ASSESSMENT OF HEALTH WORKERS' ADHERENCE TO GUIDELINES FOR PARASITOLOGICAL DIAGNOSIS AND TREATMENT OF UNCOMPLICATED AND SEVERE MALARIA IN PUBLIC HEALTH FACILITIES IN MUKONO DISTRICT

BY

Makanga Joseph

REG NO: 2015/HD07/2379U

A DISSETATION SUBMITTED TO MAKERERE UNIVERSITY IN PARTIAL FULFILLMENT OF THE REQUIREMENT FOR THE AWARD OF A MASTERS DEGREE IN HEALTH SERVICES RESEARCH OF MAKERERE UNIVERSITY

OCTOBER 2024

DECLARATION

I, MAKANGA JOSEPH hereby declare that research work submitted in this dissertation is original and a result of my own research except where otherwise acknowledged. This thesis has not been submitted for another degree award in this or any other University or institution. I therefore present it to Makerere University in in partial fulfillment of the requirement for the award of a masters degree in health services research of Makerere university

Signature:_____ Date: 01/10/2024

SUPERVISORS

This dissertation has been submitted with the approval of the following supervisors.

ASSOC. PROF. ELIZEUS RUTEBEMBERWA

Makerere University School of Public Health

Signature: ERutebemberwa Date: 01/10/2024

MS. MARY NAKAFEERO

Makerere University School of Public Health

Signature: NakafeeroM Date: 3rd October 2024

DEDICATION

I dedicate this piece of research work to my dear parents, Mr. Musisi Kalega and Mrs. Juliet Kalega, for educating me and making me a God fearing person and to my former teacher Mr. Kawuki Charles, for creating the foundation that has enabled me realize this dream.

ACKNOWLEDGEMENT

I am unreservedly thankful to my supervisors, Assoc. Prof. Elizeus Rutebemberwa and Ms. Mary Nakafeero whose guidance and support from concept development to the final stage of this dissertation allowed me to attain a better understanding of the research subject. I am also cognizant of the reality that without their support finishing this thesis would not have been possible. I wish also to offer my sincere appreciation to Dr. Musoke David and Dr. Yeka Adoke for their extensive critique and support that enabled me to perfect this dissertation to acceptable standards.

TABLE OF CONTENTS

List of Acronyms

ACT	Artemisinin Based Combination Therapy
CSV	Comma Separated Variables
DHO	District Health Officer
HC	Health Center
HSD	Health Sub-District
IRB	Institutional Review Board
IMCI	Integrated Management of Childhood Illnesses
ODK	Open Data Kit
PNFP	Private Not for Profit Provider
RDT	Rapid Diagnostic Test
RAs	Research Assistants
STG	Standard Treatment Guidelines
UBOS	Uganda Bureau of Statistics
UMoH	Uganda Ministry of Health
UNSTG	Uganda National Standards Treatment Guidelines
WHO	World Health Organization

OPERATIONAL DEFINITIONS

Adherence to malaria treatment guidelines was in this study defined as the management of a malaria case following a parasitological confirmation of the existence of the parasites with either mRDTs/Microscopy at the health facility and with the prescription of antimalarial medicines that conform to what is recommended by the national malaria treatment guidelines.

Confirmed malaria was defined as a malaria patient who received malaria testing at the health facility as part of routine case management by either microscopy or RDT and tested positive prior to receiving treatment.

Severe malaria: Acute Plasmodium falciparum malaria with signs of severity and/or evidence of vital organ dysfunction.

Suspected Malaria: was defined as symptomatically diagnosed malaria patients who attended a health facility with no parasitological diagnostic test results available

Uncomplicated Malaria: a patient with a fever or history of fever in the last 48 hours who has a positive parasitological test and no symptoms of severe disease and/or evidence of vital organ dysfunction.

ABSTRACT

Background: Uganda national malaria treatment policy guidelines recommend a malaria laboratory test in all patients presenting with fever (history of fever or an axillary temperature≥37.5 °C), and only those with a positive test receive anti-malarial treatment. However, adherence to these guidelines remains suboptimal amongst clinicians in public health facilities with clinical assessment of typical symptoms continuing to account for a significant proportion of malaria diagnosis and treatment practices that contravenes test results. Clinically diagnosed malaria remains the leading cause of morbidity and mortality in Mukono district in Uganda

Objective: The study aim was to assess health workers' parasitological testing and treatment practices for uncomplicated and suspect severe malaria and to determine the factors associated with adherence to the guidelines in public health facilities in Mukono District.

Methods: A cross sectional mixed method study design was used. Between July and September 2020, 765 records of suspect malaria patients for the year 2019 were reviewed from across nine health centers in Mukono district. Descriptive data analysis was used to determine the proportion of malaria suspect patients subjected to a malaria diagnostic test and determination of the prescription practices for malaria patients by the clinicians. Multivariable logistic regression and triangulation with qualitative analysis methods were used to explore the factors explaining prescription practices of the clinicians.

Results: Of the 765 malaria suspect patient records reviewed, 620 (81%) had a malaria parasitological test done by the clinician. Of the 578 patients diagnosed with uncomplicated malaria, (68%) were treated in accordance with national malaria treatment guidelines with 89% of those tested and confirmed, treated with the recommended first or second line antimalarial drug. Nearly 38% of the patients with negative parasitological test results were given either the first or the second line antimalarial drug, as were 56% of those without a malarial blood test prescribed an antimalarial drug. Of the patients with suspect severe malaria referred for further treatment 56% were provided an appropriate pre-referral treatment while 21% were referred without any.

Factors associated with the continued non-adherent prescription practices for malaria patients included; patient age (aOR=1.30, 95% CI: 1.14- 2.06, P=0.023), patient signs and symptoms of fever (aOR = 0.19; 95% CI: 0.52-0.76, P= 0.048), nausea (aOR = 0.48; 95% CI: 0.24-0.92, P=0.026), and sweating (aOR = 0.72; 95% CI: 0.26-0.84, P= 0.036).

Conclusion: A considerable proportion of patients presumptively diagnosed and those with negative test results still receive antimalarials.

Recommendations: District health authorities should enhance support supervision across all health facilities. The district service commission should allocate more health workers to urban centers to handle high patient volumes. Efforts should also focus on improving the quality of malaria data from public health centers to ensure accurate estimates of medicines and supplies, while scaling up training for health providers in integrated malaria/fever management to improve adherence to diagnostic results.

CHAPTER ONE: INTRODUCTION

1.1 Introduction/Background

The substantial over diagnosis of malaria as a cause of acute febrile illness has been the focus of global attention in recent years, most notably due to concerns about the clinical effects of misdiagnoses, the high cost of first-line artemisinin-based combination therapies (ACTs) and emergence of malaria drug resistance [Ezenduka et al. 2015]. In view of the need to achieve greater efficiency in the management of malaria, the World Health Organization (WHO) in 2010 introduced the Test, Treat and Track (TTT) policy.

Virtually all African countries experiencing continued malaria burden have in the recent years adopted the TTT policy and have implemented programs aimed at expanding access to and use of diagnostic testing and treatment of febrile conditions in both the public and private health sectors. The major challenge however to the implementation of the TTT policy has remained the slow transition of health worker practices from presumptive to confirmed malaria case management. Studies have shown that in most malaria endemic countries in sub-Saharan Africa, health workers of different cadres do not fully comply with treatment guidelines of the TTT policy [Kabaghe et al, 2016].

In Uganda, adherence to the existing national malaria treatment policy guidelines particularly by health care providers, remain suboptimal, with clinical assessment of typical symptoms continuing to account for a significant proportion of malaria diagnosis. In addition, there has been mixed reports on mis-treatment according to test results [UNMCP, 2018]. Clinically diagnosed malaria is the leading cause of morbidity and mortality,

accounting for up to 20% of all hospital deaths and 27.2% of inpatient deaths among children less than five years of age in Uganda [UNMCP, 2018].

Adherence to policy guidelines by healthcare providers is essential so as to improve quality of care, avoid over-diagnosis of malaria among febrile patients which may lead to inappropriate or delayed treatment, and reduce wastage of anti-malarial drugs. The TTT strategy enables isolation of malaria from non-malarial fevers which clinically present as malaria and the use of ACTs as recommended under the TTT guidelines help to reduce malaria transmission by reducing sexual parasites hence lowering patient infectiousness.

In its 2012 Strategic Plan, the Uganda National Malaria Control Program (NMCP), benchmarked to increase the proportion of malaria cases parasitologically confirmed and treated with effective antimalarial drugs from 25% to 90% by the year 2015. However, the extent to which this improvement was achieved among the different stakeholders is not well documented. To extend the frontiers of efforts to control malaria, Uganda National Malaria Control Program [UNMCP] set key goals and objectives to be achieved by the year 2020 and among the key goals is to reduce malaria morbidity to 30 cases per 1000 population and to reduce the malaria parasite prevalence to less than 7%. Furthermore, UNMCP set to achieve and sustain by 2018 at least 90% of malaria cases in the public and private sector and that community level receive prompt treatment according to the national guidelines [UNMCP 2014-2020].

The Burden of malaria in Uganda

Malaria remains a leading public health problem associated with slow socio-economic development and poverty. It is the most frequently reported disease at both public and private health facilities in Uganda. The disease is highly endemic in 95% of the country, representing 90% of the population of 35 million [UMRESP, 2021-2025]. Uganda has the third highest number of deaths from malaria in Africa, as well as some of the highest reported malaria transmission rates in the world. Household expenditure for malaria treatment is also a high burden to the population, consuming a larger proportion of the incomes in the poorest households. A single episode of malaria costs a family on average 9 US dollars, or 3% of their annual income [UMRESP, 2021-2025].

2.2 Malaria control strategies with a focus on diagnosis and treatment

Some experts have argued that in highly endemic settings, malaria elimination is not a realistic target; efforts need to be geared towards profound decreases in transmission to impact significantly upon the incidence of disease[Sunil Dhiman, 2019] For many decades prior to change of malaria treatment policy in 2011,Uganda Ministry of health in line with the World Health organization recommendation, promoted presumptive treatment approach for all febrile illness as malaria [Baiden F, 2014] This approach relies solely on clinical symptoms and signs to establish diagnosis and initiation of treatment.

The major justifications for the adaptation of presumptive approach to managing malaria in high-endemic countries were: The high levels of transmission and associated morbidity

and mortality, symptomatic treatment was favored because it enabled prophylactic treatment of asymptomatic malaria especially among children and pregnant mothers that are most vulnerable to the disease using, inexpensive and effective antimalarial drugs such as chloroquine that were widely available across malaria endemic countries [Baiden F, 2014]. In Uganda for instance the only malaria control effort between 1980s and 1990s was presumptive treatment with Chloroquine (CQ) [Ambrose OT, Adoke Y, Fred K, et al. 2014].

Furthermore the lack of easy-to-use, point of care accurate and reliable malaria diagnostic tools was another important justification for adoption of the presumptive approach. [F. Baiden, K. Malm et al, 2014]. Blood smear microscopy that had been the mainstay of parasitological confirmation of malaria for many years was too elaborate, technical, and expensive to set-up and maintain in all primary care facilities.

Symptomatic diagnosis and treatment had many shortcomings though which were against effective malaria control efforts [F. Baiden, K. Malm et al, 2014] The approach is characterized by over-diagnosis and treatment of malaria with anti-malarial which partly contributed to rapid emergence of drug resistant strains of Plasmodium falciparum. There was increased morbidities and mortality among febrile patients because clinical diagnosis and management of febrile cases often prevented clinicians from investigating the true aetiology of fever and could remain untreated [Ezenduka et al, 2014]

Faced with persistent and unacceptably increasing parasite resistance to Chloroquine (CQ) + Sulphadoxine Pyrimethamine (SP), which was the mainstay for treatment of malaria, countries in malaria endemic environments including Uganda took decision to abandon CQ first and then later CQ+SP as the first line treatment for uncomplicated malaria and adopted

Artemether-Lumefanthrine (AL) [Uganda malaria operational plan, 2023]. The decision was based on multi-country therapeutic efficacy studies which demonstrated the good efficaciousness levels of AL with respect to treatment, potential to curtail malarial transmissions rates and the likely long useful life-expectancy with low probabilities of resistance. However, affordability, adherence and feasibility remained uncertain [UMRSP, 2014-2020].

With the deeply entrenched symptomatic diagnosis and treatment practice, after adaptation of AL health workers continued with the practice of presumptive treatment of all febrile cases with AL despite affordability uncertainties and ardent interest to preserve the drug from developing resistance as well. To curtail the vice, in 2011 World Health Organization recommended test treat and track policy which has almost been adopted by all malaria endemic countries Uganda inclusive.

Test and treat strategy emphasize improved diagnosis of malaria infection, prompt treatment with effective antimalarial drugs and regular monitoring through routine information system to ensure effective implementation [UNHP II, 2015-2020]. Thus, investigations are needed to appreciate the impact of national strategies among districts that are most vulnerable. How have the prescription behaviors of health workers have changed since the introduction of ACT and adaptation of parasitological diagnosis, and how they currently navigate malaria management given the current inadequacies within the health delivery system in the Country and in the districts in particular [R. Kassam et al, 2015]

2.3 Diagnosis and treatment of uncomplicated and severe malaria guidelines in Uganda

The Uganda Malaria Control Policy 2012 specifically recommends that parasite-based diagnosis with Microscopy or Rapid Diagnostic Tests (RDTs) shall be part of malaria case management in all health facilities and at the community level. Specifically, the policy states that:

i. Suspected malaria cases will be subjected to parasite-based diagnosis.
ii. Microscopy remains the "reference or gold standard" for malaria diagnosis in case management and shall be the diagnostic method at all Health Facilities from level III and above.
iii. RDTs will be used at HC II and community levels and to fill the gaps at higher level health facilities whenever microscopy is not possible.

Treatment solely on the basis of clinical suspicion should only be considered when a parasitological diagnosis is not accessible, such as during periods of lack of qualified staff to conduct testing and stock-outs of testing supplies.

