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ACCESS AND UTILIZATION OF ARTEMETHER LUMEFANTRINE AS FIRST LINE NON-OVER THE COUNTER TREATMENT FOR MALARIA IN MASII DIVISION, MWALA DISTRICT, KENYA

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*Access and utilization
of artemether*




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DECLARATION

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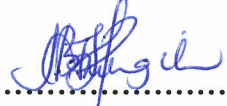
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DEDICATION

This thesis is dedicated to my wife Jane Mutio and parents; Joel Kioko and Monicah Mueni who constantly encouraged me to pursue my master degree and for their continued concern and support while in college.

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LIST OF ABBREVIATIONS AND ACRONYMS

- ACT** – Artemisinin-based Combination Therapy
- AL** – Artemether Lumefantrine
- CQ** - Chloroquine
- DC** – District Commissioner
- DMOH** – District Medical Officer of Health
- DO** – District Officer
- DPHO** – District Public Health Officer
- EIR** - Entomological Inoculation Rates
- FGDs** – Focused Group Discussions
- GOK** - Government of Kenya
- HH** - Household
- HMM** – Home Management of Malaria
- IQR** – Inter Quartile Range
- ITNs** – Insecticide Treated Nets
- KDHS** – Kenya Demographic and Health Survey
- KEMRI** – Kenya Medical Research Institute
- KNALS** - Kenya National Adult Literacy Survey
- LLINs** – Long Lasting Insecticidal Nets
- MOPH&S** –Ministry of Public Health and Sanitation
- OTC** – Over The Counter
- RBM** – Roll Back Malaria
- SP** – Sulphur Pyrimethamine based drugs

SPSS – Statistical Package for Social Scientists

URTIs – Upper Respiratory Tract Infections

USD – US Dollars

WHO – World Health Organization

OPERATIONAL DEFINITION OF TERMS

ACT - Artemisinin Based Combination therapies (ACTs) are treatments for uncomplicated falciparum malaria that combine several anti-malarial drugs, one of which is a derivative of artemisinin. The most common artemisinin derivatives used in ACT are artesunate and artemether. The drugs used in combination with the artemisinin derivative are called the **partner drugs** (mefloquine, lumefantrine, amodiaquine etc). ACTs are now accepted by the scientific community and the WHO as the best strategy for the treatment of *Plasmodium falciparum*.

RBM – the Roll Back Malaria (RBM) Partnership was launched in 1998 by a partnership of agencies to provide a coordinated global approach to fighting malaria. It includes malaria-endemic countries, their bilateral and multilateral development partners, the private sector, non-governmental and community-based organizations, foundations and research and academic institutions who bring a formidable assembly of expertise, infrastructure and funds to the fight against the disease.

Morbidity – refers to the number of individuals in poor health during a given time period (the incidence rate) or the number who currently have that disease (the prevalence rate), scaled to the size of the population.

Mortality – is a measure of the number of deaths (in general, or due to a specific cause) in some population, scaled to the size of that population, per unit time. Mortality rate is typically expressed in units of deaths per 1000 individuals per year; thus, a mortality rate

of 9.5 in a population of 100,000 would mean 950 deaths per year in that entire population.

Epidemicity – refers to the study of factors affecting the health and illness of populations, and serves as the foundation of interventions made in the interest of public health and preventive medicine. It is considered a cornerstone methodology of public health research, and is highly regarded in evidence-based medicine for identifying risk factors for disease and determining optimal treatment approaches to clinical practice.

Endemicity - refers to a disease or pathogen that is found in or confined to a particular location, region, or people. A disease that occurs regularly in a particular area, as malaria does in many tropical countries, is said to be endemic. The word endemic, built from the prefix en-, "in or within," and the Greek word demos, "people," means "within the people (of a region)." Endemic transmission may fall in any of the following categories;-

- i) **Holoendemic** - transmission occurs all year long
- ii) **Hyperendemic** - intense, but with periods of no transmission during dry season.
- iii) **Mesoendemic** - regular seasonal transmission
- iv) **Hypoendemic** - very intermittent transmission.

Non-over the Counter drug - this refers to drugs that cannot be purchased over the counter from shops or chemists without a prescription from a physician. In the context of this study it mainly refers to the current situation where by AL is not available in local

shops and are only being dispensed through health facilities or licensed pharmacies upon being prescribed by a physician.

First Line Treatment – A first-line treatment or first-line therapy is a medical therapy recommended for the initial treatment of a disease, sign or symptom, usually on the basis of empirical evidence for its efficacy. In the context of this study AL is the first line treatment for malaria in Kenya as from April 2006.

ABSTRACT

Prompt and appropriate case management has remained a major challenge in the fight against malaria in Kenya especially due to limited timely access to recommended drugs and development of resistance to drugs by malaria parasites among other reasons. As a result, Kenya changed from chloroquine to Sulphur-pyremethamine (SP) based drugs in late 90's and in April 2006 to Artemether Lumefantrine (AL) as the first line anti-malarial drug which is an Artemisinin based Combination Therapy (ACT). The main difference between the current first line treatment drug and the former ones is that it is restricted from being dispensed by shopkeepers at community level. Since the introduction of this drug in April 2006, no study has been conducted to establish levels of communities' timely access to the drug. This study therefore explored health seeking behaviour of selected residents of Masii Division, Mwala District in order to establish how this restriction affected timely access and utilization of AL for malaria treatment. A cross sectional study design was adopted and multi-stage sampling technique used. A total of 350 respondents who had suffered from malaria since October 2007 (for ease of recalling) were sampled and interviewed. Qualitative data was collected through Focus Group Discussion (FGDs) sessions and summarized in tables for report compilation while quantitative data was analyzed using SPSS computer package. Out of the sampled respondents, 86.6% took or administered drugs to children when they suffered from malaria. The drugs/ treatment substances were sourced from medical facilities (76.6%), chemists/ pharmacies 14%, shops 5.7%, traditional healers / herbalists 4.3%, prepared / used drug remains at home 2.3%, borrowed drugs from neighbors 0.6%, from both health facility and herbalists 0.6% while 6.3% took no action. Association between seeking treatment from health facilities and utilizing AL for malaria treatment had strong statistical significance. Out of the 303 people who used drugs only 8.9% (27) took AL and adhered to prescription. Of those respondents who visited health facilities, slightly less than half (41.4%) got all the anti-malarial drugs. Majority (77.1%) of the respondents reported to have at least one bed net in their households while the rest (22.9%) did not have. Access to health facilities was found to be average as 54.6% of the respondents took one hour or less to get to the nearest health facility. However, there was no statistically significant association between access to health facilities and utilization of AL for malaria treatment. Only 5.7% of respondents knew the correct first line treatment for malaria. Knowledge of AL as the first line treatment for malaria and its utilization for malaria treatment had statistically significant association. In conclusion access and utilization of AL for malaria treatment was very low in the area and malaria continues to pose a major challenge to the community. There is therefore need for extensive awareness creation on signs and symptoms of malaria and promotion of AL utilization for malaria treatment in the community. Further, integrated malaria prevention approaches need to be embraced for effective reduction of malaria burden as there is no single magic bullet.

CHAPTER I: INTRODUCTION

1.1 Background to the Study

Malaria, one of the world's most common and serious tropical diseases, causes at least one million deaths every year globally, the majority of which occur in the most resource-poor countries (Brinkmann *et al.*, 1991). The major malaria vectors in Kenya are female anopheles mosquitoes mainly members of *Anopheles. gambiae* complex and *An. funestus* (MOPH&S - DOMC, 2009). When a mosquito bites an infected person, it ingests the malaria parasites found in that person's blood. After about one week, the mosquito can spread the parasite to other people. There are four different species of parasites that cause malaria namely; *Plasmodium falciparum* (which is the most fatal and most common in Kenya), *P. vivax*, *P. malariae*, and *P. ovale* (Snow *et al.*, 1998).

More than half of the world's population is at risk of being infected by the disease, and the proportion increases each year because of deteriorating health systems, growing drug and insecticide resistance, climate change, natural disasters and armed conflict (WHO, 2005). According to (WHO 2006), an estimated 74% of the population in the African region lives in areas that are highly endemic for malaria and 19% in epidemic prone areas. Only 7% of the region's population lives in low risk or malaria-free areas.

To reduce the burden of malaria the following four core strategies are being implemented for control of malaria in Africa: Prompt access to effective treatment; Vector control: use of Insecticide Treated Nets (ITNs), Indoor Residual Spraying (IRS) and other locally appropriate means of vector control; Early detection and response to malaria epidemics;

and; Prevention and treatment of malaria in pregnant women in highly endemic areas (WHO, 2006)

According to a report by WHO (2005), Malaria case management has posed a challenge over time due to a variety of factors ranging from drug resistance, non-compliance to prescription, delayed seeking of treatment, wrong prescription or low efficacy drugs among other factors. The inappropriate use of anti-malarial drugs has contributed to the development of resistance by the parasites (Schapira, 1989). Chloroquine (CQ) was used for treatment of malaria in Kenya since the 1950's. The first case of chloroquine resistant malaria was reported in a tourist visiting Kenya in 1979 while the first case of indigenous CQ resistant malaria was reported in an infant in Kisumu in 1983. Between 1983 and 1991, 21 studies of CQ efficacy were conducted in Kenya. Eleven of the 21 studies showed parasitological failure of above 25% of all patients (WHO, 2001). The national drug policy was changed in 1998 to introduce the sulfadoxine pyrimethamine (SP) drugs for treatment of malaria which later faced a similar parasitological resistance and were replaced by Artemether Lumefantrine (an ACT) in 2008 as the first line treatment for malaria (Kangwana *et al.*, 2008). WHO recommends that all countries experiencing malaria cases that are resistant to conventional therapies use combination therapies (WHO, 2001).

Overall, the disease accounts for 10% of Africa's disease burden, and it is estimated that the disease costs the continent more than \$12 billion annually. Approximately 60% of all cases of malaria have been found to occur among the poorest 20% of the world's population (WHO, 2005). The situation seems not to be changing as the WHO (2006) report indicates the disease accounts for 50% of outpatient cases and

20% of admissions in health facilities in Africa. Household surveys conducted in 28 African countries showed that an average of 42% of children under 5 years with fever were treated with an anti-malarial. However, more than 80% of these reported treatments were with chloroquine, hence the coverage with effective treatment is likely to have been much lower. In addition, many treatments may not have been within 24 hours of onset of symptoms, and similarly, dosages could have been inadequate (WHO, 2003).

In 2003, a cross sectional survey carried out in Kenya (MOH) established that 27.9% of the children under the age of five years had fever or convulsions which were related to malaria. Out of these cases only 20% took an anti-malarial drug the same or next day with only 6% taking Sulphur Pyremethamine (SP) drugs the then recommended first line treatment for malaria (MOH, 2003). Care givers for children are major providers of anti-malarial treatment. Caregivers are mainly mothers to children and in few circumstances grandmothers and other close relatives/ household members. Home treatment practices should be strengthened and endorsed when prompt treatment at a health facility is impossible (Mbagaya *et al.*, 1998).

1.2 Problem Statement

Prompt and appropriate case management is emphasized as one of the continental Roll Back Malaria Strategies set out in Abuja in 2000, which has not yet been realized in Kenya. This has been mainly due to limited and delayed access to recommended anti-malarial drugs amongst suspected cases of malaria. Similarly, the resistance of malaria parasite to anti-malaria drugs has been a challenge of particular concern in the fight against the disease in the recent past. Inappropriate use of drugs has been largely attributed to the drug resistance phenomenon (WHO, 2006). This has caused transition

from chloroquine to Sulphur Pyremethamine based drugs and presently Artemether Lumefantrine as first line treatment for malaria. With the introduction of the latter drug which is a non-over the counter drug (restricted from selling in shops) unlike all other former first line anti-malarial drugs, the challenge of access is even expected to be greater than it was in the past.

This restrictive policy for AL contradicts the documented health seeking behaviors in Kenya, for instance Kenya Medical Research Institute (2008), reported that over the Counter (OTC) medicines were the most popular first response to fever in children with fever (47.0%) and adults with acute illnesses (56.8%) in coastal region of Kenya. Further MOPH&S (2008 – 2009) reported that only 4% of children under five used AL same day or next day while 8 % took amodiaquine which was neither a first line nor second line treatment for malaria. This is indicative of deteriorating rates of access to the correct first line treatment for malaria.

The already low levels of access and utilization are likely to be compounded by the fact that the current first line treatment is a non-over the counter drug. This study therefore, aimed to establish how these policy regulations of AL could be impacting on its access and utilization in communities. To investigate this developing trend, Masii division was chosen because of malaria endemicity in the area for the investigator to get rich and varied practices and challenges in the community that could be generalized in other areas to help increase access to AL for malaria patients once the access and utilization patterns of the drug are determined in Masii Division.

1.3 Justification

Malaria tops the list of the most prevalent diseases in the country besides being a major cause of school absenteeism among other economic losses associated with malaria. According to a report by the Ministry of Health - Division of Malaria Control (2004), over 34,000 children under the age of 5 years die annually from malaria while over 70% of Kenyan population is at risk of malaria infection. Another report (MOH 2007), indicated that child mortality had been reduced to about 26,000 deaths annually through the enhanced mass ITN distribution by the government. Kenya has performed well in ITNs / LLINs coverage through free distribution by MOH although statistics on the coverage are scanty. Prompt malaria case management remains a major challenge which requires quick redress to ensure suspected malaria cases access appropriate treatment within the recommended 24 hours (WHO, 2004) from the time of onset of fever. Poor levels of access and utilization are some of the factors which could be responsible for the quick development of resistance to drugs by malaria parasites.

For Artemether Lumefantrine to stand the test of time and be effective in malaria case management there was a need to investigate the levels of timely access and its utilization practices. The findings of the study helped to identify the appropriate interventions which could be instituted to ensure increased timely access and appropriate utilization of AL for effective case management.

1.4 Research Questions

1. What drugs / substances are used to treat symptoms of malaria in Masii Division and what are their sources?

2. What proportion of suspected malaria cases in the community access Artemether Lumefantrine for treatment and what proportion comply with the prescription?
3. What proportion of the community practice malaria prevention and control measures?
4. How effective are the Primary Health Care facilities in the management of malaria?

1.5 Null Hypotheses

1. Access to and utilization of Artemether Lumefantrine by suspected malaria cases is not related to health seeking behavior, distance to health facilities or knowledge on the recommended first line treatment
2. Practice of malaria prevention measures is not related in any way to utilization of AL

1.6 Objectives

1.6.1 General Objective

To determine the level of access and utilization of Artemether Lumefantrine as a first line non-over the counter drug for the treatment of malaria in Masii Division of Mwala District

1.6.2 Specific Objectives

1. To identify the commonly used drugs or substances for treatment of malaria in Masii Division and their sources

2. To determine the proportion of the community's malaria cases that access Artemether Lumefantrine for treatment and the proportion that complies with prescription
3. To determine the proportion of the community practicing some measures for prevention and control of malaria.
4. To establish the effectiveness of Primary Health Care facilities in management of malaria in Masii Division

1.7 Delimitation and Limitation

Gathering of factual information on drugs used and compliance to dosage was a challenge as the data was collected retrospectively on treatment measures that were taken some time back when one was suspected to suffer from malaria. The respondents relied on recall which may not have been very accurate in a few cases. However, the information given by respondents was treated as accurate and the questions had to be simplified to make it easy to infer compliance from the responses given. Identification of the first line drug was enhanced through provision of sample drugs for respondents to confirm whether they are the ones they had taken. Use of preventive measures particularly ITNS / LLINS was further confirmed through observation.

1.8 Assumptions

The study was conducted on the assumption that respondents could at least remember when they or their children suffered from malaria last and the action that they took. It was assumed that with assorted samples of drugs, it was easier for the respondents to identify precisely the drugs that they took when they last suffered from malaria. This study was

conducted in a malaria endemic area on the assumption that rich information on access and utilization of AL by the community could be collected from such an area with persistent high prevalence of malaria.

