The Use of Antimalarial Drugs Prior To Health Facility Attendance among Patients at Kitale District Hospital, Kenya

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DECLARATION

This thesis is my original work and has not been presented for a degree in any other university.

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This thesis has been submitted for examination with our approval as university supervisors.

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DEDICATION

This thesis is dedicated to my parents Mr. and Mrs. Richard Wasike who gave me the opportunity to pursue my studies and made me believe that whatever the mind can conceive and believe, it can achieve.

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LIST OF ABBREVIATIONS AND ACRONYMS

ACT	Artemisinin-Based Combination therapies.
AL	Artemether-Lumefantrine.
AQ	Amodiaquine
CPHR	Centre for Public Health Research.
DOMC	Division of Malaria Control
ERC	Ethical Review Committee
IEC	Information, Education and Communication
ITROMID	Institute of Tropical Medicine and Infectious Diseases
JKUAT	Jomo Kenyatta University of Agriculture and Technology
KEMRI	Kenya Medical Research Institute
MOH	Ministry of Health
MoPHS	Ministry of Public Health and Sanitation
NERC	National Ethical Review Committee
NGOs	Non-Governmental Organizations
NMS	National Malaria Strategy
SP	Sulfadoxine- Pyrimethamine
SPSS	Statistical Package for Social Sciences
SSC	Scientific Steering Committee
WHO	World Health Organization

ABSTRACT

Malaria is a major cause of morbidity worldwide. It remains the leading cause of morbidity and mortality in Kenya, especially in young children and pregnant women. Problems related to the distribution and use of antimalarial drugs have compounded the situation in Africa and Kenya is no exception. In Kenya, like in many other developing countries, drugs are often used without prescription. They may be purchased from local shops, markets, or street vendors. They may also be obtained by sharing with other users, or used when left over from previous treatments. There is concern that this widespread use of anti-malarial drugs for all fevers is often inappropriate and ineffective and may contribute to drug resistance and thus slow down the fight against malaria. The main objective of this study was to determine the use of antimalarial drugs prior to health facility attendance among patients at Kitale District Hospital. Specifically the study aimed to determine the treatment seeking behaviour in respect to malaria among patients attending Kitale District Hospital, establish the source and types of drugs and regimens used for malaria treatment in the management of fever prior to facility attendance, establish patients knowledge of antimalarial drugs and determine the association between demographic characteristics and treatment/ management of malaria. A descriptive facility based cross sectional study design was used. Sampling was done consecutively on patients who were diagnosed clinically and/or parasitologically for malaria at Kitale District Hospital Out Patient Department. A total of 406 respondents

were interviewed. A structured questionnaire was used as a data collection tool. The information was entered in a database using SPSS Version 12. Data analysis was performed using the same software. Descriptive statistics was used to describe the results. Of the 406 patients interviewed, a total of two hundred and eleven (63.7%) had taken an antimalarial drug prior to hospital attendance. The most commonly used antimalarials were Artemether lumefantrine (AL) (46%), Sulfadoxine- Pyremethamine (Fansidar®) (8%) and Amodiaquine (7%). There was significant difference by age and sex with regard to type of drug used for fever management (P=0.01). The sources of these drugs were diverse but public health facilities were the major source of Artemether lumefantrine (AL) (52%), while the informal sector comprising of shops, pharmacies or other sources including left over medicines at home were the major source of other antimalarial drugs. Of the 46% respondents who used Artemether lumefantrine (AL), 72% adhered to the correct dosage. Only 19% of the respondents had knowledge of AL as the new antimalarial drug being promoted by the Ministry of Health. Health workers were the major source of information on AL (66%). There was significant difference in knowledge of the new antimalarial drug by level of education of respondents (P<0.05). The study shows that treatment seeking behaviour for malaria was reported in majority of the respondents and about half of them sought treatment mainly from informal facilities such as shops rather than the recommended health care outlets, within 24 hours after the onset of fever. There was widespread use of antimalarial drugs in the community prior to hospital attendance with Artemether lumefantrine being the most

commonly used antimalarial drug. Awareness of the recommended drugs for treatment of malaria was low and educational level was significantly associated with management of malaria as well as with knowledge about antimalarials. There is need for public health campaigns by the Ministry of Public Health and Sanitation to seek improvement in health seeking behaviour by educating the public on the importance of prompt and effective management of malaria.

CHAPTER ONE: INTRODUCTION

1.1 Background

Malaria is a public health problem in more than 90 countries. Each year, between 300 and 500 million new cases are reported worldwide (Breman, *et al*., 2004). According to the Roll Back Malaria Campaign of the World Health Organization (WHO), 90 percent of the more than one million deaths worldwide caused by malaria every year take place in Africa, and malaria constitutes 10% of the continent's overall disease burden (Breman, *et al*., 2004; Buabeng, *et al*., 2007; WHO, 2001a). In Africa south of the Sahara, malaria accounts for approximately 15% of deaths in children under five years of age and most of these occur in rural areas which have poor access to health care services (WHO, 2001a; Ansah, *et al*., 2001; Binka, *et al*., 1994; Buabeng, *et al*., 2007).

In Kenya, malaria remains the leading cause of morbidity and mortality, especially in young children and pregnant women. It accounts for 30% of outpatient attendances and 19% of admissions to health facilities. It is the most important cause of death in children under 5 years of age and is estimated to cause 20% of all deaths in this age group (MOH, 2006).

Recognizing the disease and economic burden that malaria places on its population and the barrier it constitutes to development and alleviation of poverty and considering that

malaria is preventable, treatable and curable, the Ministry of Public Health and Sanitation through the Division of Malaria Control launched the National Malaria Strategy (NMS) 2001-2010 in line with the Abuja targets for halving the malaria mortality by 2010. Four interventions were adopted under the National Malaria Strategy and these are: Providing the right drugs at the right time, protecting pregnant women, promoting insecticide treated nets and pre-empting of epidemics (DOMC, 2001).

Tremendous progress has been made in achieving the set targets, something that has contributed to a decline in outpatient attendance and admissions due to malaria and a reduction in deaths among children under the ages of five (MOH, 2006).

To further cope with the increasing resistance to antimalarial drugs and as per the World Health Organization recommendations that all countries experiencing resistance to conventional monotherapies should use combination therapies, preferably those containing artemisinin derivatives (ACTs- Artemisinin based combination therapies) for falciparum malaria (WHO, 2001b), Kenya changed its first line policy for uncomplicated malaria from Sulfadoxine- Pyrimethamine (SP) to a specific ACT, Artemether-lumefantrine (AL) in 2004. Quinine became the treatment of choice for children below 5kgs, pregnant women, and as the second line; SP was reserved only for intermittent preventive treatment in pregnancy; and Amodiaquine (previous second line treatment) was no longer recommended (MOH, 2006; Zurovac, *et al*., 2008).

The implementation of the new policy by the government in 2006 was accompanied by in-service training for health workers and development and dissemination of national malaria treatment guidelines.

A community awareness campaign was also launched to educate the public on the burden of malaria and to reinforce key messages on the appropriate first line drug including where and how to access Artemether-lumefantrine (AL) free-of-charge (DOMC, 2006). The IEC campaign ran over three months, and was planned to reach 60% of the primary target audience, caregivers of children under five years of age (Amin, *et al*., 2007).

1.2 Problem statement

Following the implementation of Malaria treatment policy, the government discontinued the use of conventional monotherapies that had been rendered ineffective in the fight against malaria. To ensure strict adherence to the policy and prevent use of ineffective drugs, Artemether-lumefantrine (AL) was made more available and offered free of charge at government facilities (DOMC, 2006).

However, it is suspected that antimalarial drugs are often widely used without prescription in Kenya. They may be purchased from local shops, markets, or street vendors. They may also be obtained by sharing with other users or the left over from previous treatments. Most patients reporting at clinics and hospital facilities may have

gone through home based treatment or community drug shops/ pharmacies initially (Deming, *et al*., 1989; McCombie, 1996). Thus mainly resistant, severe, or recurrent episodes are seen at clinics and hospitals.

This widespread inappropriate use of antimalarial drugs some of which are ineffective in the treatment of malaria may slow down the fight against malaria and contribute to drug resistance.

Since the implementation of the new policy, however, there is generally very little documented information on the use of antimalarial drugs in the country. At Kitale District Hospital, such information is lacking.

1.3 Justification for the study

This study provides data on the use of antimalarial drugs before health facility attendance among patients at Kitale District Hospital. Such information was lacking and hence the need to carry out research on the use of antimalarial drugs prior to health facility attendance among patients and determine whether they were using the recommended drugs appropriately or they were still using conventional drugs that have little or no effect on *Plasmodium falciparum*.

It is expected that the results of this study will provide important information in planning strategic interventions and assist in future decision making and implementation of health policies to address the affected areas.

1.4 Research questions

1.4.1. Do the patients use malaria drugs before coming to the health facility and how are the drugs used?

1.4.2. What are the types of drugs and regimens used in the management of malaria by patients?

1.4.3. What is the source of these drugs used in the management of malaria by patients?

1.4.4. What are the patients' awareness level about malaria and the proper use of antimalarial drugs?

1.5 Objectives

1.5.1 General objective

To establish the use of anti-malarial drugs prior to health facility attendance among patients at Kitale District Hospital.

1.5.2 Specific objectives

Specifically, this study aimed to;

1.5.2.1. Determine the treatment seeking behaviour in respect to malaria among patients attending Kitale District Hospital.

1.5.2.2. Establish the types of drugs and regimens used for malaria treatment in the management of fever prior to facility attendance.

1.5.2.3. Establish the source of the drugs used.

1.5.2.4. Establish patients' knowledge of antimalarial drugs and malaria.

1.5.2.5. Determine the association between demographic characteristics and treatment/ management of malaria.

CHAPTER TWO: LITERATURE REVIEW

2.1 What is malaria?

Malaria is a mosquito-borne infectious disease caused by a eukaryotic protist of the genus *Plasmodium*. It is widespread in tropical and subtropical regions, including parts of the Americas (22 countries), Asia, and Africa. After a period of between two weeks and several months (occasionally years) spent in the liver, the malaria parasites start to multiply within red blood cells, causing symptoms that include fever, and headache. In severe cases the disease worsens leading to hallucinations, coma, and death (Kilama, 2009).

2.2 Transmission

Malaria transmission occurs primarily in tropical and subtropical regions in sub-Saharan Africa, Central and South America, the Caribbean island of Hispaniola, the Middle East, the Indian subcontinent, South-East Asia, and Oceania. In areas where malaria occurs, however, there is considerable variation in the intensity of transmission and risk of malaria infection. Highland (>1500 m) and arid areas (<1000 mm rainfall/year) typically have less malaria, although they are also prone to epidemic malaria when parasitaemic individuals provide a source of infection and climate conditions are favourable to mosquito development (WHO, 1996). Although urban areas have typically been at

lower risk, explosive, unplanned population growth has contributed to the growing problem of urban malaria transmission (Knudsen, *et al*., 1992).

2.3 Causative agents

Five species of the plasmodium parasite can infect humans: the most serious forms of the disease are caused by *Plasmodium falciparum*. Malaria caused by *Plasmodium vivax, Plasmodium ovale* and *Plasmodium malariae* causes milder disease in humans that is not generally fatal. A fifth species, *Plasmodium knowlesi*, is a zoonosis that causes malaria in macaques but can also infect humans (Fong, *et al*., 1971; Singh, *et al*., 2004)

2.4 Symptoms of malaria

Symptoms of malaria include fever, shivering, arthralgia (joint pain), vomiting, anemia (caused by hemolysis), hemoglobinuria, retinal damage,(Beare, *et al*., 2006) and convulsions. The classic symptom of malaria is cyclical occurrence of sudden coldness followed by rigor and then fever and sweating lasting four to six hours, occurring every two days in *P. vivax* and *P. ovale* infections, while every three days for *P. malariae* (Beare, *et al*., 2006), *P. falciparum* can have recurrent fever every 36–48 hours or a less pronounced and almost continuous fever. Malaria has been found to cause cognitive impairments, especially in children. It causes widespread anemia during a period of rapid brain development and also direct brain damage. This neurologic damage results

from cerebral malaria to which children are more vulnerable (Boivin, 2002; Holding and Snow, 2001). Cerebral malaria is associated with retinal whitening (Maude, *et al*., 2009) which may be a useful clinical sign in distinguishing malaria from other causes of fever (Beare, *et al*., 2006).

