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Title: Barriers and facilitators to adherence to "test and treat" of malaria case management guidelines by health providers in Lilongwe District, Malawi in 2020

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DECLARATION

I, Ella Chamanga declare that this dissertation is my work. It is being submitted for the Degree of Master of Science (MSc) Epidemiology at the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination at any other University.

(Signature of Candidate)

5 November 2020 in Johannesburg

ABSTRACT

Background: Malaria is one of the major causes of morbidity and mortality in sub-Saharan African. In 2010, the World Health Organization (WHO) recommended malaria testing and treatment for all suspected malaria cases. Since 2013, Malawi has been implementing the malaria test and treatment guidelines. In 2018, Malawi reported a high prevalence of malaria (24%). The malaria program report shows that 45% of malaria suspects were presumptively treated in 2019 at Bwaila Hospital, in Lilongwe District. Overuse and inappropriate prescription of anti-malarial drugs is a major problem. The study explored barriers and facilitators to adherence to test and treatment of malaria case management guidelines in Lilongwe District.

Methods: This was a qualitative study. In-depth interviews using a semi-structured interview guide was used to explore the experience of twelve health providers of malaria test and treatment guidelines. The interviews were audio-recorded, transcribed and analysed using the framework approach. Data collected were categorized as adherence and non-adherence based on respondent responses on practices in managing patients with fever. Adherence was defined as the prescription of antimalarial drugs to parasitological confirmed malaria cases.

Findings: Respondents were two clinical officers, four medical assistants, two registered nurses and four Health Surveillance Assistants (HSAs). The barriers to adherence to malaria test and treatment were; critical health condition of the patient, patient's satisfaction, patient volume, limited diagnostic tools and provider perception of low detection of malaria cases by Rapid Diagnostic Tests (RDT). Facilitators to adherence were the implementation of Community Integrated Management of Child Illnesses (C-IMCI), disbursement of Artemether Lumefantrine (AL), antibiotics guidelines and RDT positive results. Despite comprehensive knowledge of malaria test and treatment, health providers still prescribed anti-malarial drugs to patients with negative results. Health providers considered patient condition as the most critical factor in the management of fever.

Conclusion: To improve adherence to malaria test and treatment, health providers should be provided with enough resources at the health facility. Health providers should build trust in RDT negative results by strengthening their skills in IMCI to improve RDT compliance, rational drug use and quality fever care. National Malaria Control Programme (NMCP) should conduct regular supervisions and provide feedback to health providers to improve the quality of clinical services delivered to avoid the development of drug resistance to first-line anti-malarial drugs, antibiotics and adverse health effects to patients.

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DEDICATION

This dissertation is dedicated to all people who had malaria and were mismanaged and developed adverse health effects because of health providers' poor adherence to malaria case management guidelines.

ACRONYMS

ACT	Artemisinin Combination Therapy
AL	Artemether Lumefantrine
ASAQ	Amodiaquine Artesunate
CFIR	Consolidated Framework for Implementation Research
CHAM	Christian Health Association of Malawi
C-IMCI	Community Integrated Management of Child Illnesses
CINAHL	Cumulative Index of Nursing and Allied Health Literature
DHS	Demographic Health Surveys
FGD	Focus Group Discussions
GP	General Practitioner
HREC	Human Research Ethics Committee
HSA	Health Surveillance Assistant
IMVM	Intertgrated Malaria Vector Management
LLIN	Long Lasting Insecticide Treated Nets
MICS	Malaria Indicator Cluster Surveys
MOH	Ministry of Health
MRDT	Malaria Rapid Diagnostic Tests
NMCP	Malawi National Malaria Control Program
NHSRC	Malawi National Health Sciences Research Committee
SP	Sulfadoxine-Pyrimethamine
UNICEF	United Nations Children's Funds
WHO	World Health Organization

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CHAPTER ONE: INTRODUCTION

This chapter provides a background on the burden of malaria globally, in sub-Saharan Africa and Malawi. It explains the adherence of malaria test and treatment guidelines among health providers at Bwaila Hospital in Lilongwe District and the justification for conducting this study

1.0 Background

Malaria is a major global public health concern. A third of the world population is exposed to plasmodium falciparum species that transmit malaria which is responsible for most malaria deaths. It was estimated that among 219 million cases of malaria, 435 000 deaths occurred worldwide in 2017 (1). Malaria is the major cause of morbidity and mortality in sub-Saharan African countries (2). Two hundred million malaria cases were reported in the African Region in 2017 followed by South-East Asian countries. Half of Sub Saharan African and Asian countries are at risk of malaria, with 91 countries affected by the disease (3).

Malaria is a major public health problem in Malawi as the death rate among all ages is 17 per 100,000 people (4,5). Malaria incidence increased from 323 per 1,000 population in 2017 to 393 per 1000 population in 2018 (4) and the prevalence of malaria is at 24 percent. Malaria is responsible for 30 percent of all outpatient visits and 34 percent of all hospital admissions (5).

The Malawi Ministry of Health established the National Malaria Control Program (NMCP) in 1984. This marked the start of an organized effort to prevent and control Malaria. The NMCP is responsible for coordinating the fight against malaria in the country. It is also responsible for the development of policies, strategies and guidelines and provides technical guidance on the implementation of case management and prevention strategic plan (6).

Evidence shows that effective diagnosis and treatment can reduce malaria morbidity and mortality. To strengthen effective case management of malaria, the World Health Organization (WHO) disseminated treatment guidelines on malaria in 2010. The guidelines state that all malaria suspects should firstly be identified through biological and disease history, then parasitological diagnosis using malaria Rapid Diagnosis Tests (mRDTs) and microscopy. Thereafter, clients with malaria positive results should be treated with Artemisinin Combination Therapy (ACT) (6).

Malawi revised national treatment guidelines and distributed mRDTs to all health facilities in 2013 for testing of all suspected cases of malaria (7). The malaria case management guidelines

were meant to improve the management of patients with fever, rational drug use by excluding non-malaria fever and improving health worker's skills and knowledge on clinical assessment and treatment (6).

1.2 Problem statement

Malaria case management guidelines stipulate that all patients presenting with fever should be tested for malaria. Besides, the guidelines state that all confirmed cases of malaria should be treated with anti-malarial drugs. Any person with a negative malaria test result should not be given anti-malarial drugs but explore the other causes of fever (8).

However, in Lilongwe district, health providers do not adhere to the test and treatment of malaria case management guidelines. Rather, they prescribe antimalarial drugs to patients with malaria negative results and sometimes they treat suspected malaria cases without testing for malaria (4).

The NMCP report for 2019 shows that Bwaila Hospital registered twenty-five thousand five hundred and fifty-one presumed and confirmed malaria cases. Eleven thousand six hundred and sixty-two cases were presumptively treated and that is 45.7% of the patients were treated presumptively. The report further showed that there was no trend in adherence to malaria case management guidelines at Bwaila Hospital. There was 100% adherence to malaria test and treatment guidelines in months of January, May, August and September. Non-adherence was reported in the months of December which was at 90.68% whereas in October it was at 26% and in June at 19.66%. This demonstrates that health providers at Bwaila Hospital are the worst in adhering to malaria case management guidelines countrywide. Overuse and inappropriate prescription of anti-malarial drugs is a major problem at Bwaila hospital (4). **Refer to appendix one.**

Consequently, poor case management of malaria results in prescribing anti-malarial drugs and neglecting the investigation of other causes of fever such as pneumonia and sepsis. Such practices cause patients to be exposed to unnecessary adverse effects related to anti-malaria drugs and neglecting the management of patients with other infections resulting in patients not being treated for the infections that are causing the fever (7,9). In response to the problem, the researcher explored the barriers and facilitators to adherence to malaria test and treatment guidelines.

1.3 Justification

The study was conducted to generate new information on barriers and facilitators to adherence to malaria case management guidelines among health providers at Bwaila Hospital in Lilongwe district. The findings will be used to inform the NMCP on how to disseminate malaria case management guidelines to health providers hence promoting correct prescription practices. The findings will also be used to develop strategies to improve on the clinical investigation of other causes of fever and improve the quality of care for patients. If the quality of care to patients is improved, morbidity and mortality rates will be reduced.

1.4 Research question

What are the factors that influence health care providers' adherence to malaria test and treatment guidelines at Bwaila Hospital in Lilongwe district, in Malawi**?**

1.4.1 Aim

To explore barriers and facilitators to adherence to malaria test and treatment guidelines among health providers in 2020 in Lilongwe District, Malawi.

1.4.2 Objectives

1. To explore barriers to adherence to malaria test and treatment guidelines among health providers
2. To investigate facilitators to adherence to malaria test and treatment guidelines among health providers.

CHAPTER TWO: LITERATURE REVIEW

This section reviews literature to describe malaria case management as one of the major control of malaria. It explains adherence as a component of fidelity which is an implementation outcome. It defines the subcategories of adherence. It discusses why adherence is critical in the successful implementation of test and treat of the malaria case management guidelines. The section describes factors that affect adherence to malaria case management guidelines. These include health workers' knowledge, experiences, attitudes and perceptions of malaria test and treatment guidelines, health system factors and patient and provider interactions that affect adherence to test and treat of malaria case management. The section identifies a gap in the existing literature on the determinants to adherence to test and treatment of malaria case management guidelines among health workers. Finally, it presents the conceptual framework used for the study (10,11).

A computer-assisted search using keywords of integration in the Cumulative Index of Nursing and Allied Health Literature (CINAHL), PubMed and WHO web sites were conducted (12,13). The main keywords were barriers and facilitators to malaria case management, health providers' experiences, perceptions, attitudes, patient and provider interactions, and health systems factors that affect adherence. The researcher only selected peer-reviewed articles from the last decade to provide sound scientific evidence relevant to malaria case management.
The steps that were used to review literature: Firstly, it was planning; identifying key words, scope and style to write literature review. Secondly, reading and collecting current studies that are related to the study in line with research question of the study. Thirdly, analysing which involved summarizing the study findings, critiquing the study and identifying the limitations of the studies. Finally, identification of gaps in the current studies and organizing the study to bridge the gaps in the current studies.

2.1.1 Implementation of malaria test and treat guidelines

2.1.1.2 Malaria case management treatment guidelines

Malawi reported high rates of treatment failure to chloroquine in 1993 and switched to Sulfadoxine-Pyrimethamine (SP). In 2007, Malawi again changed its first-line antimalarial drugs to Artemether-Lumefantrine (AL) due to treatment failure to SP (6). By then, Malawi's

recommended presumptive treatment if microscopy was not available up to 2011 although there were plans to introduce mRDTs later that year (14).

Malawi revised malarial treatment guidelines in 2013 and distributed RDTs to all facilities in the same year (15). Six years of implementation of malaria case management guidelines in Malawi, health workers still prescribed antimalarial drugs to patients with malaria negative results. Sometimes they treated suspected malaria cases without testing for malaria even when mRDTs were available (4). Studies have shown that health providers inappropriately managed patients with fever despite the availability of mRDTs (16,17). Health providers prescribed anti-malarial drugs to patients with fever even when the malaria tests were negative (14,16). Other cross-sectional studies reported that health providers prescribed antibiotics to patients who had no malaria since the anti-malarial drugs were only given to those that had malaria (18,19). Cross-sectional studies conducted in Malawi also reported overuse and inappropriate prescription of anti-malarial drugs (14,16). They reported inappropriate prescription to 1.5 million outpatients who tested malaria positive and 2.7 million patients were given anti-malarial drugs although they did not have malaria in 2014 (14).
Inappropriate prescription practices have economic and life-threatening implications as poor adherence to malaria guidelines can lead to an increase in morbidity and mortality rates due to malaria and other infections, and drug resistance to anti-malarial drugs (9).

Poor implementation of malaria case management guidelines has life and cost implications for individuals and health systems. Intervention or treatment cannot be effective if it is not implemented well. Implementation research identified implementation outcomes that are preconditions for attaining desired changes in clinical or service outcomes. Implementation outcomes serve as indicators of implementation success. They are proximal indicators of implementation processes and are key intermediate outcomes to clinical outcomes in treatment effectiveness and quality of care (20).

2.1.1.3 Implementation outcomes

Implementation researchers have identified acceptability, feasibility, penetration, adoption, cost, fidelity, appropriateness and sustainability as implementation outcomes (15). Therefore, to assess the quality of implementation, one must assess implementation outcomes (21).
This study focused on implementation fidelity which is explained in literature in terms of five components that need to be evaluated (22,23). These are adherence, exposure or dose, quality

of delivery, participant responsiveness, and program differentiation. There are overlaps with the concept of process evaluation (24). Regardless of agreeing that implementation fidelity involves measurement of these five components, other researchers have argued that each of these components represents an alternative way to measure fidelity. Therefore, implementation fidelity can be measured using either adherence or dosage or quality of delivery (24). This study, therefore, will explore factors influencing adherence to malaria test and treatment.

2.1.1.4 Implementation fidelity

2.1.1.4.1 Adherence

Adherence in the current study means that all patients presenting with fever should be tested for malaria. All confirmed cases of malaria should be treated with anti-malaria drugs according to the severity of malaria. Those with uncomplicated malaria should be treated with AL while those with complicated malaria should be treated with injectable Artesunate and those with treatment failure to AL should be treated with Artesunate Amodiaquine (ASAQ). Any person with a negative malaria test result should not be given anti-malarial drugs but explore the other causes of fever (25).

Adherence is the proxy indicator that measures implementation fidelity. To avoid failure, it is important to analyse factors that contributed to successful implementation (23). It is important to be aware of the conditions under which the interventions can be implemented successfully. An implemented intervention that adheres wholly to the content, dose, frequency and coverage prescribed by its designers, is considered to have high fidelity. Content, complexity and quality delivery of the intervention determines the level of adherence to the guidelines of an intervention (22).

Measuring adherence to intervention implementation and acceptance is a comprehensive way of monitoring what was delivered compared to what was designed in the original guidelines (26). Studies have reported that semi-structured questionnaires, health facility surveys were means of evaluating adherence to clinical guidelines in many countries, particularly for malaria. Previous studies used exit interviews with patients, interviewed health providers and abstracted data from registers to evaluate the level of adherence to malaria case management guidelines among health providers (21,34). A review of treatment adherence for behavioural change researchers reported that 35 % of studies used training manuals, 22 % supervised health

providers during prescription and 27 % checked patient records on prescription practices of health providers to assess adherence (9).

In the current study, program reports were reviewed, a semi-structured interview guide was used to explore barriers and facilitators to adherence to malaria case management guidelines among health providers. Based on respondents' responses on prescription practices, it was evaluated whether the health provider adhered or did not adhere to malaria case management guidelines. The malaria program report shows that only 55 % of patients were tested and treated with anti-malarial drugs in 2019 at Bwaila Hospital in Lilongwe District. None-the-less, it was reported that health providers partially delivered the contents of the malaria case management guidelines (4).

2.1.1.4.2 Content of the intervention

The emphasis on adherence to content of the intervention in the delivery of evidence-based intervention arises from a concern for establishing the causal link between intervention and outcome that was established in efficacy trials. Several studies reported that as the implementation of intervention moves into routine settings, adherence tends to be lower than in research trials, and intervention effect sizes diminished (21,27,28). A study on the evaluation of chemoprevention of malaria in Burkina Faso reported that all components of the intervention were implemented. There was a 100 % coverage of villages and sectors. In terms of intervention, less than one-third of eligible children (32.3%) received the recommended four doses in 2015 due to drug side effects and stock out of drugs and the final evaluation showed that the intervention was not effective in the prevention of malaria (21).

Malaria test and treatment guidelines have shown little impact in reducing the prevalence of malaria in Malawi (4). Health providers adhered 100 % to malaria positive results but 27% of providers did not comply with malaria negative results. This is substantiated by studies that reported that health providers prescribed anti-malarial drugs to patients that had malaria and also they prescribed anti-malarial drugs or antibiotics to patients that did not have malaria because there were no diagnostic tools to investigate the cause of non- malaria fever (14,16). The inappropriate health worker's prescribing practices have affected the malaria control and prevention efforts by MOH as there is a minimal decline in the prevalence of malaria due to persistent malaria infections that are not treated effectively (14).

Other studies have shown that low adherence occurs when there are structural and contextual barriers to program delivery. The study on adherence effects was further complicated by concerns about generalizability as programs moved into community settings. The cultural adaptation had effects on adherence when a program was delivered to groups that differed culturally from the original validation sample (27,28). However, the contents of an intervention should cover cultural, structural and contextual issues to improve implementation fidelity (26).

2.1.1.4.3 Intervention complexity

The description of an intervention may be simple or difficult, detailed or vague. Simplified interventions were more likely to be implemented with high fidelity than difficult ones. For example, a study of guidelines intended for General Practitioners (GPs) found that detailed and clear recommendations were almost twice as likely to be followed than vague and non-specific recommendations (29). In the same manner, well-planned interventions, where all the key components were identified in advance, produced higher levels of adherence than less well-structured interventions (22,24).

For malaria case management guidelines, health providers must follow a complex series of steps in investigating the causes of fever and that must be correctly performed (5). Malaria diagnosis requires the availability of malaria testing services but most of the health workers did not correctly assess patients for fever although malaria testing tools were available. Health providers missed diagnosis of malaria to nearly 40% of patients aged under five. The patients were not assessed for fever (14,16). Overall, research recommends for simplified and detailed interventions to improve on implementation fidelity (30).

An intervention should identify motivators and barriers to the acceptance of an intervention. A study in Burkina Faso developed facilitation strategies to optimize the level of adherence (21). The strategies included the provision of training manuals, guidelines, monitoring, feedback and incentives. All these elements were included as potential moderators that link intervention to adherence. The importance of fidelity in program implementation cannot be overemphasized. If fidelity was linked with the outcome, the intervention was modified to amplify outcomes, improve efficiency, and explored for generalizability. In health studies, literature establishes that higher fidelity scores are associated with better health outcomes, ranging from patient satisfaction to the efficient delivery of services by health providers (31).

2.1.1.4.4 Quality of delivery

Quality of delivery affects adherence as health providers deliver an intervention using techniques prescribed by the program or those suggested by similar programs. Studies on quality of case management in Malawi reported that there was poor assessment of patients, providers had no trust in mRDTs, there was low use of diagnostic tests, and largely poor adherence to malaria negative test results, and poor prescription of drugs. There was an inappropriate prescription of anti-malarial drugs because of providers' inadequate skills to manage fever despite the availability of malaria rapid tests (16).

Studies that evaluated implementation fidelity reported that the provision of tools and guidelines to the implementing actors optimized the quality of the delivery of the intervention (39,40). Likewise, ongoing supervision and feedback on the implementation of intervention were good signs that the quality of implementation was prioritized (32).
In Burkina Faso, a study reported that weaknesses of the health system like insufficient financial resources and few skilled providers affected adherence to the implementation of the strategy. These challenges included low financial motivation of the health providers, limited involvement in the planning and implementation of activities, and negative attitude towards the intervention (21).