CHAPTER II: LITERATURE REVIEW

2.1 Cause, Transmission and Vulnerability to Malaria

Malaria is spread through the bite of a mosquito. When a mosquito bites an infected person, it ingests the malaria parasites found in that person's blood. After about one week, the mosquito can spread the parasite to other people. Like all mosquitoes, anophelines go through four stages in their life cycle: egg, larva, pupa, and adult. The first three stages are aquatic and last 5-14 days, depending on the species and the ambient temperature. The adult stage is when the female *Anopheles* mosquito acts as malaria vector. The adult females can live up to a month (or more in captivity) but most probably do not live more than 1-2 weeks in nature (McAllister *et al.*, 1998). However, malaria can also be spread through transfusion of infected blood or by sharing of a needle with an infected person.

Most transmissions are through female anopheles mosquito. There are four different species of parasites that cause malaria. They are the *Plasmodium falciparum* (which is the most fatal), *P. vivax*, *P. malariae*, and *P. ovale*. After a bite from an infected mosquito, the parasite enters the person's blood stream and travels to the liver where it grows and multiplies. During this time when the parasite is in the liver, there are no visible symptoms and the victim doesn't feel sick. The parasites may stay in the liver for a period as short as 8 days or as long as several months to years. After it leaves the liver, it enters red blood cells and continues to grow and multiply. The red blood cells burst, freeing the parasites to attack other red blood cells. It is during this time that symptoms of malaria may begin to surface (Snow *et al.*, 1998). Anyone living or

traveling to an area of the world where malaria is more commonly transmitted can get this disease. Malaria is more common in tropical climates, such as central and South America, Haiti and Dominican Republic, Africa, the Indian subcontinent, Southeast Asia, the middle East, and Oceania. The disease is considered endemic to these regions, which means it is native to, or naturally occurs in these areas (WHO, 2003).

Young children are always at higher risk of malaria as they have not yet developed even partial immunity, but the risks for a malnourished child are greater. In the first place, severe malnutrition masks the signs of malaria, so an unwary clinician may be falsely reassured by the lack of fever or other signs of malaria. In pregnancy, women lose any immunity to malaria that they built up during childhood. This is particularly the case in first and second pregnancies, but continues into later pregnancies in women who are HIV positive. The malaria parasite favours the placenta, causing increased anaemia, low birth weight and the risk of premature labour. In high transmission areas it does not necessarily cause any acute illness in the woman, so it is important to use every opportunity to identify pregnant women, test them for malaria parasites and treat with ACT if positive (Christa, 2005).

2.2 Malaria Endemicity

The level of endemicity of malaria in Kenya varies from region to region and there is a big diversity in risk of malaria infection largely determined by climate and temperature which are generally influenced by the altitude (Hay *et al.*, 1998). Based on malaria risk, the districts in Kenya were categorized by Snow *et al.*, (1998) and the Ministry of Public Health & Sanitation – Division of Malaria Control (2009), into one of four classes based

on ecology namely: endemic malaria districts, highland/ epidemic prone areas malaria districts, arid malaria and low risk malaria districts.

Endemic Malaria Areas

In endemic malaria areas malaria transmission is common throughout the year, immunity is acquired by the community before adulthood and the risks of disease and death from malaria are concentrated amongst children and pregnant women. These areas can show marked seasonality in transmission co-incidental with the rains. There is little variation between years in the burden of malaria. Endemic Districts in Kenya include: Kilifi , Kwale, Lamu, Mombasa, Taita Taveta, Malindi, Homa Bay, Kisumu, Migori, Siaya, Bondo, Kuria, Nyando, Suba, Rachuonyo, Bungoma, Busia, Mount Elgon, Teso, Baringo, Kajiado, Koibatek, Keiyo, Marakwet, Kirinyaga, Muranga, Maragua, Machakos, Makeni, South Meru, Tharaka, North Meru, Mbeere (Snow *et al.*, 1998).

Highland Malaria / Epidemic prone Areas

Highland Malaria is the second category which has a common feature that whilst there is always a potential for limited transmission lending itself to an overall low disease risk on an average year, variations in rainfall and ambient temperatures between years can lead to epidemics affecting all members of the community. These epidemics are relatively frequent events occurring every 3-5 years. Unlike the endemic areas, communities in highland malaria areas do not acquire immunity and all people are vulnerable during epidemics. Highland Malaria Districts include; Kisii Central, Kisii North, Gucha, Kakamega, Vihiga, Lugari/Malava, Butere/Mumias, Bomet, Kericho, Nandi, Trans Nzoia, Uasin Gishu, West Pokot, Trans Mara, Buret (Snow *et al.*, 1998).

Arid Malaria Areas / Seasonal Malaria Transmission Areas

Arid Malaria (epidemic prone) is the third category which occurs in areas that are traditionally unable to support the breeding of malaria vectors except around either man-made water bodies or perennial rivers. Consequently malaria infection risks are extremely low, locally acquired clinical disease is rare and the population do not develop immunity. However, unusual rainfall and flooding in these areas can lead to severe epidemic crisis conditions which although rare can lead to devastating levels of disease and death among the entire population. Arid Malaria Districts include Tana River, Samburu, Turkana, Isiolo, Marsabit, Moyale, Kitui, Mwingi, Garissa, Mandera, Wajir (MOPH&S, 2009)

Low Risk Malaria Areas

Low risk Malaria Districts is the fourth category; It is hard to categorise any area of Kenya as having absolutely no risk for two reasons: a) The potential for transmission can always occur with favourable climate conditions for the vector and the parasite b) People frequently travel between areas, acquire infections elsewhere and require clinical management in the "usual" place of residence. Nevertheless some districts could be classified as exceptionally low risk of acquiring infection and would not constitute high priority areas for the promotion of personal protection or malaria prevention interventions. Low risk Districts include; Kiambu, Nyandarua, Thika, Laikipia, Narok, Embu, Central Meru (Snow *et al.*, 1998).

2.3 Components of Effective Malaria Case Management

The Roll Back Malaria Partnership recognizes several essential components for effective case management using the recommended combination treatments. In addition to

appropriate drug choice, these components include: improved drug distribution and financing systems, drug quality assurance, diagnostics, and monitoring and evaluation of policy implementation. The RBM Partnership, therefore, defines “access to drugs” broadly to encompass key activities, at global and country levels, that will result in the proper implementation and utilization of efficacious drugs (WHO, 2003).

2.4 Malaria Chemotherapy

Three main factors determine treatments: the infecting species of *Plasmodium* parasite, the physiological situation of the patient (for example, adult, child, or pregnant female with either mild or severe malaria), and the drug susceptibility of the infecting parasites. Drug susceptibility is determined by the geographic area where the infection was acquired. Different areas of the world have malaria types that are resistant to certain medications. The correct drugs for each type of malaria must be prescribed by a doctor who is familiar with malaria treatment protocols. Since people infected with *P. falciparum* can die (often because of delayed treatment), immediate treatment for *P. falciparum* malaria is necessary. Mild malaria can be treated with oral medication while severe malaria requires intravenous (IV) drug treatment and fluids in the hospital (Acad, 1981).

Chloroquine phosphate (Aralen) is the drug of choice for all malarial parasites except for chloroquine-resistant *Plasmodium* strains. Although almost all strains of *P. malariae* are susceptible to chloroquine, *P. falciparum*, *P. vivax*, and even some *P. ovale* strains have been reported as resistant to chloroquine. There are, however, multiple drug-treatment protocols for treatment of drug-resistant *Plasmodium* strains. Treatment is

usually based on the majority of *Plasmodium* species diagnosed and its general drug-resistance pattern for the country or world region where the patient became infested. For example, *P. falciparum* acquired in the Middle East countries is usually susceptible to chloroquine, but if it's acquired in sub-Saharan African countries, it's usually resistant to chloroquine (www.medicinenet.com). The WHO's treatment policy, recently established in 2006, is to treat all cases of uncomplicated *P. falciparum* malaria with artemisinin-derived combination therapy (ACTs). (Acad, 1981). Malaria can be cured with prescription drugs. The type of drugs and length of treatment depend on the kind of malaria is diagnosed, where the patient was infected, the age of the patient, and how severely ill the patient was at start of treatment.

2.5 Malaria Drugs Resistance

Although there are several different treatments for malaria, widespread resistance of malaria parasites to conventional anti-malarial drugs has contributed to increasing morbidity and mortality (Hasifa *et al.*, 2006). Multidrug-resistant malaria is now prevalent in many parts of the world, with the highest rate of drug resistance reported in Southeast Asia. The inappropriate use of anti-malarial drugs especially under-dosing has contributed to the current situation (WHO, 2005). The first case of chloroquine (CQ) resistant malaria was reported in a tourist visiting Kenya in 1979 while the first case of indigenous CQ resistant malaria was reported in an infant in Kisumu in 1983. Between 1983 and 1991, 21 studies of CQ efficacy were conducted in Kenya. The results during this period suggested that between 1.9% and 96% of patients were unable to clear parasitaemia by day 7 and 11 of the 21 studies carried out showed parasitological failure of above 25% in all the patients (WHO, 2005). Chloroquine was used to treat

uncomplicated malaria infections in Kenya from the 1950s until the national drug policy was changed in 1998 when SP based drugs were introduced as first line treatment for malaria (Nabiswa *et al.*, 1994).

The widespread failure of chloroquine and sulfadoxine pyrimethamine (SP) in the treatment of malaria in Africa during the late 1990s resulted in a turbulent public health debate, which led to universal acceptance that monotherapies that failed to cure up to one in four patients should be replaced by the highly efficacious artemisinin-based combination therapy (ACT) (Kangwana *et al.*, 2008).

Over the past decade, a new group of anti-malarials, the artemisinin compounds have begun being used in combination with other drugs and on an increasingly large scale (Alfredo *et al.*, 2007). As a response to increasing levels of anti-malarial resistance, WHO recommends that all countries experiencing malaria cases that are resistant to conventional therapies use combination therapies (WHO, 2001). In 1998 Kenya changed from Chloroquine to SP based drugs as first line treatment for uncomplicated malaria and then to AL in 2006 which is Artemisinin based Combination Therapy following the development of resistance by malaria parasites.

2.6 Availability and Utilization of ACT in Kenya

The availability of essential anti-malarial medicines at primary care facilities is an indication of the functionality of a health system (Obinna, 2008). Two years after introduction of AL in Kenya in April 2006, a cross-sectional survey to investigate AL availability in government facilities was conducted. From August 18 through October 2, 2008, 164 facilities were assessed in seven districts in Nyanza, Western, and Coast Provinces, that were highly endemic for malaria. At each facility, information was

collected on the availability of AL packs for the four patient weight groups (<15kg; 15 to 25kg; 25 to 35kg; and above 35kg) either through direct review of stock cards or through phone interviews. Health workers were also asked what they prescribed in the absence of AL (Kangwana *et al.*, 2008).

A quarter (25.6%) of the surveyed facilities had none of the four AL weight-specific treatment packs in stock and complete stock outs were 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 the facilities. The median duration of stock-outs was substantial, ranging from 35 days for the 12-tablet pack to 52 for the 24-tablet pack. Of the facilities out of stock of all packs, they had been in this state for a median of 52 days. Health workers were asked what they prescribed if AL were out of stock and some gave more than one suggestion. Of the 195 alternative prescriptions specified, 26.2% were quinine, 25.6% were amodiaquine, 24.6% were SP, and the remaining 23.6% were recommendations for patients to seek various combinations of drugs from the private market including ACTs and artemisinin monotherapies. The frequency of AL stockouts was greater than those documented in 2007, when only 5% of facilities had none of the four packs in stock (Kangwana *et al.*, 2008).

According to MOPH&S - KDHS (2009) only 4 percent of children under five took ACT, and 2 percent took SP/Fansidar on the same day or the next day after the onset of the fever. A sizable proportion of children still are being given amodiaquine (8 percent) for treatment of fever, though it is neither a first- nor a second-line drug.

2.7 Use of ACT in Zanzibar, South Africa and Tanzania

Zanzibar implemented artemisinin-based combination therapy (ACT) for uncomplicated malaria in late 2003 and long-lasting insecticidal nets (LLINs) from early 2006. ACT is provided free of charge to all malaria patients, while LLINs are distributed free to children under age 5 years and pregnant women (Achuyt *et al.*, 2006).

Following deployment of ACT, malaria-associated illness (outpatient malaria diagnosis) decreased by 77% and overall deaths in children decreased to about half in Zanzibar within two years of the introduction of ACT. Free distribution of LLINs from early 2006 to children under five produced a further significant reduction in parasite prevalence in this age group and a smaller but also important reduction in parasite prevalence in older children. Because these results only showed short-term trends in the malaria burden associated with the introduction of these control strategies, they need confirmation in longer studies. These results strongly suggest that ACTs together with the widespread use of LLINs could help achieve the goal of eliminating malaria as a public-health problem in sub-Saharan Africa, provided the poor countries in this region can sustain these control strategies over the long term (Achuyt *et al.*, 2006).

Between 1995 and 2000, KwaZulu–Natal province, South Africa, experienced a marked increase in *Plasmodium falciparum* malaria, fuelled by pyrethroid and sulfadoxine-pyrimethamine resistance. In response, vector control was strengthened and artemether-lumefantrine (AL) was deployed in the first Ministry of Health artemisinin-based combination treatment policy in Africa (Barnes *et al.*, 2005). In the year following improved vector control and implementation of AL treatment, malaria-related admissions and deaths both declined by 89%, and outpatient visits decreased by 85% at the sentinel

facilities. By 2003, malaria-related outpatient cases and admissions had fallen by 99%, and malaria-related deaths had decreased by 97%. There was a concomitant marked and sustained decline in notified malaria throughout the province (Barnes *et al.*, 2005). No serious adverse events were associated causally with AL treatment in an active sentinel pharmacovigilance survey. In a prospective study, AL cured 97/98 (99%) and prevented gametocyte developing in all patients. Together with concurrent strengthening of vector control measures, the anti-malarial treatment policy change to AL in KwaZulu-Natal contributed to a marked and sustained decrease in malaria cases, admissions, and deaths, by greatly improving clinical and parasitological cure rates and reducing gametocyte carriage (Hill *et al.*, 1996).

A study was conducted on the actual drug and non-drug costs associated with deploying ACT in one district in Tanzania, and data generated was used to estimate the nationwide costs of implementation in a setting where identification of malaria cases was primarily dependant on clinical diagnosis (Mulligan *et al.*, 2008).

The costs of implementing ACT were substantial. Although drug purchases constituted the highest proportion (72.8%) of the total costs, non-drug costs were also over a quarter (31.4%) of the total cost. These findings imply that substantial external resources would be required to facilitate and sustain effective ACT delivery across Tanzania and other malaria-endemic countries (Mulligan *et al.*, 2008).

2.8 Health Care Seeking Practices in Kenyan Communities

Human health seeking behavior, which is the action people take when dealing with an illness, is influenced by a multiplicity of factors. Some of these factors are predisposing characteristics such as age, gender, occupation, education and other enabling factors such

as proximity to the health facility, health insurance, income and existence of social networks (Mbagaya *et al.*, 1998).

