets prescribed (certainly non-adherent), 28.8% took incorrect doses (probably non-adherent) with 48.3% completing doses correctly (probably adherent). This therefore tells that adherence to anti-malarial ACT therapy should be emphasized for both prescribers and patients. In a similar study conducted by Lawford et al, (2011) in Kenya, the results however showed 64% (588/918) of the 918 patients treated with AL to be probably adherent, 31.7% (291) considered definitely non-adherent and 4.3% (39) considered as probably non-adherent. Significant factors found to predict patients' adherence was strongest for patient knowledge of the ACT dosing regimen (OR= 1.76; 95% CI = 1.32-2.35) before patient age (OR = 1.65; 95% CI = 1.02-1.85).

In Nigeria, Meremikwu et al, 2007 analysed uncomplicated malaria patients records and compared prescribing practice between public and private health facilities in Cross River State. The results of the audit showed that prescribers in the public facilities were more likely to document patients' history or physical examinations than their colleague in the private facility. However, prescribers of both facility-types exhibited similar practice and prescribing behaviour where very few of the WHO guidelines were followed.

Uzochukwu et al, (2010) in a study conducted in South Eastern Nigeria compared RDT and ACT availability and use between 74 public and private health facilities found that only 31.1% of health facilities used RDTs to diagnose malaria. Public health facilities compared to private ones were found to use RDTs the more with RDT use in urban areas also higher than rural areas. However RDT healthcare provider awareness and health facility availability were 61.1% and 53.3% respectively. Factors accounting for non use of RDT were their unreliability and costs as reported in a different setting by Nanyingi, (2008), issues of supply as well as prescribers' ignorance and preference for other methods of diagnosis.

In India a convenience survey showed varied physicians malaria case management practice with reference to method of diagnosis and overall treatment, among state and public or private health facilities. The private sector of healthcare for the treatment of uncomplicated malaria showed the strongest predictor (OR 8.0, 95%CI: 3.8, 17) of artemisinin monotherapy prescription. Also more private sector physicians used RDTs exclusively and prescribed more artemisinins alone and other ACTs compared to those in the public sector (Mishra et al, 2011).

A cost benefit analysis from Burkina Faso showed that, it was more expensive to presumptively manage adult malaria in both dry and rainy seasons. Also, in the dry season, the test-based strategy for treating malaria was better for both children and adults than the presumptive strategy. Management of adult malaria with the test-based system was more economical in the dry season than in the rainy season. (Bissofi et al, 2011). Meanwhile, a prospective observational study in India about the cost analysis of prescription patterns of anti-malarials revealed that prescribers have least concern about the cost of the therapy involved in treating malaria (Shantveer Halchar et al, 2012) and hence a need for continued awareness pertaining to rational use of drugs should be ensured as they are also encouraged to adhere to treatment guidelines.

2.3 Willingness of caregivers to accept policy and impact of compliance

In Ghana, Baiden et al, (2012) conducted a cross sectional study among caregivers in a rural dwelling to determine factors that might influence caregiver's acceptability of RDT based malaria case management and their concern about the denial of ACT treatment on testing to RDT. The results showed that 98% of the caregivers preferred the test-based malaria management over the usual presumptive treatment and were also willing to be denied ACT treatment when their children test negative for malaria (OR 0.57, 95%CI 0.33–0.98). However, caregivers who had valid (adjusted O.R. 1.30, 95% CI 1.07–1.61) or expired (adjusted O.R. 1.38, 95% CI 1.12–1.73) health insurance were reluctant to be denied ACT to their RDT-negative children compared to caregivers who never had a health insurance cover. Meanwhile caregivers' acceptance could be enhanced by their engagement in the procedures of the test while a negative attitude of prescribers could undermine caregivers' acceptance.

A similar study using focus group discussions and in-depth interviews conducted by Ezeoke et al, (2012) in urban and rural areas of South Eastern Nigeria showed both public and private health service providers and community members' willingness to test for malaria. They agreed it would distinguish malaria from other illnesses with similar symptoms and hence enable the provision of an appropriate treatment. However, the reliability of negative tests was a major challenge as they believe sometimes conflict with clinical symptoms. The cost of tests and lack of testing facilities were other concerns for acceptability of test-directed treatment as against symptoms-directed treatment of malaria as reported by Uzochukwu et al, (2010) with similar method and setting as well as Nanyingi (2008) in Uganda. The researchers henceforth believe a behavioural change of both providers and patients towards malaria tests would be needed to promote test-directed treatment in patient management.

Chuma, Okungu and Melyneux, (2010) in an earlier study in Kenya used multiple data collection methods and found that the interaction of multiple factors related to affordability,

acceptability and availability of test diagnostics influenced the test-based management of uncomplicated malaria. The interacting factors regarding acceptability were also found to be prescriber-patient relationship, patient expectations as well as perception of treatment effectiveness as also reported by Baiden et al, (2012) in Ghana, distrust in the quality of care and poor adherence to treatment guidelines.

2.4 Factors influencing prescribers' compliance with test-based policy

A study by Nanyingi (2008) in Uganda identified some factors among health workers and laboratory staff preventing their adherence to laboratory diagnoses in malaria case management. Shortage of laboratory staff and training of health workers were the main considerable hindrances towards the adherence. Although health workers admitted the effective and economical role of laboratory diagnosis in malaria control, they were also concerned about possible long waiting time, unreliable results, and finally doubted the ability of a single drop of blood to reveal any possible malaria parasite in the blood. Also treatment of malaria mostly preceded laboratory diagnosis as a special situation in under fives who are more susceptible to malaria. But the question of how committed health workers would adhere to routine laboratory diagnosis and management of malaria in patients five years and above was not addressed. However health workers said routine laboratory diagnosis would only be considered in children and adults with confusing diagnosis. These study findings were observed in a similar study in Nigeria by Uzochukwu et al, (2011) where health workers perceived RDTs to be the most effective among microscopy and clinical diagnosis of malaria. Meanwhile, the health workers prescribed ACTs in 74% of RDT-negative results. The researchers therefore recommended in-depth studies to determine why such health worker behaviour occurs.

In Kenya, a cross sectional survey was conducted to assess health facility and health worker readiness to implement their anti-malarial drug policy. The assessment also included factors that influence Arthemether lumefantrine prescription for the treatment of uncomplicated malaria in children under five years of age. The results showed variable readiness of health facility and health workers towards the implementation with 89% of 193 facilities with stocked AL, 55% of 227 health workers had access to guidelines, 46% received in-service training on AL and only 1% of facilities had AL wall charts. Factors found to be associated with better prescribing practice were higher cadre of health workers, in-service training pertaining to the use of AL, positive malaria test , main complaint of fever and high temperature. Though the researchers concluded that changes in clinical practice might take a longer time than anticipated, adherence to new guidelines would be improved by provision of successful interventions which are scaled up to increase coverage (Zurovac, Njogu, Akhwale, Hamer, and Snow, 2008).

In Ghana, Dodoo et al, (2009) in a cohort-event monitoring study conducted showed that, though only 3.2% of 2,831 uncomplicated malaria diagnoses were laboratory confirmed with the highest proportion in the 5-12 years age group, predictors of ACT first line therapy prescription by physicians were laboratory-confirmed diagnosis (adjusted OR 9.7 [5.2–18.2]), age 5 years and above, and attending a government facility as against a private facility which is contrary to the report of Misra et al, (2011) in India. Also patients above 12 years were less likely to be co-prescribed antibiotics than patients under 5 years though analgesics and antibiotics were the most co-prescribed per patient. Factors that may influence prescribers' adherence to the implementation of the malaria test-based and effective use of ACT were found to be patients' age, diagnostic confirmation (Zurovac, Njogu, Akhwale, Hamer, and Snow, 2008) and concurrent conditions suspected by prescriber during consultations.

Meanwhile, a cross sectional survey conducted in Tanzania by Mubi et al, (2013) in government primary healthcare facilities showed that, malaria confirmation for only 30% of patients that were tested (31/105) among 168 fever patients seen at health facilities with available diagnostics. Anti-malarial prescriptions were given to all positive-test patients, 14% of negative-test patients and 28% of presumptively diagnosed patients for malaria. Patients with negative results compared to those with positive results and no-tested patients compared to those tested were more likely to be prescribed antibiotics. Factors that influenced adherence to test results were RDT stock outs, staff shortage and health worker perceptions as reported by Nanyingi (2008) in a different setting.

Selemani *et al*, (2013) in a repeated cross sectional health facility survey in rural Tanzania also assessed health worker factors associated with correct prescription for uncomplicated malaria. Their findings showed that health workers with three or more years of working experience had significantly higher odds of prescribing correctly (aOR 2.9; 95%CI 1.2-7.1; p =0.019) than others and health worker cadre specifically Clinical officers (aOR 2.2; 95% CI 1.1-4.5; p = 0.037), and nurse aide or lower cadre (aOR 3.1; 95% CI 1.3-7.1; p = 0.009) were also more likely to prescribe ACT correctly than medical officers. Meanwhile, their study revealed that training on ACT use, supervision visits, and availability of job aids were not significantly associated with prescribing correctly whilst health worker age less than or equal to 35 years could not determine any association to prescribing correctly

2.5 Prescriber's adherence to Guidelines

Cabana et al, (1999) identified that, clinical guidelines had limited effect in changing the behaviour of physicians who were then the main prescribers. They therefore stated a problem that showed how little knowledge exists about the process and factors involved in changing physician practices pertaining to their response to guidelines. The researchers

therefore systematically reviewed literature to identify barriers to physician adherence to clinical practice and developed a framework for improvement. The results of their search found that 293 questions about barriers included seven categories of barriers after grouping them into common themes. They found that, these barriers affected the physician in three main ways. These are physician's knowledge (which involved lack of knowledge or lack of familiarity of guideline), physician's attitude (involving lack of agreement, lack of self-efficacy, lack of outcome expectancy, or the inertia of previous practice) and physician's behaviour also involving external barriers. The external factors could be described as patient, guideline recommendation as well environmental factors. Though these findings could not be generalized since the barriers varied in different settings, it still offered a rational approach toward improving guideline adherence and a framework for future research.

Mckinlay, Lin, Freund and Moskowitz (2002) in an experimental study of an unexpected influence of a physician attributes in medical decision showed that, patients' attributes and physician attributes independently did not influence physicians' actions. Meanwhile younger physicians ordered more test for a polymyalgia rheumatica (PMR) diagnosis and for younger-older patients than older physicians who equivalently diagnose the condition in elderly patients and also order few tests. More so, younger physicians' diagnosed depression in more male patients as older physicians diagnosed more females for depression. This study showed that, indeed age of prescriber together with age and sex of patients has an impact on physicians' actions and therefore both physician and patient attributes interactively rather influence medical decisions of prescribers.

In 2009, Lugtenberg, Schaick, Westert and Burgers analysed barriers among Dutch general practitioners to determine why physicians don't adhere to guideline recommendations during their practice. This qualitative study conducted six focused group discussions using 30 General Practitioners with an average of seven per session. Factors that prevented physicians

from complying with key recommendations in clinical guidelines for 56 key recommendations were discussed separately for various groups of physicians and sessions involved. The results of the study showed that, the barriers or factors varied greatly within guidelines with the most perceived barriers being lack of agreement with the recommendations because of lack of applicability or evidence (68%), environmental factors such as organisational constraints (52%), lack of knowledge regarding the guideline recommendations (46%), and guideline factors such as unclear or ambiguous guideline recommendations (43%). Among the three levels of barriers developed into a framework by Cabana *et al* (1999) the researchers found that barriers related to the attitude of physicians occurred for 91% of the key recommendations followed by prescriber behaviour factors (82%) and lastly knowledge- related barriers of prescribers also perceived for 46% of the key recommendations. Though they concluded that the barriers varied greatly among recommendations, it is however imperative that issues of guideline recommendations bordering on awareness or familiarity, agreement, prescriber self-efficacy, expectation of the outcome, inertia of previous practice or sufficient motivation, patient factors, guideline recommendation factors and environmental factors together or independently influence a prescriber's ability to comply with recommendations of clinical guidelines. These should therefore be highly considered during implementation of strategies focussing on key recommendations of clinical guidelines to improve compliance in their practice.

CHAPTER THREE

3.0 METHOD

3.1 Study Design

A cross sectional health facility survey was conducted in all four sub municipals of the municipality and obtained both qualitative and quantitative data from prescribers, patients, and health facilities to assess factors that influence prescribers' compliance with malaria test-based case management policy in the municipality.

3.2 Study Location

3.2.1 Demography

The study was conducted in the Effutu Municipality. The Effutu Municipal area is in the Central Region as one of the 20 districts, municipalities and metropolis in the region. It is situated between latitudes 5^0 20' N and longitudes 0^0 25 W and 0^0 37 W on the eastern part of the Central Region Ghana. It is winded and sandwiched by Greater Accra Region and the districts - Ga Rural, Agona and Gomoa. It is bordered to the north by Agona Municipal, north-east by the West Akim Municipal, to the south by the Gulf of Guinea, to the east by Gomoa East District and Ga West Municipal, and on the west by the Gomoa West District.

The Municipal covers an area of 417.3 square kilometers (163 sq miles) with a population of 68,597 according to Population and Housing Census of 2010 giving a population density of 164 persons per square kilometer. The municipal population forms 3.1% of the regional population and consists of 32,795 males and 35,802 females giving a sex ratio of 1:1.1 (Ghana Statistical Service, 2012). The 2013 projected population for the municipality was 75,176 (male-35940 and female-39239) and that of children under five, five years and above and women in their reproductive age are 15,035, 60,141 and 17,290

respectively. The Effutu Municipal is sub divided into four sub municipals namely Ansaful, Essuekyir-Gyahadze, Winneba East and Winneba West.

3.2.2 Environmental Factors

The Effutu Municipal lies within the west semi-equatorial region along the Coast of the Gulf Of Guinea and it experiences two rainfall patterns: the major rainy season starts from April and ends in July and minor rainy season from September to November. The municipal also experiences two wind systems - the South-West Monsoon winds (Rainfall wind) and North-East Trade Winds (Harmattan Wind). The annual rainfall figures of the municipal are quite low ranging from 400mm to 500mm along the coast but are higher in the hinterlands with the mean annual rainfall ranging between 500mm and 700mm. The mean annual minimum and maximum temperature are 22^0C and 28^0C respectively. The vegetation of the municipality is made up of semi-deciduous forest (forming 70% of the municipality) and coastal savannah grassland.

3.2.3 Health Services

The municipal has thirteen health facilities including four functional Community-based Health and Planning Services (CHPS) zones, one health centre, one clinic, five hospitals of the district level category including a specialist hospital, one public health specialty unit and one maternity home. The municipal and Specialist hospital serve as the referral point for all the other health facilities. The health service in the municipality is provided by both private (3) and public facilities (made of Government (8), quasi-government (1) and CHAG (1)). Pharmacy Shops and licensed chemical sellers play a supplementary role as well traditional medical practitioners predominated by Traditional Birth Attendants commonly called TBAs. The levels of health service delivery are as follows;

- Hospital
- Health centres / clinics
- Reproductive and Child Health centres
- Community clinics (CHPS compounds).

