

**ASSESSMENT OF PRESCRIBING PATTERNS AND AVAILABILITY OF ANTI-MALARIAL DRUGS TO CHILDREN UNDER FIVE YEARS OF AGE IN A RURAL DISTRICT IN KENYA**

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## **KEY WORDS**

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## ACRONYMS

ACT	Artemisinin–combination Therapy
AL	Artemisinin lumefantrine
AQ	Amodiaquine
CQ	Chloroquine
DOMC	Division of Malaria Control Programme
ITN	Insecticide Treated Nets
KMIS	Kenya Malaria Indicator Survey
KNBS	Kenya National Bureau of Standards
MOH	Ministry of Health
MPHS	Ministry of Public Health and Sanitation
RBM	Roll Back Malaria
RDT	Rapid Diagnostic Test
SP	Sulphadoxine Pyrimethamine
SPSS	Statistical Package for Social Sciences
QN	Quinine
WHO	World Health Organization



## ABSTRACT

**Background:** The cornerstone of malaria case management is prompt and effective treatment. In Kenya, the National Guideline for the Diagnosis, Treatment and Prevention of Malaria has changed over the past 12 years and in 2004 Artemisinin Combination Therapy (ACT) was introduced as first line treatment for uncomplicated malaria. Successful implementation of this policy depends on changing prescribing patterns of health workers and this requires regular assessment of progress made and application of lessons learnt to inform future policy and practice.

**Aim:** The aim of this study was to assess the prescribing practices and availability of anti-malarial drugs to children under five years of age in primary health care facilities in Bondo district.

**Study design:** This was a facility-based cross-sectional study using an adapted WHO methodology and tools.

**Study population and sample:** A sample of 20 primary health care facilities were selected from Bondo district using cluster sampling and 30 care givers with their children who were under five were selected from each of these facilities using simple random sampling.

**Data collection:** Three forms were used to collect data: a prescription indicator form, a prescribing encounter and patient care form, and a health facility indicator form. Data was collected using two trained data collectors familiar with the local language and setting and then analyzed using SPSS.

**Results:** Six hundred children and their care givers were interviewed in the 20 primary health care facilities. Of the children who were diagnosed with uncomplicated malaria and participated in the study 63.5% were females while 36.5% were males. Artemisinin lumefantrine (AL) was prescribed and dispensed to 99.2% while quinine was prescribed to 0.8%. Malaria laboratory confirmatory tests were carried out in 100% of children. Furthermore, 44.5% were given the first dose of AL at the facility with swallowing of the first dose observed at the facility in 40.5% of the children. Concerning caregivers, 81.7% reported receiving explanations about the importance of completing malaria treatment

regimen and 98.3% knew that AL is the drug choice for treatment of malaria, however, disappointingly 96.7% of the care givers were not told what to do if the child vomits after taking AL. All primary health care facilities had AL and other key anti-malarial drugs in stock and 95% of the primary health care facilities had wall charts with the treatment regimen for the prescribing of AL.


**Conclusion:** Although more than 90% of the children in the primary health care facilities in Bondo district were prescribed and received AL for treatment of malaria, the quality of AL case management at the point of care was not optimal compared to the National Guidelines for the Diagnosis, Treatment and Prevention of Malaria requirements. Improved training of health workers on the importance of patient supportive care for caregivers of children under five should be introduced to achieve a malaria free zone in Kenya by 2017. Monitoring and evaluation of these recommendations are essential so that adjustments can be made towards improving patients' support.



## DECLARATION

I declare that: **Assessment of prescribing patterns and availability of anti-malarial drugs to children under five years of age in a rural district in Kenya**, is my own work and that it has Not been submitted for any degree or examination in any other university, and that all the sources I have used or quoted have been indicated and acknowledged by complete references.

Name: Oreje Joy Susan Adhiambo

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Date: June 2013



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## CHAPTER ONE: INTRODUCTION

### 1.1 Background

Malaria is one of the most important public health problems worldwide, particularly in children under five years of age. According to Bryce *et al* (2005), out of the 10.6 million annual deaths among children under five years old globally, 8 percent are attributed to malaria. Despite this, malaria control and eradication was neglected for decades and has only reclaimed global health attention since the initiation of programmes like 'Roll Back Malaria' (RBM), launched in 1998 by three United Nations agencies and the World Bank (Anonymous, 2007; Feachem and Sabot, 2008; Tanner and de Savigny, 2008; and RBM WHO, 2008). RBM (2008) reported that malaria accounts for one in five of all childhood deaths in Africa and estimated that out of the 500,000 children that develop cerebral malaria annually, 10-20% of these children die and 7% are left with permanent disability. Prompt use of an effective anti-malarial drug is essential for controlling malaria. The World Health Organization (WHO) recommends an artemisinin-based combination therapy (ACT) as the first-line treatment of uncomplicated malaria in children under five.

The disease remains a major public health problem in Kenya, accounting for 30% of outpatient consultations, 19% of inpatient admissions and up to 5% of patient deaths (DOMC, 2009). According to the Kenya Demographic Health Survey 2008-2009 the under five child mortality rate is at 74 deaths/1000 live births. The report further states that in the two weeks preceding the survey, 24% of the children under five had fever and out of this only 23% took anti-malarial drugs. In addition to this, 11% took anti-malarials on the same or next day (KNBS, 2010). Furthermore, 8% of the children under five with fever took ACT, 3% took Fansidar. Only 4% of the children took ACT on the same or next day after onset of fever and 2% took Fansidar on the same or next day. Disappointingly, 8% of the children were still being given amodiaquine (KNBS, 2010). These figures are a clear indication that more needs to be done with regards to malaria treatment for children under five with respect to ACT policy adherence, since the failed monotherapies that were done with away are still being prescribed in Kenya.

The Kenya Malaria Indicator Survey carried out in 2010, revealed that the lake side endemic zone had the highest percentage of the children who had fever two weeks prior to the survey, at 41% compared to the coastal endemic region with 30%. It further states that treatment seeking behavior among children under five is lowest in lake side endemic zone at 50% compared to the coastal endemic zone which is highest at 75 % (DOMC, 2011). This could be due a larger number of non governmental organizations present in the coastal region compared to the lake side region. In addition, only 24% of the children under five from the lake endemic zone took ACT.

The Division of Malaria Control Programme (DOMC) in conjunction with Ministry of Public Health & Sanitation (MPHS) employs four strategic approaches to control malaria across the country. They include firstly, ensuring the use of insecticide treated nets (ITNs) and other vector control measures by the at-risk communities; secondly, providing malaria prevention and treatment to pregnant women; thirdly, improving malaria epidemic preparedness and response; and lastly, case management which guarantees people access to quick and effective treatment (MOH, 2004). This fourth strategy, case management, is of most relevance to this study as its cornerstone lies in the early diagnosis (malaria laboratory tests or rapid diagnostic test) and prompt treatment with a recommended antimalarial drug as stipulated in the National Guidelines for Diagnosis, Treatment and Prevention of malaria (DOMC, 2010).

The current policy treatment in Kenya recommends artemisinin-based combination therapy (ACT) as a first line treatment of uncomplicated malaria. According to the National Guidelines for the Diagnosis, Treatment and Prevention of Malaria in Kenya (DOMC, 2010), only ACTs that are co-formulated should be used for uncomplicated malaria. It further says that the ACTs should include at least three days of treatment with an artemisinin derivative. Paediatric formulations should be used for infants and children to ensure the correct dosing (Appendix 1). In addition to this, the care givers of the children under five, need counseling and follow up as part of the treatment. The health care provider needs to observe swallowing of first dose of the treatment, teach the care givers how to prepare dispersible tablet prior to administration, educate the care giver on what to do when vomiting occurs after administration of the drug, explain dosing schedule and confirm that the care givers understands by using probing questions,

emphasize on dose completion even when the child feels better after starting the treatment regimen and advise on return to the nearest health care facility in case the patient's condition deteriorates or symptoms do not resolve after completion of treatment, that is, three days. Second to these, the health care providers need to prescribe, preferably, paracetamol as an anti-pyretic to manage fever. The care giver also needs to be educated on conservative management of fever such as tepid sponging, exposure and fanning. The care giver needs to be encouraged to give plenty of fluids to the child and continue breast feeding where applicable (DOMC, 2010).

This study was motivated on the basis that case management rests on prompt and effective treatment of malaria, and is one of the strategies to lower the child mortality and morbidity rate caused by malaria in Kenya.

## **1.2 Problem Statement**

Artemisinin-based combination therapies (ACTs) were introduced as first line treatment for uncomplicated malaria in Kenya in September 2006 with the aim of addressing the problem of failing monotherapies (amodiaquine and chloroquine) and reducing the enormous burden of malaria across the country (Snow *et al*, 2005; WHO, 2006). However, the 2007 Malaria Indicator Survey did not show much improvement in case management practices, that is, diagnosis and prompt treatment of malaria, with the survey finding that only 4.7% of children under-five received ACT treatment within 24 hours (PMI, 2009). This is far short of the Abuja declaration target of 60% (MOH, 2003). The President's Malaria Initiative (PMI) programme in Kenya (2009) asserted that the Ministry of Health, Division of Malaria Control programme (DOMC), diagnosis and treatment of malaria was an area of concern, as prompt and accurate diagnosis of malaria is key to effective disease management, and reducing the unnecessary use of anti-malarial drugs. This study sought to identify the prescribing practices in primary health care facilities among the children under five in Bondo district and compare them to the national treatment guidelines. In addition, the study also assessed the availability of anti-malarial drugs at these facilities.

### **1.3 Study setting**

The study was conducted in Bondo district, Siaya County in Kenya. The district covers a total of 1,972km<sup>2</sup>. It borders, Kisumu County to the East and Homa Bay and Suba across the Winam Gulf to the Southeast and to the West is Uganda. The district has a modified equatorial climate. Predominantly, it has warm, dry and humid climate with mean annual rainfall ranging between 800-1600 mm. Long rains occurs between March and May and short rains occurs between October and November. It is a lake side malaria endemic area where transmission occurs throughout the year, though it is highest during two rainy seasons annually. The malaria morbidity rate is 34% (UNPEI, 2007). Bondo district is a rural setting with a population of approximately 238 780 with 47% of the population 14 years old or less, and 58% are 19 years or less.

There are 3 divisions in Bondo district namely Maranda, Nyawita and Usigu each headed by a district officer. It has a total of nineteen locations and forty-nine sub-locations.

According to the Ministry of Public Health and Sanitation, there are 29 primary health care facilities in the district, 27 dispensaries and 2 health centres (MOH, 2010). However, during data collection, which was carried out during the rainy season, two of the dispensaries had been elevated to health centres. The district has one referral hospital, Bondo district hospital. The majority of the dispensaries and health centres are headed by registered nurses while others are headed by clinical officers. The registered nurses have a diploma in nursing while the clinical officers have a diploma in medicine. Each is responsible for prescribing drugs to patients. The other staffs include enrolled nurses (certificate nurses), pharmacy technicians, public health officers, nurse aids and subordinate staff. All the health facilities operate during weekdays from 8am to 6pm and are closed at weekends (Saturday and Sunday).

The primary health care facilities included in the study area were government facilities and mission hospitals. Some of the health care facilities are in remote areas and are only accessible by use of motor bikes, especially during rainy season when this study was conducted. In addition, some are on the island making entry weather dependant as experienced during data

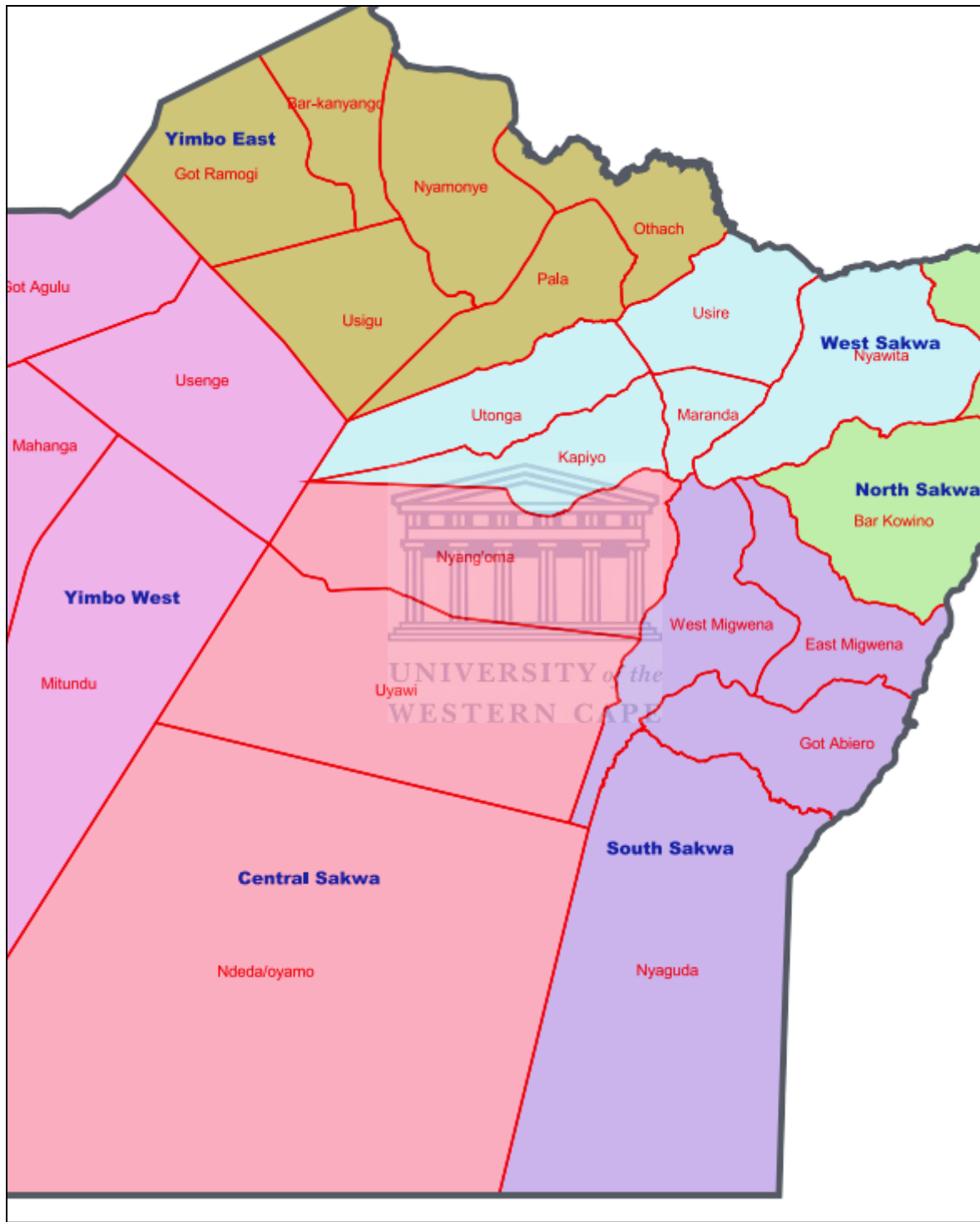
collection. Furthermore since the only mode of transport is a motor boat, the tides have to be low for accessibility.