According to a study conducted in Kenya in which female care givers provided information on 314 febrile children under 5 years of age, it was found that 23% received care at a health facility while 47% received an anti-malarial drug at home. Of the anti-malarial treatments given at home, 91% were started by the second day of fever and 92% were with chloroquine, the nationally recommended anti-malarial at the time (1996). Practices of preventive measures were low as only 5% of children under 5 years of age slept under a bed net the night preceding the date of the study. No bed nets had been treated with insecticide since purchase. At least two antenatal visits were made by 91% of pregnant women (MOH - KDHS, 1998)

In a cross-sectional study conducted to investigate health seeking behaviours between November 1997 and December 1998 in 12 villages of Isongo Sub-location, East Wanga (Shibinga) Location, Mumias Division of Kakamega District, Western Province of Kenya, it was revealed that children suffer from a number of ailments particularly fever, which is a symptom commonly associated with malaria. In this study, most mothers did nothing as their first response to the symptom of illness experienced by their children regardless of perceived severity. The study concluded that care givers took action only when the illness progressed and children were unable to eat or play (Mbagaya *et al.*, 1998). It is important to note that the decision to seek help was most often precipitated by the impairment of the child's daily activities or fear of severity. Mothers in this study, purchased over the counter drugs for their sick children. The findings of this study are an indication that, households seem to have shifted from making use of professional medical

services, a situation which is dangerous for the general health of the population and therefore worth giving proper attention. This is because some types of illnesses diagnosed by households may turn out to be different from what is diagnosed by a qualified medical practitioner. The findings of this study indicate that other enabling factors such as proximity to the health facility and availability of funds were also important in determining health-seeking behavior. Whereas a few mothers cited unavailability of funds and long distance to the health center as reasons for alternative health seeking behaviour, these issues require further exploration before definite conclusions can be drawn (Mbagaya *et.al.*, 1998). Similar findings on health seeking behaviour have been reported in another study (MOH - KDHS, 2003), where only 11% of children under five with fever during the previous two weeks had received SP, the then recommended first line treatment for malaria, of which 10% took it the same or the following day.

According to Sumba *et.al.*, (2008), in a study conducted to assess treatment-seeking behaviour for malaria in the highland area of Kipsamoite in Rift Valley Province, Kenya, the findings indicated that the most frequent initial sources of treatment for malaria in adults and children were medical facilities (66.0% and 66.7% respectively) and local shops (19.0% and 30.3% respectively). According to the same author adults and children who initially visited a medical facility for treatment were significantly more likely to recover and required no further treatment than those who initially went to a local shop (adults, 84.9% v. 36.8%, and children, 79.6% v. 40.0%, respectively).

A significant proportion of this highland population chose local shops for initial malaria treatment and received inappropriate medication at these local shops, resulting in delay of effective treatment. It was concluded that education of the shop attendants had the

potential to be a component of prevention or containment strategies for malaria epidemics in highland areas.

2.9 Home Treatment for Malaria in Kenya and Africa

The global consensus that access to prompt and effective treatment should be a key element of the RBM strategy is based on the widespread recognition that untreated falciparum malaria contributes both directly and indirectly to the death of non-immune individuals, sometimes within hours of the onset of symptoms. Prompt, effective treatment of malaria and appropriate management of clinical complications would be life-saving (WHO, 2003). Household survey conducted in 28 African countries in 2005 showed that an average of 42% of children under 5 years with fever were treated with an antimalarial. However, more than 80% of the reported treatments were with chloroquine, so the coverage with effective treatment was likely to have been much lower. In addition, many treatments may not have been within 24 hours of onset of symptoms, and dosages may have been inadequate (WHO, 2003).

The achievement of the Abuja target of 60% coverage with prompt and effective anti-malarial treatment will require more effective methods to improve delivery and compliance with recommended regimens. Measures will include full integration of malaria treatment into national health systems, improving access to effective drugs for treatment as close to the home as possible, and engaging the private sector (WHO, 2005). Prompt access to effective treatment is central in the fight against malaria. However, a variety of interlinked factors at household and health system level influence access to timely and appropriate treatment and care. Furthermore, access may be influenced by global and national health policies. As a consequence, many malaria episodes in highly

endemic countries are not treated appropriately (WHO, 2005). The Kenya National Nutrition Survey report, (MOH, 1994) regarding health seeking behaviour indicated that the proportion of the population that visited health centers/dispensaries and other medical institutions consisted of a mere 21% whereas 73.9% bought drugs from the pharmacy and retail shops that stocked the drugs and 5% took no action or visited the traditional healer .

2.10 Access and Utilization of Drugs in Kenya and Other African Countries

A survey was carried out in the coastal region of Kenya (KEMRI, 2006) where a total of 12, 445 households were visited and data on illness collected from 11, 505 children and 19, 914 adults. It was found out that, Over the Counter (OTC) medicines were the most popular first response to treating fever in children (47.0%) and adults with acute illnesses (56.8%). Although the majority of children and adults sought no further treatment, self-referral to a health facility within 72 hours of illness onset was the commonest pattern amongst those seeking further help. In these surveys, OTC medicines were popular first treatments for fever in children or acute illnesses in adults. In all districts, adults were more likely to self-treat themselves with OTC anti-malarial medicines than febrile children, and adults were less likely to adhere to the recommended dosage compared to children. Government health centers were the second most common choice for treatment and were often used within 72 hours (Greg *et al.*, 2006).

According to a university of Kuopio of Finland publication, (2008), forty three percent (43%) of the respondent interviewed in a survey conducted in Uganda had taken anti-malarial drugs within two weeks prior to hospital attendance. The sources of these medicines were licensed chemical sellers (50%), shops (21%), neighboring clinics (9%) or "other" sources (20%) including left-over medicines at home. One hundred and sixty

three which translates into (77%) of the 213 patients who had used anti-malarial drugs prior to attending the health facilities used the drugs inappropriately hence adherence to dosage was very poor (Adome *et al.*, 1996). Similar findings are contained in a study conducted by Kwame Nkurumah University (KNU) in Ghana which reported that although national and international efforts to combat malaria have intensified over the years, problems with availability, distribution, and choice of anti-malarials at medicine outlets in Africa continue to exist. According to this indicator-based assessment of availability and choice of anti-malarials at 130 licensed medicine outlets in Ghana, anti-malarials recommended in the policy were not readily available in the most accessible medicine outlets. Few outlets adhered to the policy when choosing anti-malarials. One of the conclusions of this assessment was that interventions targeting medicine outlets should be initiated to improve availability and access to effective medicines in order to support the national program for malaria control (Kwame Nkurumah University, 2008)

Several initiatives have attempted to address access to health care questions in Tanzania either by strengthening home-based management, by improving the involvement of commercial drug providers or through a general improvement of health system performance. Several models for improving case-management in health facilities were tested in a health care access programme in rural Tanzania (Manuel *et al.*, 2008). It was reported that combined approaches were found to have the most sustainable impact (Heidi *et al.*, 2007). Additionally it was reported that information and education of caretakers and care providers in this programme were found to be useful in improving malaria case management and compliance at home and in drug selling shops. The programme summed up by reporting that, considering the complexity of the issues

involved in promoting access to health care it seemed obvious that there was no such thing as a single "magic bullet" approach in solving the low health care access problem. What was needed is a comprehensive concept addressing several of the access dimensions, ranging from availability and affordability to accessibility, acceptability and quality of care (Hetzel *et al.*, 2007).

2.11 Integrated Approach for Malaria Prevention

Malaria prevention interventions vary from those that target vector reduction to case management to avoid transmission of parasites to other uninfected people (Okech *et al.*, 2008). During an entomological survey in preparation for malaria control interventions in Mwea Division, the number of malaria cases at the Kimbimbi sub-district hospital was in a steady decline. Over the last 4 years prior to this study, the malaria cases in the community hospital had reduced from about 40% in 2000 to less than 10% by 2004 and by the year 2007 malaria cases decreased to zero. In addition, a one time cross-sectional malaria parasite survey conducted in 2007 detected no *Plasmodium* infection in 300 primary school children in the area. Mosquito vector populations were variable in the six villages but were generally lower in villages that did not engage in irrigation activities. The malaria risk as estimated by entomological inoculation rates (EIR) remained low and varied by village and proximity to irrigation areas. The average EIR in the area was estimated at 0.011 infectious bites per person per day (Okech *et al.*, 2008).

The study concluded that usage of a combination of malaria control tools in an integrated fashion by residents of Mwea division might have influenced the decreased malaria cases in the district hospital and in the school children. A vigorous campaign emphasizing Integrated Malaria Management (IMM) should be adopted and expanded in Mwea

division and in other areas with different eco-epidemiological patterns of malaria transmission. With sustained implementation and support from community members integrated malaria management can reduce malaria significantly in affected communities in Africa (Okech *et al.*, 2008).

2.12 Effectiveness of Long Lasting Insecticidal Nets (LLINs) and ACT in Malaria prevention/ Control

An increasing number of malaria-endemic African countries are rapidly scaling up malaria prevention and treatment (Mac *et al.*, 2009). To have an initial estimate of the impact of these efforts, time trends in health facility records were evaluated in selected districts in Ethiopia and Rwanda, where long-lasting insecticidal nets (LLIN) and artemisinin-based combination therapy (ACT) had been distributed nationwide by 2007. The results indicated that in-patient malaria cases and deaths in children < 5 years old in Rwanda fell by 55% and 67%, respectively, and in Ethiopia by 73% and 62%. Over this same time period, non-malaria cases and deaths generally remained stable or increased. Initial evidence indicated that the combination of mass distribution of LLIN to all children < 5 years or all households and nationwide distribution of ACT in the public sector was associated with substantial declines of in-patient malaria cases and deaths in Rwanda and Ethiopia. Clinic-based data was a useful tool for monitoring of the impact of malaria programmes (Otten *et al.*, 2009).

Over all, the trend from the literature review is that of health facilities which are ill equipped to provide the recommended first line treatment for malaria. This is even complicated by poor health seeking behaviours among Kenyan communities, though

studies show that there is improvement towards seeking treatment from health facilities where AL is available. Proportions of malaria cases accessing AL for malaria treatment are still very low approximately five years into implementation of the new malaria treatment policy.

CHAPTER III: MATERIALS AND METHODS

3.1 Research Design

A cross sectional study design was adopted to collect information from the study population in Masii Division. This was the most appropriate method for establishing the general management practices for suspected malaria cases in the target community through interviewing a wide range of respondents who were sampled in such a way that they were representative of the entire population in the study area. —

3.2 Variables

Independent Variables

Age – this refers to chronological age in years and was measured through interviewing or checking registration documents.

Sex – this involved finding out whether the respondent was male or female and was done through observation

Level of Education – this refers to the highest grade of education attained; primary, secondary, tertiary or university. This was established through interviews and checking documents

Religion – this refers to religious affiliation such as Christian (catholic or protestant), Muslim or traditionalists. This was established through interviews

Malaria case – this refers to any individual who was diagnosed by a health worker either clinically or through blood test or any person who experienced malaria signs and / or symptoms particularly fever, joint pains and general malaise. According to national

malaria policies clinical diagnosis mainly presence of fever was acceptable at the time of study as confirmation of malaria case warranting administration of anti-malarial drugs

Dependent Variables

Recognition of malaria – this refers to the number of signs / symptoms of malaria the respondent could identify accurately. This was established through interviews. The number of correct responses given by each respondent were used to rank their levels of awareness.

Last malaria infection – this refers to the most recent episode when the respondent or care giver's child experienced signs / symptoms of malaria. This was established through interviewing respondents or care givers.

First site for treatment – this refers to where the respondent sought treatment for malaria first. This was established through interviews.

Appropriateness and promptness of treatment- this refers to whether the drugs taken to treat malaria were the recommended ones (AL) and whether they were taken in the right dosages and within 24 hours of onset of signs / symptoms. This was established through interviews.

Choice of drug / substances and source – this refers to the first choice of drug / substance that was taken by the respondent or child upon experiencing signs / symptoms of malaria regardless of whether they were ACT or any other drug presumed by the respondent to be curative for malaria. The source of the drugs/ substance used by respondents was established through interviews.

Reasons for choice of treatment sites – this refers to reasons which made a respondent seek treatment first from other sites other than health facilities

Adherence to prescription – this refers to whether the respondent / child took the drugs as prescribed (for 3 days). This was established through interviews to establish if the number of tablets taken and duration corresponded with the dosage requirements for AL (for 3 days).

Effectiveness of Health facilities in malaria management – this refers to whether the health facilities had the required drugs and whether provision of services to patients was friendly.

Preventive practices – this refers to whether the respondent / child slept under an ITN every night or practiced any other malaria prevention measure.

3.3 Study Area

The study was conducted in Masii Division of Mwala District, Kenya. Mwala District was carved out of the larger Machakos District in 2007 and is located along Machakos – Kitui highway. Masii Division covers 481.5 Km² with a population of approximately 95,000 people (Machakos District Development Plan, 2006). It lies within latitudes 0⁰ 45' south to 1⁰ 31' south and longitudes 36⁰ 45' east to 37⁰ 45' east. The district enjoys a relatively warm climate varying from highland equatorial to semi-arid on the plains. The topography of the district is varied and rises from 700m above sea level on the southern part to 1,700m above sea level in the west. A huge proportion of the district is semi-arid and receives very little and erratic rainfall. There are two distinct rainy seasons. The long rains fall between March and May while the short ones fall between October and December. The annual rainfall varies from 500 – 1300mm with high altitude areas

receiving more rains than low-lying areas. The rainfall is however very unreliable and varies from year to year making it very difficult for farmers to plan their farming activities thus affecting both livestock and agricultural production.

The temperatures also vary with altitude. The mean monthly temperature varies from 12⁰C in the coldest months (July – August) to 30⁰ in the hottest months (February and October). Small scale farming is the main economic activity in the District with few farmers practicing livestock farming (Machakos District Development Plan, 2006).

Masii Division consists of five Locations namely; Masii, Makutano, Mango, Vyulya and Muthetheni. Three of these Locations were sampled randomly for this study and were Masii, Makutano and Mango. Fifteen villages were sampled randomly from these three Locations and respondents were drawn depending on the comparative population proportions in the three Locations.

This area is categorized as being endemic for malaria (Snow *et al.*, 1998) and was therefore seen as a suitable area where rich information regarding malaria case management practices in rural setting in the country could be gathered.

3.4 Study Population

The study targeted men and women above the age of 16 years in Masii Division who fitted the inclusion criteria and they responded on their behalf or on behalf of young children who they took care of. The respondents were drawn from the three randomly sampled Locations (Masii, Makutano and Mango) using multi-stage sampling technique. Consent was sought from parents for sampled respondents who were between 16 and 18 years.

3.5 Inclusion Criteria

Eligible respondents included consenting adults from 16 years age and above from within the study area who had suffered from malaria within the past twelve months from the date of the study (from October 2007 to the date of study). Malaria cases included those who were diagnosed either clinically or through blood tests by health workers and those who had experienced signs and / symptoms of malaria and felt that they were suffering from the disease. Care givers of children who had suffered from or experienced signs / symptoms of malaria during the same period were also included. Care givers responded on behalf of the children in cases where both the care giver and the child had suffered from malaria almost at the same time while in cases where more than one of the children suffered from malaria almost at the same time, the care giver responded on behalf of the youngest child.

3.6 Exclusion Criteria

The study excluded non consenting respondents, individuals who had suffered from malaria before October 2007 and children below 16 years old whose care givers were not available to respond.

3.7 Sample Size Determination

The sample size was determined using the formula shown below as used by Fisher *et al.* (1998);

$$n = \frac{Z^2 p(1-p)}{d^2}$$

n – Desired minimum sample size (where population > 10,000)

z – Standard normal deviation which is 1.960 at 95% confidence level

p – Population parameter (proportion of the largest population estimated to have a particular characteristic being measured) – in this case malaria prevalence was 30% (0.3)

d – Degrees of accuracy desired for the study (standard error) - 0.05

$$\frac{1.96^2 \cdot 0.3(0.7)}{0.05^2} = \frac{0.8067}{0.0025} = 323 \text{ respondents}$$

Therefore the minimum sample size required for the study was **323**. A sample of 350 was taken to strengthen representativeness and take care of any dropouts from the study.

3.8 Sampling Techniques

Sampling was carried out using multi-stage technique. The Division was clustered into its constituent five locations. Three Locations were sampled randomly after allocating them numbers then shuffling and picking three numbers randomly. Sampled locations were further clustered into their constituent sub-locations and further into constituent villages. Villages that were involved in the study were sampled using simple random sampling technique as applied for sampling the Locations. The number of respondents drawn from each location and village was proportionate to population size.