Severe malaria is almost exclusively caused by *P. falciparum* infection, and usually arises 6–14 days after infection (Trampuz, *et al*., 2003). Consequences of severe malaria include coma and death if untreated young children and pregnant women are especially vulnerable. Splenomegaly (enlarged spleen), severe headache, cerebral ischemia, hepatomegaly (enlarged liver), hypoglycemia, and hemoglobinuria with renal failure may occur. Renal failure is a feature of blackwater fever, where hemoglobin from lysed red blood cells leaks into the urine. Severe malaria can progress extremely rapidly and cause death within hours or days (Trampuz, *et al*., 2003). In the most severe cases of the disease, fatality rates can exceed 20%, even with intensive care and treatment (Kain, *et al*., 1998). In endemic areas, treatment is often less satisfactory and the overall fatality rate for all cases of malaria can be as high as one in ten (Mockenhaupt, *et al*., 2004). Over the longer term, developmental impairments have been documented in children who have suffered episodes of severe malaria (Carter, *et al*., 2005)

Chronic malaria is seen in both *P. vivax* and *P. ovale*, but not in *P. falciparum*. Here, the disease can relapse months or years after exposure, due to the presence of latent parasites in the liver. Describing a case of malaria as cured by observing the

disappearance of parasites from the bloodstream can, therefore, be deceptive. The longest incubation period reported for a *P. vivax* infection is 30 years (Trampuz, *et al*., 2003). Approximately one in five of *P. vivax* malaria cases in temperate areas involve overwintering by hypnozoites (i.e., relapses begin the year after the mosquito bite (Adak, *et al*., 1998).

2.5 Diagnosis

Direct microscopic examination of intracellular parasites on stained blood films is the current standard for definitive diagnosis in nearly all settings. However, several other approaches exist or are in development and will be described here.

2.5.1 Clinical (presumptive) diagnosis

Areas that cannot afford even simple laboratory diagnostic tests often use only a history of subjective fever as the indication to treat for malaria. Using Giemsa-stained blood smears from children in Malawi, one study showed that when clinical predictors (rectal temperature, nailbed pallor, and splenomegaly) were used as treatment indications, rather than using only a history of subjective fevers, a correct diagnosis increased from 21% to 41% of cases, and unnecessary treatment for malaria was significantly decreased (Redd, *et al*., 2006).

2.5.2 Microscopy

The most economic, preferred, and reliable diagnosis of malaria is microscopic examination of blood films because each of the four major parasite species has distinguishing characteristics. Two sorts of blood film are traditionally used. Thin films are similar to usual blood films and allow species identification because the parasite's appearance is best preserved in this preparation. Thick films allow the microscopist to screen a larger volume of blood and are about eleven times more sensitive than the thin film, so picking up low levels of infection is easier on the thick film, but the appearance of the parasite is much more distorted and therefore distinguishing between the different species can be much more difficult. With the pros and cons of both thick and thin smears taken into consideration, it is imperative to utilize both smears while attempting to make a definitive diagnosis (Warhurst and Williams, 1996)

From the thick film, an experienced microscopist can detect parasite levels (or parasitemia) down to as low as 0.0000001% of red blood cells. Diagnosis of species can be difficult because the early trophozoites ("ring form") of all four species look identical and it is never possible to diagnose species on the basis of a single ring form; species identification is always based on several trophozoites.

One important thing to note is that *P. malariae* and *P. knowlesi* (which is the most common cause of malaria in South-east Asia) look very similar under the microscope. However, *P. knowlesi* parasitemia increases very fast and causes more severe disease

than *P. malariae*, so it is important to identify and treat infections quickly. Therefore modern methods such as PCR (see "Molecular methods" below) or monoclonal antibody panels that can distinguish between the two should be used in this part of the world (McCutchan, *et al*., 2008).

2.5.3 Antigen detection tests (also known as rapid or "dipstick" tests)

For areas where microscopy is not available, or where laboratory staff are not experienced at malaria diagnosis, there are commercial antigen detection tests that require only a drop of blood (Pattanasin, *et al*., 2003). Immunochromatographic tests (also called: Malaria Rapid Diagnostic Tests, Antigen-Capture Assay or "Dipsticks") have been developed, distributed and field tested. These tests use finger-stick or venous blood, the completed test takes a total of 15–20 minutes, and the results are read visually as the presence or absence of colored stripes on the dipstick, so they are suitable for use in the field. The threshold of detection by these rapid diagnostic tests is in the range of 100 parasites/µl of blood (commercial kits can range from about 0.002% to 0.1% parasitemia) compared to 5 by thick film microscopy. One disadvantage is that dipstick tests are qualitative but not quantitative - they can determine if parasites are present in the blood, but not how many.

The first rapid diagnostic tests were using *P. falciparum* glutamate dehydrogenase as antigen (Ling, *et al*., 1986) PGluDH was soon replaced by *P.falciparum* lactate dehydrogenase, a 33 kDa oxidoreductase. It is the last enzyme of the glycolytic

pathway, essential for ATP generation and one of the most abundant enzymes expressed by *P.falciparum*. PLDH does not persist in the blood but clears about the same time as the parasites following successful treatment. The lack of antigen persistence after treatment makes the pLDH test useful in predicting treatment failure. In this respect, pLDH is similar to pGluDH. Depending on which monoclonal antibodies are used, this type of assay can distinguish between all five different species of human malaria parasites, because of antigenic differences between their pLDH isoenzymes.

2.5.4 Molecular tests

Molecular methods are available in some clinical laboratories and rapid real-time assays (for example, QT-NASBA based on the polymerase chain reaction) (Mens, *et al*., 2006) are being developed with the hope of being able to deploy them in endemic areas.

PCR (and other molecular methods) is more accurate than microscopy. However, it is expensive, and requires a specialized laboratory. Moreover, levels of parasitemia are not necessarily correlative with the progression of disease, particularly when the parasite is able to adhere to blood vessel walls. Therefore more sensitive, low-tech diagnosis tools need to be developed in order to detect low levels of parasitemia in the field (Redd, *et al*., 2006).

2.5.5 Differential

Fever and septic shock are commonly misdiagnosed as severe malaria in Africa, leading to a failure to treat other life-threatening illnesses. In malaria-endemic areas, parasitemia does not ensure a diagnosis of severe malaria, because parasitemia can be incidental to other concurrent disease. Recent investigations suggest that malarial retinopathy is better (collective sensitivity of 95% and specificity of 90%) than any other clinical or laboratory feature in distinguishing malarial from non-malarial coma (Beare, *et al*., 2006).

2.6 Treatment of malaria

The treatment of malaria depends on the severity of the disease. Uncomplicated malaria is treated with oral drugs. Whether patients who can take oral drugs have to be admitted depends on the assessment and the experience of the clinician. Severe malaria requires the parenteral administration of antimalarial drugs. The traditional treatment for severe malaria has been quinine but there is evidence that the artemisinins are also superior for the treatment of severe malaria (Dodoo, *et al*., 2009). Active malaria infection with *P. falciparum* is a medical emergency requiring hospitalization. Infection with *P. vivax, P. ovale* or *P. malariae* can often be treated on an outpatient basis. Treatment of malaria involves supportive measures as well as specific antimalarial drugs. When properly treated, a patient with malaria can expect a complete recovery (Dodoo, *et al*., 2009).

2.7 Decisions to seek malaria treatment

Decisions about whether and what kinds of treatment to seek depend, first, on whether the patient or caregiver thinks that malaria is the cause of the illness. A host of considerations; specific symptoms, personal and family history, season of the year, factor into this judgment. Unfortunately, the symptoms of severe malaria; convulsions, loss of consciousness, often are ascribed to other causes, so malaria treatment is not sought, at least initially. When a decision is made to seek treatment for what is presumed to be malaria, what actually happens reflects both the demand side, what people want and the supply side, what is available to them. It is, in many ways, more complex than a parallel decision to seek treatment for a febrile illness in the United States or Europe, where there would be no need to worry, for instance, about whether a clinic or hospital actually has the drug needed to treat the disease. The costs of treatment in money, time, travel, and otherwise, in general, are more onerous for a poor rural African, Asian, or South American family than for their poor counterparts in richer countries (Institute of Medicine, 2004).

People may go to one of a wide range of places (although in a given place, the choices may be few), including modern health providers in public clinics or health centers of various sizes in private facilities run by religious groups or other nongovernmental organizations; or the commercial private sector, which includes traditional healers,

pharmacies, shops, markets, and drug peddlers when malaria is suspected. It is these latter outlets, mainly shops and drug peddlers, often referred to as the "informal private sector" that provide antimalarial drugs for more than half of all treated episodes in sub-Saharan Africa (Mwabu, 1986; Deming, *et al*., 1989; Ejezie, *et al*., 1990; Snow, *et al*., 1992; Mnyika, *et al*., 1995). It also is common for people to get drugs from more than one source: people often begin with self-treatment using drugs from the informal sector, and then seek care from formal providers (McCombie, 1996).

2.8 Beliefs about the disease: the knowledge base

People have varied beliefs about the causes of disease and what treatments are appropriate. In the few places where it has been studied both in Africa and Asia, mild and severe malaria often are considered distinct diseases, with different words to describe them and different beliefs about how to treat them. Severe malaria with convulsions may be perceived as involving supernatural intervention, such as spirit possession or magic spells (Mwenesi, *et al*., 1995; Winch, *et al*., 1996; Ahorlu, *et al*., 1997; Muela and Ribera, 2000), and as a consequence, people may be more likely to go to a traditional healer for treatment, such that the most dangerous cases are least likely to get effective antimalarial drugs. It is not uncommon in Africa for mothers to believe that "modern" treatment, injections in particular, are dangerous for children with convulsions (Mwenesi, *et al*., 1995; Makemba, *et al*., 1996; Ahorlu, *et al*., 1997) even though injections often are preferred over tablets for other conditions. Alternatively, both

traditional and modern medical providers may be consulted in turn (Institute of Medicine, 2004).

2.9 Treatment through the formal sector

Most malaria treatment takes place at home with drugs from the informal sector, but formal facilities bear a substantial burden. In sub-Saharan Africa and rural Asia, fever is the reason for 20 to 40 percent of all clinic and dispensary visits. These outpatient facilities generally do not offer the life-saving emergency treatments required when severe malaria develops, however, only hospitals or health centers with inpatient facilities where malaria's share of admissions ranges between 0.5 and 50 percent (Chima, *et al*., 2003) are able to provide this care.

The pattern of treatment-seeking and treatment itself is different in countries outside of Africa mainly Asia and the Latin America/Caribbean region. Malaria is a significant problem in a number of countries, but it is generally more localized to specific areas, and everywhere is much less common than in Africa. Therefore, the burden on individuals as well as the health care system is much less. In Asia and Latin America, people with malaria are treated in general medical facilities, or in special malaria clinics.

Laboratory diagnosis is much more widely used, and where these facilities are not available on-site, patients with suspected malaria often are treated presumptively for the

immediate symptoms, and given further treatment if their malaria is confirmed (Institute of Medicine, 2004).

2.10 Treatment through the informal sector

Use of the informal sector for malaria treatment is very common throughout the world, even where malaria is less common. Most of this involves the purchase of antimalarials from shops, where people may ask for a "product" by name, rather than a "service" including diagnosis and advice. In Thailand, for example, "ya chud", a packet with a mixture of medicines including antimalarial drugs sold in private outlets is used frequently (one study found that around 90 percent of respondents had used ya chud at least once in their lifetime) (McCombie, 1996).