Malaria continues to top the list of top ten causes of OPD attendance in the district, contributing 13,084 and 37,397 cases in 2011 and 2012 respectively.

3.3 Variables

The main dependent variable was the prescriber's compliance with the test-based policy. The varied independent variables of interest were as follows:

1. Patient variables

- Age of patient
- Sex of patient
- Occupation
- Patient symptoms
- NHIS status

2. Prescriber Variables

- Age of prescriber
- Sex of prescriber
- Professional Category/ Cadre of health worker
- Rank
- Years of service
- Awareness of test policy
- Training about policy

3. Health Facility

- Type of facility
- Facility accreditation to NHIS
- Availability of functional laboratory
- Number of qualified microscopists
- Availability of logistics for testing
- Availability of guidelines and protocol for malaria treatment

3.4 Sampling

3.4.1 Study Population

The study population included health facilities, prescribers involved in outpatient malaria case management and patients diagnosed of uncomplicated malaria by health facilities in the Effutu municipality.

3.4.2 Sampling Size

All four sub-districts in the Effutu Municipality were selected for the study. All the 13 health facilities in the four sub-districts were selected for the study but nine out of the thirteen health facilities participated in the study while one clinic declined consent. Two CHPS zones could not give treatment but only involved in Child welfare clinics and home visits and therefore did not diagnose and treat uncomplicated malaria. The other health facility was a Specialty Public health unit which attends to skin diseases and hence did not diagnose and treat uncomplicated malaria.

Twenty-five (25) prescribers performing general outpatient consultation encountered on the days of visit within the health facilities were included in the study.

A sample of seven patients who were diagnosed of uncomplicated malaria and within the inclusion criteria were selected as they are diagnosed for each prescriber. A total of 175 patients were therefore included in the study.

3.4.3 Sampling method

The Effutu municipality was conveniently selected and all four sub-municipals were included in the study. The sub-municipals were Ansaful, Essuekyir-Gyahadze, Winneba East and Winneba West. Each sub municipal had at least one public health facility.

3.4.3.1 Health Facilities

All the categories of health facilities in the sub-municipals were included in the study. These included the municipal hospital, health centre, CHPS compounds, a clinic/maternity home. This was to ensure that all facilities providing different levels of care and with different case loads and various cadres of prescribers contributing to total cases in the municipality were fairly represented and obtained in their maximum numbers.

3.4.3.2 Prescribers and Patients

At each health facility, the primary sampling unit for the compliance assessment part of the study was a prescriber-patient diagnoses and treatment for uncomplicated malaria. Prescribers who performed general outpatient consultations were eligible for inclusion. Eligible prescribers who consented to participate in the study were therefore included. Any patient five years and above diagnosed of uncomplicated malaria by a prescriber and has not been diagnosed of malaria in the same facility two weeks before the study was eligible for inclusion. The first seven sampling units that met the inclusion criteria were selected at each health facility. This was based on the assumption that the order in which patients arrived at a

health facility was not associated with prescribers' compliance with a medical policy. The selection of seven diagnoses and treatment for the compliance assessment was based on the Lots Quality Assurance Sampling (LQAS) technique which is based on binomial probabilities. The LQAS assumes that prescribers should comply with medical policies correctly at least 95 percent of the time. Using the binomial equation, at least six diagnoses and treatments per prescriber are needed to determine this compliance level. We assessed seven outpatient uncomplicated malaria diagnoses and treatments per prescriber.

In cases where more than one child presented by a caretaker were diagnosed and treated for uncomplicated malaria, one child was selected at random for inclusion. The other children were excluded from the study and the next patient who met the inclusion criteria was sampled. Patients less than five years old, malaria diagnosed in-patients, patients diagnosed and treated for malaria within two weeks in the same facility and pregnant women attending the facility for antenatal care were excluded from the study. Patients less than five years were excluded to avoid conflicts of under five childhood diseases management and the malaria test-based management policy to ensure better findings. In-patients were also excluded because laboratory investigation could occur more likely as part of the case admission management and not as a result of test-based management policy compliance. Patients previously diagnosed and treated for malaria within two weeks before the study were excluded to ensure the findings better represent initial malaria test-based case management practice. Pregnant women attending the health facility for antenatal care were also excluded to avoid excuse of low birth weight and maternal mortality reduction goal. Patients who met the inclusion criteria were selected as they came to collect drugs prescribed from the dispensary. All the prescribers performing outpatients' consultations together with malaria

diagnoses and treatments were included in the study for assessment of their compliance with test-based policy and interview.

3.4.5 Data Collection Techniques and tools

Three methods were used to collect the data. These included

1. Assessment of diagnoses and treatments with a patient interview questionnaire. A structured questionnaire was used to interview patients for their preference of the policy and to capture the procedures used by the prescriber to diagnose and treat them for uncomplicated malaria.

2. Assessment of the health facilities using a Health Facility Audit Questionnaire: General issues relevant to malaria test-based case management such as staffing, availability of functional laboratory, logistics and equipment as well as standard guidelines were assessed.

3. Interview of Prescribers using a Prescriber Interview Questionnaire: Prescribers who performed general outpatient consultations with malaria diagnoses and treatments were interviewed with the questionnaire to assess their characteristics, knowledge and awareness of policy as well as training on the use of RDTs and work experience.

3.4.6 Ethical Clearance

Ethical approval was sought from the Ghana Health Service (GHS) ethical review committee. Permission was also sought from the Effutu Municipal Health Directorate and the Facility Heads or In-Charges of the health facilities involved in the study.

Informed consent was obtained from prescribers, patients and their caregivers and confidentiality assured before the study. They were duly informed about the purpose, procedures, risks and benefits of participating in the study. Study participants who could not read had the consent form read and explained to them before an impartial witness. Study participants who agreed to participate in the study were required to sign or thumbprint (left thumb) the consent form to show their consent. Assents for children participants were obtained from their caregivers on their behalf.

Confidentiality of information was ensured before and after the study and used only for the purpose indicated in the study. The information was collected privately and securely stored without names or any traceable identity to the participants and in a file accessible only to the research team. A code linked to a particular name was kept confidential. The assessment of compliance and the interviewing of the participants involved were done solely by trained professionals including the principal investigator. Only health facilities, prescribers and patients who agreed were assessed and interviewed.

There was no risk to be experienced by the participants for participating in the study. The participants were however informed of possible minor discomfort for being interviewed or in answering of some questions which they could choose not to answer. Voluntary participation of the study was explained to participants and informed of their liberty to withdraw consent and discontinue participation at any time without attracting any penalty. Participants were not coerced to partake in the study and there was no direct benefit or

monetary compensation for participation besides that for the Municipal Health Management Team and the Ghana Health Service for planning health delivery services.

3.4.7 Training of Interviewers

The field workers to assist in the study were trained three days prior to the start of data collection. They were trained to understand the purpose of the study, data collection techniques and tools and their appropriate interpretation. Simulated exercises were repeated to ensure an increased agreement and consistency among the field workers and between them and the trainer.

3.4.8 Pre-testing and review of data collection tools

The data collection tools were pre-tested at the Swedru Government hospital in the Agona West district which has similar settings as that in the Effutu municipality and reflected the local conditions. The pre-test provided the clear and understandable questions required for the appropriate response and the necessary modifications made based on the pre-test.

3.5 Data Collection

We conducted the survey from December 25, 2013 to January 31st 2014. All the thirteen health facilities in the various sub municipals within the Municipality were visited. However, one Clinic, University Clinic located in the Winneba west sub municipal declined to participate in the study. Three other health facilities, the Public Health Specialty Unit, Ansaful CHPS zone and the Essuekyir CHPS zone located in the Winneba East, Ansaful and Essuekyir-Gyahadze sub municipals respectively were excluded from the study. The Public health specialty unit attended to skin diseases only whereas the Ansaful CHPS zone and the Essuekyir CHPS zone were not operating in full capacity. They were not to diagnose nor give

medications but only limited to carryout Child Welfare Clinics and home visits. They therefore referred suspected cases to the nearest fully operating facilities as at the time of the study. The team of trained professionals visited the remaining nine facilities in the mornings of selected days of the week. The team introduced its members to the health facility in-charges and unit heads involved and sought permission to begin the study. A written permission was sought from the facility in-charges. The written permission was approved and a representative from the facility introduced the team members to the various departmental heads and staff involved in the study.

All the 25 prescribers who diagnosed and treat uncomplicated malaria in the various health facilities were eligible for their compliance with the test-based policy to be assessed. Their consent was sought and enrolled in the study for the assessment. Patients diagnosed of uncomplicated malaria by enrolled prescribers were recruited at the dispensary based on the inclusion criteria and their willingness to participate in the study. Patients and Caregivers who consented to participate in the study were recruited on arrival to the dispensary. They were given identification numbers and interviewed as they wait for their turn to take their medication or after they receive their medication before they leave the health facility. The independent trained professional team assessed and recorded the diagnoses and treatment given by the prescriber without interfering with the case management practice of the prescriber. This procedure was repeated for six other patients per prescriber enrolled into the study. The prescribers were interviewed after collecting information from all corresponding seven patients and facility in-charges at their free time or after the entire consultations. Health facility in-charges and unit heads who could provide adequate information on key areas relevant to the study were interviewed at their offices of work after obtaining patient information. This was done to assess the health facility for facilities and logistics pertinent to malaria test-based case management using a Facility Audit Questionnaire.

3.6 Data Quality Control

Field workers who were health personnel and experienced in the health sector were used to ensure quality data collection. They were trained and evaluated to ascertain their ability to provide accurate assessments and document the true responses of the study participants. The principal investigator supervised field workers during the data collection and cross checked from other health records of participants in the facility for correctness.

The principal investigator ensured double entry of data into Epi-Info software version 7.1.2.0 by independent data entry personnel. All discrepancies were resolved by reference to original data collection tools. Data validation programs introduced during the development of the data entry template was used to ensure validation of data during the data entry process.

3.7 Data Processing and Analysis

3.7.1 Data Processing

Double entry of data was done by two data entry personnel independently into Epi-Info software version 7.1.2.0. Data cleaning and verification was done to ensure good quality and accurate data. For each variable entered, the frequencies were run to identify number of missing variables and incorrectly entered data. Analyses were done on variables on which data was entered. When necessary, missing data was excluded from analyses whilst correction of incorrectly entered data was done by listing the variables with the "allow update" function enabled and the necessary corrections made. The data was properly stored and backed up on an external hard drive.

3.7.2 Data Analysis

Univariate and bivariate analysis were performed and used as descriptive and inferential statistics respectively. Odds ratios were used to determine associations among variables. Confidence intervals were used to determine statistical significance.

Compliance of prescribers was determined by assessing prescriber uncomplicated malaria case management for seven patients. A prescriber was said to have complied to malaria policy if at least six of the patients seen were tested to confirm malaria diagnosis and treated according to the test results. Also a patient was said to be tested if a prescriber requested a malaria test to be done by RDT, microscopy or both on suspicion of uncomplicated malaria and the results obtained and returned to the prescriber before any treatment is prescribed. A patient was also said to be treated according to test result if only positive malaria test results were prescribed with anti-malarial drugs.

Univariate analyses of categorical data were expressed as frequencies, proportions and percentages. Cross tabulations and frequencies were used to analyse data descriptively. Appropriate measures of central tendency and dispersion were employed.

Bivariate analyses were done using unadjusted odds ratio and their corresponding 95% confidence interval to assess the association between some patients, prescriber, health facility independent variables and testing before treatment as well as treating according to test results. The unadjusted odds ratios were calculated for each predictor variable.

Multivariate analysis was not done because most of the associations obtained from the unadjusted odds ratio were statistically insignificant.

CHAPTER FOUR

4.0 RESULTS

4.1 Characteristics of Study Population

4.1.1 Health facility characteristics

Of the nine health facilities, five (55.6%) were hospitals, one (11.1%) clinic/ maternity home, one (11.1%) health centre and two (22.2%) CHPS compounds. One (11.1%) of the health facilities was located in the Nsuekyir-Gyangyanadze sub-municipal and two (22.2%) in the Ansaful sub-municipal. The Winneba East and Winneba West sub municipals had three (33.3%) facilities each participating in the study. None of the sub municipals had all the different categories of health facilities participating in the study (table 1).

Table 1. Types of health facilities by sub municipal, Effutu municipal, 2014.

Sub Municipal	Hospital	Clinic	Health Centre	CHPS	Maternity Home	TOTAL
Ansaful	2	0	0	0	0	2
Nsuekyir-Gyangyanadze	0	0	0	1	0	1
Winneba East	2	0	0	1	0	3
Winneba West	1	0	1	0	1	3
TOTAL	5(55.6%)	0	1(11.1%)	2(22.2%)	1(11.1%)	9(100)

Five (55.6%) of the health facilities were government facilities. The mission/ religious and private-for-profit operating authorities had one (11.1%) and three (33.3%) facilities respectively (table 2).

Table 2. Types of health facilities by operating authorities, Effutu municipal, 2014.

		Hospital	Clinic	Health Centre	CHPS	Maternity Home	TOTAL
Operating Authority	Government	2	0	1	2	0	5
	Quasi-government	0	0	0	0	0	0
	Mission / Religious	1	0	0	0	0	1
	Private for profit	2	0	0	0	1	3
	TOTAL	5	0	1	2	1	9

All the nine health facilities accepted NHIS from patients. Meanwhile, one (11.1%) CHPS compound, Zongo CHPS was not independently accredited by NHIS to use its facility name for NHIS claims and therefore operated its NHIS under another health facility, Winneba Health Centre. About 33% (3/9) of the health facilities in the municipality (Winneba Municipal Hospital, Klimovic Memorial Hospital and Otoo Memorial Hospital) accept other heath insurances.

From the health assessment, all the nine health facilities had the capacity to test for malaria. Seven (77.8%) health facilities had functional laboratories. Two (22.2%) facilities, Gyangyanadze CHPS and Zongo CHPS compounds did not have functional laboratories but used malaria RDTs to test for malaria parasites and had RDTs available within the last six and three months. Of the facilities with functional laboratories, there was an average of three (3) microscopists per health facility. All the twenty four (24) microscopists had undergone training in malaria parasite microscopy. All the nine facilities had on average three (3) staff

trained in the use of the RDT to diagnose malaria and also had the capacity to test for malaria parasites. Seven (77.8%) of the facilities confirm malaria using microscopy, eight (88.8%) of the facilities confirmed malaria with RDT whilst 66.7% confirm malaria using both microscopy and RDT. One (11.1%) facility confirms malaria with microscopy only and two (22.2%) by RDT only. All the seven (77.8%) facilities which confirmed malaria by microscopy also used Giemsa stain reagent to prepare blood films for malaria parasite detection. The facilities also had distilled water available for dilution of the Giemsa stock.