Sampling of respondents started from the centre of each of the sampled village. The direction taken was determined randomly through spinning a pen and then sampling of the respondents started from the direction which the tip pointed at. The first respondent was sampled from the third household in that direction and each subsequent third HH was sampled in that direction until the intended number of respondents was achieved or the interviewer reached the edge of the village. If no one had suffered from malaria in the sampled HH for the period under review the next nearest HH was sampled. Once the

interviewers reached the edge of the village in one direction, they went back to the centre of the village and moved towards the opposite direction until the intended sample size was achieved. Only one respondent from each HH sampled was interviewed with the assumption that his/her responses reflected the general practices in that HH. Care givers for children under the age of 16 years responded on behalf of their child who had suffered from malaria most recently in a household.

3.9 Research Instruments

Instruments for data collection included structured questionnaires for sampled respondents and key informants as well as structured focus group discussion guides.

Structured questionnaires were the main tools for data collection from sampled HHs. The questions were both open-ended and closed-ended. The questionnaires were administered to sampled respondents by the researcher and research assistants who marked/ wrote the responses given on the questionnaire. A focused group discussion guide was developed with the questions that guided the groups that were assembled for FGD sessions. Structured questionnaires were developed key informants including the District Medical Officer of Health, District Public Health Officer and health facility in-charges.

3.10 Pilot Study

A pilot study was conducted in Vyulya Location of Masii Division and this is a Location which had not been sampled for the study. The Location was similar to the study area in all aspects as it is adjacent to the locations that were sampled hence it gave a true picture on the feasibility of the study.

The pilot study pointed out gaps in the tools that existed and appropriate amendments were made. Feed back from the pilot study was taken and necessary adjustments made to the tools to ensure validity and reliability of the data that was collected. Data from ten of the questionnaires from the pilot study was entered into a SPSS data base in order to ensure that it could take up all the variables.

3.11 Data Collection

Household questionnaires were administered to sampled respondents and responses recorded appropriately. Three FGDs (one for men, for women and a mixed one for both genders) were conducted to gather qualitative data on their perspective as regards management of suspected malaria cases. Recording forms were provided for taking notes during discussions by two recorders per group. Secondary data from health facilities was reviewed and recorded to show trend of malaria and drug supply in the facilities.

3.12 Validity

The questionnaire was designed in such a way that the questions were clear and non-ambiguous to ensure that respondents understood the questions as intended. In cases where confirmation was required e.g identification of drugs that were taken, the interviewers provided samples of drugs to help the respondent identify them.

A standard guide for FGDs was developed to ensure that all groups responded to similar questions. The questions were asked in a standard way to ensure uniformity in collection of data from HHs and FGDs. The data collection tools and research methods were reviewed by experienced supervisors in research work (one from the department of

Public health and the other from Zoological department) to ensure they were well structured.

3.13 Reliability

Sampling was done randomly in the 3 randomly sampled Locations (Masii, Makutano and Mango) to ensure that the collected data truly represented the entire targeted population. The house hold interviews and group discussion sessions were conducted in a standard way that was agreed on during the training to ensure repeatability of the results in the event that a similar study was to be conducted. Particular attention was paid during training to ensure that the respondents understood each question as intended.

3.14 Methods of Data Analysis

The collected data was entered into SPSS data base. Data cleaning was done to ensure consistency and to correct any errors that could have occurred during entry. Data was run using the SPSS computer package for analysis. The results were checked for inconsistencies and any errors ultimately corrected before report writing begun. Qualitative data was summarized immediately after each FGD using tables for each of the thematic topics discussed. Quantitative data on health care seeking practices, distance to health facilities and malaria prevention practices were subjected to chi square test to establish whether the variables were related in any way to access and utilization of AL. Using the calculated chi square value, levels of significance for the associations stated in the hypotheses were determined from the chi square distribution table.

3.15 Logistical and Ethical Considerations

The research proposal was approved by the following bodies:-

- (a) Research and ethics committee of Kenyatta University.
- (b) The Provincial Administration of Masii Division (Appendix V, approval by the District Commissioner)
- (c) The District Medical Officer of Health in charge of Mwala District (Appendices V, approval by DMOH)

Adequate data collection tools were produced before the study commenced to avoid shortages. The research assistants were trained for two days before the data collection exercise to ensure validity and reliability of collected data.

Sample drugs were provided to help respondents identify them when they could not remember the names of the drugs

CHAPTER IV: RESULTS

4.1 Socio-demographic Information of Respondents

4.1.1 House Hold Size

About 4% of the households (HHs) had 2 people who lived there; 8% had 3 persons, over three quarters (78.6%) had between 4 and 8 persons while 9.4% had between 9 and 15 persons living in one HH. The lowest number of persons living in a HH was one in 0.3% HH while the highest was 15 in 0.6% HHs. The average number of people who lived permanently in one HH was 5.8 which was approximated to 6 people per HH. Table 4.1 below shows the results on household size.

Table 4.1: House Hold Size

Number of people living in a HH	Frequency	Percent
1.0	1	.3
2.0	13	3.7
3.0	28	8.0
4.0 – 8.0	275	78.6
9.0 - 15	33	9.4
Total	350	100.0

4.1.2 Age Characteristics of Respondents

The mean age was 36.5 years with a range of 17 to 80 years. The 17 – 25 years age category constituted 21.1%; 26 – 40 years accounted for 48.6%; 41 – 55 years 20.6%, 56 – 70 years 6% while those above 70 years represented a low of 3.7%. About 87% (304)

of the respondents were below age of 50 years. Figure 4.1 below shows the age distribution of respondents.

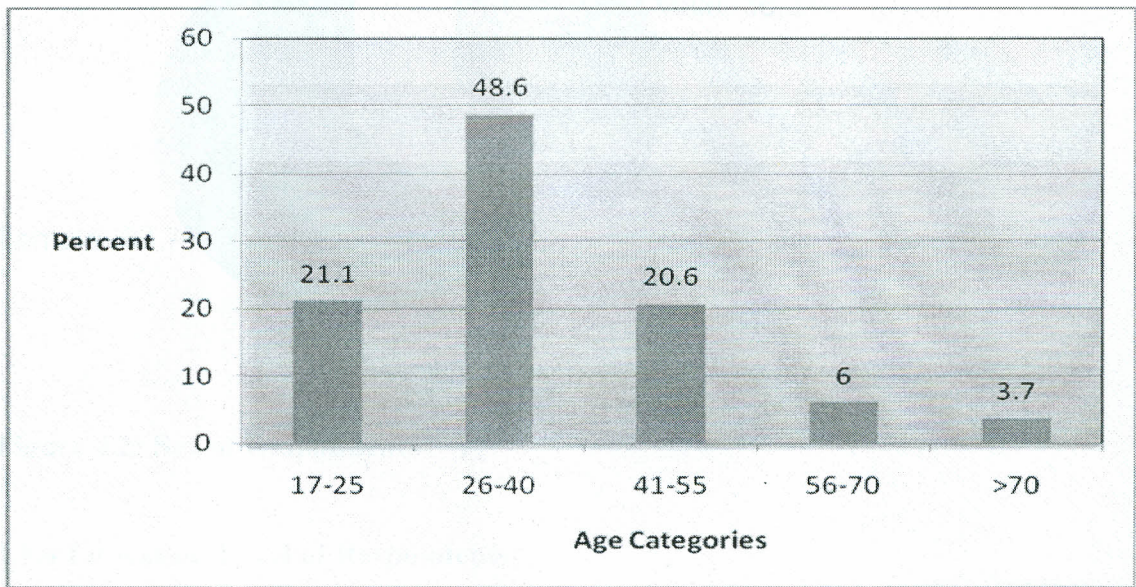


Figure 4. 1: Age Characteristics of the Respondents

4.1.3 Sex of Respondents

About 63.7% (223) of the respondents were females and the rest 36.3% (127) were males. The percentage of men and women who were respondents in the study is shown in Figure 4.2 in page 39 ahead.

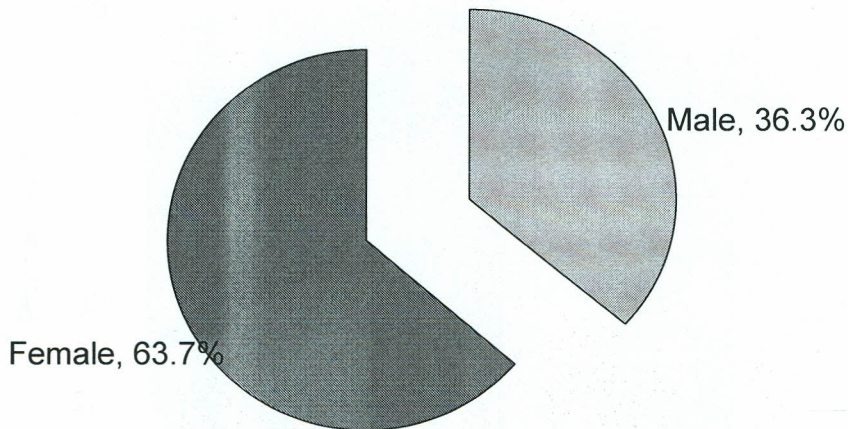


Figure 4.2: Sex of Respondents

4.1.4 Education Level of Respondents

A minority of 4.9%(17) reported that they did not have any formal education at all; slightly less than half of the respondents 48.3% (170) had attained primary school education; 38.3% (134) had attained secondary school education; 7.4% (25) had attained training in mid level colleges and 1.1% (4) had university education. An overwhelming majority (95.1%) of the respondents had attained at least primary education.

Figure 4.3 in page 40 shows the various levels of education attained by the respondents

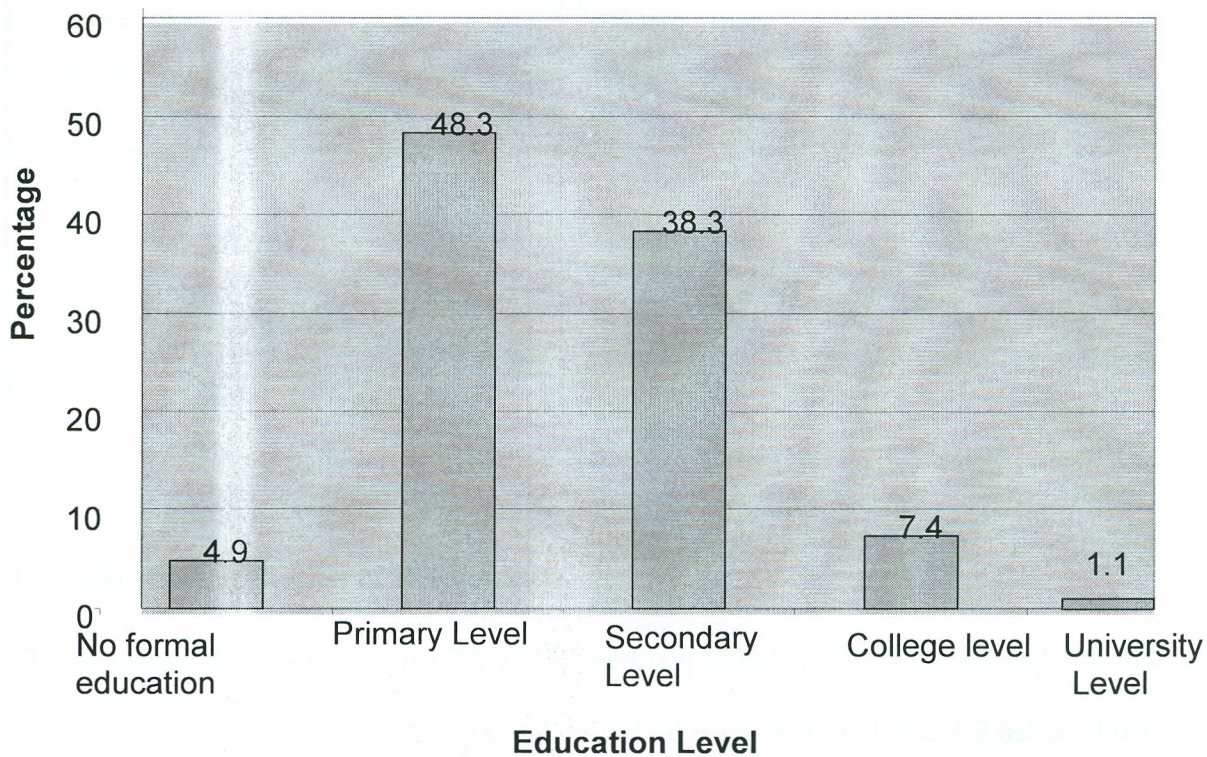


Figure 4.3: Level of Education for Respondents

4.1.5 Marital Status of Sampled Respondents

The highest percentage of respondents 65.7% (230) were married, 24.3% (85) were single, 6.9% (24) were widowed and 3.1% (11) were separated. Table 4.2 in page 41 shows marital status of respondents.

Table 4.2: Marital Status of Respondents

Marital status	Frequency	Percent
Married	230	65.7
Single	85	24.3
Widowed	24	6.9
Separated	11	3.1
Total	350	100.0

4.1.6 Religious affiliation of Respondents

The majority of respondents 63.7% (223) were protestants, 33.7% (118) catholic and 2.6% (9) were either traditionalists or had no religious affiliation. Table 4.3 below shows religious affiliation of respondents.

Table 4.3: Religious Affiliation of Respondents

Religion	Frequency	Percent
Protestant	223	63.7
Catholic	118	33.7
Others (traditionalists or no religious affiliation)	9	2.6
Total	350	100.0

4.2 Malaria Burden and Trends in the Area

4.2.1 Relationship of Respondent to Person who had Suffered from Malaria

Slightly over half of the respondents 55.7% (195) responded on their behalf, 28.6% (100) and 8.0% (28) were mothers and fathers of children below age 16 years respectively, 4.6% (16) were sisters or brothers, 2% (7) were grandmothers and 1.1% (4) were aunts to children under the age of 16. Figure 4.4 below shows the relationships between the respondents and the person who suffered from malaria.