All these primary health care facilities have laboratories that perform malaria blood diagnostic tests before drugs are prescribed and dispensed. The patients pay a fee of Kshs. 30 an equivalent of \$0.35 for this malaria test. This payment is demanded by the facility health committee for the steady supply and procurement of laboratory reagents. This is because supply from government is never sufficient and for the health care facilities to maintain laboratory services the patients have to co-share the cost hence the demand for payment of \$0.35 The patients are neither required to pay for consultations or for the anti-malarial drugs.





**Figure 1: A map of Bondo district ( Study area )**



Source. <http://www.flickr.com/photos/albertkenyaniinima/6671945119/sizes/o/in/photostream/>

NOTE: The red line borders are the existing ward boundaries

## **CHAPTER TWO: LITERATURE REVIEW**

### **2.1 Introduction**

Appropriate case management of malaria was identified as one of the four strategic approaches to control malaria in Kenya (MOH, 2004). This involves those with malaria, including children under five years of age, receiving prompt and effective treatment with anti-malarial drugs in accordance with the current National Guidelines for Diagnosis, Treatment and Prevention of malaria in Kenya (DOMC, 2010). A number of different factors have been shown to influence adherence to malaria guidelines, particularly when significant changes have been made to the policy such as malaria testing and recommended drug regimens. These include prescribing practices of health workers, availability of drugs at health facilities and the knowledge of patients and caregivers of malaria treatment.

### **2.2 Prescribing patterns of anti-malarial drugs among under fives**

Successful implementation of any new anti-malarial policy depends on changing prescribing patterns of health workers (Ucakaon *et al*, 2011). According to Wasuna *et al* (2008), failure of health workers to prescribe drugs stipulated in a drug policy may be due to issues such as the high cost of drugs, contradicting training messages in the recommended guidelines, insufficient drug supply, availability of non-recommended drugs causing prescription confusion and lack of follow-up supervision. Ucakaon *et al* (2011), suggest that performance of health workers could be evaluated by assessing their prescribing habits and says these prescribing habits may be influenced by a number of factors including lack of training, shortage of drugs, financial influences, patient load, lack of materials and prescribing attitudes. All of which are challenges in a typical health centre setting in Africa.

Asia portrays specific challenges for ACT use. Low coverage, poor targeting and monotherapy use in the private sector are cited as some of the challenges that influence prescribing patterns of ACT (Yeng *et al*, 2008). A review by Whitty *et al* (2008), comments that in Eastern Asia tolerance of malaria parasites to artemesinins are already a concern. In addition across Asia and Africa, there is substantial evidence that at most of the formal healthcare settings where ACTs are provided, a large proportion of children and adults presenting with fever are prescribed anti-

malarials, even though they may not have malaria parasites in their blood (Hamer *et al*, 2007, Reyburn *et al*, 2007). However, in South East Asia, the successful use of diagnostic services, both microscopy and rapid diagnostic tests (RDTs), provides useful models for other settings like Africa (Kolaczinski, 2007; Ratcliff, 2007).

According to DOMC (2010), malaria is either classified as uncomplicated or severe (complicated) based on the clinical presentation. It further states that **uncomplicated malaria** is defined as symptomatic infection with malaria parasitemia without signs of severity and/or evidence of vital organ dysfunction while severe malaria/complicated malaria is defined as acute malaria with signs of severity and /or evidence of vital organ dysfunction.

Irrational prescribing of anti-malarial drugs is abundantly evident in most African countries. This is cited by Jowett and Miler (2008), and Oshikoya *et al* (2006). Kamuhabwa and Ramji (2011) conducted a study in Tanzania to determine the prescribing and dispensing practices for pediatrics and found that 65% were prescribed AL while 35.5% were prescribed quinine. However, the 35.5% that were prescribed for quinine did not present with symptoms of severe malaria even though the national guidelines for the diagnosis and prevention of malaria indicates that quinine should only be prescribed as first line treatment for complicated/sever malaria. This is a worrying trend since the treatment guideline recommends AL as first line for treatment of uncomplicated malaria. In addition, the prescribers had moderate knowledge with regards to anti-malarial drug use and supportive care. Whitty *et al* (2002), asserts that lack of knowledge of anti-malarial use in pediatrics is a serious problem especially in high endemic areas where anti-malarials are repeatedly given to treat frequent fevers in the absence of malaria. This increases resistance and frequency of adverse drug reactions.

A study conducted in rural districts in Uganda, one year after implementation of artemether-lumefantrine (AL), an ACT, as a first line treatment of uncomplicated malaria, revealed that 60% of patients were prescribed AL of which 95% of these patients had correct dosage prescribed; 14% chloroquine and sulphadoxine pyrimethamine (CQ+SP); 4% quinine; 3% various other anti-malarials; and 16% had no anti-malarials prescribed to them at all. In addition, the health workers were more likely to prescribe AL weight specific packs if they were in stock, but also if

non-recommended chloroquine was absent (Ucakacon *et al*, 2011). This study highlights the importance of having steady supply of AL weight specific packs in rural health care facilities to facilitate health workers adherence to the national treatment guidelines.

Another review carried out to evaluate treatment practices for uncomplicated malaria after the policy change from SP to AL in four districts in Zambia showed that among children weighing 10 kilograms or more, SP was prescribed to 68% of children, whereas the recommended AL was prescribed for only 11%. Among children weighing less than 10 kilograms seen at facilities where AL was available, AL was prescribed for 22% of children and SP for 54% (Njuguna and Qader, 2007). This study emphasized that when a new drug policy is introduced, the transition period is crucial and must be managed effectively to ensure positive results. This calls for extensive education to sensitize prescribers and the general public.

The Kenya Malaria Indicator Survey conducted in 2010, showed that in the lake endemic zone 41% had fever two weeks prior to the survey and out of these 50% sought treatment from the health care facilities. Of the children who sought treatment in the health care facilities (the 50%), 40% took anti-malarials and 24% took ACT, however only 10.9% of these children (who sought treatment from the health care facility above) under five had blood taken from either their fingers or heel for diagnostic malaria laboratory test (DOMC, 2011). It further says that in the same lake endemic zone the under five that took ACT same or next day were, 15.5%. Those who took other anti-malarials included SP/F 1.2%, CQ 0%, AQ2.7%, Q 2.6%, other anti-malarials, 3.2% (DOMC, 2011). The above figures illustrate that ACT use among under five is still low in the lake endemic zone although there is an improvement from the 2008-2009 health indicator survey where 8% of the children under five with fever received ACT and 4% received it same or next day (KNBS,2010). Another point to note from these figures, the percentage of children that had malaria laboratory tests done is still low since the National Guidelines for Diagnosis, Treatment and Prevention of malaria strongly recommends that all patients regardless of age should have their blood tested for malaria before ACT is prescribed. This can lead to unnecessary prescription of ACT leading to artemesins parasite resistance.

Therefore, more effort needs to be put by DOMC to ensure that treatment policy is adhered to by the health care providers in all the health care institutions and more so the endemic areas where the figures of ACT uptake is still way below the 60% mark of the Abuja declaration especially among under five children. More so the prescription of failing monotherapies that are not to be prescribed (as per the National Guidelines for the Diagnosis, Treatment and Prevention of malaria in Kenya) still appears to be given to these children is a more worrying trend that needs to be addressed.

Earlier studies done in Kenya by Zurovac *et al* (2008), Skarbinski *et al* (2009) and DOMC (2009) revealed that, overall AL use was low in both under five and above five to 14 years, with current practice of prescribing non-recommended amodiaquine (AQ), SP and their combinations; secondly a substantial proportion of young children were tested for malaria; and lastly, prescriptions of AL largely followed test results and recommendations. However they found that most test negative patients were still treated for malaria mainly with alternative and non-recommended treatment.

More recent studies in Kenya seem to indicate some improvements in adherence to the new malaria policy guidelines. A study conducted three years after AL implementation in Kenya revealed that for children under five that presented with fever 63.6% were treated with the recommended AL, 9% were treated with non-recommended quinine or combination of AL and quinine, 2% received ineffective AQ or SP monotherapies and 25.4% were not treated for malaria. In addition, among test positive under five children, 74.7% of the children were treated with AL, 18.7% with AL+QN and 5.5% with quinine alone. However, among test negative children, AL was prescribed for 40.4% of these children, 9.1% were treated with AL+QN or quinine alone and 7.1% were treated with either AQ or SP monotherapies. At least one anti-malarial drug was prescribed for 56.6% of the test negative (Juma and Zurovac, 2011). All patients in this study were tested for malaria.

A survey done in Bondo district and other four endemic areas in Kenya on barriers to promote effective malaria treatment among the poorest populations revealed that low levels of ACT uptake could be attributed to poor prescribing practices, as well as other factors such as frequent

stock outs in public health care facilities, limited availability outside the public sector and high costs (Chuma *et al*, 2010). The study emphasized the importance of addressing all these issues to improve adherence to the malaria treatment guidelines.

### **2.3 Availability of anti-malarial drugs in health care facilities**

National malaria management strategy is established upon accessibility to efficient and inexpensive anti-malarial drugs (Alexandre *et al*, 2010). Availability of the recommended anti-malarial drugs at all primary health care facilities is crucial for the smooth implementation of any anti-malarial drug policy, however a number of studies have found that stock-outs are frequent occurrences in health facilities in a number of African countries.

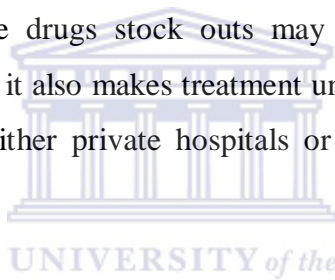
The aim of malaria management policy is to provide therapeutic guidelines to health workers and efficacious and affordable drugs to health facilities for patients to buy. This policy must be based on proper laboratory diagnosis and treatment of malarial episodes. Given the rapid evolution of parasite resistance to chloroquine and sulfadoxine-pyrimethamine (SP), several countries have modified their national policy and adopted the artemisinin derivative combined treatments (ACT's) as recommended by (WHO, 2006).

Lack of first line anti-malarial treatment in Sub Saharan Africa has been mentioned extensively as the main problem in the health care systems (Hetzl *et al*, 2008). This is reported as problematic in several other studies (Kangwana *et al* 2009; Zurovac *et al*, 2008; Chuma *et al*, 2009; Zurovac *et al*, 2008). According to Chuma *et al* (2009), a survey carried out in two districts in Kenyan coast indicated that drug shortages occurred during the peak illness and towards the end of the drug supply period. The author asserts that such factors lead to poor adherence to treatment policy.

A study undertaken in Uganda to review malaria case management under AL showed that on the survey day, any tablet packs of AL were in stock at 87% of facilities, the availability ranging from 39% for 18 tablet packs to 83% for 6 tablet packs. All four weight-specific AL packs were available at only 34% of the facilities. Other anti-malarial drugs recommended for treatment of uncomplicated malaria such as quinine, artesunate and amodiaquine were respectively in stock at

only 30%, 4%, and 2% of facilities. Disturbingly, non-recommended anti-malarials were widely available, CQ at 77% and SP at 88% of facilities. The figures above point to the likelihood of stock outs of the ACTs or other anti-malarials recommended in the policy influencing the prescribing habits of health workers and resulting in use of the non recommended antimalarials and hence not adhering to the national treatment guideline (Zurovac *et al*, 2008).

Lack of ACTs in the rural health care facilities in Kenya is attributed to several factors including high cost of treatment, long distance to the health care facilities, poor infrastructure, opening hours that are not friendly to clients and staff shortages just to mention a few (Chuma *et al*, 2010). A survey done in four districts in Kenya showed that a third of the individuals that sought treatment did not get drugs from the hospital pharmacy due to anti-malarials being out of stock. This stock outs were majorly experienced during the wet seasons when malaria infections are high (Chuma *et al*, 2010). These drugs stock outs may not only create mistrust between community and health workers but it also makes treatment unaffordable since patients are forced to seek alternative treatment in either private hospitals or local pharmacies that are equally costly.



One of the factors that influence availability of anti-malarial drugs is the poor road network that becomes inaccessible during wet seasons. This hinders not only the patients in getting the anti-malarial treatment but also the health care providers who might not report to work due to remote and inaccessibility of the health care facility to provide anti-malarial treatment needed (Noor *et al*, 2005). Several authors report in their findings that, the opening and closing hours of rural health care facilities remains a major challenge to accessibility of anti-malarials (O'Meara *et al*, 2009; Gething *et al*, 2004 and Chuma *et al* 2010). This is because most of the primary health care facilities are closed during the weekends, that is, Saturday and Sunday, The patients are therefore forced to wait until Monday when the drugs will be available as the health facility remains closed. This in turn becomes a barrier to effective malaria treatment.

A cross-sectional survey carried out in 164 government health care facilities (115 dispensaries, 30 health centers, and 19 hospitals) in high endemic areas across Kenya to assess availability of AL two years after its implementation, revealed that approximately a quarter (25.6%) of the

surveyed facilities had none of the four AL weight-specific treatment packs in stock, with complete stock outs more common in dispensaries (30.4%) than in health centers (20.0%) and hospitals (5.3%). Furthermore, three quarters (75.0%) of the facilities were out of stock of at least one weight-specific AL pack. It was particularly worrying that packs for the youngest age group, the group most at risk of malaria mortality, were absent in nearly two-thirds (61.0%) of facilities (Kangwana *et al*, 2009).

Chuma, Okungu and Molyneux (2010) asserted that drug availability was a key factor that influenced access to treatment. These researchers conducted a study in four rural districts in Kenya (Gucha, Kwale, Bondo and Makueni districts) and the results found that 30% of people who visited public health facilities did not get their drugs from the hospital pharmacy and were issued with a prescription to buy drugs elsewhere. Of these, only 32.8% individuals bought the prescribed drugs. In addition, among exit interview participants, 38.8% did not receive drugs from the facility because they were out of stock. Persistent shortages of anti-malarials in public healthcare facilities reportedly discouraged people from seeking effective treatment. Participants were vocal about chronic drug shortages in the public health facilities and the implications this had on affordability and treatment seeking behavior (Chuma, Okungu and Molyneux, 2010).