The role of traditional healers and the use of traditional medicines for uncomplicated malaria varies, but generally is considered to be of less importance than other sources of care (McCombie, 1996), though people may under report use of these services because of perceived disapproval. However, in various parts of Africa, traditional healers often may be consulted for severe malaria. In one site in rural Tanzania in the early 1990s, 90 percent of the children under 5 who died from acute febrile illness with seizures, died at home. Most (85 percent) had been seen by some kind of traditional healer, and only about half had been to a formal health facility before they died (De Savigny, *et al*., 1999).

2.11 Failure in malaria treatment

People seeking treatment for malaria through any of the channels described here often are frustrated by their experiences. In both the private sectors, patients may be faced with low quality of care, lack of drugs or poor quality drugs, and unpredictable costs, to name just a few of the problems (Institute of Medicine, 2004). All of these problems affect patients, but they also are concerns for health care systems. Some of the key problems are enumerated below:

2.11.1 Diagnosis problems

In cases where diagnosis is based on symptoms alone, there is over diagnosis, with resultant overuse of antimalarial drugs and real causes of illness possibly are left untreated (Stein and Gelfand, 1985; Olivar, *et al*., 1991; Guiguemde, *et al*., 1997). In addition to that, where parasitologic diagnosis is attempted, there is poor equipment, lack of supplies, limited training and supervision of laboratory staff, and inappropriate use of diagnostic results in treatment choices (Palmer, *et al*., 1999; Barat, *et al*., 1999). Finally lack of accurate microscopy and for rapid diagnostic tests, difficulty in determining whether a parasitic infection detected is the cause of the current illness is normally encountered, and in highly endemic areas, diagnosis based on symptoms may be equally valid (Institute of Medicine, 2004).

2.11.2 Lack of Effective Drugs and Inappropriate Use of Drugs

Health facilities are frequently out of stock of essential drugs including antimalarials especially at the end of financial year, coinciding with malaria peak in some countries, hence exacerbating the problem at a key time. The second- and third-line drugs may not be made available to lower level health facilities, despite the high frequency of treatment failure with the first-line remedy. "Polypharmacy"—prescribing of multiple, unnecessary drugs in addition to the antimalarial is common. As well as being wasteful, it may increase the risk of side effects.

In cases where patients have to pay for drugs, they may buy only some of the products prescribed, or incomplete doses, including the antimalarial itself. They may buy a complete course, but take only the first part (particularly if they feel better), storing the remainder for a subsequent episode, leading to systematic under dosing and encouraging the emergence of resistance. Expensive (and possibly more dangerous) formulations may be used in place of cheaper ones: in a study in Ghana, 42 percent of chloroquine prescribed to outpatients was administered by injection rather than orally (Ofori-Adjei and Arhinful, 1996).

Poor quality drugs are common in retail pharmacies in Africa and Asia, due to lack of quality control in manufacture and to degradation during storage (Shakoor, *et al*., 1997; Maponga and Ondari, 2003). In addition counterfeit drugs are an enormous problem in

tropical countries. Fake antimalarials have been a particular problem recently in Southeast Asia. For example, until a recent publicity campaign, more than half of the antimalarial drugs available in the private sector in Cambodia were fake. Widespread counterfeiting of artesunate has led to erroneous reports of resistance (Newton, *et al*., 2001). When patients buy their own drugs through shops or drug sellers, they may use their own judgment about how much to take (or how much they can afford to buy), and they also may get information from the sellers which may or may not be accurate. As an example of what takes place, a survey done in Kenya, only 4 percent of children given store-bought chloroquine got an adequate dose, and only half of those children received this dose over the recommended 3-day period. In the same survey, aspirin was widely used and 22 percent of children received potentially toxic doses (Marsh, *et al*., 1999).

2.11.3 Availability and quality of treatment

In most cases patients factor in what they know from past experience and general community knowledge when they decide on malaria treatment. In one rural area in Tanzania, the most common reason people gave for not using government services was the poor drug supply. At the same time, people report that public clinic staffs are often rude and insensitive, and there are long waiting times to be seen. The facilities themselves often are in poor condition, discouraging people from coming (Gilson, *et al*., 1994) and costs of drugs are sometimes unpredictable in public facilities- providers may add on charges for drugs that ought to be covered by the consultation fee. If there are no

drugs in the clinic, the patient may have to pay for the consultation, and then be told to purchase the drugs privately.

Private clinics and other outlets have their problems too. While staff attitudes may be better and waiting times shorter, private facilities may not have as wide a range of equipment or trained staff as in the public sector (Silva, *et al*., 1997; Mutizwa, 1997). And patients are aware they are paying higher prices for private services, which may make them skeptical about the motivations of private providers, balancing the welfare of patients against their own profits (Silva, *et al*., 1997; Smithson, *et al*., 1997; Institute of Medicine, 2004).

CHAPTER THREE: MATERIALS AND METHODS

3.1 Study design

This was a facility based descriptive cross-sectional study to determine the inappropriate use of anti-malarial drugs prior to health facility attendance among patients at Kitale District Hospital.

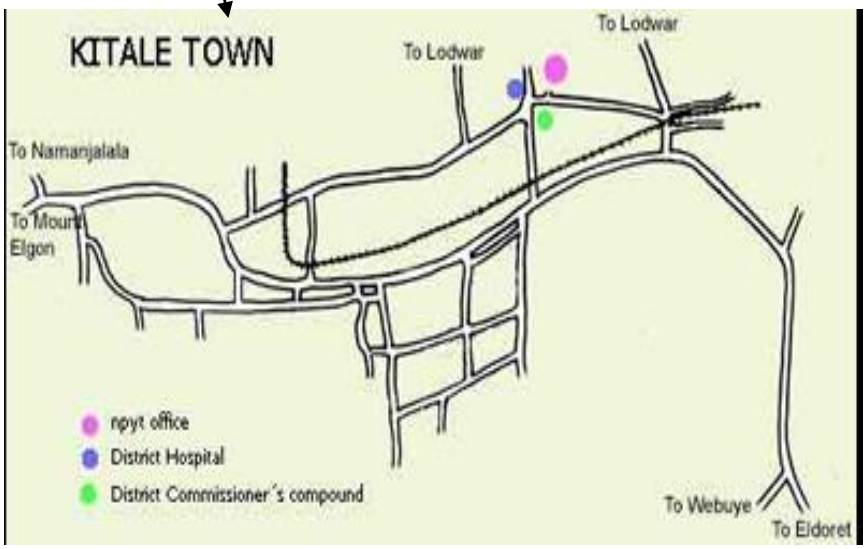
3.2 Study site

The study was conducted at Kitale District Hospital in Trans-Nzoia District. Trans-Nzoia is an administrative District of Rift valley. It is located between the Nzoia River and Mount Elgon and its centre is the town of Kitale. The District has a total population of 575,662 according to the 1999 National population census. The major economic activity is this area is maize farming.

There are other health facilities within this District such as Cherangani Nursing Home and Mt. Elgon Hospital, but Kitale District hospital is the largest public health facility in the District and it's usually a referral facility for other smaller facilities such as Endebes Sub-District Hospital and other Health centers and Dispensaries within the District.

The hospital is located in a high malaria risk area with epidemics occurring mainly in the month of June after the long rains which mainly occur in the month of April and May.

Below is a map showing of Kenya showing the location of the study site.



Source: Google Maps, 2010

3.3 Study population

The study population consisted of all patients regardless of gender and age, attending Kitale District Hospital outpatient department.

3.3.1 Inclusion criteria

3.3.1.1. All patients attending Kitale District Hospital with a diagnosis of malaria were targeted for inclusion in the study.

3.3.1.2. Those who gave consent to the study.

3.3.2 Exclusion criteria

3.3.2.1. Those with any other diagnosis other than malaria were excluded from the study.

3.3.2.2. Those who refused to consent were excluded from the study.

3.4 Sampling

3.4.1 Sampling procedure

Consecutive sampling was done till the required sample size was attained. The study population was recruited at the physicians' consultation office at the hospital.

3.4.2 Sample Size Determination

Using the Fisher's formula the minimum sample size was determined thus: (Fisher, 1960)

$N=Z^2PQ/d^2 = \frac{1.96^2 x\ 0.60\ x\ (1.0-0.60)}{0.05^2} = 369$

Where

N = the sample size required

Z = confidence level at 95% (standard value of 1.96)

P= estimated proportion of antimalarial drug use among patients in Kenya based on a study by Ruebush, *et al*., 1995 (60%).

Q= [100-p]

d=level of precision at 5%

10% of 369 were added on the minimum sample size to account for respondent biasness and incomplete filled questionnaires thus bringing the sample population to 406.

3.5 Data collection methods

The data collection tool was structured questionnaires. In addition to the patient interviews, pill identification and evaluation of previous anti-malarial drug packages was used to assess the anti-malarial drug history prior to health facility attendance for malaria treatment.

To ensure validity and reliability, the questionnaire was pre-tested on a sample of patients as a pilot at Motosiet Dispensary in Kitale. Appropriateness of drug use by patients before hospital attendance was determined using recommended dosage regimen from the Ministry of Public Health and Sanitation, National guidelines for treatment of malaria.

3.6 Data management and analysis

The completed questionnaires were examined and the information entered into a database by a single data entry clerk using SPSS, Version 12. Data analysis was performed using the same SPSS software. Descriptive statistics for different variables such as age, sex, education level, type drug, and source of drugs among others were computed; findings are summarized and presented in frequencies, percentages and charts. Two- tailed p-value were calculated to assess significance of results obtained. Level of significance was set at $P<0.05$.

3.7 Ethical considerations

Approval for scientific and ethical issues was sought from the KEMRI Scientific Steering Committee and National Ethical Review Committee respectively. Emphasis on issues of confidentiality and privacy were made clear at the time of consenting to participate in the study. The purpose of study was made clear to participants who were required to give informed consent prior to their voluntary participation in the study (see appendix i). Information was kept confidential by restricted access and coding of questionnaires. Kitale District Hospital authorities were notified of the study.

3.8 Limitations of the study

3.8.1. The study was conducted based on the responses given by interviewees and, therefore, was subject to recall bias.

3.8.2. The study was restricted to one site within the region and may, therefore, not fully represent the region as a whole but most likely to serve as a fair estimate of the situation in the region.

CHAPTER FOUR: RESULTS

4.1 Sociodemographic characteristics

4.1.1 Sex

Males constituted 51.7% (n=210) of the respondents as compared to women who constituted 48.3% (n=196) of the respondents.

4.1.2 Age

The majority of the respondents were those in the age bracket 20-29 who constituted 43.1% of the respondents (Figure 4.1). The second largest age group (30%) was the 30-39 age bracket.

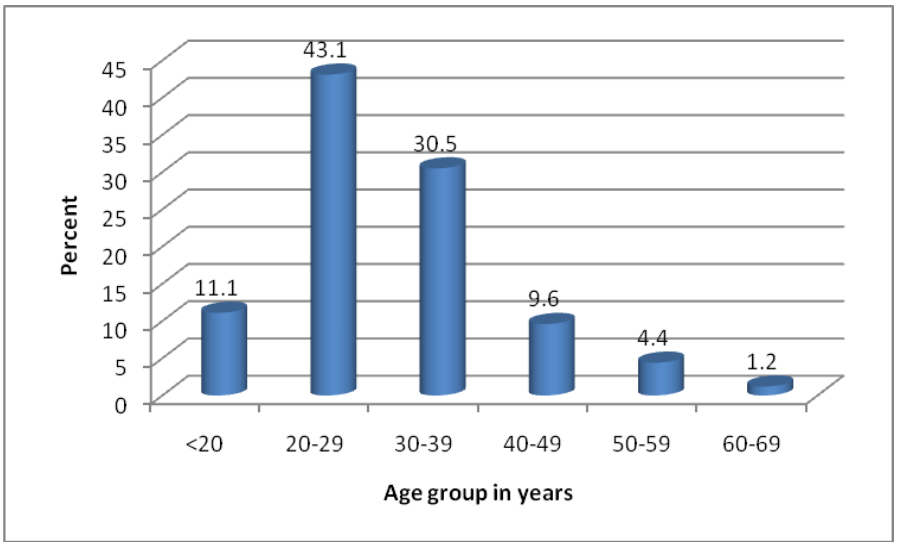


Figure 4.1: Age of respondents

4.1.3 Highest Level of Education

The majority of the respondents (93.8%) had attended school and attained different levels of education. Most respondents (53%) had attained secondary level of education, 24% had attained tertiary level of education while those with primary level of education constituted 17% (Figure 4.2). The level of education is expected to impact on the awareness about malaria and its treatment.