Although implementation outcome serves as a proxy indicator for the success of implementation of the program and some studies have also reported that some of the barriers and facilitators to adherence to malaria case management guidelines include health providers' knowledge, attitudes, beliefs experiences, patient and provider interaction and health system factors affect implementation outcomes (3,30,33).

2.2.0 Factors affecting adherence to malaria case management guidelines

2.2.1 Barriers to adherence to case management guidelines

Many barriers affect case management of malaria cases. The account below discusses these barriers.

2.2.1.1 Health providers' inadequate knowledge on the management of fever

There are several barriers to adherence to malaria test and treatment guidelines, one of these is inadequate knowledge of health providers on the management of fever. Inadequate knowledge on the management of fever was an issue of great concern, especially for the Sub Saharan

African countries. Although various efforts to train health care providers in malaria case management have been made by governments and WHO, malaria prevalence is still high, and people continue to die of malaria (34).

This was demonstrated by a quantitative cross-section study on quality of malaria case management in Malawi. The study sampled 107 health facilities, 136 health workers, and 2,019 patients. Besides, blood smear data from 28 districts were reviewed. The results showed that only 67% of patients with malaria were correctly prescribed with AL. Among patients without clinical malaria, 31% were prescribed with AL. The study reported that poor assessment of fever was the main reason for the inappropriate treatment of malaria due to miss diagnosis (14).

It is important to note that the study had a very big sample size to generalize the findings since it covered all district hospitals and health centres in the country. Interviews with patients were held to triangulate the findings. Nevertheless, this study only assessed the quality of malaria case management and did not explore the factors affecting adherence to malaria case management guidelines. The study was conducted a year after the introduction of malaria test and treatment, and this affected the findings of the study as health providers were used to old prescription habits. Therefore, the current study was needed to explore health providers' barriers to adherence to malaria case management guidelines which include health system, patient factors, provider factors, policies and guidelines.

Furthermore, a systematic review was conducted to evaluate health workers' compliance with mRDTs in Zambia, Malawi, Mozambique, Zanzibar, Cameroon, Nigeria, Uganda, Ghana and Tanzania (35). Fourteen studies were reviewed using quantitative methods. Findings showed that health workers' overall compliance in terms of initiating treatment was not following the respective mRDTs guidelines such that it was at 83 %. Adherence to positive and negative malaria results was 97 % and 78 % respectively. The results of a multivariate analysis revealed that adherence to positive mRDT results was higher compared to negative mRDTs results. Over-treatment of malaria was still a major problem in the above sub-Saharan Africa countries due to poor adherence to malaria negative results (35).

This systematic review captured information related to the provider's level of compliance to test and treatment of malaria guidelines. However, the review was biased to quantitative methods and had little information on the qualitative aspects of the factors that affected the

compliance of test and treat. Consequently, the review demonstrated that adherence to mRDT negative results was still a challenge and that health providers associated fever with malaria and they still prescribed anti-malarial drugs basing on symptoms even though mRDTs were available. Therefore, the current study was needed to conduct a qualitative study using the Consolidated Framework for Implementation Research (CFIR) to understand the factors that affect compliance to test and treatment of malaria.

A qualitative study on health worker challenges in managing non-malaria paediatric fever in the low transmission area of Mbarara District, Uganda was conducted. This study reported that health providers were unable to identify other causes of fever, and that prompted them to prescribe anti-malarial drugs to patients that tested negative to malaria. When providers failed to identify the other causes of fever and there was no microscopy for confirmation or referring the patient was not possible, many health providers prescribed malaria treatment despite a negative mRDT result (36).

The other challenge was that health providers expressed concerns about inadequate diagnostic equipment for non-malaria fever. These concerns existed despite good knowledge about other causes of fever. This suggests that health providers' non-compliance to test and treatment of malaria was also due to inadequate equipment for the diagnosis of non-malaria fever. Health providers gave anti-malarial drugs to patients who tested negative to satisfy the patient while compromising the quality of fever management. Therefore, there was a need to provide equipment and tools to help in the diagnosis of non-malaria fever to improve test and treat compliance at lower level clinics which could have empowered health workers to effectively manage patients with malaria negative results without a referral (36).

Health providers also reported that those that did not go for training on test and treat policy did not see the importance of testing before the prescription. Health providers were dissatisfied with inadequate in-service training and high staff turnover that resulted in a few suitably qualified staff supporting the implementation of malaria test and treatment (37). On the other hand, the Uganda study conducted in-depth interviews with health providers and Focus Group Discussions (FGD) with community members. The sample size of 20 for in-depth interviews and seven FDGs were adequate to explore issues that affect compliance to test and treatment guidelines.

Nevertheless, the study explored factors to adherence to test and treat of malaria guidelines among under-five children and in low-level clinics only. Investigators could have even explored compliance of test and treat in higher-level clinics where there was advanced diagnostic equipment to rule out lack of diagnostic equipment as a barrier. Another limitation was that data were collected in the dry season when malaria was not at peak, and health workers were lazy to investigate other causes of fever if the malaria test was negative. However, they still prescribed anti-malarial drugs since they had limited knowledge of how to manage non-malarial fever without the diagnostic equipment. This means that generalization could not be made to higher level clinics. There was a need to conduct a qualitative study in some higher-level clinics with different diagnostic equipment for non-malaria fever.

Similarly, in Afghanistan, a qualitative study was conducted on malaria diagnosis and diagnostics. In-depth interviews were conducted with thirty-nine health workers at twenty-two basic and community health centres. The findings showed that health providers prescribing decisions were dependent on their experience to diagnose and treat non-malarial fever. The study found that patients who often tested negative had no diagnosis and that prompted presumptive treatment practices. Health providers stated that respiratory conditions, typhoid fever, dysentery, and urinary tract infections were possible diagnoses they would consider when the patient tested negative for malaria. There was no equipment to diagnose a patient with malaria negative results because laboratory functions were very limited. As such, health providers prescribed antibiotics and analgesics for those that had malaria negative results without confirmation of a bacterial infection (38).

This study had generated evidence that context-specific factors can affect the practical success implementation of a malaria diagnostic policy. The above findings suggest that policymakers of malaria case management guidelines should be aware that implementation of malaria test and treat does not occur within a clinical vacuum but where material and social resources are available. There was a need to explore more context-specific approaches to reduce over-diagnosis of malaria and improve treatment of non-malarial fever.

The generalizability of the findings was limited to the Afghanistan setting. This is so because some social and behavioural factors may differ from Malawi. Therefore, the current study wants to discover the context-specific factors for Malawi which is in sub-Saharan Africa.

2.2.1.2 Health provides perceptions and experience of test and treatment of malaria.

Another barrier to adherence to compliance to test and treatment of malaria is the health provider's perception and experience in the management of fever. A qualitative study that was conducted in Cameroon assessed the health provider's adherence to malaria test and treatment. The study conducted focus group discussions with health providers (39). The study found out that health providers that had worked for a long time even before the introduction of test and treat, relied much on clinical judgement than mRDT results. This was so because health providers had practical experience in managing fever and that framed their perceptions towards malaria test and treatment guidelines. The study also revealed that health providers trusted the results of mRDTs, however, their prescription was influenced by their perception that mRDT could not detect other strains of malaria. MRDTs could be negative to patients who had already taken anti-malarial drugs before coming to the health facility. Health providers reported that clinical judgement was most important in the management of malaria especially in endemic areas. Their experience in managing patients with fever empowered them to continue prescribing anti-malaria drugs even in those that had tested negative because they had seen patients getting better after treatment. Withholding anti-malaria drugs to monitor patients with fever just worsened the situation and others developed severe malaria. In such situations, providers gave anti-malarial drugs to patients who tested negative for malaria (39).

The study just conducted FDGs with health care providers only; the FDGs comprised of doctors, nurses and clinical officers. There was little information that these health providers shared to express their experience in the management of malaria cases in the presence of their supervisors. It is recommended that in-depth interviews be conducted when investigating for personal experiences, as FDGs are good to explore people's perspectives towards a certain issue. In addition, the study was not guided by a conceptual framework. It only explored the provider and patients' perspectives. In this regard, the current study has employed CFIR which covers the following domains: outer setting such as policies, inner setting like health systems factors, which were not explored in the Cameroon study.

Another qualitative study that was conducted in Western Uganda explored the rationale behind health workers' prescription of anti-malarial drugs to patients with negative rapid test results (40). The study found that health providers prescribed anti-malarial drugs without relying on

test results as malaria symptoms of fever, headache, vomiting, and body or joint pains overshadowed the results. Consequently, health providers had little confidence in mRDTs especially when microscopy results were positive to the patient that had mRDT negative results. This study found that providers lacked alternative options when a patient tested malaria negative (40).

Malaria case management is complex and is influenced by peers, health providers' experiences, perceptions and beliefs on the diagnostic tests and impacts treatment decisions. Although training on test and treatment has been conducted in many countries in sub-Saharan Africa, little impact has been achieved. This was so because provider interactions with peers, patients and experience on using mRDTs, have shown to affect anti-malarial prescribing practices in different contexts (40).

This study gave a deeper understanding of factors driving the prescribing behaviour in the Ugandan context. An in-depth qualitative investigation was conducted to ascertain how providers manage patients who tested negative and what informed their decision to prescribe anti-malarial drugs during routine practice in a remote, rural health care setting. The results were useful in the development of strategies to implement the malaria test and treat policy, as well as to design appropriate supporting interventions. The findings also had broader implications for clinical practice and the development of methods for diagnostic decision-making in resource-constrained contexts (40). The study concentrated on providers' perspectives in a rural setting with limited diagnostic equipment. The study was conducted ten months after the dissemination of test and treatment guidelines to the health workers. Therefore, it was too early to assess health care prescription practices since other health providers could not have been briefed on the new guidelines. The current study has been conducted six years after the implementation of the malaria test and treatment policy. As alluded to, the current study explored health systems, patient factors, policies and providers' factors that affect adherence to malaria case management guidelines.

A qualitative study was conducted to describe the challenges to the implementation of mRDT at primary care facilities in a Ghanaian district in 2016 reported that health providers agreed that the guidelines improved malaria case management (41). The study reported that health providers agreed that the guidelines were useful and that use of mRDT was part of the policy implementation. MRDTs were mostly used in basic facilities in remote settings without

laboratory services. Providers at hospitals and larger health centres with laboratories clearly stated their preference for microscopy. Nonetheless, both public and private health providers prioritized clinical judgment over a malaria test result based on malaria prevalence in their setting, risk and consequences of delayed treatment. The health providers still prescribed anti-malarial drugs to patients with negative results thinking that it was not harmful but necessary to prevent the development of complicated malaria. Providers who had more experience reported that they had been managing cases with fever, so very good history taking determined diagnosis without relying on tests. They reported that the patient's recovery was essential regardless of what the guidelines stipulated (37).

The study generated useful data on experience with test and treatment guidelines for malaria management. Validation of data was done by conducting FGDs and direct observations and reviewed the strategic plan for malaria control, guidelines for malaria management and district mRDT distribution records. However, the study failed to explore more on other policies or guidelines that were affecting adherence to test and treat guidelines. Hence the current study also explored guidelines and policies that affect adherence to malaria test and treatment.

2.2.1.3 Patient and health provider interactions

Patient and health provider interactions in the management of cases is another barrier to compliance with malaria test and treatment guidelines. This is supported by a quantitative study conducted in South-East Nigeria on malaria treatment perceptions, practices and influences on provider behaviour with fifty health providers (42). The study found that 35.2% of health providers considered critical illnesses of the patients or the ability to pay bills and (9.4%) of the providers helped those patients that they knew from home. Hospitals most of the time commenced immediate treatment if they noticed that the patient was very ill (48). The study also revealed that psychosocial support was essential for the successful healing and satisfaction of patients. However, malaria case management guidelines only focused on physical treatment while psychological and social management of the cases were not incorporated (42).

Nonetheless, this study was quantitative and focussed on measuring the knowledge levels on factors that affected the prescription of anti-malarial drugs. The study did not examine the reasons behind the decisions made during prescriptions. The current qualitative study was designed to investigate the factors that affect adherence to malaria test and treat.

Similarly, a qualitative study on motives for clinical staff to over-diagnose malaria in Tanzania reviewed 2,082 patient consultations and interviewed 34 clinicians for three months at two hospitals (43). The results showed that clinicians felt under pressure from patients. Patients were more knowledgeable and knew that the symptoms they had were for malaria and were not ready to be told that they did not have malaria. The health providers gave anti-malarial drugs to such kind of patients even though they did not have malaria. Some clinicians said that they were afraid of patients' complaints if they did not prescribe antimalarial drugs (43).

This study unearthed useful information on how provider-patient interactions affect adherence to test and treatment guidelines. The patient played a critical role in adhering to the guideline. However, the study was conducted a year after the introduction of the mRDTs and interviewed clinicians only leaving behind nurses and community workers who also manage malaria cases.

A study in Uganda reported that health providers considered education, socio-economic status and beliefs of patients when managing cases. Those considered well educated were inquisitive and demanded tests and treatment compared to the less educated. Health providers did not adhere to case management guidelines when interacting with less-educated patients. Health providers had difficulties telling the patients that they did not have malaria, as they were not confident to answer difficult questions from knowledgeable patients. Medical doctors who could not identify the other cause of fever prescribed anti-malarial drugs as they were afraid that they would be labelled incompetent (44).

Other studies that have been conducted, explored health provider and patient factors that affected adherence to case management guidelines without using conceptual framework and other domains like inner setting and outer settings were not explored. Most of the studies were conducted a year after the guidelines were disseminated. This affected the results as most of the providers were not oriented on malaria case management guidelines. Eight years after the implementation of malaria case management guidelines, providers still prescribe anti-malarial drugs to patients without malaria. Using the CFIR, all the factors related to provider adherence to case management were explored to inform the strategies on how to promote correct prescribing habits.

2.2.1.4 Health system factors

Health systems factors such as policies, guidelines, equipment and the number of staff and processes involved in the management of cases have an impact on adherence to case management guidelines. This was substantiated by a systematic review of effective coverage and systems effectiveness for malaria case management in Sub-Saharan African Countries (45). The review revealed that financial, structural and social issues in health facilities affected the quality of care. Lack of financial incentives, inadequate testing tools and drug supplies, lack of electricity and water, unreliable transport systems for referring emergency cases to higher-level facilities, were cited as some of the challenges in the sub-Saharan region. Inadequate diagnostic tools and drugs were rated as a greater challenge than frustration over salaries in the sub-Saharan countries. Thereafter rigid, inadequate, management styles and rigid hierarchical systems were identified as impeding good patient care. Despite these challenges, health providers acknowledged that attitudinal change in themselves could take place if necessary, steps were taken to address their challenges at work (45).

The foregoing systematic review revealed that structural and social issues in the health system affected the quality of patient care and compliance with case management guidelines in different countries. However, data from Demographic Health Surveys (DHS) and Malaria Indicator Cluster Surveys (MICS) had different study designs, testing tools, and interpretation techniques, making it difficult to generalize the findings. There was significant variation between countries in the quality of drugs and adherence to test and treatment. Therefore, a qualitative study to understand the structural related health systems factors that affect adherence to malaria test and treatment guidelines in each country was needed.

Likewise, another study reported that constraints in the health system were among the drivers for malaria over-treatment. Providers reported that poor referral systems, shortage of staff, inadequate communication with other clinical staff to discuss what to do when they encounter difficult cases, inadequate expertise to manage patients with fever, inadequate equipment for diagnosing different types of fever affected malaria case management. The providers reported that unavailability of mRDTs, laboratory reagents for typhoid fever and thermometers affected the management of patients. They also reported that they gave the antimalarial drug to patients without malaria because they did not have anything to give to those patients (40). Some of the findings above were corroborated by a study done in Cameroon which reported that use of mRDTs affected the work of the providers. Providers also reported that testing for malaria

delayed managing other patients to be assisted as they had a lot of patients to attend to (39). These studies revealed that the availability of testing tools and effective drugs does ultimately promote the desired health providers prescribing practices. Rather, context-specific strategies modified to promote the translation of knowledge into correct prescribing practices reduce the over-prescription of drugs (39,40).

2.2.2 Facilitators to adherence to case management guidelines

Provider's knowledge of malaria test and treat guidelines, positive attitudes and support from health systems influence adherence to malaria case management as discussed below.

2.2.2.1 Health providers' knowledge of malaria test and treat

A study that was conducted in Nigeria, showed that health provider's knowledge of the use of mRDTs, improved adherence to malaria case management guidelines (46). The study sampled 32 health workers from four health centres and collected data using open-ended questions. The study reported that it was easy to use mRDTs to confirm malaria compared to diagnosing using symptoms and signs of malaria. Most of the health providers (65.6%) believed that mRDT was more effective for malaria diagnosis than microscopy (25.0%) and clinical diagnosis (9.4%). Respondents reported that mRDTs led to fast diagnosis and efficient utilization of ACT (46).

The study was conducted 12 months before and after the introduction of mRDTs, but the results did not show an increase in knowledge levels before and after the intervention. It focussed on perceptions of mRDTs and ACT not on knowledge levels on test and treat policy. The study was quantitative as a result it did not explore the underlying factors that affect the adoption of malaria test and treatment guidelines.

Similarly, a cross-sectional study in Oyo State, Nigeria reported that that 322 (77.8%) had received training on the use of mRDT for case management of malaria; 129 (30.5%) had good knowledge on causes of fever, and 329 (80.6%) had received supportive supervision. When a patient's malaria mRDT result was negative, 141 (24.3%) of the health workers prescribed antimalarial drugs to the patients. Training on the use of mRDT in malaria case management, health worker's knowledge of causes of fever and health workers experience with supportive supervision showed statistically significant association with prescription of antimalarial drugs to mRDT negative patients. The results revealed that inadequate knowledge was associated

with poor adherence to negative mRDT results. Therefore, there was a need to develop training modules on alternative causes of non-malaria fever and the management of non-malarial fever. Such modules would contain clear instructions on clinical actions to follow when managing non-malaria fever the required treatment (3).

In addition to treatment guidelines, treatment charts should be displayed in consultation rooms in health facilities to guide health workers when treating patients with negative mRDT results. Such charts may offer options on actions and investigations to be carried out when a patient's mRDT result is negative. Such charts could be helpful to health workers when confronted with negative mRDT results (3).

It was a quantitative study and it did not explore the reasons behind the prescription practices among health providers. The health facilities sampled were those that had a stock of mRDTs and drug supplies all the time and that most of the health providers were trained in malaria test and treatment guidelines. The study setting was not like other settings where most of the providers received on the job mentorship with their facilities having erratic supplies of mRDTs and ACT. Therefore, a similar study to explore factors that influence adherence to malaria test and treatment guidelines in health facilities with few trained staff on malaria case management and with the routine supply of mRDTs is required.

2.2.2.2 Management of knowledge on non-malaria fever

Health providers' knowledge on causes of fever is another facilitator to adherence to malaria case management guidelines. Health providers that were more knowledgeable on the management of non – malaria fever were adhering to malaria test and treatment guidelines (47). This is substantiated by a non-randomized four-centre clinical trial conducted in Zanzibar. The study reported that health care providers explained that uncomplicated malaria was based on fever and the alternative causes of fever were otitis, pneumonia and other acute respiratory tract infections. For children below the age of five, clinical diagnosis was based on the sick child reporting form for IMCI (47).

