

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



**ASSESSING COMPLIANCE WITH TEST AND TREAT OF THE
MALARIA T3 POLICY IN TWIFO/ATTI MORKWA DISTRICT**

BY

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**THIS DISSERTATION IS SUBMITTED TO THE UNIVERSITY OF
GHANA LEGON, IN PARTIAL FULFILMENT OF THE
REQUIREMENT FOR THE AWARD OF THE MASTER OF
SCIENCE IN MONITORING AND EVALUATION DEGREE**

JULY 2019

DECLARATION

I, FRANCIS ADJEI-SARPONG declare that this work is my original research and has not been presented either in whole or part elsewhere for another degree except the references to literature and other studies by other researchers which have been duly cited.

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.....

.....

DATE.....

DATE.....

DEDICATION

I dedicate this work to my entire family for being there for me throughout my education career to this level.

God richly bless you all.

ACKNOWLEDGEMENT

My sincere gratitude goes to the Almighty God for His grace and mercies that have brought me this far.

I am very grateful to my supervisor Seth Kwaku Afagbedzi, Ph.D. for his guidance and directions on this work.

I am also extremely thankful to the entire faculty of the School of Public Health and to the NMCP especially the M&E and Research Unit for their useful suggestions.

My heartfelt gratitude goes to Ms. Mavis Narh Acting District Director of Health Services for Twifo/Ati Morkwa and the entire staff of the health directorate and all health facilities for their support.

I am also grateful to Dr. John Benjamin Annan, Medical Superintendent of Twifo Praso Government Hospital not forgetting the hospital administrator, Julius Waamsassiko, Ph.D.

I wish to also say a big thank you to all prescribers who consented to participate in our interviews and to all who helped as research assistants during the data collection.

ABSTRACT

Background: Malaria treatment policy has changed from presumptions based on signs and symptoms to specific drug treatment after positive test results. The Ghana NMCP signed up to the WHO policy known as the test, treat and track (T3) which stipulates that all cases of malaria must be treated only after they have been confirmed by means of a laboratory test. Ghana has however not reached the level proposed for the elimination of malaria as still not all suspected cases are tested which suggest that compliance with the policy and some other factors could be the cause.

Objective: The study sought to assess compliance with the test and treat of the malaria T3 policy by determining the proportion of patients confirmed by testing, ACT antimalarial prescribed, prescribers who complied with the policy, and factors associated with prescriber compliance.

Method: The study used a descriptive cross-sectional approach in 7 facilities. It was conducted in Twifo/Atti Morkwa district where patient records were reviewed and interviews conducted with prescribers in the 7 selected facilities. Pearson Chi-square test was done to establish possible associations between the categorical variables using some patient, prescriber and facility factors as the independent variables and compliance as the dependent variable. Logistics regression analysis was then done on those significant independent variables to determine their association with compliance.

Outcome: Of the 572 patient records reviewed, 29.7% were children under five years and 59.6% of the patients were females. 28.57% of prescribers interviewed were physician assistants and 57% of facilities used for the study were CHPS facilities. Prescriber

compliance was high (75%), patients tested before treatment was 80%, patients given ACT according to the policy were 97%. Factors identified to influence compliance include: patient age, a symptom of fever presented by patient and health facility type

Conclusion: Prescriber compliance with the test and treat policy in the Twifo/Atti Morkwa district was high. From this study, prescribers were more likely to comply with the policy if patients were younger in age and prescribers at higher facilities were more compliant than those at lower-level facilities and when patients present with elevated fever.

Keywords: Malaria, prescriber, compliance, fever, tested, treated, ACT, RDT

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LIST OF ABBREVIATIONS

ABBREVIATION	MEANING
AA	Artesunate Amodiaquine
ACTs	Artemisinin-based Combination Therapies
AL	Artemether Lumefantrine
CHPS	Community-Based Health Planning and Services
CI	Confidence interval
CV	Curriculum Vitae
DHAP	Dihydroartemisinin-Piperaquine
DHIMS	District Health Information Systems
ERC	Ethical Review Committee
GHS	Ghana Health Service
MLGRD	Ministry of Local Government and Rural Development
NHIS	National Health Insurance Scheme
NMCP	National Malaria Control Programme
OPD	Out-Patient Department
OR	Odds ratio
PA	Physician assistant
RDT	Rapid Diagnostic Test
RGN	Registered general nurse
T3	Test, Treat and Track Policy
TAMDA	Twifo Ati Mokwa District Assembly
WHO	World Health Organization

CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

Malaria is a vector-borne disease which causes high morbidity and mortality, especially among children under five years (WHO, 2014). It is an acute febrile illness caused by plasmodium and transmitted through the bite of an infective female anopheles' mosquito. Anopheles Gambiae and Anopheles Funestus are the two main Anopheles species in Africa. In Ghana, the prevalence of Anopheles Gambiae and Anopheles Funestus are 52% and 48% respectively (Akantele Agandaa et al., 2016). Malaria has five main species of parasites that affect the human population which includes: Plasmodium falciparum, Plasmodium Vivax, Plasmodium Malariae, Plasmodium.Ovale and Plasmodium Knowlesi. Plasmodium falciparum causes the most severe form of malaria which leads to high fever and chills. It is most predominant in Africa, Southern Asia, Central America, and South America.

Plasmodium falciparum is the most prevalent malaria parasite in the WHO African Region, accounting for 99.7% of estimated malaria cases in 2017, as well as in the WHO regions of South-East Asia (62.8%), the Eastern Mediterranean (69%) and the Western Pacific (71.9%). Plasmodium Vivax is the predominant parasite in the WHO Region of the Americas, representing 74.1% of malaria cases (WHO, 2018)

According to the WHO, there were 219 million cases of malaria in 2017, up from 216 million cases in 2016. The WHO African Region continues to report the high share of the global malaria burden. In 2017, Africa recorded 92% of world malaria cases and 93% of world malaria deaths(WHO,2017).

In 2016, a total of 10.4 million cases of suspected malaria were recorded at Ghana's OPDs. This is a 2.5% increase over the 2015 figures. On average, almost 28,606 cases are recorded daily in Ghana's health facilities (NMCP, 2016).

In order to achieve an appreciable level of the control of malaria transmission and reduce its burden, accurate and timely detection of cases, effective treatment with the right medications (ACTs) cannot be downplayed.

WHO in 2012 launched a strategy known as Test, Treat and Track which enjoins all malaria burdened countries and all stakeholders involved in the fight against malaria to improve upon testing, the use of ACT to treat patients and to report on malaria in a well-defined surveillance system (WHO, 2016). The strategy was brought in to shepherd endemic countries to urge them in the fight against malaria. The T3 is in line with the policy direction of WHO to have all suspected malaria cases tested and once confirmed ACTs will be the drug of choice for treatment.

Proper case management aims at improving client care and to see to it that malaria drugs are used appropriately. Promoting the use of antimalarials in health facilities will ensure that malaria cases are promptly attended to. It is also important to track cases and deaths to help in knowing highly affected areas and target them for appropriate resource allocation (WHO,2016).

In recent years, treatment of malaria has shifted from presumptive which was mainly centered on mere signs and symptom to results based diagnosis and treatment after a positive test, known as "test, treat and track" (T3) which is overturning the presumptive treatments (Faust et al., 2015).

Laboratory confirmation followed by treatment with ACTs can bring to the barest minimum wrong diagnosis, have a better patient recovery, and reduce financial burden. This can be achieved if the T3 policy is implemented efficiently (Faust et al., 2015). Ghana's malaria slide positivity rate reduced from 31.0% in 2015 to 26.4% in 2016 while Test positivity rate using RDTs also increased from 33.0% in 2015 to 34.3% and an overall increase in malaria testing rate from 73.6% in 2015 to 77.3% in 2016 (NMCP, 2016).

The health infrastructure available in Twifo/Atti Morkwa suggests that only 4 facilities can use both microscopy and RDT in malaria case management with the remaining 14 relying on RDT or clinical signs. According to reports, malaria continues to be the topmost reported condition at the OPD accounting for about 39% of cases. Though most (84%) of the cases are tested, some (21%) are treated without testing which is against the T3 global focus.

1.2 Problem Statement

Investment in procurement and supply of malaria test kits and medications are high yet not all suspected cases are tested and treated with the drugs of choice which is indicative of the fact that there may be issues of non-compliance to the malaria treatment guidelines.

According to the WHO, there were an estimated 20 million fewer malaria cases in 2017 than in 2010. Data for the period 2015–2017 highlights that no significant progress in reducing global malaria was made in this timeframe (WHO, 2018).