Moreover, the policy for treatment of malaria recommends ACTs for treatment of uncomplicated malaria and intravenous Artesunate and Quinine for treatment of severe malaria. The policy directs that Artemether/Lumefantrine (AL) should be the first line treatment for uncomplicated malaria, while Artesunate/Amodiaquine is the alternative first line treatment. Artesunate (given intravenously) is the recommended medicine for the treatment of severe malaria while intravenous Quinine or Intramuscular Artemether is the

alternatives to be used when Artesunate is not available. [WHO malaria treatment guidelines 2015]

1.2 Malaria treatment policy profile in Mukono district

Mukono district adopted test, treat and track based approach in 2013. The district experiences hyper-endemic transmission rates of malaria with peaks in May-June and November-December [Mbonye et al, 2013]. Malaria incidence rates and prevalence remain significantly higher in the district compared to the national year-2020 set target [UNMCP 2014-2020].

Since adoption of the TTT policy guidelines in Mukono district, various initiatives including mentorship of health workers in integrated management of malaria, capacity building in clinical auditing and provision of quarterly support supervision have been undertaken by the district health team to ensure effective implementation of the TTT policy.

Despite these efforts, there are numerous challenges reported by the district health team that may be militating against improvements in health workers' adherence to the national malaria treatment guidelines. Among which is the regular stock outs of essential drugs and diagnostic supplies specifically mRDTs, inadequate support supervision, and absenteeism of laboratory staff and regular breakdown of microscopic equipment [2018 district health report]. Research evidence suggests that the factors that influence practices of health workers are context specific [R. Kassam et al, 2015].

In Mukono district, since adoption of the TTT malaria treatment policy few studies have been conducted to assess health workers' adherence to malaria treatment policy guidelines. Moreover there is paucity of information about the performance of previously undertaken

initiatives on the prescription practices for febrile patients in Mukono district. Studies that have been done majorly have looked at the management of malaria with the aid of rapid diagnostic tests results [Naigino R, 2014]. Thus, this study sought to determine the degree of adherence to malaria diagnosis and treatment guideline among health care service providers and the associated factors in public health facilities in Mukono district.

CHAPTER TWO: LITERATURE REVIEW

2.0 Introduction

This chapter presents synthesized relevant literature carried out with respect to adherence to treatment guidelines for malaria and the possible barriers to adherence. Further the chapter also corroborates findings of other studies demonstrating adherence to treatment guidelines and non-adherent febrile patient management practices.

2.1 Suspected malaria cases attending OPD in public health facilities that receive a malaria parasitological confirmatory test.

Malaria case-management based on parasitological confirmation of all suspected malaria patients before targeted treatment of only test positive cases has been the mainstay of malaria control efforts in Uganda and elsewhere in Africa where malaria is endemic since 2010 (Dejan Zurovac et al, 2022). While the availability of 'test and treat' commodities is the prerequisite for the policy implementation, health workers' compliance with recommended guidelines determines the cost-effectiveness of case-management [Worges M, Celone M et al, 2019).

A study evaluating malaria case management at public health facilities in two provinces in Angola revealed significant adherence differences to test and treat policy between the two provinces despite similar availability of testing and ACT commodities (Mateusz M. Plucinski et al, 2017). Of the proportion of suspect malaria cases attending OPD, only 30% received a parasitological confirmatory test in Huambo province compared to 69% in Uíge. Overall, only 28% of patients with uncomplicated malaria, as determined during the re-examination, were appropriately treated with an ACT with the correct dose in Huambo, compared to 60% in Uíge (Mateusz M. Plucinski et al, 2017).

A cross sectional study with a sample size of 1840 outpatients conducted in 117 public health facilities, found the rate of malaria testing for febrile patients significantly lower in three provinces in Mozambique, Maputo (33%), Zambézia (62%), and Cabo Delgado (69%) (Baltazar Candrinho et al, 2019). Notably, the study also found testing of fever cases for malaria to be higher at 70% in the high-transmission provinces of Zambézia and Cabo Delgado, compared to only 33% in the low malaria transmission province of Maputo. Elsewhere this finding then appears to suggest that the decrease in malaria disease burden (Uganda malaria indicator survey,2018/2019), may be one of the reasons clinicians may not request for a parasitological diagnostic test in patients with fever. In its 2020 report, the World health organization highlighted that whereas significant improvements in malaria control have been made globally, progress in the recent years has plateaued (World malaria report, 2020).

Recent improvements in malaria 'test and treat' compliance have equally been reported across health facilities in Africa (Klootwijk L, Chirwa AE et al, 2019). Despite the improvement trends and in the face of increased availability of implementation research evidence proving efficacy of malaria test, treat and track policy (Obi IF, Sabitu K, Olorukooba A,et al. 2019), non-compliant practices to the policy guidelines have not been eliminated, and they are more pronounced with respect to testing than treatment compliance (O'Boyle S, Bruxvoort KJ et al, 2020). In a drug use study conducted across 11 provinces of the DRC, which analyzed prescription patterns of anti-malarial drugs in public health centers and general referral hospitals, it was found that medical personnel requested confirmation of malaria through a rapid diagnostic test (RDT) or microscopy modes in only 63% of suspected cases (Ntamabyaliro et al, 2018)

A similar study done in Malawi at the medical outpatient departments across 105 public health facilities found adherence levels to the testing requirement of malaria patients relatively high but still fell short of the Ministry of Health's strategic goals. Of the 1427 suspect uncomplicated malaria patients who required a parasitologicalal test, 76% received the test. Most confirmed malaria patients (93%) were appropriately treated. On the contrary however of the of 90 suspect severe malaria patients, only 6% of the 90 patients received an appropriate pre-referral treatment (Namuyinga et al. 2017).

Similar multicentre studies done in multiple African countries (DRC, Mozambique, Nigeria, Rwanda, Tanzania, and Zambia), further highlight that when suspected patients test positive for malaria, the large majority receive the correct treatment. On the contrary when testing is not available, where patients are presumed to have malaria, treatment is more often sub-optimal, with a very small proportion of the clinically diagnosed cases receiving the recommended treatment [Baraka et al, 2023]. This strongly suggests that health workers make more effective malaria management decisions when guided by diagnostic test results.

2.2 Health workers prescription practices for uncomplicated and suspected severe malaria patients

Assessment of adherence to prescription protocols for malaria has been relatively done in various areas especially those prone to malaria however it has mostly been done based on strict malaria case management parameters alone; potentially this can obscure inappropriate prescription practices if all diagnostic pathways are considered [Rao VB et al, 2016].

In another similar study, it was observed that prescription compliance with the recommend antimalarial to febrile patients was less impressive when all diagnostic pathways were

considered, that is inclusion of clinical malaria diagnosis, with only 33.7% of patients diagnosed with malaria by any means provided the correct antimalarial. Study finding further revealed that primary healthcare workers may at times prescribe less effective, obsolete antimalarial to presumptively/clinically diagnosed malaria patients as compared to confirmed malaria cases, this practice has been recorded elsewhere [Pulford J, Smith I, 2016)

In related research while overall compliance with prescription protocols was observed to be relatively high when diagnostic pathway was not considered (77.8%), compliance with a strictly defined 'test and treatment' guideline (all febrile cases tested by RDT or microscopy, correct antimalarial only prescribed to confirmed malaria cases, no antimalarial prescription to test negative cases) was observed to be much lower (62.8%) [Pulford J, Smith I et al 2016]. These findings suggested that there can still be considerable room for improvement in health workers compliance in routine diagnostic testing and antimalarial prescribing practices.

In the absence of alternative point of care diagnostic tool, it is recommended for the providers to conduct symptomatic diagnostic following IMCI algorithm for patients who diagnose negative with uncomplicated malaria [Uganda malaria operational plan, 2023]. This requires however clinicians to obtain all the necessary information that can enable them classify patients appropriately based on the presented conditions to target medicine prescription to those who actually need it [Uganda malaria operational plan, 2023].

But following evidence as indicated from recently concluded studies, providers collect very little minimal information from the patients, hardly take the necessary patient history that go beyond the key complaints made by the patients as well as their duration, rarely do they

(health workers) conduct the necessary physical examinations or enquire about the presence of specific symptoms that could be linked to the cause of fever [Altaras et al. 2016]. This lives room for one to wonder whether clinicians actually adhere to the test and treatment prescription standards.

In a related study while health care providers appeared to value the test and treat based practice using mRDTs as a confirmatory diagnostic, some in their observed practice demonstrated limited capacity to diagnose non-malarial fevers. The degree of subjectivity faced by clinicians may pose considerable potential to compromise the level of adherence to standard prescription guidelines [Helen E D Burchett et al, 2017]. Very often providers find it difficult to decide whether to recommend antimalarial or antimicrobials especially for febrile conditions which present with similar signs and symptoms. [Nyaoke BA, Mureithi MW, Beynon C 2019]

In the initial days of the introduction of the test and treatment algorithm, evidence from various studies reveal differing health workers prescription practices for febrile patients from the set test and treatment protocol. A research study conducted in Uganda indicated that some health workers would prescribe non-ACT malaria treatment to patients above five years of age with a positive mRDT result in order to preserve ACTs for patients aged below five years and as well to meet the expectations of patients who insisted on getting a treatment for their complaints [Shennae O′Boyle et al, 2020].

Relatedly in a recently concluded study which investigated compliance barriers to test and treatment guidelines for febrile patients found out that reluctance to test current/recently febrile patients for malaria infection by RDT or microscopy in the absence of acute malaria/fever symptoms; desire to reserve recommended first line antimalarial for confirmed malaria cases only; choosing to clinically diagnose a malaria infection, despite a negative RDT result; and having too little time to provide malaria prevention advice were still among the flourishing compliance barriers to the new malaria treatment guidelines [Rao VB et al, 2016].

Despite observations in one of the reviews that health workers' adherence to revised anti-malarial prescription protocols generally improves over time [Bawate et al, 2016], comparison of evidence from initial implementation stages of the test and treatment algorithm to recent practices, raises questions of whether there is any change in providers believes, attitudes and practices to reinforce adherence to test and treatment guidelines for malaria and other febrile illnesses.

A related study on prescription practices in Mulago National Referral and Teaching Hospital, (Tumuhamye, 2020) found that out of 182 prescriptions for child patients with suspected bloodstream infections in the department of pediatrics, compliance with the *Uganda Clinical Guidelines* [MoH, 2016] as to the nature of the prescribed antibiotic was observed in about half (50%) of the treated patients. Moreover, the study further revealed that the *Uganda Clinical Guidelines* [MoH, 2016] were hardly used; in fact, it would appear that many specialists in this teaching hospital ignored the guidelines. Exploratory and educational interventions urgently needed to address non-use of Uganda national standars

treatment guidelines (UNSTG) and improve the prescribing practices in both sector [Obua C, Waako P, et al 2016].

Evidence from previous studies has revealed complaints from providers about the high workload that is associated with using mRDTs as a constituent of test and treatment-based approach. In one study Providers reported that they were now doing additional tasks and that it required too much time per patient for the proper management that conforms to the set stands, particularly in a context where a health worker was often working alone to manage an overwhelming number of patients [Robin Altaras, et al 2016]

2.3 Factors associated with health workers adherence to malaria diagnosis and treatment guidelines

Health system factors

A range of context specific factors in which providers operate have been widely demonstrated in previous studies to significantly affect adherence to test and treatment protocols. Stock outs of mRDTs, ACTs, non-reliability of diagnostic laboratory results, and delay in producing laboratory results are among the drivers found in other studies for the providers not to base malaria management according to laboratory findings [Burchett HED, Leurent B, Baiden F, et al, 2017]. In a synthesis of ten studies conducted across various African countries, stock outs of ACTs were observed to be significantly associated with variation in adherence to malaria treatment guidelines; this could not however explain all the observed variation.

In some cases, ACT use was relatively low absence or few stock outs, whereas in others, ACT use was high despite relentless stock outs occurring. This suggests that other than

provider confidence in the stability of ACT supplies and related medicines possibly there are other determinants which influence prescription practices and rationing of ACTs, even when they are available. A similar situation was observed in Tanzania, where lower rates of adherence to malaria treatment standards were observed in the situations where stock outs were most frequent and even after intermittences of ACT stock outs were addressed.

In another study it was found that provision of 100% stock of ACTs was associated with a 28.9%-point increase in the proportion of malaria cases given an ACT; similarly, it also resulted in a 26%-point increase in the proportion of non-malarial febrile illness (NMFI) cases prescribed an ACT [Pulford J, Smith I et al, 2016].

The effect of support supervision and continued use of treatment guidelines by the health workers when diagnosing and treating patients suspected of febrile illness, has been investigated [Ruth J. et al, 2017]. In the study, the observed testing rates differed among health workers depending on whether or not health workers had received any supervision visit in the previous 6 months. Among health workers that had not received supervision, the odds of testing of suspected patients for malaria was lower among health workers who had not been continuously supervised and among those that had no treatment guidelines compared to those who did have [Ruth J. et al, 2017].

Similarly, only 57% of patients seen by the providers who were neither supervised in the previous 6 months nor possessed a copy of the treatment guidelines were tested, compared to 76%, 79% and 87% of the patients seen by health workers with both supervision and

copy of the treatment guidelines [Ruth J. et al, 2017]. In a related study despite the availability of the guidelines, providers straightforwardly explained they did not refer to them in practice [Olukunle O. Oyegoke1, 2022]. The lack of other diagnostic tools or ability to test for other diseases was also cited as a constraint by providers [Olukunle O. Oyegoke1, 2022]

Patient clinical factors

Certain clinical features of febrile illness that patients present with may at times inappropriately influence a health workers treatment decision [Agbemafle EE et al, 2023]. In a study conducted in Malawi, it was found that patients without confirmed malaria who complained of fever to the health workers, vomiting or chills were significantly more likely to be over treated for malaria, as compared to those who reported fatigue [Ruth J. Namuyinga, 2017].

In a similar study conducted to understand health workers adherence to prescription guidelines, it was found that presence of cardinal malaria signs and symptoms and a "typical" clinical picture of malaria without any suspicion to conduct other diagnoses were found to be strong drivers for the health workers not to base management of malaria cases on test and treatment protocol [Charles B, 2016]. This study however was conducted in a district where there was an ongoing project endeavoring to improve malaria case management and it only included health center III and IV, thus may not be representative of malaria endemic districts where such similar interventions have not taken place.

In another study, when health providers were asked if they sometimes prescribe anti-malarial drugs to mRDT negative patients, 67% of them admitted to such a practice. The rationale according to them for prescribing anti-malarial drugs to RDT-negative patients was because the clinical symptoms were suggestive of malaria and one mentioned persistent symptom in patients with negative results. Five health workers said patients sometimes demand anti-malarial drugs despite negative results, although only one admitted to prescribing due to patient demand [Robin A et al, 2016; Ugwu I. Omale, 2024].