The study promoted that patients with mRDT negative should not be treated with antimalarial drugs. All patients did not develop complicated malaria during the two-week follow-up. This was attributed to improved treatment of patients with fever not associated with malaria. More antibiotics were prescribed to mRDT-negative patients. The introduction of mRDT and ACT

thus provides an opportunity to improve the treatment of both malaria and bacterial diseases (47).

However, this was a non-randomized study where the intervention mentored the health providers to comply with malaria test and treatment guidelines. The two-week period followed by the research nurses influenced findings. Therefore, there was a need to conduct a study in routine practice to check if the adoption of the test and treat policy would sustainably take place.

Another study reported that fever was the most common symptom and the most reliable criterion in the diagnosis, treatment, and follow-up of malaria. Health providers reported that the alternative causes of fever were pneumonia or diarrhoea as well as eye, ear, skin or urinary infections. These could prompt different treatment options notably antibiotics or oral rehydration. In other instances, the health provider saw that fever was not associated with other signs and symptoms of other conditions. In such cases, treatment for malaria was prescribed. Intermittent fever was noted to indicate malaria while persistent fever could be associated with other infections and typhoid (19).

2.2.2.3 Patients socio-economic status

Health workers have reported that education levels and the social-economic status of patients were important when interacting with patients. A Qualitative study conducted in Cameroon and Uganda reported that educated patients were able to understand the diagnosis especially when tests were done while the less educated patients had difficulties to understand the non-malaria fever because all along they had information that fever is a symptom and or sign of malaria. Those that were economically empowered, could go to private clinics and pharmacies to buy anti-malaria drugs when the public facilities did not have any. Sometimes patients who were not convinced that the mRDT was negative at public facilities could go to a private clinic for a retest through microscopy so that they could access anti-malarial drugs (39,40)**.**

2.2.2.4 Health system support

Health systems factors such as financial incentives, regular supervision and mentorship encouraged adherence to malaria test and treatment guidelines. This is supported by a study that was conducted in Kenya (48). The findings showed that a monitoring program reinforces training and help to maintain high-quality diagnosis of malaria through microscopy. On-the-job supervision and slide rechecking were an important component of the program and continually

reinforced mentorship. Two other programs reported positive effects of on-site mentorship and slide rechecking. The study specificity improved over the first few months, probably reflecting the influence of the regular feedback and reviews of discrepant slides. The training in malaria diagnosis dramatically improved the performance of health providers (48).

This study was conducted in rural facilities with high patient volume and very basic infrastructure. Therefore, this approach could be applied in other similar contexts and settings. The study did not provide any special equipment or reagents. Nonetheless, health care infrastructure in the malaria-endemic areas of the world varies markedly and this type of program may not be practical in places with no electricity, no laboratory technologists, or other major infrastructure. The study did not investigate the sustainability of incentives and availability of resources for microscopy, reviews and mentorship in resource constraint countries such as Malawi. However, performance improved because of regular reviews and feedback which in routine practice may not be feasible.

A study that was conducted in Cameroon and Nigeria reported that a reward, access to additional employment income, supervision and mentorship was associated with adherence to test and treatment of malaria. In private clinics, providers tested the patients with mRDTs and microscopy and gave anti-malaria drugs, since it was an income generation for the owner of the facility (49). The results revealed that health providers that went for review meetings and mentorship programs were more likely to adhere to case management guidelines as monetary incentives were attached to the meetings (49).

The study was part of a larger study principally designed to examine prescription to febrile patients as such some other factors were not explicitly explored. Thus, the generalization of the findings was limited. Therefore, there was a need to conduct another study in each country to interrogate the health system factors that affect adherence to malaria test and treatment.

Available evidence suggests that organization policies, patient and provider interaction affect the implementation of malaria case management guidelines (40,50). A CFIR has been used to investigate facilitators and barriers in settings where delivery of an intervention is underway to understand the processes involved and how they affect the implementation of various guidelines (24,51).

In Malawi, training of health providers on malaria case management is an ongoing process. Also, there is a good supply of diagnostics tools and ant-malaria drugs at community and facility level. NMCP conducts supervision every quarter but the prescription practices among health workers was still poor. Therefore, there was a need to conduct a qualitative study to understand the barriers and facilitators to adherence to malaria case management guidelines. This is so because most prior studies that were conducted in Malawi were quantitative in most respects.

2.3.0 Gaps identified in the literature review

A review of the literature has demonstrated that there is limited information on how supervision and feedback reports affect compliance with malaria test and treatment. Literature is scanty on how health providers are involved in the development of guidelines and how challenges that providers face is addressed to promote adherence to guidelines. Little information is available on what and how other guidelines and policies that are implemented in the routine settings affect the implementation of malaria case management guidelines. Another gap is that little is known about how experience and profession influence adherence to guidelines. Therefore, this among others necessitated the need to conduct a comprehensive qualitative study using CFIR to understand the barriers and facilitators to compliance with malaria test and treatment guidelines. This would provide a comprehensive report with recommendations that can be used for the planning and implementation of malaria case management guidelines.

2.4.0 Consolidated Framework for Implementation Research (CFIR)

CFIR has been used to investigate facilitators and barriers to implementation of interventions among providers in clinical settings (24). Malaria case management guidelines emphasize adherence (fidelity). Fidelity is the degree to which an intervention is implemented as prescribed in the original protocol (22,52). This is largely influenced by the quality of program delivery (20). Thus, the CFIR was used to identify barriers and facilitators that affect implementation fidelity of malaria case management guidelines in Malawi.

The five domains of CFIR were used to guide in the development of the interview guide provide the focus area to explore and to be used in analysing emerging themes into either barriers or facilitators to adherence to malaria case management guidelines.

The first domain is the intervention characteristics which comprise provider knowledge, attitude towards complexity, benefits, relative advantage and evidence source of malaria case management guidelines (52).

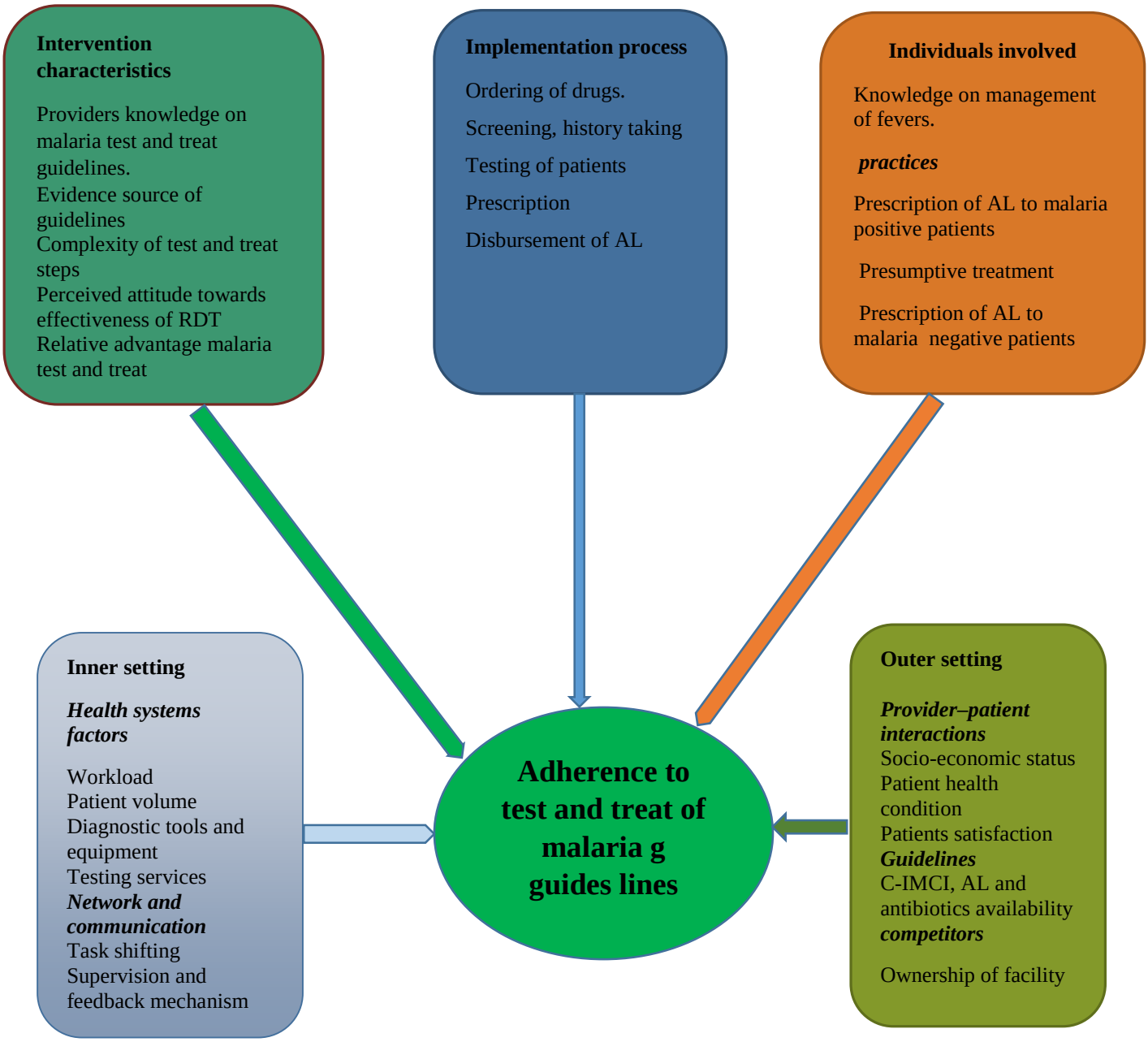
The second domain is the inner setting. This explores the implementation climate within the health facility including available resources, norms, values, teamwork and health system factors (52,53).
The third domain is the outer setting. This explores factors external to Bwaila Hospital including other national guidelines that affect adherence to malaria test and treatment (20,51).

The fourth domain comprises the characteristics of individuals implementing malaria case management guidelines at Bwaila Hospital. This consists of health providers' knowledge, beliefs, perceptions, attitudes, practices (21,53).

The fifth domain focuses on the implementation process that encompasses activities ranging from the identification of malaria suspected patients to treatment. This involves how providers plan, diagnose, test and treat patients and they evaluate and give feedback to the malaria control program (20).

Below is a figure illustrating the conceptual framework used to depict these domains and their relationship with adherence to malaria case management guidelines in Lilongwe District, Malawi. This is an adapted version of the original diagram (42)

Figure 1: CFIR conceptual framework (42).



CHAPTER THREE: METHODOLOGY

This chapter describes the research methodology which was used in undertaking the study. A descriptive qualitative design was used to gather an in-depth contextual understanding of health providers' experience in the management of complicated and uncomplicated malaria cases. A purposive sample was used. Data was collected through the application of semi-structured interviews. Data were analysed using a thematic content analysis technique through key qualitative research concepts, namely trustworthiness, credibility, conformability and transferability. Finally, ethical considerations were discussed.

3.1 Study design

This was a cross-sectional study using a descriptive qualitative approach to explore barriers and facilitators to adherence to malaria case management guidelines through a semi-structured interview guide. The approach helped health care providers to describe their experiences, attitudes, and feelings in own their terms and deeper understanding of barriers and facilitators that affect compliance to malaria test and treatment guidelines (54).

3.2 Study site

The study was conducted in Lilongwe district, the capital city of Malawi which is in the central region of the country (55). It has a catchment population of 1,637,583 in the rural area and 989,318 in the city (56).

Malaria is the major cause of morbidity for all ages and the leading cause of deaths among under-five children in Lilongwe (55). Malaria transmission is year-round in most areas and peaks during the rainy season from November to April (6). The incidence of malaria in Lilongwe is 306 per 1000 population and is one of the districts which has a high number of patients with suspected cases of malaria in the country (4). In Lilongwe, there are 46 public facilities, eleven Christian Health Association of Malawi (CHAM) facilities and 92 private clinics (55).

The first level of the district health system is the health post which includes community-based services delivered by HSAs (55). The next level comprises health centres, which are either public or non-public funded by non-governmental institutions, individuals or religious

organizations. The health centres are led by a clinical officer or medical assistant (55). The third level is the hospital which is generally led by a medical doctor or clinical officer, and is equipped with an outpatient clinic, maternity ward and may have functional laboratory services and provide uncomplicated malaria and severe malaria services (55). Malaria testing with mRDT and treatment with AL are free in both public and non-public facilities as the government provides test kits and drugs (8).

Specifically, the study was conducted at Bwaila Hospital which provides third level and second level health facility services. Bwaila Hospital is in the city of Lilongwe and it gets patients from the other health facilities apart from serving patients from its catchment population of 164,656. Bwaila has ten clinical officers, fifteen medical assistants, fifty-three community health workers popularly known as Health Surveillance Assistant (HSAs), four laboratory assistants, a hundred and eighteen nurse-midwives and seventeen registered nurses. Bwaila Hospital has an outpatient department which provides malaria services, and a family health department which provides malaria services for pregnant mothers (55).

3.3 Study population

The study participants were from Bwaila Hospital and were four medical assistants who have a certificate in clinical medicine, two clinical officers who have a diploma in clinical medicine, two registered nurses who have Bachelor of Science in Nursing and Midwifery and four HSAs who have a certificate in disease surveillance and control.

3.3.1 Inclusion criteria

Health providers that prescribe anti-malarial drugs were interviewed. Those that worked for a month on clinical assessment, diagnosis and treatment of malaria before the implementation of the study were interviewed**.**

3.3.2 Exclusion criteria

Health providers who were not present during the time of interviews and those who do not provide malaria services were not interviewed.

3.4 Sampling

Purposive sampling was used to identify participants. Purposive sampling is a form of sampling in which the selection of a sample is based on a judgement of the researcher as to which participants best fit the criteria of the study (54). Twelve participants were purposively sampled, two clinical officers, four medical assistants, two registered nurses and four HSAs whose job in the facility include diagnosis and treatment of malaria up until the saturation point was reached.

3.5 Data collection

3.5.1 Semi-structured in-depth interview guide

Data was collected from health providers through in-depth interviews using a semi-structured guide in English. In total, twelve in-depth interviews were conducted using a semi-structured interview guide which was developed using constructs from CFIR.

Semi-structured in-depth interviews of approximately forty-five minutes were audio recorded in a place that was agreed upon by the researcher and respondents. The interview guide was flexible with open-ended questions derived from constructs in the CFIR. The guide was chosen as an appropriate tool to enable participants to describe their experience in terms of malaria case management. The researcher and one research assistant collected data.

3.5.2 Pre-testing of the data collection tool

The tool for data collection was pre-tested at Kawale Health Centre which has similar characteristics to Bwaila Hospital. Pretesting was conducted to check for the sequencing, clarity, and whether some questions were repeated. The questions were asked in a manner so that the respondents could explain whether they agreed or disagreed with the internal consistency of the data collection tool.

Three in-depth interviews were administered to two medical assistants and one nurse. The pretesting allowed the researcher to practice interviewing techniques. The outcome of the pretesting exercise went on well such that no changes were made to the data collection tool.

3.5.3 Definition of adherence

Adherence was defined as the prescription of antimalarial drugs for parasitological confirmed malaria cases as stipulated in the malaria case management guidelines (8). Adherence means that all patients presenting with fever were tested for malaria. All confirmed cases of malaria were treated with anti-malarial drugs according to the severity of malaria. Those with uncomplicated malaria were treated with AL and those with complicated malaria were treated with injectable Artesunate and those with treatment failure to AL were treated with Amodiaquine (ASAQ). Any person with a negative malaria test result should not be given anti-malarial drugs but explore the other causes of fever (8). On the other hand, non-adherence was defined as a situation when there was no parasitological confirmation of malaria cases and the patients were prescribed antimalarial drugs or presumptive treatment and the health providers did not follow the national malaria treatment guidelines to treat the patient (8).

3.5.4 Data collection

Data collected was categorised as adherence or non-adherence based on the responses from the respondents largely based on their prior practices in managing patients with fever. Questions were asked to health providers with an intent to explore their knowledge, practices and experiences in the implementation of malaria test and treatment guidelines to assess their adherence to what the guidelines stipulate. Semi-structured in-depth interviews lasting for approximately 45 minutes were conducted and recorded by a voice recorder. Data collection was done through face to face interviews, observations and instant note-taking. This was essential because feelings and experience were explored through intensive dialogue with the respondents. The responses were used to evaluate their adherence to malaria case management guidelines.

To observe providers' practices and to elicit their interest in the discussion, the researcher followed them at their respective duty stations where data was collected. Probing questions were asked along the way to keep the conversation on track for the research topic to ensure accurate interpretation of the intended meaning. During data collection, respondents were at liberty to clarify their opinions and experiences in managing patients with fever. A deliberate effort was made to enable the interaction to be participatory and engaging. All the interviews were conducted in English and only a few expressions were in Chichewa as per the respondent's preference. Use of in-depth interviews in conducting this study gave the researcher a broader

perspective and understanding of the phenomena under investigation. During data collection and management measures were instituted to ensure trustworthiness.

3.5.5 Data quality

To ensure data quality, the researcher and the research assistant were trained on the study objectives and data collection tools before the commencement of fieldwork. As highlighted in the foregoing, the data collection tool was pretested and reviewed for final fieldwork. The audio-recorded interviews were played back at the end of each field day to listen to the recordings and improve on weak areas during the next interviews. The guides were revised for further probing based on previous interviews.

3.5.6 Reflexivity

Within the context of the study, the team considered how their interaction with respondents might have influenced results by their professional background, experience and prior assumptions (12). The study considered that the professional background of the research team could have affected the respondent's willingness to express their experience and how this knowledge might have framed what was said. The researcher and the assistant informed respondents that they were non-clinical staff. Interviews were conducted at the respondents' duty station and they were the lead in setting the pace of the interview as the researchers were guests. At the beginning of each interview, researchers established a working rapport with the respondents. All interviews were done at a time that was convenient for the respondents. Researchers assured the respondents that the interview would be conducted within 45 minutes.

3.5.7 Trustworthiness

During data collection and management, measures were put in place to ensure trustworthiness (57). The study was conducted based on the scientific rigour criteria used in qualitative methodology for data collection, management and analysis. Data collection was conducted in a precise, consistent and exhaustive manner through audio recording and note-taking. The study explicitly explained the methods of analysis with enough details to enable the readers to determine whether the process was credible. Four criteria that were used to ensure and enhance rigour in qualitative research were credibility, confirmability, dependability and transferability (57).

3.5.8.1 Credibility

Credibility was achieved using prolonged engagement with respondents at their duty stations. During data collection, the respondents became acquainted with the researcher. The researcher also had an opportunity to observe the interaction between patients and health providers. Direct quotes from the respondents were recorded and reported so that interested people could determine whether the findings could apply to other similar contexts (57).