Ghana's Malaria Control Program signed up to the WHO T3 policy which prescribes that, upon detection of fever (Auxiliary $\geq 37.5^{\circ}\text{C}$, Rectal $\geq 38.5^{\circ}\text{C}$) plus other symptoms, malaria should be suspected, confirmed by Testing (RDT or microscopy) and put on treatment

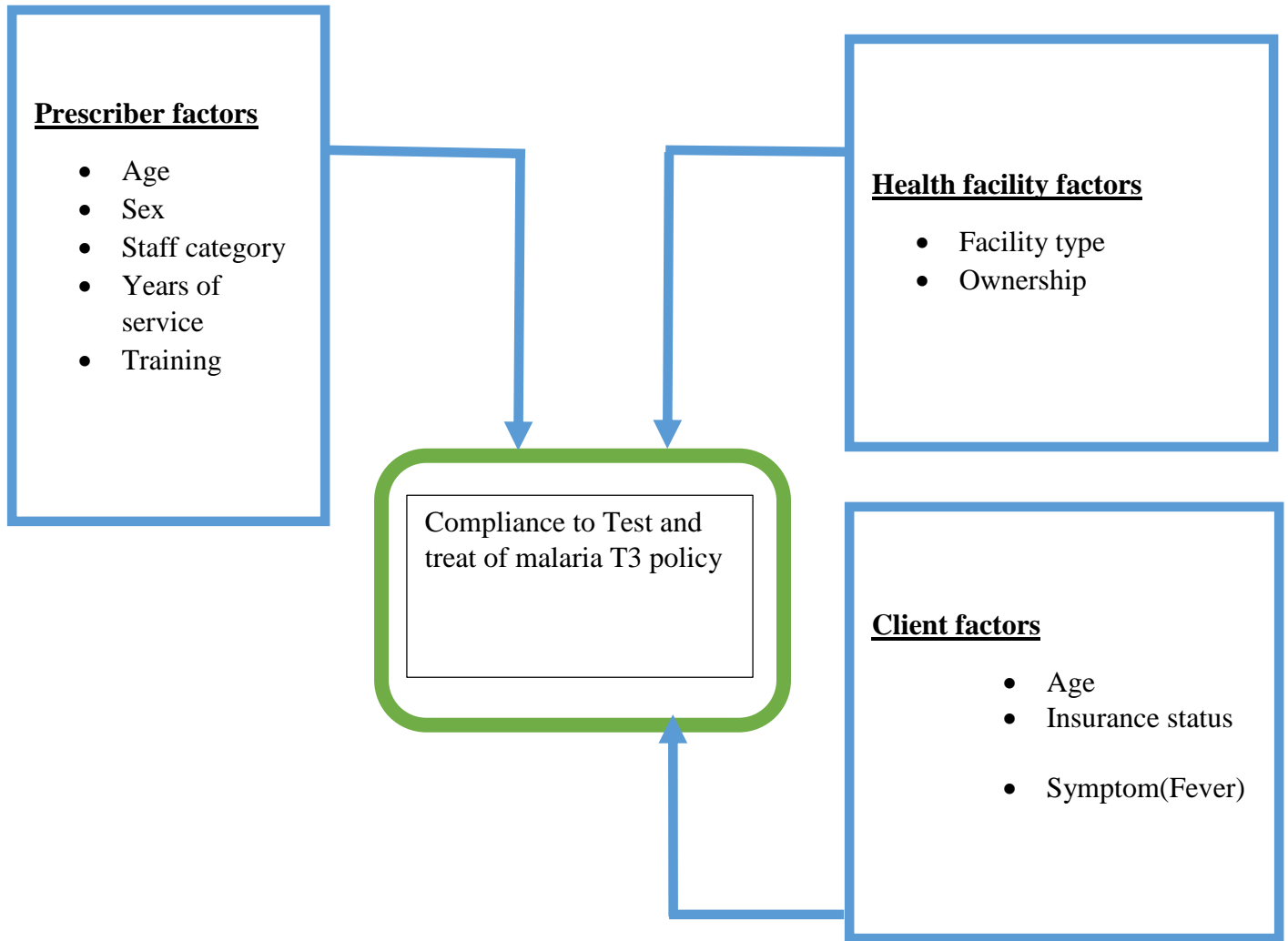
(Artemisinin-based combination therapy). All cases of malaria should also be documented in a surveillance system to enable effective planning and resource allocation.

In Twifo/Ati Morkwa district, available data between 2014 and 2017 suggests an improvement in the proportion of cases tested (54% to 84%) and a decline in cases not tested but treated (54% to 21%) which is still at variance with the global focus of the T3 policy (GHS,2017).

Shortage of RDT, inadequate skilled staff and lack of trust by health workers in RDT test results may lead to improper diagnosis of malaria (Ogbonna A, Uneke, C 2015).

Non-compliance to the test and treat policy if not addressed may lead to increased malaria cases, parasite resistance, resource wastage, and treatment failure which is a burden to the entire nation (“WHO | T3: Test. Treat. Track initiative,” 2016a). This research, therefore, set out to determine the level of compliance with the policy and its associated factors.

Figure 1: Conceptual Framework



1.3 Explanation of the Conceptual Framework:

Several factors may influence a prescriber's decision in managing a patient, however for the purpose of this study factors to be presumed to have an influence on a prescriber's decision to comply with the malaria test and treat policy or not have been grouped as Prescriber-related factors, health facility factors, and patient factors.

A prescriber's professional category, years of service, and training on the T3 Policy can directly affect how he or she complies with the policy. The type of facility and whether it is higher or lower-level facility can have a direct bearing on compliance with the policy. Patient-related factors that have been noted from literature to have an influence on compliance to the T3 policy include age, insurance status and presenting fever as a symptom can influence a prescriber's compliance.

1.4 Justification

The focus of all National Malaria Control Programs (NMCPs) is to meet their targets on controlling the menace. In order to achieve this, standards set by the WHO employs all member countries to Test, Treat and Track every suspected case. This research, however, sought to assess the extent to which testing and treating of this policy(T3) were being complied with and to identify factors there in that affects compliance and success of the policy in order to make recommendations. The tracking aspect will not be measured in this study as it goes beyond individual cases and will require a whole study to scrutinize data availability, consistency, and reliability at all levels. A cross-sectional study approach was used for records review of clients' folders at the OPD. This approach was used because of time and financial constraints however it will offer a snapshot opportunity to collect information on multiple variables required to test the compliance level of prescribers.

1.5 Research Objectives

General objective

The aim of this study was to assess compliance with the test and treat of the malaria T3 policy in Twifo/Atti Morkwa district

Specific objective

1. To determine the proportion of malaria patients tested (RDT/microscopy) before treatment
2. To determine the proportion of patients treated with recommended anti-malarial according to policy
3. To determine the proportion of prescribers who complied with the test and treat policy.
4. To determine factors associated with compliance to the policy.

1.6 Research Questions

1. What proportion of treated malaria patients were tested(RDT/microscopy) before treatment?
2. What proportion of prescribers complies with the T3 policy?
3. What proportion of treated cases were given recommended antimalarial according to policy?
4. What factors affect compliance with the test and treat policy?

CHAPTER TWO

LITERATURE REVIEW

2.0 Malaria

Malaria is caused by the Plasmodium parasite and it is transmitted to humans through the bite of an infective female Anopheles mosquito. People can also get the disease through exposure to infected blood (Zoyah & Diedong, 2014). Plasmodium falciparum is the most prevalent malaria parasite on the African continent. It is the cause of most malaria-related deaths globally while Plasmodium vivax is the dominant malaria parasite in most countries outside of sub-Saharan Africa (Zoyah & Diedong, 2014).

2.1 The Test, Treat and Track (T3) Initiative

Now, the treatment of malaria across the world has changed from just the signs and symptom mainly fever to a more specific treatment after a positive laboratory-based diagnosis (Faust et al., 2015). The focus is to get every suspected malaria case tested, treated and tracked.

For so many years, malaria prevention and control have seen massive investments which have saved millions of lives. In spite of these, malaria still occurs in over 99 countries so it is important for governments to prioritize malaria issue (World Health Organization, 2012).

At the same time, support for improvement in the T3 initiative is not forthcoming hence, it will, therefore, become a challenge to find adequate means of strengthening the T3 strategy to conquer malaria. If endemic countries get the needed support, then they will be moving towards achieving the health-related Development Goals.

2.1.1 Proportion of treated malaria patients receiving test

In the past, fever has been a precursor to malaria in high reporting nations. However, control efforts have immensely brought malaria cases down and have become clear that continued treatment focusing on just signs and symptoms of malaria may cause drug wastage, resistance and financial lost (World Health Organization, 2012).

Recently, availability of quality malaria RDTs has led to an improvement in access to testing resulting to the rise in the proportion of cases tested across the world rising from less than 5% in 2000 to 45% in 2010 (World Health Organization, 2012). Most African countries with a high incidence of malaria are still not close to achieving all-round access to testing facilities and will require massive investment to increase access to RDTs or microscopy.

In Ghana, the percentage of positive malaria cases using microscopy reduced from 31% in 2015 to 26.4% in 2016 while RDTs also increased from 33% in 2015 to 34.3% and an overall increase in malaria testing rate from 73.6% in 2015 to 77.3% in 2016 (NMCP, 2016).

Available data between 2014 and 2017 suggests an improvement in the proportion of cases tested (54%-84%) and a decline in cases not tested but treated (54%-21%) in Twifo/Ati Morkwa District (GHS,2018).

According to research work in Zambia, about 67%(CI 66.1-68.7) of clients are tested before treatment(Chanda-Kapata et al., 2014) and about 65.5% of the patients were recommended for malaria (laboratory) testing in Uganda (Banek, Lalani, Staedke, & Chandramohan, 2014).

In Nigeria, a records review of patients treated for uncomplicated malaria revealed that 49% received testing mostly through microscopy out of which 45% percent were confirmed malaria positive(Ezenduka C.C., 2014). In addition to this, a study conducted in 12 health facilities in Zambia revealed that about 67%(CI₉₅ 66.1-68.7) of the patient that were tested with either microscopy or RDT (Chanda-Kapata et al., 2014)

2.1.2 Proportion of patients treated with recommended ACTs according to policy

Malaria can be prevented and treated the reason several people are saved by effective drug treatment. Though effective drugs are available, thousands of people in high-risk areas still cannot have easy access to required treatment (World Health Organization, 2012).

Fast and effective case management are integral components of the control strategy. There are two main components of the case management strategy: accurate case identification through testing and effective treatment with ACTs (Chanda-Kapata et al., 2014).

In 2010, over 181 million ACT drugs were distributed throughout the world in the public sector, increasing from 158 million in 2009, and just 11 million in 2005. ACT use was estimated to get to 287 million courses in 2011, which was an increase of over 30% compared to 2010 due to discounted sales in the private sector (World Health Organization, 2012).