Related studies have on the other hand showed that health workers prescribing patterns can also be affected by non-clinical factors in up to one half of cases [Richard Ofori, 2016]. In today's fee for service or managed-care environment, healthcare providers are pressed to see more patients in less time. They have insufficient time to educate patients about appropriate use of medicines. Thus, prescribing an antimalarial or an antimicrobial even when not appropriate may be an effective way to conclude a patient clinical consultation and possibly to prevent more serious super-infections [Batwala et al, 2017]

The interplay of the contextual realities providers undergoes like work overload and lack of reliable laboratory services often result into nuisances that antagonizes health providers intent to manage patients according to treatment guidelines and instead chose to manage them based on clinical presentations which plays a very central role in guiding the prescriptions of medicines [Jaffu Chilongola, et al, 2015]. Although the National Standard Treatment Guidelines and the National Essential Medicines List are available, strict adherence to these guidelines remains a critical challenge that needs to be urgently

addressed in many lower-level health facilities in Uganda [UNMCP Severe malaria management report, 2017]

CHAPTER THREE

3.1 PROBLEM STATEMENT

Parasitological confirmation and treatment with the recommended antimalarial are the national supported policy for the effective management and control of malaria. The policy in Mukono district was adopted in 2012, despite nearly a decade of its adoption and the efforts undertaken in its implementation, not all suspected malaria cases are tested before treatment, for some when tested, health workers disregard negative test results and prescribe antimalarial drugs [2018 district health office report].

The district health team though believes that part of the problem is largely accounted for by the numerous challenges encountered by the district, among which is the high incidence rate of malaria which stands at 252 cases per 1000 population in the district [District health office report, 2017], lack of functional laboratory diagnostic equipment and regular stock outs of antimalarial drugs and supplies in the various health facilities in the district. The district rolled out training of all health workers in integrated management of malaria however only 30% of the health workers have been enrolled in the training. There have been efforts to redistribute medicines and other medical supplies in cases of oversupply and stock outs from one facility to another. The effects of these interventions with respect to improving adherence to malaria treatment guidelines remain under documented.

Non adherence to malaria test and treatment guidelines among health workers affects the successful implementation of the current parasitological diagnosis and malaria treatment policy in the district. The practice undermines optimization of the efficaciousness of prompt and effective management of malaria cases as it may lead to delayed and poor-quality treatment of patients particularly for non-malarial febrile illness, exposure of patients

unnecessarily to adverse effects of drugs which may actually contribute to development of drug resistance.

The purpose of this study was to investigate and document the circumstantial factors and or cases under which health workers fail to adhere. Based on the information generated appropriate corrective measures were suggested to improve adherence to malaria treatment guidelines. This is anticipated to further contribute to the transition of health workers' prescription practices from presumptive to parasitological confirmation-based management of malaria in Mukono district.

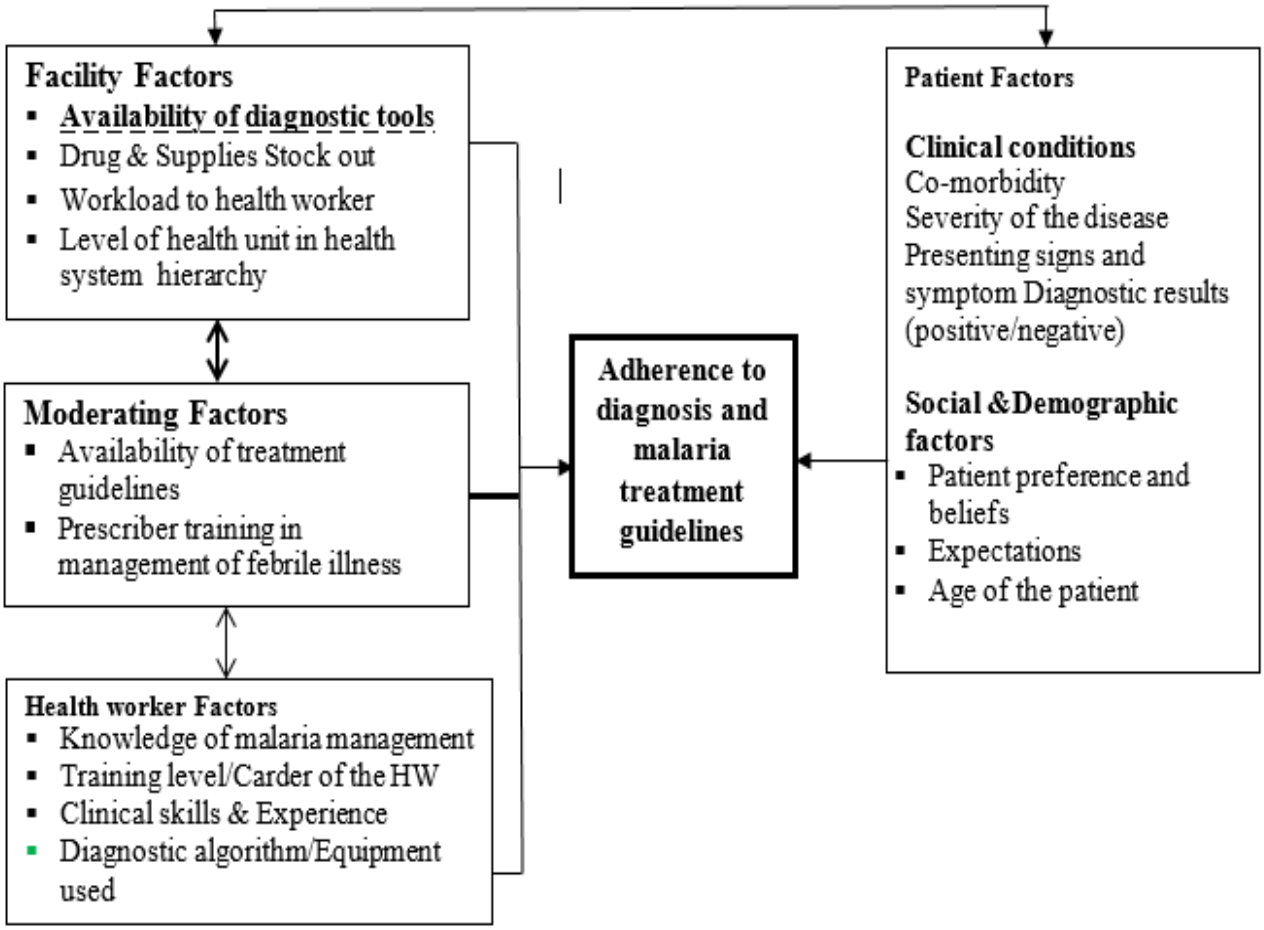
3.2 Justification for the study

Prompt and effective management of malaria remains a major strategy in the control of malaria with parasitic confirmation as its backbone. It is therefore very critical for health workers to correctly diagnose and comply with malaria treatment guidelines. While meticulously crafted policies and public health interventions are essential to advance malaria control efforts, a better understanding of clinicians' experiences with respect to malaria management and appreciation of their knowledge, perceptions, challenges and coping mechanisms will enable solutions better targeted to the problem of non-adherence to treatment policy guidelines for malaria in public health facilities in Mukono District.

The research is expected to contribute to public health improvement efforts in Mukono district by documenting good malaria management practices that are a result of the different interventions undertaken by the district. This will help Mukono district health planers to know which interventions that work and those that don't work with respect to improving adherence to malaria treatment guidelines. Lessons learned from one facility may be picked and applied to other facilities to ensure a successful adoption of the strategy. Additional

contribution of the study will be towards documentation of the coping mechanisms devised by the health workers found to have meaningful effect on febrile management practices.

3.3 CONCEPTUAL FRAMEWORK



The conceptual framework is not an adoption from other frameworks but rather developed by the researcher

3.4 Narrative of the conceptual framework

Deciding whether to prescribe an antimalarial to a febrile patient can be a complex process, during which healthcare providers are influenced by interplay of factors which with respect to the present conceptual framework fall under the enabling and facilitating factors. The training level of the clinician, the clinical skills and experience possessed by the health workers in management of febrile illnesses and the diagnostic algorithm employed are among the identified enabling factors of which it is presumed that when interact with facilitating factors may potentially affect the management practices of febrile patients by the health providers. Otherwise, each of the factors may independently influence the prescription decisions of healthcare provider to a patient in many different ways.

Health facility/System factors for instance; availability of diagnostic equipment, drugs, workload to the health providers and quality assurance requirement attached to a case worked upon may less likely lead health providers not to adhere to the general management guidelines while on the other hand health provider related factors such as the clinical skills possessed by the clinicians to diagnose febrile conditions, training level of the clinician and the diagnostic algorithm employed by the clinician may more likely lead to health worker's non adherence to the treatment guidelines.

Patient factors also can pose acceptable influence on the prescriber to bend towards the desires of the patient, expectation and beliefs of the patient for example may cause a health care provider to prescribe medicines or not. This study therefore focused on determining prescription practices of healthcare providers to febrile patients and the extent to which they comply with the standard treatment guidelines. Moreover, the study attempted to explore

and as well determine the factors associated with health workers adherence to malaria diagnosis and treatment guidelines in public health facilities.

3.5 RESEARCH QUESTIONS

1. What proportion of suspected malaria cases attending OPD in public health facilities in Mukono district receives a malaria parasitological test?

2. What are the prescription practices of health workers for uncomplicated and suspect severe malaria cases in public health facilities in Mukono district?

3. What factors are associated with health workers adherence to malaria diagnosis and treatment guidelines in public health facilities in Mukono district?

CHAPTER FOUR

4.0. STUDY OBJECTIVES

4.1. General Objective

The overall objective of this study was to assess health workers' parasitological testing and prescription practices for uncomplicated and suspect severe malaria and to explore, determine the factors associated with adherence to malaria diagnosis and treatment guidelines in public health facilities in Mukono District.

4.2. Specific Objectives

1. To determine the proportion of suspected malaria cases attending OPD in public health facilities in Mukono district that had a malaria parasitological test in 2019.
2. To determine health worker prescription practices for uncomplicated and suspect severe malaria in public health facilities in Mukono district.
3. To explore and determine the factors associated with health workers adherence to malaria diagnosis and treatment guidelines in public health facilities in Mukono district

CHAPTER FIVE: METHODOLOGY

5.0 Introduction

This chapter presents the methodology including the general approach and study design, the set protocol for data collection, preparation and analysis and reporting. The chapter further focuses on the actions which were taken to ensure the quality (rigor), validity and reliability of the study data

5.1 STUDY AREA

The study was conducted in Mukono district. The district is sub-divided into four (4) health sub-districts (HSDs), including Mukono Municipal Council (M/C), Nakifuma, Mukono North and Mukono South. In total the district has 42 health units, including one (1) PNFP Hospital, 13 Government owned Health Centre IIIs, 21 Health Centre IIs and 2 Health Centre IVs. Distribution of the health facilities across the Health Sub-districts is such that Mukono M/C HSD has one HC IV, one HC III, three HC II and one PNFP HC II. Mukono North HSD has 2 HC IIIs, 5 HC IIs and 1 PNFP HC II. Mukono South hosts 1 HC IV, 4 HC IIIs, 7 HC IIs which are Government owned. Mukono South also hosts 3 HCIIs and 1 HC III that are both PNFP. Lastly Nakifuma HSD has 6 HC IIIs, one PNFP Hospital, 6 HC IIs and one PNFP which is at HC II level (see Table 1 below).

Table 1. Distribution of health facilities in Mukono district by HSD and level

Health Sub-District (HSD)	Health Center Level							Total
	Public facilities			Private not for profit				
	HC II	HC III	HC IV	HC II	HC III	HC IV	Hospital	
Mukono M/C	3	1	1	1	0	0	0	6
Nakifuma	6	6	0	1	0	0	1	14
Mukono North	5	2	0	1	0	0	0	8
Mukono South	7	4	1	3	1	0	0	16
Total	21	13	2	6	1	0	1	42

5.2 STUDY SITE

This was a health facility-based study. No records were abstracted outside the health facilities.

5.3 STUDY DESIGN

A cross-sectional study design employing mixed methods that is, quantitative and qualitative methods of data collection was used in the determination of adherence level of health workers prescription practices to diagnosis and treatment guidelines for uncomplicated and suspect severe malaria and to identify the factors associated in public health facilities.

The quantitative method utilized review of malaria patient case records at OPD for up to 12 months preceding the study. The qualitative method sought to engage health workers and administrators at the selected health facilities to learn more about the extent and circumstances that bring about non adherence.

5.4 STUDY POPULATION

The study population for the quantitative part of the study included suspect uncomplicated and severe malaria patients managed at the outpatient level.

For the qualitative component the study population was health care workers in the public health facilities who were directly involved in the diagnosis and treatment of patients suspected to have malaria. These included medical officers (doctors), clinical officers, laboratory technicians, nurses and the pharmacists as well as health facility administrators and district health planers.

5.5 SAMPLE SIZE DETERMINATION

To estimate a representative random sample of all patients that qualify for the study, the Kish Leslie (1965) sampling formula for known proportions of the variable of interest in the study population was used:

$$n = \frac{Z\alpha^2\, P(1-P)\, D}{d^2}$$

where

n = the desired sample size.

$Z\alpha$= critical value corresponding to the standard normal distribution at 95% confidence level (typically equal to 1.96 from statistical tables)

P = proportion of the variable of interest (in this case, adherence at 29%[district health report 2018]) in the study population

d^2 = desired level of precision is 3.5%

Sample Design effect, D is given by: $D = 1+\rho[b-1]$

Where:

b= number of study units (respondents) per cluster which for practical reasons estimated to be 60. This is the number of records that is expected to be abstracted in a day.

ρ(rho) = intra cluster correlation; rho value of 0.02 (typical value derived from various demographic health studies) was used. This gives D = 1.18, which represents the effect of clustering due to having prescriptions from the same prescribers and cluster sampling design.

Choosing a precision level of 3.5% and substituting P=29% into the above formula yielded a sample size of **646** which was then adjusted to account for Sample design effect as follows

Adjusting for design effect 646 x 1.18 the sample size for the study became 763 and this was then approximated to 765 patient records.