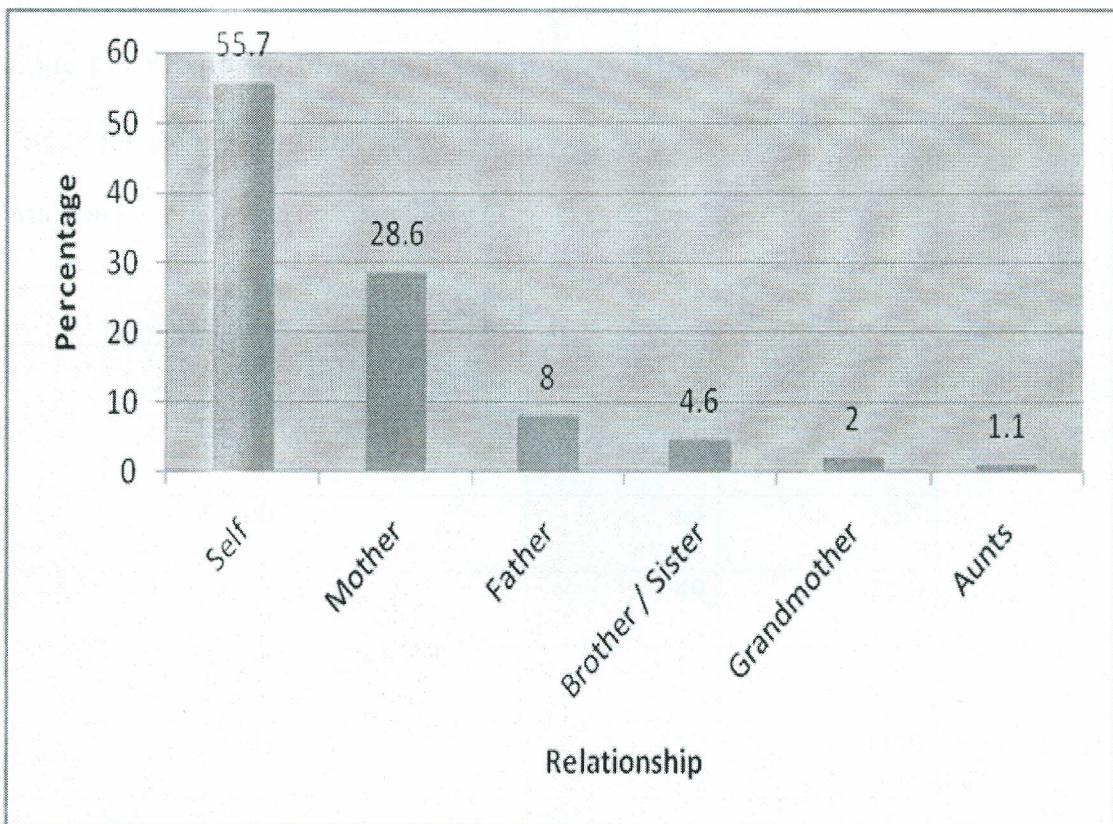


Figure 4.4: Relationship of Respondents to Person who had suffered from Malaria

4.2.2 Frequency of Malaria Infections in HHs since October 2007

The highest percentage of respondents 25.1% (88) had only one person who had suffered from malaria within the period under study while 21.1% (74) had two persons, 18.6% (65) had three persons, 18.3% (64) had four persons, 13.9% (49) had five to seven persons, 3% (10) had eight to 14 persons who had suffered from malaria. The average number of people per HH who had suffered from malaria was 3 with a range of 1 to 14. Majority of the HHs (83.1%) had between 1 and 4 people who had suffered from malaria during the period under study. Table 4.4 below shows frequency of malaria cases reported in sampled HHs.

Table 4.4: Frequency of Malaria Infections in HHs since October 2007

No. of people who suffered from Malaria per HH since October 2007	Frequency	Percent
1.00	88	25.1
2.00	74	21.1
3.00	65	18.6
4.00	64	18.3
5.00 – 7.00	49	13.9
8.00 to 14.00	10	3.0
Total	350	100.0

4.2.3 Burden of the Top Five Diseases in Masii Health Centre

The leading cause of morbidity in Masii health centre in 2006 was malaria with 7254 cases while other infections recorded included; 5549 cases for Upper Respiratory Tract Infections (URTIs), 1741 cases for skin diseases, 932 cases for diarrhea and 745 cases for worm infestation. Figure 4.5 below shows the burden for top five diseases in Masii Health Centre in the year 2006.

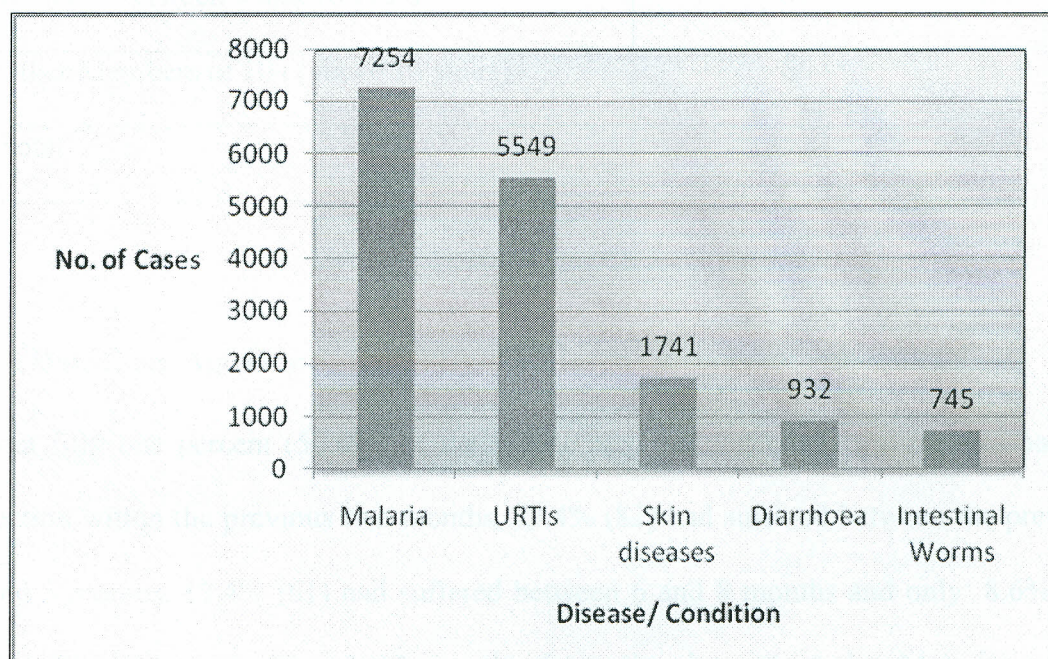


Figure 4.5: Burden of the Top Five Diseases In 2006; Source – Masii Health Centre

4.2.4 Categories of People Who Suffered from Malaria

Thirty four percent (34%) of those who had suffered from malaria during the period under study were the heads of HH or his / her spouse followed by children under 5 years 28.6% (100), other children between 5 and 16 years old 18.6% (65) while other members of the HH accounted for 18.9% (66). Heads of HH and children under five years were

the most vulnerable to malaria infection. Table 4.5 below shows malaria infection for various categories of people in house holds.

Table 4.5: Categories of Persons who had Suffered from Malaria

Categories of People who suffered from malaria	Frequency	Percent
Head of HH / Spouse	119	34.0
Children under the age of 5 years	100	28.6
Children between 5 and 16 years	65	18.6
Other Members of HH (above 16 years)	66	18.9
Total	350	100.0

4.2.5 How Long Ago One Suffered from Malaria

About fifty one percent (50.6%) of the people who had suffered from malaria had the infection within the previous two months, 23.4% (82) had suffered between the previous 2 and 5 months, 17.4% (61) had suffered between 6 and 8 months and only 8.6% (30) had suffered between 9 and 12 months from the date of study. Majority of the respondents (74%) had suffered from malaria within the past five months from the date of study. Table 4.6 in page 46 shows distribution of malaria infection among those infected during the period under study.

Table 4.6: How Long Ago the Persons Suffered from Malaria

Malaria Episodes	Frequency	Percent
Less than 2 months ago	177	50.6
Between 2 and 5 months	82	23.4
Between 6 – 8 months	61	17.4
Between 9 - 12 months	30	8.6
Total	350	100.0

4.2.6 Knowledge on the Signs and Symptoms of Malaria

An overwhelming majority 92.9% (325) felt that they knew the signs and symptoms of malaria while only a handful 7.1% (25) felt they did not know.

Only a small minority of 8% (28) could mention at least 5 signs / symptoms, 26.3% (92) could mention 4, 30.3% (106) could mention 3, 12.9% (45) could mention 2, and 15.4% (54) could mention only one correct sign or symptom of malaria. Table 4.7 in page 47 shows details of knowledge of signs / symptoms of malaria.

Table 4.7: Number of Signs / Symptoms Mentioned

Number of Signs / Symptoms mentioned	Frequency	Percent
Any one correct sign/ symptom	54	15.4
Two correct signs / symptoms	45	12.9
Three correct signs / symptoms	106	30.3
Four correct signs/symptoms	92	26.3
Five or more correct signs / symptoms	28	8.0
Doesnt know any sign or symptom	25	7.1
Total	350	100.0

4.3 Health Seeking Behaviour in the Community

Majority (86.6%) of the respondents took or administered drugs to children when they suffered from malaria, 6.3% (22) used herbal medicine, 6% (21) took no action, 0.9% (3) administered both drugs and herbs when one failed and 0.3% (1) were not aware of the action that was taken when the child suffered from malaria.

Table 4.8 in page 48 shows actions that were taken when respondents or children under their care suffered from malaria.

Table 4.8: Substances Administered for Treatment of Malaria

Substance administered for Treatment of malaria	Frequency	Percent
Drugs	303	86.6
Herbal medicine	22	6.3
Drugs and herbs	3	.9
Dont Know	1	.3
Nothing	21	6.0
Total	350	100.0

4.4 Sources of Drugs / Substances Used for Treatment of Malaria

Majority of the respondents 66.3% (232) obtained drugs from GOK health facilities, 7.4% (26) from private / mission health facilities, 14% (49) from chemists/ pharmacies, 5.7% (20) from shops, 4.3% (15) obtained herbal drugs from traditional healers / herbalists, 2.3% (8) prepared herbs at home or used drug remains at home, 0.6% (2) borrowed drugs from neighbors, 0.6% (2) obtained drugs and herbal drugs from both health facility and herbalists and 6.3% (22) took no action. There was statistically significant association between seeking treatment from health facilities and utilizing AL for malaria treatment $P < 0.05$ ($\chi^2 = 15.69$, $df=3$, $P=0.0013$).

Table 4.9 in page 49 shows the sources of drugs / substances used for malaria treatment.

Table 4.9: Treatment Sites

Treatment Sites	Frequency	Percent
GOK health facilities	206	58.9
Private/ mission health facilities	26	7.4
Chemist / pharmacy	49	14.0
Ordinary shop	20	5.7
Traditional healer / herbalist	15	4.3
Others (prepared at home or drug remains at home)	8	2.3
Neighbour (borrowed drugs)	2	0.6
Both health facility and herbalist/traditional healer	2	.6
Don't Know	1	0.3
Did Nothing	21	6.0
Total	350	100.0

4.5 Reasons given for not Seeking Treatment from Health Facilities

Varied reasons were given by the 33.7% (118) of respondents shown in Table 4.9 above who did not seek treatment from either GOK, private or mission health facilities. Fifty percent (50%) of those who did not seek treatment from health facilities reported that chemists and shops were more accessible and convenient, almost a quarter 21.8% (25) claimed that services at the GOK health facilities were poor, 15.9% (18) cited lack of money to go to the hospital as a reason, 10.5% (12) gave long distances to health facilities as a barrier, a small percentage of 1.8% (2) reported both reasons (lack of

money and long distances) as the causes for not seeking treatment from health facilities.

Figure 4.6 below shows the various reasons given.

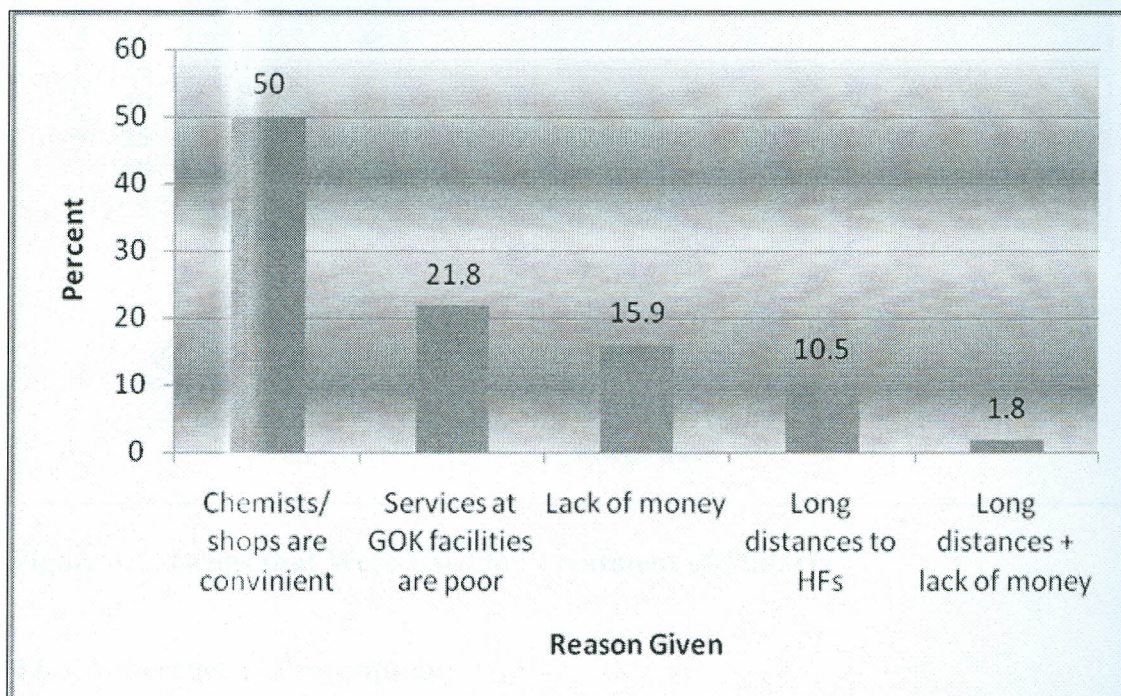


Figure 4.6: Reasons Given for Not Seeking Treatment from Health Facilities

4.6 Drugs Used for Treatment of Malaria

About forty four percent, 43.6% (132) of those who took drugs reported that they took Fansidar (SP), 17.2% (52) took paracetamols such as Hedex, Mara Moja and Action, only 14.2% (43) took AL the current recommended first line treatment for malaria, 7.6% (23) took metakelvin, 3.3% (10) took chloroquine and 3.3% (10) took amodiaquine while a sizable proportion 10.8% (33) could not identify the drug that they took even after viewing the samples of drugs. Majority (85.8%) of the respondents who had suffered from malaria used other drugs other than AL. Figure 4.7 below shows various drugs taken to treat malaria.

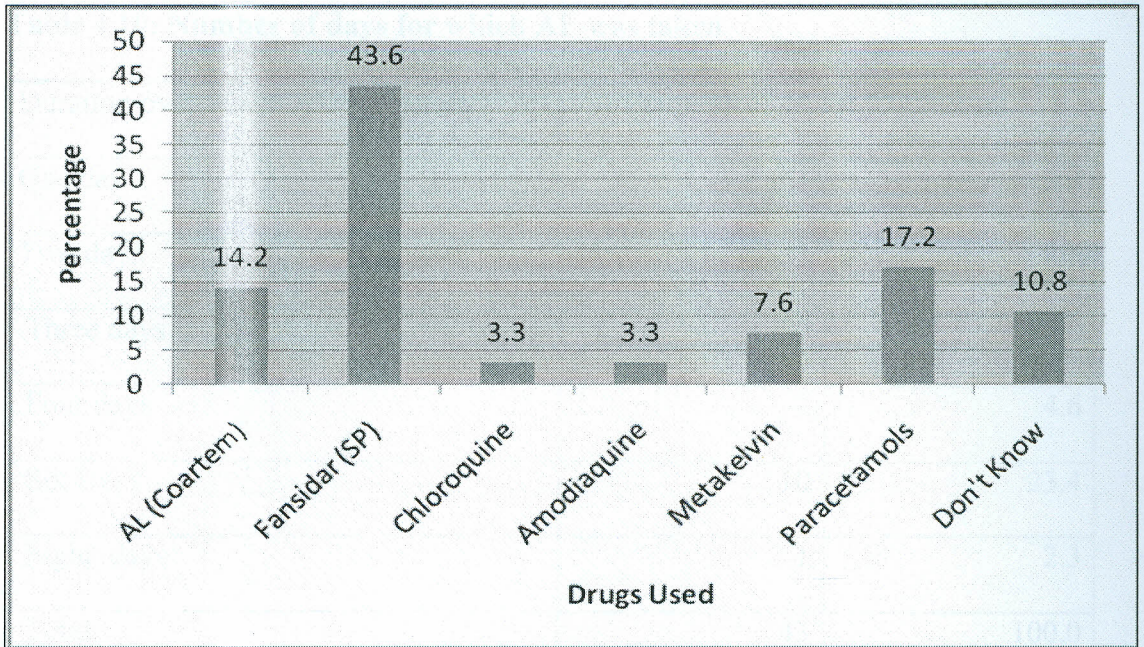


Figure 4.7: Drugs that Were Used for Treatment of Malaria

4.6.1 Adherence to Prescription

About two percent (2.3%) of the respondents who used AL reported that they used the drug for one day, 4.6% (2) for two days, 62.8% (27) for three days, 4.6% (2) for four days, 23.4% (10) used it for six days and 2.3% (1) reported having used the drug for eight days. Out of all the respondents who used drugs (303), 14.2% (43) used AL the recommended first line treatment. Only 62.8% (27) of those who used AL adhered to the recommended dosage while overall out of all the respondents only 7.7% (27) utilized and adhered to prescription.