A research work done in Bongo in the Upper East of Ghana reveals that almost (99.4%) of children were treated for malaria using ACTs except (0.6%) who were treated with Quinine, which is used as a second-line drug, or for severe malaria. A majority (91.2%) were treated with ACTs based on test results whiles 8.8% were treated without testing (Akanteele Agandaa et al., 2016).

The number of malaria cases put on ACTs reduced from 5,845,998 in 2015 to 5,752,931 in 2016 which could be attributed to the improvement in adherence to the T3 policy (NMCP, 2016).

Elsewhere, it was reported that, in a total of 127 (64.5%) of the 197 patients who participated in a study received ACT drugs or ACT drug prescription with 63.0% of patients who received ACT drugs or prescription had received it after a malaria test (Banek et al., 2014). In Nigeria, it is reported in a research work that about 93% of patients receive ACTs with Artemether-Lumefantrine(AL) being the most (50.5%) prescribed drug (Ezenduka C.C., 2014).

Also, Chanda-Kapata et al,(2014) indicate that 56% of patients in Zambia are treated with ACTs with AL being the preferred (35%) drug. In Ghana, research on the quality of uncomplicated malaria among insured and non-insured patients reports that all patients interviewed were served ACT in line with the policy as a first-line drug for uncomplicated malaria (Fenny, Hansen, Enemark, & Asante, 2014)

2.1.3 Tracking

Improved reporting on malaria cases and deaths give an idea of people and places most affected to inform the decision as to where resources are needed most and also enable policymakers to take appropriate decisions in malaria prevention and control programs (World Health Organization, 2012).

Active surveillance for malaria cases involves health workers searching for malaria infections at community and household level in populations that are seen to be at high-risk

whiles passive surveillance are the cases that are captured at health facility level when people report on their own (World Health Organization, 2012).

2.2 Implementation of T3 in Ghana

Ghana adopted WHO's test, treat and track (T3) strategy by updating her existing 2009 malaria case management guidelines. Following the adoption of the strategy, health care providers across the country received training on the revised treatment policy (Akanteele Agandaa et al., 2016).

In Ghana, compliance with the guidelines on ACT use is 66.7%. The cost-effectiveness of implementing test-based management of malaria depends on health workers adhering to test results and restricting ACTs to test-positive cases while looking for other causes of fever in the test-negative cases (Akanteele Agandaa et al., 2016)

In the Twifo/Ati Morkwa District, according to the District Health Information Management Systems (DHIMS), malaria test rate keeps improving: 54%, 74%, 72% and 84% for 2014, 2015, 2016 and 2017 respectively whiles the proportion of suspected malaria cases not tested but treated as malaria also follows a downward trend: 42%, 35%, 40% and 21% for the same periods (GHS, 2017).

A research work done in Kenya showed an increase in the proportion of confirmed malaria cases in lower-level health facilities whiles one-third of the patients were still treated based on signs and symptoms without testing with about 33% of ACTs being consumed in excess in 2015 (Mbuli et al., 2016). Adherence to the T3 Policy in the country, coupled with other intense malaria intervention strategies, need to be enhanced.

2.3 Target Levels of Utilization of T3

In Ghana, there are 4 levels of health delivery where malaria is managed hence the utilization of the T3 initiative. More cases are seen at the lower levels while severe ones will require referral to a higher level of care.

- ✓ Community-level: households, licensed chemical sellers, community-based agents and volunteers.
- ✓ Primary health facility level: CHPS compounds, health centers, private clinics pharmacies, polyclinics, and similar institutions.
- ✓ Secondary health facility level: district hospitals.
- ✓ Tertiary health facility level: Regional hospitals and Teaching hospitals

2.4 Factors affecting T3 Implementation

This initiative of the WHO is obviously a positive attempt to improve case management by ensuring adherence to the T3 guidelines as per the treatment protocols of each WHO member state. The initiative has taken off smoothly across Africa with Ghana joining in 2013, however, is working not without challenges.

A study conducted in Bongo, Upper East Region of Ghana elicited that frequent RDT stock-outs (39.3%) as the major challenge followed by lack of diagnostic (35.7%) with the least being frequent ACTs stock-outs (3.6%). RDT shortage was key at the CHPS level, lack of diagnostic facilities was a major challenge at the Health Centre level whilst the District Hospital, however, did not have any challenge (Akantele Agandaa et al., 2016). A study in Western Uganda reports that few prescribers raised concerns about RDT negative test that later proved to be smear-positive (Altaras et al., 2016).

Research works seen have failed to be facility-specific with regards to the various identified challenges and also failed to state clearly the way forward for mitigating the identified gaps. This study, however, seeks to assess compliance with the T3 initiative and link possible challenges to suggested solutions.

2.5 Prescriber compliance with the treatment policy

The WHO upon launching the T3 initiative in 2012, therefore, suggested that the management of malaria is no longer presumptive but evidenced-based. It was therefore recommended that patients can be treated based on signs and symptoms only if laboratory facilities cannot be accessed within 2 hours (WHO, 2018).

Effective case management, therefore, requires proper diagnosis and treatment hence the need to comply owing to the availability of logistics (Fenny et al., 2014). Due to the resistance of parasites to malaria monotherapies, high-risk countries now use artemisinin-based combination therapies (ACTs) as the first-line drug for the management of uncomplicated malaria (Lawford.H. et al., 2011).

The decision by any prescriber to comply is very critical to the success and attainment of goals of the national malaria control program through the new policy (Zurovac et al., 2008). In Papua New Guinea, it was revealed that 62.8% of health workers complied with the test and treat (Pulford, Smith, Mueller, Siba, & Hetzel, 2016).

However, elsewhere in Uganda, a study reports a very low (3.1%) adherence levels among health care workers involved in malaria case management (Kaula, Kiconco, & Nuñez, 2018).

2.6 Availability of malaria case management commodities

Malaria commodities such as RDTs and ACTs are so crucial to the case management and for that matter, a person's ability to comply with the test and treat policy heavily depends on the availability of the commodities. ACTs and RDTs come with their logistics and program management challenges (John Snow Inc./DELIVER, 2011). There is enough evidence to show that testing of patients is on the increase and the use of ACT is declining due to the constant availability of RDTs for testing (John Snow Inc./DELIVER, 2011).

In Mozambique, research into malaria commodity supply and use by health workers reported a shortage of RDTs and some AL formulations among 66% of supervisors interviewed and also the use of Community Health worker kits were reported among 44% of prescribers. It was therefore concluded that variations in geographic and seasonal malaria commodity needs should be considered in distribution plan (Davlanes et al., 2019).

Access to quality improved malaria treatment is a key mandate of the National malaria control program (Ababa, et al, 2016). This, therefore, requires that adequate plans are put in place to ensure constant availability of high quality and reliable case management commodities at all levels of care (Ababa, et al, 2016). Plucinski et al., 2017, the report in their study that evaluated malaria case management in Angola that there were 71% and 83% availability of case management commodities in Huabo and Ulge respectively however despite the availability of commodities in both provinces, testing and ACT treatment in Huambo was low compared to Ulge.

Elsewhere in Southern Malawi, a study concluded that appropriate management of uncomplicated malaria was good when testing facilities were available (Namuyinga et al., 2017a).

2.7 Factors associated with compliance with the treatment policy

Several factors may influence a prescriber's decision in managing a patient, and these may positively or negatively affect a prescriber's compliance with the policy.

A study in Uganda identified factors such as the absence of job aides, inadequate laboratory facilities and lack of regular training for health care workers on case management as some of the factors affecting compliance with policy (Bawate, Callender-Carter, Nsajju, & Bwayo, 2016). These are rightly so in that the current policy of malaria case management stipulates an evidence-based treatment anchored on diagnostic confirmation as stated by the WHO (WHO, 2010).

In southern Malawi, it was reported that compliance was significantly associated with patients presenting fever (OR 2.6; (CI₉₅ 1.7–4.0), headache (OR 1.5; 95% CI 1.1–2.1) or vomiting (OR 2.0; 95% CI 1.0–4.0) to HWs and less likely if they reported skin problems (OR 0.4; 95% CI 0.2–0.6)(Namuyinga et al., 2017b). These are very common signs and symptoms that come with malaria infection hence prescribers are more likely to comply seeing patients present them.

Elsewhere, a cross-sectional study in Uganda reports that Training on the use of malaria treatment guidelines, category of the healthcare worker and facility ownership were the only factors that were significantly associated with adherence to malaria management guidelines.

In Nigeria, it was reported that factors such as patient age, prescribers receiving training and prescribers who were aware of the policy were known to have an influence on compliance with the policy, (Kore, Shete, Desai, & Dnyanpeeths, 2011). A study conducted in Ghana revealed that prescribers were likely to comply if treatment were by a low cadre of health staff when a child is below 5 years of age, and malaria test was performed (Kwarteng et al., 2015).

In a Kenyan research work, 6 factors were identified to be significantly associated with adherence: patient knowledge on dosing regimen ((OR) = 1.76; 95% CI = 1.32-2.35), patient age (OR = 1.65; 95% CI = 1.02-1.85), prescriber age (OR = 1.37; 95% CI = 1.10-2.48), whether a respondent had seen AL before (OR = 1.46; 95% CI = 1.08-1.98), whether a patient had reported dislikes to AL (OR = 0.62 95% CI = 0.47-0.82) and whether a respondent had waited more than 24 hours to seek treatment (OR = 0.73; 95% CI = 0.54-0.99) (Lawford H. et al., 2011). Elsewhere in Uganda, it was reported that facility type was associated with adherence at the health center level and that in comparison to nursing aides, enrolled nurses were 1.57 times more likely to comply (p=0.004) (Bawate et al., 2016). Facility ownership whether public or private may also be an associated factor to compliance. Fever as stated in the classification of uncomplicated malaria, that person may be suspected of malaria if fever >37.5°C is recorded plus other signs and symptoms (Akotsen-Mensah, 2014). It is for this reason that it was reported in Malawi that prescribers were more likely to comply with the treatment policy if patients present with elevated temperature (Namuyinga et al., 2017b)

CHAPTER THREE

METHODS

3.0 Study Design

A descriptive cross-sectional study was used which involved the collection of primary and secondary data. The secondary data involved a retrospective review of records on treated malaria patients from patient folders while the primary data was collected through interviews with prescribers involved in malaria case management in the selected study facilities to explore factors affecting the implementation of the T3 policy. The health facilities in-charge were also interviewed to assess the availability of commodities.