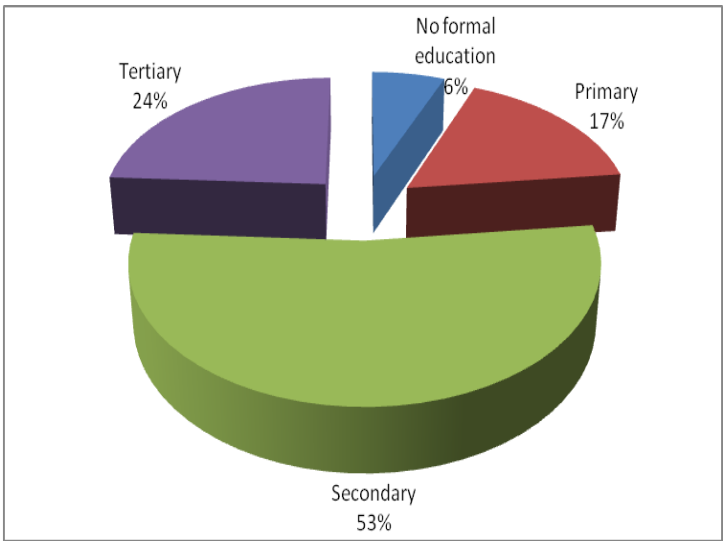


Figure 4. 2: Highest level of education

4.2 Fever and its management among respondents

4.2.1: Treatment seeking

Most of the respondents (57%) sought treatment for fever, as compared to 43% of the respondents who did not seek treatment for fever. Treatment seeking for fever did not differ significantly by level of education (P=0.59).

4.2.2: Source of advice for treatment of fever

Treatment for fever was sought from various sources. The most common source of advice for treatment of fever was the informal sector comprising of shops, pharmacy and

other sources such as herbal clinics accounted for 49% of the mentioned sources (Figure 4.3 and Table 4.1). Public health facilities comprising of government hospitals, government health centres and government dispensaries accounted for 36% of the mentioned sources. Faith based/private facilities including private doctors accounted for 15% of the said sources.

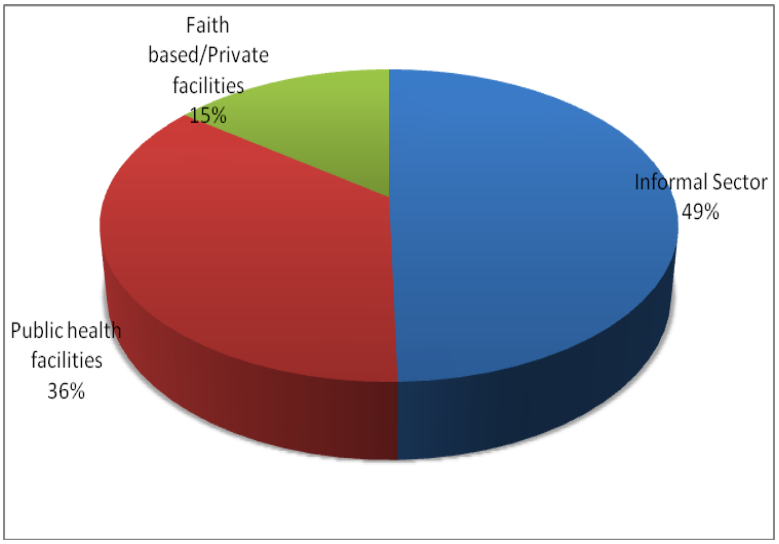


Figure 4.3: Source of advice for treatment of fever

There was significant difference by highest education level of respondents with regard to where treatment was sought ($P<0.05$). Amongst those respondents who sought treatment for fever, the informal sector was the most preferred source advice for treatment (64.7%) by respondents who had no formal education (Table 4.1).

Respondents with primary level of education preferred the public health facilities (47.2%) as their source of advice/ treatment for fever. General similarity was observed between the respondents with secondary and tertiary level of education with respect to public health facilities as their source of advice/treatment for fever (34.7% and 35.7% respectively). This trend was also observed within this group with respect to faith based/private health facility and the informal sector.

Table 4.1: Source of advice for treatment of fever by highest level of education

Highest level of education	**Where advice for treatment was sought**			
	Public health facility	**Faith based/ Private facility**	**Informal sector**	**Total**
No formal education	3 (17.6%)	3 (17.6%)	11(64.7%)	**17**
Primary	17 (47.2%)	7 (19.4%)	12 (33.3%)	**36**
Secondary	42 (34.7%)	16 (13.2%)	63 (52.1%)	**121**
Tertiary	20 (35.7%)	8 (14.3%)	28 (50%)	**56**
Total	**82 (35.7%)**	**34 (14.8%)**	**114 (49.6%)**	**230**

4.2.3: Duration of fever

Duration of fever before treatment was sought varied amongst the respondents. Most respondents (51%) sought treatment within 24 hours of fever onset (Figure 4.4). This decreased with duration of fever with few respondents (4%) seeking advice above 72 hours of fever onset.

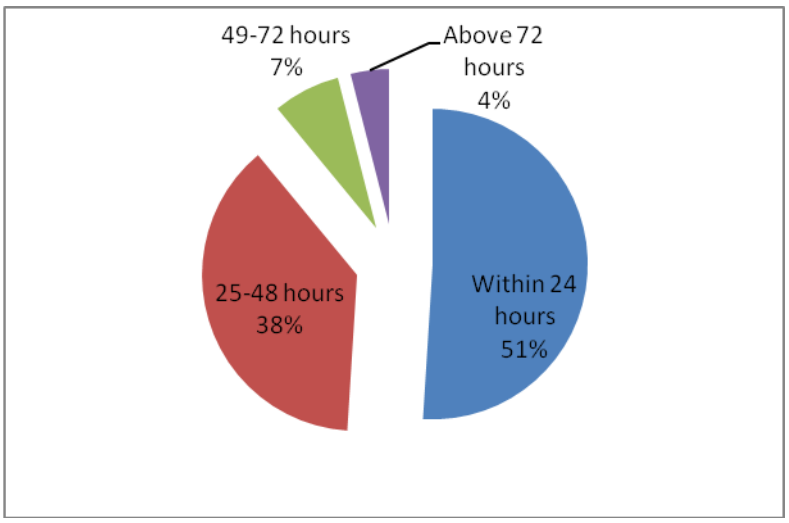


Figure 4.4: Duration of fever before treatment was sought

There was significant difference by level of education of respondents with regard to duration with fever before seeking treatment (P=0.04). Respondents with secondary level of education were more likely (55.4%) than others to receive treatment for fever before 24 hours (Table 4.2). Those who had not attended school of any kind were more

likely (58.8%) to seek treatment within 25- 48 hours of fever onset. Significant difference was also noted by age with regard to duration with fever before seeking treatment ($P<0.05$). Respondents below 20 years of age were more likely (85.6%) to seek advice within 24 hours (Table 4.3). No significant difference was noted by sex of respondents with regard to duration with fever before treatment was sought ($P=0.27$).

Table 4.2: Level of education by duration with fever before treatment was sought

Highest level of education	Duration with fever before advice/treatment was sought				
	Within 24 Hours	**25- 48 hours**	**49-72 hours**	**Above 72 hours**	**Total**
No formal education	4 (23.5%)	10 (58.8%)	3 (17.6%)	0 (0%)	**17**
Primary	19 (52.8%)	10 (27.8%)	5 (13.9%)	2 (5.6%)	**36**
Secondary	67 (55.4%)	42 (34.7%)	8 (6.6%)	4 (3.3%)	**121**
Tertiary	28 (50.9%)	24 (43.6%)	0 (0%)	4 (5.5%)	**56**
Total	**118 (51.5%)**	**86 (37.6%)**	**16 (7%)**	**9 (3.9%)**	**230**

Table 4.3: Respondents age by duration of fever before treatment was sought

Age	Duration with fever before treatment was sought				
	Within 24 hours	**25-48 hours**	**49-72 hours**	**Above 72 hours**	**Total**
<20	25 (89.3%)	2 (7.1%)	1 (3.6%)	0 (0%)	**28**
20-29	55 (56.1%)	34 (34.7%)	2 (2.0%)	7 (7.1%)	**98**
30-39	23 (34.8%)	34 (51.5%)	9 (13.6%)	0 (0%)	**66**
40-49	9 (34.6%)	11 (42.3%)	4 (15.4%)	2 (7.7%)	**26**
50-59	6 (66.7%)	3 (33.3%)	0 (0%)	0 (0%)	**9**
60-69	0 (0%)	3 (100%)	0 (0%)	0 (0%)	**3**
Total	**118 (51.5%)**	**86 (37.6%)**	**16 (7.0%)**	**9 (3.9%)**	**230**

4.3 Drugs used for fever management

Most of respondents (81%) reported to have used drugs of one kind or another for fever management before visiting the health facility.

4.3.1: Types of drugs used for treatment of malaria

Different types of drugs were used but the most commonly used ones were antimalarial drugs with Artemether lumefantrine being the common used drug (46%) (Figure 4.5).

SP (Fansidar®) and Amodiaquine were also reported to have been used and these accounted for 8% and 7% respectively, of the types of drugs used.

Other antimalarial drugs such as Sonaquin®, Homaquin® and Malaratab® were also reported to have been used and these accounted for 5% of the drugs used.

Antipyretics were also reported to have been used and within this category the most commonly used antipyretic was Paracetamol® (26%) followed by Ibuprofen® (8%).

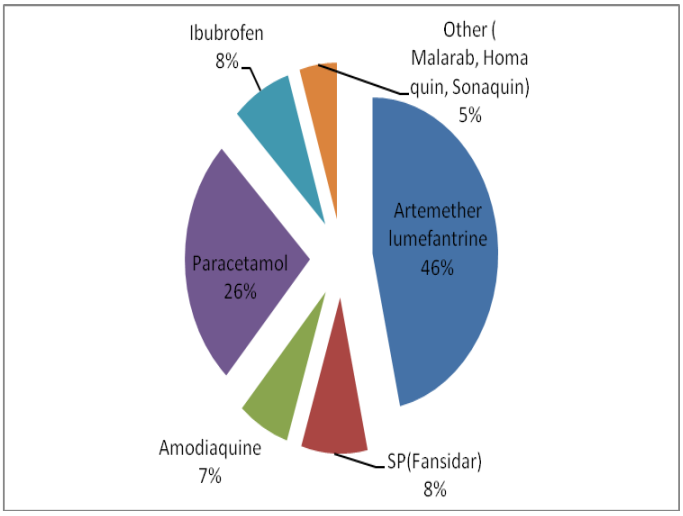


Figure 4.5: Type of drug taken for fever

The type of drug taken for fever did not differ significantly by highest education level of respondents (P=0.39). However, significant difference was noted by sex and of respondents (P=0.01).

4.3.2: Time taken to access to antimalarial drugs (AL)

Access to antimalarial drugs varied among the respondents. Of the 46% of the respondents who reported to have used AL only 42% of them accessed AL within 24 hours of fever onset (Figure 4.6). The highest proportion of respondents (45%) accessed AL within 25-48 hours. This, however, did not differ significantly by level of education of respondents (P=0.14).