Table 4.10 in page 52 shows duration over which AL was taken.

Table 4.10: Number of days for which AL was taken

Duration over which AL was taken	Frequency	Percent
One day	1	2.3
Two days	2	4.6
Three days	27	62.8
Four days	2	4.6
Six Days	10	23.4
Eight days	1	2.3
Total	43	100.0

4.7 Access to Health Facilities

Twelve percent (12%) of the respondents reported that they could walk to the health facility in less than 30 minutes, 42.6% (149) reported that it took them between 30 minutes to one hour to walk to the nearest health facility, 31.7% (111) reported that it took them more than one hour, 12.6% (44) reported that it was not a walking distance while 1.1% (4) did not know how long it could take them to the nearest health facility. There was no significant association between access to health facilities and utilization of AL for malaria treatment, $P > 0.05$ ($\chi^2 = 1.85$, $df=3$, $P=0.6041$). Figure 4.8 in page 53 shows the duration taken to get to the nearest health facility on foot.

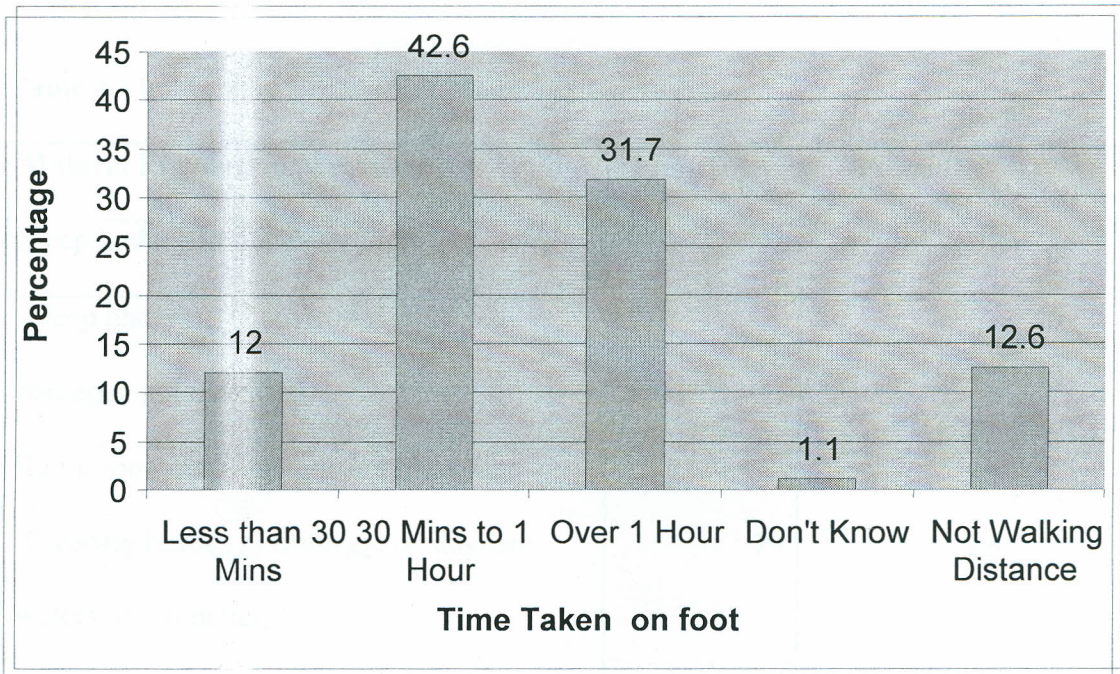


Figure 4.8: Time Taken to Access Health Facilities on Foot

4.8 Malaria Prevention Practices

About twenty three percent (22.6%) reported that they relied on mosquito bed nets only while 50.9% (178) reported that besides using bed nets they also undertook at least one environmental management activity for malaria prevention such as burning of cow dung, burning of local plants such as “*Mutaa*” which has repellent effects to mosquito, clearing bushes and draining stagnant water. Slightly less than a quarter 22.6% (79) did not have bed nets but undertook some environmental management activities for prevention of malaria, minority of 2.6% (9) reported that they relied on prophylactic drugs for malaria prevention and 1.3% (5) did nothing to prevent malaria. There was no significant association between practice of malaria prevention interventions (use of ITNs) and utilization of AL for malaria treatment, $P > 0.05$ ($\chi^2 = 5.35$, $df=3$, $P=0.1479$). Table 4.11 in page 54 shows malaria prevention practices by the respondents.

Table 4.11: Malaria Prevention Measures Undertaken

Malaria Prevention Measures	Frequency	Percent
Sleep under bed net every night	79	22.6
Sleep under net + environmental management measures	178	50.9
Environmental management measures (Clearing bushes or drainage of stagnant waters, use repellents)	79	22.6
Prophylaxis	9	2.6
Nothing	5	1.4
Total	350	100.0

4.9 Possession and Utilization of Mosquito Bed nets in the Community

Slightly over three quarters 77.1% (269) of the respondents reported that they owned at least one bed net in their house holds while the rest 22.9% (81) did not have. An overwhelming majority 92.2% (248) of those who had a net had someone sleep under the net the previous night while the rest 7.8% (21) did not use the net. Figure 4.9 and Table 4.12 in page 55 shows possession and utilization of nets by respondents respectively.

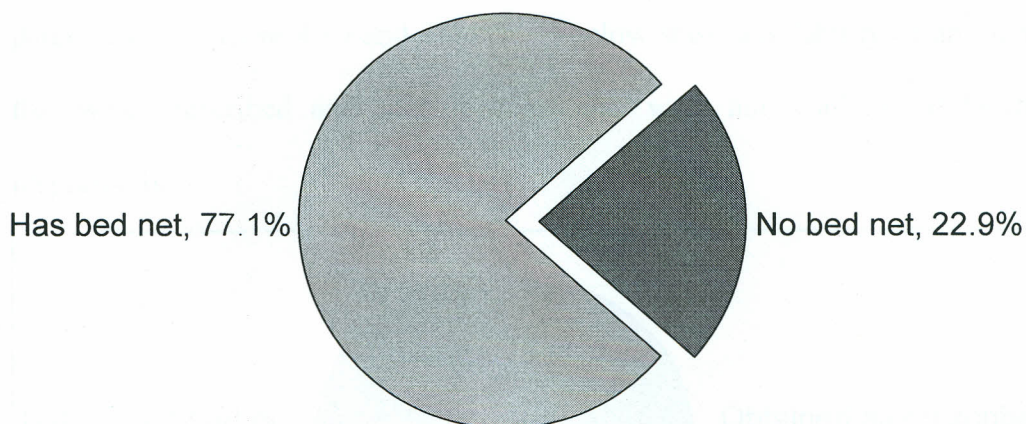


Figure 4.9: Ownership of Mosquito Bed Nets

Table 4.12: Utilization of ITNs the Previous Night

Those who had slept under ITN the previous night	Frequency	Percent
Someone slept under ITN	248	92.2
No one Slept under ITN	21	7.8
Total	269	100.0

4.10 Ability of Health Facilities to Manage Malaria Cases Effectively

About forty one percent (41.4%) (108) of the respondents who sought treatment from health facilities obtained all the drugs that were prescribed for them while the rest 58.6% (153) did not get one or both of the drugs (anti-malarial or paracetamols).

Out of the 261 respondents who visited health facilities about a third 30.2% (79) reported that they did not get anti-malaria drugs, 21.1% (55) reported that they did not get paracetamols which usually accompany anti-malaria drugs for treatment of fever and 7.3% (19) reported that they did not get both the anti-malarial drugs and the

paracetamols. Figure 4.10 and Table 4.13 below show availability of anti-malaria drugs that were prescribed and specific drugs that were not available at health facilities respectively.

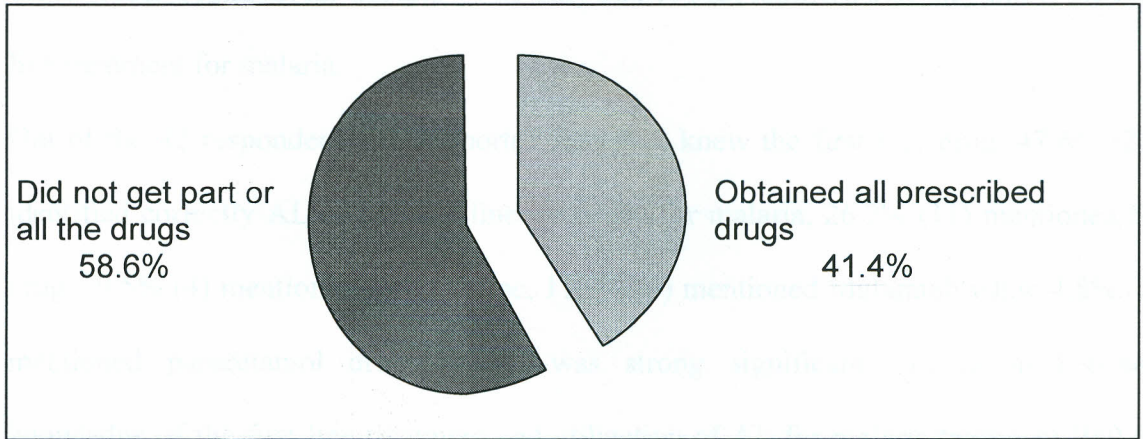


Figure 4.10: Availability of Anti-malarial Drugs

Table 4.13: Drugs That Were Prescribed but Were Missing in Health Facilities

Drug (s) that was / were not received	Frequency	Percent
Anti-malarials Missing	79	30.2
Paracetamols Missing	55	21.1
All the drugs (both above) Missing	19	7.3
All drugs Received	108	41.4
Total	261	100.0

4.11 Knowledge on the Recommended First Line Treatment

About eighty eight percent of respondents, 87.7% (308) reported that they did not know the first line treatment for malaria while only 12.3% (42) reported that they knew the first line treatment for malaria.

Out of the 42 respondents who reported that they knew the first line drug, 47.6% (20) identified correctly AL as the first line treatment for malaria, 26.2% (11) mentioned SP drugs, 9.5% (4) mentioned Chloroquine, 11.9% (5) mentioned Malaratab while 4.8% (2) mentioned paracetamol drugs. There was strong significant association between knowledge of the first line treatment and utilization of AL for malaria treatment $P < 0.05$ ($\chi^2 = 27.3$, $df=3$, $P=0.0001$). Table 4.14 below shows knowledge of first line treatment for malaria.

Table 4.14: Knowledge of the First Line Treatment for Malaria

Recommended first line treatment for malaria (for those who said they knew)	Frequency	Percent
Coartem / AL	20	47.6
SP based drugs	11	26.2
Chloroquine	4	9.5
Malaratab	5	11.9
Paracetamols	2	4.8
Total	42	100.0

4.12 Suggestions on How Access to AL Could be Improved

About forty percent, (40.1%) of the respondents suggested that to improve access to AL, the drug should be availed in health facilities and should also be given to Community Health Workers (CHWs) to distribute in the community to suspected malaria cases. The other common recommendations made included availing the drug in health facilities (37.1%), availing the drug to CHWs (7.4%), awareness creation / health education (6.3%), availing the drug in shops (4.6%) while others gave other varying recommendations such as tracking consumption of drugs in health facilities (3.4%) to prevent misappropriation. A minority of 1.1% had no suggestion on how access to AL could be improved. Figure 4.10 below shows recommendations given on how to increase access to AL in the community.

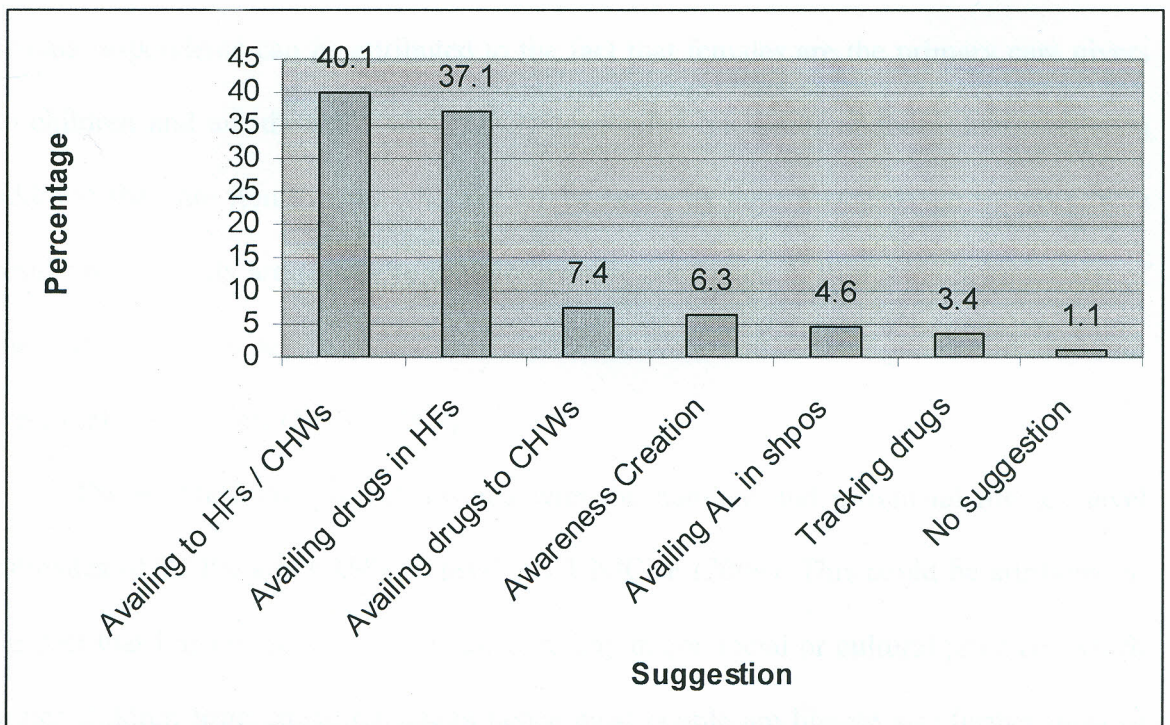


Figure 4.11: Recommendations Made By Respondents for Increasing Access to AL

CHAPTER V: DISCUSSION

5.1 Socio-demographic information

The average household size of 5.8 was in agreement with the figure of 6 people reported for Machakos District (Machakos District Development plan, 2006). About 87% (304) of the respondents were below age of 50 years. This age distribution of respondents is very close to that reported by the Kenya Demographic and Health survey (2003) in which 93.2% of the respondents were below the age of 50 years and was also attributed to the normal population distribution where young adults form a greater proportion of the population as compared to the older people.

The male / female ratio was almost 1:2 and does not conform to the national male / female ratio estimated at 1:1.01 (World Bank fact book, 2008). The higher proportion of female respondents can be attributed to the fact that females are the primary care givers to children and are the ones who mainly responded on behalf of their children and in addition they are housewives who are left at home as their husbands go to work. The results of the study are similar to those of a study conducted in Bungoma in which out of the 670 households which were interviewed, 666 were female care givers and only four were male care givers (WHO, 2009).

The 95.1% literacy level differed with the national and provincial literacy level estimates of 72.1% and 69.9% respectively UNICEF (2006). This could be attributed to the fact that Eastern province does not have any major social or cultural practices which hinder children from attending school hence most people are literate and further most of

the respondents were young people as opposed to UNICEF's survey which targeted the entire populace including the elderly.