Another survey in the above named four districts (Bondo included) in Kenya to evaluate why health workers do not prescribe ACT indicated that there was fear of stock-outs in all the districts that the studies were conducted. The report further says that the health workers stated that the supply of AL was inconsistent during the initial stages of policy implementation. Three districts, including Bondo, had experienced at least one month of AL stock-out during the three month period (December 2006 to February 2007). Virtually all health workers indicated that they were rationing the drug because they were not certain when the next supply would be available basing their experience on the previous stock-outs periods (Wasuna *et al*, 2008).



## 2.4 Care givers knowledge on treatment and patient care

Caregiver's knowledge in the management of malaria is crucial in reducing child mortality and morbidity caused by malaria. Caregivers need to know and understand that prompt treatment, correct dosage and completion of treatment is essential in treating malaria and limiting drug resistance. Studies in several sub-Saharan African countries have investigated this critical aspect of malaria treatment and care.

A study undertaken in Sudan to assess prescribing habits of health workers revealed that the care-givers had poor knowledge of the anti-malarial treatment they had received. The researcher speculated as to whether the information on the prescribed drug was issued voluntarily or the care-giver was expected to ask questions regarding the dispensed anti-malarial (Mannan, Malik and Ali, 2009). Failure of the dispenser to convey the correct message regarding treatment to the care giver could result in compromised treatment. In addition, the study showed poor labeling practices in many health centers, including, lack of patients' names, incomplete dosage schedules and sometimes incorrect dosages. This could have been due to lack of knowledge of appropriate labeling practices by the dispensers (Mannan, Malik and Ali, 2009). A similar study done in Uganda by Zurovac *et al* (2008), revealed that of the 669 patients 97% received explanations about how to take AL at home, 67% were advised to complete all doses, 47% were instructed to take the drug after a meal, 15% received the first AL dose while at the facility, 14% were observed while swallowing the first dose and 7% were advised what to do in case of vomiting..

In Tanzania, a survey was done to assess knowledge of care givers on AL prescribed to their children under five. It was noted that 67% of parents/care givers had a moderate level of knowledge regarding the instructions given by prescribers on AL home use and 33% had low level of understanding of the instructions given for anti-malarial home use. The argument here is that if these parents (a large number) who have a low level of understanding instructions on drug home use then how will the drug be of benefit to the child to cure malaria that it is intended to? In addition to this, only 2% of parents could comprehend supportive care (which includes fever management, fluid and nutritional intake during treatment) while 69% had moderate understanding of supportive care and 30% had a low understanding on supportive care. These figures are of a great concern as it means that the care givers who ought to know the supportive

care that is outlined in most national treatment guidelines are not aware, and so the adherence to treatment guideline is in jeopardy. This trend could be an indication that the drug dispensers are not transmitting the messages that they ought to. In this study the researchers attributed this trend to heavy patient work load and so there is no time for the health care providers to pass the knowledge to care givers (Kamuhabwa and Ramji 2011).

Wasuna *et al* (2010) conducted pre and post training surveys of health workers in Bondo district, the setting for this research, to assess four different dispensing and counseling tasks performed by health workers to the caregivers of the children under five with malaria and treated with AL and dispensed in the facility. The four dispensing and counseling tasks evaluated included; firstly, weight measured, secondly, initial dose administered in the health facility, thirdly, explanation on dosage to take at home and emphasis on completion of full course, fourthly, advice on vomiting. They found the following results from the pre and post training surveys: those to whom their weights were taken (74.2% and 79.0% respectively), those given first dose in the health facility (21.6% and 33.6% respectively), those to whom dosage to take at home was explained (98.5% and 99.1% respectively), finally those given advice on vomiting (3.3% and 8.0% respectively). During both pre and post training surveys nearly all (98.5% and 99.1% respectively) caretakers of children for whom AL was dispensed, reported that the health workers provided advice on completion of the AL treatment regimen. However, few children (1.5% before and 5.0% after the intervention) received all four AL dispensing and counseling tasks, while the performance of at least three out of four tasks increased from just 20.1% to 34.8%.

Although the above survey shows an improvement, even after training and offering job aids to health workers to enhance case-management practices, these figures (on all four AL dispensing and counseling tasks) are too low to curb malaria morbidity and mortality among under fives. Therefore there is need to improve malaria treatment practices and to continuously monitor prescribing practices and assess availability of anti-malarials among under fives.

## **2.5. Conclusion**

This chapter reviewed the literature on malaria treatment practices, particularly in developing countries. It focused on prescribing patterns of AL among children under five in Uganda, Tanzania, Sudan and Kenya. Furthermore, it reviewed availability of anti-malarials to these age groups and care givers knowledge of malaria treatment in children. The literature from Kenya showed that malaria treatment is still at variance from the national guidelines for the diagnosis, treatment and prevention of malaria, suggesting that more emphasis needs to be put on AL prescribing adherence by health workers, and improvements in the quality of counseling to caregivers on malaria treatment.



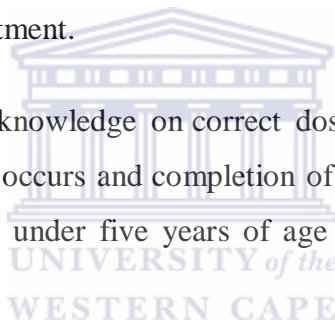
## **CHAPTER THREE: AIM AND OBJECTIVES**

### **3.1 Aim of research study**

To assess the prescribing practices and availability of anti-malarial medicines for treatment of children under five years of age in primary health care facilities in Bondo district.

### **3.2 Objectives of research study**

1. To describe the prescribing practices of anti-malarial medicines for children under five years of age in primary health care facilities in Bondo district.
2. To compare the prescribing practices of anti-malarials to national standard treatment guidelines for Malaria Treatment.
3. To determine care givers knowledge on correct dosage, drug administration at home, what to do when vomiting occurs and completion of course of treatment after ACT has been dispensed to children under five years of age in primary health care facilities in Bondo district.
4. To establish the availability of key anti-malarial drugs in stock at the primary health care facility pharmacies in Bondo district
5. To establish the presence of a national anti-malarial treatment guideline chart in the room where patients are screened.



## **CHAPTER FOUR: RESEARCH METHODOLOGY**

### **4.1 Introduction**

This chapter describes the methods that were used to conduct the study. It includes study design, study population, sample size, sampling strategy including selection of the primary health care facilities and selection of the children under five years. It also includes data collection and analysis, strategies to ensure trustworthiness of data, ethical considerations and study limitations.

### **4.2 Study design**

This was a facility-based descriptive cross-sectional study with the aim of assessing the existing prescribing practices of anti-malarials and availability of these anti-malarials to children under five years of age in primary health care facilities in Bondo district. The study adapted the WHO methodology and tools for investigating drug use in health facilities (WHO, 1993).

### **4.3 Study population**

The study population consisted of all the primary health care facilities of Bondo district. Children from 0-59 months diagnosed with malaria and their caregivers as they attend the rural primary health care facilities in Bondo district constituted the secondary unit of analysis.

### **4.4 Sample size**

A sample of 20 primary health care facilities were selected for the study and 30 care givers with their children who are under five were selected from each facility based on WHO recommendations (WHO, 1993).

### **4.5 Sampling**

There are 29 primary health care facilities in Bondo district - 27 dispensaries and 2 health centres (MOH, 2010). Both health centres and 18 dispensaries were selected for the study.

#### **4.5.1 Dispensary selection strategy**

The 18 dispensaries were selected using cluster sampling of administrative units of locations. There are three divisions in Bondo district, namely Usigu, Maranda and Nyawita and these are sub-divided into administrative units (See Table 1). If the administrative unit only had one dispensary, then it was selected for the study. Where there was more than one dispensary in the administrative unit the required number of dispensaries were selected proportionally by simple

random sampling. For administrative units with 1-2 dispensaries, 1 was selected; 3-4 dispensaries, 2 were selected; 5 dispensaries, 3 were selected; 6 dispensaries, 4 were selected; and 7 dispensaries, 5 were selected. The random selections were made by writing the names of the dispensaries of each administrative unit on pieces of paper, placing them in a hat and then picking the required number of dispensaries for the study from the hat. A total of 18 dispensaries were selected as shown in Table 1 below. Although two of the dispensaries were elevated to health centres during data collection, the dispensary selection strategy was implemented as envisaged in the proposal.

**Table 1: Dispensary selection strategy**

<b>Division</b>	<b>Administrative Unit</b>	<b>No. of dispensaries</b>	<b>No of selected dispensaries</b>
Usigu	Western Yimbo	4	2
	North Yimbo	3	2
	East Yimbo	2	1
	Central Yimbo	2	1
	Mageta	1	1
Maranda	North Sakwa	2	1
	Western Sakwa	1	1
	South West Sakwa	1	1
	Bondo	1	1
Nyawita	Central Sakwa	7	5
	South Sakwa	3	2
<b>Total</b>		<b>27</b>	<b>18</b>

#### **4.5.2 Children under five years selection strategy**

A sample of 30 children under five years of age diagnosed with uncomplicated malaria and their care givers were selected from each facility. They were selected using the simple random sampling method that meant as they emerged from the consultation rooms and primary health care facility pharmacy they were given an opportunity to pick a folded paper with a YES or NO written on it from a hat. Those who chose a YES paper were interviewed and those who picked a NO paper were not interviewed.

### **4.6 Data collection**

#### **4.6.1 Data collection instruments**

Data was collected using three forms that were filled in by trained data collectors (Appendix 2) which were adapted from the WHO (1993) manual.

**Form 1. Prescribing indicator form (page 49):** This form captured the date, name of the investigator and the health care facility, division and location (administrative unit) of the health facility. Other sections recorded age and weight of the child and names of the various anti-malarials, anti-biotics and anti-pyretics prescribed and dispensed for children.

**Form 2. Prescribing encounter form and Patient care form (page 50):** This form was in two parts.

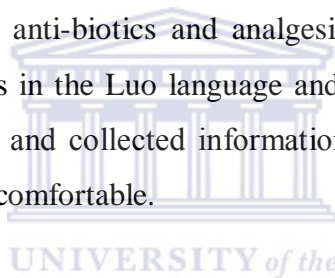
**Part A** was the Prescribing encounter form that captured age, sex and weight of patient. Other sections were: chief complaint, diagnosis, temperature of patient, laboratory investigations, anti-malarials and other drugs prescribed

**Part B** was the Patient care form and captured details of anti-malarial drugs prescribed and quantity dispensed and information on labeling of drugs, care givers knowledge on dosage, drug administration and signs of recovery.

**Form 3. Health facility indicator form (page 51);** This form captured details of selected key drugs in stock and presence of a national guideline treatment chart and guidelines in the prescription room, and the presence of an essential drug list formulary in the health care facility.

#### **4.6.2 Data collection preparations and procedures**

Data collection took place during the rainy season by two research assistants who were identified and trained on how to fill in the forms and code the data. The research assistants were trained pharmaceutical technologists with a diploma in pharmacy. Data collection training for the research assistants was done in accordance with the WHO (1993) manual and they were trained by the principal researcher who holds a bachelors degree in nursing. The training included their role as data collectors, how to fill in the various forms, anticipation of any of the problems during data collection, work schedule, start and finish dates and what to expect. They were also trained on the anti-malarial, analgesics and antibiotics that they are likely to encounter in the primary health care facilities, both their generic and trade names, including dosages and provided with a list of anti-malarial drugs, anti-biotics and analgesics. They were also trained on the different names of the above drugs in the Luo language and Kiswahili. The research assistants were fluent in Luo and Kiswahili and collected information from patient's care givers in the language in which they were most comfortable.



The data collection tools were pre-tested in two different primary health care facilities in Bondo district that were not selected for the study and appropriate revisions and corrections were made before the commencement of data collection. For instance, a question to care givers on whether AL was dispensed in full quantity appeared to be irrelevant, given that AL was dispensed as pre-packs (patient ready packs) from the government supplier. Instead, the researcher opted to record whether the full quantity was dispensed as an observation recognizing that dispensing AL in full quantity is the one of the cornerstones of treating malaria.

#### **4.6.3 Data management and analysis**

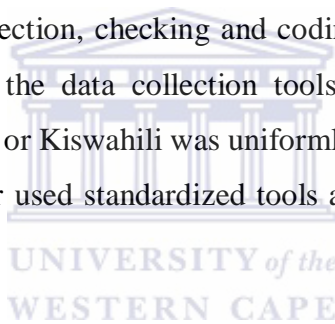
Once the data was collected it was checked for completeness and cleaned before leaving the primary health care facility. This included spell checking, for instance on the name of anti-malarial drugs, secondly for invalid character values e.g. gender instead of entering F or M it is either missing, or lower case has been used. Thirdly, the team checked for invalid numeric values, for instance on the number of drugs prescribed if the data entered read 20 or age of child



read 1200. Coding was then carried out, for instance for gender F=1 M=2. Then the data was entered by the two research assistants into SPSS where summary statistics of frequencies, means and percentages were calculated to describe all outcomes relating to prescribing practices and availability of medicines. Results have been presented in tables and charts.

#### **4.7 Validity and reliability**

Validity relates to whether the results of the research are consistent with the data collected from the study. It also considers the likelihood of a given measurement procedure giving the same results if the exercise is repeated (Merriam, 1998). To ensure validity, the researcher trained the two research assistants together to guarantee uniformity of data collection. The research assistants were pharmaceutical technologists who have an understanding of primary health care facilities and drugs used in treatment of malaria, they were then allowed to practice together to ensure consistency in the data collection, checking and coding procedures. Furthermore, a pilot study was carried out to pretest the data collection tools. The researcher ensured that the translation from English to Dholuo or Kiswahili was uniformly done to obtain the same outcome. To ensure reliability the researcher used standardized tools adapted from WHO (1993) for data collection.



#### **4.8 Generalisability**

The researcher ensured generalisability of the study by including an adequate population sample size as recommended by WHO to represent the entire population of Bondo district, that is, 30 children under five years with their care givers from 20 primary health care facilities (WHO, 1993).

#### **4.9 Limitations**

During data collection several limitations were experienced. Firstly, some of the health care facilities were in remote areas and could only be accessed by a motor bike especially when it rained. This affected duration of data collection since the data collectors had to arrive late extending hours of data collection hence more days of collecting data. Secondly, a few health care facilities were on an island and were only be accessible when the tides were low making it weather dependant. This affected the schedule for data collection since the research assistants

had to collect data within a specified time as the motor boats have a specific time departing and arriving at the island. Due to poor accessibility in remote health care facilities and especially on the island, it further extended the days of collecting data making it more expensive for the researcher. Thirdly, some of the care givers had ‘research fatigue’. This was because research in different fields including HIV and, STIs had been carried out in Bondo District so clients are tired of being part of research studies. This as well extended the duration of data collection since we had to wait for more clients to get the required number of care givers for the particular health care facility. Lastly, five care givers in a certain health care facility felt they should be paid to give information as they feel these studies being done in Bondo are getting external funding and more so some of the NGOs at times offer incentives to care givers like mosquito nets etc. therefore the research assistants had an uphill tasks to convince the care givers that this research was purely for academic research and this in the end consumed time intended for data collection by prolonging data collection period by a day. All in all the willing care givers were convinced and so the data was eventually collected.