Microscopists in seven of the facilities have been trained in malaria parasite microscopy. Seven of the facilities have had staff trained in malaria case management within the last six months. All nine health facilities had staff trained in the use of RDT to diagnose malaria. The 2010 standard treatment guidelines and 2010 anti-malarial drug policy was available in seven and five health facilities respectively (Table 3).

Table 3. Facility level indicators for malaria test-based case management, Effutu municipal, 2014.

Indicator	Number of Facilities	Percentage
functional lab	7	77.8
f functional microscope	7	77.8
staining reagent in last 3 months	7	77.8
staining reagent in last 6 months	7	77.8
Availability of Microscopist	7	77.8
Training of microscopists in malaria parasite microscopy	7	77.8
RDTs in last 3 months	7	77.8
RDTs in last 6 months	6	66.7
2010 standard Treatment guidelines	7	77.8
2010 Anti-malarial drug policy	5	55.6
Training of staff in the use of RDT to diagnose malaria	9	100
Training of staff in case management within last six months	7	77.8

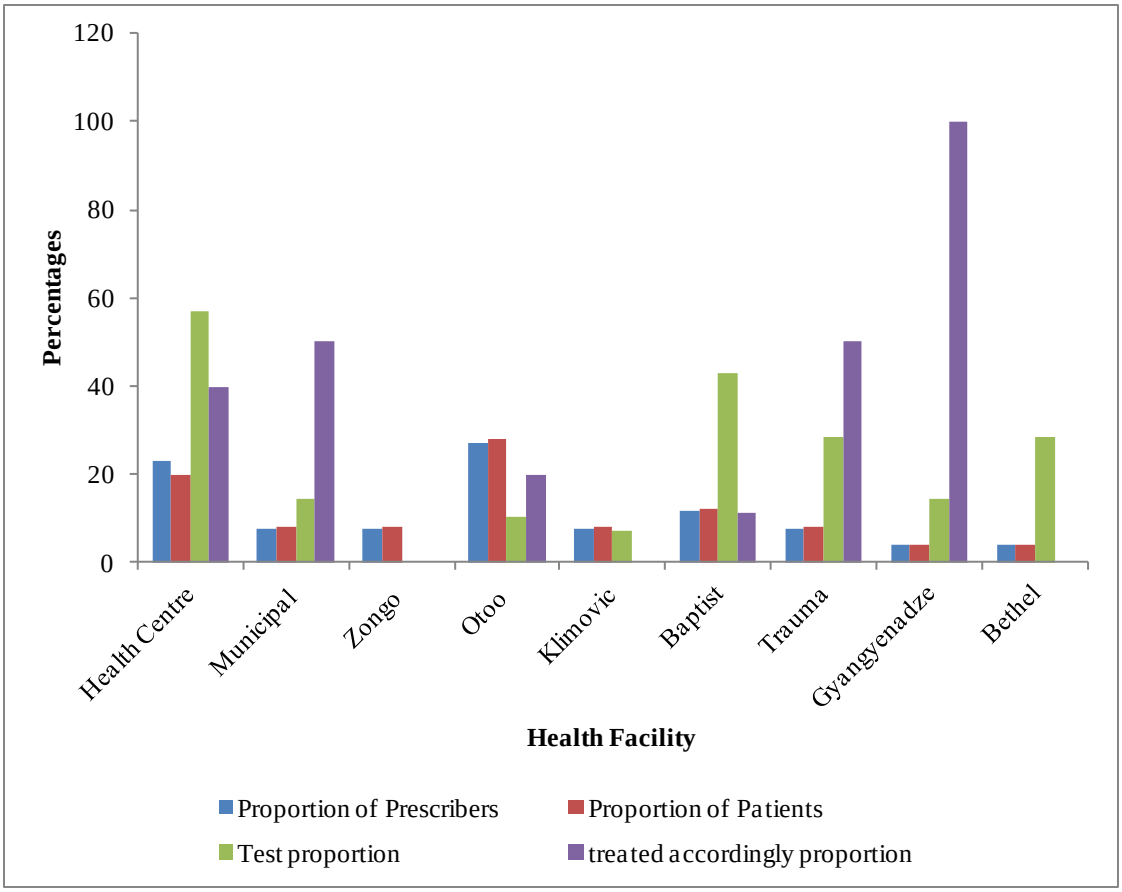
n=9

Only one (11.1%) health facility, Otoo Memorial Hospital had no RDTs available within the last six months from the study. However, all nine health facilities had RDTs

available within the last three months from the study. Of the facilities with functional laboratories, a functional microscope was available for malaria parasite microscopy.

Otoo Memorial Hospital was the health facility with most prescribers (26.9%) that participated in the study followed by Winneba Health Centre (23.1%) which also tested the most of patients tested (57.1%). The facility that treated the most (100%) of cases tested according to test result was Gyangyanadze CHP zone as shown in Fig 2 below.

Figure 2: Proportion of prescribers, patients tested and treated according to test results by health facility, Effutu Municipality, 2014.



4.1.2 Prescriber Characteristics

All the 25 prescribers consented to participate in the study. Of the 25 prescribers, seven (28%) were medical officers, ten (40%) were physician assistants and the rest, various categories of nurses. Thirteen (52%) out of the 25 prescribers were females. The medical

officers and physician assistants comprised of 57% and 40% females respectively. The youngest age was 24 years whilst the oldest was 76 years with a median age of 29 years (inter-quartile range 27.5 - 44.0). Seven (28%) of the prescribers did not have any training in malaria test-based case management and of the twenty (80%) who were aware of the malaria test-based case management policy, sixteen (64%) had training in malaria test-based case management policy. Five (20%) of the prescribers feel they do not need any additional training to manage malaria better and 3 (12%) were unwilling to comply with the malaria test-based case management policy as shown in the table below:

Table 4. Characteristics of prescribers by sub-municipal, Effutu Municipal, 2014.

Prescriber Characteristics		**Sub Municipal**				**Overall**
		Winneba East	**Winneba West**	**Ansaful**	**Nsuekyir Gyangyanadze**	
		n (%)	**n (%)**	**n (%)**	**n (%)**	**n (%)**
Sex	Female	4 (57.1)	5 (38.5)	3 (75)	1 (100)	13 (52)
	Male	3 (42.9)	8 (61.5)	1 (250	0 (0)	12 (48)
Trained	Ever	5 (71.4)	10 (76.9)	1 (25)	1 (100)	17 (68)
	Never	2 (28.6)	2 (15.4)	3 (75)	0 (0)	7 (28)
	Missing	0 (0)	1 (7.7)	0 (0)	0 (0)	1 (4)
Awareness of Policy	Yes	4 (57.1)	12 (92.3)	3 (75)	1 (100)	20 (80)
	No	3 (42.9)	0 (0)	1 (25)	0 (0)	4 (16)
	Missing	0 (0)	1 (7.7)	0 (0)	0 (0)	1 (4)
Willingness to comply	Yes	7 (100)	10 (76.9)	4 (100)	1 (100)	22 (88)
	No	0 (0)	3 (23.1)	0 (0)	0 (0)	3 (12)
Need Additional Training	Yes	6 (85.7)	10 (76.9)	3 (75)	1 (100)	20 (80)
	No	1 (14.3)	3 (23.1)	1 (25)	0 (0)	5 (20)
TOTAL		**7 (100)**	**13 (100)**	**4 (100)**	**1 (100)**	**25(100)**

Eighteen (72%) of the prescribers said they routinely request malaria test for patients five years and above suspected of uncomplicated malaria before prescribing treatment while seventeen (68%) said they routinely treat malaria cases according to test results in patients five years and above (Table 5).

Table 5. Responses of Prescribers by Cadre, Effutu Municipal, 2014.

Prescriber Responses		**Cadre of Prescriber**				**Overall**
		Medical Doctors	**Physician Assistants**	**Nurses & Midwives**	**Community Health Nurses**	
		n (%)	**n (%)**	**n (%)**	**n (%)**	**n (%)**
Sex	Female	4 (57.1)	4 (40)	3 (60)	2 (66.7)	13 (52)
	Male	3 (42.9)	6 (60)	2 (40)	1 (33.3)	12 (48)
Routinely test cases	Yes	4 (57.1)	8 (80)	4 (80)	2 (66.7)	18 (72)
	No	3 (42.9)	2 (20)	1 (20)	1 (33.3)	7 (28)
Routinely prescribe according to test results	Yes	5 (71.4)	8 (80)	3 (60)	1 (33.3)	17 (68)
	No	2 (28.6)	2 (20)	2 (40)	2 (66.7)	8 (32)
TOTAL		**7 (100)**	**10 (100)**	**5 (100)**	**3 (100)**	**25(100)**

4.1.3 Patient Characteristics

Out of the 175 patients interviewed, 125 (71.4%) were females and 41 (23.4%) were aged twelve years and below. The median age of the patients was 28 years (inter-quartile range 14.5 - 48.0). Most 81 (46.3%) adult patients were the age group 13 - 45 years old. The records for paediatric patients from 5 - 12 years old were 41 (23.4%). There were two (1.1%) patient records (one each from the hospital and health centre category) for which age of patient was not provided. The age and sex distribution of the patients interviewed by the type of health facility in which they were seen are shown in table 6.

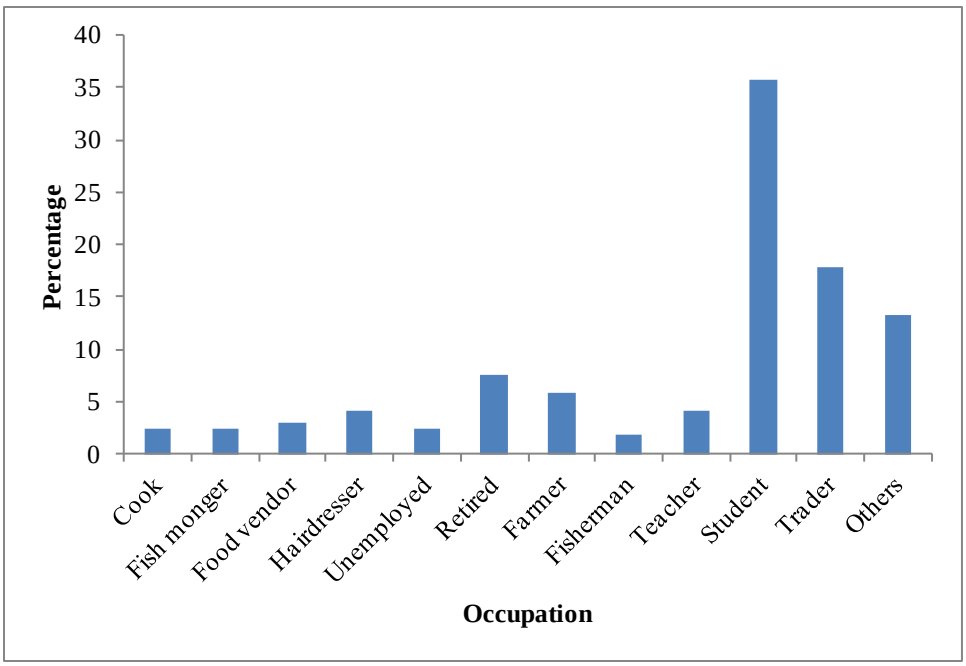
Table 6. Distribution of patients interviewed by age, sex and by type of health facility, Effutu Municipal, 2014.

Patient Characteristics		Type of Health Facility				Overall
		Hospital	Health Centre	Maternity Home	CHPS	
		n (%)	n (%)	n (%)	n (%)	n (%)
Sex	Female	82 (73.2)	22 (62.9)	7 (100)	14 (66.7)	125 (71.4)
	Male	30 (26.8)	13 (37.1)	0 (0)	7 (33.3)	50 (28.6)
Age	5 -12	23 (20.5)	9 (25.7)	1 (14.3)	8 (38.1)	41 (23.4)
	13 - 45	55 (49.1)	13 (37.1)	4 (57.1)	9 (42.9)	81 (46.3)
	46 - 60	13 (11.6)	9 (25.7)	1 (14.3)	2 (9.5)	25 (14.3)
	>60	20 (17.9)	3 (8.6)	1 (14.3)	2 (9.5)	26 (14.9)
	Missing	1 (0.9)	1 (2.9)	0 (0)	0 (0)	2 (1.1)
TOTAL		**112 (100)**	**35 (100)**	**7 (100)**	**21 (100)**	**175 (100)**

4.1.3.1 Patient Occupation

Majority 62(35.8%) of the patients interviewed were students and pupils followed by traders 31(17.9%). Patients who were on retirement were 13 (7.5%) and very few 4 (2.3%) were temporarily unemployed. There were two (1.1%) patients whose interview could not capture their occupation. These were excluded from the analysis in Fig 3.

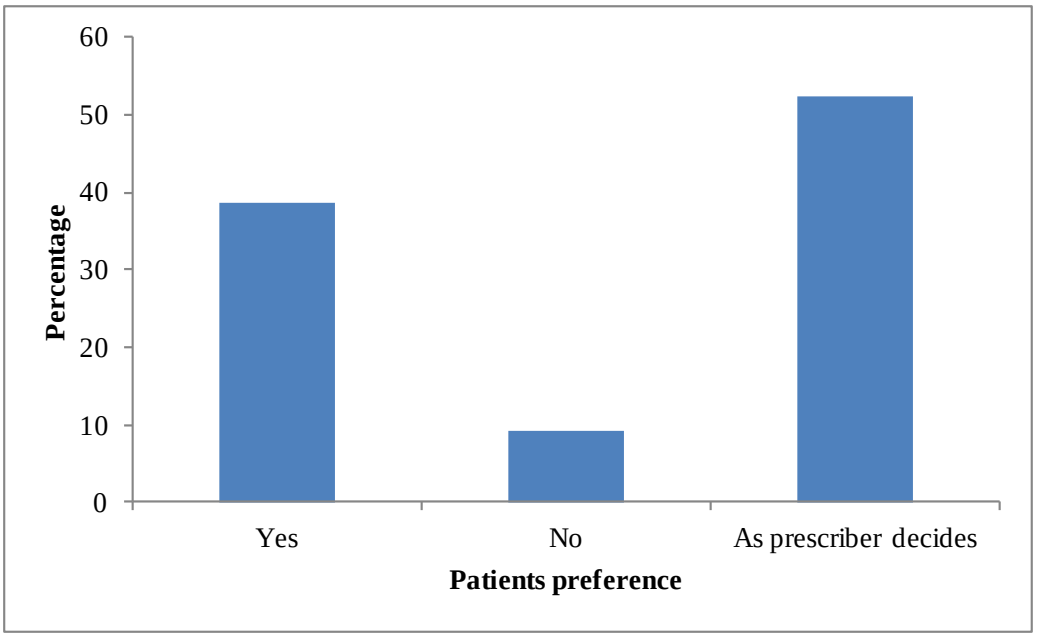
Figure 3: Distribution of patients interviewed by occupation, Effutu Municipal, 2014.