Sample size determination for the qualitative component was achieved by use of progressive evaluations for information generated from respondents and theme saturation. The minimum sample was set at Nine (9) Key informant interviews from 9 health facilities and three in-depth interviews with health workers in administrative positions of the district health team. This number was found sufficient to reach saturation level of information regarding reasons for adherence or non-adherence to malaria treatment guidelines.

5.6 SAMPLING PROCEDURE

Sampling procedure for health facilities

Stratified random sampling was used to select Health Centers II, III, and IV, stratified by facility tier. A sampling frame was created from the estimated number of all febrile patients seen at each public health facility in the district in 2019, and this was used to generate the sample. Four strata were created at the health sub-district level. Based on the total number of patients (measure of size) per stratum, proportionate allocation approach was employed to determine the number of health units to be selected per stratum as provided in table 2.

Table 2: Determination of health facility and patient records allocations per stratum

Strata (HSD)	**Patient records par facility level and health sub-district (HSD)**				**Records Allocations**	**Facility Allocations**	**Health Facilities allocated (Adjusted)**
	HC II	**HC III**	**HC IV**	**Total**			
Mukono M/c	22,798	12,805	37,154	72,757	153.0	(153÷765) *9	2
Mukono North	42,614	41,441	-	84,055	176.0	(176÷765) *9	2
Mukono South	39,244	48,726	22,769	110,739	233.0	(215÷765) *9	3
Nakifuma	31,138	65,566	-	96,704	203.0	(204÷765) *9	2
Total	**135,794**	**168,538**	**59,923**	**364,255**	**765.0**		**9**

Probability proportional to size was employed to allocate the sample across the different strata individual health facilities. Alongside the estimated number of febrile patients per facility, a cumulative measure of size per stratum was generated, and Excel's inbuilt RAND-BETWEEN formula was used to randomly select one health facility from each category within each stratum.

In total 9 out of the 36 public health units were sampled from the four HSDs. One of the 3 health center II in Mukono Municipal Council was randomly selected together with one HC III. In Mukono North HSD one HC III and one of the 5 HC IIs were randomly sampled. In Mukono South, one of the 6 HC IIs and one of the 4 HC IIIs were randomly selected as was HC IV. In Nakifuma HSD one of the 6 HC IIIs and one of the 6 HC IIs were also randomly selected. At the health facilities, simple random sampling was employed to select the participating cases. Full list of the sampled health facilities together with their corresponding records allocations is provided in Table 3.

Table 3: Study Sampled public health facilities in Mukono district

County (HSD)	Sub-County	Parish	Health Unit	Facility level	Patient Records Allocated
MUKONO M/C	GOMA DIVISION	NYANJA	KYUNGU	HC II	63.0
MUKONO M/C	GOMA DIVISION	MISINDYE	GOMA	HC III	90.0
MUKONO NORTH	KYAMPISI	NTONTO	NAMASUMBI	HCII	70.0
MUKONO NORTH	NAMA	KATOOGO	KATOOGO	HC III	106
MUKONO SOUTH	NAKISUNGA	KATENTE	KATENTE	HC II	32.0
MUKONO SOUTH	MPATTA	KABANGA	KABANGA	HC III	46.0
MUKONO SOUTH	NTENJERU	NTANZI	KOJJA	HC IV	155
NAKIFUMA	KIMENYEDDE	KIWAFU	KIMENYEDDE	HC II	44.0
NAKIFUMA	KIMENYEDDE	NAMALIGA	NAKIFUMA	HC III	159.0

Sampling procedure for patient records at the sampled health units

At each of the sampled health facility, medical records of all suspect malaria patients at the health facility registry were identified through the facility in-charge and records officer. These were then reviewed, extracted the identification number, gender and age of the patient. The extracted attributes were subsequently entered into Microsoft excel, aggregated them up and generated a sampling frame that included all the eligible patient records for each particular health center sampled for the study. Using Microsoft excel data analysis tool pack, simple random sampling was performed and selected the allocated number of patient medical records from the generated sampling frame at each health center. It is these selected patient medical records that were included in the study sample.

Data extraction clerks then identified and extracted the data from them into the data extraction form according to the data quality control protocol set by the researcher. The researcher then reviewed the collected data, and referenced a sample of records to the OPD and inpatient records to ensure data quality before living the facility and proceeding with preparations for data analysis

Sampling procedure for Health workers at the respective health facilities

Purposive sampling and theme saturation principle was utilized to identify health workers who participated in the research. The basis of the purposive sampling was the need to select health care workers that have experience relevant to the study. Health care workers at the different levels of health facilities and cadres were chosen based on their direct or indirect involvement in diagnosis and management of malaria suspected cases. Among which were the clinicians, nurses, laboratory technologists, health facility in charges and district health management team members involved in planning and management of health care services delivery in the district.

5.6.1 Inclusion criteria

Health Facilities

The inclusion of a health facility was based on a facility being owned by the government. Public health Centers II, III and IV that were in active operation during the study period were approached and requested to take part in the study.

Medical records of malaria patients

Facility registry records of patients for the year 2019 of all ages and gender suspected with malaria and treated at the 9 selected public health facilities in Mukono district were considered eligible for the study.

The inclusion of patient medical records was further based on clinician's presumption of malaria, confirmatory diagnosis and prescription made. Patient medical records that indicated suspected malaria based on the indicated symptoms, confirmatory diagnosis with either a positive or a negative parasitemia and with antimalarial or non-antimalarial drugs prescribed were ultimately eligible for the study. In addition, patients with other non-malarial febrile conditions indicated on the patient medical record with an antimalarial prescribed were also included in the study.

Health Workers

Eligibility of health workers for the key informant interviews and in-depth interviews was based on seniority (i.e., the experience and the number of years spent while managing malaria cases) but also on availability and involvement in the day-to-day management of cases at the respective health facility. A health worker was considered eligible if he/she had been involved in management of malaria cases for at least one year in Mukono district.

Health workers at the targeted health facilities were identified through consultations with the health facility in charge.

5.6.2 Exclusion criteria

Exclusion criteria for health facilities and medical records

Any public health center at any level whose routine operations during the survey period would not enable the researcher to access medical records for malaria patients was excluded from the study.

Patients seeking routine specialized health care other than febrile care services were also excluded. Health workers who had not been involved in management of malaria patients for up to one year prior to the day of the study were excluded.

Health workers who declined to give consent to participate in the study were as well excluded.

5.7 Study variables

5.7.1 Dependent variable

The dependent variable is adherence of healthcare workers' prescription practice to national diagnosis and treatment guideline for management of suspected uncomplicated and severe malaria cases. It is a categorical variable that was measured on a binary scale as adherent and non-adherence. Adherence was defined as when prior to prescription parasitological confirmation of malaria was done by the health service providers using mRDTs/Microscopy at the health facility and that the choice of antimalarial medicines conforms to those recommended by the national malaria treatment guideline.

Treatment was considered non-adherent when there is no parasitological confirmation done using mRDTs/ Microscopy prior to prescription at the health facility or when the choice of

antimalarial medicines prescribed by the health worker does not conform to the recommendations of the national malaria treatment guidelines. Health workers' diagnosis was the diagnosis that is indicated by the health worker on the prescription records of the patient.

5.7.2 Independent Variables

Independent variables were categorized into facility related factors, health worker related and patient clinical related factors influencing adherence to national treatment and diagnostic guidelines. Health workers' related factors identified include socio-demographic characteristic, knowledge about malaria case management, and access to national guidelines. Health facility related factors include availability of functional diagnostic equipment [mRDT/Microscopes] and antimalarial medicines.

Availability of diagnostic equipment and anti-malarial medicines were measured as the proportion of health facilities with one or more functional equipment for malaria diagnosis and the recommended anti-malarial medicine in stock in the last 3 months before the survey.

5.8 DATA COLLECTION METHODS

5.8.1 Quantitative data collection

Retrospective review of health facility records of malaria suspected patients for the year 2019 was conducted in public health facilities in Mukono District. Patients' reported symptom or complaints, clinical and laboratory diagnoses made, and the drugs prescribed by the health worker were extracted from HMIS 002 registers for the year 2019. Observations of the availability of functional basic diagnostic equipment and availability of supplies for malaria treatment at each sampled facility were also utilized.

The data was electronically captured using Open Data Kit (ODK) an Electronic Data collection platform that operates on Android gadgets. Pre-programed data collection tools were preloaded on android operating devices which thereafter were given to trained research assistants (RA) for use during the data collection process.

To correctly abstract data from patient prescription records research assistants with training and experience in clinical practice were recruited. On every survey day, the research team reported to the assigned health units with all the necessary documents introducing them to the facility authority. Efforts were made to ensure that the study team reaches the health units before health workers start their routine work.

5.8.2 Qualitative data

To understand further how contextual, health facility and health work related factors may influence prescription practices and the perspectives of health workers on the prescription behavior, Key informant (KII) qualitative interviews were conducted with experienced health workers involved in management of malaria patients at the sampled health units and in-depth interviews with some of the members in administrative positions of Mukono district health team.

5.8.3 Data collection tools

Data collection tools included a pre-programed data abstraction guide which was used to extract data from patient records at the respective health facilities. A check list was also used to capture data about the availability of basic functional equipment and supplies for the treatment of malaria at each sampled health facility.

In addition, a key informant interview guide and an in-depth interview guide consisting of questions designed to assess and document the availability of drugs and supplies at the respective health facilities, knowledge and training on malaria treatment guidelines, basis for referring malaria suspects for malaria diagnosis as well as their prescription practices for parasitologically confirmed malaria cases and suspects were utilized. Notes of each KII and in-depth interview were taken by the moderator during the interview.

5.8.4 Data quality assurance

At the programming level of the tool data, validation rules that deter invalid responses from being captured by the data collectors were embedded into the data extraction tool.

The server on which data was hosted and the data collection devices were password protected. These were only accessible by the lead researcher, server administrator and the research assistants. The collected data was routinely checked for completeness and accuracy before being sent to the server. A pre-programed data extraction guide and a check list allowed use of automatic data validation and quality control checks that deterred research assistants from capturing invalid data at the data collection level.

Considering the mode of data collection and the skills required, three RAs with medical or clinical background were recruited and trained to familiarize them with the survey tools with regard to data abstraction from patient records and recording of the responses using electronic android devices. This was done in a period of two days. To ensure mastery of what research assistants had been trained to do, debriefing and role playing with the RAs recording responses until accuracy among them was gained were also done. The background of the study, objectives, methodology and the expected benefits of carrying

out the study were also explained to the RAs during training. This helped to reinforce cooperation of the research assistant with the team leader.

At the end of each survey day, each survey recorded were checked by the research assistant for mistakes and completeness so that necessary corrections can be made before leaving the data collection site and sending it on the saver.

5.9 DATA MANAGEMENT AND ANALYSIS

5.9.1 Data management

Completed records were uploaded on the server on a daily basis where on reaching the server they formed into a digitized data set in comma separated variables (CSV) format which was then downloaded, for data cleaning and post coding. Handy dashboard functions available with ODK platform were used to monitor the quality of uploaded data with regard to validity of input responses. A complete cleaned and post coded data set was thereafter converted to excel format which is the appropriate format for the creation of analyzable dataset in STATA version 14.

5.9.2 Data Analysis Procedure

Suspected malaria cases attending OPD in public health facilities that had malaria parasitological test

Descriptive statistical analysis was performed to determine the proportion of suspected malaria patients who received a parasitological test. Frequency tables, proportions and interquartile range were used to describe the distribution of the observations. A categorical variable consisting of proportion of malaria suspected patients who received parasitological test prior to treatment and those that did not receive a parasitological test was generated. The data was obtained from the general symptomatic, physical and

laboratory assessments made by the health workers and the accompanied treatment decisions.

Prescription practices of the health workers for uncomplicated and suspect severe malaria patients in public health facilities

The data pertaining to prescription practices for suspected malaria cases was descriptively analyzed and presented using frequency tables and proportions. In addition, a binary variable made up of the proportion of patients whose treatment practice by the service providers is adherent to the treatment guidelines and those that the treatment practice is not adherent to the general guidelines was generated and used to present the result.

Factors associated with health workers adherence to malaria diagnosis and treatment guidelines in public health facilities

For the quantitative part of analysis of this particular objective, multivariable logistic regression was employed to determine the factors associated with adherence to national treatment guidelines particularly in management of patients with suspect uncomplicated malaria. To identify factors for inclusion in the multivariable model, simple logistic regression with only one independent variable at time was conducted and along with key variables to the outcome, factors that had $p< 0.25$ were included in the final model. The base model was also checked for multicollinearity.

For the qualitative part of analysis, key informant interviews and in-depth interview data were transcribed and analyzed following manifest content and thematic approaches. Excel coding matrix tool was developed based on the scope of the enquiry in which codes were added following review of the data. The data was extracted into meaning units to inform the initial coding scheme. Preliminary codes were refined and applied back to the transcripts for triangulation and then grouped into mutually agreed themes to describe

response patterns emerging from the data. These themes were further refined into a set of final categories reflecting the study objectives

5.1.1 ETHICAL CONSIDERATIONS

The proposal was presented and approved by the Institutional Review Board (IRB) of the School of Public Health, Makerere University. Permission to conduct the study at the district level was sought for from the in-charges of the health facilities through the District Health Officer (DHO).

A consent statement was read out to participants that duly informed them of the purpose of the study and their right to consent. For this study a participant was considered to have consented if she/he signs the consent form. Furthermore, confidentiality of the collected information was maintained by using unique identifiers for the participants other than their names, and also by limiting access to the data by use of passwords to only the PI and the research assistants.

5.1.2 DISSEMINATION PLAN OF THE STUDY RESULTS

Study results will be shared in a report form with Makerere University School of Public Health and to the health administration team of Mukono District as well as to the facilities where the research was conducted.

CHAPTER SIX: STUDY RESULTS

6.1 Demographic characteristics of the patients

The study was conducted in nine health centers and among which were four HC IIs, four HC IIIs and one HC IV. A total of 4627 patient records from HMIS 002 registers for the year 2019 were screened from July 2020 to September 2020. Over 2832 records were identified to be eligible and from which a total of 765 records of malaria suspected patients were drawn and reviewed. To obtain qualitative data 9 health workers were interviewed who included 4 clinical officers, 5 nurses and 3 district health care service delivery planners.

Of the 765 sampled records, majority (429) [56%] were female patients. The median age of the patients studied was 12 years with interquartile range of [5-25] years. The majority of the patients reviewed [230 +248 (62%)] were aged below 18 years. This is presented in Table 4 herein.