#### **4.10 Ethical considerations**

Ethics is about what is right or wrong in human conduct. Ethical issues are of particular relevance in research during data collection as well as when publishing the findings (Merriam, 1998). Before embarking on the field trip to the institutions, the researcher obtained ethical approval from both the local ethics and review committee, that is, the University of Nairobi and Kenyatta National Hospital ethics review committee and University of the Western Cape Research and Ethics Committee (Appendix 3 and 4). The researcher also obtained permission from the District Medical Officer who is in charge of all health care facilities in the district. Written approval was obtained and given to the primary health care facilities in charge (Appendix 5). Informed consent was obtained as well from the care givers of the children interviewed in different health care facilities that were part of the study within Bondo district (See Appendix 6 and Appendix 7). During interviews with the care givers Dholuo was used as the main language as majority of patients were Luo speaking.

Regarding patient and facility confidentiality, the data collected and coded was only available to the researcher. The data was locked in a cabinet and the researcher was the only one with the key

to the cabinet. The data in the computer was protected by use of a password only known by the researcher. In addition the data collected is presented as aggregated data for Bondo district and individual facilities are not identified. The results have been disseminated to the relevant authorities including the District Medical Officer, district pharmacist, senior nurse, representatives from NGO's and mission hospitals of the facilities surveyed and the National Council for Science and Technology.



## CHAPTER FIVE: RESULTS

### 5.1 Introduction

This chapter presents the findings of the study which was to assess the prescribing patterns of anti-malarials to children under five years of age at primary health care facilities in Bondo district and compare these practices to the National Guidelines for the Diagnosis, Treatment and Prevention of Malaria. In addition, the study assessed the quality of dispensing and counseling services and the availability of anti-malarials and guidelines at the facilities. A total of 600 patients (under five years of age children) diagnosed with uncomplicated malaria and prescribed with anti-malarials, their care givers consented and took part in the study, 63.5% were females while 36.5% were males. The results are further presented in frequency tables and graphs.

### 5.2 Description of study participants

The gender and age of the study participants who were children under five years and diagnosed with uncomplicated malaria are shown in Table 2 below. More females participated in the study (380) compared to their male counterparts (220). Importantly, males and females of the age group between 37-60 months were more compared to other age groups.

**Table 2: Distribution of age and sex of participants (N= 600)**

Gender		Age Group(Months)				Total
		1-12 months	13-36 months	37-60 months	Not Stated	
Female	Count	119	123	137	1	380
	%	31.3%	32.4%	36.1%	0.3%	100.0%
Male	Count	45	50	124	1	220
	%	20.5%	22.8%	56.6%	0.0%	100.0%
Total	Count	164	173	261	2	600
	%	27.4%	28.9%	43.6%	0.2%	100.0%

**Table 3: Distribution of age and weight of the participants (N=600)**

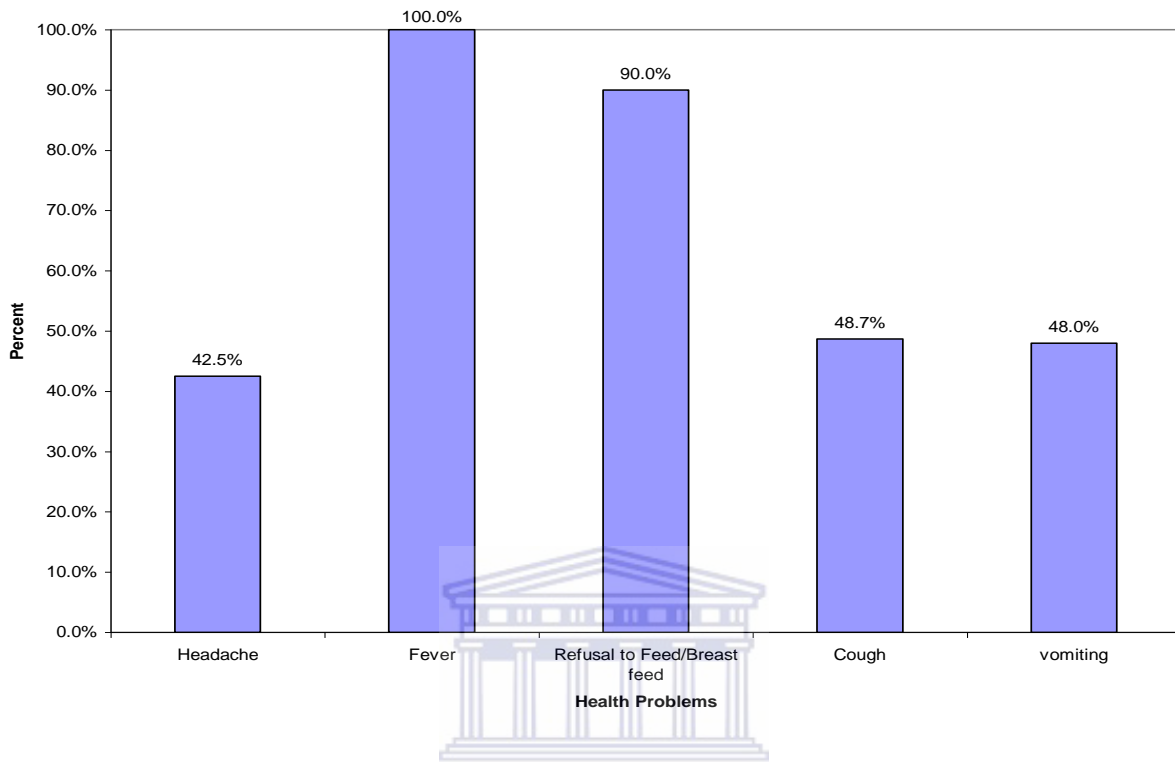
Age Group(Months)		Weight in Kg				Total
		5-14	15-24	25-34	Not Stated	
1-12 months	Count	151	10	0	3	164
	%	92.1%	6.1%	0.0%	1.8%	100.0%
13-36 months	Count	142	13	0	18	173
	%	82.1%	7.5%	0.0%	10.4%	100.0%
37-60 months	Count	31	206	6	18	261
	%	11.9%	78.9%	2.3%	6.9%	100.0%
Not Stated	Count	2	0	0	0	1
	%	100.0%	0.0%	0.0%	0.0%	100.0%
Total	Count	326	229	6	39	600
	%	54.3%	38.2%	1.0%	6.5%	100.0%

The results in Table 3 above show that a large percentage of children's weights were taken which is in line with the national treatment guideline. However, 10.4 % (18) of the children between the ages of 13-36 months were not weighed and 6.9 % (18) between 37-60 months were not weighed either. Although the percentages look small, this trend remains critical.

### **5.3 Reported health problems**

Figure 2 shows the percentage of the study participants reporting with various signs and symptoms. Fever (body temperature higher than 36.5 degrees Celsius) was reported in all participants, followed by refusal to feed or breast feed (90%). Coughing, vomiting and headache were reported in just under half of the participants.

**Figure 2 : Reported Health problems: signs and symptoms (N=600)**



#### 5.4 Diagnosis and prescribing procedures

Table 4 indicates diagnosis procedures undertaken by the health workers. In all cases children’s age, temperature and laboratory tests were taken and recorded in their respective medical records books, however a small percentage of the children, 6.5%, did not have their weight taken. This is critical as weight is used to determine the dosing schedule for artemether-lumefantrine (AL), the anti-malarial of choice for uncomplicated malaria in children.

**Table 4 : Recorded diagnosis procedure ( N=600)**

	No (%)
Age	600 (100%)
Weight	561 (93.5%)
Temperature	600 (100%)
Laboratory diagnosis	600 (100%)

The results from the table above indicate that diagnosis procedures were in conformance with the national treatment guidelines in the vast majority of participants.

**Table 5: Anti-malarial and other medicines prescribed to participants ( N=600)**

	Anti-malaria	Analgesics	Anti-biotics
AL	595(99.2%)		
Quinine	5(0.8%)		
Paracetamol		595(99.2%)	
Amoxicillin			512(85.3%)
Metronidazole			22(3.7%)
Nystatin Oral suspension			11(1.8%)
Cotrimazole			33(5.5%)
Tetracycline eye ointment			11(1.8%)

Table 5 above shows that almost all participants were prescribed for AL as a first line for treatment of malaria, however, there were a small percentage of participants, 0.8% of the children, who presented with uncomplicated malaria and were prescribed quinine. This is not in accordance with the National Guidelines for the Diagnosis, Treatment and Prevention of Malaria in Kenya. An analgesic, paracetamol was largely prescribed for fever, which is in line with the guidelines. Secondly, there are children who were also diagnosed with other infections hence prescribed for other drugs which included amoxicillin, cotrimazole, nystatin oral suspension, metronidazole and tetracycline eye ointment. Amoxicillin was the preferred choice of antibiotic prescribed for most coughs that were reported, followed by cotrimazole syrup. Nystatin oral suspension was prescribed to children who presented with oral thrush while metronidazole was dispensed to children who complained of diarrhea; lastly tetracycline eye ointment was dispensed to children who complained of purulent discharge from their eyes.

## 5.5 Quality of dispensing and counseling of AL

### 5.5.1 Dispensing of AL as observed

In all cases AL was dispensed in full quantity in pre-packed blisters as received from the government suppliers. They are packed according to weight of patient (weight 5kg to less than 15kg and 15kg to less than 25kg for children under five years) see Appendix 8 and 9.

The name of the drug and the strength are labeled in red (Coartem, Dispersable-Artemether/Lumefantrine 20mg/120mg). There is a sign of the moon and the sun -where the moon means the drug to be taken in the evening while the sun means drug to be taken in the morning. An additional feature noted on the blister pack was a sample of malaria parasite appearance in blood from the 1<sup>st</sup> dose to the last day of taking medication (1<sup>st</sup> day the malarial parasites are numerous in blood, on the 2<sup>nd</sup> day they are scanty while on the 3<sup>rd</sup> day there are none). However there is no space for the dispenser to write the patients name or dispensing date on the blister packs and so none of the AL dispensed were labeled adequately. Also, most of the other drugs dispensed alongside AL were not labeled either.

### 5.5.2. Reported counseling and understanding of caregivers

**Table 6: Reported counseling and understanding of care givers (N=600)**

Reported counseling and understanding of care givers	No (%)
Tell me which of these drugs is used to treat malaria(AL)	590 (98.3%)
Childs first dose of anti-malaria given at the health facility	267 (44.5%)
Dispenser observed swallowing of first dose	243 (40.5%)
Dosing schedule explained	580 (96.7%)
Importance of completing anti-malarial course	490 (81.7%)
Told what to do when your child vomits	20 (3.3%)

Table 6 above shows that 98.3% of caregivers in the study were aware that AL is the drug of choice to treat malaria, while 44.5% of children were given first dose of AL at the health care facility as supervised by the dispenser and 40.5% of the children were observed by the dispenser when swallowing their first dose of AL in the health facility. What was seen during data collection is that some are given instruction to go to the water drinking point and give the 1<sup>st</sup>

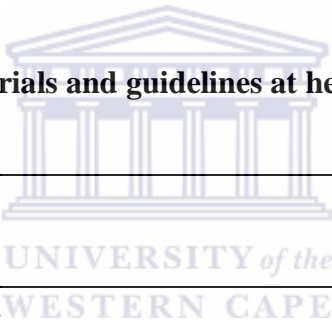


dose to the child while some care givers are just told to go and give the drug at home. Additionally, the care givers were assessed on their understanding of malaria treatment as given at the health care facilities with the health care providers. A high percentage of caregivers (96.7%) knew how to give their children medicine at home as explained to them by the drug dispensers who in this case were either nurses or pharmaceutical technologists. Secondly, a high proportion of the care givers were told on the importance of drug completion. 81.7%. However, only 3.3% of the care givers were told what to do when their children vomited the drug after administration as described in the national treatment guideline.

## 5.6 Availability of anti-malarials and guidelines

Table 7 shows that all of the health care facilities in the study had all key anti-malarials in stock at the time of data collection.

**Table 7: Availability of anti-malarials and guidelines at health facilities ( N= 600 )**



Health facility indicator	No (%)
All key anti-malaria drugs in stock	20 (100%)
AL dispensing wall charts exposed	20 (100%)
Algorithm for assessing and treating children under 5yrs exposed	20(100%)
Booklet with miniature case management wall charts available	20(100%)
Folder recommending presumptive treatment of childhood fevers with AL available	19(95%)
Poster recommending presumptive treatment of childhood fevers with AL available	20(100%)
Essential drug list formulary present in the facility	19(95%)

This included AL (in different pack sizes of 1, 2, 3, and 4 drug blister packs), which is the first line drug for uncomplicated malaria in adults and children; quinine injections used for severe malaria in both adults and children and Sulphurdoxine Pyremethamine (SP) is used for malaria

prophylaxis in pregnant women. The malaria treatment guidelines and charts were on the walls of all the health care facilities as indicated in the table below. A small percentage of health care facilities (0.5%) did not have a folder that recommends presumptive treatment of childhood fevers with AL. In addition, 0.5% of the facilities did not have essential drug list formulary as well.

## **5.7 Conclusion**

This chapter has covered the outcomes of the study carried out in Bondo district. It has explored description of study participants, health problem as reported by the care givers, prescribing and diagnostic procedures, quality of dispensing AL and counseling services offered, availability of AL in adequate stock and presence of wall charts with the course of action from National Guidelines for the, Diagnosis, Treatment and Prevention of Malaria. The next chapter will discuss these findings.



## **CHAPTER SIX: DISCUSSION**

### **6.1 Introduction**

This chapter discusses the results in the light of the Kenya National Guidelines for the Diagnosis, Treatment and Prevention of Malaria and published literature. The overall findings revealed that almost all (99.2%) of children under five with uncomplicated malaria in this study were prescribed AL, as recommended by the national guidelines. It was pleasing to note that AL and other anti-malarial drugs were in stock at all the selected primary health facilities at the time of the study. In addition, diagnosis and prescribing procedures as per the guidelines were adhered in majority of cases, with the exception of 6.5% of patients whose weights were not taken and recorded by health workers. AL was dispensed in blister packs with appropriate instructions for administration to all patients with the prescriptions, however, labeling remained a serious challenge as none of the drugs dispensed, including AL, were labeled with patients name or date of dispensing. This contrary to recommended practice could compromise treatment. The quality of counseling provided to caregivers was mixed, with some gaps that need to be addressed.