4.1.3.2 Patients' preference to test-based management of malaria

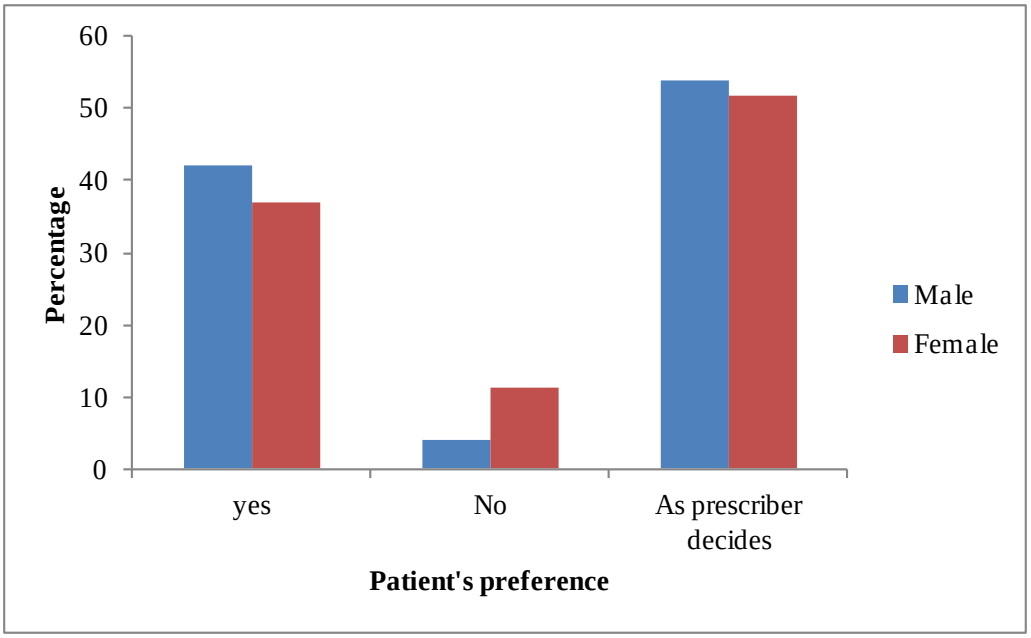
More patients, ninety one (52.3%) preferred the prescribers' decision (As prescriber decides) to manage them upon diagnosis of malaria whiles 67 (38%) preferred (Yes) to be tested and treated according to test results. One of the patient's preferences could not be captured and was therefore not used in the analysis. The figure 4 shows the proportion of patients' preference to comply with malaria test-based case management policy.

Figure 4: Proportion of patient's preference to comply with malaria test-based case management policy, Effutu Municipal, 2014.



More males 42% (21/50) preferred (Yes) to be tested and treated according to test results upon malaria diagnosis compared to females 36.8%(46/125). Of the patients who preferred the prescriber's decision (As prescriber decides) in managing them for uncomplicated malaria, males 54% (27/50) dominated. On the other hand, more females did not (11.3%) preferred(No) to be tested and treated according to test results than males as shown in Fig 5.

Figure 5: Proportion of patient's preference to comply with malaria test-based case management policy by sex, Effutu Municipal, 2014.



4.2 Assessment of the level of compliance by prescribers

Of the sampled seven uncomplicated malaria cases diagnosed per prescriber, the highest number tested by a prescriber before prescribing appropriate treatment was 6 (85.7%). The tested cases that were mostly treated according to test results were 15 (42.9%). None of the twenty five (25) prescribers appropriately tested and treated at least six of the sampled cases to attain compliance. The compliance level of the prescribers with the malaria test-based policy was therefore zero (Table 7).

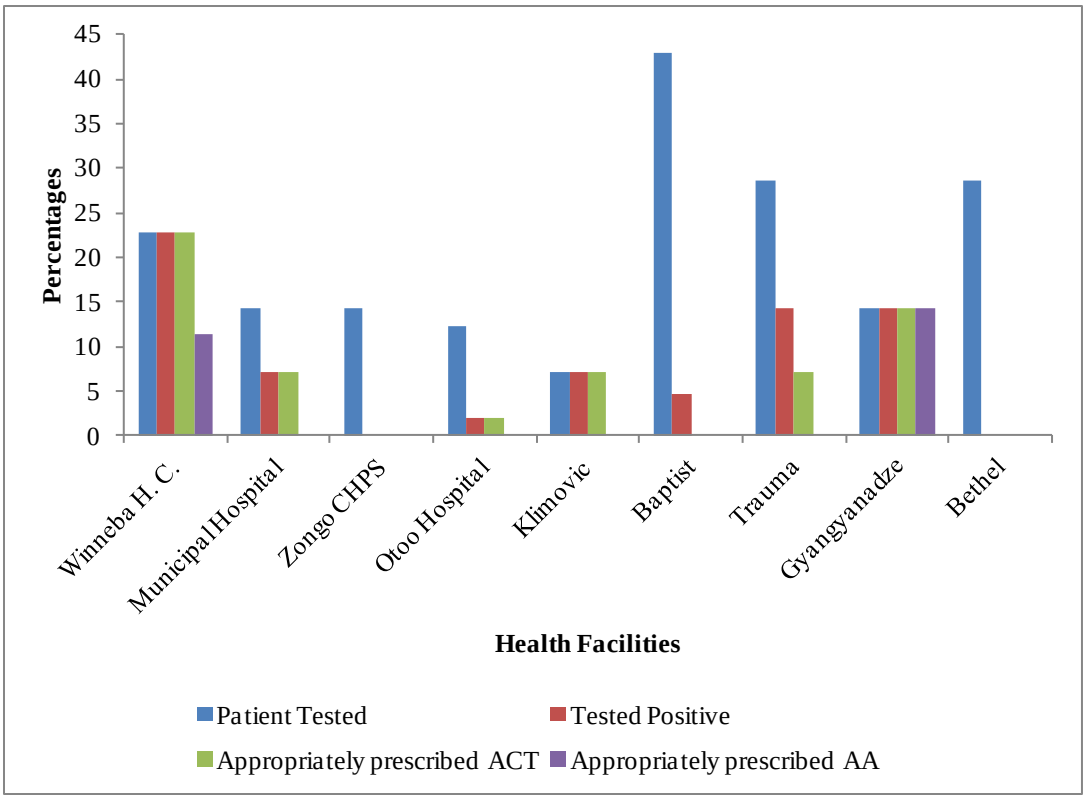
Table 7: Performance of Prescriber towards compliance with malaria test-based case management policy, Effutu Municipality, 2014.

Health Facility	Prescribers Code	Malaria Cases n (%)	Cases tested n (%)	Cases tested positive n (%)	Cases treated according to test results n (%)	Prescriber compliance (Yes-- ≥6/7 No--- <6/7)
Winneba Health Centre	A	7 (100)	1 (14.3)	1 (100)	1 (100)	No
	B	7 (100)	2 (28.6)	2 (100)	2 (100)	No
	C	7 (100)	3 (42.9)	3 (100)	3 (100)	No
	D	7 (100)	2 (28.6)	2 (100)	2 (100)	No
	E	7 (100)	0 (0)	0 (0)	0 (0)	No
Municipal Hospital	A	7 (100)	2 (28.6)	1 (50)	1 (50)	No
	B	7 (100)	0 (0)	0 (0)	0 (0)	No
Zongo CHPS	A	7 (100)	1 (14.3)	0 (0)	0 (0)	No
	B	7 (100)	1 (14.3)	0 (0)	0 (0)	No
Otoo Memorial Hospital	A	7 (100)	1 (14.3)	0 (0)	0 (0)	No
	B	7 (100)	1 (14.3)	0 (0)	0 (0)	No
	C	7 (100)	1 (14.3)	0 (0)	0 (0)	No
	D	7 (100)	1 (14.3)	0 (0)	0 (0)	No
	E	7 (100)	0 (0)	0 (0)	0 (0)	No
	F	7 (100)	0 (0)	0 (0)	0 (0)	No
	G	7 (100)	2 (28.6)	1 (50)	1 (50)	No
Klimovic Memorial Hospital	A	7 (100)	0 (0)	0 (0)	0 (0)	No
	B	7 (100)	1(14.3)	1 (100)	1 (100)	No
Coast For Christ Baptist Hospital	A	7 (100)	6 (85.7)	0 (0)	0 (0)	No
	B	7 (100)	2 (28.6)	1 (50)	1 (50)	No
	C	7 (100)	1 (14.3)	0 (0)	0 (0)	No
Trauma and Specialist Hospital	A	7 (100)	3 (42.9)	2 (66.7)	2 (66.7)	No
	B	7 (100)	1 (14.3)	0 (0)	0 (0)	No
Gyangyanadze CHPS	A	7 (100)	1 (14.3)	1 (100)	1 (100)	No
Bethel Maternity Home	A	7 (100)	2 (28.6)	0 (0)	0 (0)	No
TOTAL		**175(100)**	**35(20)**	**15(42.9)**	**15(42.9)**	**25**

4.2.1 Prescriber prescription practice

Of the 175 patients sampled for the compliance assessment, only 15 (8.5%) were tested and treated appropriately with anti-malarials. Presumptive treatment was given to majority 140 (80%) of the patients and twenty (11.4%) patients who tested negative were also given anti-malarials regardless of the test results. Of six (66.7%) facilities which appropriately prescribed ACTs for malaria treatment, Artesunate Amodiaquine AA was less prescribed being prescribed only in two (33.3%) facilities as shown in Fig 6 below.

Figure 6: Proportion of suspected malaria cases tested and appropriately prescribed ACT by health facilities, Effutu Municipal, 2014.



The responses of prescribers concerning preference for AA for treatment of malaria showed that eight (32%) rarely prescribe AA for malaria treatment whilst 15 (60%) sometimes did. Moreover, eight (32%) never prescribed AA for malaria treatment. Most 17

(68%) prescribers prescribed other anti-malarials than AA for fear of adverse reactions. Four (16%) prescribers mentioned patient preference as a reason for prescribing other anti-malarials than AA (Table 8).

Table 8: Reasons for prescriber preferences to anti-malarials other than AA by sex, Effutu Municipality, 2014.

Reasons why prescribers sometimes prescribe other anti-malarials than AA	**Sex of Prescribers**		**Total**
	Male n (%)	Female n (%)	n (%)
Fear of Adverse Reaction	9 (36)	8 (32)	17 (68)
Prescriber Personal Choice	0 (0)	1 (4)	1 (4)
Stock out of drug	5 (20)	3 (12)	8 (32)
Lack of confidence in drug	4 (16)	1(4)	5(20)
Patient's Preference	3 (12)	1 (4)	4 (16)
Clinical decision	0 (0)	1 (4)	1 (4)

n = 25

4.3 Factors associated with testing suspected malaria cases before treatment.

4.3.1 Patient Factors

At bivariate analysis, patient factors associated with being tested for malaria parasites before treatment were: patient aged 13 - 45 years (OR=1.26, 95%CI = 0.50 - 3.20), when compared with ages 5-12 years, measured temperature of 37.5^{o}C or more (OR = 2.40, 95%CI = 0.66-8.76) and patient with NHIS status (OR = 3.54, 95%CI = 0.44 - 27.99) as shown in table 9. Meanwhile, the odds of being tested before treatment were the same in both male and female patients (OR = 1.00, 95%CI = 0.44 - 2.27). Patient occupation as students had higher odds of testing than government workers (OR= 1.26, 95%CI= 0.32 - 5.07). Patient symptoms that

were associated with being tested before treatment included Loss of appetite (OR = 1.26 95%CI = 0.44 - 3.63) when compared with patients who had fever. All these analysis were positively associated with being tested before treatment of malaria. However, all these differences were statistically insignificant (Table 9).

Table 9: Patient factors associated with being tested before prescribed treatment, Effutu Municipal, 2014.

Variable Patients seen by Prescribers	N(%) Conforming	Bivariate Unadjusted OR	95%CI	p-value
Patient age group (years)				
5 - 12 (n=41)	8(19.5)	Ref		
13 - 45 (n=81)	19(23.5)	1.26	0.50 - 3.20	
> 45 (n=51)	8(15.7)	0.77	0.26 - 2.26	
Patient Sex				
Female(n=125)	25(20.0)	Ref		
Male(n=50)	10(20.0)	1.00	0.44 - 2.27	
Measured Temperature(n=162)				
< 37.5^{o}C(n=151)	29(19.2)	Ref		
≥ 37.5^{o}C(n=11)	4(36.4)	2.40	0.66 - 8.76	
Patient NHIS Status (n=173)				
Without NHIS(n=14)	1(7.1)	Ref		
With NHIS(n=159)	34(21.4)	3.54	0.44 - 27.99	
Patient Occupation (n=174)				
Government worker(16)	3(18.8)	Ref		
Self employed(n=79)	14(17.7)	0.93	0.23 - 3.72	
Students (n=62)	14(22.6)	1.26	0.32 - 5.07	
Unemployed (n=17)	3(17.6)	0.94	0.16 - 5.45	
Patient Symptoms				
Fever (n=86)	18(20.9)	Ref		
Headache(n=98)	17(17.3)	0.79	0.38 - 1.66	
Body pains(n=39)	4(10.3)	0.43	0.14 - 1.37	
Cough(n=40)	6(15.0)	0.67	0.24 - 1.83	
Chills(n=69)	14(20.3)	0.96	0.44 - 2.11	
Bitter taste(n=36)	8(22.2)	1.08	0.42 - 2.77	
Fatigue(n=13)	3(23.1)	1.13	0.28 - 4.55	
Loss of appetite(n=24)	6(25.0)	1.26	0.44 - 3.63	

4.3.2 Prescriber Factors

Twenty prescribers (80%) mentioned severity of disease as the most influential factor to test cases before treatment. Thirteen (52%) mentioned availability of laboratory service with one prescriber (4%) indicating patient waiting time as shown in the table below;

Table 10. Perceived factors influencing testing for malaria parasites before treatment by prescribers, Effutu Municipal, 2014.

Mentioned factors	Testing before treatment		Percentage
	Yes (n)	No (n)	Yes (%)
Patient Age	10	15	40
Availability of lab	13	12	52
Availability of RDT	5	20	20
Patient NHIS Status	4	21	16
Patient preference	8	17	32
Patient waiting time	1	24	4
Prescriber personal choice	4	21	16
Prescriber work load	2	23	8
Severity of Disease	20	5	80
Treatment Failure	2	23	8

At bivariate analysis, prescriber factors that were positively associated with being tested for malaria parasites as a patient before being prescribed treatment were: sex of prescriber as a female than a male, prescriber aged thirty five years or less (OR= 1.52 95%Cl= 0.68 - 3.42), prescriber cadre as physician assistant (OR=2.08, 95%Cl=0.79 - 5.44) and nurses and lower cadres (OR=1.30, 95%Cl = 0.46 - 3.74) than being a medical doctor,

years of experience less than six years (OR=1.71, 95%Cl =0.69- 4.23) and Professional Rank at first level after graduation (OR = 1.71, 95%Cl = 0.69 - 4.23). Prescribers' awareness of malaria test base case management policy and training about policy were also positively associated with patients seen as shown in Table 11. All these differences were however statistically insignificant.