Results on religious affiliation were close to those reported in by MOH in KDHS (2003). The only major variation compared to other studies such as KDHS (2003) was that there were no Muslims identified and this could be due to predominance of Christianity in this rural setting which has not experienced any infiltration by other religions.

5.2 Malaria Burden and Trends in the Area

The findings show that most of the respondents (92.3%) responded either on their own behalf or on behalf of their children. The rest of the respondents were permanent residents of the HHs and were regular care givers to the children they responded on their behalf and equally had first hand information hence information gathered was very reliable.

Majority of the HHs (90.5%) had between 1 and 5 people who had suffered from malaria during the period under investigation. Noteworthy is the fact that no HH was sampled and lacked a person who had suffered from malaria (based on those who visited health facilities and prescribed anti-malarial drugs, 66.3%) during the period under study. This reaffirmed the fact that the area is highly endemic for malaria as reported by Snow *et al.*, (1998). This high malaria burden was further confirmed by secondary data of 2006 obtained from the Masii Health Centre where malaria was the leading cause of morbidity at 44% followed by URTIs at 34.2%.

The head of house hold or his / her spouse formed the largest percentage (34%) of categories of people in the HH who had suffered from malaria during the period under

study. This could be explained by the fact that most of the respondents (64%) were females within their reproductive age (mean age of 36.5 years) and may have been pregnant or lactating during the period under review and these categories of women are categorized as being highly vulnerable to malaria infection (MOH, 2004). Vulnerability of children seemed to decrease as age increase as expected based on categorization of vulnerable groups to malaria infection (MOH, 2004). This is a strong show case that the category of children under five years and pregnant women should be prioritized for malaria prevention interventions in the community.

These findings further confirm that the area is highly endemic for malaria as majority (74%) of the people who had suffered from malaria had experienced malaria infection within the previous five months while the rest had suffered between the previous 6 and 12 months thus corroborate the findings reported by Snow *et al.*, (1998) who categorized Machakos District where Mwala lies as a malaria endemic zone.

5.3 Knowledge on Malaria

Knowledge on symptoms and signs of malaria was high as an overwhelming majority (92.9%) could mention at least one sign or symptom. The commonly mentioned signs and symptoms were fever and head ache. It was noted that even amongst those who mentioned four or five correct signs/ symptoms most of them would mix them with irrelevant signs or symptoms for other diseases and hence knowledge on malaria is still low in the community. These findings were similar to those reported in a study conducted in Nyamira District where 70% of mothers were able to identify one sign/ symptom of malaria (Osero *et al.*, 2006).

The fact that that few respondents (12.9%) could accurately point out at least two signs of malaria implied that malaria cases could not be identified promptly in HHs for treatment. This corroborated with the data gathered from all the focus group discussions where the signs and symptoms of malaria were poorly understood to the extent that symptoms of almost all diseases were viewed to be signs of malaria. A related observation that was reported is that malaria was so common in the area to the extent that when one experienced any form of general malaise, they assumed it was the disease and mostly they delayed seeking treatment for the disease that “they were used to living with” hence malaria was not taken seriously. This was a dangerous practice which contributed to delays before seeking treatment for malaria and this could ultimately lead to complicated malaria or even death.

5.4 Health Seeking Behaviour and Treatment Sites in the Community

Overall 66.3% of the respondents sought treatment from health facilities whether GOK, private or mission which is a positive health seeking behavior which can promote uptake of AL. These findings differed significantly from those reported in a study conducted in Bungoma West District which indicated that only 43% of febrile children were taken to a health facility (Hamel *et al.*, 2001). On the other hand these findings were very similar to those reported in a study conducted on treatment seeking behaviour for malaria cases in the highlands of Rift Valley-Kenya which reported that most frequent initial sources of treatment for malaria in adults and children were medical facilities (66.0% and 66.7% respectively) (Sumba *et al.*, 2008). The findings from the current study and those of the study conducted by Sumba *et al.*, (2008) showed that most people who had suffered from malaria sought treatment from health facilities. However, the study conducted by Hamel

et al., (2001) indicated that less than half of the respondents sought treatment from health facilities. This variation could be associated with the positive transformation and improvement of Kenyan health systems since 2003 when there was a change of regime which improved management and supply of drugs to government health facilities which may be responsible for the increased care seeking from health facilities. Seeking treatment from health facilities and utilizing AL for malaria treatment was found to have a significant statistical association. With more awareness interventions, treatment seeking from health facilities can be increased significantly in the community in order to promote access to AL since a strong positive association has been demonstrated between seeking treatment from a health facility and use of AL.

5.5 Reasons for not Seeking Treatment from Health Facilities

A sizable proportion of the community did not seek treatment from health facilities when they suffered from malaria. If health facilities could be more accessible it is possible that those who viewed chemists and shops as being closer to them and convenient (50%) as well as those who cited long distances (10.1%) as prohibitive factors to seeking treatment from health facilities would in future seek treatment from health facilities. Another factor that requires redress is improvement of services in the health facilities to reverse the notion that services at GOK health facilities are poor as reported by 21.8%. This could be achieved by ensuring consistent availability of anti-malarial drugs and improving flow of patients to avoid overstaying in the health facilities by patients waiting to be served. This would boost the confidence of the community with local health facilities. As evident from FGD sessions, aggressive advertisements and marketing by herbalists especially at market centres caused more people to depend on uncertified herbal medicines than from

health facilities. Regulation of herbalists and education of the community are the twin interventions that could help to address this challenge. Seeking treatment from health facilities had a strong significant association with utilizing AL for malaria treatment hence the need to promote conditions that promote treatment seeking from health facilities by communities.

5.6 Drugs Used for Treatment of Malaria

Results on drugs that were taken to treat malaria indicated that only 14.2% of the respondents took AL the recommended first line treatment for malaria at the time of study while the rest took other drugs. Thus uptake of AL is very low in the community. These findings differ with those reported by Mbagaya *et al.*, (1998) who reported that of all suspected malaria cases 92% took chloroquine the then recommended first line treatment. This variation is attributed to the change of anti-malarial drugs policies which currently prohibit stocking of AL in shops as was the case when chloroquine was the first line treatment. This ensured easy access to chloroquine from shops and chemists unlike from April 2006 when AL was introduced and restricted to health facilities. Appropriate policy review and community level awareness creation need to be instituted to increase access to AL. This is consistent with the recommendations by health workers who expressed the need for awareness to be created in communities to increase uptake of AL. It was further established during FGD sessions that majority of the people did not know that AL was the current first line drug for treatment of malaria as only two people in one of the Men's FGDs knew about AL. Thus, the low levels of access to AL are attributed not only to the restrictive policy but also to low levels of awareness in the community regarding the drug.

5.7 Adherence to Prescription

Findings on adherence to prescription revealed that out of the 303 malaria cases who used drugs to treat malaria only 8.9% (27) took AL and adhered to prescription while overall only 7.7% of the sampled respondents who had suffered from malaria used AL and adhered to prescription. This situation is worse compared to a study conducted in Nyamira District in which it was reported that 29% of malaria cases in the area used the correct dosage of the recommended drug (Tevrow, *et al.*, 2002). This is a dangerous trend as it is clear that failure to adhere to prescription is a major contributor to development of resistance (WHO, 2001). Utilization of the drug is very low and an urgent intervention is required to improve access in order to avoid abuse of the drug which can easily result to development of resistance by malaria parasites. Community wide health education through multiple channels will be a critical component in improving utilization and adherence to AL in rural communities.

5.8 Access to Health Facilities

Results indicated that access to health facilities were averagely high as 54.6% of the respondents took one hour or less to get to the nearest health facility on foot which is within the one hour national access benchmark (KEMRI, 2006). Distance to the health facility was cited during FGD sessions as a factor which determined whether an individual visited a health facility or other sites for treatment. However, it was established that there was no statistically significant association between access to health facilities and utilization of AL for treatment of malaria. This finding differs with that reported from a study conducted in Pakistan which reported that children living less than

4 km from a government health facility made 22% less use of that facility than those living 4 km or more away. The study concluded that factors other than distance were the primary determinants of use of government services for treating children (Noorali *et al.*, 1999). The respondents and health workers in the current study were of the view that access to AL could be promoted if more health facilities were put up, the drug deregulated and provided to community health workers who can prescribe it to community members whenever signs / symptoms of malaria are reported by any community member.

5.9 Malaria Prevention Practices

At least each household undertook an intervention to prevent malaria including use of ITNs (77.1%), environmental modification, burning plants with repellent effect among others except 1.4% of the respondents who reported that they did nothing to prevent malaria. These findings are similar to those of a study conducted in Mwea which reported that almost 90% of households reported owning and using an insecticide treated bed net (Okech *et al.*, 2008). Before the government initiated the mass net distribution, the Kenya demographic and health survey (2003) reported that slightly over 20% of households owned at least one mosquito net though only 6% had an insecticide treated net. The high net coverage could be attributed to the recent free mass distribution of ITNs by Ministry of Health to children under five and pregnant women through maternal and child health care clinics across the country. In such a malaria endemic area, malaria prevention interventions need to be stepped up further through health education so that the community adopts other measures to complement the role of ITNs in malaria prevention as only about half (50.9%) reported integrating other prevention measures alongside use

of ITNs. In a study conducted at Mwea it was concluded that the usage of a combination of malaria control tools in an integrated fashion by residents of Mwea division could have influenced the decreased malaria cases in the district hospital and among the school children which were studied (Okech, *et al.*, 2008). Similarly this study recommends employment of integrated approaches in malaria prevention alongside use of ITNs. It was however established that there was no significant association between practicing malaria prevention measures (using ITNs) and utilizing AL for malaria treatment.

5.10 Ability of Health Facilities to Manage Malaria Effectively

Results of the study revealed that local health facilities lacked the ability to effectively manage malaria cases. Out of the respondents who visited health facilities, 58.6% reported that they did not get any or part of the drugs prescribed from the health facilities. This was viewed as a factor that could be responsible for the low confidence with health facilities among community members and caused some of the suspected malaria patients not to go to health facilities for treatment. In the main health facility of Masii Division (Masii Health Centre) it was noted that at the time of the study (September 2008) the drug had been available approximately two months ago (July 2008) and that was the last time it was dispensed in the health facility. Similar challenges were reported from Mango and Maueli dispensaries where one of the common challenge raised by health workers was inadequate supply of AL to the facilities. These findings were similar to those reported in a country wide study conducted in Kenya in 2008 where 25.6% of the surveyed facilities had none of the four AL weight-specific treatment packs in stock (Kangwana *et al.*, 2008). Improvement in delivery of health care services and ensuring adequate supply of drugs will be imperative in order to win confidence of

communities so that more people seek treatment from health facilities in future. On the part of health workers, they felt that they were overloaded as the health facilities had very few health workers and the patient / health workers ratio was very high. Increasing the number of health workers in health facilities by the government would reduce work load and each health worker would be able to give quality time to patients. For quality services to be realized in health facilities, alongside the preceding suggestions, refresher training of health workers on counseling and patient handling would be imperative.

5.11 Knowledge on the Recommended First Line Treatment

Findings indicated that knowledge of the first line treatment for malaria was low as overwhelming majority (87.7%) responded reported that they did not know the first line treatment for malaria while on further follow up only 5.7% of all sampled respondents knew the correct first line treatment for malaria. These findings corroborated the FGD findings where only two people out of all the three FGDs conducted knew the correct first line treatment and these were people who had been trained as community health workers. This was attributed to lack of awareness creation in the community when the drug was launched which is an important component whenever a new drug is introduced. The low level of awareness regarding AL was confirmed in the men's FGD where one of the participants exclaimed in Kikamba "*ai ndawa isu twamiw'a naku*" which means "Gosh, we have just heard that drug with you". The results established that there was a statistically significant association between knowledge of AL as the first line treatment for malaria and using it to treat malaria.

Thus extensive awareness creation coupled with improvement of drug supply to health facilities in this community and other similar rural settings in Kenya would ensure that malaria patients access the correct treatment for malaria promptly.

5.12 Suggestions on How Access to AL could be Improved

Various recommendations were made by respondents and health workers on how access and utilization of AL could be promoted in the community. The most common joint recommendations made by respondents was improving availability of the drug in health facilities and giving the drug to CHWs to dispense in the community to suspected malaria cases (40.9%). All these recommendations converged at a point of ensuring increased community awareness on the recommended first line treatment and making the drug more accessible at strategic points in the community. These recommendations make the Home Management for Malaria (HMM) model recommended by WHO (2005) a suitable area of exploration in promoting access to AL. This will be crucial to ensure those who do not seek treatment from health facilities can easily access treatment from trained CHWs in the community. This will be in addition to improving services at the health facilities.

CHAPTER VI: SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

6.1 Summary

The findings point out a grave situation in the community where by only 7.7% (27) of those who suffered from malaria in the community used AL the recommended first line treatment and adhered to recommended prescription. It has further been established that the drug is not actually known in the community as only 5.7% of the respondents identified it correctly as the first line treatment. This implies that there exists a gap which has never been bridged since the drug was introduced in April 2006. As defined by the RBM partnership, access to drugs encompasses those activities which ensure availability of the drugs not only at the health facilities but also to the community. Thus interventions that would promote access to the drug in the community would be required. The community was innocently using SP based drugs especially fansidar (over 66%) which they were not aware that it was replaced by AL as the first line treatment for malaria. Poor capacities of health facilities to manage malaria cases and the erratic supply of anti-malarial drugs were found to be contributing factors to poor access to AL in the community. This inconsistency of supply was cited by all health workers who were interviewed in the District and requires urgent redress for effective case management to be achieved. Further, for communities to gain more confidence with the services provided especially in the GOK health facilities which are the main health care service providers, services ought to be improved drastically. It was very clear that implementation of the policy on the new drug was disjointed as it was done at the higher levels but its cascading to the community level was not well coordinated. Extensive awareness creation and

health education on adherence to prescription is required across the community using various approaches to ensure communities get the right information regarding malaria case management. It was established that seeking treatment from health facilities had a strong significant association with utilizing AL for malaria treatment hence the need to encourage community members to seek treatment from health facilities. Use of bed nets was observed to be pretty high in the area however a good percentage (over 7%) of those who had nets did not use them the previous night. This shows that awareness on consistent utilization of bed nets among other vector control measures need to be stepped up. Integrated approaches of malaria prevention need to be promoted in the community for prevention to be effective.

6.2 Conclusion

The overall objective of the study was to determine the level of access and utilization of Artemether Lumefantrine as a first line non-over the counter drug for the treatment of malaria in Masii Division of Mwala District. The results showed that access and utilization of AL in the community was extremely low and urgent interventions required to be instituted to ensure that the proportion of malaria patients accessing AL was increased. This situation was associated with lack of information by the community in one hand and erratic supply of drugs to the local health facilities coupled with poor quality services at health facilities on the other hand. Part of the community seemed to have little confidence with the health facilities especially because of the shortage of common drugs witnessed when they visited health facilities for treatment. It was noted that a huge proportion of malaria patients visited health facilities when they suffered from malaria and more people would even go to health facilities if they were sure of

availability of drugs and efficiency in service delivery by health workers. Further, there was a section of the community which did not view malaria as a serious disease and chooses not to take any action or took home made herbal concoctions whose efficacy is questionable or relied on uncertified medication from traditional healers / herbalists or street vendors. This scenario was cited by health workers as a common cause of complicated malaria in the area.

This study demonstrated that seeking treatment from health facilities and utilization of AL for treatment of malaria were strongly associated with high statistical significance. Therefore it would be necessary to create awareness in the community to promote health care seeking from health facilities. Similarly, the study has demonstrated high levels of statistical significance between knowing AL as the first line treatment and using it for malaria treatment. It would be imperative that the government, NGOs and other stakeholders in health step up awareness creation on malaria treatment to promote treatment seeking from health facilities. In summary, the low level of access to AL needs to be addressed more systematically and strategically ensuring that the cascading of policy implementation is effectively done to win community cooperation and understanding of malaria case management strategy. Awareness creation could be an important intervention to improve access to AL as knowledge of AL as the first line treatment was shown to have a statistically significant association with utilization of AL for malaria treatment.