The chapter discusses the findings under the following sub headings; reported health problems, recorded diagnosis procedures, anti-malarials and other medicines prescribed, dispensing of Artemether Lumefantrine (AL) observed, reported counseling and understanding and availability of anti-malarials.

### **6.2 Reported health problems**

The study found out that 100% of the patients presented with fever, 90% of the children refused to feed/breast feed and other symptoms such as coughing ,vomiting and headache were common. These symptoms are in line with the National Guidelines for the Diagnosis, Treatment and Prevention of Malaria which states that uncomplicated malaria is characterized by fever in the presence of parasitemia. Other symptoms mentioned included chills, profuse sweating, muscle pains, abdominal pain, diarrhoea, nausea, vomiting and irritability. The guidelines further says that the symptoms may present singly or combination (DOMC, 2010). Kamuhabwa and Ramji (2011) in a study from Tanzania also reported fever (90%) as the most common health problem among children under five with uncomplicated malaria. Similarly, Mannan, Malik and Ali

(2009) and Zurovac *et al* (2008) describing studies from Khartoum and Uganda respectively reported fever in 77.6% and 83.2% of patients with malaria.

### **6.3 Recorded diagnosis procedures**

The study found that, in general, diagnostic procedures were followed as per the national treatment guideline. The patients' age, temperature and laboratory investigations were taken and recorded in all the patients interviewed. However, although the child's weight was taken in 93.5% of the cases, in 6.5% of the children their weights were missing. This was probably due to the heavy work load experienced by health workers observed in most of the health care facilities during data collection. The National Guidelines for the Diagnosis, Treatment and Prevention of Malaria recommends that the weight of the child must be taken as the treatment dosage of AL is pegged on the weight of the child. This is particularly important for children under five years of age as failure to have accurate weight could lead to under dosing or overdosing a child with AL hence treatment failure, drug resistance and even relapse of malaria.

Contrary to the study findings, a similar study in Tanzania found that all the children had their weights taken and did not weigh less than 5kg (Kamuhabwa and Ramji 2011). If a patient's weight is not taken or recorded it could be attributed to a number of factors including lack of scales or heavy work load of the health workers. Ucaakon *et al* (2011) suggested in his study that patient work load was one of the factors that could influence the prescribing habits of health workers more so in an African setting.

### **6.4 Anti-malarials and other medicines prescribed**

Although AL was prescribed to 99.2% of the children, 0.8% were prescribed quinine. The National Guidelines for the Diagnosis, Treatment and Prevention of Malaria recommends AL as the first line drug for treatment of uncomplicated malaria in children with quinine recommended for treatment of complicated or severe malaria. In this study the 0.8% that were prescribed for quinine were not admitted with complicated or severe malaria nor did they present with the complicated or severe in the outpatient clinics in the health centers, implying that these cases were not adherent to treatment guidelines.

Available literature from earlier studies carried out in Kenya (Juma and Zurovac, 2011) reported that of the 63.6% of children under five who presented with fever, 9% were treated with non-recommended quinine or combination of AL and quinine contrary to the national treatment guideline. We can therefore notice from the comparison of these studies that the trend of prescribing quinine by health workers without complying with the treatment guideline is still occurring. This view is supported by other surveys done in Bondo district and four other endemic areas in Kenya which revealed that adherence by health workers on the treatment guideline was low (Chuma *et al*, 2010). Zurovac *et al*, (2008) revealed in his survey in Kenya that 1.9% of children under five with uncomplicated malaria were prescribed quinine. In the wider East Africa region a similar study in Tanzania revealed an even a higher percentage (35.5%) of the children were prescribed for quinine yet they did not present with complicated or severe malaria (Kamuhabwa and Ramji, 2011). In Uganda, 4% of the patients were prescribed quinine yet the national treatment guideline recommends AL as first line drug for treatment of uncomplicated malaria and not quinine (Zurovac *et al* 2008).

This study also revealed that most children received other medicines in addition to anti-malarials. These included paracetamol, anti-biotics, metronidazole, nystatin oral drops and tetracycline eye ointment. Instructively, paracetamol was prescribed as is required by the national treatment guideline. Other studies in Tanzania, Uganda, and Khartoum also confirmed that patients were prescribed analgesics for control of fever and headache (Kamuhabwa and Ramji, 2011; Zurovac *et al* 2008; Mannan *et al* 2009).

The National Guidelines for the Diagnosis, Treatment and Prevention of Malaria also encourage health workers to advise care givers on other mechanical ways to reduce fever such as tepid sponging and exposure to fresh air. This study revealed that the majority of patients were dispensed paracetamol syrup but the other mechanisms, were not shared with the care givers, possibly owing to the patient work load experienced in most of the health care facilities. These results are in line with a study conducted in Khartoum where a majority of patients especially children under five who were diagnosed with uncomplicated malaria were prescribed antipyretics whilst the researcher argues that other mechanisms as mentioned above are more

effective and ought to have been offered to the care givers as opposed to drugs (Mannan, Malik and Ali, 2009).

Antibiotics were prescribed and dispensed to all patients who additionally presented with a cough. This could indicate irrational use of antibiotics because some coughs could be viral and may not necessarily need anti-biotics. In addition according to the national guidelines for the diagnosis, treatment and prevention of malaria in Kenya, diarrhoea is listed as one of the symptoms that children with malaria would present with clinically (MPHS & MMS, 2010). In this particular study, children who presented with diarrhoea, metronidazole was prescribed without a confirming stool laboratory test which is an example of irrational prescribing.

### **6.5 Dispensing of AL observed**

Dispensing is an important step in ensuring anti-malarial drug accessibility, affordability, safety and rational use (Mannan, Malik and Ali, 2009). In this study AL was prescribed and dispensed in full quantity to all children. They were supplied in pre-packed blisters which were available in two categories for children under five years of age (5kg to less than 15kg and 15kg to less than 25kg). The blister packs incorporate several features to facilitate drug adherence among the care givers and patients with malaria. The malaria parasites are illustrated on the blister pack how they appear in blood from the first day when drug administration is commenced (more parasites in the blood) to the third day when drug is completed (no malaria parasite). This is to put emphasis to care givers that for a child to be completely cured and well, all the doses must be given. Additionally, the illustration of the sun and moon on the blister pack guides illiterate care givers on what time to give their children the drug since the sun means the drug should be given in the morning while the moon means evening.

However, one of the problems with the blister packs was that they did not have space for the dispenser to label them with the name of the patient. This could lead to the drug being given to a wrong patient in cases where there is more than one child being attended to by one care giver. Moreover, where its one child dispensed with unlabeled syrup, the caregivers might not remember the frequency of administering the drug leading to under dose or over dose.

## 6.6 Reported counseling and understanding of caregivers

The importance of counseling patients and caregivers on malaria treatment has been clearly described in the National Guidelines for the Diagnosis, Treatment and Prevention of Malaria. It advises that health workers need to directly observe the first treatment dose at the health facility which may be given on an empty stomach. Secondly, the care givers ought to be shown how to prepare the dispersible tablets before administration and this should be done before they leave the health facility, thirdly, if vomiting occurs 30 minutes after drug administration the dose should be repeated and lastly the emphasis should be put on dosage completion even if the patient feels better after taking a few doses. In addition care givers need to be advised that in case the child's condition gets worse, then they should go back to the health care facility (DOMC, 2010).

In this study counseling given to the caregivers by the health workers was of variable quality. The study showed that 98.3% knew that AL is the drug of choice for treating malaria -which is very good, however only 44.5% were given first dose at the health facility, and 40.5% were observed by the dispenser swallowing their first dose. Whilst, 96.7% had the dosing schedule explained to them and 81.7% were told of the importance of completing the course of treatment, only 3.3% were told what to do when their children vomited after administration of AL, which is worrisome.

The above results indicate that the quality of patient care and counseling remains an area of concern and there is an urgent need to address the counseling services that ought to be offered to the care givers. The number of the patients who were administered to AL and swallowing observed by the dispenser at the health care facility was still low (40.5%) although there was a marked improvement compared to earlier studies done in Bondo by (Wasuna *et al*, 2010) ,where the pre-training and post training survey found figures of 21.6% and 33.6% respectively.

For instance, of the counseling services assessed there is need to educate the care givers on what to do when their children vomit within 30 minutes after AL administration. This advice was only availed to 3.3% of the patients. According to Wasuna *et al*, (2010) the pre and post training surveys of counseling services done in Bondo district revealed that only 3.3% and 8%

respectively were given advice on what to do when vomiting occurs. This is a worrying trend because vomiting does occur fairly frequently and the therapeutic effect needed to kill the malaria parasite may not be achieved if the vomited drug is not repeated. This in the end will not aid Kenya achieve its Abuja target of eradicating malaria by 2017. Similar trends are seen in studies done in Sudan (Mannan, Malik and Ali, 2009), Uganda (Zurovac *et al*, 2008) and Tanzania (Kamuhabwa and Ramji, 2011). These high numbers from the study are due to heavy work load on the few health workers as witnessed at most of the health care facilities during data collection. This perhaps shows heavy workload affects compliance to the guidelines. Another reason is thought to be, lack of adequate training on the need for providing supportive care and counseling services to the care givers.

### **6.7 Availability of anti-malarials and guidelines at health facilities**

The research study revealed that all the health care facilities had adequate stock of the anti-malarials which included AL, Quinine and SP. AL was prescribed as a first line treatment for uncomplicated malaria and it was available in all the health care facilities. Secondly, quinine was available too for complicated and severe malaria and in adequate stock. The only setback was that a few health officers prescribed it to the children with uncomplicated malaria which ought not to be done. SP was available for prophylaxis in pregnant women. These findings are different from similar research done in Bondo and elsewhere. Chuma, Okungu and Molyneux, (2010) reported AL stock outs in four districts in Kenya, which included Bondo. Similarly, Wasuna *et al* (2008), reported that Bondo had a stock out of AL drugs from December 2006 to February 2007 and health workers indicated that they rationed drugs because they were not certain when the next drugs would be supplied.

The availability of anti-malarials in this study were contrary to those of a similar study in Bondo district during 2009 where it found that AL stock outs were experienced majorly during the rainy season when malaria infections were high (Chuma *et al*, 2010). According to Noor *et al* (2005) poor road network is a factor that influences availability of anti-malarial drugs during wet seasons. This hinders not only the patients in getting the anti-malarial treatment but also the health care providers who might not report to work due to remote and inaccessibility of the health care facility to provide anti-malarial treatment needed. During the data collection phase of



this study confirmed some of these challenges in that several of the more remote facilities could only be accessed by motor bikes especially during the wet season, and the islands were only accessible when the tides are low. However, encouragingly none of the care givers reported instances where AL was unavailable nor did a facility report lack of at least one health care provider due to rain and road inaccessibility.

The findings from this research study show a marked improvement on availability of AL and other anti-malarial drugs in all the health care facilities that were assessed compared to other research findings that were conducted earlier. The treatment guideline charts were present in all the health care facilities except for one facility. This too is contrary to similar studies done in Sudan where the guideline wall charts were available in 70.8% of the health care facilities assessed (Mannan, Malik and Ali, 2009).

On the whole, the study findings reported a significant improvement compared to the previous surveys may be due to vigorous campaigns by the division of malaria control programme and implementing various recommendations from past research. In spite of this progress, it is crucial to implement recommendations suggested in this study as well to improve counseling services offered to the care givers so as to avoid malaria relapse, drug resistance and more so reduce both morbidity and mortality rates among children under five to help Kenya achieve its Abuja target by 2017.

## **CHAPTER SEVEN: CONCLUSIONS AND RECOMMENDATIONS**

This chapter gives a summary of the research outcome. It further suggests ways to improve prescribing patterns and quality of dispensing artemether lumefantrine (AL), and counseling practices to children under five years with uncomplicated malaria in line with the National Guidelines for the Diagnosis, Treatment and Prevention of Malaria

### **7.1 Conclusions**

The research found that prescribing of AL in Bondo district to children under five as first line for the treatment for uncomplicated malaria was largely in line with recommendations in the guidelines. However, a very small percentage of the children (0.8%) were prescribed for quinine which is not recommended for uncomplicated malaria.

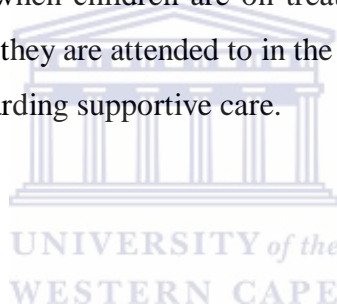
The research further discovered that the majority of care givers knew that AL is the drug of choice for treatment of uncomplicated malaria. On the other hand, advice on drug administration at home and what to do when a child vomits was very poor indicating that the quality of dispensing and counselling practices needs to be improved further in these health care facilities.

It was very encouraging to find that key anti-malarial drugs were in stock in all the 20 health care facilities and the national treatment guideline charts and other relevant charts pertaining to AL prescription and patient care were well placed on the walls where patients are being screened in 95% of the facilities.

## 7.2 Recommendations

The result of the study identifies a few areas that need to be attended to so that optimal results are achieved. These include;

1. Further training of health workers at facilities regarding adherence to malaria treatment practices at the facility and the advice they give to care givers
2. Continuous training of staff on the importance of adhering to the National Guidelines for the Diagnosis, Treatment and Prevention of Malaria, including rational prescribing of antibiotics.
3. Regular monitoring of anti-malarial availability at health facilities.
4. Employment of more health workers in the rural health facilities to cope with heavy workloads.
5. Educate the rural community and especially the caregivers in Baraza's (community meetings) on supportive care when children are on treatment of AL, as is indicated in the treatment guideline as the time they are attended to in the health care facility is limited and so not much can be discussed regarding supportive care.



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## APPENDICES

### Appendix 1: Artemether lumefantrine treatment regimen

Weight in kg	Age in years	Number of tablets per dose					
		Day 1		Day2		Day 3	
		1St dose	8hrs	24hrs	36hrs	48hrs	60hrs
5-14	5months< 3 years	1	1	1	1	1	1
15-24	3-7years	2	2	2	2	2	2
25-34	8-11 years	3	3	3	3	3	3
Above 34	>12years	4	4	4	4	4	4

Copied from the *National Guidelines for the Diagnosis, Treatment and Prevention of Malaria in Kenya*. (DOMC, 2010)

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## Appendix 2 : Data collection tools.

### FORM 1. PRESCRIBING INDICATOR FORM

Division..... Research assistant.....

Administrative Unit.....

Location (Administrative unit).....

Name of health facility.....

Date.....