Table 4: Demographic characteristics of the patients

characteristic	Frequency	Percentage
Age	n	%
0-5	**230**	**30.0**
6-17	**248**	**32.0**
>18	**287**	**38.0**
Total	765	100
Gender		
Male	**336**	**44.0**
Female	**429**	**56.0**
Total	765	100

Health facility/System functionality characteristics

A check list to ascertain the availability of antimalarial, basic equipment and supplies required for proper management of malaria patients showed that of the 9 health facilities studied one HCII and one HCIII had run out of stock of Artemether Lumefantrine (AL) on the day of the survey. On top, more three health centers, reported that they had at least experienced stock out of some of the antimalarial medicines in the past one or more months.

With respect to testing services, in all the health centers studied malaria diagnostic services were generally available but in varying functionality. In one among the three health centers found without a functional microscope, the equipment was available but the facility had spent more than a week without electricity, this had left health workers with no option other than relying solely on mRDTs for malaria testing. The other two health center that is HCII and HCIII reported experiencing stock out of mRDTs at least in the past one month. In six

out of the nine health centers there was at least a copy of the national malaria treatment guidelines and accessible by the health workers. Those that did not have had at least other MoH reference material such as the Uganda national treatment clinical guidelines.

Table 5: Health Facility/system functionality assessments

Health Facility/system functionality aspects	Number of facilities that experienced particular functionality status		Total
	On the survey day	At least in past one month/more	
Stockouts of antimalarials	2	3	5
Stockout of RDTs, other supplies	**0**	**2**	**2**
Microscopic Break down	**1**	**3**	**4**
Availability of copy of malaria treatment guidelines	**6**	**0**	**6**
Availability of clinical treatment guidelines	3	0	3

Signs and Symptoms patients reported as main complaints to the health workers

Of the 765 patients that comprised the sample, 68 patients had their data for signs and symptoms missing, thus the actual sample against which signs and symptom figures were computed stood at 697 patients. Fever as a primary symptom for seeking care was documented in 681(98%) of the patients. Additional signs and symptoms noted in significant proportion and that could potentially influence health worker's management decision of the malaria patient were vomiting documented in 161(23%) of the patients, muscle/Joint pain 113(16%) of the patients and difficulty in breathing documented in 67(10%) of the patients. Virtually all of the patients reviewed reported at least one sign or symptom of malaria and therefore required a parasitological diagnostic testing before initiating treatment.

Table 6: Signs and Symptoms patients reported to the health workers

Signs and symptoms reported	Frequency	Case (%)
Fever	681	98.0
Sweating	193	28.0
Vomiting	161	23.0
Headache	125	18.0
Muscle/Joint pain	113	16.0
Nausea	81	11.0
Breathing difficulty	67	10.0
Convulsions	41	6.0
Severe anemia	26	4.0
Coma	1	1.4.0

Co-Morbidities presented by the patients

Of the total number of patients studied, less than half of them presented with either one or more co-morbidity on the day they sought malaria treatment services while 440(57%) did not report any. The most prevalent co-morbidity was common cold documented in 75(10%), of the patients followed by respiratory tract infections and Pneumonia each documented in 51(7%) of the patients respectively. Diarrhea and urinary tract infections were each documented in 24(3%) of the patients [Table 7].

Table 7: Co-morbidities reported by the patients

Condition reported	Frequency	Percentage of cases
No Condition reported	440	57.0
Common cold	75	10.0
Respiratory tract infections	52	7.0
Pneumonia	51	7.0
Headache	29	4.0
Urinary tract infections	30	3.0
Diarrhea	24	3.0
Typhoid	18	2.0
Skin infection	5	1.0
Chest pain	9	1.0
Peptic ulcers	10	1.0
Cough	7	1.0
Bacterial infection	7	1.0
Ear infection	8	1.0

6.2 Suspect malaria patients attending public health facilities in the district that had a malaria parasitological test

The analysis of health workers malaria diagnostic practices indicates that close to 620 (81%) of malaria suspected patients were subjected to confirmatory diagnostic testing while only 145 (19%) were not tested for malaria. Of the 620 patients tested, 338 (55%) tested positive for malaria parasite and of these 129 (20.8%) were children bellow the age of five years while 209 (33.7%) were over 5 years of age.

Table 8: Proportion of patients that received a diagnostic test for malaria

		At most 5 years n(%)	Over 5 years n(%)	Total n(%)
Patients Tested for malaria (n=765)				
	Tested	200(26.1)	420(55.0)	**620(81.0)**
	Not Tested	30(4.0)	115(15.0)	**145(19.0)**
Test Result (n=620)				
	Positive	129(20.8)	209(33.7)	**338(55.0)**
	Negative	71(11.5)	211(34.0)	**282(45.0)**

Among patients that received a confirmatory diagnostic test the majority were diagnosed using mRDT 486(63%), while 134(18%) were diagnosed using microscopy (Table: 9). Although parasitological testing for malaria was significantly high as indicated in table 8,

the proportion of those who were clinically diagnosed that is 145(19%) is notably high (Table: 9). This signifies non adherence to malaria treatment guidelines.

Table 9: Malaria diagnostic modes used by the health workers

Diagnostic Mode	Frequency	Percentage
Microscopy mode	134	18
Clinical diagnosis	145	19
mRDT mode	`486	63
Total	**765**	

Among patients who were indicated as positive for malaria by the health workers 223 (65.9%) had uncomplicated malaria while 115(35.1%) had suspect severe malaria (Table 10). Contrary to the current malaria treatment guidelines which recommend health workers to steak to diagnostic results, a significant proportion 248(88%) of the patients who diagnosed negative were classified as uncomplicated malaria cases while the rest 34(12.0%) were classified as severe malaria cases. Additionally of the patients who did not undergo any parasite confirmatory test, 107(73.8%) were classified as uncomplicated malaria cases whereas 38(26%) as severe malaria cases (Table: 10).

Table 10: Severity classification of malaria patients by the health workers

	Diagnostic result (microscopy or mRDT)		Clinical diagnosis	Total
	Positive	Negative		
Severity Classification				
Uncomplicated malaria	223(65.9)	248(88.0)	107(73.8)	578(75.8)
Suspect Severe malaria	115(35.1)	34(12.0)	38(26.2)	187(24.1)
Total	**338**	**282**	**145**	**765**

6.3. Adherence to treatment guidelines in the management of uncomplicated and suspect severe malaria patients

6.3.1. Prescription practices for patients diagnosed with uncomplicated malaria

The data indicate that of the 223 patients that were tested and confirmed to have uncomplicated malaria, [20+178] 198(89%) were treated with the first or second line antimalarial recommended by the national malaria treatment guidelines. Of these 178(80%) patients were treated with Artemether Lumefetrine (AL) while 20(9%) were treated with Artesunate/Amodiaquine. Contrary to the guidelines however, 7(3%) patients with uncomplicated malaria who diagnosed positive were not prescribed any antimalarial treatment. Additionally, 18(8%) of the patients diagnosed with uncomplicated malaria were treated with Quinine which is currently not recommended drug for the treatment of uncomplicated malaria this tantamount to non-adherence to treatment guidelines [Table 11]. Of the patients with negative parasitological test result 248 had uncomplicated malaria and of these 154(62.3%) were not treated with any antimalarial, this practice astute to the treatment guidelines.

Of the 248 patients, who diagnosed negative and presumed to have uncomplicated malaria (Table 11), 94[79+13+2; (38%)] were inappropriately prescribed antimalarial and of these 79[32%] patients were prescribed Artemether Lumefetrine (AL), 13 [5%] received Quinine while 2[1%] were dispensed Artesunate. Of the 107 patients who attended the facilities without parasitological testing and presumed to have uncomplicated malarial, the first or second-line antimalarial medicine was prescribed to 60 (56%) of them [8 for first-line, 52 for second-line]. Three (2.8%) were dispensed quinine, while 44 (41%) did not receive any antimalarial medicine. [Table 11].

Table 11: Prescription practices for uncomplicated malaria patients and adherence level to the treatment guidelines

	mRDT/Microscopy		Clinical
Prescribed Drugs	**Positive**	**Negative**	
	n(%)	**n(%)**	**n(%)**
Quinine	18(8.0)	13(5%)	3(2.8)
Artesunate/Amodiaquine	20(9.0)	2(1.0)	8(7.5)
Artemether Lumefantrine	178(79.8)	79(31.6)	52(48.6)
No anti-malarial	7(3.1)	154(62.0)	44(41.1)
Total	**223**	**248**	**107**
Adherence to treatment guidelines (n=578)		**Frequency**	**Percentage**
Adhered		392	68
Did not adhere		182	32

6.3.2 Uncomplicated malaria patients managed according to treatment guidelines

Overall, of the 578 patients that had suspect uncomplicated malaria and managed accordingly by the health workers, 363(68%) were managed adherent to the current malaria treatment guidelines while 185(32%) were not managed according to the present malaria treatment guidelines as indicated under [Table 11].

6.3.3 Prescription practices for suspect Severe Malaria patients that were not referred for further treatment

Of the 187 patients suspected of having severe malaria, 117 were managed at the respective health facilities, while 70 were referred for further treatment. Although malaria treatment guidelines allow for the initiation of treatment for suspected severe malaria prior to parasitological confirmation when confirmation is not readily feasible, only 21 (18%) of the patients admitted or treated immediately at the studied facilities were clinically treated without confirmation. The majority of suspected severe malaria patients received parasitological confirmation before the initiation of treatment. Most patients, 64 (54.7%),

were treated with intravenous Artesunate, 19 (16.2%) with intramuscular Artesunate, and 21 (17.9%) with intravenous Quinine. Although most patients suspected of severe malaria received appropriate antimalarial treatment, 13 (11%) who were not referred were managed with rectal Artesunate, which is intended for pre-referral treatment only [Table 12].

Table 12: Management practices of suspect severe malaria patients at the studied health facilities

Diagnostic mode	**mRDT/Microscopy**	**Clinical**	**Total**
Prescribed Drugs	**n(%)**	**n(%)**	**n(%)**
IV Artesunate	51(43.6)	13(11.1)	64(54.7)
IM Artesunate	15(12.8)	4(3.4)	19(16.2)
IV Quinine	19(16.2)	2(1.7)	21(17.9)
Rectal artesunate	11(9.4)	2(1.7)	13(11.1)
Total	**96**	**21**	**117**

6.3.4 Management of suspect severe malaria patients referred for further treatment

Of the 70 suspect severe malaria patients referred, [22+17; (55.8%)] were provided an appropriate pre-referral treatment recommended by the national malaria treatment guidelines. On the other hand, 15(22%) were referred without pre-referral antimalarial provided. Of these 4 were less than five years while 11 were above five years. Antimalarial only without rectal Artesunate were prescribed to 16(23%) of the referred patients while 17(24%) were concomitantly prescribed both Rectal Artesunate (RA) plus at least one other antimalarial mainly AL (Table: 13).

Table 13: Management of referred patients suspected to have severe malaria

Patient age groups	**At most 5 years n (%)**	**Over 5 years n (%)**	**Total n (%)**
Prescribed Drugs			
Rectal Artesunate (RA) only	13(20.4)	9(11.2)	22(31.4)
RA plus at least one antimalarial	10(15.0)	7(9.0)	17(24.4)
Antimalarial without RA	6(8.5)	10(14.2)	16(22.6)
No antimalarial given	4(4.6)	11(17.0)	15(21.6)
Total	**33**	**37**	**70**

6.4. Factors associated with health work prescription practice adherence to national malaria treatment guidelines

The results of the study indicate that there exist notable significant deviations from the current national malaria treatment guidelines at the level of parasite diagnosis and prescription practices of antimalarials amongst health workers in the district. This therefore makes it warranting to understand the factors that associated with the observed management practices of suspect uncomplicated and severe malaria patients in the respective facilities in Mukono district. Subsequent subsection of the analysis therefore presents both the quantitative and the qualitative components exploring factors reported.

6.4.1. Quantitative analysis of the factors associated with health workers adherence to malaria diagnosis and treatment guidelines in public health facilities in the district

Bivariable analysis was performed to determine health facility, health worker and patient level predictor variables associated with the observed diagnosis and treatment practices for uncomplicated and severe malaria patients. Headache symptom (p=0.016), Nausea symptom (p=0.002) and patient age (p=0.026) are the factors found to be statistically significantly associated with adherence to diagnosis and treatment guidelines for malaria patients at this level of analysis [Table 14].

Table 14: Bivariable analysis of the factors associated with adherence to malaria diagnosis and treatment guidelines

	Adhered	Did not Adhere	Total	P-values
	Freq(row%)	Freq(row%)	Frequency	
Health facility level				
HC II	73(66.9)	36(33.0)	139	0.795
HC III	187(67.3)	91(32.7)	278	
HC IV	89(64.0)	50(35.9)	109	
Patient age				
<=5	109(72.2)	48(27.7)	157	0.026
>5	228(61.1)	141(38.6)	369	
Patient sex				
Male	152(67.9)	72(32.14)	224	0.529
Female	197(65.23)	105(34.77)	302	
Fever symptom				
Suspected fever	311(66.5)	157(33.6)	468	0.887
No fever suspected	38(65.5)	20(34.48)	58	
Headache symptom				
Had headache pain	50(55.6)	40(44.4)	90	0.016
No headache pain	299(68.7)	136(31.2)	435	
Vomiting symptom				
Vomiting	60(65.2)	32(34.8)	92	0.800
Not vomiting	289(66.6)	145(33.41)	434	
Sweating symptom				
Sweating	70(59.3)	48(40.7)	118	0.067
Not Sweating	279(68.3)	129(31.62)	408	
Breathing Difficulty				
Difficulty	22(68.3)	10(31.3)	32	0.767
No difficulty	327(66.19)	165(33.8)	494	
Nausea symptom				
Had nausea	21(45.7)	25(54.4)	46	0.002
No nausea	328(68.3)	152(31.7)	480	
Comorbidity conditions				
Had comorbidity	162(65.6)	87(34.9)	249	0.553
No comorbidity	187(67.5)	90(32.5)	277	

To assess for multicollinearity, variance inflation factor (VIF) approach was used and any predictor variable with VIF>10 indicated multicollinearity and was removed. In order to cater for clustering among patients sampled at the respective health centers, robust standard errors were obtained at the bivariate and multivariable level of analysis. Moving from

bivariate to multivariable analysis, all variables with p-value less than 0.2 were considered for a multivariable model (Table: 15) and in addition to logical approach all variables were considered as universal confounders.