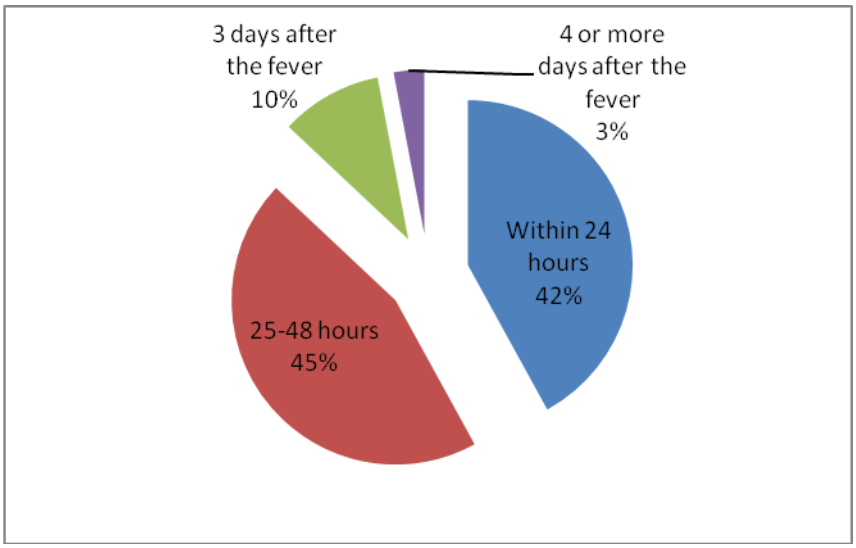


Figure 4.6: Duration taken with fever before Artemether lumefantrine was started

4.3.3 Adherence to correct dosage

Of the 46% respondents who reported to have used AL, 72% of them adhered to correct dosage of AL i.e. 3 days (Figure 4.7). While 22% of those who used AL took the drug for less than 3 days and 6% took it for more than 3 days. There was significant difference in adherence to dosage by age ($P<0.05$). Respondents under the age of 20 years and those within the 60-69 age group were more likely to take AL for more than 3 days (40% and 100% respectively) (Table 4.4). There was no significant difference in adherence to dosage by level of education of respondents ($P=0.55$).

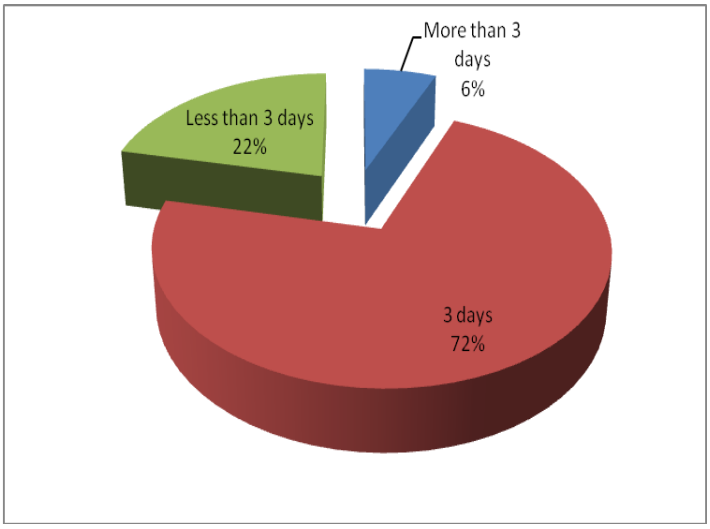


Figure 4.7: Adherence to correct dosage

Table 4.4: Age of respondents by days under which AL was taken

Age	Days under which AL was taken			
	<3 days	**3 days**	**>3 days**	**Total**
< 20	0 (0%)	3 (60%)	2 (40%)	**5**
20-29	4 (16%)	20 (80%)	1 (4%)	**25**
30-39	9 (28.1%)	22 (68.8%)	1 (3.1)	**32**
40-49	2 (14.3%)	12 (85.7%)	0 (0%)	**14**
50-59	2 (100%)	0 (0%)	0 (0%)	**2**
60-69	0 (0%)	0 (0%)	1 (100%)	**1**
Total	**17 (21.5%)**	**57 (72.2%)**	**5 (6.3%)**	**79 (100%)**

4.3.4 Source of Artemether Lumefantrine (AL)

Various sources of AL were mentioned, but public health facilities were the most common source (52%) (Figure 4.8). A quarter (26%) of the respondents who used this drug reported to have used left over medicines at home after previous treatments. Private health facilities accounted for 5%. Other specified sources such as community pharmacy and neighbor among others accounted for 17%. There was no significant difference in source of AL by level of education, sex or age of respondents.

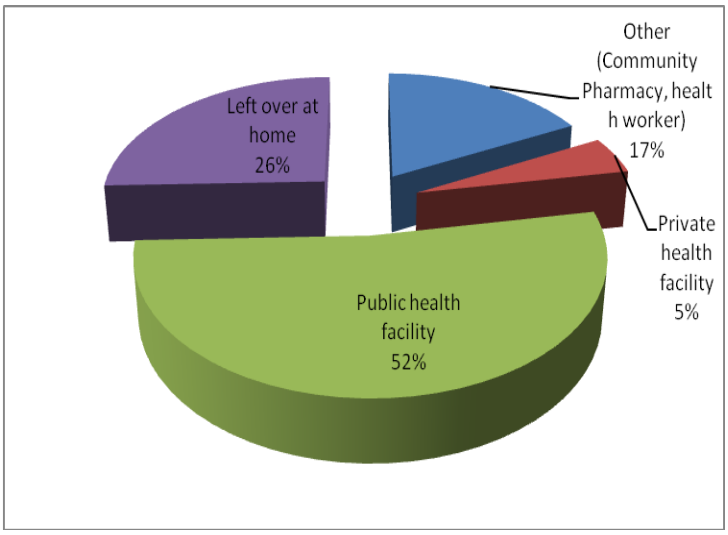


Figure 4.8: Source of Artemether lumefantrine

4.3.5 Source of other antimalarial drugs

The major source for other antimalarial drugs including SP/Fansidar and Amodiaquine was the shop (38%) (Figure 4.9). Other specified sources including community pharmacy and health workers in the community accounted for 34%. Having these drugs at home accounted for 28%. There was no significant difference in source of other antimalarial drugs by level of education, age or sex of respondents.

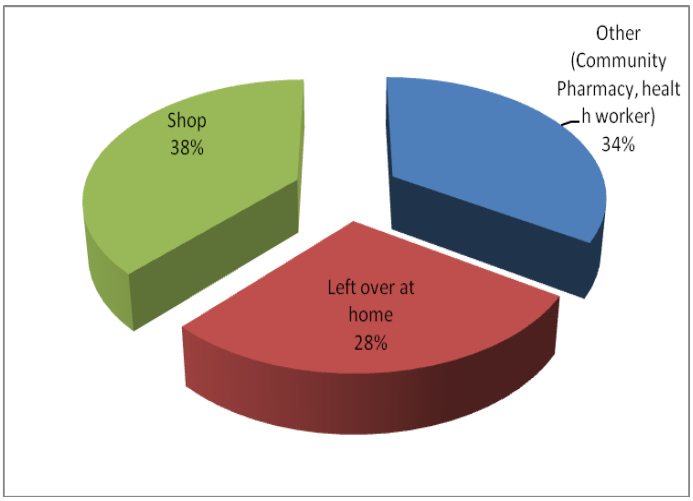


Figure 4.9: Source of other antimalarial drugs

4.4 Knowledge of AL

4.4.1 Awareness of AL

Only 19% of the respondents had knowledge of AL as the new antimalarial drug that the Ministry of Public Health and Sanitation is currently promoting (Figure 4.10). Some of the respondents singled out SP (Fansidar®) and Amodiaquine as the new drug that is being promoted but this was negligible (1%).

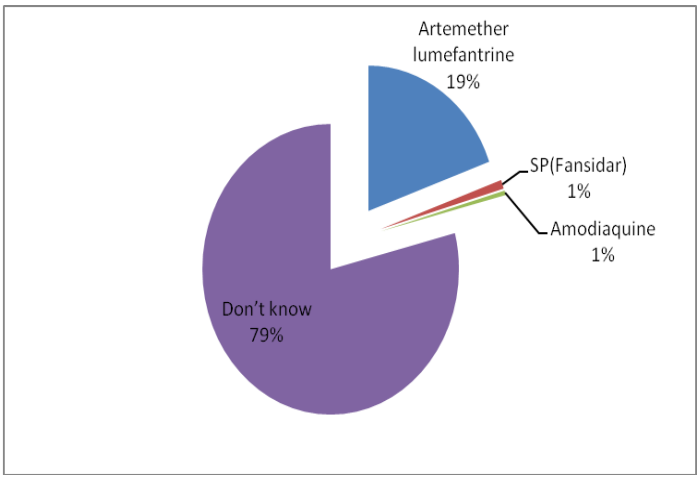


Figure 4.10: Awareness of name of new antimalarial drug

There was significant difference in knowledge of AL by level of education of respondents (P<0.05). As expected respondents with tertiary level of education were more informed (27.6%), followed by those with secondary level education (23.8%), then primary level respondents (1.4%) (Table 4.5). Respondents who did not attend school of any kind were the least informed as none of them could single out the name of the new drug. No significant difference was noted by either sex or age of respondents in knowledge of AL (P=0.49 and P=0.46 respectively.

Table 4.5: Name of the new antimalarial drug by level of education

Highest level of education	Name of the new antimalarial drug being promoted				
	Artemether lumefantrine	**SP (Fansidar®)**	**Amodiaquine**	**Don't know**	**Total**
No formal education	0 (0%)	1 (4%)	0 (0%)	24 (96%)	**25**
Primary	1 (1.4%)	0 (0%)	0 (0%)	68 (98.6%)	**69**
Secondary	51 (23.8%)	3 (1.4%)	0 (0%)	160 (74.8%)	**214**
Tertiary	27(27.6%)	0 (0%)	2 (2.0%)	69 (70.4%)	**98**
Total	**79 (19.5%)**	**4 (1%)**	**2 (0.5%)**	**321 (79.1%)**	**406**

4.4.2 Source of information on AL

Most of the respondents (62%) had neither seen nor heard information in relation to AL. The most common source of information on AL were health workers (66%) (Figure 4.11). These were followed by the media and this included Television, Radio and the Newspapers (14%), relatives/ friends to respondents had a 12.7% contribution. Other specified sources such as posters at the health facility accounted for 6.4% contribution. The least common source of information on AL were village barazas (0.6%).

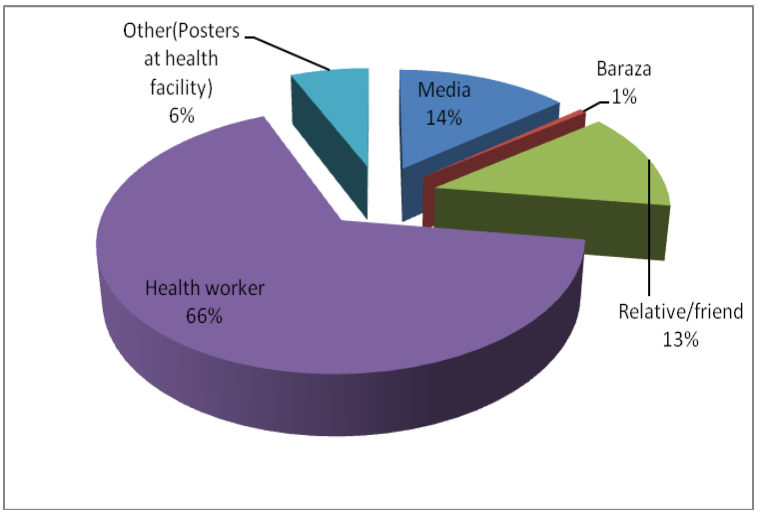


Figure 4.11: Source of information on AL

4.5 Knowledge of malaria

4.5.1 Symptoms of malaria

Various symptoms of malaria were mentioned by respondents but the most commonly reported symptom of malaria was fever (32%) (Figure 4.12). This was followed by loss of appetite (14%), then headache (12%) while the least common stated symptom for malaria was diarrhea (1.7%).