No	Age of pt	Weight of patient(Kg)	Diagnosis of patient(state)( M=Malaria,O=Other)	Artemesinin lumefantrine prescribed and dispensed(PD=Prescribed and dispensed, PND=Prescribed and not dispensed).	Other anti-malarials prescribed and dispensed.(PD=Prescribed and dispensed, PND=Prescribed and Not dispensed)	Anti-pyretic drug prescribed(P=Paracetamol,I=Ibuprofen).	Anti-pyretic drug (prescribed and dispensed=PD, prescribe and not dispensed=PN D)(P=Paracetamol,I=Ibuprofen)	Reason why drugs not available in the health facility(S=out of stock, M=not enough money, H= have at home, W=do not want, O=other)
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
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29								
30								

**FORM Z/A1: PRESCRIBING ENCOUNTER FORM**

1.Division..... Research Assistant.....  
 Administrative Unit.....  
 Name of Health Facility..... Date.....

2.Name (Initials)..... Date..... Sex..... Age..... Weight..... Prescriber.....

1.Health Problems(signs and symptoms)	Yes	No. (Tick)
i)Headache	<input type="checkbox"/>	<input type="checkbox"/>
ii)Fever	<input type="checkbox"/>	<input type="checkbox"/>
iii)Refusal to feed/breast feed	<input type="checkbox"/>	<input type="checkbox"/>
iv)Other	<input type="checkbox"/>	<input type="checkbox"/>

2.Temperature done	1.Yes. (specify) <input type="checkbox"/>
	2.No. <input type="checkbox"/>

3.Laboratory investigations done	1.Yes(specify)..... <input type="checkbox"/>
	2.No. <input type="checkbox"/>

4.Diagnosis	1.....
	2.....
	3.....

5.Anti-malarial prescribed	1.....	Strength.....	Dose.....	Quantity.....
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6. All other drugs prescribed	1.....	Strength.....	Dose.....	Quantity.....
	2.....	Strength.....	Dose.....	Quantity.....
	3.....	Strength.....	Dose.....	Quantity.....
	4.....	Strength.....	Dose.....	Quantity.....
	5.....	Strength.....	Dose.....	Quantity.....
	6.....	Strength.....	Dose.....	Quantity.....

**2/B.PATIENT CARE FORM**

	Name of drug prescribed	Full quantity dispensed (Y/N)	If no, give reason (S= out of stock, M= not enough money, H= have at home, W= do not want, O=other)	If no, told where to buy medicines (Y/N)	Labelling of all medicines				Antimalarial medicine treatment & advice given										
					Correctly labelled patients name (Y/N)	Correct dosage(Y/N)	Correct strength (Y/N)	Total quantity of the drug dispensed correctly(Y/N)	Correct treatment frequency(Y/N).	Care giver identifies antimalarial dispensed to the child (Y/N)	First dose of anti-malarial given to the child at the health facility(Y/N)	Drug dispense observed swallowing of first dose(Y/N)	Dosage to take home expalned(Y/N)	State the advice given to the care giver	Advice on what to do when the child vomits given(Y/N)	State the advice given to the care giver.	Adice on completion of treatment regimen given(Y/N)	State the advice given to the care giver on treatment regimen.	
1																			
2																			
3																			
4																			
5																			
6																			
Total No of drugs																			

**FORM 3. HEALTH FACILITY INDICATOR FORM:**

Division.....  
 Administrative unit.....  
 Name of health facility.....  
 Date.....

Research assistant.....

**3.1.KEY DRUGS**

No	Ant-malarial	Strength	Pack size	Available(Y=Yes,N=No).
	1 AL			
	2 SP			
	3 Q			

**3.2.MALARIAL GUIDELINES**

No	AL dispensing wall charts exposed(Y=Yes,N=No).	Algorithm for assessing and treating children under five years exposed(Y=Yes,N=No).	Booklet with miniature case management wall charts available(Y=Yes,N=No).	Folder recommending presumptive treatment of childhood fevers with AL available (Y=Yes,N=No).	Poster recommending presumptive treatment of childhood fevers with AL exposed(Y=Yes,N=No).	Essential drug list formulary present in the facility (Y=Yes,N=No).
1						



**Appendix 2.1 :Patient care structured interview form (English)**

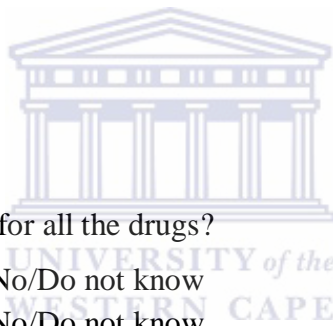
**Form 2b: Patient care structured interview**

Division..... Research Assistant.....  
Administrative Unit..... Date.....  
Health Facility.....

Name (Initials).....Date.....Sex.....Age.....Weight.....  
Prescriber..... Dispenser.....

1. Please tell me the names of all the drugs (medicines) that have been **prescribed** for your child today?

- 1.....
- 2.....
- 3.....
- 4.....



2. Was the full quantity **dispensed** for all the drugs?

- |             |                    |
|-------------|--------------------|
| Drug 1..... | Yes/No/Do not know |
| Drug 2..... | Yes/No/Do not know |
| Drug 3..... | Yes/No/Do not know |
| Drug 4..... | Yes/No/Do not know |

3. If No, kindly give reasons (mark ALL reasons mentioned, may be more than one reason)

S= not in stock; M=not enough money; H=have at home; W=do not want; B= told to buy drugs; O=other (specify)

- Drug 1.....
- Drug 2.....
- Drug 3.....
- Drug 4.....

**LABELLING**

**4. My I see all the drugs you have received today for your child.**

(Read the labels and tick if the information appears on the labels)

Drug	Strength	Dose	Total quantity	Patient name	Facility name	Date
Drug 1						
Drug 2						
Drug 3						
Drug 4						

**5. Please tell me which of these drugs is to treat malaria (the anti-malarial).**

Name of drug..... OR Do not know.....

(Write answer given by care-giver. If care-giver cannot identify anti-malarial drug, or incorrectly identifies, tell them which one is the anti-malarial drug, so they can complete the remainder of the questions)

The rest of these questions are about this drug (medicine)

**6. Was your child’s first dose of anti-malarial given at this health facility today?**

Yes

No

**7. Did the drug dispenser observe swallowing of your child’s first dose?**

Yes

No

**8. Was the dosage to be given to your child at home explained?**

Yes

No

If yes, please explain

.....  
 .....  
 .....



9. Were you told what to do if your child vomits after taking the anti-malarial drug?

Yes

No

If yes, please explain

.....  
.....  
.....

10. Were you told about the importance of completing the anti-malarial drug regimen?

Yes

No

If yes, please explain

.....  
.....  
.....



## Appendix 2.2: Patient care structured interview form(Kiswahili)

### Mahojiano ya kina kuhusu huduma anayopewa mgonjwa



CHUO KIKUU CHA CAPE MAGHARIB

Private Bag, x 17 Bellville 7535, AFRIKA KUSINI.

Tel;+27 21-959, Fax 27 21-959 2630

Barua pepe; hbradley@uwc.ac.za

Idara..... Mtafiti msaidizi.....

Kitongo simamizi..... Tarehe.....

Kituo cha afya.....

Jina..... Tarehe..... Jinsia..... Umri..... Uzito.....

Mhudumu..... Mpeaji dawa.....

1. Tafadhali niambie majina ya madawa ambazo mtoto wako **amepewa** leo?

1.....

2.....

3.....

4.....

2. Je, **ulipewa** idadi kamili ya tembe unayohitaji?

Dawa ya 1.....Ndio/La/Sijui

Dawa ya 2.....Ndio/La/Sijui

Dawa ya 3.....Ndio/La/Sijui

Dawa ya 4.....Ndio/La/Sijui

3. Kama la tafadhali toa sababu

S=Dawa hazikuwa;

M=sikuwa na hela za kutosha;

H=niko na dawa nyumbani;

W= Hatutaki dawa;

B= niliambiwa ninunue dawa kwingine;

O= sababu nyingine

KUIPATIA MADAWA YA MALARIA NA MENGINE:

4. Naomba kuona madawa ambazo umepokea leo kwa niaba ya mtoto wako.

Dawa	Nguvu	Kiwango	Jumla ya kiwango	Jina la mgonjwa	Jina la zahanati	Tarehe
Dawa ya 1						
Dawa ya 2						
Dawa ya 3						
Dawa ya 4						

5. Tafadhali niambie gani kati ya dawa hizi ni ya kutibu malaria.

Jina la dawa..... AMA Sijui.....

6. Je, ulipewa madawa ya malaria ya kwanza ya mtoto wako katika hospitali hii?

Ndio

La

7. Je, mhudumu alichunguza umezaji wa tembe za kwanza za mototo wako?

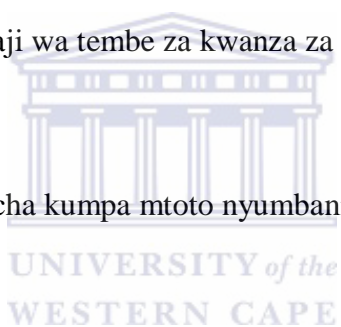
Ndio

La

8. Je, uliambiwa kipimo cha dawa cha kumpa mtoto nyumbani?

Ndio

La



Kama ndio tafadhali  
fafanua.....

9. Uliambiwa la kufanya iwapo mototo atapika baada ya kumeza tembe za malaria?

Ndio

La

10. Je, uliambiwa umuhimu wa kukamilisha tembe za malaria?

Ndio

LaKama

ndio

tafadhali

toa

sababu

.....

**Appendix 2.3: Patient care structured interview form (Dholuo)  
2B NONRO MAR RIT JATUO**



**MBALARIANY MAR WESTAN CAPE**

**Sikund Ajuoke mag Kor Gweng,'**

**Sanduk Mar Posta, Private Bag X 17, Bellville 7535,**

**AFRIKA MAR MILAMBO.**

**Sime: +27 21-9592809, Fax: 27 21-9592872**

Divison.....

Jatim Nonro.....

Gweng' ..... Tarik.....

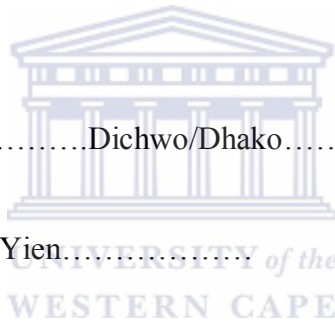
Kar Thieth.....

Nyng(E ..... yo

machwok)..... Tarik..... Dichwo/Dhako..... Higa..... Ratil.....

.....

Japim Yien..... Jachiw Yien.....



1. Yie inyisa nying yedhe ma daktari (Laktar/ajuoga) osango ne nyathini kawuono?

1.....

2.....

3.....

4.....

2. Be ne omiyi yedhe duto ma ne idwaro?

Yien 1..... Eee/Ooyo/Akia

Yien 2..... Eee/Ooyo/Akia

Yien 3..... Eee/Ooyo/Akia

Yien 4..... Eee/Ooyo/Akia

Ka ooyo to wach gima omiyo (Non gigo ma omiyo, nyalo bedo mathoth ne achiel)

S= Onge e hosiptal; M= pesa orem; H= an go dala; W= ok wadwar; B= onyisa ni mondo adhi ang'iew; O=Moro amora (Chiw ler)

Yien 1.....

Yien 2.....

Yien 3.....

Yien 4.....

RANYISI)

Donge de arange yedhe duto ma ikawo ne nyathini kawuono ?

(Som ranyisi mondo ichwo tik kaluwore gi weche ma nitie e kore)

Yien	Teko	Dos	Totol mag yath	Nying Jatuo	Nying Hosiptal	Tarik
Yien 1						
Yien 2						
Yien 3						
Yien 4						

5.Yie ilerna ni ere yedhe ma thiedho malaria kuom ma omiyi gi.

Nying yath..... KATA ok ang'eyo.....

(Ndik dwoko ma ochiw gi jarit nyathi. Ka jarit nyathi ok nyal yango yadh malaria kata ok oyange ma kare to nyis gi yadh malaria ma owinjore mondo gi tiek dwoko penjo ma odong')

Penjo ma odong' gi ni kuom yath me ne omiyi ni

6. Nyathini be ne omi yadh malaria mokwongo e hosiptand ni kawuono?

Eee

Ooyo

7. Nga't mane omiyi yedhe be ne ong'iyo kaka nyathini mwonyo yien mokwongo?

Eee

Ooyo

8. Be ne opimni kaka idhi miyo yathi yedhe ma odong' kichopo dala/pacho?

Eee

Ooyo

Ka oyie to opim kaka ne onyise

.....

.....

.....

9. Be ne onyisi gima onego itim ka nyathi ong’ogo yedhe malaria ma omiyi gi?

Eee

Ooyo

Ka oyie to opim kaka ne onyise

.....

.....

.....

10 Be ne opimni duong’ kata umuhimu mar tieko “dos” mar yedhe malaria ma omiyi?

Eee

Ooyo

Ka oyie to opim kaka ne onyise

.....

.....

...



## Appendix 3: University of Nairobi & Kenyatta national hospital ethics review committee



UNIVERSITY OF NAIROBI  
COLLEGE OF HEALTH SCIENCES  
P O BOX 19676 Code 00202  
Telegrams: varsity  
(254-020) 2726300 Ext 44355  
Ref: KNH-ERC/A/150



KNH/UON-ERC  
Email: [uonknh\\_erc@uonbi.ac.ke](mailto:uonknh_erc@uonbi.ac.ke)  
Website: [www.uonbi.ac.ke](http://www.uonbi.ac.ke)  
Link: [www.uonbi.ac.ke/activities/KNHUoN](http://www.uonbi.ac.ke/activities/KNHUoN)

KENYATTA NATIONAL HOSPITAL  
P O BOX 20723 Code 00202  
Tel: 726300-9  
Fax: 725272  
Telegrams: MEDSUP, Nairobi  
6<sup>th</sup> June 2012

Akoko Joy Susan Adhiambo  
School of Public Health  
University of Western C ape  
South Africa

Dear Joy

**Research proposal: "Assessment of prescription patterns and availability of anti-malarial Drugs to children under five years in a rural district in Kenya"** (P170/04/2012)

This is to inform you that the KNH/UoN-Ethics & Research Committee (ERC) has reviewed and **approved** your above revised research proposal. The approval periods are 6<sup>th</sup> June 2012 to 5<sup>th</sup> June 2013.

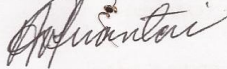
This approval is subject to compliance with the following requirements:

- Only approved documents (informed consents, study instruments, advertising materials etc) will be used.
- All changes (amendments, deviations, violations etc) are submitted for review and approval by KNH/UoN ERC before implementation.
- Death and life threatening problems and severe adverse events (SAEs) or unexpected adverse events whether related or unrelated to the study must be reported to the KNH/UoN ERC within 72 hours of notification.
- Any changes, anticipated or otherwise that may increase the risks or affect safety or welfare of study participants and others or affect the integrity of the research must be reported to KNH/UoN ERC within 72 hours.
- Submission of a request for renewal of approval at least 60 days prior to expiry of the approval period. (*Attach a comprehensive progress report to support the renewal*).
- Clearance for export of biological specimens must be obtained from KNH/UoN-Ethics & Research Committee for each batch of shipment.
- Submission of an *executive summary* report within 90 days upon completion of the study  
This information will form part of the data base that will be consulted in future when processing related research studies so as to minimize chances of study duplication and/or plagiarism.