3.1 Study Area

This research was done in the Twifo/Atti Morkwa District which is one of the twenty Districts in the Central Region of Ghana. The district was selected conveniently from a list of top 10 districts in the Central region with the highest numbers of reported malaria cases at the OPD.

Twifo/Atti Morkwa District is bounded by the Hemang Lower district in the south, Upper Denkyira East in the north, Assin South district in the East and Wassa district in the West. The district capital is Twifo Praso. The district has a surface area of 957sq kilometers and a population of 78,086 with an annual growth rate of 3.3%. The Population density of the district is 82 persons per square kilometers.

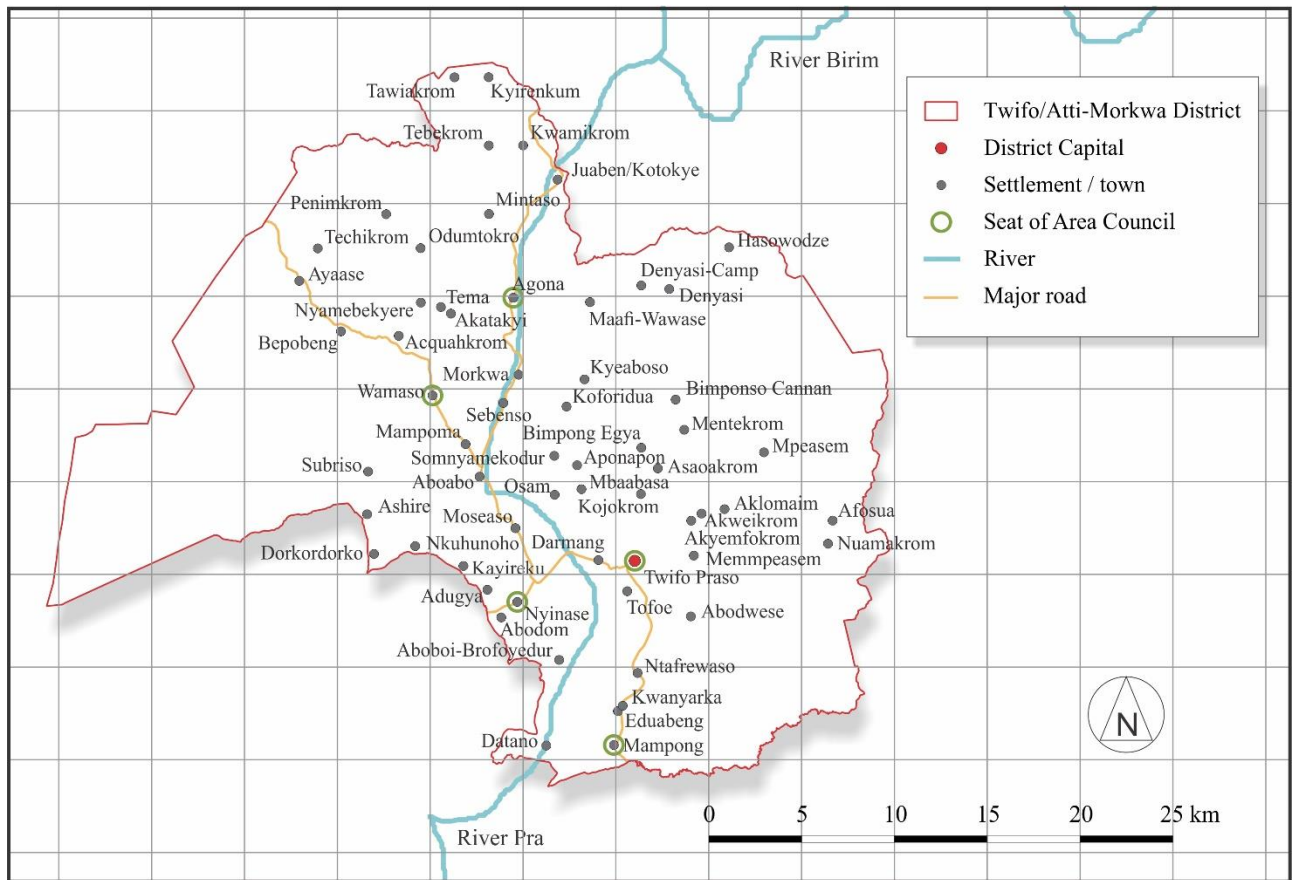
This is considered to be one of the least densely populated districts in the Central Region. It is a predominantly rural District with 1510 settlements with 176 clearly defined communities (see figure 1 below). According to the 2010 household census, only two

communities are urban and this constitutes 14% of the district's population. Most of the remaining settlements are farmlands usually with a population less than 350 people. All the major settlements are located along the main Cape Coast-Twifo Praso-Dunkwa on Offin trunk road.

The District has 18 health facilities-; 1 Government Hospital-; 2 private clinics-; 1 Catholic Health Association of Ghana (CHAG) clinic-; 13 Community Based Health and Planning Services (CHPS) compounds and 1 health center, 1 Poly Clinic

Figure 2: Map of the Twifo/Atti Morkwa District

Settlements in Twifo/Atti-Morkwa District



Source: MLGRD / TAMDA

3.2 Study Population

The study population was patients treated for malaria at the OPD from selected health facilities in Twifo/Atti Morkwa District from 1st to 31st January 2019.

3.3 Inclusion Criteria

- All patients with a confirmed diagnosis of malaria within the period and clearly specified as such in the patient folder.

- Health workers involved in the diagnosis and treatment of malaria as prescribers in the study's health facilities.

3.4 Exclusion Criteria

- All Patients recorded to have malaria in the consulting room register, but malaria diagnosis not clearly written or missing in the patient's folder
- Health workers who did not treat malaria as prescribers in the selected facilities were not involved.

3.5 Definition of Indicators

Table 1: Definition of Indicators

INDICATOR	MEASUREMENT
the proportion of treated malaria cases tested (RDT/microscopy)	Numerator: Number of malaria cases tested Denominator: Number of malaria cases treated
The proportion of malaria cases testing positive	Numerator: Number of malaria cases tested positive Denominator: Number of suspected malaria cases tested
The proportion of tested patients treated with the recommended anti-malaria	Numerator: Number of positive cases put on any anti-malaria(AA/AL/DHAP) Denominator: Number of positive malaria cases
The proportion of prescribers who complied with the malaria case management guideline	Numerator: Total number of treatments in which prescribers complied with the policy Denominator: Total number of patient folders reviewed
Compliance	Compliance will be said to have been met if a prescriber suspects a patient of having malaria, test the patient, if positive prescribes an ACT and if negative no ACTs given.

3.6 Study Variables

Dependent variable

Compliance to test and treat of malaria T3 policy was estimated as a binary variable.

Compliance to the policy in this study is defined as any prescriber who suspected client of having malaria, tested the client, and prescribed an ACT if positive and if negative no ACT is given.

Independent variables

Table 2: Variable Table

No.	Variable Name	Operational definition	Measurement	Data source
1	Facility Type	Level of health care delivery	Based on the GHS definition of the level of facility	DHIMS2
2	Facility ownership	Is the facility private or government own	Based on GHS classification	DHIMS2
3	Staff category	The rank of the prescriber	facility's nominal roll shall be used to determine the various staff categories	Prescriber/facility administration
4	Training on guidelines	Prescriber having been trained on how to manage malaria cases	Status of staff regarding training will be determined using the facility training logbook	Prescriber/facility administration
5	Years of service	For how long the prescriber has been working as a qualified health worker	facility's nominal roll shall be used to determine the number of years served by staff	Prescriber/facility administration
6	Age	Age collected in completed years	Age of at the last birthday in completed years	Prescriber/facility administration
7	Sex	Identification of prescriber as male or female	Sex shall be measured as either male or female	Prescriber/facility administration
8	Insurance status	Does the patient have a valid health insurance number	Verify from patients NHIS card	NHIS card
9	Symptom presented(fever)	The temperature of the patient recorded in degrees Celsius on day of the visit	Measured whether patients temperature was above or below 37.5°C	Patient folder

3.7 Data Collection Methods and Tools

A mixed-method approach was used to collect both quantitative and qualitative data. All four (4) sub-districts in the Twifo/Atti Morkwa district were involved in the study. Seven (7) health facilities were conveniently selected ensuring representation by type (Hospital, Health center, Clinic, CHPS). The district has only one (1) Hospital and one (1) Health center so they were automatically enrolled and one (1) private clinic and four (4) CHPS compounds 1 from each sub-district were selected for the study.

3.7.1 Quantitative Method

All health facility records of patients treated for malaria for the month of January 2019 were reviewed from the patient folders in the selected facilities using a checklist. All four (4) sub-districts in the Twifo/Atti Morkwa district were involved in the study. Seven (7) health facilities were conveniently selected ensuring representation by type (Hospital, Health center, Clinic, CHPS).

This was to ensure facilities providing different levels of care and with different caseloads or volumes of attendance, and various cadres of prescribers in the district were fairly represented for the purpose of varying observations at the various levels. The district has only one (1) Hospital and one (1) Health center so they were automatically enrolled and one (1) private clinic and four (4) CHPS compounds 1 from each sub-district were selected for the study.