3.5.8.2 Transferability

In this study, the researcher thoroughly described the research context, respondents' characteristics and steps that were taken during research design, data collection, analysis and interpretation to ensure transferability of data.

3.5.8.3 Dependability

Raw data and description of how data was collected and analysed is kept safe in Cloud by the researcher. Every person can request and review the data to appreciate the research processes that were employed during research.

3.5.8.4 Confirmability

The researcher ensured that audio-recorded data, references used, and field notes were kept for peer review and checked to validate how the findings were achieved**.** The findings are based on the responses from respondents and not the personal opinions of the research team.

3.6.0 Inquiry

The inquiry included;

3.6.1 Individuals involved: provider's demographic characteristics, experience, knowledge, practices and attitudes towards malaria test and treatment guidelines.

3.6.2 Inner setting: health facility communication, teamwork, resources, norms and values, supervision, and feedback received on malaria test and treatment guidelines.

3.6.3 Intervention characteristics: perception of health providers on complexity, relative advantage and evidence of the source of the guideline.

3.6.4 Implementation processes: steps taken from the identification of patients up to treatment.

3.6.5 Outer setting: interaction between providers and patients including patients' satisfaction, preferences and ownership of the facility.

3.7 Data transcription and analysis

3.7.1 Data transcription

Each interview was audio-recorded with a digital voice recorder. The audio-recorded interviews were extracted from the recorder to a password-protected computer. All digital recordings were transcribed verbatim in English by two professional transcribers. The researcher and the research assistant re-listened to the audios to ensure that there was no missing information in the typed transcriptions**.**

3.7.2 Data Analysis

The purpose of data analysis was to organise, provide structure and to elicit meaning from the data collected (12). Data analysis started concurrently with data collection. Audio recorded data were transcribed verbatim in English. The data that was collected was in text form from narrative interviews and interpretations of the feelings. Five steps were used to analyse the data as listed below:

3.7.2.1 Familiarization

The researchers and research assistant re-listened to the audios to sensitise themselves to data so that the researchers understand respondents' differences. The researcher, supervisor and research assistant then made a summarised matrix of codes of each interview in an excel document.

3.7.2.2 Coding and indexing

The research team grouped a list of common codes from the transcriptions to give the expression of repeating voices across participants which identified common codes in the transcriptions provided for analysis (57). Data were coded first by hand by the researcher, supervisor and research assistant and agreed on coding definitions. A codebook was developed, and it was then used to mark for all transcriptions.

3.7.2.3 Categorizing codes and concepts

In this study, the marked units (codes) were grouped according to their similarities and differences. The grouping and regrouping of similar and dissimilar units made the researcher come up with categories from grouped units of data. The categories enabled the research team

to identify the meaning underlined in these categories to come up with themes and sub-themes which were presented as findings of the study.

3.7.2.4 Charting

Data were organised according to the CFIR constructs, developed themes and subthemes and other themes that were emerging from data.

3.7.2.5 Mapping and interpretation

Data were analysed according to the relationship of the concepts for all the themes and explored how each of the themes related to each other and added quotes from the data to support the themes.

3.8 Ethical considerations

Ethical approval was obtained before the commencement of the study from the Human Research Ethics Committee (HREC) of the University of the Witwatersrand and the Malawi National Health Sciences Research Committee (NHSRC). Administrative permission was obtained from the Lilongwe District Health Office.

Consent was sought from the respondents by explaining to them the purpose of the study, benefits, and risks. No names were written down to ensure the confidentiality of the information given. Written and informed consent was sought from the participants. Participants were told the purpose, method of data collection, duration, risks, and benefits of the study. They were assured of voluntary participation, privacy, confidentiality, and freedom to withdraw from participation in the study. Finally, respondents were asked to sign a consent form. The records of this study would be kept strictly confidential. Unique identifiers were used to save the audio files and kept in a password-protected computer. Participants were not identified in any published work or report. Views of all participants were summarized. Any information obtained during this study was stored and analysed for this study only.

3.9 Dissemination of results

The results will be disseminated to the NMCP, Health Management Team of Lilongwe District Health Office, health workers from Bwaila Hospital, Global Fund who provide technical and

financial resources for malaria control, WHO country office which ensures health providers comply with malaria quality management standards, and Witwatersrand Public Health School.

CHAPTER FOUR: RESULTS

This chapter presents the findings of the study whose aim was to explore barriers and facilitators to adherence to test and treat of malaria case management guidelines by health providers in Lilongwe District, Malawi in 2020. Demographic characteristics of participants were presented. The experiences are presented in detailed themes that emerged from the data analysis. These themes were placed within the context of the virtually phenomenon understudy. These results also include direct quotations expressed by participants to illustrate important points from their experiences**.**

4.1 Demographic characteristics

Twelve health providers from Bwaila Hospital participated in this study. The demographic variables studied for respondents were sex, age group, profession and experience in the clinical management of fevers. There were four females and eight males. One clinical officer was an intern in his final year in clinical medicine.

Table 1 below show frequency distribution of the demographic characteristics of respondents

Table 1: Frequency percentage of sex, age, profession and experience of the respondents

Variable	**Female (n=4), (n=33.33%)**	**Male (n=8), (n=66.67%)**
Age group		
26-30	1 (8.33%)	2 (16.67%)
31-35	1 (8.33%)	1 (8.33%)
36-40	3 (25%)	1 (8.33%)
40+	1 (8.33%)	2 (16.67%)
Profession		
Clinical officers	0 (0%)	2 (16.67%)
Medical Assistants	1 (8.33%)	3 (25%)
Health Surveillance Assistants	2 (16.67%)	2 (16.67%)
Nurse midwife	1 (8.33%)	1 (8.33%)
Experience(years)		
1-5yrs	0 (0%)	4(33.33%)
6-10yrs	2 (16.67%)	2 (16.67%)
11-15yrs	1 (8.33%)	0 (0%)
16+	1 (8.33%)	2 (16.67%)

The demographic variables studied for respondents were sex, age group, profession and experience in the clinical management of fever.

The age range of respondents was from 26 to 46. Most of the respondents' age range was 36 to 40 years, (n=4) 33.33% followed by 25% (n=3) for each range who were between 26-30 years or 40 plus. Only 16.67% (n=2) respondents were between the age of 30-35 years.

On profession, 33.33% (n=4) were medical assistants or Health Surveillance Assistants; 16.67% (n=2) were clinical officers or nurse-midwives. In addition, 33.33% (n=4) of the respondents had 6 to 10 years or 1 to 5 years of experience, 25% (n=3) had 16 plus years of experience and 8.33% (n=) had 11 to 15 years of experience in malaria case management**.** The years of experience in the management of malaria cases and fever ranged from one year to twenty-four years.

Medical assistants have a certificate in clinical medicine while clinical officers have a diploma in clinical medicine. All nurses had a bachelor's degree in nursing and midwifery. HSAs went for twelve weeks training on disease control and surveillance, and two-week training on C-IMCI. The HSAs managed malaria cases among under-five children in hard to reach areas, far from the health facilities. They do not manage any case above five years.

4.2 Qualitative findings

Results are presented according to the five domains of the CFIR. When there are specificities to an area, they are explained in the narrative. Ten main themes emerged from the interviews and are described in table 2 below.

Table 2: Emerging Themes, CFIR Constructs and Study Objectives

CFIR Constructs	Themes	Study Objectives
Intervention characteristics- Provider perception of complexity and relative advantage of the guidelines	**1. Knowledge of malaria test and treat guidelines.** **2. Evidence source of guidelines** **3. Perceptions of providers on the intervention** o Quality and strength of evidence o The complexity of the test and treat steps o Perceived attitude towards effectiveness of RDT o The relative advantage of RDTs and anti-malaria drugs	Objectives 1 & 2
Implementation process- steps involved in the management of fever cases	**4. Steps in management of malaria cases** o Ordering of drugs. o Testing of patients o Disbursement of AL	Objective 1 &2
Individuals involved – Health provider, knowledge and practices in the management of fevers	**5. Knowledge of the management of fevers.** **6. Prescription practices** o Presumptive treatment o Prescribe AL to malaria negative patients o Prescribe Artesunate Amodiaquine (ASAQ) to uncomplicated malaria patients o Prescribe antibiotics to negative malaria patients. o No antimalarial drugs were given to malaria negative patients. o Prescribed injectable Artesunate to complicated malaria patients	Objectives 1 Objective 2
Inner setting: Health systems factors and availability of resources **Network and communication**	**7. Health system factors** o Workload o Patient volume o Diagnostic tools and equipment o Testing services **8. Network and communication** o Task shifting o Supervision and feedback mechanism	Objectives 1 & 2
Outer setting – Provider–patient interactions **Guidelines that support the implementation** **Peer pressure- competitors**	**9. Patient-provider interactions** o Patient education o Patient economic status o Health condition of the patient o Patient satisfaction. **10. Guidelines** o C-IMCI, AL and antibiotics availability **11. Competitors** o Ownership of facility	Objective 1 Objective 2

4.3 Intervention characteristics

This construct explains the health providers' perception of complexity and the relative advantage of the malaria test and treatment guidelines. These include providers' knowledge, evidence source of the guidelines, and advantages and complexity of the guidelines.

4.3.1 Knowledge of malaria test and treat guidelines

Respondents stated that they were informed of malaria test and treatment guidelines through malaria case management training, and a refresher training on malaria case management that were organized to facilitate their adherence to malaria test and treatment guidelines.

"*I went for refresher training on malaria test and treat in 2018, at Kamuzu College of Nursing, mmmm actually what I know is when you have identified complicated malaria case you have to treat with Artesunate Amodiaquine (ASAQ) and for uncomplicated malaria cases, we have to treat with AL. So far the basic information that I have now". (*Male respondent five)

Respondents reported that they were trained on malaria test and treatment guidelines during the C-IMCI training. They reported that the guidelines stipulated that all uncomplicated malaria suspects had to be tested for malaria using mRDTs and only those with malaria positive results should be given AL for uncomplicated malaria. Patients with malaria negative results should not be given anti-malaria drugs but explore other causes of fever or refer them to a health facility.

"I went for C-IMCI training in 2012 where we were told that when a child has fever, then we should test for malaria using mRDTs if the test comes out positive we should give AL, if negative we just have to advise the mother to go to a health facility immediately when the condition is not improving". (Male respondent 3)

The respondents also reported that they were informed of malaria test and treatment guidelines while in college and through reading a handbook on Malawi standard treatment guidelines. They said the guidelines stipulated that they should not prescribe anti-malarial drugs to patients with malaria negative results even if the patients were showing signs and symptoms like those of malaria.

"I got this information from school, and from the internship as well as … a handbook on Malawi standard treatment guidelines. With the malaria test and treat, we are not supposed to give

antimalarial drugs even if the patient is presenting the signs and symptoms of malaria we should not prescribe presumptively or when mRDT is negative". (Male respondent 7)

The respondents reported that for complicated malaria they are supposed to do malaria parasite check using microscopy and when the results are positive, they are supposed to give Amodiaquine Artesunate (ASAQ).

*"I got malaria test and treat information from … college, I have a soft copy of guidelines and it says that those who do have convulsions, vomiting and other things, … we suggest … doing malaria parasite check because it is complicated malaria, if it is positive we start them with ASAQ". (*Male respondent 8)

Respondents reported that they acquired knowledge on how to screen patients with fever, testing for malaria and prescription of ant-malaria drugs from attending training and reading guidelines.

"The malaria test and treat training was about, uncomplicated malaria signs and symptoms which were fever, vomiting, joint pains and malaise, and with such cases, we should do the test using mRDT, and if positive treat with AL, for complicated malaria signs and symptoms were convulsions, anaemia, vomiting, high fever, and they test with microscopy to check malaria parasite and treat with ASAQ. Patients with a negative malaria test should not be given AL". (Female respondent 10)

4.3.2 Evidence source of the guidelines

Other respondents reported that the C-IMCI guidelines were developed by the United Nations Children's Funds (UNICEF) and the government of Malawi.

"*I think it was UNICEF through the government that designed it so that we can be using it. The sick recording form guides us in investigating … causes of fever and we cannot miss anything*". (Female respondent 4)

Respondents also said that the malaria test and treatment guidelines were developed by the NMCP and WHO, but they were not consulted during development and some aspects of the guideline were not practical in their settings.

"I think NMCP and WHO developed the guidelines, but we were not consulted during development and some aspects of the guidelines are not practical especially when the mRDT is negative". (Male respondent six)

4.3.4 Quality and strength of evidence

Other respondents said that the guidelines were not practical as they did not address the issue of patient condition and clinical judgement. The malaria test and treatment guidelines did not allow clinicians to make a clinical judgement which is against their professional.

"I *was not consulted, and I didn't hear anywhere in the practice that NMCP people came for feedback on the management of fever. I just heard that the standard treatment guidelines will be released next year, so when it was released, we just received it from District Medical Officer that is why we still have implementation challenges as the current guidelines did not address the challenges*". (Male respondent six)

4.3.5 Complexity of test and treat steps

Other respondents said that malaria test and treatment guidelines were difficult to implement as one had to follow many steps, so it was boring to the patient as well as to the provider.

"*Yes, it is difficult to implement, because we see a lot of patients, it takes time, coming to the consultation room and mRDT room, and even mothers complain a lot that they are being sent back and forth though at the end of the day they get right treatmen*t". (Male respondent ten)

"*There is a lot of documentation in malaria test and treat; We have mRDTs registers in RDTS room, AL registers in the pharmacy and the data clerk registers every patient in the outpatient so it is not easy to follow every step*". (Male respondent six)

Respondents implementing C-IMCI complained that the steps they had to perform in management of fever were tedious and that delayed treatment of patients.

"*It is not easy because I do everything by myself, the first thing is observing the child with caution then mRDT follows I test the child and wait for results then I write prescriptions*". (Female respondent four)

4.3.6 Attitude towards the effectiveness of mRDT

4.3.6.1 Facilitators to adherence to malaria test and treatment guidelines.

Respondents said that facilitators to their compliance to malaria test and treat guidelines included that mRDTs were effective in detecting malaria cases and their work was simplified as they could treat what the patient was suffering from.

"*mRDT is the best diagnosis for malaria and it is easy to know whether this one has malaria or not". (*Male respondent nine)

Other respondents said that mRDTs are very effective and efficient in detecting malaria and that AL is an effective drug to treat malaria.

"*I repeat mRDTs when am not convinced with the results and send the same patient to the lab for malaria parasite check, all times it comes out negative confirming that the patient did not have malaria but for my case, AL which is the first-line drug is effective, for Artesunate for the second-line drug is also effective". (*Male respondent nine)

4.3.6.2 Barriers to adherence to malaria test and treat

Respondents revealed the barriers to adherence to malaria test and treatment were that the mRDTs were not effective to detect malaria in most of the cases and sometimes they were prompted to presumptively treat patients or give antimalarial drugs to patients who tested negative for malaria.

"*MRDTs are not reliable, sometimes a child comes with high fever, shivering and vomiting yellowish vomit but when tested it shows negative, so I just give the mother advice. I had a similar case, it was Monday and I told the mother that if the condition does not improve she should come back on Friday. She came back so I tested the child again this time the mRDT showed positive but with a faint line so I questioned myself, the same child came on Monday with same signs and symptoms and was found negative and today it shows positive with a faint line which means that the child had malaria but I sent him back because mRDT showed negative that time, so I can say not all mRDTs find patients positive right away*". (Female respondent four)

Other respondents also reported that the mRDTs are fifty-fifty as sometimes they do detect malaria cases but some other time they miss malaria cases, and when the providers were convinced that it is malaria, they ordered microscopy for malaria parasite check, so most of the times the results were positive even if the mRDT was negative.

"M*ost of the times mRDT does not detect when the infection is so high, it detects antibodies not necessary the presence of the parasites, now if there are antibodies or infection is so high, the antibodies are low as a result it fails to detect antibodies and the result will become negative*

*and yet somebody is suffering from malaria and it affects me because now I do prescribe a drug which is unnecessary to the patient***".** (Male respondent seven)

4.3.7 Relative advantage of mRDTs and anti-malaria drugs

For the drugs like AL and ASAQ, respondents reported that they were very effective though some patients had not been cured with AL and in such cases, they were regarded as treatment failure**.**

"*I had a patient who got antimalarial treatment AL for 3 months consecutively 3 times and that mRDTs were still positive, and I was stranded on what to do because he has been taking antimalarial drugs. And according to history, the patient said he uses mosquito net. So, I had to consult my colleagues that's when we decided to prescribe that patients second-line drugs,* ASAQ". (Male respondent six)

4.4 Implementation processes

The processes in the management of fever patients were; ordering of drugs, screening, testing and disbursement of AL.

4.4.1 Ordering of drugs.

Respondents reported that for inward patients, drugs were ordered per patient based on their file and that delayed treatment as it was tedious to be ordering drugs per patient admitted.

"*Drugs are ordered according to the patient admitted and they use the inpatient admission file for each patient for the ordering of the malaria drugs. At times you have cases who come at night and then also test malaria positive and is at night, the patient will get the treatment in the morning if the health provider cannot borrow from other patients*". (Male respondent eleven)

Respondents said that for out-patients' drugs were ordered based on previous consumptions and that sometimes patients were sent back without treatment as the ordering of drugs were done on Mondays, Wednesdays and Fridays.

"*It is hard, the problem is the pharmacy, we have three days in a week to make orders, Monday, Wednesday and Friday. It is not daily, so when I order 500 mRDTs for outreach clinics, the patients will come like 700. So, others will be treated as sepsis since we cannot prescribe AL as it is a protected drug*". (Male respondent nine)

4.4.2 Testing of patients

Some respondents reported that sometimes testing services were not readily available especially during the night and weekends and that hindered them from complying with the test and treatment guidelines.

*"If we suspect a patient has malaria and is presenting signs and symptoms but there is no way to test the patient then we start malaria treatment and when the mRDT or lab is open we test the patient, if malaria positive we continue the treatment if not we stop. That treatment is given to cover the patient of any illness. So, in terms of testing, I still work with what I have of course it is a challenge and painful to see a patient going back without being tested". (*Male respondent eleven)

Respondents also said that sometimes mRDTs had some technical faults and could not give quality results.

*"Results are like we have maybe mechanical errors, you fail to read, to give a clear picture whether the patient has malaria or not you may take the sample and put on mRDT device sometimes it fails to read, it does not give a clear picture on whether a patient has malaria or not so sometimes is difficult and to avoid delaying we just treat using clinical judgement". (*Male respondent eight).

4.4.3 Disbursement of AL

Respondents reported that the facilitator to comply with malaria test and treatment guidelines was the AL disbursement policy as it was a protected drug and that pharmacy personnel had to check that one getting AL had mRDT positive results, and no patient with mRDT negative result was given AL but for ASAQ the pharmacy personnel do not need malaria test results.