Table 11: Prescriber factors associated with testing of patients seen before prescribing treatment, Effutu Municipal, 2014.

Variable: Patients seen by Prescribers as follows:	**N(%) Conforming**	**Bivariate Unadjusted Odds Ratio**	**95%CI**	**p-value**
Prescriber age				
>35 years(n=63)	10(15.9)	Ref		
≤ 35 years(n=112)	25(22.3)	1.52	0.68 - 3.42	
Prescriber Sex				
Female(n=91)	22(24.1)	Ref		
Male(n=84)	13(15.5)	0.57	0.26 - 1.23	
Prescriber Category				
Medical Doctor(n=49)	7(14.3)	Ref		
Physician Assistant(n=70)	18(25.7)	2.08	0.79 - 5.44	
Nurses and lower cadres(n=56)	10(17.9)	1.30	0.46 - 3.74	
Years of experience				
≥ 6 years(n=49)	7(14.3)	Ref		
< 6 years(n=126)	28(22.2)	1.71	0.69 - 4.23	
Professional Rank				
Higher than first level(n=49)	7(14.3)	Ref		
At First Level(n=126)	28(22.2)	1.71	0.69 - 4.23	
Awareness of Policy (n=168**)**				
Not aware(n=28)	5(17.9)	Ref		
Aware(n=140)	29(20.7)	1.20	0.42 - 3.43	
Training on Policy (n=168)				
Not Trained(n=49)	8(16.3)	Ref		
Trained(n=119)	27(22.7)	1.50	0.63 - 3.59	

4.3.3 Health Facility Factors

At bivariate analysis, patients seen at lower health facilities had similar odds of being tested before treatment as at a hospital facility. Health facilities which accepted NHIS were positively associated with testing patients seen in those facilities for malaria (OR = 1.55, 95%Cl = 0.33 - 7.25). Other health facility factors that were positively associated with testing of patients seen for malaria parasites before treatment were: availability of functional laboratory and having five microscopists for malaria parasite identification compared with less or equal to three microscopists as shown in table 12. All these differences were also statistically insignificant. Meanwhile, patients seen at Mission or CHAG health facility were significantly associated with being tested for malaria before treatment (OR = 5.08, 95%Cl = 1.67 - 15.45) than in health facilities with government or private operating authorities.

Table 12: Health Facility factors positively associated with testing before prescribing treatment, Effutu Municipal, 2014.

Variable: Patients seen at Health facilities as follows:	N(%) Conforming	Bivariate Unadjusted Odds Ratio	95%CI
Facility Type			
Hospital(n=112)	22(19.6)	Ref	
Lower health facilities(n=63)	13(20.6)	1.06	0.49 - 2.29
Operating Authority			
Private(n=70)	9(12.9)	Ref	
Government(n=84)	17(20.2)	1.72	0.71 - 4.14
Mission/CHAG(n=21)	9(42.9)	**5.08**	**1.67 - 15.45**
Facility NHIS Status			
Does not accept NHIS(n=14)	2(14.3)	Ref	
Accepts NHIS(n=161)	33(20.5)	1.55	0.33-7.25
Functional Laboratory			
Not Available(n=21)	3(14.3)	Ref	
Available(n=154)	32(20.8)	1.57	0.44 - 5.68
Number of Microscopists			
Less or equal to Three(n=63)	13(20.6)	Ref	
Four(n=56)	8(14.3)	0.64	0.24 - 1.68
Five(n=35)	11(31.4)	1.76	0.68 - 4.51
Availability of Guidelines			
Standard Treatment Guideline			
Not Available(n=21)	4(19.0)	Ref	
Available(n=154)	31(20.1)	1.07	0.34 - 3.41
Anti-malarial Drug Policy			
Not Available(n=42)	9(21.4)	Ref	
Available(n=133)	26(19.5)	0.89	0.38 - 2.09

4.4 Factors associated with treating suspected malaria cases according to test results.

4.4.1 Patient Factors

Bivariate analysis also showed a positive association between being treated according to test results and patient characteristics such as age of patient above 45 years (OR= 1.50, 95%CI=0.17-13.22) than patient aged 5 - 12 years and measured temperature of 37.5^{o}C or more (OR = 1.23, 95%CI = 0.15 - 9.97). Meanwhile, the odds of being treated according to test results were higher in female patients compared to male patients. Being self employed, student or unemployed was more associated with being treated according to test results at bivariate analysis than being a government worker. Patient symptoms such as body pains (OR= 3.00, 95%CI=0.26-34.58) had higher odds of being treated according to test results than fever. However, all these differences were statistically insignificant (Table 13).

Table 13: Patient factors positively associated with treating cases according to test results, Effutu Municipal, 2014.

Variables Patients tested by prescribers	**N(%) Conforming**	**Bivariate Unadjusted Odds Ratio**	**95%CI**
Patient age group(n=34)			
5 - 12 years(n=8)	5(62.5)	Ref	
13 - 45 years(n=19)	5(26.3)	0.21	0.04 - 1.24
>45 years(n=7)	5(71.4)	1.50	0.17 - 13.22
Patient Sex			
Female(n=25)	11(44.0)	Ref	
Male(n=10)	4(40.0)	0.84	0.19 - 3.77
Measured Temperature			
< 37.5^{o}C(n=29)	13(44.8)	Ref	
≥ 37.5^{o}C(n=4)	2(50.0)	1.23	0.15 - 9.97
n=33			
Patient Occupation			
Government worker(n=3)	1(33.3)	Ref	
Self employed(n=12)	6(50.0)	2.00	0.14 - 28.42
Students (n=14)	7(50.0)	2.00	0.15 - 27.44
Unemployed (n=2)	1(50.0)	2.00	0.05 - 78.25
Patient Symptoms			
Fever (n=18)	9(50.0)	Ref	
Headache(n=17)	7(41.2)	0.70	0.18 - 2.66
Body pains(n=4)	3(75.0)	3.00	0.26 - 34.58
Cough(n=6)	3(50.0)	1.00	0.15 - 6.35
Chills(n=14)	5(35.7)	0.56	0.13 - 2.32
Bitter taste(n=8)	3(37.5)	0.60	0.11 - 3.30
Loss of appetite(n=6)	2(33.3)	0.33	0.05 - 2.12

4.4.2 Prescriber Factors

Twenty prescribers (80%) mentioned severity of disease as the most influential factor to test cases before treatment. Thirteen (52%) mentioned availability of laboratory or diagnostic service with one prescriber (4%) indicating patient waiting time as shown in the table below;

Table 14. Perceived factors influencing treatment of uncomplicated malaria according to test results by prescribers, Effutu Municipal, 2014.

Mentioned factors	Treating according to test result		Percentage
	Yes (n)	No (n)	Yes (%)
Severity of Disease	20	5	80
Patient Age	9	16	36
Availability of drug at facility	4	21	16
Laboratory confirmation	16	9	64
Patient preference	1	24	4
Patient waiting time	0	25	0
Prescriber personal choice	4	21	16
Trust in test results	10	15	40
Patient NHIS Status	3	22	12
Treatment Failure	1	24	4

Bivariate analysis also showed positive association between treating patients seen according to test results and prescriber characteristics such as sex of prescriber as a male (OR = 2.04, 95%Cl = 0.51 - 8.23), prescriber aged thirty five years or less (OR= 2.15 95%Cl= 0.45-10.29), prescriber cadre as medical doctor than physician assistants and nurses and lower cadres and years of experience below six years (OR = 2.17, 95%Cl = 0.36 - 13.11). Also, professional Rank at first level after graduation, prescribers' awareness of policy and training about policy were also positively associated with treating patients according to test results as shown in table 15. These associations were all statistically insignificant.

Table 15: Prescriber factors positively associated with treating cases according to test results, Effutu Municipal, 2014.

Variable: Patients tested by Prescribers as follows:	**N(%) Conforming**	**Bivariate Unadjusted Odds Ratio**	**95%CI**	**p-value**
Prescriber age				
≤ 35 years(n=25)	12(48.0)	2.15	0.45 - 10.29	
>35 years(n=10)	3(30.0)	Ref		
Prescriber Sex				
Female(n=22)	8(36.4)	Ref		
Male(n=13)	7(53.8)	2.04	0.51 - 8.23	
Prescriber Category				
Medical Doctor(n=7)	4(57.1)	Ref		
Physician Assistant(n=18)	6(33.3)	0.38	0.06 - 2.24	
Nurses and lower cadres(n=10)	5(50.0)	0.75	0.11 - 5.24	
Years of experience				
≥ 6 years(n=7)	2(28.6)	Ref		
< 6 years(n=28)	13(46.4)	2.17	0.36 - 13.11	
Professional Rank				
Higher than first level(n=7)	2(28.6)	Ref		
At First Level(n=28)	13(46.4)	2.17	0.36 - 13.11	
Awareness of Policy(n=34**)**				
Not aware(n=5)	2(40.0)	Ref		
Aware(n=29)	13(44.8)	1.22	0.18 - 8.42	
Training on Policy				
Not Trained(n=8)	3(37.5)	Ref		
Trained(n=27)	12(44.4)	1.33	0.26 - 6.74	

4.4.3 Health Facility Factors

At bivariate analysis, patients seen at lower health facilities and government operating health facilities were significantly associated with being treated according to test results than a hospital, mission and private operating health facilities. On the other hand, health facilities with a functional laboratory (OR=1.56, 95%CI=0.13 - 18.95), five microscopists (OR=1.22, 95%CI=0.14 - 10.48) compared with less or equal to three microscopists and with the anti-malarial drug policy available (OR=1.71, 95%CI=0.28 - 12.73) showed positive association with treating patients according to test results at bivariate analysis as shown in table 16. These differences were however statistically insignificant.

Table 16: Health facility factors associated with treating patients according to test results, Effutu Municipal, 2014.

Variable: Patients tested at Health facilities as follows:	**N(%) Conforming**	**Bivariate Unadjusted Odds Ratio**	**95%CI**
Facility Type			
Hospital(n=22)	6(27.3)	Ref	
Lower health facilities(n=13)	9(69.2)	**6.00**	**1.33 - 27.05**
Operating Authority			
Private(n=9)	2(22.2)	Ref	
Government(n=17)	12(70.6)	**8.40**	**1.27-55.40**
Mission/CHAG(n=9)	1(11.1)	0.39	0.03 - 5.21
Functional Laboratory			
Not Available(n=3)	1(33.3)	Ref	
Available(n=32)	14(43.8)	1.56	0.13-18.95
Number of Microscopists			
Less or equal to Three(n=13)	2(50.0)	Ref	
Four(n=8)	1(12.5)	0.79	0.06 - 10.38
Five(n=11)	2(18.2)	1.22	0.14 - 10.48
Anti-malarial Drug Policy			
Not Available(n=9)	3(33.3)	Ref	
Available(n=26)	12(46.2)	1.71	0.35-8.37

CHAPTER FIVE

5.0 DISCUSSION

From the results, all the health facilities had the capacity to test for malaria parasites indicating the readiness to test patients suspected of malaria before treatment. Though two of the facilities did not have a functional laboratory, malaria RDTs were available within the last three months prior to the study. For facilities with functional laboratories, an average of three microscopists in their laboratory who have undergone training in malaria parasite microscopy shows that, enough staffs are available to contain the patient load of malaria and other laboratory tests requested by prescribers in their bid to comply with the test-based policy. The availability of giemsa reagents, distilled water and microscope together with other testing logistics confirms the PMI report of provision of appropriate logistics to aid compliance with the policy. The fact that all the health facilities had three staff on average trained to use malaria RDT to diagnose malaria indicated that health workers were equipped to manage malaria appropriately by following the test-based policy. Therefore non compliance of the health workers and prescriber to the policy could not be attributed to lack of training, shortage of staffs or inadequate or unavailability of the necessary logistics in the health facilities.

The median age of prescribers suggests a fairly young prescriber group who would be more likely to comply with protocols and guidelines as reported by Mckinlay, Tin, Freund and Moskowitz (2002) and hence be able to request malaria test and treat accordingly the more. Though only few of the prescribers had no training in malaria test-based case management policy, majority were aware and agreed that the policy was clear and understandable. This shows that, prescribers did not have any barriers related to knowledge to comply with the policy. Therefore the action of prescribers towards compliance was a

challenge of their attitude and behaviour towards compliance and hence their sole prerogative and personal decision.

However, contrast of the prescribers' response to routinely request malaria test and treat accordingly with what was observed in the study was consistent with the study in Nigeria by Uzochukwu et al, (2011) where health workers treated RDT-negative results for malaria in their practice after perceiving RDTs to be the most effective in diagnosing malaria. This could suggest that the prescribers responded to questions as required but not according to their desire. Therefore the factors that influence prescribers could be related to their behaviour which is consistent with findings in Nigeria by Uzochukwu et al, (2011) in their description of health workers from a study where health workers who perceived RDTs to be the most effective among microscopy and clinical diagnosis of malaria further prescribed ACTs in 74% of RDT-negative results. However, it is in contrast with the report of Lugtenberg, Schaick, Westert and Burgers in 2009 among Dutch physicians where barriers related to prescribers attitude preceded that of their behaviour in their study in which 56 key recommendations were studied. The difference in the findings could be as a result of the method of data collection where they used focussed group discussions in which prescribers' reasoning could be influenced by that of a colleague thereby not obtaining accurate results.

Though some patients were willing to comply with the policy, it was the prescribers' decision to initiate it. Meanwhile the willingness of the vast majority of prescribers to comply with the policy could not be relied upon as a sign of positive response to the policy. This is because their response to routine testing and treating patients appropriately was in contrast to their practices assessed. This therefore poses a challenge to better malaria management per the policy because most patients prefer the prescribers' sole decision to manage them of

uncomplicated malaria as shown in Fig 4 in the results. The results showing high patients preference against the test-based malaria management was in contrast with that of Baiden et al (2012) in their study in Ghana where nearly all caregivers preferred it. This could be due to the fact that the sample population of their study was caregivers of under five children who might prefer the appropriate targeted treatment for their vulnerable children but not actually for themselves whereas adult population formed the majority in this study.

The results from the compliance assessment show that none of the prescribers complied with the malaria test-based case management policy of testing uncomplicated malaria cases and treating them according to test results. Presumptive treatment and belief in the clinical judgement of prescribers was the norm as this was common among them. The relatively low testing rate and treatment by prescribers was comparatively lower than that found in Tanzania by Mubi *et al*, (2013) in a similar study. The difference is that they worked at 30% compliance whereas this study aimed at 95% compliance. Neglect of negative test results towards treatment was also in the majority against test positive patients who were treated. Lack of applicability of the policy with reference to non treatment of test negative cases posed a challenge to prescribers as they do not know what else to treat for and hence, alternatives for treatment of negative cases are their most bargains. Meanwhile non compliance with policy guidelines is not uncommon among prescribers as mostly, some levels of compliance is achieved as found in the reports of Nanyingi (2008) in Uganda where health workers still treated negative test results despite training and guidelines received.