3.7.2 Qualitative Method:

Purposive sampling technique was used to select 14 health care prescribers for interviews using a health worker interview guide. Health workers who perform outpatient

consultations and available during the survey were interviewed. The questionnaire assessed health worker knowledge about the policy, training, supervision, challenges, and ways to improve the policy. Category of prescribers interviewed included: doctors, physician assistants, registered general nurses, community health nurses, midwives and enrolled nurses.

In conducting the interviews, a team of 4 were put together which comprised of the interviewer, a recorder, a timekeeper then the interviewee. A participant information sheet and consent forms were given to the interviewee to read and ask all necessary questions for clarification after which if he/she agreed to participate in the interview was done. Each interview lasted between 10-20 minutes and all recordings were transcribed for analysis based on thematic contents from the interview guide used and themes that came out from initial responses to the interview process.

3.8 Data Processing and Analysis

Research assistants were engaged and given a one-day orientation and put into 3 groups led by a nurse prescriber. Instruments were pre-tested in a nearby facility to assess the practicality, clarity, and ease of administration of the checklist/questionnaire for corrections. Data collected was validated and entered daily using designed Microsoft excel forms with validation rules set to ensure entry errors are reduced and data entry was done daily to reduce errors due to fatigue. Upon completion of the entry, further checks through data cleaning were done before exporting to STATA for analysis. Fourteen qualitative interviews were conducted to assess prescribers' knowledge, training on T3, supportive supervision, challenges in the implementation and ways to improve on the policy. The

qualitative interviews were done in English and audio recordings were transcribed for analysis. The interviews were grouped into thematic themes using Nvivo 9.0.

The proportions of treated malaria cases tested were summarized into descriptive statistics and estimated by expressing the number of suspected malaria cases tested as a proportion of the total malaria cases treated:

$$\text{Proportion of suspected malaria cases tested} = \frac{\text{Number of malaria cases tested}}{\text{Total Malaria Cases treated}} \times 100$$

$$\text{Proportion of prescribers who complied} = \frac{\text{Number patient folders in which prescribers complied}}{\text{Total Number of patient folders used}} \times 100$$

Total Number of patient folders used

The number of prescribers who complied with the test and treat policy was expressed as a proportion of the total number of patient folders available for the study:

In determining the proportion of positive patients who were treated with ACTs, the number of positive patients treated with Acts was expressed as a proportion of the total number of patient who tested positive for malaria:

$$\text{Proportion of positive patients treated with ACT} = \frac{\text{Total number of positive patients treat with ACT}}{\text{Total Number of patient tested positive for malaria}} \times 100$$

Total Number of patient tested positive for malaria

To establish possible associations, Pearson Chi-square test was done using some patient, prescriber and facility factors as the independent variables and compliance with the test and treat policy as dependent variable. A multiple logistic regression analysis was done on variables that were significant to find their association to compliance with the test and treat

policy of malaria case management, at a 95% confidence intervals for the odds ratios and significance levels of 0.05.

Logistic Model:

The Logistic Regression Equation is

Where $L =$ is the log odds of the probability of presence of the characteristic of interest (compliance)

X_1 and $X_2 =$ linear predictors or independent variables in the study

$B_0 =$ is the regression constant when all the independent variables are zero

$$L = \log \frac{p}{1-p} = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \dots + \beta_n x_n$$

3.9 Ethical Consideration

Ethical approval was sought from the ethics review committee of the Ghana Health Service and the District Director of Health Service as well as heads of participating health facilities. Clients names were not used during result dissemination to ensure anonymity. All potential interviewees were requested to give verbal or written consent before interviews and administration of the questionnaire after the objectives of the study had been read or explained to them. Data was also coded to provide confidentiality.

3.9.1 Informed Consent Process

A study information sheet which explains the purpose of the study, the potential risks and benefits, how privacy and confidentiality were to be maintained, and an emphasis that taking part in the research is voluntary, was presented to potential participants. Trained research assistants took participants through the consent process and only prescribers who agreed to be part signed the consent form.

3.9.2 Risks and Benefits of Research Participation

The project did not present any risks to research participants. Although there were no direct benefits to the participants, they have contributed to generating knowledge that can improve health policies and practices.

3.9.3 Privacy and Confidentiality

All the interviews were conducted in a secured room in the selected health facilities. Confidentiality was also maintained by anonymizing the data that was collected and transcripts adequately protected. No names and personal identifiers of the participants have been recorded or reported in the thesis. The data will be accessible only to the student researcher and supervisors.

3.9.4 Compensation

Participants did not receive any payments, compensation or any other form of incentives for their participation in the research.

3.10 Dissemination of Results

Findings of this research were first reported in a thesis form as part of the partial fulfillment of the award of Master of Public Health, Monitoring and Evaluation degree at the University of Ghana School of Public health. Process in the form of Manuscripts on key findings is being developed to be submitted to peer-reviewed journals for publication.

The Ministry of Health and its agencies such as the Ghana Health Service through the National Malaria Control Programme were also beneficiaries of the findings from this study through presentations at their 2019 Half Year review meetings of the study District (Twifo/Atti Morkwa).

CHAPTER FOUR

RESULTS

4.0 Introduction

This chapter presents the outcome of the analysis of this study. The results are presented to provide information on study participants background characteristics and also findings in line with the study objectives.

4.1 Background characteristic

Table 3: Background characteristics of Patients

Variable	Frequency	Percentage
The age group of patients		
0-4	170	29.7
5-10	91	15.9
11-15	61	10.7
16-20	34	5.9
21-25	31	5.4
26-30	33	5.8
31-35	21	3.7
36 And above	131	22.9
Total	572	100
Sex of Patients		
Female	341	59.6
Male	231	40.4
Total	572	100
Patients Insurance status		
Non-Insured	169	29.6
Insured	403	70.5
Total	572	100
Occupation of patients		
Unemployed	389	68.0
Farmer	97	17.0
Trader/businessman	62	11.0
Artisan	12	2.0
Public Servant	12	2.0

The table above shows that of the 572 records reviewed, children under five years constituted 29.7% (n=170) while majority (59.6%) of the patients were females. Most (70.5%) were insured with the NHIS.

Table 4: Background characteristics of Prescribers

Variable	Frequency	Percentage
The age group of Prescriber		
20-29	3	21.43
30-39	8	57.14
40-60	3	21.43
Total	14	100
Sex of prescriber		
Female	10	71.43
Male	4	28.57
Total	14	100
Category of Staff		
Community Health Nurse	3	21.43
Enrolled Nurse	1	7.14
RGN	2	14.29
Midwife	3	21.43
Physician Assistant	4	28.57
Doctor	1	7.14
Total	14	100
Prescriber's Years of Service		
1-5	11	78.57
6-10	2	14.29
11-20	1	7.14
Total	14	100

Table 4 shows that of the 14 prescribers interviewed, 57.14% of them were between 30-39 years and most (78.57%) had served between 1-5 years in the service. Physician assistants formed the majority (28.57%) and 71.43% of the prescribers were females.

Table 5: Background characteristics of Facilities

Variable	Frequency	Percentage
Facility Type		
Hospital	1	14.3
Health Centre	1	14.3
Clinic	1	14.3
CHPS	4	57.1
Total	7	100.0
Facility ownership		
Private	1	14.3
Public	6	85.7
Total	7	100

The above table shows that most (57.1%) of the facilities surveyed were CHPS facilities and only 1 private facility.

Table 6: Proportions of patients receiving test and those receiving Acts according to policy

Variable	Response	Frequency	Proportion	95% Confidence interval	
The proportion of treated malaria patients receiving test	No	90	0.2	0.25	0.18
	Yes	359	0.8	0.75	0.82
The proportion of patients Treated with recommended ACTs according to policy	No	9	0.03	0.02	0.05
	Yes	303	0.97	0.95	0.98

Table 6 shows that 80% of patients treated received malaria tests (CI₉₅ 0.75-0.82) while 97% of the patients visiting the health centers were given recommended anti-malarial according to policy (CI₉₅ 0.95-0.98)

4.2 Perceived opinions of prescribers on T3 Implementation (Qualitative)

4.2.1 Knowledge on the policy

In most of the interviews, it was clear a greater number of prescribers had appreciable knowledge about the policy for being able to explain the rationale for the policy. This is supported by a quote from a participant:

“I think first of all is talking about after the person has given you his/her complaints then I think you suspect malaria, you test, you treat then you track - ID: QTPNUAM02-community health nurse”

4.2.2 Training and supportive supervision:

Training and supportive supervision were inadequate as very few prescribers had received formal training on case management and none of them had been supervised specifically on case management though they had been visited by district officers. This is backed by a quote from one prescriber:

“Well like the testing and treating? I had it for a long time that was the time 2014 when we were doing our orientation there was a workshop” ID: QTPAGON01-physician assistant

4.2.3 Challenge in implementation:

On challenges confronting the implementation of the T3 policy, it was reported that the biggest problem they face is when RDT test negative but the signs and symptoms are very clear of malaria but the policy says don't treat, meanwhile, the patient is suffering which usually leaves them in a state of confusion as to what to do for the patient. Most of the prescribers, however, confessed that they mostly treat in such situations.