"So, with malaria, you still have problems with the pharmacy personnel, they will say no, we have been told that when mRDT is negative you should not prescribe anti-malaria drugs. That one has compromised the practice according to me as we prescribe ASAQ to cover that patient from malaria if we suspect malaria". (Male respondent five)

Another facilitator was malaria mRDT negative results, as respondents gave antibiotics to patients that had negative results as the pharmacy personnel could not allow giving AL to patients with mRDT negative results.

"When the mRDT is negative then it becomes a dilemma for me because I cannot send the patient for microscopy as it is not in the protocol obviously lab personnel will turn them back

and I can't prescribe AL as pharmacy guys will say the result is negative. In that situation, I normally treat them as septicaemia and *prescribe antibiotics although clinically I know it is malaria, it is pathetic". (Male respondent seven*)

The respondents said that the pharmacy office was closed during the night and that patients with malaria were asked to come the following day to collect drugs and that delayed commencement of treatment.

"*If you have a patient with positive results during the night, you just give the start dose or two-doses because they do not open the pharmacy at night or during weekends, the patient has to come to collect their full dose the following day. Other patients do not come maybe they buy drugs". (Male respondent nine)*

4.5 Individuals involved

This construct explains the health provider knowledge and practices of the management of fever and malaria

4.5.1 Knowledge on the management of fevers

Respondents reported that the physical assessment was used to categorise malaria fever into complicated and uncomplicated malaria. Complicated malaria had signs and symptoms of vomiting, weakness, malaise and convulsions. With these symptoms and signs, health providers treated patients presumptively with ASAQ.

"*If the patients have high fever, convulsions, not eating, anaemia and are very sleepy then, the child's condition is critical, we do not test, we just give the child Artesunate and refer the child to the Health facility". (Female respondent two*)

Respondents reported that positive mRDT influenced adherence to malaria test and treatment as patients that had fever, headache, joint body pains but were strong were treated as uncomplicated malaria and they had to do mRDT and when positive they were treated with AL.

"*Vomiting but most times with fever we asked for how many days the child had fever and when it was three or more days, we do mRDT, if positive we surely give the child AL". (Male respondent one*).

Respondents revealed that barriers to compliance to malaria test and treatment was when they had patients with negative malaria results, as they were categorised as having non- malaria fever and mostly they were treated with antibiotics or anti-malarial drugs depending on clinical judgement of the health provider.

*"When a patient complains of vomiting, joint pains, malaise we do mRDT if it is negative, we prescribe Artesunate, that prescription is only as a start dose and continues with AL". (*Male respondent nine)

"*For non- malaria fever we do for bull Blood Count (FBC), order FBC, to identify the cause, sometimes they give us a clue maybe sepsis or other possible causes, we also need to culture to identify what is causing the infection, but currently it is not available. I can say so and it takes days for culture results to be out. So now I give crystapen and gentamicin and sometimes I give Amoxicillin and co-trimoxazole".* (*Male respondent eight*)

Respondents reported that another barrier was that treatment of non-malaria fever was on a trial basis as they had limited knowledge and equipment to diagnose and treat such fever.

"In a situation where the mRDT result is negative, I still treat for sepsis, and if sepsis fails we still look for other conditions if still, fever is persistent we try typhoid, but if still, it is not working, we do the test but it is still negative but if I feel that if I give AL the patient will improve, we do prescribe Artesunate or AL because we have tried antibiotics but are not working". (Male respondent eight)

4.5.2 Barriers for prescribing practices

4.5.2.1 Presumptive treatment

Respondents reported that they treated presumptively those patients that were very ill especially children under five to avoid the development of complicated malaria.

"*So I give antimalarial drugs to patients who are very ill without waiting for results because I have seen patients developing severe malaria, they convulse on the line while waiting for mRDT results; that affects the management, they came with uncomplicated malaria but while waiting for mRDT results they fall and convulse, so you see".* (*male respondent eight)*

4.5.2.2 Prescribe AL to malaria negative patients

Other respondents said that they prescribed anti-malarial drugs to patients that had mRDT negative results but clinically they were convinced that it was malaria although the malaria test and treat guidelines do not allow them to do so.

"Yaa it happens sometimes but it is a tie, it becomes challenging because even if I base on my best clinical judgement I think this is malaria, considering that I have ruled out other possible causes of fever but malaria test comes out negative, I prescribe AL, but pharmacy personnel would not disburse AL, they can't justify disbursing AL to somebody who is malaria negative because AL disbursed will not tally with malaria positives at the lab. Aaaaa in such scenarios, I usually go to the pharmacy personnel to justify my clinical diagnosis, and they say if the auditors come to audit for AL consumption just call me I will defend myself on my prescriptions that's how it goes because there are no guidelines or proper channels that would say that if you are strongly suspecting a particular patient with malaria you can still give AL eeee there is nothing like that". (Male respondent six)

4.5.2.3 Prescribe ASAQ to uncomplicated malaria patients

Some respondents said that they prescribe ASAQ to patients with uncomplicated malaria but mRDT is negative since they clinically think that the patient had malaria. Providers cannot prescribe AL as it is a protected drug by the pharmacists, but ASAQ for complicated malaria do not require malaria test results.

"*I have to confirm uncomplicated malaria, so I have to run mRDTs if negative but clinically I feel is uncomplicated malaria cases I treat with Artesunate Amodiaquine (ASAQ) and the like sometimes I treat with quinine". (Male respondent five*)

4.5.3 Facilitators to prescription practices

4.5.3.1 Prescribe antibiotics to negative malaria patients

Some respondents said that those patients with negative mRDT results were not given anti-malaria drugs but antibiotics as they assumed it was sepsis.

"Patients with malaria negative results but have fevers, we just think of sepsis, and we send the child home with antibiotics, sometimes we refer the patient to Kamuzu Central Hospital (KCH)". (Female respondent ten)

4.5.3.2 Prescribe injectable Artesunate to patients with complicated malaria

Some respondents reported that they give *injectable Artesunate* when a patient is vomiting, anaemic, has convulsions and high fever.

"*We give Artesunate when the child has a high fever, is convulsing, anaemic and vomiting, and refer him or her to the hospital*". (*Male respondent two*)

4.5.3.4 Prescribe AL to patients with mRDT positive results

The facilitator to prescribing practices was that C-IMCI guidelines do not allow the health providers to prescribe AL to patients that have malaria negative results. Respondents reported that they give AL to patients with malaria positive results as they were told during C-IMCI training.

"If it's not malaria we cannot give AL, so this test and treatment method should not stop it should go on, because when we give medication we are confident that if something happens and we are taken to court we can justify ourselves with the mRDT results as proof, but just giving a child medication, if the child faints or losses consciousness it would be hard to explain especially if the child dies". (*Male respondent one*)

4.6 Inner setting

For this current study, these were health facility factors that affect adherence to "test and treat" of malaria. These include workload, patient volume, diagnostic tools and equipment, and task shifting**.**

4.6.1 Workload

Respondents reported that barriers to compliance with test and treatment guidelines were that there was one health provider to assess the patient, test, prescribe and disburse the drugs when they were conducting C-IMCI clinics, outreach clinics, during the night and on Sundays.

"It is too much I don't know what the one who started C-IMCI was thinking when he or she decided that assessment, testing, prescription and disbursement of drugs should be done by one person while the same work at a health facility is done by many people…" (Male respondent three)

"I do all the activities alone on Sunday and at outreach clinics, on average I see 70 patients. So, I work alone, so sometimes it shoots to 100. I do test with mRDT, after mRDT results, I have to record in a register, then prescribe, then when dispersing AL, I have to enter the details in the AL register as it is a very protected drug in Malawi". (Male respondent nine)

Respondents also said that with the malaria test and treat, patients with malaria negative results are reviewed now and again when the condition is not improving, that has increased their workload.

"Possibly yes, because mmmm those patients with malaria negative results you have to review them again and again, unfortunately, we do not have a short stay room so you are worried if it will go to severe form of malaria so you have to advise them to come back for a check-up again whether it is malaria or not. So that has contributed to increased workload". (Male respondent eight)

4.6.2 Patient volume

Other respondents reported that large numbers of patients per day could not allow them to follow all the steps for malaria test and treat. Other steps were not done as stipulated in the guidelines. Respondents said that on average a provider would see eighty to one hundred patients per day and thus they were overwhelmed and tired. In this case, some steps outlined in the guidelines were skipped.

"*Today we have seen over 200 close to 300 but it is a holiday. Only one person is running the mRDTs, so we send over 100 people and he uses a conveyor belt system to run the tests and cannot wait for five minutes, the results will normally be negative since we want to assist all patients, we just use clinical judgement to prescribe the drugs*". *(Male respondent five)*

4.6.2.1 Distance between health facilities

Another barrier was the distance between health facilities. The respondents reported that the health providers were enough if they were to cover people from their catchment area only, but some people came from very far places to get the services at Bwaila Hospital. Health facilities were very far from each other. As such, they had to assist many patients with limited resources.

"*Coverage of health facilities is a challenge, we see patients coming very far from this hospital because in this department we are 8 in total and to me, we are enough. Like Likuni, Area 36*

were supposed to have their clinics, so patients come from very far places" *(Male respondent five)*

Respondents who were conducting C-IMCI clinics also reported that since other HSAs were not conducting these clinics, they always had a lot of children coming from very far villages to get medical care.

"*So, people from other catchment areas come to my village clinic so I cannot send them back, that would be inappropriate*". *(Male respondent three)*

4.6.3 Diagnostic tools and equipment

Respondents reported that barriers to adherence to malaria test and treatment guidelines were that diagnostic tools were limited.

"*For mRDTs and drugs yes, they are available most of the times but for microscopy is a challenge, I do not know the problem, maybe the lab personnel are not proactive or the supplies for microscopy are not available. (Male respondent six)*

Respondents reported that the other barrier was that the laboratory would conduct other tests to check what was causing non-malaria fever, but it could take time and that would affect the health condition of the patient.

"*Basically what we do is we do FBC, order FBC, to identify the cause, sometimes they give us a clue maybe sepsis or other possible causes, we also need to culture to identify what is causing the infection, but currently culture sensitivity test is not available I can say so it takes days for culture results to be out"*. *(Male respondent eight)*

"so, as you know with limited resources, we do use mRDTs that are out of date, and cannot give quality results". (Male respondent seven)

4.6.4 Testing services

The respondent said that sometimes testing services were not available during the night and weekends as such patients were treated presumptively.

"Rarely test and treat is there but then sometimes we come across a patient showing malaria symptoms but then at that time, there are no lab tests done still more at least you need to cover that patient with malaria treatment, whenever we come across lab or rapid test we do the test

because we cannot just say I can't. We start with the malaria treatment and then test later; I feel that patient health is a priority than the test". (Male respondent eleven)

Other respondents complained that for uncomplicated malaria the laboratory personnel could not do malaria parasite check, as the supplies were for complicated malaria cases only.
"*You order for microscopy malaria parasite check when you suspect complicated malaria, then it becomes a dilemma for me because I cannot send the patient with uncomplicated malaria for microscopy as it is not in the protocol, lab personnel will turn them back. In that situation, we normally treat them as septicaemia*". *(Male respondent seven)*

4.6.5 Task shifting

Respondents reported that task shifting of laboratory services to HSAs was another barrier. This is so because mRDTs which were done by HSAs gave poor quality results as they had little knowledge of laboratory techniques.
"*Yes because you can send a patient for mRDTs but after two minutes the results are out, and you ask this is so quick, and the patient will be amazed that I also wonder if the turn- around time has been followed. So, if that one can come tomorrow and you run the test, it turns out to be positive*". *(Male respondent six*

"*We have some problems with the personalities, the person doing mRDTs. Because sometimes they open 20 or 50 mRDTs at once, and I think it affects the potency of the test. Sometimes they do not wait for the turn- around time of 15-to 20 minutes. Those HSAs can't wait for that long. Sometimes they can run mRDTs and report that mRDT is negative and when you are suspicious, and you rerun the test the same time it turns out to be positive. They discard the test before the turn -around time. Sometimes we have seen the test turning positive in the waste bin, it happens here". (Male respondent five*)

Another facilitator to compliance with malaria test and treat guidelines was when the laboratory personnel performed the mRDTs and malaria parasite check.
"*Yes, the quality will be good, the laboratory personnel understand things, because sometimes I have gone with a patient to the laboratory, but you have to wait for 15 minutes, they say it is showing negative, but we have to wait for 10 to 15 minutes that's the only way we can be sure that it is negative*". *(Male respondent five)*

4.6.6 Supervision and feedback mechanism

Respondents said that another barrier to compliance to malaria test and treatment guidelines was that NMCP and malaria coordinators were not conducting regular supervision and feedback meetings to share with the health providers on what is practically happening on the management of fever. In this case, most of their challenges were not addressed and they continued to do what they know will help their patients.

"*I remember we complained that the HSAs who were doing mRDTs were not giving quality re*sults, *so we had a meeting and discussed as a clinical team and we agreed that they should be briefed on how mRDTs work and that the in-charge of the paediatric department should be observing them. All HSAs who do run mRDTs were briefed that they should wait for at least ten minutes and I have seen the in-charge observing them, but still, the turn-around time is not followed". (Male respondent five)*

Respondents said that no review meetings were taking place to solve the challenges they were facing when managing patients with fever.

"*No, no review meeting has ever happened, so now they don't call us to hear about problems we are facing on the ground, there is no mentorship or nothing of that sort. I know we are dealing with people's lives and we need to be updated on new mRDTs and new developments and resolve our challenges. You cannot say you know everything when it comes to dealing with people's lives, we need to be updated and mentored from time to time because we may get too confident and mistreat children. (Female respondent two)*

4.7 Outer setting

The factors were health provider and patient interaction, facility ownership and other guidelines that influence the implementation of the malaria test and treatment guidelines.

4.7.1 Patient education

Other respondents reported that patients' education was a barrier to adherence to malaria test and treatment guidelines. Respondents reported that those that were not educated had difficulties understanding the causes of fever and hence they could not adhere to the guidelines for testing and treatment of malaria.

"So those that are not educated enough it becomes a challenge when it comes to informing them that the child has no malaria and even when giving medication, they will give the child

the drugs for two days and will come back and say the child is not improving when you ask them how they were giving the drugs, they will say they have given the drugs for two days while I told them to give them for three". (Male respondent seven*)*

Other respondents reported that they could not adhere to malaria test and treatment guidelines when they encountered knowledgeable patients who were giving them a tough time to manage, as they were inquisitive about tests and treatment. They would ask for another test and to convince them not to conduct another test was a challenge.

"*Yes some patients who regard themselves as knowledgeable come as a health worker with their diagnosis in their head depending on how they feel so in most cases they are not satisfied with the treatment we give them because they want a different treatment that they think is right for them so they love to dictate how we should treat them and it becomes difficult because they always think they have been undertreated"*. (*Male respondent eleven*)

4.7.2 Patient economic status

Economic status was one of the barriers to comply with test and treatment of malaria. Respondents said that the economic status of patients made them have access to cash and would force the health provider to prescribe some drugs for them to buy if they failed to get the drugs from the government pharmacy.

"*Well to do people are the most difficult to treat because they have the internet and some little health knowledge, so they come thinking they know more than what I know. They ask me to prescribe drugs so that they can buy". (Male respondent eleven*)

"*One woman even told me that even though her child is always found negative when she buys AL and gives it to her, she gets better, despite the negative malaria result*". (*Female* respondent four)

Respondents reported that they could not adhere to test and treatment guidelines if patients tested negative. Patients who tested negative were advised to come to be retested. These patients could afford to buy medicine from drug stores without being retested. Other patients who could not afford to buy drugs from drug stores came back with complicated malaria.

"*If I ask them to come back some of them do not come back because they can buy the drugs from the drug store, or they may go to a private clinic. Those that cannot afford to buy, actually they come back when they are very ill and those are the patients that will test positive and since*

we do not have the second-line drugs most of the time and they cannot afford to buy so I still prescribe AL". (Male respondent five)

"Those that have money and are illiterate go to a private clinic where the treatment sometimes is questionable". (Male respondent nine)

4.7.3 Patient satisfaction

Respondents reported they did not adhere to test and treat if they wanted to satisfy the patient to be given what s/he wants. The health provider would ask the patients several questions to establish the cause of their illness. They could listen attentively and request for tests. When the results were out, they would tell them the results and give them several options on available drugs to treat their infection and other drugs that were out of stock.

"*Actually what I do these days when a patient comes I will give them the full platform to explain what they feel like they are suffering from, they exhaust everything then after exhausting everything, so I would say do you have any other issues about your illness other than what you have already said to make sure that the patient has exhausted everything. From that stage, I do the necessary investigations. During my prescriptions I will tell them that you do not have malaria, you have such infections. So if I prescribe will be able to buy from private pharmacies I do the prescription and they go, some will say don't worry prescribe, I will buy from private pharmacies some will say that I will not be able to buy, but I will lobby money from home and I will see what to do with the medication. When I do that I feel the patients get to be convinced because they know that doctors gave me a chance to explain everything which is suffering from aaa and they gave me chance to get the medication which I need, not what they have on the shelf. When I do that the patient goes out with the heart that I have been assisted". (Male respondent six)*

4.7.3.1 Comfort patients.

Respondents reported that it was unfair to let the patient go home without any treatment because the mRDT was negative and they could not establish the cause of fever to treat the patient effectively. In such a situation patients were given antibiotics to comfort them.

"If mRDT is still negative and the child is not very sick, I comfort the mother with antibiotics, but still ask her to come for review after two days, then after two days if she still is sick that's when I refer her to Kamuzu Central Hospital". *(Female respondent ten).*

Besides, other clients were resistant to accept the diagnosis. Instead, they bought antimalaria drugs over the counter even though the health provider informed them that they are not suffering from malaria.

"If you tell someone that you don't have malaria is still a challenge for somebody to accept that. Even if I say, do not buy AL you are suffering from an infection that is not malaria, you need such kind of drugs, what he has in his mind is that I have malaria, they will still go somewhere to buy". (male respondent six)

4.7.4 Health facility ownership

Respondents reported that when they were working at a government health facility, they were limited to prescribe AL to patients with negative malaria results. This improved their adherence to test and treatment guidelines compared to when they were working at a private clinic where they were free to prescribe AL to any patient regardless of test results.

"So, when I am working in a private clinic I still treat as malaria even when the mRDT is negative, not when I am working at a government hospital. So, I feel is bad to give antibiotics when your clinical judgement says it is malaria". (Male respondent five)

Respondents reported that patients were not convinced that they did not have malaria at a government hospital so they would go to a private clinic to demand ant-malarial drugs.

"*If mRDT is negative, they will be told you do not have malaria, but if the patient goes to a private clinic and use microscopy, he may be malaria positive. So you see we are at somebody business so to say no go back it is me who saw you at Bwaila Hospital, I would not do that, I would not send somebody back when they have come to purchase the AL with their own money at somebody business so I will just ooo you need AL here you are". (Male respondent six)*

Respondents also reported that private clinics would lie that the patient had malaria for them to make more money.