At the multivariable level of analysis, where we controlled and adjusted for the effects of each predictor variable included in the model, malaria patients older than 5 years were more likely to be treated according to treatment guidelines compared to patients under 5 years of age (aOR = 1.30; 95% CI: 1.14-2.03, P=0.023). Patients presenting with main complaints of fever (aOR = 0.19; 95% CI: 0.52-0.76, P= 0.048), nausea (aOR = 0.48; 95% CI: 0.24-0.92, P=0.026), and sweating (aOR = 0.72; 95% CI: 0.26-0.84, P= 0.036) were significantly associated with a lower likelihood of being managed in adherence to malaria treatment guidelines [Table: 15].

Table 15: Multivariable logistic regression analysis of the factors associated with health provider adherence to the guidelines in the management of uncomplicated malaria patients

	Adhered	Unadjusted	Adjusted	P-values
	Freq(row%)	**OR(95% CI)**	**OR(95%CI)**	
Health facility level				
HC II	73(66.9)	1.00	1.00	
HC III	187(67.3)	0.86(0.56-1.32)	1.01 (0.49-1.23)	0.939
HC IV	89(64.0)	0. 79 (0.51-1.48)	0.79 (0.45-1.37)	0.419
Patient sex				
Male	152(67.9)	1.00	1.00	
Female	197(65.23)	1.12(0.78-1.62)	1.06(0.72-1.56)	0.741
Patient age				
<=5	109(72.2)	1.00	1.00	
>5	228(61.1)	1.57(1.24-2.39)	1.30(1.14- 2.06)	0.023
Nausea symptom				
No nausea	328(68.3)	1.00	1.00	
Had nausea	21(45.7)	2.57(1.39-4.73)	0.48(0.24-0.92)	0.026
Fever symptom				
No fever suspected	38(65.5)	1.00	1.00	
Suspected fever	311(66.5)	0.95(0.53-1.70)	0.19(0.52-0.76)	0.048
Headache symptom				
No headache pain	136(31.2)	1.00	1.00	
Had headache pain	40(44.4)	1.76(1.10-2.79)	0.65(0.36-1.18)	0.159
Vomiting symptom				
Not vomiting	145(33.41)	1.00	1.00	
Vomiting	32(34.8)	1.06(0.66-1.70)	0.91(.54-1.55)	0.470
Sweating symptom				
Not Sweating	152(31.7)	1.00	1.00	
Sweating	25(54.4)	1.48(0.97-2.26)	0.72(0.26-0.84)	0.036
Comorbidity conditions				
No comorbidity	187(67.5)	1.00	1.00	
Had comorbidity	162(65.6)	1.11(0.78-1.60)	0.8(0.61-1.30)	0.580

6.4.2. Qualitative analysis of the factors associated with health workers adherence to malaria diagnosis and treatment guidelines in public health facilities in Mukono district

Health facility/ System constraints

During key informant interviews (KIIs) and in-depth interviews (IDIs), a number of health system constraints that occasionally lead to non-adherent malaria management practices

by health care service providers were raised. Among these were; stock outs of medicines and diagnostic supplies, and frequent break down of diagnostic equipment especially microscopes. Other health system constraints noted included; understaffing particularly in urban health facilities that witness a higher patient inflow. All these system constraints were expressed by the participants as follows.

Stockouts of medicines and diagnostic supplies

Stockouts of medicines were commonly mentioned in HC IIIs and IVs that receive relatively high numbers of patients. Health workers reported that they can't prescribe the recommended antimalarial if they are out of stock. They further explained that this inconsistent medical supply and subsequent stockouts were partly due to reluctance to use epidemiological surveillance data to accurately forecast the trends in incidence rates of malaria and thus informed drug stocking.

> *Malaria is very high in this area but I don't understand why the suppliers of medicines don't use information contained in the reports we submit every month to understand that there is increase in malaria cases now so that they supply us medicines that caters for that increase [Clinical officer, in charge HCIV]*

Stockouts of diagnostic supplies

Health workers during discussions reported occasional stock out of diagnostic supplies in laboratories. This according to them it sometimes limits them from perform parasitological confirmations and on several occasions lowers the chances of performing differential diagnosis of specific febrile conditions when need arises. They explained that this sometime eventually leads them to make symptomatic treatment of malaria.

Work overload and infrequent supervision

Health providers, especially those in urban based health facilities that have relatively higher patient inflow complained about high workload which they attributed to insufficient

staffing levels. They reported that as such, they cannot test each and every patient who presents at the facility. Health workers added that due to the work load, they sometimes get fatigued causing them to sign out a little earlier before even when colleagues who would take over have actually clocked in. This goes on partly due to poor supervision from those responsible to do so.

Pressure from patients to obtain medicines

Some providers reported that at some point, during their work, they had been pressured to prescribe anti-malarial drugs to RDT- negative patients. They attributed this to the fact that many patients who present at the facilities know how several of the anti-malarial drugs look like and expect to receive them irrespective of the mRDT results.

> *"Treating patients from rural areas is sometimes challenging, because many of them whenever they come to the facility they expect to go back with medicines. At times we sympathize with some [Clinical officer HCIII]; you look at a patient and see that he/she does not have money to go to another health facility, some of these when they diagnose negative, they insist "Nurse please help me and provide me some malaria drugs so that I do not go back empty handed"*

> *When a provider refuses, some take it that we have denied them access to care and a few reports us to politicians, which sometimes complicates our relations with the politicians and the community".[Clinical officer HCIII]*

Despite the fact that several providers complained that patient reactions is a challenge, most were adamant that they did not allow this to influence their prescribing practices. Nonetheless, perceived patient acceptance was indirectly cited by a few providers as a reason for giving anti-malarial drugs to patients who tested negative.

Clinical beliefs of the Health Workers and Trust in diagnostic results

Almost all health workers interviewed demonstrated great appreciation of the role of especially mRDTs in the diagnosis and treatment of malaria. One health worker noted that

"mRDTs enhanced our capacity to deliver quality malaria treatment services. We no longer depend on guesswork because we treat what we know" [Nurse, HCII]

Drawing from their experiences most health care providers appeared to accept that a negative RDT result means that the patient does not have malaria and that fever may be symptomatic of an alternative illness or infection, though this was not universal. A section of health workers expressed some disbelief in the mRDT results saying that

> *"mRDTs can not 100% mean that the person doesn't have malaria, two out of every 100 patients diagnosed may be false negatives. Parasites have an incubation period in blood when a person has just gotten sick, blood drawn from body peripheral may not have the parasites yet in such cases when you see a person has malaria disease you imagine the difficulties she has gone through coming to the facility means"[Clinical officer, HCIII in charge]*

Gaps in skills and capacity to diagnose non malaria conditions

During IDI discussions some respondents noted that in facilities where integrated management of malaria training hasn't been carried out, there is general lack of clinical skills. In the KIs respondents reported that shortage of clinical capacity was most limiting when providers encounter non-malaria conditions that have overlapping signs and symptoms.

> *"Ruling out malaria was addressed, with test and treat one is able to tell whether a patient has malaria or not, challenge arise when a patient test negative, providers ability is at times limited by lack of clinical skills to find out the specific cause of fever" [Nurse officer, HCII in Charge]*

Because health workers have gaps in clinical skills, they sometimes lack confidence in some of the alternative diagnosis/treatments that they make which further limits the options available for them to manage particular conditions. Resultantly because of the fear of missing out the true diagnosis/risking adverse outcomes in case of a very ill patient,

providers end up prescribing more than the required medicines and very often treating patients that have diagnosed negative with anti-malarial.

Severity status of the disease

According to respondents, many of the patients with suspected severe malaria present when the disease has already progressed to severity level which they noted that it leaves very little space to manage the patient according to the stated guidelines. According to the providers when patients present with suspected severe malaria; the chief objective is to prevent death or permanent disability of the patient thus the provider has discretion to manage the patient in a way he/she sees that will enable resuscitation of the patient regardless of adherence to the guidelines.

Noncompliance with referral advice by the patients/caretakers

Concomitant administration of Artemether Lumefentrine and Rectal Artesunate to referred patients suspected to have severe malaria was a common practice observed among patients suspected to have severe malaria and referred for further treatment. During KIIs and IDIs, health workers revealed that patients/caretaker's non- compliance with referral advice was the reason driving this non adherence practice to malaria treatment guidelines. In their words respondents noted

> ***"****On referring patients, we administer Rectal Artesunate a fast response repository made to enable a patient reach the referred facility for parenteral treatment. From experience we came to learn that many caretakers instead of taking the child to the referred facility, they just go back home****.*** *Some when they realize that the patient is gaining some recovery, they completely become reluctant to proceed with the referral which potentially leads to partial treatment of malaria" [Clinical officer, HCIV]*

To minimize this potential partial treatment some health workers disclosed that they choose to provide both Rectal Artesunate and oral antimalarial to enable caretakers at least complete the treatment even when reaching the referred facility fails.

CHAPTER SEVEN

7.0 DISCUSSION OF THE RESULTS

7.1 Introduction

The study aimed to assess health workers adherence to malaria treatment guidelines and the factors associated with management practices of malaria patients in public health facilities. The results provide various explanations relating to clinician, health system and patient factors which would help to recognize where possible interventions could be undertaken to improve the level of adherence to national malaria treatment guidelines.

7.2 Suspected malaria cases attending outpatient department in public health facilities that had a malaria parasitological test

The study found that the rate of parasitological confirmation for malaria in public health facilities within the study district was relatively high, with over 81% of suspected malaria patients receiving a parasitological test. However, the 2014-2020 Uganda Malaria Reduction Strategic Plan set a target of 90% of all malaria cases to be parasitologiacally confirmed before treatment by the year 2020. This finding then implies that whereas substantial progress has been made in increasing the proportion of suspected malaria patients tested before initiation of treatment, a gap remains. Implementing more effective interventions and proactive strategies is needed to ensure full compliance with the requirement for parasitological testing for all malaria patients in the district and the country in general. This is similar to findings from the 2019 World Malaria Report, which revealed

that 83.9% of registered malaria cases in the public health sector in East and Southern Africa received a confirmatory test for malaria (WHO Malaria Report, 2019).

Reasoned from the results of this study, the observed relatively big proportion of malaria suspected patients who receive parasitic test could be explained by the reality that over the years of implementing the new parasite diagnostic technologies particularly mRDTs that came along with the current malaria treatment guidelines, the skepticism and distrust that initially surrounded the use of these new malaria testing technologies have to a reasonable extent been addressed. Indeed, more clinicians in the district today appreciate the value of point of care malaria diagnostic tools in ensuring prompt and quality care to malaria and other febrile patients. Moreover, the supportive policies undertaken by the ministry of health together with other various stakeholders at the district level have seen a modest integration so far of malaria diagnostic services into other health care services. Substantial improvements in the supply and distribution mechanisms of particularly mRDTs across the country and the World at large has enabled their availability to the health care providers for use whenever necessary.

7.3 Prescription practices of health workers for malaria patients

Among patients with uncomplicated malaria, the current study found the overall adherence level of the prescription practices to diagnosis and national treatment guidelines to be at 68%. Compared to the relatively high level of parasitological testing observed, adherence to malaria test results by the health workers remain suboptimal. A substantial proportion of suspected malaria cases were found to be treated contrary to their diagnostic test results.

Refusal by health workers to adhere to test results was recognized by the district health authorities to frustrate attainment of Test, Treat, and Track" policy for malaria. Then under the national malaria reduction strategic plan framework (UMRSP) the district health team together with its implementing partners in 2016 devised to train health workers in integrated management of malaria (IMM), intensified support supervision and initiated clinical audits in public health facilities. These have since been proactively rolled out to nearly 55% of all the public health facilities in the district.

The findings of this study appear to imply that the interventions undertaken so far have had a positive impact on the prescription practices as they have enabled health workers to acquire diagnostic skills needed to offer health care services that astute to malaria treatment guidelines. Indeed, revelations from health workers appear to indicate that in facilities where such interventions haven't yet been rolled out, they experience skills gap particularly in performing differential diagnosis for patients who test negative using mRDT diagnostic tools.

While suboptimal, the level of adherence noticed is relatively higher compared to findings reported by other similar studies like one conducted in Kamuli District which reported adherence level of 50.6% (Bawate et al. 2016). Elsewhere a study conducted in Tanzania reported adherence level of health workers to diagnosis and treatment guidelines of 54.6% (Adela B et al. 2020). Additionally, the current study reports non adherence level to diagnosis and treatment guidelines of 32%, a level observed to be lower than that reported by a similar study carried out in Tanzania of 40.3% (Adela B et al. 2020) but notably higher than what a related study done in Nigeria reported of 22.5% (O. F. Bamiselu et al. 2016).

As evidenced by results in this study the use of recommended antimalarial particularly ACTs in the management of malaria patients was generally high. This phenomenon could perhaps be attributed to various reasons and among which is the high adherence rate to diagnosis requirement, over 80% of suspect malaria patients in this study received parasitological confirmation for malaria before receiving drugs. This has had a ripple effect which has eventually seen that over time antimalarial wastage to suspect negative patients has decreased and that the availability of these antimalarial to patients who actually test positive conversely increased. Evidence from a related study in Kenya showed that following strict health worker adherence to parasitological testing of malaria patients, AL stock out decreased significantly by 20-percentage points (Zurovac et al.2022)

7.3 Factors associated with health workers adherence to malaria diagnosis and treatment guidelines in public health facilities in Mukono district

Diagnostic test results, patients with positive diagnostic results were more likely to be managed according to treatment guidelines by health workers than those with negative test results. This implies that, unlike when the test, treat, and track policy was first introduced in Uganda, the beliefs and attitudes of health workers towards the policy have gradually shifted over time. Health workers have developed a reasonable level of trust in the available diagnostic algorithms, especially mRDTs, for diagnosing malaria. This shift reassures that the broader goals of the policy promoting evidence-based, effective management of febrile conditions and reducing drug wastage will be achieved. Similar findings have been reported in studies that were done in Kenya (Wilfred Ouma Otambo et al.2022) and Nigeria (Beatrice Amboko et al. 2020) where in both studies' treatment adherence for test positive patients and overall adherence to national treatment guidelines for malaria improved significantly by nearly an equal margin.