“ so far some of the challenges have been like at times based on your physical examination and other things you actually see clearly the child is suffering from malaria but you test and the results are negative and for that matter you will not be allowed to treat for malaria so you treat for something else but the person will go

and come back with the same conditions so when you treat, though the T3 is there to guide us, but at time your physical signs and symptoms are there so at times we do treat and after treating the person become well so that has been the challenge about the T3 but apart from that I think it's a good initiative or a good policy". ID: QTPHOSP03-physician assistant

4.2.4 On ways of improving the policy:

On ways of improving the policy, prescribers suggested a constant supply of RDTs and ACTs because these two commodities are crucial to the policy's sustainability. The policy according to them will suffer a setback if there is no constant supply of these two commodities especially the RDTs which is supported by a quote from a prescriber:

"The items needed for the test treat and track should be readily available almost all the time like the RDT should be readily available" ID: QTPMORK02

4.3 Prescriber compliance with the treatment policy

Table 7: Prescriber compliance with the treatment policy

Variable	Response	Frequency	Proportion	95% Confidence interval	
Prescriber Compliance	No	143	0.25	0.21	0.28
	Yes	429	0.75	0.72	0.79

As shown in the table above, 75% of prescribers complied with the policy (CI₉₅ 0.72-0.79)

4.4 Patient factors associated with compliance

Table 8: Patient factors associated with compliance

Overall Compliance	Odds Ratio	p-value	[95% Confidence Interval]	Significance
Age Category of patients				
0-4	0.38	0.028	0.16 - 0.89	**
5-10	0.788	0.635	0.295 - 2.106	
11-15	Ref	.	.	
16-20	0.525	0.267	0.168 - 1.641	
21-25	0.791	0.710	0.230 - 2.725	
26-30	0.397	0.109	0.128 - 1.228	
31-35	0.625	0.495	0.162 - 2.411	
36 and above	0.282	0.061	0.122 - 0.654	
Patients Insurance status				
Non-Insured	Ref	.	.	
Insured	1.060	0.800	0.675 - 1.666	
A symptom of fever presented				
Fever<37.5°C	Ref	.	.	
Fever>37.5°C	2.49	0.000	1.58 - 3.91	***

**P<0.05

To assess the association between patient factors and compliance, logistic regression was done with the outcome as overall compliance. As shown in table 8, of the 3 predictor patient variables that were assessed, 2 were found to be significantly associated with health worker compliance with the new treatment guidelines.

Based on the WHO classification and relative importance of malaria case management in children under five, the 0 – 4 year age bracket was not made as the reference for the age variable in the logistic regression. Patients aged 11-15 years were randomly picked as the reference. Patient age 0-4 years were 0.38 times [OR:0.38 95% CI (0.16,0.89)], more likely

to be complied with compared to age 11-15 years. Also, prescribers were more likely to comply with patients presenting with Fever>37.5°c 2.49 times [(OR:2.49 95% CI (1.58,3.91)] than those presenting with Fever<37.5°c

4.5 Prescriber factors associated with compliance

Table 9: Prescriber factors associated with compliance

Overall Compliance~	Odds ratio	p-value	[95% Confidence Interval]	Significance	
Age of prescriber					
20-29	0.50	0.254	0.14	1.67	
30-39	0.439	0.137	0.149	1.298	
40-60	Ref	.	.	.	
Sex					
Male	Ref	.	.	.	
Female	1.00	0.975	0.62	1.64	
Staff Category					
CHN	Ref	.	.	.	
Enrolled Nurse	0.05	0.000	0.01	0.21	**
RGN	0.02	0.000	0.01	0.09	**
Midwife	0.11	0.038	0.01	0.89	**
Physician Assistant	0.01	0.000	0.00	0.08	**
Doctor	0.01	0.000	0.00	0.05	**
Training					
Yes	0.64	0.476	0.19	2.18	
No	Ref	.	.	.	

**P<0.05

As shown in table 9, of the four variables that were assessed, only staff category was associated to health worker compliance with the new treatment guidelines. The results noted that Doctors were 0.01times [OR: 0.01 95% CI (0.00, 0.05)], physician assistant 0.01 times [OR:0.01 95% CI (0.00,0.08)], midwife 0.11 times [OR:0.11 95% CI (0.011,0.89)], RGN 0.02times [OR:0.02 95% CI (0.01,0.09)], enrolled nurse 0.05times [OR:0.05 95% CI (0.01,0.21)] more likely to comply compared to CHN.

4.6 Facility factors associated with compliance

Table 10: Facility factors associated with compliance

Overall Compliance	Odds Ratio	p-value	[95% Confidence	Interval]	Significance
Facility Type					
CHPS	Ref	.	.	.	
Clinic	0.01	0.000	0.000	0.08	***
Health center	0.16	0.028	0.03	0.82	*
Hospital	0.02	0.000	0.00	0.06	***
Facility ownership					
Private	Ref	.	.	.	
Public	0.77	0.830	0.07	8.60	

**P<0.05

Table 10 shows results of the facility factors associated with overall compliance analyzed and facility type was found to be associated with compliance with the policy where Hospital 0.02 times [OR:0.02 95% CI (0.00,0.06)], Health Center 0.16 times [OR:0.16 95% CI (0.03,0.82)], Clinic 0.01 times [OR:0.01 95% CI (0.00,0.08)]

CHAPTER FIVE

DISCUSSION

5.0 Background characteristics

The study reviewed 572 patient records of which children under five constituted 29.72% malaria which may not be different from WHO reports of high cases of under-five malaria leading to the death of about 285000 children in sub-Saharan Africa in 2016.

5.1 Proportion of treated malaria patients receiving test

Availability of high-quality malaria RDTs has significantly improved and expanded diagnostic testing across all levels of the health system. This has led to the continuous increase in the testing rate in all high-risk malaria regions of the world rising from less than 5% in 2000 to 45% in 2010(World Health Organization. Global Malaria Programme, 2012). This report is strongly supported by the findings of this research as 80% of patients were tested before treatment which therefore suggests that presumptive treatment of malaria still persist. This is corroborated by the 77% test rate as reported in the 2016 roll back malaria bulleting. Available data between 2014 and 2017 suggests an improvement in the proportion of cases tested (54%-84%) and a decline in cases not tested but treated (54%-21%) in Twifo/Ati Morkwa District(GHS,2018). The findings from this study are not far from that established by Chanda-Kapata et al., 2014 in Zambia which reported a 67% testing for patients. The high(80%) testing rate in this study and other reports in an away contrast the report of Ezenduka C.C., 2014 in Nigeria who found a relatively low (49%) testing rate for patients.

Also, the high testing rate was achieved through the use of RDT (93.3%) as only 2/7 (28.6%) of the health facilities could do both RDT and microscopy. This is also supported by the fact that RDT use requires no sophisticated skills hence with a little training staff at all levels are able to use. This finding, however, contradicts a report by Ezenduka C.C., 2014, who reports in his assessment of adherence to treatment guidelines in Nigeria that laboratory confirmation is mostly (49%) done through microscopy and not RDTs just as also J. et al., 2008 reported a 76% microscopy use. In support of the findings of this study on the heavy reliance on RDT(93.3%) for testing, Pulford, et al, 2016, reported a 97% use of RDT for malaria testing in Papua New Guinea.

Several research works have corroborated the high use of RDTs for confirmation of malaria but mention must also be made of the investment in the supply of the commodities which ensures its constant availability and use. The number of RDTs distributed by NMCPs rose between 2010-2015 but dropped from 247million to 221 million in 2016 which was mainly in Sub Sahara Africa(WHO, 2018). Within that period, over 1.6 billion RDTs were sold globally by manufacturers.

5.2 Proportion of patients treated with recommended ACTs according to policy

Prompt and effective case management are integral components of the malaria control strategy. There are two main components of the case management strategy: accurate case identification through testing and effective treatment with ACTs(Chanda-Kapata et al., 2014). The findings from this study show that in 97% of patients one of the first line ACTs were prescribed which are an improvement on other findings like Kaula, et al, 2018 who reported 65% ACT prescription. Again, this study's findings are strongly supported by Pulford et al., 2016 who reported a 96% ACT prescription in Papua New Guinea. The most

prescribed ACT according to this study was AL (87%) reason being that that is what is usually procured by facility administration. Elsewhere in Zambia, a lower (56%) AL use was reported but still the most prescribed ACT there (Chanda-Kapata et al., 2014).

Also, this study established that, of the 513 (97%) patients who received ACTs, 96.7% were given according to body weight as stated by the policy. This finding deviates from that reported by Pulford, et al,2016 of 76% conformity to prescription according to policy. This high policy weight-based prescription could be as a result of the 100% availability of weighing scales in all 7 health facilities in which the study was conducted.

5.3 Prescriber compliance with the treatment policy

From the results of the study, 75% of prescribers were compliant with the policy as most (78%) of suspected patients were tested and the majority (96%) of clients who tested positive were given ACTs according to policy. This finding does not differ much from Pulford et al, 2016 who reported a 62.8% compliance of health workers with new case management policy in Papua New Guinea.

However, in sharp contrast to the findings of this study is a Ugandan one which reported a very low (3.1%) compliance level among health care workers involved in malaria case management(Kaula et al., 2018) though both studies retrospectively reviewed patient folders. The difference in compliance may be due to the periods of the study because the Ugandan assessment was done 3 years into the inception of the policy whiles this study did it after 7 years of implementation so acceptance of the policy should be better. The high compliance level as reported by this study could also be as a result of the 100% availability of weighing scales, RDTs and ACTs mainly AL as reported by this study in all the health

facilities. This also explains why over 96% of positive patients were prescribed with ACTs according to the treatment policy.

In Ghana, most patients are treated for malaria according to the accepted guidelines(Kwarteng et al., 2015). This is supported by the findings of this study of 75% compliance with the treatment policy however the two studies disagree on the appropriate use of ACTs. Whiles this study reports 96% appropriate prescription of ACTs to patients, Kwarteng et al., 2015 reports a widespread in-appropriate prescription of ACTs.

5.4 Factors associated with compliance to treatment policy

Several factors may influence a prescriber's decision in managing a patient, and these may positively or negatively affect a prescriber's compliance with the policy. This study reveals that patient age and presenting a fever $>37.5^{\circ}\text{c}$ were significantly associated with a prescriber's decision to comply with the test and treat policy.