"Yes, *I met three or four patients at night, you know most people go to private clinics, these clinics are for business, so they will tell the patient that the mRDT is negative, let's try microscopy and they tell the patient that they have malaria while they are lying. So, they give them treatment. So, they tell me that I went to such a clinic they told me I have malaria*". *(Male respondent nine)*

4.7.5 Guidelines on C-IMCI, AL and antibiotics

Respondents reported that some guidelines supported adherence to malaria test and treatment guidelines.

4.7.5.1 Antibiotics availability

Respondents reported that antibiotics were misused as most of malaria negative patients were given antibiotics since the antibiotic's guidelines did not have strict measures as it was supposed to be.

"*I think so, initially we had a clinical diagnosis of malaria, actually now they say we do not have a clinical diagnosis of malaria. If it is negative, we give antibiotics. But as I said in practice, you can see that someone may be negative today but might be positive in 24 hours or later. So maybe sometimes we have misused the antibiotics of course". (Male respondent eight)*

"Because of the test and treat, we are not supposed to give antimalaria drugs. Even when the patient is presenting the signs and symptoms of malaria, we do not prescribe presumptively or when mRDT is negative as a result we prescribe antibiotics". (Male respondent seven)

4.7.5.2 AL disbursement guidelines

Respondents complained that malaria test and treat guidelines had compromised their clinical judgement as most of the patients that were sent back because they had malaria negative results, would normally come back for review as the condition did not improve.

"*I was thinking if a patient is tested negative, but a clinician thinks that patient after a thorough history taking and physical examination might have malaria, he should rerun the test or request for microscopy. Unfortunately, we cannot do that, if mRDT is negative, they will be told you do not have malaria, I feel that if a clinician feels this is malaria there should be a request for malaria parasite check using microscopy or prescribe anti-malaria drugs presumptively". (Male respondent five)*

Other respondents said that the malaria test and treatment guidelines had facilitated the improved prescription of anti-malarial drugs and antibiotics.

"When we see it is not malaria, we feel is an infection, so we treat as infection. The introduction of mRDTs and AL has helped us because yaa nowadays we are having malaria, but not to my perception not as severe as we had before, yes children do come with malaria, not as complicated before, previously most children were coming in convulsing but now they are coming with uncomplicated malaria that's my perception, I see that change. (Female respondent ten)

"Antibiotics have been regulated, like antibiotics, let's say magnesium sulphate in labour ward where a pregnant woman can present with convulsions, they can say this one is it preeclampsia or eclampsia, yet it is severe malaria, yaa that has helped the use of other drugs". (Male respondent nine)

4.7.5.3 C-IMCI guidelines

Respondent reported that since HSAs were managing under five cases on behalf of clinical personnel to reduce childhood illnesses especially malaria. Task-shifting prompted the HSAs to use a sick child reporting form to thoroughly examine the child and treat according to C-IMCI guidelines. HSAs were very cautious as they were not protected by Malawi Medical Council Act to provide medical care services so if anything, bad happened to the child they could be fined.

"The *sick child recording form is what tells you the right decision to make, whatever is in the register is also already in the sick child recording form, the decision comes after hearing what the parent said and what you have seen because you are supposed to see, observe, feel and listen to the parent then the sick child recording tells you what to do treat at home or refer ". (Female respondent two)*

CHAPTER FIVE: DISCUSSION

This section provides the interpretation of the findings of the study and the implications they have on clinical practice. The discussion of the findings is based on study objectives which included: to explore barriers to adherence to the malaria test and treatment guidelines among health providers; and to investigate facilitators to adherence to malaria test and treatment guidelines among health providers at Bwaila Hospital in Lilongwe District in 2020. The section discusses the implications of the study for clinical practice.

This chapter also summarises the findings of the study and the recommendations on what needs to be done by health providers, policymakers and researchers to improve adherence to malaria test and treat guidelines.

5.1 Discussion of main findings

The barriers to adherence to malaria test and treatment guidelines were; patient factors such as education, economic status and the satisfaction of patients. Health system factors included the workload, patient volume, limited diagnostic tools and equipment and testing services. Barriers related to the processes involved in the management of malaria cases included lack of regular supervision and feedback. Barriers related to the intervention characteristics were the complexity of the test and treatment steps and low detection of malaria cases by mRDTs. Barriers related to health provider attitudes and practices included the critical health conditions of their patients, negative attitudes towards the effectiveness of mRDTs and the personnel performing mRDTs. For the outer setting privately owned health facility was a barrier to adherence to malaria case management guidelines since they were in the business of maximising profits through selling drugs and provision of laboratory services.

The facilitators to adherence to the guidelines related to the outer setting included availability of C-IMCI, AL, antibiotics guidelines and government-owned facility. Other health providers perceived that malaria test and treat policy was effective and had more advantages compared to presumptive treatment. This is so when the mRDT was positive is was easy for them to treat the patient with anti-malaria drugs. For the processes involved that facilitated adherence to malaria test and treat policy were disbursement of AL, ordering of drugs, mRDT positive results.

Other factors that either facilitated or hindered implementation were task shifting, capacity building and years of service.

A detailed discussion on barriers and facilitators to adherence to malaria test and treat policy are discussed at length.

5.1.1 Barriers to adherence to malaria test and treatment guidelines

5.1.1.2 Intervention characteristics

The findings showed that other health providers perceived that the malaria test and treatment steps were complicated. The steps of screening, history taking, testing and prescription made the patients to be moved from one room to another with a lot of documentation was involved in the process. This led to the delayed provision of treatment.

Some providers doubted the effectiveness of mRDTs stating that they failed to detect malaria in some patients. As such, they resorted to treating the patients presumptively. Sometimes they gave antimalarial drugs to a patient with mRDT negative results. These findings are consistent with a research that was conducted in Cameroon which revealed that health providers had perceptions that mRDT could not detect other strains of malaria and that they could give negative results in patients who had already taken anti-malarial drugs before coming to the health facility (39).

5.1.1.3 Individuals involved

5.1.1.3.1 Health provider attitudes and practices

The findings revealed that patients who were seriously ill were treated for complicated malaria. As such, they were treated quickly without testing for malaria. Health providers were more concerned with the patients' health condition and were afraid that any delay in treatment would lead to a serious condition including death. Patients with complicated malaria were treated with ASAQ and not the recommended injectable Artesunate. For those patients that were tested after the initial dosage of anti-malarial drugs, treatment continued despite malaria negative results and health providers also provided the patients with antibiotics. These findings agree with those from a study that was conducted in Kenya which revealed that when second-line drugs were in stock, patients were significantly less likely to receive the recommended treatment (58).

The findings also showed that other health providers did not have confidence in the personnel, especially HSAs who were doing mRDTs, as they did not adhere to the recommended turn around time within which the results were supposed to be processed. Lack of adherence to the turn around time worsened with increased numbers of malaria suspects. Personnel doing mRDTs used a conveyor belt system to test 30 to 50 patients at once and could expose the mRDTs to the sun. Respondents complained that the results were not correct most of the time. The findings also revealed that sometimes the mRDTs had faint lines and difficult to read the results. Even if the tests were repeated, the results were still faint, and the person could not read the results correctly. These findings concur with a study that was conducted in South-East Nigeria which found out that on some occasions, mRDTs were faint as positive or invalid tests or negative and this affected the interpretation of results and affected the kind of treatment that was given to the patients (46).

The findings above suggest that respondents had negative attitudes toward the effectiveness of mRDTs in detecting malaria in suspected patients. They argued that mRDTs failed to detect most cases of malaria. When the same patient went to a private clinic and a malaria parasite check using microscopy was done, the results were positive. This finding is in line with the study that was conducted in Cameroon whose findings revealed that health providers had little trust in mRDTs especially when microscopy results were positive for the patient that had mRDT negative result (40).

5.1.1.4 Outer setting

5.1.1.4.1 Patient factors

The findings demonstrated that both educated, and less educated patients doubted the services provided at Bwaila Hospital owned by the government. Regardless of their education status, patients demanded antimalarial drugs even if the mRDTs were negative. The patients had preconceived knowledge that malaria causes fever as was communicated by the MOH before the introduction of malaria test and treatment guidelines. The results strikingly disagree with those from a study that was conducted in Zambia, Senegal, Mozambique and Uganda that showed that health providers if they perceived clients to be educated, it was likely that they would give all the necessary information about their health problem. On the other hand, if the patients were perceived as ignorant, the health provider did not give any information to the

cause of fever. Hence, health providers preferred patients with some education since they understood things better (59).

Furthermore, the findings have revealed that sometimes, health providers satisfied their patients by providing them with emotional and psychosocial treatment. In cases where health providers failed to diagnose the cause of fever, they just prescribed anti-malarial drugs, antibiotics and analgesics depending on clinical judgement. Health providers thought that patients should not go home without medication, arguing that counselling alone was not enough to heal their condition. The findings are in line with studies that were conducted in Cameroon and Nigeria which revealed that health providers gave anti-malarial drugs to patients who tested negative because they believed a patient should not go home empty-handed (3,40).

Whenever those patients who went to seek treatment at government health facilities were not convinced that they did not have malaria and had money to spare they went to private clinics for testing and to buy anti-malaria drugs. The finding is in line with those the of a study that was conducted in Tanzania which revealed that patients that were not satisfied that they did not have malaria, went to a private dispensary where they were given positive results and anti-malaria drugs (60).

5.1.1.4.2 Private owned facilities

The findings revealed that other government health providers were working in private clinics on a part-time basis. When the health providers were at private clinics, they were in the business of making money and their priority was not patients' health. At private clinics, health providers prescribed anti-malaria drugs to patients who did not have malaria so that they could pay for drugs and laboratory services. The findings corroborated with those from Nigeria which showed that mRDT was available in 81.9 % of the public health facilities and 19.4 % of the private health facilities. The presumptive diagnosis of malaria was higher among private healthcare workers (94.9 %) compared to 22.7 % in public health facilities (33).

5.1.1.5 Inner setting

5.1.1.5.1 Health system factors

The findings showed that health providers had a lot of patients to assist and they felt that it was not practical to follow all the steps prescribed in the malaria test and treatment guidelines. Health providers were passionate about their patients. They did not bother to follow all the steps for malaria test and treatment. Their priority was to treat all patients on time and leaving no patient unattended to. The findings are in line with a study that was conducted in Western Uganda that most providers complained about the high workload associated with using mRDTs. Providers reported that they were now doing additional tasks which required too much time per patient to manage properly, particularly in situations where they were often working alone (40).

The findings revealed that testing services were not available during the night and weekends as such patients were treated presumptively. For uncomplicated malaria, the laboratory personnel could not do malaria parasite check, as the supplies were for complicated malaria cases only. For patients with mRDT negative results, health providers had to use their technical expertise, patient history and condition to come up with the diagnosis. Patients with negative results were commonly diagnosed as septicaemia and treated with antibiotics as the laboratory could not do culture and sensitivity to identify the causes of fever. Sometimes when the health providers were convinced that the patient had malaria even if mRDT was negative, they prescribed AL or ASAQ. The results agree with the findings of a study from Uganda which reported health providers expressed concerns about inadequate diagnostic equipment for non-malaria fevers. These concerns existed despite good knowledge about other causes of fever. This suggests that health providers' non-compliance to test and treatment of malaria was due to inadequate equipment and tools for the diagnosis of non-malaria fever (36).

5.1.1.5.2 No supervision and feedback reports

The findings have shown that there were no supervision and feedback mechanisms to share challenges and solutions that affect the implementation of the guidelines. This affected adherence as every provider was doing what s/he knows as there were no means to discuss challenges with the implementation of malaria test and treatment guidelines and how to address those challenges to improve on prescribing practices. At some point, health providers were not sure that ASAQ is a second-line drug or not. The findings essentially disagree with the results

from a study conducted in Malawi and Kenya that supervision did not show an association with treatment quality and thus it was difficult to make conclusions about the effectiveness of supervision and feedback (14,61).

5.2.0 Facilitators to adherence to malaria test and treat guidelines

5.2.1 Outer setting

5.2.1.1 Guidelines on C-IMCI, AL and availability of antibiotics

The results revealed that C-IMCI guidelines promoted comprehensive investigation of child illness using sick child recording form. Every child had to be investigated for causes of fever such as pneumonia and malaria. The form made the community health worker adhere to malaria test and treatment guidelines as no child with malaria negative results were administered anti-malaria drugs. The C-IMCI program emphasised that the community health workers were tasked to manage children in areas far from the facility to reduce child illnesses and death and any adverse event following their prescription, they would be arrested. Since they were not covered by the Medical Council of Malawi that made them follow all the steps in the malaria test and treat. The findings are in line with a study that was conducted in Malawi that effective implementation of IMCI and mRDT together could help reduce both anti-malarial and antibiotic over-treatment associated with mRDT negative results (19).

The results revealed that AL was disbursed by pharmacy personnel. The amount of disbursed AL was supposed to match with mRDT positive results and it was tough to give AL anyhow. The audits that were conducted to balance mRDT and AL in a way reinforce adherence to positive results. Health providers frequently did not prescribe AL to patients that had malaria negative results however they prescribed ASAQ since pharmacy personnel did not require positive results to give ASAQ.

The results discovered that antibiotics were prescribed without following the disbursement of antibiotic guidelines. This was so because the antibiotic guidelines were not reinforced. Most patients with malaria negative results were given antibiotics. Health providers prescribed antibiotics to patients that had malaria negative results to comfort them. The providers were not committed to investigating other causes of fever as antibiotics were readily available to treat for any condition that had no diagnosis. This tendency of prescribing antibiotics without following guidelines has consequences of antibiotic resistance and adverse health effects to the

patients. The mRDT negative results were strongly associated with antibiotic over-treatment conditioned by a cough or difficulty breathing complaint (19).

5.2.1.2 Government-owned facility

The findings showed that pharmacy personnel from government facilities did not give AL to patients with mRDT negative results. The auditors were auditing AL every six months at a government facility, but this was not the case in private clinics. Auditing of AL and mRDTs was a very big issue and some pharmacy personnel were asked to reimburse funds for AL and mRDT for failing to account for their use. There were strict measures in the disbursement of AL at the government facility than in the private health clinics. The results agree with the study conducted in Nigeria that adherence to guidelines was significantly higher among public health care workers (60.6 %) compared to those in private facilities (27.3 %). Availability of antimalarial medicine was the main factor that influenced treatment prescribing practices in private facilities and also drug promotion by manufacturers had a major influence on private health care workers' prescription practice (62).

5.2.2 Individuals involved

5.2.2.1 Health provider attitudes and practices

The findings revealed that health providers that had a positive attitude towards malaria test and treat guidelines perceived that mRDTs were simple to use and effective in detecting malaria. The providers were not worried about the tedious steps they had to follow but the quality of service given to their patients. Delay in treatment was not a matter of concern to these health providers. Some health providers noted how this additional time spent with the patient was beneficial to the identification of the real causes of fevers. The finding agrees with those from a study that was conducted in Western Uganda which revealed that despite the challenges, a belief in doing the right thing for the patient and desire to ration ACT use appeared to override the workload (63).

5.2.3 Processes involved in the test and treat

5.2.3.1 Ordering AL

AL was ordered from the pharmacy stores. AL was distributed to departments if the documentation was complete. AL was ordered strictly based on the previous number of malaria positive results and a report that balanced malaria positive results and AL disbursed. For inpatient ward, AL was ordered using patient file and laboratory results. AL was ordered during special days on Monday, Wednesday and Friday only. There were no emergency orders for AL, providers had to get AL from other departments if their section had stock out of AL. The findings agree with those of a study that was conducted in Malawi which showed that late submission of malaria data reports to the district health office further affected the utility of health information which was required for drug ordering and supply. These practices contributed to drug stock-outs leading to the prescription of antibiotics (16,64).

5.2.3.2 MRDT positive results

MRDT positive results facilitated adherence to test and treat. MRDT was mostly used to screen patients with uncomplicated malaria who had fever, vomiting, joint pains and cough if they had malaria or not. When mRDT was positive health providers did not bother to investigate other causes of fever but prescribed anti-malaria drugs. The findings are consistent with those from of a systematic and meta-analysis review conducted in sub-Saharan Africa countries which showed patients with mRDT positive results were treated with AL. Health workers' overall compliance with positive and negative results was 97 % and 78 % respectively (65).

5.2.4 Other implementation issues

Issues that affected negatively and positively or never influenced adherence to malaria test and treat at all were;

5.2.4.1 Task shifting

The results have shown that task shifting facilitated as well as hindered adherence to malaria test and treat. The study has revealed that most of the health providers were clinicians seconded by HSAs who were tasked to manage child illness in hard to reach areas through C-IMCI program. Registered nurses were also tasked to manage childhood illnesses in the paediatric department at the health facility level. The results showed that registered nurses and HSAs

adhered to malaria test and treat because they were not supposed to prescribe as stipulated in the Medical Council of Malawi regulations. They feared adverse events following their prescriptions. The C-IMCI guidelines promoted HSAs to thoroughly examine children and follow each step in the management of fever and that is why they adhered to the malaria test and treatment guidelines. Some studies reported that community health workers had higher compliance rates to negative test results than clinicians. Clinical officers may have been taught that their clinical judgement can overrule guidelines (16,58,65).

On the other hand, when HSAs were tasked to do mRDTs on behalf of laboratory personnel at the facility level, the health providers complained that HSAs did not follow all the steps in testing as such the results were questionable and health providers did not trust the test results. In such a situation, sometimes health providers used their clinical judgement to prescribe drugs not based on mRDT test results. The findings concur with those of a study conducted in Nigeria which showed that the quality of laboratory test results was dependent upon resource factors such as availability of electricity and working equipment, together with the skill of laboratory technicians or attendants (65).

5.2.4.2 Capacity building-knowledge and years of service

The findings show that respondents had good knowledge of malaria test and treat. The results also confirmed that participants working experience had no association with the adherence to test and treatment guidelines. Participants that started working before and after test and treat could still prescribe anti-malarial drugs to patients with malaria negative results, the same applied to respondents that started working after the implementation of malaria test and treatment. Health providers depended on clinical judgement, available resources like diagnostic tools, drugs, their perceptions on the test and treat and processes involved in managing fever. The results disagree with those from studies conducted in Malawi, Cameroon and Uganda which showed that health providers learnt about malaria test and treat from co-workers and that the level of awareness of mRDTs by all the providers was not high enough. Health workers were used to old habits of presumptive treatment and those health providers remain predisposed to seeing malaria as the most likely explanation for persistent fever (9,50,63).

5.3 Relevance of the study

The findings are intended to inform clinical directorate in the Malawi MOH, NMCP, WHO, Lilongwe DHO and Global fund on how to disseminate malaria test and treat guidelines and reinforce the implementation of C-IMCI, antibiotic guidelines at the national policy level, district facility level and community level. The study comprehensively describes barriers and facilitators to the provision of quality management of fever and malaria. The findings have revealed the health system factors such as availability of diagnostic tools and equipment, health providers' perception and practices, processes involved in malaria test and treatment and ownership of health facility influence management of fever . The factors are critical in the development of guidelines, strategies and implementation of malaria test and treat to promote correct prescription practices among health providers.