On the contrary, management of suspected cases that diagnose negative for malaria remains a big challenge to address in Uganda in particular. As evidenced in this study, (33%) of the proportion of patients despite testing negative, they were presumed to have uncomplicated malaria and were all prescribed antimalarial medicines. This proportion is 30-percentage points much higher than what has been reported in a similar study from Malawi (Namuyinga et al. 2017). In the year 2017/18 the percentage of test negatives that received treatment for malaria in Uganda was 40% (Uganda MoH performance report 2017/18).

Treatment of test-negative cases in the current study could be attributed to several reasons, one of which, as evidenced in this study, is that healthcare workers and facilities lack sufficient skills and capacity to perform differential diagnoses for non-malarial febrile conditions, limiting the potential to explore alternative treatment options. Moreover, despite more than a decade of mRDT use, a considerable level of mistrust still exists among some health workers regarding the validity of negative mRDT results, even though these are the most widely used tool for diagnosing malaria in the country. Based on these findings therefore it is necessary first to conduct broader representative field studies to establish the validity of persistent false mRDT negative test results claims. The Uganda ministry of health performance report, 2017 pointed out that it is important to address the problem of treatment of negative tests to minimize wastage of antimalarial medicines, exposure of patients to unnecessary drug pressure and to delay the onset of drug resistance for malaria. Similar findings were reported in a study done in Nigeria (Obi IF, Sabitu K, Olorukooba A, Adebowale AS, Usman R, Nwokoro U, et al. 2019).

Medicines and supplies, staffing, and medical equipment dysfunctionality aspects of the healthcare system were as well found to be associated with adherence to prop heavy workloads that prevent thorough testing of all suspected cases, and stockouts of recommended medicines, leaving health workers with no option but to prescribe what is available. Dysfunction in medicines and supplies, staffing, and medical equipment within the healthcare system was identified as a common factor affecting adherence to malaria test and treatment policy standards in public health facilities. Persistent stockouts of medicines in health facilities within the district are cited as one reason health workers are sometimes forced to prescribe non-recommended antimalarials or to withhold drugs from patients who test positive. Similarly, issues such as work overload due to understaffing, routine stockouts of RDTs and reagents, and frequent breakdowns of microscopes are linked to the non-performance of malaria testing.

Stockouts of medicines and supplies are a common upheaval in Uganda's health care system and they are attributed to various factors like poor planning, prioritization, ineffective supervision and monitoring systems that are compounded by distribution barriers. Fundamentally, all the dysfunctionality aspects of the health care system highlighted are majorly due to insufficient funding, the national health financing mechanisms have not yet been well established to mobilize the required resources to meet the increasing demand for health. These findings thus highlight the need to improve the distribution, management, monitoring and forecasting of medicines at the district level. They also highlight the need for the government to increase funding to the public health facilities. These findings are in agreement with the findings of a study by the ministry of finance planning and economic development for Uganda which reported poor planning and

forecasting characterised by failure to present adequate and timely procurement plans by both health facilities and district health officials are to partly be blamed for the problem of drug stockouts. The study further highlights that stockouts problem is worsened by the increasing population, inadequate drug budgets and sometimes changing disease patterns (MoFPED, 2020).

Patient age, testing and prescriptions for younger children less than 5 years, were more likely to conform to malaria test and treatment policy standards compared to older patients. Revelations by the health workers appear to suggest that unlike adult patients, young children never deny being tested nor argue over treatment provided to them. Hitherto in this study it has been evidenced that parasitological confirmation of malaria was significantly associated with provider adherence to the treatment standards. Age has also been positively associated with test and prescription adherence to malaria treatment guidelines elsewhere in Uganda (Ampadu etal.2019) and Ghana (Kolekang et al. 2022).

Patient signs and symptoms presented as the main complaint were strong predictors of adherence to diagnostic and prescription standards. Health workers seem to depend on signs and symptoms to rule out malaria in febrile patients, despite the poor sensitivity of clinical case definitions. It is observed in this study that patients with primary complaints suggestive of malaria (such as fever, sweating, and nausea) were significantly less likely to undergo a diagnostic test for malaria than those whose main complaints were not typically associated with malaria. Although these are non-interventional factors and therefore not directly modifiable, the district health team and other implementing partners should take them into account when designing interventions to improve compliance

treatment standards.These results align with findings from other studies indicating that patients' clinical signs and symptoms can influence adherence to malaria treatment guidelines.

Interestingly this study found a remarkable level of adherence to malaria treatment guidelines in the management of severe malaria patients at the outpatient level. This finding is similar to what has been reported in other related studies done in Uganda and Ghana but different from what was reported by a study done in Malawi where it was found that pre-referral treatment for suspect severe malaria patient was being poorly done (Namuyinga et al. 2017). The relatively high level of adherently managing suspect severe malaria cases in the current study may possibly be attributed to the high level of the perceived seriousness of the illness by the health providers which draw much of their attention to provide quality care that would ensure the patient is saved from all possible complications of the disease.

Nevertheless, considerable number of suspect severe cases was not managed in conformity to treatment guidelines. The revealed concomitant administration of Rectal Artesunate and AL to referred patients may be viewed as an indication that health workers still perceive treatment guidelines as suggestions rather than recommendations which they are required to strictly adhere to. Pre-referral treatment for suspect severe malaria is pivotal for patients of all ages, the results of this study however appear to suggest that older patients were less likely to receive RAS prior to referral compared to children below 5 years. In India it was found that patients aged above 50 years were equally likely to die from malaria as those younger than 10 years of age (Chery et al. 2016). It is also concerning that a considerable

proportion of suspect severe malaria patients were referred without any pre-referral antimalarial provided and yet the risk of mortality from untreated severe malaria increases with delayed access to treatment (Mvumbi et al. 2019).

7.4 Study Limitations

The study used data from health facility records (HMIS 002), which has often faced data quality issues such as incompleteness, inaccuracies, and transposition errors. To minimize these concerns, a rigorous data quality assessment was conducted using electronic data capture. Additionally, triangulating the results of the abstracted data with qualitative data provided further quality assurance. While World Health Organization recommends to review a minimum of 100 records in order to do a representative assessment of any facility level performance, for some facilities this study did not reach the recommended minimum number of records. Thus, the results may not fully represent patient management practices for some of the facilities, future larger studies are recommended for an exhaustive assessment of the problem

The study is also limited by the fact that it was conducted in only one district with relatively high malaria transmission rates. Additionally, the study focused exclusively on public health facilities, which represent only a portion of the health facilities in Mukono district; thus, health workers' adherence to malaria treatment guidelines in private health facilities remains unknown. Similar research should be conducted in private health facilities within the district and in other regions of the country with varying levels of malaria endemicity.

Conclusions and recommendations to address non adherent malaria management practices to the guidelines

Conclusions

- The performance of parasitological diagnosis and confirmation before initiating treatment for suspected malaria cases in outpatient departments of public health facilities in Mukono district was found to be substantially high. This high level of adherence to parasitological diagnosis reflects the successful integration and acceptance of the "test and treat" policy within the district's healthcare system.

- While adherence to parasitological testing requirement is high, adherence to prescription guidelines remains a challenge. A significant proportion of patients are prescribed treatment that contradicts their parasitological test results, particularly among those who test negative for malaria. In this study, a considerable number of patients who tested negative were still treated for uncomplicated malaria, leading to wastage and misuse of medicines.

- The study also found several other non-adherent prescription practices, including the concomitant administration of antimalarial medicines and the failure to prescribe the recommended referral antimalarials to suspected severe malaria patients who were referred for further treatment. These practices increase the risk of parasite resistance to currently effective antimalarial medicines, the development of severe malaria complications, and death, ultimately undermining the objectives and goals of the current malaria treatment policy.

- Regarding the factors associated with health workers' adherence to malaria diagnosis and treatment guidelines in public health facilities, the study identifies diagnostic test results as a key factor. Health workers are more likely to follow treatment guidelines when patients test positive for malaria, highlighting the importance of the availability and accuracy of parasitological diagnostics. Additionally patient age, specific reported symptoms particularly nausea and Mistrust of Negative Diagnostic Results which stem from concerns about the accuracy of mRDTs also affect adherence to diagnosis and treatment guidelines.
- Skill gaps and resource limitations have equally been found to drive health workers in public health facilities in Mukono district to treat all febrile patients as though they have malaria, even when test results are negative. This underscores the need for training and capacity building to improve differential diagnosis and expand treatment options for febrile illnesses beyond malaria.

Policy recommendations to district health authorities, ministry of health and all other key stakeholders

- The district health management team working together with the stakeholders should scale up efforts in training of health providers in integrated management of malaria/fever to improve compliance to parasitological diagnostic results and to strengthen the capacity to diagnose and to manage malaria and non-malaria fevers. Interventions should be devised by the district health planers to improve the capacity and the quality of malaria epidemiological data generated by the clinicians from public health centers across the district to enhance its reliability, precision in estimating the required malaria medicines and supplies. Additional mechanisms should be devised to strengthen medicine and supplies chain management in the district to eliminate unnecessary stock outs.
- District health authorities working closely with health facility management teams should devise targeted public health interventions at the patient-health worker interaction level and at the community level to ensure patients appreciate the need to comply with the referral advice of health providers. This may possibly require bringing

on board community health workers to follow up patients and ensure they comply with referrals.

- The district health authorities working corroboratively with responsible stakeholders should devote efforts and attention to improving health workers capacity to recognize severity signs of malaria disease and administration of pre-referral treatment of suspect severe malaria patients with the recommended antimalarial medicines.
- The Ministry of health together with the district health management team should also explore more avenues to provide the necessary support supervision visits to health workers across all the health facilities in the district.
- The district health authorities in corroboration with the district service commission should take steps to allocate more health care workers to urban based health centers to enable them cope with the high numbers of patients many of whom move from rural based health centers to urban based health centers in search for better services.

References

1. Augusta Soninour Kolekang, Yaw Afrane, Stephen Apanga, Dejan Zurovac, Anthony Kwarteng, Samuel Afari-Asiedu, Kwaku Poku Asante6 and Anthony Danso-Appiah.**Challenges with adherence to the 'test, treat, and track'malaria case management guideline among prescribers in Ghana.** Malaria Journal 2022 21:332 https://doi.org/10.1186/s12936-022-04365-6
2. Burchett HED, Leurent B, Baiden F, 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.** BMJ Open 2017;7012973. doi:10.1136/bmjopen-2016-012973

3. Beatrice Amboko Kasia Stepniewska Peter M. Macharia, Beatrice Machini, Philip Bejon, Robert W. Snow and Dejan Zurovac. **Trends in health workers' compliance with outpatient malaria case-management guidelines across malaria epidemiological zones in Kenya,** 2010–2016 Malar J 2020 19:406 doi.org/10.1186/s12936-020-03479-z

4. Beatrice Amboko Kasia Stepniewska Peter M. Macharia, Beatrice Machini, Philip Bejon, Robert W. Snow and Dejan Zurovac. **Factors influencing health workers' compliance with outpatient malaria 'test and treat' guidelines during the plateauing performance phase in Kenya,** 2014–2016. Malaria Journal 2022 21:68. doi.org/10.1186/s12936-022-04093-x

5. Borna A. Nyaoke Marianne W. Mureithi2, Caryl Beynon. **Factors associated with treatment type of non-malarial febrile illnesses in under-fives at Kenyatta National Hospital in Nairobi, Kenya.** 2019 PLoS ONE 14(6): e0217980. https://doi.org/10.1371/journal.pone.0217980

6. Dejan Zurovac, Beatrice Amboko, Kasia Stepniewska, Beatrice Machini, Philip Bejon, Robert W. Snow. **Factors influencing health workers compliance with outpatient malari test and treat guidelines during the plateauing performance phase in Kenya**. Malaria Journal 2022 21:68 https://doi.org/10.1186/s12936-022-04093-x

7. Ernestina Esinam Agbemafle, Adolphina Addo-Lartey, Magdalene Akos OdikroI Joseph Asamoah Frimpong Chrysantus Kubio, Donne Kofi Ameme, Samuel Oko Sackey, Harriet Affran Bonful. **Adherence to the test, treat and track strategy for malaria control among prescribers, Mfantseman Municipality, Central Region, Ghana.** PLoS ONE 2023. https://doi.org/10.1371/journal.pone.0279712

8. Justin Pulford, Iso Smith, Ivo Mueller, Peter M. Siba, Manuel W. Hetzel. **Health Worker Compliance with a 'Test And Treat' Malaria Case Management Protocol in Papua New Guinea** (2016) PLoS ONE 11(7): e0158780. doi:10.1371/journal.pone.0158780

9. Klootwijk L, Chirwa AE, Kabaghe AN, van Vugt M. Challenges affecting prompt access to adequate uncomplicated malaria case management in children in rural primary health facilities in Chikhwawa Malawi. BMC Health Serv Res. 2019;19:735.