Patient age 0-4 years were more likely to be complied with compared to patients aged 11-15 years. Also, prescribers were more likely to comply with patients presenting with Fever $>37.5^{\circ}\text{c}$ 2.49 than those presenting with Fever $<37.5^{\circ}\text{c}$. This is supported by the fact that in malaria case management, children 0-4 years are considered to be vulnerable and a fever $>37.5^{\circ}\text{c}$ is enough to suspect malaria(NMCP, 2016)

In agreement with this study is the findings of Kwarteng et al., 2015 who reports that prescribers were more likely to comply if the patient was less than five years (0-4years). This is also supported by Namuyinga et al., 2017b who reported in Malawi that prescribers were likely to comply if patients reported with higher temperatures.

Health facility type was also established by this study to have an influence on prescriber compliance. Hospitals and clinics were likely to comply compared to CHPS facilities.

This possibly could be due to the caliber of staff at the hospital, availability of logistics and a structured administrative set up which will be keen on the daily operations compared to a CHPS facility which usually is operated by one person without regular supervision. This is in agreement with Bawate et al., 2016 who also reported in Uganda that health facility type is associated with compliance whiles Bamiselu et al., 2016 who reported that compliance varies widely among different levels.

Health facilities with the ability to test using both microscopy and RDT have a better chance of complying since the two complements each other and this study established that both the hospital and the clinic had laboratories in addition to RDT. This is supported by a study elsewhere which reported that compliance is likely to be high if testing facilities are available (Bawate et al., 2016)

Findings from this study also show that staff category is associated with compliance and that prescribers at higher facilities were more likely to comply than the lower level which is possible due to the level of training obtained. However, this is in contrast with Kwarteng et al, 2015 who reported that prescribers were more likely to comply if treatment were by a low cadre of health staff. Other research works such as Kaula et al., 2018, H. et al., 2011 have also found Training, patient knowledge and Side effects of malaria medications as being factors that are associated with compliance however this study did not find any of such associations however this study could not establish an association between training of prescribers and compliance.

In an effort to explore factors affecting the implementation of the policy, 14 prescribers who manage malaria cases at the OPD were interviewed. The majority (28%) of them were physician assistants and only 1 doctor (1/14=7%) and the rest were nurses of all categories. Four major themes were formed based on the common responses from the interviews which included: knowledge on policy, training and supportive supervision, implementation challenges and ways to improve the policy upon which the analysis was done.

On knowledge about the policy, a greater number (12/14=85.7%) of the prescribers had appreciable knowledge about the policy for being able to explain the rationale for the policy at least the test and treat. This is supported by a quote from one prescriber: *“What I know about the new treatment policy is that when a person comes to the facility and you test for malaria and it is negative you don’t have to treat you only treat when the person is RDT positive-QTPMAMP01 nurse-midwife”*

The knowledge level as expressed by some of the prescribers may be supportive of the findings of this study as that higher-level staff is more likely to comply than the lower level which was clear in the response during the interviews. This is supported by quotes from prescribers of different levels:

“The new treatment policy is all about unnecessary use of antimalarial drug where there are times you treat; patient comes with a condition you don’t do any investigation then you treat for malaria which apparently at times may not be so with this policy it helps us to know whether the person is actually suffering from malaria or you need to probe further so it’s really helpful ID: QTPHOSP03-physician assistant”

*“It is about you testing for malaria using the RDT test kits, the malaria test kits. If it is positive, then you treat. Sometimes too we treat based on the signs and symptoms we treat based on that **ID: QTPMAMP03-community health nurse**”*

*“The new policy treatment for malaria is, it needs to be confirmed before it’s been treated so when someone walks in with symptoms of malaria such as bitterness in the mouth, joint pains, fever, chills the person need to test it before we give any treatment regimen. sometimes you have to do RDT instantly or sometimes you have to let the person go to the lab to do a blood film test before we give any treatment **ID: QTPHOSP02-nursing officer**”*

Though this study was not looking at the tracking, prescriber’s views were sought and most of them could not explain the tracking aspect of the policy however the few who tried misinterpreted it.

*“Tracking is actually not easy if they can get any criteria concerning the malaria symptoms. The tracking is trying to get the right person like the condition, trying to track whether it’s actually malaria the person is suffering from **ID: QTPAGON01-physician assistant**”.*

*“I think is only about the tracking, when they come after the test and treatment they don’t come back as for that is for sure because the person knows after taken the drug he/she is ok so the doesn’t come back again **ID: QTPNUAM01-midwife**”.*

As reported by other studies like Kaula et al., 2018, training and supportive supervision have been found to be integral in case of management and for that matter strongly associated with prescriber compliance. The prescription practices of prescribers who have received training and are regularly supervised may vary from others who lack all those. This study, however, found out from the interviews that very few (5/14=28.6%) of the prescribers had received formal training on case management. The few that reported of

having received training had it long ago some as far as the 2013 and 2014 when the policy was being introduced in Ghana. As in this quote from a prescriber

“Well like the testing and treating? I had it for a long time that was the time 2014 when we were doing our orientation there was a workshop ID: QTPAGON01-physician assistant”

As at the time of this study, the NMCP was organizing malaria case management training across the country in which the district of the study had already benefited yet only (3/14=21%) of the respondents benefited because the training could only cover few people from each facility. This, therefore, raises concern about centralized training not being effective in the dissemination of critical messages of policy which is evident by these quotes from prescribers:

“Yes, it was a 3-day workshop that happened just last week (June 2019) ID: QTPHOSP04-doctor”

“Not really, some selected individuals went for a workshop so we are expecting them to come and give us a brief summary of what they learned about it but I personally have not received any training ID: QTPHOSP02-nursing officer”

Supportive supervision is aimed at guiding workers to improve their work performance continually at their workplaces without the feeling of strict monitoring (Bailey et al., 2016). However, this all-important activity seems to be lacking specifically for malaria case management in the study site. Though most prescribers could recount visits from the district office and few from the regional and national office, none of the reported supervisions were specifically on malaria case management. This may not be good because such visits are supposed to complement investments in training to ensure that the cascading effects are felt.

“I think our officers usually come here go through our folders to see whether what we are doing is right or not, like last time they were here I think it wasn't their first

time any time they get free chance they come and go through our OPD book and consulting book to see whether what we were doing is right or not, I think they usually come here to do supervision ID: QTPNUAM02-community health nurse”.

“So far I have not received any supervision- ID: QTPAGON02-general nurse”

“Since I came I have been here for 6 months and I have not seen any facilitative supervision since I arrived- ID: QTPHOSP04-doctor”

In a study conducted in Bongo in the Upper East region of Ghana, respondents enumerated key challenges that they face with the implementation of the T3 strategy and it was reported that frequent RDT stock-outs was a major challenge followed by a lack of diagnostic facilities, with the least being frequent ACTs stock-outs(Akanteele Agandaa et al., 2016). At the CHPS level RDT stock-out was their major issue, Health Centre level it was diagnostics while District Hospital did not have any challenge(Akanteele Agandaa et al., 2016). Contrarily, the findings of this study did not report stock-out of RDTs and ACTs as challenges in the facilities though the most stocked ACT in all the facilities is AL which explains why it is the most (87%) prescribed ACT according to this study.

The main challenge as reported in this study is the mistrust in RDT results by prescribers who are mostly thrown into a state of dilemma when RDT test negative but their clinical judgment suggests otherwise to them. A study in Western Uganda reports that few prescribers raised concerns about RDT negative test that later proved to be smear-positive(Altaras et al., 2016) which therefore falls in line with the claims of almost all prescribers interviewed in this study and supported by the prescriber quotes below:

“For me I will say that sometimes a child will come and then you will check the RDT and it will be negative but looking at the complains you will suspect that it is malaria, but because they said we should not treat when it is negative you can't

treat, you may treat infection or other conditions. The person will go and come back. When the person comes back and you do the RDT you will see that it is positive. So for me, I will say that, like for the children under 5 years they should allow us to treat with signs and symptoms and not only the RDT. And moreover the anti-malaria sometimes we don't get them at the region and it is a very difficult problem for us the only one you get is AL- ID: QTPMAMP01-midwife”

“ so far some of the challenges have been like at times based on your physical examination and other things you actually see clearly the person is suffering from malaria but you test and the results are negative and for that matter you will not be allowed to treat for malaria so you treat for something else but the person will go and come back with the same conditions so when you treat, though the T3 is there to guide us, but at time your physical signs and symptoms are there so at times we do treat and after treating the person become well so that has been the challenge about the T3 but apart from that I think it's a good initiative or a good policy- ID: QTPHOSP03-physician assistant”

“..... sometimes the pyrexia or the symptoms the malaria symptom you yourself you see that this is malaria symptom but just because they say don't treat when negative you always become confused and you don't know what to do so sometimes we are compelled to treat- ID: QTPAGON01-physician assistant”

All the above narrations by prescribers could, therefore, explain why even when the study points out there was no case of commodity stock-out yet compliance to the test and treat is 75% which is evident that presumptive treatment and treatment of negative test results still goes on.

An important aspect of the study during the interview was to seek the views of prescribers as to how to improve the policy. Basically, most of the prescribers were happy that as at the time of the study there were commodities however the commonly shared opinion to

enhance the policy is to ensure constant availability of rapid diagnostic test kits(RDTS) and ACTs especially the RDTs because the testing is more crucial to erode all doubts about what to treat.

“The items needed for the test treat and track should be readily available almost all the time like the RDT should be readily available ID: QTPMORK02-physician assistant”

A concern was also raised to have manufacturers reduce the (15-20minutes) duration patients will have to wait to receive test results as some do complain.