5.4 Study Limitations

The study purposively sampled health providers that were managing malaria cases at Bwaila Hospital. The qualitative data collection enabled the respondents to explain what is happening practically and their experiences in managing malaria cases. The respondents shared what was working well and the challenges they faced in managing patients with fever.

Data collected was self-reported and was independently verified. Some health workers gave ideal answers, rather than what they do. To limit such wrong answers, the researcher carefully framed the questions to be able to obtain true information and assured them of confidentiality. Probing techniques and multiple lines of questioning were used to elicit providers' true beliefs and practices and encouraged providers to feel that all responses were acceptable. The study did not interview patients to get their perspective as a result, patients' experiences were not included in this study. The study did not include health providers working in private health facilities only as such the results do not apply to private health facilities.

5.5 Conclusion

Current study findings indicate that barriers to adherence to malaria test and treat were; patient volume, workload, limited diagnostic tools, the critical condition of patients, socioeconomic status of patients and negative attitudes of providers towards mRDTs. The emerged facilitators were the presence of guidelines on C-IMCI, AL and availability of antibiotics, mRDT positive results and positive attitudes of health providers towards malaria test and treatment guidelines. Knowledge of malaria test and treat among providers did not affect their prescribing practices,

patient health condition was essential in the management of fevers. Guidelines on C-IMCI, AL and antibiotics reinforced adherence to malaria test and treat. MRDT-negative results were associated with antibiotic over-treatment. These findings suggest that malaria test and treat should integrate C- IMCI and mRDT at the health facility level to improve quality fever care and rational use of both anti-malarial and antibiotic medicines.

5.6 Recommendations

The findings have great implications for improving correct prescription practices, hence adherence to malaria test and treatment guidelines is very important. The recommendations have been made in terms of health providers attitudes and practices, health system constraints, policymakers' practices and research.

5.6.1 Health providers' attitudes and practices

- There is a need for health providers to build trust in mRDT negative results by strengthening their skills in integrated management of illnesses as it is being implemented in C-IMCI. Such interventions could not only improve mRDT compliance, rational drug use and quality fever care but also strengthen the overall health system.
- NMCP and clinical directorate should conduct supervisions and give feedback to health providers. The supervision will improve the quality of clinical services delivered to avoid the development of drug resistance to first-line anti-malarial drugs, antibiotics and adverse health effects to patients.

5.6.2 Health system constraints

Ministry of health and Lilongwe District Health Office should reduce workload, patient volume and provide diagnostic tools and equipment to improve the quality of care to patients and improve clinical practice for management fever.

5.6.3 Policymakers

5.6.3.1 Guidelines

- NMCP and IMCI programs should develop national guidelines which integrate mRDT and C-IMCI at the health facility level to improve the use of antibiotics to support recent world commitments to combat antibiotic resistance.
- NMCP should develop guidelines on the use of ASAQ and put strict measures as it has done with AL.
- NMCP to engage health providers who have practical experience in the management of fever in the development of the malaria test and treatment guidelines. The guidelines should include the psychosocial component to promote adherence to the guidelines

5.6.4 Implications for future implementation research

Implementation research on strategies which tackle these barriers and facilitators to adherence to case management is important to improve adherence. Therefore, implementation research should be conducted to understand the practical implementation in the routine settings to enhance providers' skills in clinical decision-making.

- There is also a need to conduct implementation research on implementation fidelity focussing on coverage, participant responsiveness and programme differentiation.

REFERENCES

1. Hay SI, Guerra CA, Gething PW, Patil AP, Tatem AJ, Noor AM, et al. A World Malaria Map: Plasmodium falciparum Endemicity in 2007. Mueller I, editor. PLoS Med. 2009 Mar 24;6(3):e1000048.

2. World Malaria Report 2018 ISBN 978 92 4 156565 3 [Internet]. [cited 2019 Dec 28]. Available from: www.who.int/malaria

3. Akinyode AO, Ajayi IO, Ibrahim MS, Akinyemi JO, Ajumobi OO. Practice of antimalarial prescription to patients with negative rapid test results and associated factors among health workers in Oyo State, Nigeria. Pan Afr Med J. 2018;30:1–8.

4. Malaria program Report 2019, National Malaria Control Programme Community Health Sciences Unit, Private Bag 65, Lilongwe Malawi.

5. Kabaghe AN, Visser BJ, Spijker R, Phiri KS, Grobusch MP, Van Vugt M. Health workers' compliance to rapid diagnostic tests (RDTs) to guide malaria treatment: A systematic review and meta-Analysis. Vol. 15, Malaria Journal. BioMed Central Ltd.; 2016.

6. Malaria Strategic Plan, 2017-2022, Malawi National Malaria Control.

7. Koram KA, Molyneux ME. When is "malaria" malaria? The different burdens of malaria infection, malaria disease, and malaria-like illnesses. 2007;

8. Government of Malawi, MOH, NMCP. Guidelines for the treatment of malaria in Malawi, 4th Edition, July 2013. 2013;(July).

9. Kabaghe AN, Visser BJ, Spijker R, Phiri KS, Grobusch MP, van Vugt M. Health workers' compliance to rapid diagnostic tests (RDTs) to guide malaria treatment: a systematic review and meta-analysis. Malar J. 2016 Dec 15;15(1):163.

10. Mokuolu OA, Ntadom GN, Ajumobi OO, Alero RA, Wammanda RD, Adedoyin OT, et al. Status of the use and compliance with malaria rapid diagnostic tests in formal private health facilities in Nigeria. Malar J. 2016;15(1).

11. Burns N (Nancy A, Grove SK. The practice of nursing research : appraisal, synthesis, and generation of evidence. Saunders/Elsevier; 2009. 750 p.

12. Polit DF, Tatano C. International Journal of Nursing Studies Generalization in

quantitative and qualitative research : Myths and strategies. Int J Nurs Stud. 2010;47(11):1451–8.

13. Whittemore R, Knafl K. The integrative review: updated methodology. J Adv Nurs. 2005 Dec 1;52(5):546–53.

14. Steinhardt LC, Chinkhumba J, Wolkon A, Luka M, Luhanga M, Sande J, et al. Quality of malaria case management in Malawi: Results from a nationally representative health facility survey. PLoS One. 2014 Feb 20;9(2).

15. Hooft AM, Ripp K, Ndenga B, Mutuku F, Vu D, Baltzell K, et al. Principles, practices and knowledge of clinicians when assessing febrile children: A qualitative study in Kenya. Malar J. 2017;16(1).

16. Kabaghe AN, Phiri MD, Phiri KS, Van Vugt M. Challenges in implementing uncomplicated malaria treatment in children: A health facility survey in rural Malawi. Malar J. 2017;16(1):1–10.

17. Keating J, Finn TP, Eisele TP, Dery G, Biney E, Kedote M, et al. An assessment of malaria diagnostic capacity and quality in Ghana and the Republic of Benin. Trans R Soc Trop Med Hyg. 2014 Oct 1;108(10):662–9.

18. Bastiaens GJ, Schaftenaar E, Ndaro A, Keuter M, Bousema T, Shekalaghe SA. Malaria diagnostic testing and treatment practices in three different Plasmodium falciparum transmission settings in Tanzania: Before and after a government policy change. Malar J. 2011;

19. Johansson EW, Selling KE, Nsona H, Mappin B, Gething PW, Petzold M, et al. Integrated paediatric fever management and antibiotic over-treatment in Malawi health facilities: data mining a national facility census. Malar J. 2016 Dec 4;15(1):396.

20. Proctor E, Silmere H, Raghavan R, Hovmand P, Aarons G, Bunger A, et al. Outcomes for implementation research: Conceptual distinctions, measurement challenges, and research agenda. Adm Policy Ment Heal Ment Heal Serv Res. 2011;38(2):65–76.

21. Compaoré R, Wambi M, Yameogo E, Millogo T, Tougri H, Kouanda S. Evaluation of the implementation fidelity of the seasonal malaria chemoprevention intervention in Kaya health district, Burkina Faso. 2017;

22. Dusenbury L, Brannigan R, Falco M, Hansen WB. A review of research on fidelity of implementation: implications for drug abuse prevention in school settings. Health Educ

Res. 2003 Apr 1;18(2):237–56.

23. Carroll C, Patterson M, Wood S, Booth A, Rick J, Balain S. A conceptual framework for implementation fidelity. Implement Sci. 2007;2(1):1–9.

24. Kirk MA, Kelley C, Yankey N, Birken SA, Abadie B, Damschroder L. A systematic review of the use of the Consolidated Framework for Implementation Research. Implement Sci. 2015 Dec 17;11(1):72.

25. Lubell Y, Reyburn H, Mbakilwa H, Mwangi R, Chonya S, Whitty CJM, et al. The impact of response to the results of diagnostic tests for malaria: Cost-benefit analysis. BMJ. 2008 Jan 26;336(7637):202–5.

26. Ae JAD, Dupre EP. Implementation Matters: A Review of Research on the Influence of Implementation on Program Outcomes and the Factors Affecting Implementation.

27. Durlak JA, DuPre EP. Implementation matters: A review of research on the influence of implementation on program outcomes and the factors affecting implementation. Am J Community Psychol. 2008;41(3–4):327–50.

28. Gottfredson D, Kumpfer K, Polizzi-Fox D, Wilson D, Puryear V, Beatty P, et al. The Strengthening Washington D.C. Families Project: A randomized effectiveness trial of family-based prevention. Prev Sci. 2006 Mar;7(1):57–74.

29. Bor W, Sanders MR, Markie-Dadds C. The effects of the triple P-positive parenting program on preschool children with co-occurring disruptive behavior and attentional/hyperactive difficulties. J Abnorm Child Psychol. 2002 Dec;30(6):571–87.

30. Grol R, Dalhuijsen J, Thomas S, In 'T Veld C, Rutten G, Mokkink H. Attributes of clinical guidelines that influence use of guidelines in general practice: Observational study. Br Med J. 1998 Sep 26;317(7162):858–61.

31. Godard J. Beyond the High-Performance Paradigm? An Analysis of Variation in Canadian Managerial Perceptions of Reform Programme Effectiveness. Br J Ind Relations. 2001 Mar 16;39(1):25–52.

32. Bellg AJ, Resnick B, Minicucci DS, Ogedegbe G, Ernst D, Borrelli B, et al. Enhancing treatment fidelity in health behavior change studies: Best practices and recommendations from the NIH Behavior Change Consortium. Vol. 23, Health Psychology. Health Psychol; 2004. p. 443–51.

33. Bamiselu OF, Ajayi I, Fawole O, Dairo D, Ajumobi O, Oladimeji A, et al. Adherence to malaria diagnosis and treatment guidelines among healthcare workers in Ogun State, Nigeria. BMC Public Health. 2016 Aug 19;16(1).

34. Boyce MR, O'Meara WP. Use of malaria RDTs in various health contexts across sub-Saharan Africa: a systematic review. BMC Public Health. 2017;17(1).

35. D Burchett HE, Leurent B, Baiden F, Baltzell K, Björkman A, Bruxvoort K, et al. Improving prescribing practices with rapid diagnostic tests (RDTs): synthesis of 10 studies to explore reasons for variation in malaria RDT uptake and adherence.

36. White Johansson E, Eric Kitutu F, Mayora C, Awor P, Swartling Peterson S, Wamani H, et al. It could be viral but you don't know, you have not diagnosed it: health worker challenges in managing non-malaria paediatric fevers in the low transmission area of Mbarara District, Uganda. Malar J. 2016;

37. Boadu NY, Amuasi J, Ansong D, Einsiedel E, Menon D, Yanow SK. Challenges with implementing malaria rapid diagnostic tests at primary care facilities in a Ghanaian district: a qualitative study. Malar J 2016 151. 2016 Feb 27;15(1):1–12.

38. Reynolds J, Wood M, Mikhail A, Ahmad T, Karimullah K, Motahed M, et al. Malaria "diagnosis" and diagnostics in afghanistan. Qual Health Res. 2013;23(5):579–91.

39. Chandler CIR, Mangham L, Njei AN, Achonduh O, Mbacham WF, Wiseman V. "As a clinician, you are not managing lab results, you are managing the patient": How the enactment of malaria at health facilities in Cameroon compares with new WHO guidelines for the use of malaria tests. Soc Sci Med. 2012;

40. Altaras R, Nuwa A, Agaba B, Streat E, Tibenderana JK, Strachan CE. Why do health workers give anti-malarials to patients with negative rapid test results? A qualitative study at rural health facilities in western Uganda. Malar J. 2016 Jan 11;15:23.

41. Boadu NY, Amuasi J, Ansong D, Einsiedel E, Menon D, Yanow SK. Challenges with implementing malaria rapid diagnostic tests at primary care facilities in a Ghanaian district: A qualitative study. Malar J. 2016;15(1).

42. Onwujekwe O, Uzochukwu B, Dike N, Uguru N, Nwobi E, Shu E. Malaria treatment perceptions, practices and influences on provider behaviour: Comparing hospitals and non-hospitals in south-east Nigeria. Malar J. 2009;

43. Chandler CIR, Jones C, Boniface G, Juma K, Reyburn H, Whitty CJM. Guidelines and

mindlines: Why do clinical staff over-diagnose malaria in Tanzania? A qualitative study. Malar J. 2008;7.

44. Cundill B, Mbakilwa H, Chandler CIR, Mtove G, Mtei F, Willetts A, et al. Prescriber and patient-oriented behavioural interventions to improve use of malaria rapid diagnostic tests in Tanzania: Facility-based cluster randomised trial. BMC Med. 2015 Dec 12;13(1).

45. Galactionova K, Tediosi F, De Savigny D, Smith T, Tanner M. Effective coverage and systems effectiveness for malaria case management in Sub-Saharan African countries. PLoS One. 2015 May 22;10(5).

46. Uzochukwu BSC, Onwujekwe E, Ezuma NN, Ezeoke OP, Ajuba MO, Sibeudu FT. Improving rational treatment of malaria: Perceptions and influence of RDTs on prescribing behaviour of health workers in Southeast Nigeria. PLoS One. 2011;6(1).

47. Msellem MI, Mårtensson A, Rotllant G, Bhattarai A, Strömberg J, Kahigwa E, et al. Influence of rapid malaria diagnostic tests on treatment and health outcome in fever patients, Zanzibar - A crossover validation study. PLoS Med. 2009;

48. Wafula R, Sang E, Cheruiyot O, Aboto A, Menya D, O'Meara WP. High sensitivity and specificity of clinical microscopy in rural health facilities in western Kenya under an external quality assurance program. Am J Trop Med Hyg. 2014 Sep 1;91(3):481–5.

49. Mangham-Jefferies L, Hanson K, Mbacham W, Onwujekwe O, Wiseman V. What determines providers' stated preference for the treatment of uncomplicated malaria? Soc Sci Med. 2014;

50. Chandler CIR, Mwangi R, Mbakilwa H, Olomi R, Whitty CJM, Reyburn H. Malaria overdiagnosis: Is patient pressure the problem? Health Policy Plan. 2008;

51. Damschroder LJ, Aron DC, Keith RE, Kirsh SR, Alexander JA, Lowery JC. Fostering implementation of health services research findings into practice: A consolidated framework for advancing implementation science. Implement Sci. 2009;4(1):1–15.

52. Rabin BA, Brownson RC, Haire-Joshu D, Kreuter MW, Weaver NL. A glossary for dissemination and implementation research in health. J Public Health Manag Pract. 2008 Mar 1;14(2):117–23.

53. Nilsen P. Making sense of implementation theories, models and frameworks. Implement Sci. 2015;10(1):1–13.

54. Tanenbaum SJ. Knowing and Acting in Medical Practice: The Epistemological Politics of Outcomes Research. J Health Polit Policy Law. 2008;

55. Lilongwe District Implementation Plan Situational analysis _2016-17-Mponela, Malawi.

63. Malawi Population and Housing Census Report,2018 Malawi Population and Housing Main Report [Internet]. 2019 [cited 2019 Jul 25]. Available from:http://www.nsomalawi.mw/images/stories/data_on_line/demography/census_2018/2018 Malawi Population and Housing Census Main Report.pdf

57. Ritchie J, Spencer L. Qualitative Data Analysis for Applied Policy Research In: The Qualitative Researcher's Companion. A. Michael Huberman, Matthew B. Miles, editors. Thousand Oaks: SAGE Publications, Inc.; 2002. 305–329 p.

58. Zurovac D, Rowe AK, Ochola SA, Noor AM, Midia B, English M, et al. Predictors of the quality of health worker treatment practices for uncomplicated malaria at government health facilities in Kenya. Int J Epidemiol. 2004 Oct;33(5):1080–91.

59. Fonn S, Mtonga AS, Nkoloma HC, Bantebya Kyomuhendo G, Dasilva L, Kazilimani E, et al. Health providers' opinions on provider-client relations: Results of a multi-country study to test Health Workers for Change. Health Policy Plan. 2001;

60. Mubi M, Kakoko D, Ngasala B, Premji Z, Peterson S, Björkman A, et al. Malaria diagnosis and treatment practices following introduction of rapid diagnostic tests in Kibaha District, Coast Region, Tanzania. Malar J. 2013;12(1).

61. Juma E, Zurovac D. Changes in health workers' malaria diagnosis and treatment practices in Kenya. Malar J. 2011;10.

62. Bamiselu OF, Ajayi I, Fawole O, Dairo D, Ajumobi O, Oladimeji A, et al. Adherence to malaria diagnosis and treatment guidelines among healthcare workers in Ogun State, Nigeria. BMC Public Health. 2016 Dec 19;16(1):828.

63. Altaras R, Nuwa A, Agaba B, Streat E, Tibenderana JK, Martin S, et al. How do patients and health workers interact around malaria rapid diagnostic testing, and how are the tests experienced by patients in practice? A qualitative study in western Uganda. PLoS One. 2016 Aug 1;11(8).

64. Singlovic J, Ajayi IO, Nsungwa-Sabiiti J, Siribié M, Sanou AK, Jegede AS, et al. Compliance With Malaria Rapid Diagnostic Testing by Community Health Workers in 3 Malaria-Endemic Countries of Sub-Saharan Africa: An Observational Study. Clin

Infect Dis. 2016 Dec 15;63(suppl 5):S276–82.

65. Uzochukwu BSC, Chiegboka LO, Enwereuzo C, Nwosu U, Okorafor D, Onwujekwe OE, et al. 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.

APPENDIXES

Appendix 1: Table 1: Showing non- adherence levels to malaria case management at Bwaila Hospital in 2019

Period	Confirmed Malaria Cases	Presumed cases	OPD Confirmed & Presumed Malaria Cases	Non-adherence level (Percentage)
Jan-19	1454	0	1454	0.00
Feb-19	1250	92	1342	6.86
Mar-19	1777	29	1806	1.61
Apr-19	1570	39	1609	2.42
May-19	2321	0	2321	0.00
Jun-19	1328	325	1653	19.66
Jul-19	421	12	433	2.77
Aug-19	557	0	557	0.00
Sep-19	900	0	900	0.00
Oct-19	578	204	782	26.09
Nov-19	585	83	668	12.43
Dec-19	1118	10878	11996	90.68
Grand Total	**13859**	**11662**	**25521**	**45.70**

Appendix 2: Plagiarism declaration

I, **Ella Chamanga**, (Student number: **2160718**) am a student registered for the degree of **MSc Epidemiology in Implementation Science** in the academic year **2020**.