10. Ministry of health. Uganda Malaria Reduction and Elimination Strategic Plan 2021-2025.
11. Ministry of health; Uganda National Clinical Guidelines for management of common conditions 2016
12. Ministry of health. National Guidelines for the Management of Common Conditions. Uganda. clinical. guidelines. 2016
13. Mateusz M. Plucinski, Manzambi Ferreira, Carolina Miguel Ferreira, Jordan Burns, Patrick Gaparayi, Lubaki João, Olinda da Costa, Joltim Quivinja, Eliane Mbounga. **Evaluating malaria case management at public health facilities in two provinces in Angola** 16:186 2017 DOI 10.1186/s12936-017-1843-7

14. Nsengi Y. Ntamabyaliro*, Christian Burri, Didier B. Nzolo1, Aline B. Engo, Yves N. Lula, Samuel M. Mampunza Célestin N. Nsibu et al. Drug use in the management of uncomplicated malaria in public health facilities in the Democratic Republic of the Congo. Malar J 2018 17:189. doi.org/10.1186/s12936-018-2332-3

15. Obi IF, Sabitu K, Olorukooba A, Adebowale AS, Usman R, Nwokoro U, et al. **Health workers' perception of malaria rapid diagnostic test and factors influencing compliance with test results in Ebonyi state, Nigeria.** PLoS 2019

16. Olukunle O. Oyegoke · Leah Maharaj · Oluwasegun P. Akoniyon1 · Illiya Kwoji1 · Alexandra T. Roux . **Malaria diagnostic methods with the elimination goal in view**. Springer Nature 2022 doi.org/10.1007/s00436-022-07512-9

17. Ruth J. Namuyinga, Dyson Mwandama, Dubulao Moyo, Austin Gumbo, Peter Troell, Miwako Kobayashi, Monica Shah, Andrew Bauleni, Jodi Vanden Eng, Alexander Steinhardt Health worker adherence to malaria treatment guidelines at outpatient health facilities in southern Malawi following implementation of universal access to diagnostic testing Malar J. 2017 16:40. DOI 10.1186/s12936-017-1693-3

18. Sunil Dhiman **Are malaria elimination efforts on right track? An analysis of gains achieved and challenges ahead**. Infectious Diseases of Poverty, 2019 8:14; doi.org/10.1186/s40249-019-0524-x

19. Shennae O'Boyle, Katia J. Bruxvoort, Evelyn K. Ansah, Helen E. D. Burchett1, Clare I. R. Chandler, Siân E. Clarke, Catherine Goodman, Wilfred Mbacham, Anthony K. Mbonye, et al. **Hopkins Patients with positive malaria tests not given artemisinin-based combination therapies: a research synthesis describing under-prescription of antimalarial medicines in Africa.** BMC Medicine 2020 18:17 https://doi.org/10.1186/s12916-019-1483-6

20. Tumuhamye J, Sommerfelt H, Bwanga F, Ndeezi G, Mukunya D, Napyo A, et al. (2020). **Neonatal sepsis at Mulago national referral hospital in Uganda: Etiology, antimicrobial resistance, associated factors and case fatality risk.** PLoS ONE 15(8): e0237085. https://doi.org/10.1371/journal. pone.0237085

21. Ugandan National Malarial Control Program severe management of malaria report, 2017

22. U.S. President's malaria initiative; Uganda Malaria Operational Plan FY 2023

23. Ugwu I. Omale. **A qualitative study on determinants of the use of malaria rapid diagnostic test and anti-malarial drug prescription practices by primary healthcare workers in Ebonyi state, Nigeria.** Malaria Journal 2024 23:120. doi.org/10.1186/s12936-024-04958-3

24. Vito Baraka, Abel Nhama, Pedro Aide, Quique Bassat, Agatha David, Samwel Gesase, Jonathan Gwasupika, Sebastian Hachizovu, Geofrey Makenga, Christian Ruchaho Ntizimira, Orikomaba Obunge et al. **Prescription patterns and compliance with World Health Organization recommendations for the management of uncomplicated and severe malaria: A prospective, real-world study in sub-Saharan Africa. Malaria Journal 2023** 22:215; doi.org/10.1186/s12936-023-04650-y

25. Wilfred Ouma Otambo, Julius O. Olumeh, Kevin O. Ochwedo, Edwin O. Magomere, Isaiah Debrah, Collins Ouma, Patrick Onyango, Harrysone Atieli, Wolfgang R. Mukabana, Chloe Wang, Ming-Chieh Lee, Andrew K. Githeko8, Guofa Zhou, John Githure, James Kazura9 and Guiyun. Yan. **Health care provider practices in diagnosis and treatment of malaria in rural communities in Kisumu County, Kenya.** Malaria Journal 2022 21:129. doi.org/10.1186/s12936-022-04156-z

26. Worges M, Celone M, Finn T, Chisha Z, Winters A, Winters B, et al. Malaria case management in Zambia: a cross-sectional health facility survey. Acta Trop. 2019;195:839.

27. World health organization. World malaria report, 20 years of global progress and challenges. 2020
28. World Health Organization (WHO). Guidelines for the Treatment of Malaria. Second ed. Geneva: WHO; 2010.
29. World Health Organisation. Guidelines for the treatment of malaria, 3rd addition, 2015
30. World Health Organization. World Malaria Report 2014 Geneva.

APPENDIX 1: Data collection instruments

Appendix 1.1 CONSENT SCRIPT FOR THE RESEARCH PARTICIPATION

DESCRIPTION: Good day. My name is _____. I am a student from Makerere University School of public Health. This facility was selected to participate in a research study on Health workers adherence to malaria treatment guidelines in Mukono District. The purpose of this study is to understand health workers prescription practice adherence to malaria treatment guidelines and the factors that influence the practices. You are asked to allow access to the medical records of malaria patients to enable the researcher obtain data required to answer the research questions. The information obtained may be shown at scientific meetings, published in a written format, or used to develop new education modules/material, diagnostic tools, or treatment protocols.

TIME INVOLVEMENT: For data the exercise will take between 6-8hours and for qualitative interview 30-45 minutes.

RISKS AND BENEFITS: There is no risk that can be associated with extraction of patient data from medical records in this study because any information obtained, it will be difficult to directly link it to any third party. Friends, employers and the general public will not have any knowledge of whose medical record was included. Study ID codes will be used to protect patient identity. There will be no dissemination of any identifying information disclosing whose medical record was included and the results will be presented without any identifying factors.

There are no direct benefits from taking part in this study. However the non-direct benefits which may be reasonably expected to result from this study are a better understanding of what factors influence the prescription practices of antimalarial for uncomplicated and severe malaria. This will provide insights about the quality of treatment patients suffering from malaria illness receive. The information you will provide would be used for potential development of new education modules, and treatment protocols to improve prescription practices for malaria and non- malarial febrile illness in the country.

PAYMENTS: You will not receive any payment for your participation.

PARTICIPANT'S RIGHTS: If you have read this form and have decided to participate in this study, please understand your participation is voluntary and you have the right to withdraw your consent or discontinue participation at any time without penalty or loss of benefits to which you are otherwise entitled.

CONTACT INFORMATION:

Questions: In case you have any question about the study you can ask it. You can also raise your questions, concerns or complaints about this research, its procedures, risks and benefits, to the contact the Chairperson of the Institutional Review Board, Makerere University School of Public Health on the telephone number 0312-297565.

I give consent to participate in this study.

Indicate ***Yes*** or ***No***:_____

SIGNATURE _____ DATE_____

Appendix 1.2 STRUCTURED DATA EXTRUCTION GUIDE FROM MEDICAL RECORDS OF SUSPECTED MALARIA CASES OF 2017-2018 AT 9 HEALTH FACILITIES IN MUKONO DISTRICT

Date of facility visit	
Date/year patient visited the facility	
Name of the health facility	
Health Facility level	1.HC II 2.HCIII 3.HCIV

SOCIAL DEMOGRAPHICS

1. OPD Number Assigned to the patient…….....……..
2. Patient Parish of residence……...

3. Age of the patient……..... [In complete years/months]

Q4) Sex of the patient *(Tick the appropriate response)*:

a)	Male			b)	Female	
	1				2	

MALARIA DIAGNOSIS

Symptomatic Assessment

Q5). What is the Main complaint/symptom that the patient reported to the clinician at the time of seeking care from the facili**y** *[RA: Extract this from the patient medical records]*

a	Fever/high temperature	1	g	Coma	7
b	Vomiting	2	h	Severe anemia	8
c	Sweating/Perspiration	3	i	Respiratory difficulties	9
d	Muscle/Joint pains	4	j	Convulsions/ confusion	10

e	Nausea	5	k	Missing	99
f	Headaches	6			
	Other_5 (Specify).....				

Q6).Was the temperature of the patient measured?

Yes			**No**	
1			0	

Q7) If yes to Q6 what is the recorded temperature of the patient that was measured
[RA:If there is no temperature recode]

LABORATORY DIAGNOSIS

Q8) Was any malaria blood test done?	1. Yes 0. No 99. Missing

Q9. If yes to Q8 what diagnostic tool/algorithm was used?	1. mRDT 2. Microscope 99. Missing

Q10. What was the blood test result?	1. Positive 0. Negative 99. Missing

Q11. If positive what was the severity of malaria?	1. Non severe malaria 0. Severe malaria 99. Missing

Q12. If severe malaria was any of the following tests done as well?	1. Blood glucose level test 2. Erythrocyte volume fraction (haematocrit) 3.Other specify… 4.None was done

PRESCRIPTION OF MEDICINE

13) Based on blood test results or symptomatic assessment what medicine was prescribed to the patient? ***[****RA: Verify this from the patient's medical record]*

13a	**Antimalarial for Uncomplicated malaria**			
1	Artemether/Lumefantrine (Tablets)	**6**	Artemisinin-naphthoquine	
2	Artesunate + Amodiaquine	**7**	Quinine	
3	Artesunate + Mefloquine	**8**	Chloroquine	
4	Artesunate + Sulfadoxine/ Pyrimethamine			
5	*Dihydroartemisinin-piperaquine*			
13a	**Other.....**	**77**	None	

13b	**Antimalarial for Suspected severe malaria**			
1	Artesunate + Amodiaquine	9	Phenobarbitone	
2	intravenous artesunate	10	Phenytoin	
3	Intravenous Quinine	11	Dextrose	
4	Intramascular Artemether	12	Benzodiazepine (IV)	
5	Intramascular Quinine	13	Midazolam (IV)	
6	Intramascular artesunate	14	Referred to higher level	
7	Rectal artesunate			
8	Lorazepam			
11a	Other.....	77	None	

13c	**Antibiotics**	**Yes**	**No**
1	Amoxicillin	**1**	**0**
2	Penicillins	**1**	**0**
3	Ampicillin	**1**	**0**
4	Cefuroxime	**1**	**0**
5	Ceftriaxone	**1**	**0**
6	Ciprofloxacin	**1**	**0**
77	None		
11c	Other (Pecify).....		

13d	**Analgesics/ Antipyretics**	**Yes**	**No**
1	Paracetamol	**1**	**0**
2	Diclofenac	**1**	**0**
3	Ibuprofen	**1**	**0**
4	Tramadol	**1**	**0**
5	None		
11d	Other specify		

Appendix 1.4 KEY INFORMANT INTERVIEW GUIDE FOR THE INCHAGES AT THE HEALTH UNITS

Study participant ID #_____
Date and facility of interview _____
Length of interview in minute's _____

Health worker related factors

Training in malaria management

1.) Please what is your **current position** and **how long** have you been serving at this facility/Mukono District? .....
.....

2.) What is your training level/Cadre?

		Yes
I	Medical officer	
Ii	Clinical officer	
Iii	Nursing officer	
Iv	Comprehensive nurse	
V	Other please specify.....	

3.) Have you or other health workers who provide malaria treatment services to patient at this health facility received any support supervision in the last 3 months? .....
.....

4.) If yes how has it contributed to your diagnosis and treatment practices for malaria pants*?[Probe with respect to adherence to malaria]*
.....
.....

5.) If no how does lack of support supervision affect health workers adherence to diagnosis and malaria treatment guidelines? .....
.....

6.) Have you or other health workers who provide treatment to malaria patients at this facility received any in-service training on IMM?
.....
.....

7.) If yes how has this contributed to changes in your prescription practices for malaria patients?
.....
.....

8.) If no how does it negatively affect your assessment and treatment practices for febrile patients?.....
.....

Knowledge and attitude towards malaria diagnosis and management

9.) What is the recommended first line and second line treatment for

a. Uncomplicated malaria…….....
b. Severe malaria……

10a.) Thinking about the context in which you provide health care services, is test and treat an appropriate strategy for the management of malaria in Mukono district? …….

10b) Yes/No Why…….
……

11a.) If you test a patient for malaria using mRDT and get a negative result, would you fully accept the diagnostic results that the person does not entirely have malaria?
……..

11b) Yes/No Why [Probe: with regard to health workers attitude, beliefs, and lack of skills to diagnose other non-malarial febrile conditions]
……
……

<u>Health worker related factors</u>

12.) At times health workers disregard the guidelines and treat patients for malaria symptomatically or disregard the test result and treat otherwise. Based on your experience what health work related factors that may sometimes influence you or other health workers to treat febrile patients not according to test results i.e prescribing of antimalarial to patients who tested negative or prescribing non recommended medicines to malaria positive patients *[Moderator: Probe with regard to mistrust of results of the testing tool used, fear to miss out an underlying infection, lack of skills to differentiate parasitic, bacterial and Viral infections and patient self-medication]*

.....
.....

<u>Facility and health system factors</u>

13.) What facility related factors that may sometimes influence you or other health workers to disregard test results and treat febrile patients not according to test results i.e prescribing of antimalarial to patients who tested negative or prescribing non recommended medicines to malaria positive patients *[drug stock outs, mRDT stock outs, unavailability of diagnostic equipment, work load to health workers, staffing challenges and breakdown of the microscope]*

.....
.....

14.) How does any of the factors mentioned in Q above affect the diagnosis and prescription decisions? ……..
.....

Patient social Demographic factors

15.) What patient social and demographic considerations would you say that sometimes may influence a health worker's prescription decision, not to steak to diagnostic results and malaria treatment guideline for febrile patients? *[Moderator Probe: with regard to patient/caregivers expectation/beliefs, income level, and self-medication etc]*
.....
.....

16. How does any of the mention in Q15 above affect the prescription decisions?
.....
.....

Suggested Solutions

17. What do you think should be done to address some of the problems you have highlighted above to improve management of malaria patients and adherence to malaria treatment guidelines. .....
.....

End of the interview thank you for your time and participation

Appendix 1.5 IN-DEPTH INTERVIEW GUIDE FOR THE DISTRICT HEALTH TEAM MEMBERS AND FACILITY IN-CHARGES

Study participant ID #_____
Date and facility of interview _____
Length of interview in minute's _____

1. Please can you give me a brief overview of your **current position** and **how long** you've been in this post?

2. Thinking about test and treat approach for malaria and the context in which the policy is being implemented how would you describe the rate of adoption of the strategy by the health workers in Mukono district?

3. Does the rate of shift of health workers prescription practices from presumptive to confirmatory approach meet your set target as a district?

4. What health work and health facility related factors that influence the prescription practices of health workers for suspected malaria cases? *[Moderator Probe in line with **health workers disregarding test results and prescribe otherwise**]*

   Health Facility/System factors .....

   Health worker related factors .....

5. Based on the facts you have what are the major challenges or gaps that affect health workers adherence to diagnosis and treatment guidelines for malaria in Mukono District? *[Moderator Probe with respect to Health worker related factors (staffing, training etc) and Health system factors]*

6. What interventions have been undertaken by the district health authority to address the challenges?

7. What interventions have been undertaken to address the challenges and enhance health worker adherence to malaria treatment guidelines?

End of interview thank you for your time and participation