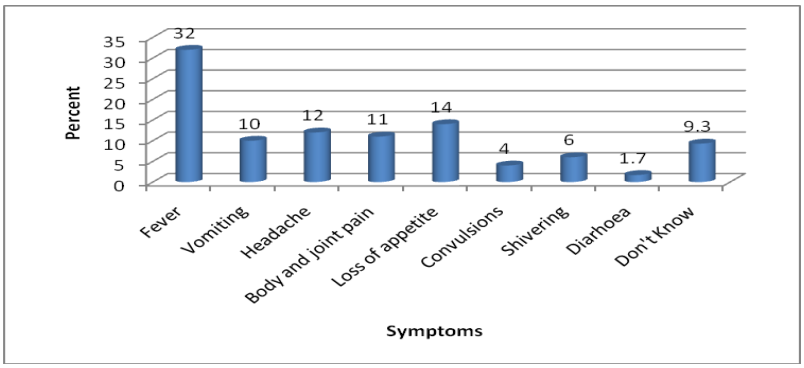


Figure 4.12: Symptoms of malaria

4.5.2 Danger signs

Severe vomiting was the most common reported danger sign (32%) that will make respondents go to the health facility immediately (Figure 4.13). This was followed by unconsciousness/difficult to arouse (17%). Convulsions accounted for 16% of the reported danger sign.

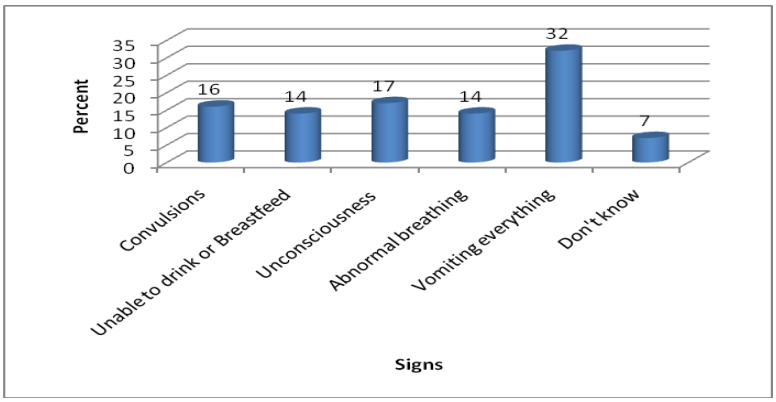


Figure 4.13: Danger signs for malaria

CHAPTER FIVE: DISCUSSION

5.1 Treatment seeking for malaria

Effective management of malaria requires the consumers and the care- givers, seek, obtain, and use drugs appropriately (WHO, 2004). This is linked to timely decision, accessibility, correct use of the drugs and follow-up after prescription. In this study, most respondents acted to manage malaria, including the use of antimalarial drugs at home (63.7%), and taking malaria patients to health facilities without home medication (18.5%). The findings agree with the results of studies carried out in Kenya, Togo, and Sri Lanka (Mwenesi, *et al*., 1995; Deming, *et al*., 1989; Ruebush, *et al*., 1995).

In the present study fever was correctly identified as the most common symptom of malaria. The study results reflected patients/ care-givers fairly good knowledge about malaria and its prevention. Furthermore, they identified that *vomiting of everything*, *loss of consciousness/difficult to arouse, convulsions, unable to drink/feed and abnormal breathing* were features if malaria episodes evolved into a more serious situation (severe malaria) and that requires urgent treatment at health facilities. These findings are consistent with similar studies carried out in Sri Lanka (Konradsen, *et al.*, 2000). In most rural communities, where people are familiar with the clinical manifestations and treatment of malaria, the first response to the illness is home treatment (Deressa, *et al*., 2003).

More than half of malaria cases sought advice within two days of onset of the illness. In a study in Sri Lanka, about 33% of patients sought treatment within two days of the onset of malaria; this was low compared with results of this study, in which about 67% sought treatment after two days (Jayawardene, 1993). This tendency to obtain home treatment before seeking care at a health facility has been observed in different studies (Deming, *et al*., 1989; Ruebush, *et al*., 1995, Hamel, *et al*., 2001). This makes it possible to suggest that self-treatment of malaria at home is widespread in the study area.

A variety of sources of advice for treatment of fever were mentioned in this study, a common practice in malaria endemic areas. In this study the major source of advice for treatment of fever was the informal facilities comprising of shops and traditional clinics, followed by public health facilities, faith/private facilities. A study in Philippine (Espino, 2000) showed availability of six treatment choices for families ranging from 'not doing anything for the patient' to 'treatment with drugs based on formal prescription'. Sources of health care identified in Uganda, included public health institutions, private practitioners, traditional healers and self treatment (Nuwaha, 2002). Commonly people start self medication at home with what is available (herbs, remaining drugs, drugs from shops, tepid sponging), when there is no response or if the condition deteriorates then they seek advice from health personnel. Medication at home before moving to health facilities was reported also in Tanzania (Tarimo, *et al*., 2000). A study in Kenya (Nyamongo, *et al*., 2002) showed that moving from different options determined by duration of sickness, its intensity and the expected cost. As stated by

others, the delay in seeking care at health facilities level was related to existence, accessibility, satisfaction (Nuwaha, 2002) and cost (Hill, *et al*., 2003) of service, as well as satisfaction with traditional medicine and herbs (Deressa, *et al*., 2003). This observation calls for a need to target consumers and providers on the importance of prompt treatment of malaria with effective antimalarial drugs.

A community-based intervention in northern Ethiopia, for example, used mother coordinators to provide home treatment of malaria and showed a 40% reduction in mortality in those aged <5 years (Kidane, *et al*., 2000). In addition, a community-based malaria control programme in the northern part of that same country, which used community health workers, had a good impact on morbidity and mortality (Ghebreyesus, *et al*., 2000).

5.2 Types of drugs and regimens used

In this study, the most commonly used antimalarial drug was AL (46%). However other antimalarial drugs that are no longer recommended such as SP (Fansidar®) and Amodiaquine were used in treatment of malaria. This observation is consisted with the findings of another study carried out in Mali (Abdoulaye, *et al.*, 1998). The widespread occurrence of Sulfadoxine -resistant P. falciparum in Kenya meant that the national antimalaria drug policy was revised in 2004 and AL was substituted for Sulfadoxine (MOH, 2006). AL is the drug recommended for the first-line treatment of uncomplicated falciparum malaria in Kenya and this explains why it was the most commonly used

antimalarial drug. In peripheral health services without laboratory facilities, AL is given to patients with signs and symptoms suggestive of malaria.

The reported use of conventional monotherapies raises issues of great concern. This is so, because, with the introduction of Artemether lumefantrine, these conventional monotherapies which had been rendered ineffective in the fight against malaria were abolished and a phase out plan was initiated in order to rid the market of these drugs (MOH, 2006). SP (Fansidar®) was the only drug retained for intermittent preventive therapy (MOH, 2006) and its presence in the market could at least be explained by this fact. The resistance of falciparum malaria to Sulfadoxine–Pyrimethamine and other conventional monotherapies is a concern for patients: those in whom conventional monotherapies are ineffective may rely on them without seeking alternative antimalarial drugs, which could delay early diagnosis and appropriate treatment (DOMC, 2006).

As much as Artemether lumefantrine was the most commonly used drug for treatment of malaria, access to this drug was delayed by more than 24 hours in majority of the respondents. This delay in seeking therapy may complicate the situation further and lead to severe malaria which is difficult to manage. Other antimalarial drugs were accessed within 24 hours. This disparity in access to antimalarial drugs could be explained by the fact that Artemether lumefantrine is not easily found in the informal sector because of its cost but other conventional monotherapies are always available in this sector. The informal sector is always the first place people go for advice/treatment because of their proximity as has been shown by this study and other studies elsewhere.

This calls for a need to intervene and target consumers directly bearing in mind their different levels of education with appropriate messages emphasizing on the importance to follow the right recommendations for treatment of malaria.

5.3 Source of antimalarial drugs

In this study, public health facilities were mentioned as major sources of AL (52%). This is likely to reflect modalities of AL implementation process in Kenya. During the process Artemether lumefantrine was supplied to government health facilities and they were to be given to patients free of charge or at a highly subsidized cost (DOMC, 2006). In the private sector, the cost of such a drug is high and this could explain why government facilities were the major source of this drug. Although, this was the case, the informal sector especially shops were also found to be a large source (38%) of antimalarials (conventional monotherapies). This agrees with a study in central Ethiopia which reported that 42.3% of patients used drug shops as a frequent source of antimalarial drugs (Yeneneh, *et al*., 1993); this higher use of drug shops as a source of antimalarials than that in this study could be because of ease of accessibility to such sources (Deressa, *et al*., 2003). Elsewhere in Kenya, mothers obtained antimalarials from pharmacies (54%) and small shops (29%) (Deressa, *et al*., 2003). Lack of access to formal health services, inadequate services (shortage of drugs and long waiting time), and the easy availability of over-the-counter treatments encourages the purchase of antimalarial drugs from unofficial sectors (WHO, 1998). Most medicines do not need

mandatory prescriptions in Kenya, and people obtain drugs freely at pharmacies and drug shops. More than half of the participants had bought antimalarial drugs from drug shops, markets, or any other shops at which prescription of drugs usually is not required. This suggests a common practice of self-treatment of malaria without prescription in the study population. This observation presents an important entry point for malaria control programmes in Kenya to ensure that drug distribution systems reflect public health policy and that the recommended treatment is available though all types of health care outlets used by the population. Efforts should be directed towards improving the availability of appropriate antimalarial drugs to communities in endemic rural areas.

5.4 Knowledge of AL

At the time of this study, respondents knowledge on AL as the new antimalarials drug was very low (19%), far much below the 60% target set by the government in 2006 (DOMC, 2006; Amin, *et al*., 2007). This may mean that the promotion campaign done in Trans-Nzoia District did not reach enough of the right target audience in some areas and Kitale is one such area. This is so because though nationwide implementation was started in 2006, three years down the line only a few people know about Artemether lumefantrine. Information dissemination also seemed to be ineffective, since only 38.2% of the respondents reported to have seen or heard information in relation to Artemether lumefantrine. This could be explained by the fact that the health workers were the major source of this information (66%) and this could mean that only people who had access

to them or utilized health services could get the information. Those who could not reach them could not get the information unless if it was through the media, barazas, relative/friend or other sources such as posters with information on the same.

5.5 Association between demographic characteristics and management of malaria

Educational level was found to be significantly associated with duration with fever before advice was sought, as well as with knowledge about antimalarials. Knowledge of antimalarial drugs increased with the level of education. This agrees with other studies done elsewhere in Africa, for example; In Tanzania, higher educational level was associated with promptness in seeking care from a health care provider (Tarimo, *et al.*, 1998) and with higher knowledge about antimalarial. In Malawi, higher educational level of the household was associated with attending a clinic (Slutsker, *et al*., 1994). In a comparison of two communities in Accra, Ghana, the poorer community with lower educational levels was more likely to engage in self-treatment (Biritwum and Welbeck, 2000).

Age of respondents was also found to be significantly associated with duration of fever before advice was sought ($P<0.05$). Indirect evidence that age of the patient may be related to self treatment comes from studies of health facility use. Studies done in other parts of Kenya found that younger children are more likely to taken to health facilities (Kaseje, *et al*., 1987; Slutsker, *et al*., 1994; Molyneux, *et al*., 1999), while a study of

mortality in Myanmar found that delays in being taken to a hospital were common for those older than 15 (Ejov, *et al*., 1999).

These observations call for a need for policy makers to use more diverse approaches with regard to promotion of antimalarial drugs, putting into consideration the various sociodemographic characteristics of the population.