For more details consult the KNH/UoN ERC website [www.uonbi.ac.ke/activities/KNHUoN](http://www.uonbi.ac.ke/activities/KNHUoN)

"Protect to Discover"

Yours sincerely



**PROF. A.N. GUANTAI**  
**SECRETARY, KNH/UON-ERC**

c.c. The Deputy Director CS, KNH  
The Principal, College of Health Sciences, UoN  
The HOD, Records, KNH  
Supervisors; Ms. Hazel Bradely, University of Western Cape, South Africa  
Dr. Onditi Kodhiambo Maurice, School of Health Sciences, Kenyatta University



**UNIVERSITY of the**  
**WESTERN CAPE**

*"Protect to Discover"*



## Appendix 4: UWC ethics and review committee approval



### OFFICE OF THE DEAN DEPARTMENT OF RESEARCH DEVELOPMENT

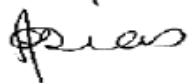
01 March 2012

#### To Whom It May Concern

I hereby certify that the Senate Research Committee of the University of the Western Cape has approved the methodology and ethics of the following research project by:  
Mrs J Akoko (School of Public Health)

Research Project: Assessment of prescription patterns and availability of anti-malaria drugs to children under five years of age in a rural district in Kenya

Registration no: 12/1/4



*Ms Patricia Josias  
Research Ethics Committee Officer  
University of the Western Cape*

Private Bag X17, Bellville 7535, South Africa  
T: +27 21 959 2948/2949 . F: +27 21 959 3170  
E: [pjosias@uwc.ac.za](mailto:pjosias@uwc.ac.za)  
[www.uwc.ac.za](http://www.uwc.ac.za)

A place of quality,  
a place to grow, from hope  
to action through knowledge

**Appendix 5: Bondo district ministry of health approval**

REPUBLIC OF KENYA



MINISTRY OF PUBLIC HEALTH AND SANITATION

District Medical Officer of Health  
Bondo District  
P.O. Box 89  
**BONDO**

Telephone: (057) 520005  
When replying Please quote:  
Our Ref: ...MOPHSB/3/10/12(1)  
Your Ref: .....

Date.2<sup>nd</sup> Oct, 2012

To all  
Health facilities in-charges  
Bondo District


**RE: AUTHORISATION TO CONDUCT REASEARCH FOR AKOKO JOY SUSAN  
ADHIAMBO**

The above named person has been authorized to conduct research in Bondo District rural health facilities on "Assessment of prescription patterns and availability of anti-malarial drugs to children less than 5yrs of age in a rural district in Kenya" in the month of October and November 2012.

This is following approval by KNH/UON-ERC and university of Western Cape South Africa.  
Please accord her all the necessary assistance she may need.

Thank you,

Yours faithfully,

  
Dr. Oliech J.N.S  
Medical Officer of Health  
BONDO DISTRICT



## Appendix 6 : Participant information sheet

### Appendix 6.1: Participant information sheet (English)



**UNIVERSITY OF THE WESTERN CAPE**

Private Bag X 17, Bellville 7535, South Africa

*Tel: +27 21-9592809, Fax: 27 21-9592872*

### **PROJECT TITLE: ASSESSMENT ON PRESCRIPTION PATTERNS AND AVAILABILITY OF ANTI-MALARIAL DRUGS TO CHILDREN UNDER FIVE IN A RURAL DISTRICT IN KENYA**

**Dear Participant**

#### **What is this study about?**

This is a project being conducted by **AKOKO JOY** a master's student at the School of Public Health at the University of the Western Cape, South Africa.

I am inviting you to take part in this research project as am interested in the malaria treatment being provided for children under five years of age in Bondo District. The purpose of this research project is to identify the prescription patterns that exist in the primary health care facilities among the children under five in Bondo district and compare them to the national treatment guidelines. The research will also assess the availability of anti-malarials to these children.

#### **What will I be asked to do if I agree to participate?**

If you agree to participate in this study you will be asked a number of the questions about your understanding of malaria treatment, particularly drug administration by the research assistants and to provide them with your child's prescription book that you carry home so they can extract specific information about your child and the anti-malarial treatment they have received. The

questions will take about 15 minutes and the prescription book will be returned to you as soon as the research assistants have finished with the necessary documentation.

I will keep all personal information confidential. To help protect confidentiality, neither the child's name nor your name will be recorded. The results from this project will only be presented in an aggregated format.

### **What are the risks of this research?**

There are no known risks associated with participating in this research project. However, social and psychological risks/discomforts may arise during the interviews with the caregivers. The researcher will ensure confidentiality of all the information provided and any recommendations made will be used to improve service delivery.

### **What are the benefits of this research?**

This research will not benefit you or your child directly but is likely to provide useful information for the Bondo district community. The results from the project will indicate whether the malaria prescription patterns are in accordance with the national treatment guideline and the research will offer recommendations to improve service delivery, especially the, quality of patient care and accessibility to anti-malarials to the under five children.

### **Do I have to be in this research and may I stop participating at any time?**

Your participation in this research is completely voluntary. You may choose not to take part at all or you may withdraw at anytime during the project. If you choose not to participate, the treatment of your child will not be affected in any way now or in the future.

### **What if I have questions?**

This research is being conducted by **Mrs. Akoko Joy**, School of Public Health at the University of the Western Cape. If you have any questions about the research study itself, please contact **Mrs. Akoko Joy** at the following address:

**Cell: +254 722 407559**

**Email: joy.adhiambo@gmail.com**

Should you have any questions regarding this study and your rights as a research participant or if you wish to report any problems you have experienced related to the study, please contact:

**Research study supervisor: Ms. Hazel Bradley.**

**University of the Western Cape**

**Private Bag X17, Belville 7535**

**Telephone: +27219592630 Cell: +27 72 297 9932 Fax: +2721959-2872**

**Research study local supervisor,**

**Dr Onditi Kodhiambo Maurice,**

**Lecturer Kenyatta University, School of health sciences**

**P.O. Box 43844-00100.**

**Nairobi, Kenya.**

**Telephone +254 20 813460 cell +254 724468162**



**Head of Department: Prof Uta Lehmann**

**University of the Western Cape**

**Private Bag X17, Belville 7535**

**Telephone: +27 21959 2633 Cell: +272 82 202 3189**

**Dean of the Faculty of Community and Health Sciences: Prof Hester Klopper**

**University of the Western Cape**

**Private Bag X17**

**Bellville 7535**

**Telephone: +27 219592809**

**KNH/UON –ERC**

**P.O.BOX 19676-00200, 20723-00200**

**NAIROBI.**

**Telephone +254 20 2726300 ext 44355, +254 726300-9**

This research will be approved by both the local ethics and review committee i.e. university of Nairobi and Kenyatta national hospital ethics review committee and the University of the Western Cape's Senate Research and Ethics Committee.



## Appendix 6.2: Participant Information sheet (Swahili )

### karatasi ya maelezo ya washiriki



**CHUO KIKUU CHA CAPE YA MAGHARIBI**

Private Bag X 17, Bellville 7535, Afrika Kusini

*Tel: +27 21-9592809, Fax: 27 21-9592872*

### **MRADI WA UTAFITI: TATHMINI YA MIFUMO YA DAWA NA UPATIKANAJI WA DAWA ZA KUPAMBANA NA MALARIA KWA WATOTO CHINI YA MIAKA MITANO KATIKA KIJJI KIMOJA NCHINI KENYA**

#### **Ndugu Mshiriki**

#### **Je, utafiti huu ni juu ya nini?**

Huu ni mradi unaofanywa na **Bi. AKOKO JOY** mwanafunzi wa shahada ya masters, Shule ya Afya ya Umma katika Chuo Kikuu cha Cape ya Magharibi, Afrika Kusini.

Tunakukaribisha kushiriki katika mradi huu wa utafiti, tuna nia ya kufanya utafiti juu ya matibabu ya malaria inayotolewa kwa watoto chini ya miaka mitano katika Wilaya ya Bondo. Madhumuni ya mradi huu ni kutambua ruwaza ambazo zipo katika vituo vya afya vya kimsingi vinavyo toa huduma ya matibabu ya malaria miongoni mwa watoto chini ya miaka mitano katika wilaya ya Bondo na kuyalinganisha na miongozo ya kitaifa ya matibabu. Utafiti pia unanuiya kutathmini upatikanaji wa madawa ya kupambana na malaria kwa watoto hawa.

#### **Nitaulizwa maswali gani kama nitakubali kushiriki?**

Kama utakubali kushiriki katika utafiti huu utaulizwa maswali kadhaa kuhusu uelewewe wako wa tiba ya malaria, upeanaji wa madawa ya malaria hasa na watafiti wasaidizi nakuwapatia kitabu cha matibabu cha mtoto wako ambacho wewe hubeba kwenda nyumbani ili waweze kudondoa taarifa maalum kuhusu mtoto wako na tiba ambayo ameweza kupata dhidi ya malaria. Maswali yatachukua muda wa dakika 15 na kitabu kitarejeshwa kwako pende watafiti wasaidizi watakapo kamilisha utafiti wa nyaraka muhimu.

Tutaweka taarifa zote za kibinafsi siri. Kusaidia kulinda siri, jina lako wala la mtoto halitakuwa kwenye kumbukumbu. Matokeo kutokana namradi huu utawasilishwa kwa njia ya siri.

#### **Je, utafiti huu una hatari gani?**

Hakuna hatari inayojulikana kuhusishwa na kushiriki katika mradi huu wa utafiti

**Utafiti huu una manufaa gani?**

Utafiti huu haitakuwa na faida wa moja kwa moja kwako au mtoto wako lakini ni uwezekano wa kutoa taarifa muhimu kwa ajili ya jamii ya wilaya ya Bondo. Matokeo kutoka mradi huu yataonyesha kama dawa za malaria yanatolewa kwa mujibu wa mwongozo wa kitaifa, na utafiti utatoa mapendekezo ya kuboresha utoaji wa huduma, hasa utoaji wa huduma bora kwa mgonjwa na upatikanaji wa dawa za kupambana na malaria kwa watoto chini ya miaka mitano.

**Je, lazima niwe katika utafiti huu na naweza omba kuacha kushiriki katika utafiti huu wakati wowote?**

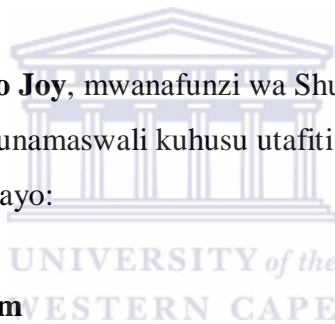
Ushiriki wako katika utafiti huu ni wa hiari kabisa. Unaweza kuchagua kutoshiriki kabisa au unaweza kuondoka wakati wowote katikati ya mradi. Kama utachagua kutoshiriki, matibabu ya mtoto wako hayataathirika kwa njia yoyote sasa au katika siku zijazo.

**Na Kama nina maswali?**

Utafiti huu unafanywa na **Bi Akoko Joy**, mwanafunzi wa Shule ya Afya ya Umma katika Chuo Kikuu cha Cape Magharibi. Kama unamaswali kuhusu utafiti wenyewe, tafadhali wasiliana na **Bi Akoko Joy** kwa anwani ifuatayo:

**Cell: +254 722 407559**

**Email: joy.adhiambo @ gmail.com**



Kama una maswali yoyote kuhusu utafiti huu na haki yako kama mshiriki au kama unataka kutoa taarifa kuhusu tatizo lolote kuhusiana na utafiti huu, tafadhali wasiliana na:

**Msimamizi mkuu wa utafiti: Bi Hazel Bradley.**

**Chuo Kikuu cha Cape ya Magharibi**

**Private Bag X17, Belville 7535**

**Simu: +27219592630 Cell: +27 72 297 9932 Fax: +2721959-2872**

**Mkuu wa Idara: Prof Uta Lehmann**

**Chuo Kikuu cha Cape ya Magharibi**

**Private Bag X17, Belville 7535**

**Simu: +27 21959 2633 Cell: +272 82 202 3189**

**Mkuu wa Kitivo cha Sayansi ya Afya ya Jamii: Prof HesterKlopper**

**Chuo Kikuu cha Cape ya Magharibi**



**Private Bag X17 Bellville 7535**

**Simu: +27 219592809**

Utafiti huu utaidhinishwa na kamati ya seneti ya utafiti na maadili cha Chuo Kikuu cha Cape Magharibi.



## Appendix 6.3: Participant Information sheet (Dholuo)

### form mar vie golo paro e nonro



**MBALARIANY MAR WESTAN CAPE**

**Sikund Ajuoke mag Kor Gweng,'**

**Sanduk Mar Posta, Private Bag X 17, Bellville 7535,**

**AFRIKA MAR MILAMBO.**

**Sime: +27 21-9592809, Fax: 27 21-9592872**

**THUON WACH: YANGO TIE (YUDRUOK) KOD KAKA ICHIWO YEDHE MAG  
MALARIA NE NYTHINDO MA BWO HIGNI ABICH E GWENGE MA KENYA.**

*Ne Jakanyono,*

Nonro ni itimo gi AKOKO JOY ma en japunjre mar rang'iny mar "masters" e sikul mar ajuok kor gwenge e mbalariany mar Western Cape man nitie e piny ma Africa ma Milambo.

Warwaki ni mondo igol pachi e nonro ni nikech en hero wa ni mondo wang'e kaka ithiedho malaria kuom nyithindo ma ni e bwo higni abich e district mar Bondo. Nonro ni dwaro yango kaka ichiwo yedhe ne nythindo ma bwo higni abich e hosipatande ma Bondo mondo wapim gi kaka sirkal dwaro. Nonro ni be biro fwenyo tie(yudruok) mar yedhe gi ne nythindo ma e bwo higni abich.

**En ang'o ma ibiro penja ka ayie golo pacha?**

Ka iyie to ibiro penji penjo moko ma bwora kaluwore gi winjoni e thieth mar malaria, ahinya to e chiwo yedhe, toke to ibiro kwayi bug hospital mar nyathini mondo yud tiend weche e thieth mar malaria ma osechiw ne nyathini. Penjo biro kawo dakika apar kod abich tok ma ibiro dwok ni bug nyathini mar hospital. Weche duto ma ibiro chiwo ok bi nyis nga'to ang'ata kendo kata nying nyathini ok bi ndiki kamoro amora.