Amidst the higher level of disregard for negative test results at 57.1% compared with studies in Malawi, Uganda and Sudan by Chinkhumba *et al*, (2010), Nanyingi (2008) and Abdelgader *et al*, (2012) respectively, attaining zero compliance with the policy shows the

looming danger of high cost of suspected malaria case management as reported by Bissofi et al, (2011) in their cost benefit analysis of strict adherence to malaria RDTs in Burkina Faso and Shantveer *et al*, 2012 in India, potential risks of overtreatment as well as possible resistance feared to occur. Despite numerous funded researches, findings and interventions put in place to curb the situation, prescribers do not seem to be perturbed about the test-based policy. As to why they continue to request malaria test for patients knowing they will not treat according to the test results to fully comply with the policy is yet to be understood.

The prescription practice of prescribers further continues to favour use of Artemether Lumefantrine than Artesunate Amodiaquine which is the recommended first line drug and the former the alternate drug for first line treatment. This finding also corresponds with other studies where heath workers prefer other anti-malarials than the first line. However, this instance could be due to the fear of adverse reaction experienced earlier during the introduction of AA which was also mentioned by prescribers.

Also, the high prescription of ACTs found in both government and private-for profit health facilities than other anti-malarials shows their acceptance by prescribers for their efficacy as the most effective anti-malarial drugs. Meanwhile the use of the first line AA and alternate AL were high in government and private health facilities respectively. The availability and use of ACTs by both government (public) and private health facilities in this study contrasts with study findings in Nigeria by Uzochukwu et al, (2010) where ACTs were more readily available and used in public health facilities than private ones. The difference in findings could be due to the duration between these studies for the fact that the use of ACT policy could have been in its early stages of implementation where the public facilities could easily obtain the drugs from the government than private ones. The action of private facilities

in AL prescription could be to avoid legal confrontations that may ensue from poor use of AA and possible loss of patients as clients for their services as compared to government facilities who might have government machinery to manage their occurrences during the initial adverse reactions of the AA use.

In the bivariate analysis, adult patients aged 13 to 45 years and above 45 years were positively associated with testing before treatment than paediatric patients aged 5 to 12 years. This finding is important owing to the fact that, these groups of patients are outside the vulnerable group of malaria infection which are the under fives, pregnant women and other immuno-compromised foreigners or travellers (WHO, 2012b). As such, it would be highly appropriate to test these patients to confirm diagnosis before appropriate treatment is prescribed to avoid over-diagnosis and overtreatment of malaria with its attendant implications. It is therefore improper that patients' age group greater than 45 years was negatively associated with testing than that of the paediatrics with the same reasoning. This is because not only are they outside the vulnerable group but also more susceptible to chronic conditions that may present like malaria and it would be more appropriate to test in order to rule out or confirm malaria before an appropriate treatment is given.

Moreover , finding patients aged 5 to 12 years and above 45 years to have higher odds of treating patients according to test results than patients age 13 - 45 years shows that prescribers could better manage patients at the extremes of the outer susceptible populations appropriately but difficult for patients 13 to 45 years of age. This corresponds with the study by Dodoo et al (2009) in Ghana where patients above five years predicted treatment by first line drug as compliance with policy. This is possible because prescribers could attribute general malaise or weakness of patients above 45 years to progressive old age and possible

chronic conditions than malaria as alternative management of their ailments as well as paediatrics 5 to 12 years commonly plagued with bacterial infections than malaria. However, getting alternative diagnosis for patients 13 to 45 years where most stressful activities persist becomes a bit difficult than malaria as they are challenged with confusing symptoms as reported by Uzochukwu *et al*, (2011) in their study in Nigeria and therefore use the endemicity of malaria in the sub region as justification for their practice. Prescribers are therefore encouraged to do more in order to diagnose such group appropriately.

The fact that the odds of testing among females is the same as the odds of testing among males confirms that, sex is not a factor in malaria susceptibility and therefore not associated with testing patients before treatment either positively or negatively. Meanwhile patients with measured temperature greater or equal to 37.5^{o}C had higher odds to be tested as found in the study by Zurovac *et al*, (2008) in Kenya. This could mean that prescribers were not certain with some high temperatures to be malaria and would want to confirm it or rule it out to make way for other diagnosis due to the presenting symptoms available.

Similar to findings by Ezeoke *et al*, (2012) in a study in southern Nigeria where the logic of test directed treatment could be hindered by the cost of test, patients with health insurance (NHIS) were more likely to be tested by prescribers before treatment since the insurance cover absorbs the cost. In similar reason, it is not surprising that all such patients were also treated with ACT anti-malarial irrespective of their test results because it is more to the benefit of facility owners as there was a readily available payment from the insurance cover. Thus, whether prescribers test cases or treat presumptively, the facilities receive payments once the insurance claims are filled correctly. In a similar fashion, some patients

would not want to be denied of the drug since they don't feel the direct payment for it as found by Baiden *et al,* (2012) in rural Ghana among caregivers of under five children.

Also, government workers had higher odds of being tested than self employed and unemployed patients but not the case for students. Although there could be no biological explanations to such association between patient occupation and testing, prescribers could have been a little bit intimidated and influenced by students and the government workers through their mode of dressing, appearance and or confidence with which they presented their issues. The finding that students had higher odds of being tested than the government workers could also be explained that, most were tertiary students from the university situated within the municipality and were more likely to have engaged prescribers in the English language as against the local dialect used by the majority of patients during the consultation process. In spite of all these reasons, prescribers treated patients other than government workers according to test results the more. This could therefore be explained that prescribers initial testing of those patients was mainly to rule out malaria to make way for other obvious diagnosis identified during the consultation process.

Moreover, patients who presented symptoms such as loss of appetite, fatigue and bitter taste in the mouth had higher odds of being tested before treatment than those with complaints of fever but not to treat according to test results. This was not surprising because malaria diagnosis from treatment guidelines had always been based on fever complaints for presumptive treatment. Prescribers therefore could have followed their usual practise exposing their difficulty to avoid presumptive treatment to comply with the test-based malaria policy. This could also explain why prescribers treated complaints of body pains according to test results than fever and therefore could not be seen as a sign of showing

compliance with test-based policy. This further emphasizes the fact that prescribers put their clinical judgement first before laboratory findings which is contrary to modern scientific developments. It would therefore be proper to change the malaria case definition found in the guidelines to reflect that of the test-based policy to attain compliance.

Prescriber age less than or equal to 35 years, years of experience less than 6 years, professional cadre as physician assistant, as well as professional rank at first level since graduation were found to influence prescribers' decision to test for malaria before prescribing treatment to patients. This is comparable to the findings by Selemani *et al.* (2013) in Tanzania where years of working experience and health worker cadre were associated with correct ACT prescription for uncomplicated malaria. Meanwhile, training of the prescribers about the policy found to influence prescribers decision in this study was contrary to that found by Selemani *et al.* (2013). The findings of the young age and few years of working experience of the prescribers also corresponds with a study by Mckinlay, Tin, Freund and Moskowitz (2002) in the United States of America to determine physician attributes that influence medical decisions where younger physicians were found to request more tests than their older counterparts. This could be explained that, younger prescribers with less years of experience at the first level rank since graduation would easily follow guidelines and protocols in their quest to overcome their limitations and gain competence in their profession after which they practice their beliefs and experience gained over the years. These factors together with awareness and training of policy were found to influence prescriber treatment of patients as well which corresponds with similar findings by Zurovac *et al*, (2008) in Kenya. Meanwhile the finding that female prescribers tested patients before treatment but did not treat according to test results than their male colleagues could suggest that, the female prescribers mainly tested patients to confirm their malaria diagnosis without considering

other alternative diagnosis but not to determine malaria diagnosis. With such behaviour, the female prescribers could not treat the patients according to test results as their male colleagues did. With this same reasoning on the other hand, the practise of the male prescribers could have followed that of medical doctors among the other professional cadre where they could not test patients before treatment the more but had higher odds of treating patients according to test results.

With the influence of health facility factors, lower health facility types were found to be associated with testing of patients before treatment and significantly associated with treating patients according to test results than hospital facility type. This could be due to the fact that, the lower health facilities are mostly managed by younger and lower level prescribers than the hospital facilities and therefore were more likely to comply with testing. The fact that mission or religious based health facilities with CHAG were significantly associated with testing than government compared with private facilities suggests that, test directed treatment is feasible in the government public facilities as well since the government support for mission facilities is lower comparatively despite their similar case loads. Meanwhile, government public facilities were also significantly more likely to treat patients according to test results the other facilities. These findings are in contrast with studies in South east Nigeria by Meremikwu *et al*, 2007 where prescriber practice and prescribing were the same in both government and private health facilities. Health facilities with functional laboratory and with five microscopists were found to influence prescriber to both test cases before treatment and also treat patients according to test results the more. This therefore supports the Presidents Malaria Initiative in their provision of diagnostic logistics and training of microscopists as found in the 2012 PMI malaria operational plan report for the successful implementation of the test-based malaria policy.

LIMITATION

Different prescriber professional cadres (medical doctors, physician assistants, nurses, midwives, community health nurses) were involved in the study for patient enrolment, testing and treatment. These prescribers were not uniformly distributed at the various study sites of health facilities. Lower level cadres were therefore more likely to be found in the lower or remote facilities without microscopy than the higher ranking facilities which formed over 50% of the health facilities studied and had higher cadres of prescribers. These may have affected the degree of compliance with the study as abilities to manage febrile patients in the various sites were inherently different. However, little could be done about this limitation as these cadres were the main prescribers involved in general Out Patient Consultations in the various health facilities found in the study site.

The quality of the training given to prescribers on the malaria test-based policy was difficult to ascertain and therefore treated the trainings at the same level in determining its effect in the compliance study.

The study was purely non-interventional and therefore neither tested untested patients to verify their diagnosis nor assess whether prescription was appropriate for age and weight.

CHAPTER SIX

6.0 CONCLUSION AND RECOMMENDATIONS

None of the prescribers enrolled tested and treated at least six patients appropriately according to the malaria test-based case management policy. The prescriber compliance with the policy in the Effutu Municipal at patient level was therefore low. From this study, prescribers at Mission/Religious operating health facility significantly tested more patients before treatment than those in private hospitals. However, prescribers at government operating health facilities and lower health facility types significantly treated patients according to test results than those in private hospital and hospital facilities respectively. The other factors identified for both testing and treating according to test results were all statistically insignificant.

Recommendations

Based on the findings from the study, the following recommendations are being made:

The Municipal Health Management Team

1. Should educate health facility owners and administrators of various operating authorities of the need to comply with the malaria test-based policy.
2. Sensitize prescribers on currently lower prevalence of malaria and come up with alternative diagnosis and treatment for negative malaria test results for patients presenting with symptoms common with malaria.
3. Develop a road map on the conflicting challenge of prescribers' use of clinical judgement and test-based malaria management towards prescriber compliance with the effective malaria treatment guideline.

4. Given the prevailing situation where the vast majority of patients who had an active health insurance (NHIS) but diagnosed and treated of uncomplicated malaria without parasitological testing, stakeholders meeting should be held with the National Health Insurance Authority (NHIA) to deliberate and agree to pay insurance claims with uncomplicated malaria diagnosis and treatment with an attached test report confirming the diagnosis.

Health Facility Management

1. Ensure availability and sustenance of diagnostics and logistics required for malaria testing for effective and targeted case management
2. Educate prescribers about the high cost implications of presumptive treatment and treating negative malaria test results with ACT which further leads to a wrong estimate of the malaria burden.
3. Ensure regular patient education about the need for a test-directed treatment on suspecting malaria ailment.

REFERENCES

Abdelgader, T. M., Ibrahim, A. M., Elmer, K. A., Githinji, S., Zurovac, D., Snow, R. W., & Noor, A. M. (2012). Progress towards implementation of ACT malaria case management in public health facilities in the Republic of Sudan: A cluster-sample survey. *BMC Public Health, 12*(11), doi:10.1186/1471-2458-12-11

Ansah ,E. K., Narh-Bana, S., Epokor,M., Akanpigbiam, S., Quartey,A. A., Gyapong ,J., & Whitty, C. J. M. (2010). Rapid testing for malaria in settings where microscopy is available and peripheral clinics where only presumptive treatment is available: a randomised controlled trial in Ghana. *BMJ* 2010 340:c930.

Baiden F, Owusu-Agyei S, Okyere E, Tivura M, Adjei G, Chandramohan, D. & Webster, J. (2012). Acceptability of Rapid Diagnostic Test-Based Management of Malaria among Caregivers of Under-Five Children in Rural Ghana. *Plos One,*7(9): doi:10.1371/journal.pone.004 5556.

Bisoffi, Z., Sirima, S. B., Meheus, F., Lodesani, C., Gobbi, F., Angheben, A., ... & Ende, J. V. (2011). Strict adherence to malaria rapid test results might lead to a neglect of other dangerous diseases: a cost benefit analysis from Burkina Faso. *Malaria Journal* 2011, 10(226) doi:10.1186/1475-2875-10-226.

Boivin, A., Legare, F., Gagnon, M. P. (2008). Competing norms: Canadian rural family physicians' perceptions of clinical practice guidelines and shared decision-making. *Journal of Health Service Research Policy,* 13(2):79-84.

Bonku, E. (2012). The Ghana Urban Malaria Study helps us defend against a killer. *The Pump*. www.jsi.com

Cabana, M. D., Rand, C. S., Powe, N. R., Wu, A. W., Wilson, M. H., Abboud, P. A. C., & Rubin, H. R (1999): Why don'tphysicians follow clinical practice guidelines? A framework for improvement. *JAMA* 1999, 282(15):1458-1465.

Chandler, C. I. R., Jones, C., Boniface, G., Juma, K., Reyburn, H., & Whitty C. J. M. (2008). Guidelines and mindlines: Why do clinical staff over-diagnose malaria in Tanzania? A qualitative study. *Malaria Journal 2008,* 7(53), doi:10.1186/1475-2875-7-53.

Chinkhumba, J., Skarbinski, J., Chilima, B., Campbell, C., Ewing, V., Miguel San Joaquin, M. S., Sande, J. Ali, D., & Mathanga, D. (2010) Comparative field performance and adherence to test results of four malaria rapid diagnostic tests among febrile patients more than five years of age in Blantyre, Malawi. *Malaria Journal* 2010. 9(209) doi: 10.1186/1475-2875-9-209.

Cranney, M., Warren, E., Barton, S., Gardner, K. & Walley, T. (2001). Why do GPs not implement evidence-based guidelines? A descriptive study. *Journal of Family Practice,* 18(4):359-363.

Dodoo, A.N.O., Fogg, C., Asiimwe, A., Nartey, E. T., Kodua, A., Tenkorang, O., & Ofori- Adjei, D. (2009).Pattern of drug utilization for the treatment of uncomplicated malaria in urban Ghana following national treatment policy change to artemisinin- combination therapy. *Malaria Journal, 8*(2) doi:10.1186/1475-2875-8-2.

Ghana Health Service (2010). 2010 Annual report, Ghana. Author.