CHAPTER SIX: CONCLUSION AND RECOMMENDATIONS

6.1 Conclusions

Treatment seeking behaviour for malaria was reported in majority of the respondents and about half of them sought treatment mainly from informal facilities such as shops rather than the recommended health care outlets, within 24 hours after the onset of fever. There was widespread use of antimalarial drugs in the community prior to hospital attendance with Artemether lumefantrine being the most commonly used antimalarial drug. Public health facilities were the major source of Artemether lumefantrine while the informal sector including leftover medicines at home were the major source of other antimalarial drugs. Awareness of the recommended drugs for treatment of malaria was low as only about one fifth (19%) had knowledge of AL as the recommended antimalarial drug. Educational level was significantly associated with management of malaria as well as with knowledge about antimalarials. Age was found to be significantly associated with duration with fever before treatment was sought, as well as with type of drug used for fever management.

6.2 Recommendations

6.2.1. There is need for public health campaigns by the Ministry of Public Health and Sanitation to seek improvement in health seeking behaviour by educating the public on the importance of prompt and effective management of malaria.

6.2.2. The Ministry of Public Health and Sanitation Health should continue educating the Public to encourage the use of recommended drugs for treatment of malaria. As a way of promoting the new antimalarial drug the Ministry should target the informal sector that is always frequented by people as a first source for advice for treatment of fever as has been shown by this study and other studies done elsewhere.

6.2.3. There is need for effective control of drug products in the community by the Ministry of Public Health and Sanitation. This should especially target the informal sectors that appear to have stocks of ineffective antimalarial drugs.

6.2.4. There is need for policy makers to use more diverse approaches with regard to promotion of antimalarial drugs, putting into consideration the various demographic characteristics of the population.

6.2.5. The study was restricted to one site within the region and may, therefore, not give a clear reflection of the situation. There is therefore, need to carry out studies on the same in the other regions of the country in order to get a clear picture on how the antimalarial drugs are being used.

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APPENDICES

APPENDIX 1: INFORMED CONSENT FORM

TITLE: **The use of antimalarial drugs prior to health facility attendance among patients at Kitale District Hospital, Kenya**.

Principal investigator: Emmanuel Musombi

Introduction:

Good morning /afternoon?

My name is Emmanuel Musombi and I am a student at the Jomo Kenyatta University of Agriculture and Technology (JKUAT), Institute of Tropical Medicine and Infectious Diseases (ITROMID) located in Kenya Medical Research Institute (KEMRI). I am here with my research to team conduct a study on the use of antimalarial drugs prior to health facility attendance among patients at Kitale District Hospital as part of my thesis. I would like to seek your permission, please read the consent form below. I would be very grateful if you will assist me by agreeing to be a volunteer in my study.

The purpose of the study

The purpose of this study is to: (a) determine the treatment seeking behaviour in respect to malaria among patients attending Kitale District Hospital (b) determine the types of

drugs and regimens used in the management of fever prior to facility attendance (c) establish the source of the drugs used (d) establish patients knowledge of antimalarial drugs and malaria. (e) determine the association between demographic characteristics and treatment of malaria.

The information you provide will therefore be of benefit to you and also aid in planning strategic intervention programmes which can alleviate inappropriate use of antimalarial drugs among patients in Kenya

Procedure

The purpose of this form is to obtain your consent to participate. If you choose to participate a questionnaire will be administered to you and the interview will take between 10 and 20 minutes to complete.

Participation is voluntary and you can choose not to answer any individual question or all of the questions. However, we hope you will participate in this interview since your views are important.

Benefits

There are no direct benefits to you by choosing to participate in this study. However, the results of this study will be communicated back to the health facility for necessary action by the health authority and to KEMRI who will also take action depending on the

outcome. The results will also be used in writing my thesis as part of requirements by the university.

The information you provide will therefore be of benefit to you and also aid in planning strategic intervention programmes which can alleviate inappropriate use of antimalarial drugs among patients in Kenya.

What are the risks of the study?

Apart from the inconveniences caused by taking part of your time, the process is safe and there are no risks involved. However, we will try as much as we can to make sure we safe on your time.

What about confidentiality?

All the information obtained will be strictly confidential and data password protected only accessed by the Principal investigator, participants in the study will be kept anonymous, being identified only by specific numbers assigned by the principal investigator.

Contact information

For any enquiries in the event of any research related questions, comments or complaints, the following persons will be available for contact:

Principal Investigator:

Emmanuel Musombi

Telephone: 0712 165 238

Email: emusombi@yahoo.com

Or

The Secretary,

National Ethical Review Committee

P.O. BOX 54840-00200 Nairobi

Tel: (254) (020) 2722541, 0722-205 901, 0733-400003

Email: info@kemri.org

At this point, do you want to ask me anything about the study?

Subject permission:

I, the undersigned have understood the above information which has been fully explained to me by the investigator. I have agreed to voluntarily consent to participate. I was given the chance to ask questions and I received satisfactory responses.

Name of Participant or respondent.....

Relation to the index child (in case of children).....

Signature.....Date.....

Signature of the person obtaining consent _____ Date _____

(Must be the investigator or individual who has been designated to obtain consent

APPENDIX 1: <u>Karatasi ya kufahamisha idhini</u>

Habari ya asubuhi/mchana?

Jina langu ni Emmanuel Musombi, mwanafunzi katika chuo kikuu cha Jomo Kenyatta kwa ushirikiano na Taasisi ya uchunguzi wa matibabu ya Kenya. Nikohapa na wenzangu kufanya utafiti kuhusu utumizi wa dawa za maleria kabla ya kufika hospitalini. Nakuomba idhini usome karatasi hili la kukufahamisha. Nitashukuru sana iwapo utanisaidia kwa kujitolea na kuwa mshiriki.

Madhumuni ya uchunguzi huu

Lengo la uchunguzi huu ni kupata habari kuhusu dawa zilizotumiwa kutibu maleria kabla ya kuenda hosipitalini, aina ya dawa iliyotumika, jinsi ilivyotumiwa na hatimaye kujua kuelewa kwako kwa maleria na aina ya dawa inayotumika kutibu. Maelezo utakayo tupa yatasaidia katika kupanga huduma za afya zitazolenga utumizi bora wa madawa za maleria. Vile vile matokeo hayo yatatumika kuandika tasinifu (thesis) ambayo inahitajika na chuo kikuu.

Taratibu za utafiti

Lengo la hii karatasi ni kukuomba idhini ya kushiriki. Iwapo utakubali kushiriki, basi nitajaza fomu ya maswali. Kikao kimoja cha mazungumzo nawe kitakuwa kati ya dakika kumi na ishirini kumalizika.

Kuhusika kwako katika mazungumzo haya ni kwa hiari na unaweza kukataa kujibu swali lolote lile utakalo chagua ama usijibu swali lolote. Hata hivyo, tunatumaini utashiriki kushiriki katika mradi huu kwa kuwa maoni yako ni muhimu.

Faida

Hakuna faida ya moja kwa moja utakayopata, hata hivyo majibu ya utafiti huu yatatumwa kwa wahusika wahosipitali hii wachukue hatua zifaazo. Faida nyingine ni kuwa, matokeo hayo yatasaidia sekta ya afya ikishirikiana na taasisi ya utafiti ya KEMRI katika kutengeneza mikakati itakayolenga utumizi bora wa madawa za maleria. Vile vile matokeo hayo yatatumika kuandika tasinifu (thesis) ambayo inahitajika na chuo kikuu.

Madhara

Mbali na kuchukua wakati wako, hakuna madhara mengine. Hata hivyo tutajaribu kutumia wakati vizuri ili tusichukue wakati wako mwingi.

Siri ya hali yako

Majibu ya utafiti huu yatawekwa kwa siri kuu. Mchunguzi mkuu ndiye pekee atakua na idhini. Hakuna jina litakalochapishwa popote hata baada ya uchunguzi kukamilika. Washiriki watajulikana kwa nambari za siri zitakazopeanwa na mchunguzi mkuu.

Gharama

Hakuna ada au gharama yoyote mshiriki atatozwa katika uchunguzi huu.

Haki zako kama mshiriki?

Kushiriki katika uchunguzi huu ni kwa hiari na mshiriki anaweza kujiondoa wakati wowote na mshiriki hatahujumu haki zake kwa kutia kidole kwenye stakabali hii.

Habari zaidi au maswali

Iwapo utakuwa na swali lolote kuhusu mradi huu linastahili kuelekezwa kwa wafuatao:

Mchunguzi mkuu:

Emmanuel Musombi

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Au

Kwa Karani,

National Ethical Review Committee

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Pepe: info@kemri.org

Je, ungependa kuuliza lolote kuhusu mradi huu?

Idhini ya mhusika

Mimi mhusika niliyetia sahihi hapa chini, nimeelewa habari yote iliyo hapo juu ambayo nimesoma na kuelelezwa na mtafiti. Nimekubali kwa hiari kuhusika katika mradi huu. Nilipewa nafasi ya kuuliza maswali na nikapata majibu yanayoridhisha.

Jina la mshiriki/ mhusika_____

Sahihi ya mshiriki_____tarehe_____

Sahihi ya mtu anayechukua idhini_____tarehe_____

Jina la mtu anayechukua idhini_____

(*Lazima awe mtafiti/mchunguzi ama mtu aliyepewa jukumu la kupewa idhini*)

APPENDIX 2: QUESTIONNAIRE

Section 1: Socio demographic data/Habari kuhusu muulizwa maswali

	QUESTIONS AND FILTERS/MASWALI NA MCHUJO	CODING CATEGORIES/AINA ZA KUANDIKISHA
101	Record the time/ Andika wakati	Hour/Saa ☐ Minutes/Dakika ☐
102	Sex of respondent/Jinsia ya anayehojiwa	Male/Mme ……..……..1 Female/ Mke …….……...…2
103	How old were you at your last birthday? Umri wako kutoka siku ya kusherehekea kuzaliwa kwako	Age in completed years Umri wa miaka kamili ☐ Ambayo umemaliza

		Don’t know/ Sijui ….……..…98
104	Have you ever attended school? Umewahi shiriki Shule?	Yes/ Ndio …….1 No/La……..…..2
105	What is the highest level of education you attended? Kiwango cha juu cha masomo?	Primary/ Msingi……1 Secondary/Upili……..…..2 Higher/ Juu ……..……3

Section 2: Fever in patients/Joto kwa wagonjwa

	QUESTIONS AND FILTERS/MASWALI NA MCHUJO	CODING CATEGORIES/AINA ZA KUANDIKISHA
201	How many days ago did fever start? If less 1 day record '00' Joto lilianza kwa siku ngapi zilizopita? Kama chini ya siku moja jaza '00'	Days ago/Siku zilizo pita ☐ Don't know/Sijui……...8
202	Did you seek advice or treatment for the fever from any source? Je ulitafuta ushauri ama ulitafuta dawa za joto kutoka kokote?	Yes/Ndio……...……...….1 No/La…….…....2 Skip to 204/ Ruka uende 204
203	Where did you seek advice or treatment? Anywhere else? Record all sources Je, ulitafuta huo ushauri au hizo dawa kutoka	**Public medical sector/ mashirika ya umma** Government hospital/ Hospitali ya serekali …….....…..1

	wapi? Kuna kwingine kokote? (Andika kote kunako tajwa)	Government health centre/ Kituo cha afya cha serekali …….……..2 Government dispensary/ Dispensari ya Serekali ….....…..3 Mobile clinic/ Kliniki za kuzungushwa …….……..……....4 Community health worker/ Wafanyikazi wa afya vijijini ……..…5 Other public (specify)/ Kwingine kwa Umma (taja) …….……..…6 Faith based facility (specify)/ Hospitali za kidini (taja ……..……..…….7 **Private medical sector/ Mashirika ya kibinafsi** Private hospital/clinic/ Hospitali/kliniki ya kibinafsi ……8 Pharmacy/ Duka la kuuza dawa ……9 Private doctor/ Dakitari wa kibinafsi