I hereby declare the following:

- I am aware that plagiarism (the use of someone else's work without their permission and/or without acknowledging the source) is wrong.

- I confirm that the work submitted for assessment for the above degree is my unaided work except where I have explicitly indicated otherwise.

- I have followed the required conventions in referencing the thoughts and ideas of others.

- I understand that the University of the Witwatersrand may take disciplinary action against me if there is a belief that this is not my work or that I have failed to acknowledge the source of the ideas or words in my writing.

Signature:  Date: 5 November 2020

Appendix 3: Witwatersrand University Human Research Ethics Committee (HREC) Ethical clearance

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG

R14/49 Ms E Chamanga

HUMAN RESEARCH ETHICS COMMITTEE (MEDICAL)
CLEARANCE CERTIFICATE NO. M1911149

NAME: (Principal Investigator)	Ms E Chamanga
DEPARTMENT:	School of Public Health Division of Biostatistics and Epidemiology Medical School University
PROJECT TITLE:	Barriers and facilitators to adherence to "test and treat" of malaria case management guidelines by health care providers at Bwaila Hospital in Lilongwe District, Malawi in 2020
DATE CONSIDERED:	2019/11/29
DECISION:	Approved unconditionally
CONDITIONS:	
SUPERVISOR:	Dr J Kagura
APPROVED BY:	Dr CB Penny, Chairperson, HREC (Medical)
DATE OF APPROVAL:	2020/01/29

This clearance certificate is valid for 5 years from date of approval. Extension may be applied for.

DECLARATION OF INVESTIGATORS

To be completed in duplicate and **ONE COPY** returned to the Research Office Secretary on the 3rd Floor, Phillip Tobias Building, Parktown, University of the Witwatersrand, Johannesburg.

I/we fully understand the conditions under which I am/we are authorized to carry out the above-mentioned research and I/we undertake to ensure compliance with these conditions. Should any departure be contemplated, from the research protocol as approved, I/we undertake to submit details to the Committee. I **agree to submit a yearly progress report**. When a funder requires annual re-certification, the application date will be one year after the date when the study was initially reviewed. In this case, the study was initially reviewed in **November** and will therefore reports and re-certification will be due early in the month of **November** each year. Unreported changes to the application may invalidate the clearance given by the HREC (Medical).

Principal Investigator Signature _____ Date _____

PLEASE QUOTE THE CLEARANCE CERTIFICATE NUMBER IN ALL ENQUIRIES

Appendix 4: Malawi National Health Sciences Research Committee ethical clearance letter

Telephone: + 265 789 400
Facsimile: + 265 789 431

All Communications should be addressed to:

The Secretary for Health and Population

In reply please quote No.

.....

MINISTRY OF HEALTH AND POPULATION
P.O. BOX 30377
LILONGWE 3
MALAWI

24th January, 2020

Ella Chamanga
Health Education Unit, MOH

Dear Sir/Madam,

Protocol # 19/11/2447: Barriers and Facilitators to Adherence To "Test and Treat" Of Malaria Case Management Guidelines by Health Providers at Bwaila Hospital in Lilongwe District, Malawi in 2020.

Thank you for the above titled proposal that you submitted to the National Health Sciences Research Committee (NHSRC) for review. Please be advised that the NHSRC has **reviewed** and **approved** the above titled study.

- **APPROVAL NUMBER : 2447**
- The above details should be used on all correspondences, consent forms and documents as appropriate.
- **APPROVAL DATE : 24/01/2020**
- **EXPIRATION DATE**
  This approval expires on **23/01/2021**. After this date, this project may only continue upon renewal. For purposes of renewal, a progress report on a standard form obtainable from the NHSRC Secretariat should be submitted one month before the expiration date for continuing review.
- **SERIOUS ADVERSE EVENT REPORTING:** All serious problems having to do with subject safety must be reported to the NHSRC within 10 working days using standard forms obtainable from the NHSRC Secretariat.
- **MODIFICATIONS**: Prior NHSRC approval using forms obtainable from the NHSRC Secretariat is required before implementing any changes in the protocol (including changes in the consent documents). You may not use any other consent documents besides those approved by the NHSRC.
- **TERMINATION OF STUDY**: On termination of a study, a report has to be submitted to the NHSRC using standard forms obtainable from the NHSRC Secretariat.
- **QUESTIONS**: Please contact the NHSRC on phone number *+265 999397913* or by email on mohdoccentre@gmail.com.
- **OTHER**: Please be reminded to send in copies of your final research results for our records (Health Research Database).

Kind regards from the NHSRC Secretariat.

SECRETARY FOR HEALTH
2020 -01- 24
P.O. BOX 30377, CAPITAL
LILONGWE 3

.....
CHAIRPERSON, NATIONAL HEALTH SCIENCES RESEARCH COMMITTEE
Promoting Ethical Conduct of Research

Appendix 5: Lilongwe District Health Office administrative letter

Ref. No.:
Telephone No.: 265 726 466/464
Telefax No.: 265 727817
Telex No.:
E-Mail. lilongwedho@malawi.

In reply please quote NO DZH/MALAWI,
Lilongwe District Health Office
P.O. Box 1274
Lilongwe
Malawi

COMMUNICATIONS TO BE ADDRESSED TO:

14th February, 2020

The In-charge, Bwaila Hospital

Dear Sir/Madam

PERMISSION TO CONDUCT A REASERCH STUDY IN LILONGWE DISTRICT

Permission has been granted to the bearer of this letter: Ella Chamanga, Masters Masters in Epidemiology from Witwatersrand University in Republic of South Africa to conduct research study at your facility.

Research Title:-
"Barriers and Facilitators to adherence to malaria Case Management guidelines among health providers in Lilongwe District Malawi "

Any assistance rendered would be appreciated.

Dr. Mary Chimseu Nkunika
For: DIRECTOR OF HEALTH AND SOCIAL SERVICES

Appendix 6: Information Sheet for health providers

Study Title: Barriers and facilitators to adherence to malaria case management guidelines among health providers in Lilongwe District, Malawi.

Researcher: Ella Chamanga**,** MSc Epidemiology (Implementation Science)

Dear Sir/Madam, Introduction

My name is Ella Chamanga, a student pursuing a master's in Epidemiology majoring in Implementation Science at the University of the Witwatersrand. I am researching to explore barriers and facilitators to adherence to malaria case management guidelines by health providers in Lilongwe District, Malawi.

Invitation to participate

I cordially invite you to take part in this research because you have a good understanding of malaria case management at this facility. I ask that you read this form and ask any questions that you may have before agreeing to participate in the study. The findings of this study will be written as a report and submitted to the School of Public Health Library and may also be shared in conferences, or published in a journal. The results will provide useful important information for the development of guidelines for malaria case management to promote correct prescriptions and improve the quality of care for patients.

Description of the Study

If you agree to take part in the study, I will ask you to answer some questions, which will take about 1 hour of your time. The interview will be audio-recorded to ensure that our discussion is captured as accurately as possible. A copy of this form and a consent form will be given to you after you agree to participate in this study. A separate consent form for the recording of the discussion will also be given to you.

Risks and Benefits of Being in the Study

There are **minimal risks**. The benefits of participation are that your responses will contribute to research to inform malaria program on development of malaria case management guidelines, in Lilongwe

Confidentiality

The records of this study will be kept strictly confidential. Unique identifiers will be used to save the audio files and will be kept in a password-protected computer. You will not be identified in any published work or report, however, views of all participants will be

summarized. Any information obtained during this study will be stored and analysed for this study for a period not exceeding two years if the research report is published and five years if no publications emanate. The information that is shared in this interview will be kept confidential by myself, and by all investigators involved in the study.

Payments

There will be no payment for participation in this study.

Right to Refuse or Withdraw

Your participation in this interview is voluntary. You may refuse to take part in the study at any time without affecting your relationship with the investigators of this study or with the Lilongwe District Health Office.

Right to Ask Questions and Report Concerns

You have the right to ask questions about this research and to have those questions answered by me before, during or after the research. If you have any questions afterwards about this research, feel free to contact me on the details listed below. If you have any queries, concerns or complaints regarding the ethical procedures of this study, you are welcome to contact the National Health Sciences Research Committee, Ministry of Health, P.O. B 30377, Lilongwe 3, Malawi, Tel: +265 1 726 422/418 Email: mohdoccentre@gmail.com

Yours sincerely,

Ella Chamanga (2160718 @students.wits.ac.za or +265888545872)

Supervisors' names E-mail addresses

Dr Juliana Kagura Juliana.Kagura@wits.ac.za

Appendix 7:Interview Consent Form for health providers

Study Title: Barriers and facilitators to adherence to malaria case management guidelines among health providers in Lilongwe District, Malawi.

Researcher: Ella Chamanga**,** MSc Epidemiology (Implementation Science)

Informed Consent

I have been adequately informed of (or I have read and understood) the purpose, procedures, potential risks, and benefits of this study.

• I have the opportunity to ask questions about it. Any questions that I have asked have been answered to my satisfaction.

• I know that I can refuse to participate in the study without any loss of benefit to which I would have otherwise been entitled.

• I understand that if I agree to participate, I can withdraw my consent at any time without any problem.

• I understand that any information collected will be treated confidentially.

• I freely agree to participate in the study, after signing below I will receive a copy of this consent form.

For Participant

Name of Participant ……

Signature of Participant……. Date: ……. /……. /……..

For Study Staff

I have adequately informed the participant of the purpose, procedures, potential risks, and benefits of this study.

I have answered all the questions to the best of my ability.

Name of study personnel…….

Signature…… Date: ……/……. /……

Appendix 8: Consent Form for audio-recordings

Study Title: Barriers and facilitators to adherence "test and treat" of malaria case management guidelines among health providers in Lilongwe District, Malawi.

Researcher: Ella Chamanga, MSc Epidemiology (Implementation Science)

Consent for audio recording

Would like to inform you that the discussions will be audio recorded so that we do not miss any information when writing the report. The recordings will be used for this research only. Unique identifiers will be used to save the audio files and will be kept in a password-protected computer which will be accessed by the research team only. Participants will not be identified in any published work or report, however, views of all participants will be summarized. I have been adequately informed of the purpose of audio recordings.

• I have the opportunity to ask questions about it. Any questions that I have asked have been answered to my satisfaction.
• I understand that if I agree to participate, I can withdraw my consent at any time without any problem.
• I understand that any information collected will be treated confidentially.
I agree that the discussions will be audio-recorded and that the recordings will be used for the study only
• I freely agree to participate in the study, after signing below I will receive a copy of this consent form.
For Participant

Name of Participant ……

Signature of Participant……. Date: ……. /……. /……..

For Study Staff

I have adequately informed the participant of the purpose, procedures, potential risks, and benefits of this study.

I have answered all the questions to the best of my ability.

Name of study personnel…….

Signature……. Date: ……/……. /……

Appendix 9:Semi-structured interview guide for health care providers

Study Title: Barriers and facilitators to adherence to malaria case management guidelines among health providers in Lilongwe District, Malawi

Researcher: Ella Chamanga, MSc Epidemiology (Implementation Science)

- Introduction using the information sheet
- Take consent for participation and recording
- Set recorder
- Begin interview

Basic Demographics

- Age:
- Gender:
- Health facility Name:

Provider demographic information

Tell me about your professional training?

Probe for years of experience

How long have you been providing malaria services? What specific role do you do in the provision of malaria services? **Probe for training on malaria case management guidelines, time training took place, organisers, the content of the training**

Construct 1: Intervention characteristics-malaria case management guidelines

Providers knowledge and attitudes on Complexity, relative advantage, applicability and evidence source of the guideline

1. Do you have a guideline on malaria case management? Who developed the guidelines?
2. What is your opinion on people or institutions that developed the guidelines?
3. How do you use the guideline in your daily activities? Why do you use these guidelines?

What are the benefits of using the guidelines in malaria management to you as well to the patient?

1. What are your general comments about the practicability of the guidelines?
2. What components of the guidelines do you feel should be changed or modified? why?
3. What support malaria case management guidelines give you in the management of malaria cases?
4. How do you perceive the use of RDTS?
5. How the use of RDTs have impacted your work and patients' management?

6. How do you perceive the effectiveness of ant malarial drugs?

Construct 2: Inner setting

1. What are health facilities factors that motivate/impact you to work for malaria services?
2. What norms and values support malaria case management within this facility?

How do the available resources affect the management of malaria cases?

1. What are some of the health facility factors that promote quality of care to your patients?
2. How do you work with other members of staff to support you to provide quality care to your patients? How does the infrastructure of the facility (physical structure, systems, age, working hours, number of staff) affect malaria case management?
3. How do you resolve those challenges that affect case management of malaria?
4. How do you coordinate with the malaria coordinator?
5. What kind of personal and organization support do you get in the provision of malaria services?
6. Do you have to write a report on the management of malaria cases to your supervisor?

Construct 3: Outer setting

1. How do you interact with your patients? **Probe for communication, relationship with patients**
2. How do patients react to malaria testing and treatment? **Probe for coercion by patient**
3. What patient factors affect the diagnosis and treatment of your patients**? probe for the health provider and patient interactions, relationship**
4. I Know there is the physical and psychological treatment that you offer to patients. How do you ensure that sure your patients are convinced that you have given them the best treatment? **probe for patient satisfaction and preferences?**
5. What Policies, guidelines, regulations, do effect the implementation of malaria test and treat? how**?**
6. Do you share information on malaria case management with other facilities?
7. What is the experience like in those facilities in terms of management of non-malaria fevers?

Construct 4: Individual involved

1. How do you differentiate the diagnosis of fevers? What test do you use? Why do you test for malaria diagnosis?

2. What are your perceptions/beliefs towards the effectiveness of RDTs? Why do perceive so?
3. What is your perception of the effectiveness of anti-malaria drugs? Why?
4. How do you manage patients with non-malaria fevers/ malaria negative test results?
5. What are the challenges you encounter during the testing and treatment of fever patients?

Construct 5: Implementation process

1. What are the processes that are involved in malaria services? Who provides those services in each step? Who supervises those steps?
2. Who ensures that the supplies and equipment are available in those steps?
3. Is there any feedback mechanism in the process of the provision of malaria services? How is it done?
4. Which steps are more critical and why? How do you feel about the steps that are involved in malaria services?
5. What are the challenges in each step? How do you deal with those challenges?
6. What are your recommendations on malaria case management guidelines?

Appendix 10: Codebook for the research

Codebook for Barriers and facilitators to adherence to "test and treat" of malaria case management guidelines by health providers in Lilongwe District, Malawi in 2020

Main theme	Definition	Sub-themes	Definition

1.Knowledge of malaria test and treat	how the provider got information and skills on malaria test and treat and what the provider know about it**.**	Training	One-week discussion on malaria assessment, tests and treatment
		Refresher training	Two days briefing on malaria test and treat guidelines
		College education	Knowledge acquired during professional training.
		Handbook and treatment guidelines	Studying treatment guidelines
		Acquired knowledge	what provider knows or leant on malaria test and treat
		Evidence source	Organization or institution who developed the intervention
2.Management of fevers	This is how health provider assessed, tested and treat ed malaria fevers and non-malaria fevers.	uncomplicated malaria fevers	Symptoms and signs like fever, vomiting, headache.
		complicated malaria fevers	Symptoms and signs like convulsions, anaemia, malaise
		non-malaria fevers.	Patients with RDT malaria negative result
3.Health providers' perceptions	this is providers' opinion on the effectiveness and user-friendliness of test and	Effective	Malaria rapid tests can detect malaria cases and anti-malarial drugs cure malaria

	treat of malaria guidelines.		
		Not effective	Malaria rapid tests are not able to detect malaria cases and anti-malarial drugs cure malaria.
		both effective or not effective	50-50, RDT able or not able to detect and anti-malaria drugs cure malaria but sometimes some patients are not cured with AL
		Easy to implement	The steps that are involved in the management of malaria cases of the test and treatment guidelines are difficult and not practical
		Difficult to implement	The steps that are involved in the management of malaria cases of the test and treatment guidelines are simple and practical
4.Providers' prescription practices	this is what practically providers do in the management of fevers.	Presumptive treatment	Health provider gave anti-malarial drug without testing
		Prescribe AL to malaria negative patients	Health provider gave AL to patients with malaria negative results.

		Prescribe Artesunate Amodiaquine (ASAQ) to uncomplicated malaria patients	Health provider gave ASAQ to the patient with headache, vomiting, fever.
		Prescribe antibiotics to negative malaria patients	Health provider gave antibiotics to patients without malaria
		No antimalarial drugs were given to malaria negative patients	Health provider did not give anti-malaria drugs to patients without malaria
		Prescribe ASAQ to complicated malaria patients	Health provider gave ASAQ to patients who were convulsing, anaemic, high fevers
		Prescribe AL to positive malaria patients	Health providers gave anti-malaria drugs to patients with malaria only
5.Health provider-patient interactions	this is relationship and communication between provider and patients.	Patient Education Economic Status	How Literacy level of patients affect adherence to test and treatment of malaria How the financial status of the patients affect adherence to test and treat malaria
		Patient satisfaction	How health provider made the patient feel that s/he is treated well.

		Patient condition	The perceived severity of the patient state of health and how that influenced adherence to test and treat guidelines of malaria
		Comfort	How the health provider comforted the patient to make s/he happy
6.Health systems factors,	these were activities that happen at the institution to deliver quality services to patients.	Volume of patients	A large number of patients managed by health Provider than what the provider is supposed to manage.
		Task shifting	Assigning another cadre to perform a duty on behalf of a certain cadre
		Distance between health facilities	The sparse location of health facilities.
		Diagnostic tools.	Rapid tests for malaria and blood firm malaria parasite check using microscopy.
		Supervision and feedback mechanisms	Coordinators and health managers checking and appraising the prescribers
7.Ownership of facility	the institution or person managing the health facility	Private owned health facility	A health facility owned by an individual
		Government-owned health facility	A health facility owned by the government
8.Processes in the management of cases	these are the steps that are involved in the management of cases.	Ordering of drugs	Requesting drugs from the pharmacy.
		Testing	Taking blood a sample to diagnose an infection or disease

		Dispensing of drugs.	Giving drugs to patients
9.Guidelines that affected the implementation of malaria test and treat.	these are guidelines or policies that influence adherence to malaria test and treat policy.	C-IMCI	The steps that are used in the management of integrated child illnesses to manage malaria cases
		Antibiotics availability	The steps that are followed to prescribe antibiotics
		AL guidelines	Steps that are followed to disburse AL in the management of fevers

Appendix 11: Turnitin report

2160718: Revised_Draft_Dissertation_turntin_report_ELLA_CHAM… 20.doc

ORIGINALITY REPORT

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