6.3 Recommendations

- Extensive awareness creation by the government and other stakeholders in health should be conducted in the community to ensure that community members are aware of AL as the first line treatment for malaria.
- The GOK should improve capacities of health facilities in malaria case management through ensuring consistent supply of anti-malaria drugs and improving on staffing to improve service delivery to the community.
- The Ministry of Public Health and Sanitation should regulate market place herbalists who continuously advertise herbal drugs in the market centres to ensure that they do not sell substandard herbal substances to the community.
- The Ministry of Public Health and Sanitation should explore the option of home management for malaria for roll out through CHWs who could be trained and equipped with treatment kits and rapid diagnosis test kits to ensure prompt access to AL by suspected malaria cases in communities especially those located far from the health facilities
- Awareness should be conducted in the community to promote consistent use of ITNs and employment of integrated approaches for malaria prevention to complement ITNs.

6.3.1 Further Research

1. Persistence of malaria among those treated using AL was reported by health workers. This requires investigation to establish whether this could be due to developing

resistance, due to poor utilization practices by the patients or could be cases of re-infection.

2. It would be important in future to establish factors that promote health care seeking from health facilities as the study has demonstrated that seeking treatment from health facilities had a strong association with utilization of AL.

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APPENDICES

APPENDIX I: MAP OF KENYA SHOWING LOCATION OF MWALA DISTRICT



APPENDIX III: STRUCTURED HOUSE HOLD QUESTIONNAIRE

Access and Utilization of Artemether Lumefantrine as first line non-over the counter treatment for malaria in Masii Division, Mwala District

Household Questionnaire

CONSENT

My name is, I come from I am in this Location to conduct / help a student from Kenyatta University conduct a research on how the community is treating malaria cases. The information collected will be used the student to make a report for examination purposes and the report will also be shared with the local leaders so that they can identify areas they can assist community members to manage malaria cases better. The District Medical Officer of Health is aware as well as the chief of the location. Your household has been sampled randomly so that it can represent others which will not be visited. The information collected from your household will be treated confidently and your names will not be disclosed in the report to indicate what you said. Do you agree to participate in this survey?

Yes1

No2

September 2008

IDENTIFICATION

LOCATION NAME----- VILLAGE NAME-----

HOUSEHOLD NUMBER

NAME OF INTERVIEWER -----DATE OF INTERVIEW -----

SECTION 1: DETERMINATION OF ELIGIBLE HOUSEHOLDS

1. Is there any one in this HH who has suffered from malaria since October 2007

Yes Proceed to 2

No Sample another HH

2. How many people have suffered from Malaria in this HH since October 2007?

3. Among all these people who was the most recent to suffer from malaria?

Name _____

a. Child under age of 5 years

b. Children between 5 to 15 years old

c. Head of HH / spouse

d. Other members of the HH

4. When did you or the person (identified earlier) suffer from malaria?

a. Less than two months ago

b. Between 2 and 5 months

c. Between 5 months and one year

d. Over 1 year ago

5. What is your relationship to the person who suffered from malaria?

a. Self

b. Mother

c. Father

d. Grand / mother

e. Grand father

f. Brother / Sister

g. Aunt

h. Others _____

Get the right respondent (Adult who suffered from malaria latest or primary care giver for children below 16 years)

SECTION 2: RESPONDENT CHARACTERISTICS

NO	QUESTIONS AND FILTERS	CODING CATEGORIES	GUIDING NOTES
6.	How old are you?		
7.	Sex of respondent	Male 1 Female 2	
8.	What is your highest education level that you have attained?	Primary 1 Secondary 2 Tertiary 3 University 4 None 5	
9.	What is your marital status?	Single 1 Married 2 Separated/ Divorced 3 Widowed 4	

10.	What is your religious affiliation?	Catholic	1	
		Protestant	2	
		Muslim	3	
		Other	4	

11. How many people live in this Household on permanent basis?

SECTION 3: KNOWLEDGE AND PRACTICES REGARDING TREATMENT OF MALARIA

NO	QUESTIONS AND FILTERS	CODING CATEGORIES	
12.	Do you know the signs / symptoms of malaria?	YES.....1 NO..... 2	If No Skip to 14
13.	What signs do you look for to know that a person is suffering from malaria	Fever.....1 Headache.....2 Joint pains/ general malaise.....3 Loss of appetite.....4 Diarrhea/ stomach upsets.....5	

		Don't know6 Others (specify).....7	
14.	When you / (NAME of the child) suffered from malaria, what were you /was s/he given to treat the disease?	Drugs.....1 Herbal medicine.....2 Nothing.....3 Others(specify).....4 Don't know.....5	
14a.	Where were the drugs / treatment substances obtained from?	GOK health facility.....1 Private/mission health facility2 Dispensing chemist / pharmacy.....3 Shop4 Neighbor5 Others (specify)7 Don't know.....6 Traditional Healer/ herbalist.....8	Proceed to 14b if answer is not a health facility
14b.	Why did you not go / take your child to a health facility when you / s/he suffered from malaria?	Distance to health facility is prohibitive1 Lack of money to go to hospital2 Poor services at health facility..... 3 Others	Skip if treatment was sought at

	7	health facility
15.	<p>What drugs were given for treatment of malaria?</p> <p>Show drug samples to the respondent for them to identify the one they took precisely if they can not remember.</p>	<p>ACT (Coartem / Artemether Lumefantrine 1</p> <p>SP drugs(fansidar, falcidin, orodar etc).... 2</p> <p>Chloroquine3</p> <p>Amodiaquine4</p> <p>Metakelfin5</p> <p>Paracetamol (panadol, mara moja, aspirin, headex)6</p> <p>Others (specify)</p> <p>.....</p> <p>Don't know7</p>	<p>Proceed to 16 if treatment was AL (1)</p>
16.	<p>What quantities were you / was (NAME) taking per day and for how many days?</p>	<p>No.of Tablets.....</p> <p>Days</p> <p>1 day1 4 days 4</p> <p>2 days 2 5 days5</p> <p>3 days 3 6 days..... 6</p> <p>Others (specify).....</p>	
17.	<p>How long does it take you to get to the nearest health facility while walking?</p>	<p>Less than 30 minutes 1</p> <p>30 minutes to 1 hour 2</p> <p>Over 1 hour 3</p> <p>Not a walking distance 4</p> <p>Don't know 8</p>	

18.	What measures / activities do you undertake to protect yourself and other family members from malaria?	<ol style="list-style-type: none"> 1. Sleep under a bed net every night 2. Draining stagnant waters 3. Clearing bushes around the compound 4. Applying repellents on skin at night 5. Using repellent mosquito coils 6. Prophylaxis (taking drugs to prevent infection) 6. Others (specify) 	
19.	Do you have a mosquito bed net in this family?	<ol style="list-style-type: none"> 1. Yes 2. No 	Skip to 20 if answer is No
19b.	Did any one sleep under the net last night?	<ol style="list-style-type: none"> 1. Yes 2. No 	
20.	When you or (NAME) went to the hospital to seek treatment for malaria did you / s/he get all the prescribed drugs from the health facility?	<ol style="list-style-type: none"> 1. Yes 2. No 3. N/A 	Skip to 22 if response is yes
21.	What drugs were not available or were inadequate?	<ol style="list-style-type: none"> 1. Antimalarials 2. Paracetamols 3. Others (specify) 	

22.	Do you know what drug is recommended by the government for treatment of malaria in Kenya?	1. Yes 2. No	Skip to 24 if answer is No
23.	What drug is recommended?	Coartem / AL/ACT.....1 Fansidar / metakelfin2 Chloroquine3 Malaratab4 Cortexin5 Paracetamols6 Antibiotics9 Don't know6 Others8	
24.	What would you suggest as the best action to be taken to ensure that the recommended first line treatment is widely and easily accessible by community members	Availing the drug in all health facilities 1 Availing the drug in shops..... 2 Availing the drug to community health workers3 Others (specify)	

Thank you for your time and cooperation

APPENDIX IV: FGD GUIDE FOR COMMUNITY MEMBERS

1. Is malaria a problem in this community? Probe for the main problems associated with malaria.
2. Where do people seek malaria treatment in this community? What reasons make people buy drugs or use herbal medicine or do nothing when suffering from malaria other than going to health facilities?
3. How long does it take some one suffering from malaria to seek treatment from the time of onset of symptoms? What factors determine how fast one seeks treatment?
4. Are there any factors / beliefs that hinder effective and timely treatment of malaria in this community? What are they?
5. What drugs / substances do people use locally for treatment of malaria?
6. How effective are the local government health facilities in treatment of malaria cases? What challenges do you face when you visit the health facilities?
7. Do you know the current recommended drug for treatment of malaria in Kenya? What is the drug? Do you know the dosage of the drug?
8. How is malaria prevented in this community? Probe for any preventive practices
9. Are bed nets used regularly in this community? Are there some beliefs related to use of nets that prevent their utilization in the community?
10. What needs to be done to ensure that treatment for malaria with the right drug is accessible to everybody in the community within the shortest time possible after onset of symptoms?

11. Do you have any other issue with regard to treatment of malaria that you would wish to share with us? Give the group an opportunity to share any other issue of interest regarding the subject

NAME OF HEALTH FACILITY:

CADRE OF HEALTH WORKER:

Before your health facility has been selected for this study being conducted by a student from Kenyatta University on how the community and health facility manage malaria cases. The information collected will be used by the student for research and examination purposes. The information collected will also be shared with the local health officer for their use in planning malaria control activities in the community members and health facilities to reduce malaria burden. The District Health Officer of Health is aware as well as the project administration. The information collected from your household will be treated confidentially and your names will not be disclosed in the report to indicate what you have said. If you agree to participate, kindly fill the following questions.

1. What prescriptions do you make for patients who visit your health facility with signs / symptoms of malaria?

2. What challenges do you face while treating malaria cases in your health facility?

- Heavy work load
- Inadequate drugs
- Delayed malaria cases who come late
- Inadequate diagnostic facilities

APPENDIX V: HEALTH WORKERS QUESTIONNAIRE

Access and Utilization of Artemether Lumefantrine as first line non-over the counter treatment for malaria in Masii Division, Mwala District

NAME OF HEALTH FACILITY:

CADRE OF HEALTH WORKER:

Hello, your health facility has been selected in this study being conducted by a student from Kenyatta University on how the community and health facilities are managing malaria cases. The information collected will be used by the student to make a report for examination purposes and the report will also be shared with the local leaders so that they can identify areas they can assist community members and health facilities to manage malaria cases better. The District Medical Officer of Health is aware as well as the provincial administration. The information collected from your household will be treated confidentially and your names will not be disclosed in the report to indicate what you said. If you agree to participate, kindly fill the following questions.

1. What prescriptions do you make for patients who visit your health facilities with signs / symptoms of malaria?
-
2. What challenges do you face while treating malaria cases in this health facility?
 - a. Heavy work load 1
 - b. Inadequate drugs 2
 - c. Delayed malaria cases who come late 3
 - d. Inadequate diagnostic facilities4

- e. Others (specify)
-
-

3. How would you rate access and utilization of AL as first line treatment for malaria in this community using the scale below?

- a. Very low 1
- b. Low 2
- c. Average 3
- d. Above average 4
- e. Very high 5

4. What recommendations would you make to promote access and utilization of AL in this community?

- a. Health education /awareness in the community..... 1
- b. Allowing shopkeepers to sell the drug 2
- c. Others (specify)
-

5. Do you have any other comment you would wish to make concerning improving access and utilization of AL in the community.

.....

.....

.....

Thank you for your time and cooperation

APPENDIX VI: APPROVAL LETTERS FROM MINISTRY OF HEALTH AND PROVINCIAL ADMINISTRATION

Attached next

Our Ref: 157/OL/12727/2004

Your Ref:

TO WHOM IT MAY CONCERN

REG. NO. 157/OL/12727/2004

This is to confirm that the above is a bona fide student of Kenyatta University pursuing a Masters of Public Health degree.

He has finished his course work and is currently undertaking his research project on "Malaria Treatment Practices in Mwala District".

I wish to introduce him to Mwala District through your office for the purpose of collecting data for his project in the month of October 2004.

Any assistance accorded to him will be highly appreciated.





**KENYATTA UNIVERSITY
OFFICE OF THE CHAIRMAN
DEPARTMENT OF PUBLIC HEALTH**

Our Ref: **I57/OL/12727/2004**
Your Ref:

P.O BOX 43844 - 00100
NAIROBI, KENYA
TEL. 020-810901 Ext. 236
E-mail: chairman-pubhealth@ku.ac.ke

October 3rd, 2008

TO WHOM IT MAY CONCERN

**RE: DATA COLLECTION FOR JONATHAN KIOKO REG. NO. I57/OL/12727/2004
IN MWALA DISTRICT**

This is to confirm that the above is a bona fide student of Kenyatta University, pursuing a Masters of Public Health degree.

He has finished his course work and is currently undertaking his research project on "Malaria Treatment Practices in Mwala District".

I wish to introduce him to Mwala District through your office where he will be collecting data for his project in the months of October and November 2008.

Any assistance accorded to him will be highly appreciated.



CHAIRMAN, DEPARTMENT OF PUBLIC HEALTH



KENYATTA UNIVERSITY
OFFICE OF THE CHAIRMAN
DEPARTMENT OF PUBLIC HEALTH

Our Ref: I57/OL/12727/2004
Your Ref:

P.O BOX 43844 - 00100
NAIROBI, KENYA
TEL. 020-810901 Ext. 236
E-mail: chairman-pubhealth@ku.ac.ke

*No further
Do. Mr. Masii for
assistance*

October 3rd, 2008

**DISTRICT COMMISSIONER
MWALA**

TO WHOM IT MAY CONCERN

RE: DATA COLLECTION FOR JONATHAN KIOKO REG. NO. I57/OL/12727/2004
IN MWALA DISTRICT

This is to confirm that the above is a bona fide student of Kenyatta University, pursuing a Masters of Public Health degree.

He has finished his course work and is currently undertaking his research project on "Malaria Treatment Practices in Mwala District".

I wish to introduce him to Mwala District through your office where he will be collecting data for his project in the months of October and November 2008.

Any assistance accorded to him will be highly appreciated.

*17/10/08
Mr Kiooko will be working in
Masii, Makutano and Mago
locations. Please give him all
the necessary assistance*

Thank
KENYATTA UNIVERSITY
OFFICE OF THE CHAIRMAN
03 SEP 2008
PROF. MWANZO
CHAIRMAN, DEPARTMENT OF PUBLIC HEALTH

[Signature]
**DISTRICT OFFICER
MASII DIVISION**

Jonathan M. Kioko

P. O. BOX 43844,

Nairobi.

18 - 09 - 2008

0920-271062

The Medical Officer of Health,

Mwala District,

Eastern Province.

Armed
THE DISTRICT MEDICAL
OFFICER OF HEALTH
MWALA DISTRICT
P. O. BOX 191 MWALA
DATE *23/9/08*

Dear Sir / Madam

**PERMISSION TO VISIT HEALTH FACILITIES WHILE CONDUCTING
RESEARCH**

Greetings,

I am a student taking my Masters of Science degree in Public Health at Kenyatta University. I will be conducting a research on “**Access and Utilization of Artemether Lumefantrine as first line non-over the counter treatment for malaria in Masii Division, Mwala District**”. In this research visits will be made to the community and health facilities to establish the practices by the community as well as challenges faced by health facilities with regard to treatment of malaria. The findings of this study will be shared with you and any other stakeholder in health who may be interested in health care in the District. Will appreciate your support as I conduct this study which will take place between 22/09/08 and 09/10/08.

Yours faithfully,



Jonathan Kioko