		……..……...…10 Mobile clinic/ Kliniki za Kuzungushwa……...…..11 Community health worker/ Wafanyikazi wa kiafya vijijini …..12 Other private medical (specify/ Hospitali zingine za kibinafsi (taja).....13 Red cross volunteer/ Mtu wa kujitolea wa msalaba mwekundu ……14 **Other source/ Kwingine Kokote** Shop/ Duka…….…….15 Traditional practitioner/ Daktari wa Kienyeji …….……..……16 Other (specify)/ Kwingine (taja)…..17

203 A	How many days after the fever begun did you first seek treatment? If same day record '00' Ulimaliza siku ngapi tangu joto lianze ndipo ukatafuta dawa? Kama siku hiyo hiyo jaza '00'	Days/ Siku ☐
204	Are you (name) still sick with fever? Je, bado una joto (jina)?	Yes/Ndio …….……1 No/La……..……..……..……2 Don't know/ Sijui…….……..…8
205	At anytime during the illness, did you (name) take any drugs for fever? Ulitumia dawa zozote ukiwa na joto?	Yes/Ndio ……..……...….1 No/La……...…...…….……..…2 Don't know/Sijui…….…..……8

206	What drugs did you (name) take? ASK TO SEE DRUG(S) IF TYPE OF DRUG IS NOT KNOWN. IF TYPE OF DRUG IS STILL NOT DETERMINED, SHOW TYPICAL ANTIMALARIAL DRUGS TO RESPONDENT. Ulitumia dawa gani? ULIZA UONYESHWE DAWA HIZO. KAMA AINA HIYO YA MADAWA HAIJULIKANI AMA KAMA AINA HIYO HAIEZI KUJULIKANA, MUONYESHE MUHOJIWA AINA YA MADAWA ZA MALERIA ITUMIKAYO	**ANTIMALARIAL/ MADAWA YA MALARIA** Al(Artemether lumefantrine)…….1 SP/fansidar…….2 Chloroquine……3 Amodiaquine……..……...4 Quinine……..……..…...5 Other antimalarial (specify)/ Mengine (taja)……6 **Other drugs/ Madawa mengine** Asprin……..……...……7 Acetaminophen/ paracetamol…..…..8 Ibuprofen……..…….…….9 Other (specify)/ mengine (taja)...….10 Don't know/Sijui……...……..11

207	Check 206 Any code 1-6 circled? Angalia 206 Yoyote kutoka 1 – 6 iliyowekwa mviringo?	 Yes/Ndio No/La
208	Check 206 Al (Artemether lumefantrine) (1) Given? Angalia 206 Al (Artemether lumefantrine) (1) Ndiyo aliyopewa?	Code '1' circled Code "1" not circled.
209	How long after the fever started did you (name)first take AL (Artemether lumefantrine)? Ni mda gani tangu joto kuanza ulipotumia AL (Artemether lumefantrine)?	Within 24 hours/ Ndani ya masaa 24……..…1 Within 48 hours/ Ndani ya Masaa 48…….....2 3days after the fever/ Baada ya siku 3 ……...…….3 4 or more days after fever/ Baada ya siku 4 au zaidi ……4

		Don't know/ Sijui……..…….....8
210	Have 3 or more days passed since treatment with AL (Artemether lumefantrine) was started? Je siku 3 zimepita tangu uanze kutumia AL (Artemether lumefantrine)?	Yes/Ndio…….…….…….1 No/La……...2 Go to 212 Enda 212

211	For how many days did you (name) take AL(Artemether Lumefantrine) 3 or more days record 3 Ulitumia AL (Artemether Lumefantrine) kwa siku ngapi? Kama siku 3 au zaidi jaza 3.	Days/Siku ☐ Don't know/Sijui……..…8
212	Did you have the AL (Artemether lumefantrine) at home or did you get it from somewhere else? IF SOMEWHERE ELSE, PROBE FOR SOURCE. IF MORE THAN ONE SOURCE MENTIONED, ASK: Where did you get AL first?	At home/Nyumbani…….……1 Government health facility/worker/… Kituo cha afya cha serekali/ mfanyikazi wa kituo hicho……2 Private health facility/worker/ Kituo cha afya cha kibinafsi/ mfanyikazi wa kituo hicho .....…..3

	Je ulikuwa na AL (Artemether lumefantrine) humo nyumbani ama ulipata toka kwingine? KAMA NI KUTOKA KWINGINE KOKOTE ULIZIA ILIKOTOKA. KAMA NI ZAIDI YA PAHALI PAMOJA, ULIZIA: JE HII AL ULIPATA WAPI KWANZA?	Shop/Duka…….……..…4 Red cross volunteer/ Mtu wa kujitolea wa msalaba mwekundu ……5 Other (specify)/ Kwingine (taja)……6 Don't know/Sijui……...…..8
213	What did you pay for the AL (Artemether lumefantrine)? Note price according to age band (Blue or Yellow?) Ulilipia nini dawa ya AL (Artemether lumefantrine)? Andika bei kulingana na rangi ya huo mstari(Samawati ama Njano)	Cost of Blue band/ Bei ya: Mstari wa Samawati ……. Yellow band/ Mstari wa njano……..
214	Check 206; Other antimalarial given Name of medicines	Code "2" to "6" circled ☐ "2" - "6" imeviringishwa

	Angalia 206; DAWA NYINGINE ZA MALERIA ALIZOPEWA Jina ya dawa hizo…….	
215	How long after the fever started did you (Name) first take (NAME OF OTHER ANTIMALARIAL)?	Within 24 hours/ Ndani ya masaa 24…….……..……1 Within 48 hours/ Ndani ya Masaa 48…….....….2 3days after the fever/ Baada ya siku 3 …….3 4 or more days after fever/ Baada ya siku 4 au zaidi ……..…4 Don't know/ Sijui……...……..8
216	For how many days did you (name) take (NAME OF OTHER ANTIMALARIAL)? IF 7 OR MORE DAYS, RECORD "7" Ulitumia (JINA LA DAWA NYINGINE YA MALERIA KWA SIKU NGAPI)?	Days/Siku ☐ Don't know/Sijui……..……8

	KAMA NI SIKU 7 AMA ZAIDI JAZA '7'	
217	Did you have the (NAME OF OTHER ANTIMALARIAL) at home or did you get it from somewhere else? IF SOME WHERE ELSE PROBE FOR SOURCE. IF MORETHAN ONE SOURCE MENTIONED, ASK: Where did you get the (NAME OF OTHER ANTIMALARIAL) first? Je hizi (JINA LA DAWA NYENGINE YA MALERIA) ulikuwa nazo nyumbani ama ulipata kutoka kwingine? KAMA NI KUTOKA KWINGINE KOKOTE ULIZIA ILIKOTOKA. KAMA NI ZAIDI YA PAHALI PAMOJA, ULIZIA: JE (JINA LA DAWA NYENGINE YA MALERIA) ULIPATA WAPI KWANZA?	At home/Nyumbani……..…..1 Government health facility/worker/… Kituo cha afya cha serekali/ mfanyikazi wa kituo hicho ……..…...……..…2 Private health facility/worker/ Kituo cha afya cha kibinafsi/ mfanyikazi wa kituo hicho ……....3 Shop/Duka…..…..…….…4 Red cross volunteer/ Mtu wa kujitolea wa msalaba mwekundu ……5 Other (specify)/ Kwingine (taja)..….6 Don't know/Sijui…….…..…....8

Section 3: Knowledge of ACT and malaria/ Kuelewa kuhusu ACT na malaria

	QUESTIONS AND FILTERS/ MASWALI NA MCHUJO	CODING CATEGORIES/AINA ZA KUANDIKISHA
301	What is the name of the new antimalarial drug that is being promoted by the ministry of Health? **Circle the response given**. Je, jina la dawa mpya ya malaria inayosisitizwa kutumika na Wizara ya Afya inaitwaje? **Viringa jibu ulilopewa**	Al (Artemether lumefantrine)……..…1 SP/fansidar…….…....2 Chloroquine…….…...3 Amodiaquine…….…….4 Quinine…….…..5 Other antimalarial (specify)/Ingine (taja).……..……..6
302	Have you seen or heard information in relation to AL (Artemether lumefantrine)? Umeisikia au kuoana habari kuhusu AL (Artemether lumefantrine)?	Yes/Ndiyo..……..1 No/La…….2

303	If, yes to the above what was the source of the information? **Circle the response given**. Kama ndio, habari hizo ulizipata wapi? **Viringa jibu ulilopewa**.	TV…….……1 Radio/Redio……...……2 Newspaper/ Gazeti……..…..3 Baraza……..….4 Relative/friend/ Rafiki/ Jamaa…..….5 Health worker/ Mfanyikazi wa kiafya ……...……...6 Community leader/elder/ Mzee wa Mtaa …….7 Community health worker/ Mfanyikazi wa afya vijijini ……..8 Red cross volunteer/ Mtu wa Kujitolea wa msalaba mwekundu …….…..9 Other (specify)/ Ingine (taja)…..……10
304	If you or anyone in your family has used AL (Artemether lumefantrine) where did	Pharmacies/chemists/ Duka ya Dawa …..……....1

	you receive the medication?	Government clinics/ Kliniki ya serekali ……..…….2 Other clinics/ Kliniki zinginezo ……..3 Red cross volunteer/ Mtu wa kujitolea wa Msalaba mwekundu ……4 Other source (specify)/ Ingine (taja)…….….5 Do not remember/ Sikumbuki…...….6
305	How can malaria be prevented? **DO NOT READ OUT**. **Circle the response given**. Unaezaje zuia maleria? **USISOME**. **Viringa Jibu Ulilopewa**	By sleeping under a net/ Kulala ndani ya neti ……..…1 Spraying the inside of the house with insecticide/ Kupuliza dawa ya mbu ndani ya nyumba ……..…...2 Use mosquito repellant/ Kutumia dawa za kufukuza mbu …….……3 Other (specify)/ Ingine (taja).…….....4

		Don't know/ Sijui ……..8
306	What are the symptoms of malaria? (Can circle more than one answer) **DO NOT READ OUT**. **Circle the response given.** Dalili za maleria ni zipi? (Unaeza viringa zaidi ya jibu moja) **USISOME**. **Viringa jibu ulilopewa.**	Fever/ Homa ……...…1 Sweating/ Kutokwa na jasho……2 Shivering/ Kutetemeka…..……..….3 Headache/ Kuumwa na kichwa…....4 Body/Joint pain/ Maumivu ya mwili/ viungo……..…….5 Mild cough/Kikohozi kidogo...…….6 sVomiting/ Kutapika…….……..7 Diarrhoea/Kuhara…….…….……8 Refusal to feed/loss of appetite/ Kukataa/Kukosa Hamu ya Chakula ……..…..……..9 Convulsions/Kupapatika/Kufitika ...10 Unconsciousness/ coma/ Kupoteza fahamu/Kuzimia……..…11

		Other (specify)/ Ingine (taja)...…....12 Don't know/Sijui…….……..13
307	What are the danger signs that will make you or your child with a fever go the health facility immediately? **DO NOT READ OUT**. **Circle the response given** Dalili gani hatari zinazowezafanya wewe au mtoto wako kutafuta matibabu ya haraka? **USISOME**. **Viringa jibu ulilopewa.**	Convulsions/fits/ Kupapatika/Kufitika ……...…..1 Unable to drink/Breastfeed/ Kutoeza kunywa/kunyonyesha …….2 Unconscious/difficult to arouse/ Kukosa Fahamu/kuwa na ugumu wa kuamuka …….3 Abnormal breathing/ Kupumua kusiko kwa kawaida ……..…….4 Vomits everything/ Kutapika kila kitu …….....……5 Other (Specify)/Ingine (taja)……..….6 Other (Specify)/Ingine (taja)……...7 Don't know/Sijui…….……8

308	Record the time Muda/Wakati	Hour/Saa…… Minutes/Dakika…….