Ghana Statistical Service. (2012b). *2010 Population and housing census.* Accra, Ghana: Author.

Juma, E., & Zurovac, D. (2011). Changes in health workers' malaria diagnosis and treatment practices in Kenya. *Malaria Journal 2011, 10*(1). doi:10.1186/1475-2875-10-1.

Kasje, W. N., Denig, P. & Haaijer-Ruskamp, F. M. (2002). Specialists' expectations regarding joint treatment guidelines for primary and secondary care. *International Journal of Quality Health Care*, 14(6):509-518.

Lugtenberg, M., Judith M Zegers-van Schaick, J. M. Z., Westert, G. P. & Burgers, J. S. (2009). Why don't physicians adhere to guideline recommendations in practice? An analysis of barriers among Dutch general practitioners, *Implementation Science*, 4(54) doi:10.1186/1748-5908-4-54.

McKinlay, J. B., Lin, T., Freund, K. & Mark Moskowitz (2002). The Unexpected Influence of Physician Attributes on Clinical Decisions: Results of an Experiment. *Journal of Health and Social Behavior*. 43(1): 92-106.

McKinlay, J. B., Link, C. L., Freund, K. M., Marceau, L. D., O'Donnell, A. B. & Lutfey, K. L. (2007). Sources of Variation in Physician Adherence with Clinical Guidelines: Results from a Factorial Experiment. *Journal of General Internal Medicine*, 22(3): 289–296.

Meremikwu, M., Okomo, U., Nwachukwu, C., Oyo-Ita, A., Eke-Njoku, J., Okebe, J., … Garner, P. (2007). Anti-malarial drug prescribing practice in private and public health facilities in South-east Nigeria: A descriptive study. *Malaria Journal 2007*, 6(55), doi:10.1186/1475- 2875-6-55.

Ministry of Health. (2009). Guidelines of case management of malaria in Ghana: Author: MOH, 2009.

Ministry of Health. (2009). Strategic Plan for Malaria Control in Ghana 2008-2015. Ghana. Author.

Mishra, N., Anvikar, A. R., Shah, K. N., Kamal, V. K., Sharma, S.K., Srivastava, H. C., … Valecha, N. (2011). Prescription practices and availability of artemisinin monotherapy in India: Where do we stand? *Malaria Journal 2011*, 10(360), doi:10.1186/1475- 2875-10-360.

Nanyingi, M. (2008). Adherence to laboratory findings in the management of malaria in the high and low transmission areas of Nakasongola and Kabalore Districts of Uganda. *Health Policy and Development Journal*, 6(3), 164-172.

National Malaria Control Programme(2010). 2010 Annual Report. Accra. Author. NMCP

Okebe, J. U., Walther, B., Bojang, K., Drammeh, S., Schellenberg, D., Conway, D. J., & Walther (2010). Prescribing practice for malaria following introduction of artemether lumefantrine in an urban area with declining endemicity in West Africa. *Malaria Journal 2010*, 9(108) doi: 10.1186/1475-2875-9-180.

President's Malaria Initiative, (2012). Malaria Operational Plan (FY2012) : PMI, 2012.

Shantveer H., Neelkantreddy P., Hinchageri, S. S., Jivangi, V. M., Manjunath G. & Anand G. (2012). Analysis of prescription pattern of anti-malarials and its cost in malaria at a teaching hospital. *International Journal of Pharmacology and Therapeutics*. 2(3):8-16.

Selemani, M., Masanja, M. I., Kajungu, D., Amuri, M., Ngozi, M., Khatib, A. R., Abdulla, S. & Savigny, D. (2013). Health worker factors associated with prescribing of artemisinin combination therapy for uncomplicated malaria in rural Tanzania. *Malaria Journal*. 12:334.

Smith, L., Walker, A. & Gilhooly, K. (2004) Clinical guidelines of depression: a qualitative study of GPs' views. *Journal of Family Practice*, 53(7):556-561.

Uzochukwu, B. S. C., Chiegboka, L. O., Enwereuzo, C., Nwosu, U., Okorafor, D., Onwujekwe, O. E., … Ezeoke, O. P. (2010). Examining appropriate diagnosis and treatment of malaria: Availability and use of rapid diagnostic tests and artemisinin-based combination therapy in public and private health facilities in south east Nigeria. *BMC Public Health 2010,* 10(486), doi:10.1186/1471-2458-10-486.

Uzochukwu, B. S., Onwujekwe, E., Ezuma, N. N., Ezeoke, O. P., Ajuba, M. O. & Sibeudu, F. T. (2011). Improving rational treatment of malaria: perceptions and influence of RDTs on prescribing behaviour of health workers in southeast Nigeria. P*los one* 6(1):e14627. doi: 10.1371/journal.pone.0014627.

World Health Organization: *World Malaria Report*. WHO, Geneva; 2008.

World Health Organization: *World Malaria Report*. WHO, Geneva; 2010.

World Health Organization: *Factsheet on the World Malaria Report*. WHO, Geneva; 2012a.

World Health Organization: *World Malaria Report*. WHO, Geneva; 2012b.

Zurovac, D., Njogu, J., Akhwale, W., Hamer, D. H. & Snow, R. W. (2008). Translation of artemether–lumefantrine treatment policy into paediatric clinical practice: an early experience from Kenya. *Tropical Medicine & International Health,* 13(1), 99-107.

APPENDICES

APPENDIX 1: CONSENT FOR PARTICIPANTS

CONSENT FORM
Prescriber

FACTORS INFLUENCING COMPLIANCE OF PRESCRIBERS WITH MALARIA TEST-BASED CASE MANAGEMENT POLICY IN EFFUTU MUNICIPALITY, CENTRAL REGION.

Principal Investigator: Alexander Asamoah

Address: School of Public Health, University of Ghana, Legon.

Tel: 0246597921 E-mail: lexis_lea@yahoo.com

General Information:

The purpose of this study is to determine factors that may influence the compliance of prescribers with the malaria test-based case management policy.

The study will involve prescribers and patients in all the health facilities in the municipality. It is expected that the results will be used in planning health care delivery in the municipality. As part of this study, you have been selected to help in obtaining information for this study. If you agree to be part of this research, it will involve either one or both of the following;

- Answering some questions that will be posed to you by a member of the research team
- Allowing a member of the research team to assess aspects of the consultation processes for a few patients
- Allowing a member of the research team to audio tape the in-depth interview session of the study

- The audiotapes would be kept for 5 weeks after the data collection process
- The expected duration of the interview will be about 20 to 30 minutes

Possible Risks and Discomforts

The research will not pose any risks to you. You may however experience some minor discomfort for being assessed or in answering certain questions. You may refuse to be assessed or 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 Municipal Health Management Team and the Ghana Health Service in planning health delivery services. Your participation may therefore help in improving malaria test-based case management in the municipality.

Confidentiality

All the information obtained will be confidential and used for the purpose indicated for the study. The information will be securely stored without your name or any traceable identity and 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.

Compensation

Participation in this study is purely voluntary. There is no monetary compensation available to you for accepting to be part of this study

Choice of Participation

You do not have to participate in this study if you do not wish to. Your refusal to participate will not attract any penalty. If you agree to participate, you can withdraw consent and discontinue participation at any time. This will not affect you in anyway

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. S. O. Sackey
Tel: 0242 216542
E-mail:sackey492003@yahoo.co.uk

Alexander Asamoah
Tel: 0246 597921
E-mail: lexis_lea@yahoo.com

PARTICIPANT AGREEMENT

I have read the written information (or have had the information read and adequately explained to me) for the study "FACTORS INFLUENCING COMPLIANCE OF PRESCRIBERS WITH MALARIA TEST-BASED CASE MANAGEMENT POLICY IN THE EFFUTU MUNICIPALITY, CENTRAL 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 / Thumbprint of Participant

Date

I certify that the purpose and nature of the research, the potential benefits and possible discomforts associated with participating in this research have been explained to the participant who has agreed to voluntarily participate

....

Signature / Thumb print of Person Who Obtained Consent

Date

CONSENT FORM

Patient 18 years and above

FACTORS INFLUENCING COMPLIANCE OF PRESCRIBERS WITH MALARIA TEST-BASED CASE MANAGEMENT POLICY IN EFFUTU MUNICIPALITY, CENTRAL REGION.

Principal Investigator: Alexander Asamoah

Address: School of Public Health, University of Ghana, Legon.

Tel: 0246597921 E-mail: lexis_lea@yahoo.com

General Information:

The purpose of this study is to determine factors that may influence the compliance of prescribers with the malaria test-based case management policy.

The study will involve prescribers and patients in all the health facilities in the municipality. It is expected that the results will be used in planning health care delivery in the municipality. As part of this study, you have been selected to help in obtaining information for this study. If you agree to be part of this research, it will involve either one or both of the following;

- Answering some questions that will be posed to you by a member of the research team
- The expected duration of the interview will be about 10 minutes

Possible Risks and Discomforts

The research will not pose any risks to you. You may however experience some minor discomfort for being assessed or in answering certain questions. You may refuse to

be assessed or 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 Municipal Health Management Team and the Ghana Health Service in planning health delivery services. Your participation may therefore help in improving malaria test-based case management in the municipality.

Confidentiality

All the information obtained will be confidential and used for the purpose indicated for the study. The information will be securely stored without your name or any traceable identity and 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.

Compensation

Participation in this study is purely voluntary. There is no monetary compensation available to you for accepting to be part of this study

Choice of Participation

You do not have to participate in this study if you do not wish to. Your refusal to participate will not attract any penalty. If you agree to participate, you can withdraw consent and discontinue participation at any time. This will not affect you in anyway

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. S. O. Sackey
Tel: 0242 216542
E-mail:sackey492003@yahoo.co.uk

Alexander Asamoah
Tel: 0246 597921
E-mail: lexis_lea@yahoo.com

PARTICIPANT AGREEMENT

I have read the written information (or have had the information read and adequately explained to me) for the study "FACTORS INFLUENCING COMPLIANCE OF PRESCRIBERS WITH MALARIA TEST-BASED CASE MANAGEMENT POLICY IN THE EFFUTU MUNICIPALITY, CENTRAL 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 / 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 / Thumb print of Witness Date

I certify that the purpose and nature of the research, the potential benefits and possible discomforts associated with participating in this research have been explained to the participant who has agreed to voluntarily participate

....

Signature / Thumb print of Person Who Obtained Consent

Date

ASSENT FORM

Patient below 18 years

FACTORS INFLUENCING COMPLIANCE OF PRESCRIBERS WITH MALARIA TEST-BASED CASE MANAGEMENT POLICY IN EFFUTU MUNICIPALITY, CENTRAL REGION.

Principal Investigator: Alexander Asamoah

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General Information:

The purpose of this study is to determine factors that may influence the compliance of prescribers with the malaria test-based case management policy.

The study will involve prescribers and patients in all the health facilities in the municipality. It is expected that the results will be used in planning health care delivery in the municipality. As part of this study, you have been selected to help in obtaining information for this study. If you agree to be part of this research, it will involve either one or both of the following;

- Answering some questions that will be posed to you by a member of the research team
- The expected duration of the interview will be about 10 minutes

Possible Risks and Discomforts

The research will not pose any risks to you. You may however experience some minor discomfort for being assessed or in answering certain questions. You may refuse to be assessed or 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 Municipal Health Management Team and the Ghana Health Service in planning health delivery services. Your participation may therefore help in improving malaria test-based case management in the municipality.

Confidentiality

All the information obtained will be confidential and used for the purpose indicated for the study. The information will be securely stored without your name or any traceable identity and 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.

Compensation

Participation in this study is purely voluntary. There is no monetary compensation available to you for accepting to be part of this study

Choice of Participation

You do not have to participate in this study if you do not wish to. Your refusal to participate will not attract any penalty. If you agree to participate, you can withdraw consent and discontinue participation at any time. This will not affect you in anyway

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. S. O. Sackey
Tel: 0242 216542
E-mail:sackey492003@yahoo.co.uk

Alexander Asamoah
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PARTICIPANT AGREEMENT

I have read the written information (or have had the information read and adequately explained to me) for the study "FACTORS INFLUENCING COMPLIANCE OF PRESCRIBERS WITH MALARIA TEST-BASED CASE MANAGEMENT POLICY IN THE EFFUTU MUNICIPALITY, CENTRAL 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 / Thumbprint of Caregiver

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 / Thumb print of Witness Date

I certify that the purpose and nature of the research, the potential benefits and possible discomforts associated with participating in this research have been explained to the participant who has agreed to voluntarily participate

....

Signature / Thumb print of Person Who Obtained Consent

Date

APPENDIX 2: DATA COLLECTION TOOLS

Form A. Prescriber Interview Questionnaire - Effutu Municipality

Instructions: Interview the Prescriber(s) at the facility; who provides curative care services for malaria.	
INTERVIEWER: INTRODUCE YOURSELF TO THE PRESCRIBER / CONSENT	
I am a student of the University of Ghana School of Public Health. As part of my MPhil thesis, I am collecting data on prescriber compliance with malaria test-based case management policy in the municipality. The information generated will be useful to you, your facility, the MHMT in planning your health service delivery. All information collected from this survey will be confidential. I am asking for your assistance to ensure accurate information is collected. However, participation in answering questions from this survey is voluntary. You may refuse to answer any question or all the questions.	
100	SIGNATURE OF INTERVIEWER INDICATES PARTICIPANT'S AGREEMENT TO PARTICIPATE AND THAT THE TIME IS CONVENIENT

FACILITY IDENTIFICATION	
Name of Region : CENTRAL	REGION CODE ☐
Name of Municipal : EFFUTU	DISTRICT CODE ☐
Name of facility : …….	FACILITY CODE ☐
Type of Health Facility: (1=Hospital; 2=Health Centre; 3=CHPS; 4= Clinic; 5= Maternity Home 6= Other……)	FACILITY TYPE ☐
Operating Authority: 1= Government; 2=Quasi Government; 3= Non-Governmental Organization; 4=Mission/Religious; 5= Private for profit 6=Other……)	OPERATING AUTHORITY ☐

Date: …….. . DAY / MONTH / YEAR	INTERVIEWER CODE ☐
Name of Interviewer…….	