**Rach moro dibedie e golo pacha?**

Onge rach moro amora manyalo wuok e paro ma ibiro golo. Pachi biro mana kelo ber e konyo thieth mar malaria ne nyithindo ma bwo higni abich.

### **Ber mage ma nonro ni biro kelo?**

Ber ma achiel ka achiel ne in kata nyathini to onge. Kata kamano, paro ma ibiro chiwo biro konyo aluora mar Bondo nikech fweny ma nonro ni dhi golo biro yawo wang' kuom kaka thieth mar malaria chalo e aluora mar Bondo ma biro yango ka thieth ma ichiwo oluwore gi kaka sirkal (piny owach) dwaro. Ibiro fweny bende kuonde ma inyalo jiw mondo chiw thieth makare mar malaria ne nythindo ma pok okalo higni abich.

### **Ochuno ni nyaka abedi jakanyono e nonro ni to be an kod thwolo mar loko pacha kapok nonro ni orumo?**

Paro duto ma ibiro golo en kuom yie mari. Inyalo dagi bedo jakanyono, kata inyalo wuok e nonro nus. Tamruok ni ok bi mono thiedh nyathini kuom seche gi to kata mana bang'e.

### **To ka an gi penjo?**

Nikech nonro ni itimo kod mikai **AKOKO JOY** ma mbalariany mar Westan Cape, penjo duto inyalo or ne ka okalo e ong'we yamo kata it oboke mar mbui ma piny ni:

**Sime: +254 722 407559**

**Email: joy.adhiambo@gmail.com**

Kuom penjo duto ma oluwore gi ratiro magi e nonro ni kata chandruok moro amora ma diwuog e nonro ni to iyie itudri gi:

**Nyapara Mar Nonro: Ms. Hazel Bradley.**

**Mabalariany Mar Westan Cape,**

**Private Bag X17, Belville 7535**

**Sime: +27219592630 Cell: +27 72 297 9932 Fax: +2721959-2872**

**Jatend Migao: Prof Uta Lehmann,**

**Mbalariany Mar Westan Cape,**

**Private Bag X17, Belville 7535**

**Sime: +27 21959 2633      Cell: +272 82 202 3189**

**Jatend Migap ajuoke mag kor gwenge: Prof Hester Klopper**

**Mabalariany Mar Westan Cape,**

**Private Bag X17**

**Bellville 7535**

**Sime: +27 219592809**

Nonro ni ibiro go kogno gi Telo mochung' ne ratiro mar Mbalariany ma Westan Cape.



**Appendix 7: Consent form**

**Appendix 7.1: Consent form (English)**



**UNIVERSITY OF THE WESTERN CAPE**

School of Public Health

Private Bag X17 • **BELLVILLE** • 7535 • South Africa

Tel: 021- 959 2809, Fax: 021- 959 2872

**Title of Research Project: ASSESSMENT ON PRESCRIPTION PATTERNS AND AVAILABILITY OF ANTI-MALARIA DRUGS TO CHILDREN UNDER FIVE IN A RURAL DISTRICT IN KENYA**

The study has been described to me in language that I understand and I freely and voluntarily agree to participate. My questions about the study have been answered. I understand that my identity will not be disclosed and that I may withdraw from the study without giving a reason at any time and this will not negatively affect me in any way.

Participant's name.....

Participant's signature.....

Date.....

Should you have any questions regarding this study or wish to report any problems you have experienced related to the study, please contact the study Supervisor

**Research study supervisors' Name: Ms. Hazel Bradley.**

**University of the Western Cape**

**Private Bag X17, Belville 7535**

**Telephone: +27219592630 Cell: +27 72 297 9932 Fax: +2721959-2872**

**Research study local supervisor,  
Dr Onditi Kodhiambo Maurice,  
Lecturer Kenyatta University, School of health sciences  
P.O.Box 43844-00100.  
Nairobi, Kenya.  
Telephone +254 20 813460 cell +254 724468162**

**Head of Department: Prof Uta Lehmann  
University of the Western Cape  
Private Bag X17, Belville 7535  
Telephone: +2721 959 2633 Cell: +272 82 202 3189**

**Dean of the Faculty of Community and Health Sciences: Prof Hester Klopper  
University of the Western Cape  
Private Bag X17  
Bellville 7535  
Telephone: +2721959 2809**



**KNH/UON –ERC  
P.O.BOX 19676-00200, 20723-00200  
NAIROBI.  
Telephone +254 20 2726300 ext 44355, +254 726300-9**

## Appendix 7.2: Consent form (Kiswahili)

### Fomu ya idhini



**CHUO KIKUU CHA CAPE YA MAGHARIBI**

**Shule ya Afya ya Umma**

Private Bag X17 • Bellville 7535 • Afrika Kusini

Tel: 021-959 2809, Fax: 021-959 2872

### **MRADI WA UTAFITI: TATHMINI YA MFUMO WA DAWA NA UPATIKANAJI WA DAWA ZA KUPAMBANA NA MALARIA KWA WATOTO CHINI YA MIAKA MITANO KATIKA KIJJI KIMOJA NCHINI KENYA**

Utafiti umeelezwa katika lugha ambayo naelewa, ninashiriki kwa huru na kwa hiari. Maswali yangu kuhusu utafiti huu yamejibiwa. Naelewa kwamba utambulisho wangu hautafunuliwa na kwamba naweza kuondoka kwenye utafiti huu bila ya kutoa sababu wakati wowote na hii haitaniathiri kwa njia yoyote.

**Jina la**

*mshiriki*.....

**Sahihi ya**

*mshiriki*.....

**Tarehe**.....

Kama, una swali lolote kuhusu utafiti huu au unataka kuripoti matatizo yoyote ambayo umekumbana nayo katika utafiti huu, tafadhali wasiliana na Msimamizi wa utafiti

**Jina la mtafiti msimamizi: Bi Hazel Bradley.**

**Chuo Kikuu cha Cape ya Magharibi**

**Private Bag X17, Belville 7535**

**Simu: +27219592630 Cell: +27 72 297 9932 Fax: +2721959-2872**

**Mkuu wa Idara: Prof Uta Lehmann**

**Chuo Kikuu cha Cape ya Magharibi**

**Private Bag X17, Belville 7535**

**Simu: +2721 959 2633 Cell: +272 82 202 3189**

**Mkuu wa Kitivo cha Sayansi ya Afya ya Jamii: Prof HesterKlopper**

**Chuo Kikuu cha Cape ya Magharibi**

**Private Bag X17**

**Bellville 7535**

**Simu: +2721959 2809**





### Appendix 7.3: Consent form (Dholuo)



#### **MBALARIANY MAR WESTAN CAPE**

**Sikund Ajuoke mag Kor Gweng,'**

**Sanduk Mar Posta, Private Bag X 17, Bellville 7535,**

**AFRIKA MAR MILAMBO.**

*Sime: +27 21-9592809, Fax: 27 21-9592872*

#### **FORM MAR YIE GOLO PARO E NONRO**

**THUON WACH: YANGO TIE (YUDRUOK) KOD KAKA ICHIWO YEDHE MAG  
MALARIA NE NYITHINDO MA BWO HIGNI ABICH E GWENGE MA KENYA.**

*Ne Jakanyono,*

Nonro ni itimo gi AKOKO JOY ma en japunjre mar rang'iny mar "masters" e sikul mar ajuok kor gwenge e mbalariany mar Western Cape man nitie e piny ma Africa ma Milambo.

Warwaki ni mondo igol pachi e nonro ni nikech en hero wa ni mondo wang'e kaka ithiedho malaria kuom nyithindo ma ni e bwo higni abich e district mar Bondo. Nonro ni dwaro yango kaka ichiwo yedhe ne nyithindo ma bwo higni abich e hospitatande ma Bondo mondo wapim gi kaka sirkal dwaro. Nonro ni be biro fwenyo tie(yudruok) mar yedhe gi ne nyithindo ma e bwo higni abich.

**En ang'o ma ibiro penja ka ayie golo pacha?**

Ka iyie to ibiro penji penjo moko ma bwora kaluwore gi winjoni e thieth mar malaria, ahinya to e chiwo yedhe, toke to ibiro kwayi bug hospital mar nyathini mondo yud tiend weche e thieth mar malaria ma osechiw ne nyathini. Penjo biro kawo dakika apar kod abich tok ma ibiro dwok ni bug nyathini mar hospital. Weche duto ma ibiro chiwo ok bi nyis nga'to ang'ata kendo kata nying nyathini ok bi ndiki kamoro amora.

**Rach moro dibedie e golo pacha?**

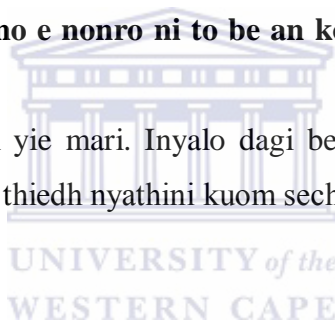
Onge rach moro amora manyalo wuok e paro ma ibiro golo. Pachi biro mana kelo ber e konyo thieth mar malaria ne nyithindo ma bwo higni abich.

**Ber mage ma nonro ni biro kelo?**

Ber ma achiel ka achiel ne in kata nyathini to onge. Kata kamano, paro ma ibiro chiwo biro konyo aluora mar Bondo nikech fweny ma nonro ni dhi golo biro yawo wang' kuom kaka thieth mar malaria chalo e aluora mar Bondo ma biro yango ka thieth ma ichiwo oluwore gi kaka sirkal (piny owach) dwaro. Ibiro fweny bende kuonde ma inyalo jiw mondo chiw thieth makare mar malaria ne nythindo ma pok okalo higni abich.

**Ochuno ni nyaka abedi jakanyono e nonro ni to be an kod thwolo mar loko pacha kapok nonro ni orumo?**

Paro duto ma ibiro golo en kuom yie mari. Inyalo dagi bedo jakanyono, kata inyalo wuok e nonro nus. Tamruok ni ok bi mono thiedh nyathini kuom seche gi to kata mana bang'e.



**To ka an gi penjo?**

Nikech nonro ni itimo kod mikai **AKOKO JOY** ma mbalariany mar Westan Cape, penjo duto inyalo or ne ka okalo e ong'we yamo kata it oboke mar mbui ma piny ni:

**Sime: +254 722 407559**

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Kuom penjo duto ma oluwore gi ratiro magi e nonro ni kata chandruok moro amora ma diwuog e nonro ni to iyie itudri gi:

**Nyapara Mar Nonro: Ms. Hazel Bradley.**

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**Jatend Migao: Prof Uta Lehmann,**

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**Jatend Migap ajuoke mag kor gwenge: Prof Hester Klopper**

**Mabalariany Mar Westan Cape,**

**Private Bag X17**

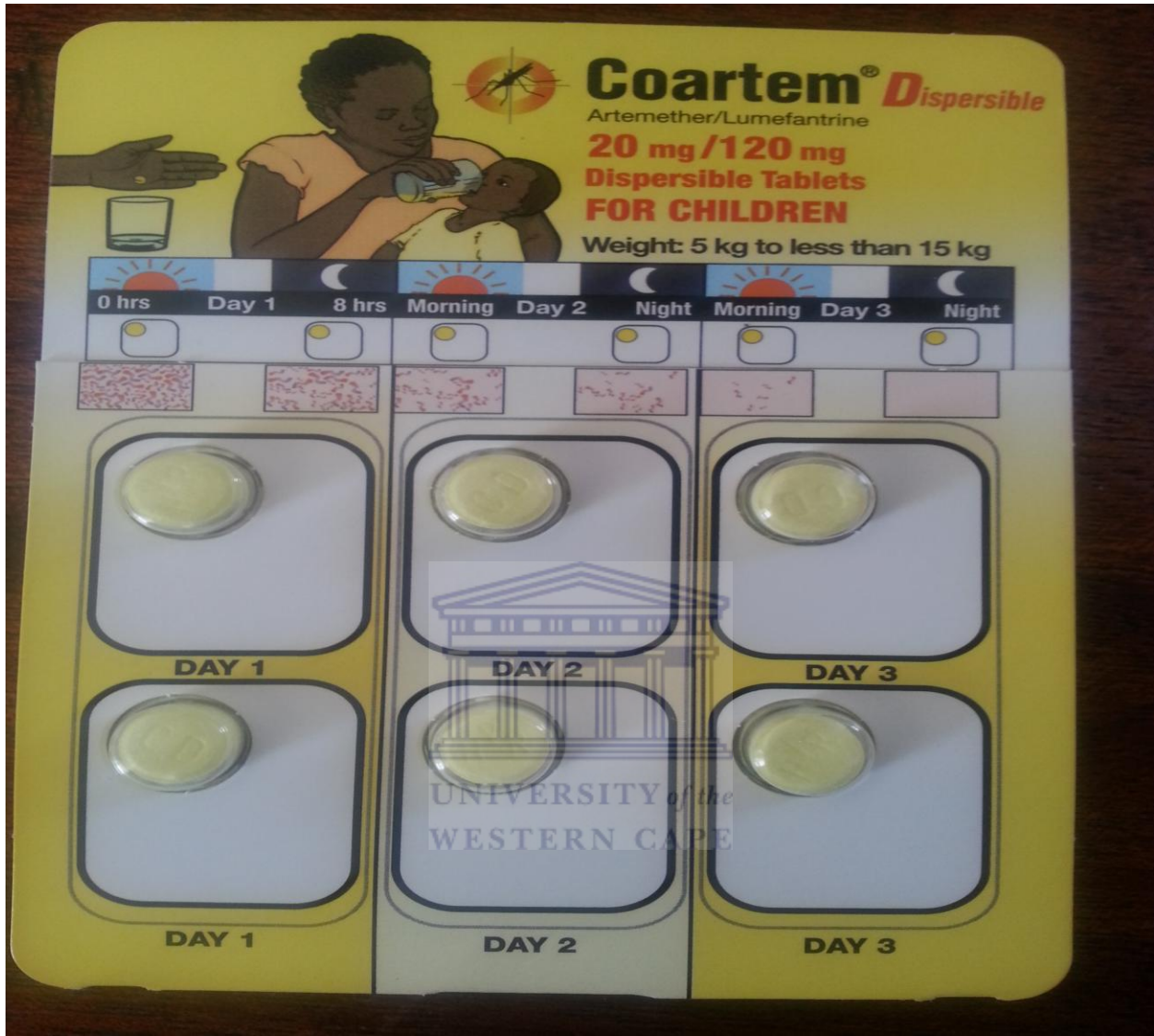
**Bellville 7535**

**Sime: +27 219592809**

Nonro ni ibiro go kogno gi Telo mochung' ne ratiro mar Mbalariany ma Westan Cape.



Appendix 8: A sample of blister pack for 5kg and less than 14kg



Appendix 9: A sample of an al blister pack for weight 15kg and less than 25kg