” To improve on that I think, if normally they need to wait for at least 15 to 20 minutes before we can give them accurate result, so I think for them sitting here maybe after doing the test the person may wait and still we need to wait for 15 to 20 minutes, I think the person may feel that we are taking his/her much time here, I think if there is anything we can do so that the test will give us fast result, I think that will also be a good idea- ID: QTPNUAM02-community health nurse”

5.5 Limitation of the study

This study may be limited by the use of one-month data for the study as it may have the potential of skewing the results to assume a certain pattern. For instance, in a facility where one prescriber happens to be on duty consistently for a long time within the period, then the prescription pattern of that facility will tone a certain line whether good or bad. The study may also be limited in scope as it was unable to assess the tracking aspect of the entire T3 policy.

CHAPTER SIX

CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusion

Prescriber compliance with the test and treat policy in the Twifo/Atti Morkwa district was high. From this study, prescribers were more likely to comply with the policy when patients were younger in age and prescribers at higher facilities were more compliant than those at lower-level facilities. Also, prescribers were likely to comply with patients who presented fever $>37.5^{\circ}\text{c}$

6.2 Recommendations

It is therefore recommended that:

- I. The NMCP/GHS should focus on on-site supportive supervision to prescribers rather than centralized pieces of training. This will prove to be more cost-effective as more prescribers can be reached at a time to disseminate vital information on case management and also have firsthand information on what is happening in the health facilities.
- II. NMCP/GHS should embark on continuous education on the T3 policy with much focus on personnel at the lower level facilities to improve on their compliance level.
- III. Commodities should be readily available based on a PUSH system and not last-mile distribution (LMD). The LMD intervals of getting to facilities upon their last visits sometimes take too long hence may affect facilities ability to test if they run out of RDTs. This was a major concern during the interviews with prescribers hence should be looked at.

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APPENDICES

Appendix A

Participant Consent Form

Research title: Assessing compliance with Test and Treat of the malaria T3 policy in the Twifo/Ati Morkwa district

Name of Researcher: Francis Adjei-Sarpong

Research Supervisor: Seth.K. Afagbedzi, Ph.D

PART I: INFORMATION SHEET

PARTICIPANT INFORMATION SHEET FOR MALARIA PRESCRIBERS

TITLE OF RESEARCH: ASSESSING COMPLIANCE TO TEST AND TREAT OF MALARIA T3 POLICY IN THE TWIFO/ATTI MORKWA DISTRICT

INTRODUCTION:

My name is Francis Adjei-Sarpong, a Master of Science in Public Health Monitoring and Evaluation student at the University of Ghana, School of Public Health. This study aims to assess compliance to test, treat and track policy of malaria case management in the Twifo/Ati Morkwa district. Health personnel who consult/prescribe at the OPD in selected facilities will be involved in this study. You are being asked to take part in this study because you are a health worker in one of the chosen facilities for this study

BACKGROUND AND PURPOSE OF THE STUDY

Malaria treatment policy has changed from treatment based signs and symptoms to drug-specific treatment after positive test results. The Ghana NMCP signed up to a WHO policy

known as the Test, treat and track(T3) which recommends that all suspected cases of malaria are put on treatment only after they have been confirmed by means of a diagnostic test (RDT or microscopy). Ghana has however not reached the level proposed for the elimination of malaria as still not all suspected cases are tested which suggest that compliance to the T3 policy and some other factors could be the cause.

The information that would be gathered will be made available to the District level health Management concern agencies for the purpose of planning and streamlining malaria case management.

NATURE OF THE STUDY:

The study will use a census approach to review folders of all cases of uncomplicated malaria that will be available in the health facility records. Interviews will be conducted with prescribers involved in malaria case management who will be available within the study period.

PARTICIPANT INVOLVEMENT:

Duration/What is involved in the study:

If you accept to be part of this research, you will be required to answer a few questions which will be asked by a member of the research team. It is expected that each process will not last more than 20 minutes

Potential Risks:

In participating in this study, I will be asking you to share some personal views and experiences concerning the T3 policy implementation with me. You do not have to answer every question. Also, you may withdraw from the study at any time that you wish. You

have an opportunity at the end of the interview to review your responses to suit your desired response. This study will pose no risk to you or your work.

Possible Benefits:

The outcome of the study will provide useful information that can lead to an improvement in malaria case management.

Costs:

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

Compensation:

In participating in this work, no compensation shall be paid to you, however, your time spent on this work will be very much appreciated.

Confidentiality:

All information picked from you shall be strictly confidential. Every information gathered from this study will be used for the sole purpose of the research and the interview will be conducted in privacy at your convenience. In presenting the data in the thesis and manuscript for publication, your name or any personally identifiable information shall not be quoted. Information will be strictly under lock and key only accessible to the principal investigator.

Voluntary Participation/ Withdrawal:

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

Outcome and Feedback:

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

Funding information:

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

Sharing of Participant Information:

The data that would be gathered will be shared with the University of Ghana for academic purpose, the Ghana Health Services Ethics Review Committee shall be given a copy for their inputs about the work and if possible dissemination of findings to the ERC. The District Health Directorate of Twifo/Atti Morkwa will be debriefed on the findings in the presentation session so as to update them on the situation on the ground.

Provision of information and consent for participants:

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

If you have any questions, you can ask them now or later. If you wish to ask questions about the study later, you may contact me Francis Adjei-Sarpong, School of Public Health, the University of Ghana on the following numbers 0243-54-24-38/0504-54-24-38 or kwajobakwame@gmail.com;

My supervisor: Dr. Seth Afagbedzi (Tel: 0244-59-19-53, [e-mail: safagbedzi@gmail.com](mailto:safagbedzi@gmail.com)).

On ethical issues and infringement of your fundamental human rights in participating in the study, you can also contact Madam Hannah Frimpong the Administrator GHS-ERC, on 0507041223 for any clarifications.

PART II: CERTIFICATE OF CONSENT

I have been invited to participate in a study on Assessing compliance to test, treat and track policy of malaria case management in the Twifo/Ati Morkwa district. The document describing the nature and purpose as well as risks and benefits of the study has been read and explained to me.

I have been given an opportunity to have any questions about the study answered to my satisfaction. I agree voluntarily to participate in this study.

_____	_____	_____
Identity number of participant	Signature	Date

INVESTIGATOR STATEMENT AND SIGNATURE:

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

Researcher name:.....

Signature:

Date:

Appendix B

Check List for Data Extraction from Folders

The University of Ghana, School of Public Health

Project title: Assessing compliance to test and treat of the T3 policy of malaria case management in the Twifo/Atti Morkwa District

CHECKLIST FOR FOLDER REVIEW

Date of review..... Name of Reviewer.....

Patient ID..... Facility Name:.....

Instrument ID:.....

SECTION 1: SOCIO – DEMOGRAPHIC DATA-PATIENTS (Please circle)			
No.	Question	Coding	Skip To
1	Age (completed years)		
2	Sex	Male-1 Female-0	
3	Religion	Christianity 1 Islamic 2 Traditionalist 3 Other specify.....4	
4	Educational level	None-0 Primary-1 Secondary-2 Tertiary-3	
5	Occupation	Unemployed-0 Farmer-1 Trader-2 Artisan-3 Public Servant-4 Other(specify)-5	
6	Insurance Status	Not Insured-0 Insured-1	
7	Symptoms have the following(fever, chills, and headache)	Yes-1 No-0	
SECTION 2: HEALTH FACILITY FACTORS			
8	Facility type	CHPS-1	

		Clinic-2 Health centre-3 Hospital-4	
9	Ownership	Private-1 Public-2	
10	NHIS accreditation	No-0 Yes-1	
SECTION 3: PRESCRIBER FACTORS			
11	Age		
12	Sex	Male-1 Female-0	
13	Staff category	Community health nurse-1 Enrolled nurse-2 RGN-3 Midwife-4 Physician assistant-5 Doctor-6 Other(specify).....-7	
14	Years of service		
15	Training on guideline	No-0 Yes-1	
16	Time of service provision	Morning-1 Afternoon-2 Night-3	
SECTION: 4 DIAGNOSIS, TESTING AND MEDICATION			
17	Was Fever established (Auxiliary $\geq 37.5^{\circ}\text{C}$, Rectal $\geq 38.5^{\circ}\text{C}$)	Yes-1 No-0	
18	Was the client referred for testing?	Yes-1 No-0	If Yes 18
19	What type of test?	RDT-1 Microscopy-2	
20	What was the test outcome?	Positive-1 Negative-0	If positive 21 and if Negative 24
21	Was antimalarial prescribed?	Yes-1 No-0	If Yes 22

22	What antimalarial was prescribed?	AA-1 AL-2 DHAP-3	
23	Was antimalarial given accordingly as prescribed by the policy?	Yes-1 No-0	
24	Was antimalarial still prescribed?	Yes-1 No-0	

SECTION 5: COMPLIANCE

	Were the under listed complied to?	RESPONSE(YES=1/NO=0)
25	Suspected of malaria(fever and day of onset)	
26	Test is done	
27	Given medication(ACT)	
28	Overall compliance(suspected of malaria, testing done and if positive ACTs given, if negative ACTs not given)	

Appendix C

Questionnaire/Interview Guide For Health Workers

Participant ID number..... Date

Health facility name Facility Type:.....

Category of health worker..... Years of Service.....

Sex of health worker.....

Introduction

- Thank health worker for their time and introduce project
 - Go through the consent form and give the participant a signed copy
 - Outline format of the interview
1. Briefly tell me your responsibilities in this facility
 2. Can you kindly tell me what the new treatment policy is all about(T3)?
 3. Have you had any training on the new policy? (Look out for the kind of training and period)
 4. How often do you receive facilitative supervision on the new policy for the treatment of malaria? (Probe form of supervision and who comes for supervision)
 5. Assuming a client is suspected to have uncomplicated malaria, how do you go about it?
 6. In your opinion, what do you think are the challenges to the implementation of the T3 policy.
 7. In what ways do you think the policy can be improved for optimal compliance?

THANK YOU