Prescriber Information	
Prescriber category: (1=Doctor; 2=Medical/Physician Assistants; 3=Nurse; 4=Midwife, 5=Community Health Officer; 6=Other Specify……)	PRESCRIBER CATEGORY ☐
Sex of Prescriber; (1=Male; 2=Female)	SEX OF PRESCRIBER ☐
Age of Prescriber; ..... years	AGE OF PRESCRIBER ☐
Prescriber Code (Start numbering the interviews at each facility from one and continue till you have interviewed all the lead health workers who diagnose and treat for malaria in the facility	PRESCRIBER CODE ☐

Prescriber Training and Experience			
NO.	QUESTIONS	CLASSIFICATION CODE	GO TO
101	Do you personally diagnose and manage uncomplicated malaria?	YES.....1 NO.....2	→ END
102	In what year did you start working in this facility?	. ☐☐☐☐	
103	What is your current technical qualification?	Medical Officer…….1 Medical/Physician Assistant…….....…...2 Nurse……...……...3 Midwife…….4 Community Health Nurse.....5 Other…… ……99	
104	What year did you graduate with this qualification?	☐☐☐☐	
105	How many years of experience do you have with this qualification?	☐☐	

NO	QUESTION	CLASSIFICATION CODE	GO TO
106	What is your current rank in your qualification?	Beginner .....1 House Officer.....2 Medical Officer.....3 Senior.....4 Principal.....5 Deputy.....6 Chief.....7 Specialist.....8 Other, Specify.....9	

NOW I WOULD LIKE TO ASK YOU SOME QUESTIONS ABOUT THE SERVICES YOU PROVIDE HERE IN RELATION TO MALARIA

107	Do you routinely request for malaria test when you suspect uncomplicated malaria in **patients 5 years and above** before prescribing treatment? If yes what laboratory test type do you routinely ask for	YES 1	NO 2
	A. Microscopy	1	2
	B. RDT	1	2
	C. Both Microscopy and RDT	1	2
108	What factors do you consider before requesting laboratory test for malaria parasites in **patients 5 years and above** before prescribing treatment?	Severity of the disease……...1 Age of the patient……..……....2 Patient's preference ……...…..3 Possession of NHIS……....4 Patient's educational status…....5 Patient's occupation……....6 Sex of patient.....7 Availability of lab.....8 Other, Specify……...……9	
109	Do you routinely prescribe malaria treatment according to the test results in **patients 5 years and above**?	YES 1	NO 2
110	What factors do you consider before prescribing anti-malarials for the treatment of uncomplicated malaria in **patients 5 years and above**?	Severity of the disease……...…1 Laboratory confirmed disease…..2 Age of the patient……....3 Patient's preference…...……..4 Possession of NHIS……..…...5	

		Availability of drug at facility....6 Patient's educational status……7 Patient's occupation……..……..8 Sex of patient.....9 Patient without NHIS.....10 Other, Specify……..…...99

NO.	QUESTION	MENTIONED	NOT MENTIONED
111	What drugs do you usually prescribe for uncomplicated malaria in **patients 5 years and above**? **DO NOT READ, DO NOT PROMPT - ASK ANY OTHERS**		
	A. Artesunate-Amodiaquine	1	2
	B. Artesunate only	1	2
	C. Amodiaquine only	1	2
	D. SP	1	2
	E. Artesunate + SP	1	2
	F. Artemether/Lumefantrine or Lonart or Coartem	1	2
	G. Alaxin	1	2
	H. Quinne	1	2
	I. Other, Specify…….	1	2

NO.	QUESTION	CLASSIFICATION CODE	GO TO
112	How often do you prescribe Artesunate-Amodiaquine for the treatment of malaria?	ALWAYS……1 OFTEN/SOMETIMES…….2 RARELY……..……3 NEVER……4	3 OR 4 113
113	Why would you sometimes prescribe other anti-malarials/combinations? **CIRCLE ALL APPLICABLE**	Fear of adverse reaction.……1 Personal choice……..2 Patient's preference……3 Stock out of drug.……...4 Lack of confidence in drug…5 Other, Specify……6	

Now I would like to ask a few questions about training and standards and guidelines in this facility				
NO.	**QUESTION**	**CLASSIFICATION CODE**		
114	Do you have a copy of the following? **(Ask to see a copy)**	Yes seen or reported to have	No	Don't Know
	A. National Malaria Drug policy	1	2	8
	B. Standard Treatment Guidelines	1	2	8
	C. Malaria Treatment Guidelines	1	2	8
115	Are you aware of the malaria test-based cases management policy?	YES.....1 NO.....2		
116	Have you received any training on the use of malaria test (RDT or Microscopy) refresher or follow up on malaria test-based case management? If Yes: In what year did you receive the last training?	YES.....1 NO.....2 [ ][ ][ ][ ]		
117	Do you feel you need additional training in order to be able to manage malaria better?	YES.....1 NO.....2		
118	Are you willing to comply with the malaria test-based case management guidelines?	YES.....1 NO.....2		

INTERVIEWER'S COMMENT

Form A. Patient Interview Questionnaire - Effutu Municipality

Instructions: Recruit patients at the dispensary and extract information available from patient folder and interview patient where information is absent.	
INTERVIEWER: INTRODUCE YOURSELF TO THE HEALTH WORKER / CONSENT	
I am a student of the University of Ghana School of Public Health. As part of my MPhil thesis, I am collecting data on prescriber compliance with malaria test-based case management policy in the municipality. The information generated will be useful to you, your facility, the MHMT in planning your health service delivery. All information collected from this survey will be confidential. I am asking for your assistance to ensure accurate information is collected. However, participation in answering questions from this survey is voluntary. You may refuse to answer any question or all the questions.	
100	SIGNATURE OF INTERVIEWER INDICATES PARTICIPANT'S AGREEMENT TO PARTICIPATE AND THAT THE TIME IS CONVENIENT

FACILITY IDENTIFICATION	
Name of Region: CENTRAL Name of District: EFFUTU MUNICIPAL Name of facility……..…… Name of Observer…….…… Date……	FACILITY CODE ☐
Type of health facility: District hospital= 1, Other hospital=2, Polyclinic=3, Health centre= 4, Clinic= 5, CHPS= 6, Other, Specify…….. ……	FACILITY TYPE ☐
Type of Prescriber assessed: Doctor= 1, MA= 2, Nurse= 3, Midwife= 4, Other= 5: Specify……	PRESCRIBER TYPE ☐ PRESCRIBER SEX ☐
Sex of Prescriber: Male= 1, Female = 2	PRESCRIBER NUMBER ☐
Age of Prescriber (in years) : ☐☐☐	(For first health worker observed in a consultation room, write 1. If the health worker in THAT consultation room changes write 2, 3 etc)
Rank of Prescriber: Beginner=1, Senior=2, Principal=3, Deputy=4, Chief=5, Specialist=6 Other=7, specify.....	PRESCRIBER RANK ☐
Operating Authority: Government=1, Mission /Religious= 2, Private for Profit= 3, Quasi- government= 4, Other, Specify……...	OPERATING AUTHORITY ☐

Patient Information			
NO.	**QUESTIONS**	**CLASSIFICATION CODE**	
200	Age of Patient (in years)	☐☐☐	
201	Sex of Patient	Male 1	Female 2
202	Do you possess a valid NHIS card?	YES 1	NO 2
203	Occupation of patient	Farmer……1 Fisherman.....2 Trader……...3 Businessman/woman……...4 Health worker……..……....5 Teacher……..……...6 Student/Pupil……....7 Other, Specify……...8	
204	Have you visited any other health facility in the last two weeks?	YES 1	NO 2
205	Have you been diagnosed of malaria and prescribed with malaria treatment in the last two weeks?	YES 1	NO 2
206	Have you taken any anti-malarial drug in the last two weeks?	YES 1	NO 2
207	What symptoms did you present to the prescriber during the consultation?	YES	NO
	A. Fever/Hot body	1	2
	B. Headache	1	2
	C. Body pains	1	2
	D. Vomiting	1	2
	E. Chills	1	2
	F. Poor feeding	1	2
	G.Convulsion	1	2
	H. Other, Specify……..		
208	Temperature of patient (^{o}C)	☐☐	
209	Did the prescriber diagnose you of uncomplicated malaria?	YES 1	NO 2
210	Did the prescriber request a malaria test for you before prescribing treatment for it?	YES 1	NO 2
211	What laboratory test type was requested?	a. RDT.....1 b. Microscopy.....2 c. Both.....3	

212	What was the parasitaemia result?	+……1 ++……2 +++……3 ++++……4 No mps seen.....5 Result not available on same day…. ….6 Patient did not return with result…...…7 Test not done……8
213	What other diagnosis did the prescriber make?	Enteric fever……1 URTI……2 Pneumonia……...3 Otitis media……4 Anaemia..……5 Gastritis.....6 Diarrhoea.....7 Others, Specify……8 No additional diagnosis……9

NO.	QUESTION	CLASSIFICATION CODE	
214	Did the prescriber prescribe anti-malarial drug for you? If yes, go to 209	YES 1	NO 2
215	Which anti-malarial drug was prescribed?	YES	NO
	A. Artesunate-Amodiaquine	1	2
	B. Artesunate only	1	2
	C. Amodiaquine only	1	2
	D. SP	1	2
	E. Artesunate + SP	1	2
	F. Artemether/Lumefantrine or Lonart or Coartem	1	2
	G. Alaxin	1	2
	H. Quinine	1	2
	I. Other, Specify…….	1	2
216	Therefore, was the anti-malarial drug prescribed according to test results?	YES 1	NO 2
217	What other medications were prescribed?	MENTIONED	NOT MENTIONED
	a. Antibiotics	1	2
	b. Paracetamol	1	2

	c. Iron tablets / Syrup	1	2
	d. Multivitamins	1	2
	e. ORS	1	2
	f. Injection	1	2
	g. Other, specify.....		
218	Would you want to be tested for malaria parasites and treated according to the results any time malaria is suspected?	YES 1	NO 2

INTERVIEWER'S COMMENT:

FACILITY QUESTIONNAIRE

Instructions: Interview the facility in-charge and unit heads involved in the provision of curative care services for malaria management.
INTERVIEWER: INTRODUCE YOURSELF TO THE FACILITY IN-CHARGE
I am a student of the University of Ghana School of Public Health. As part of my MPhil thesis, I am collecting data on prescriber compliance with malaria test-based case management policy in the municipality. The information generated will be useful to you, your facility, the MHMT in planning your health service delivery. All information collected from this survey will be confidential. I am asking for your assistance to ensure accurate information is collected. However, participation in answering questions from this survey is voluntary. You may refuse to answer any question or all the questions.

300	SIGNATURE OF INTERVIEWER INDICATES PARTICIPANT'S AGREEMENT TO PARTICIPATE AND THAT THE TIME IS CONVENIENT

FACILITY IDENTIFICATION	
Name of Region : CENTRAL Name of Municipal : EFFUTU Name of facility : …….	REGION CODE ☐ DISTRICT CODE ☐ FACILITY CODE ☐
Type of Health Facility: (1=Hospital; 2=Health Centre; 3=CHPS; 4= Clinic; 5= Maternity Home 6= Other……)	FACILITY TYPE ☐
Operating Authority: 1= Government; 2=Quasi Government; 3= Non-Governmental Organization; 4=Mission/Religious; 5= Private for profit 6=Other……)	OPERATING AUTHORITY ☐

Date: …… . DAY / MONTH / YEAR Name of Interviewer…….	INTERVIEWER CODE ☐

NO.	QUESTION	CLASSIFICATION CODE
301	Is there a trained health worker present at the facility at all times (24 hours a day)?	Yes……1 No……2 Don't Know……..8
302	Is there a trained health worker available on call at all times after normal working hours? IF YES ASK TO SEE A CURRENT DUTY ROSTER	Yes……1 No……2 Don't Know……..8

Facility accreditation to Health Insurance				
NO.	QUESTION	CLASSIFICATION CODE		
303	Is this facility NHIS accredited? If yes,	YES 1	NO 2	GO TO If yes,304 If No,307
304	What is the NHIS accreditation grade or class?	Grade A.....1 Grade B.....2 Grade C.....3 Grade D.....4 Grade E.....5 Grade F.....6		
305	What is the NHIS accreditation facility type?	Hospital.....1 Polyclinic.....2 Clinic.....3 Maternity Home.....4 Health Centre.....5 CHPS.....6		
306	What is the NHIS accreditation facility level?	Primary.....1 Secondary.....2 Tertiary.....3		
307	Does this facility accept other health insurances?	YES 1	NO 2	GO TO If yes,308

308	**Which other health insurance is this facility accredited to?**	**CLASSIFICATION CODE**	
		YES	NO
	A. Nationwide mutual healthcare	1	2
	B. Liberty mutual health	1	2
	C. Acacia health insurance	1	2
	D. Premier mutual health	1	2
	E. Empire mutual health	1	2
	F. Universal health insurance	1	2
	G. Apex mutual health	1	2
	H. mso	1	2
	I. Glico Health Plan	1	2

Availability of Functional Laboratory				
NO.	QUESTION	CLASSIFICATION CODE		
309	Does this facility have a functional laboratory?	YES 1	NO 2	GO TO If yes,
310	Does the laboratory have the capacity to test for malaria parasites?	YES 1	NO 2	If yes,
311	**What is the total number of laboratory staff in this facility?**			
	A. Number of Biomedical Scientists			
	B. Laboratory Technologists			
	C. Laboratory Technicians			
	D. Laboratory Assistants			
	E. Laboratory Clerks			
	F. Laboratory Cleaners			
312	How many Microscopists do you have in this facility?			
313	Have these Microscopist undergone any training in malaria parasites microscopy?	YES 1	NO 2	
314	Do you have staffs in this facility who have obtained training in the use of RDT to diagnose malaria? If yes, how many?	YES 1	NO 2	

Availability of logistics			
NO.	QUESTIONS	CLASSIFICATION CODE	
315	Does the laboratory have a microsope? If yes, how many?	YES 1 ☐☐☐	NO 2
316	What reagent is used to stain blood film for malaria parasites?	Giemsa Stain.....1 Field Stain.....2 Other specify.....3	
317	Was the reagent available within the last six (6) months?	YES 1	NO 2
318	Was the reagent available within the last three (3) months?	YES 1	NO 2
319	How much of the reagent is currently in stock?	☐☐☐☐	Millilitres (ml) or grammes (g)
320	Does the facility have distilled water available? If yes, how much is available?	YES 1 ☐☐ litres	NO 2
321	Does the laboratory have RDTs available?	YES 1	NO 2
322	Were RDTs available within the last six (6) months?	YES 1	NO 2
323	Were RDTs available within the last three (3) months?	YES 1	NO 2
324	What is the current stock of RDT in this facility?	☐☐☐	
325	How is malaria confirmed in this facility?	Microscopy.....1 RDT.....2 Microscopy and RDT.....3 Other, specify.....4	

Availability of guidelines				
NO.	QUESTION	CLASSIFICATION CODE		
326	Does this facility have copies of the following? IF YES, ASK TO SEE A COPY	**Reported Available**	**Not Available**	**Not Determined**
327	New Standard Treatment Guidelines	1	2	8
328	New Anti malarial Drug Policy	1	2	8
329	Treatment Protocol in consulting rooms	1	2	8
330	IPT Manual	1	2	8
331	How many staff have been trained on malaria case management, within the last 6 months?			Don't Know 8
332	How many uncomplicated malaria cases **in patients 5yrs and above** were diagnosed in this facility same day a week ago from today?			Don't Know 8
333	How many of the cases were prescribed anti-malarial drugs?			Don't Know 8
334	How many of the diagnosed cases were tested for malaria parasites in the laboratory?			Don't Know 8
335	How many tested positive for malaria parasites?			Don't Know 8

INTERVIEWER'S COMMENT