KNOWLEDGE, ATTITUDES AND PRACTICES REGARDING MALARIA TREATMENT AND DRUG RESISTANCE AMONG HEALTH WORKERS IN PUBLIC HEALTH FACILITIES IN KILIFI DISTRICT, COAST PROVINCE

BY

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DECLARATION

I, **Dr Sara Koki Muli –Kinagwi** declare that this thesis is my original work and that neither has it been presented to any other institution for the purpose of obtaining a degree nor been published in any journal.

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DEDICATION

I dedicate this work to my husband Thuranira and my children Mwiti and Nkatha and to my parents- Mr and Mrs Robert Mulli.

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LIST OF ABBREVIATIONS

AQ - Amodiaquine

ACT - Artemisinin-based Combination Therapy

CMEs- Continuous Medical Education

CQ - Chloroquine

DOMC- Division of Malaria Control

FGDs - Focus Group Discussions

GDP - Gross Domestic Product

HCW - Health Care Workers

IPT - Intermittent Presumptive Treatment

MOH - Ministry of Health

RDT - Rapid Diagnostic Test Kit

SND - Standard Normal Deviate

SSA - sub-Saharan Africa

SP - Sulfadoxine-Pyrimethamine

WHO - World Health Organisation.

ABSTRACT

Malaria is a disease caused by blood infection with protozoan parasites of the genus *Plasmodium,* which are transmitted from one human to another by the bite of infective female Anopheles mosquitoes. Malaria affects human beings with either uncomplicated or severe presentations with fever as one of the main symptoms.

Recently, the disease has shown signs of defying treatment regimes and control through the conventional anti-malarial drugs. This development has prompted malaria endemic countries to set new guidelines for treatment. Adherence to these guidelines is considered critical in ensuring that the malaria parasites remain sensitive to the drugs as well as slowing down the development of resistance.

This study was descriptive study and assumed a cross-sectional approach. It was conducted among all the healthcare workers (HCW) based at the public health facilities who treat malaria cases in Kilifi District. The objective of the study was to establish the knowledge, attitudes and treatment practices of heath care workers in malaria and their relationship to drug use patterns, which are associated with the development of drug resistance.

Data collection was conducted using a structured questionnaire, by adopting an open and closed-ended questions format. Focus group discussions were also utilised with a similar interview schedule. Data analysis was conducted using the Statistic Package for Social Scientists (SPSS).

This study established that the level of knowledge of malaria among the HCW was adequate. The HCW were also knowledgeable about the factors associated with the development of resistance. The majority of HCW were also found to have positive attitudes to the new treatment policy. Some HCW raised various concerns about the cost of the new treatment, issues of compliance and increased workload. The majority of the HCW were also found to have positive malaria case management practices in malaria. There was a significant association between having a copy of the treatment guide at the facility and malaria case management practice.

This study also established that the HCW were not adhering to the recommended treatment at the time of the study. In fact several treatment violations were found out such as – the use of coartem as second line treatment, continued use of Chloroquine, use of artemisinin monotherapy. The public health facilities also do not adequately support the treatment

practices of the HCW because the majority of the respondents did not have access to fully functional laboratories all the time as well as adequate antimalarial supply all the time.

This study therefore recommends among others, that the government should ensure that all facilities have copies of the treatment guidelines and that all HCW should have access to regular training. It is also imperative for the government to conduct regular monitoring and evaluation among HCW to establish their treatment practices and ensure that they follow the national malaria treatment guidelines.

CHAPTER ONE: INTRODUCTION

1.1 INTRODUCTION

Malaria is a disease caused by blood infection with protozoan parasites of the genus *Plasmodium,* which are transmitted from one human to another by the bite of infective female Anopheles mosquitoes. The parasites pass an essential part of their life cycle in these mosquitoes. Four species of malaria parasites infect humans, these are

Plasmodium falciparum

Plasmodium vivax

Plasmodium ovale and

Plasmodium malariae

P. vivax has the widest geographical range. It is prevalent in many temperate zones but also in the tropics and subtropics. It is however rare in Africans because it does not infect people with a certain blood type (Duffy +) and the majority of West Africans (95%) have this blood type.

P. falciparum is the commonest species throughout the tropics and subtropics. It is associated with significant morbidity and mortality.

P. malariae is patchily present over the same range as *P. falciparum* but is less common.

P. ovale is found chiefly in tropical Africa but also occasionally in the west Pacific.

The major mosquito vectors in Sub-Saharan Africa are *Anopheles funestus* and two members of the *Anopheles gambiae* complex: *An. gambiae ss* and *An. arabinensis*.

P. falciparum is the commonest species in Kenya accounting for 98% of the cases and is associated with significant morbidity and mortality[1]. Malaria is characterized by fever in the presence of peripheral parasitaemia. Other features include headache, joint aches, nausea, vomiting and profuse sweating. The clinical course of *P. falciparum* malaria may present either as uncomplicated malaria or severe malaria.

1.2 BACKGROUND

1.2.1 Malaria Epidemiology

Malaria is a major public health problem in Kenya, with malaria burden and transmission patterns varying across the country. The following malaria epidemiological zones have been identified:

- Stable malaria zones (holoendemic and hyperendemic) near Lake Victoria and most parts of the coastal region;
- Unstable malaria zones- which are of two types:-
    1. Seasonal malaria zones (mesoendemic) where there are seasonal fluctuations mostly in the arid and semi arid areas.
    2. Epidemic prone areas especially in the highlands west of the Rift Valley that border the endemic areas and
- Malaria free zones.

1.2.2 Malaria Burden

About 48% of the world's population is at risk of malaria infection. 90% of malaria deaths occur in sub-Saharan Africa where 90% of the infected people live. *P falciparum* is responsible for about 95% of malaria deaths worldwide and has a mortality rate of 1-3%. According to the World Health Organisation (WHO), there are 1.5 to 3 million deaths due to malaria each

year [1]. A recent study estimated that there were 515 (range 300-660) million clinical episodes of *P. falciparum* malaria. 70% of these attacks were in the African region and 25% in the South East Asia region [2].

Children less than five years of age and pregnant women are the most vulnerable to infection and death. Malaria is estimated to cause 20% of all deaths in children less than five years of age in sub-Saharan Africa. It is further estimated that malaria kills 3,000 children per day translating to over one million annual deaths in Africa. In regions of intense transmission, up to 40% of children under five years may die of acute malaria.

Malaria endemic countries are among the poorest in the world. Poverty is concentrated in the tropical and subtropical zones, the same geographical boundaries where malaria is found. Between 1965 and 1990, countries in which a large proportion of the population lived in regions with *P. falciparum* malaria experienced an average growth in per-capita GDP of 0.4% per year, while average growth in other countries was 2.3% per year [3].

A study done in Ghana [4] showed five days of production are lost per episode of malaria alone, with 64.2% of them due to care taking. Thus malaria and

poor health affects households and their communities by reducing agricultural and non-agricultural productivity, as many workdays are lost.

Seizures have been found to be commonly associated with *P. falciparum* infection even in uncomplicated infections. Repeated convulsions are associated with residual neurological defects such as cortical blindness and cortical damage. A study done in Uganda[5] showed that cerebral malaria may be a major cause of cognitive impairment in children in sub-Saharan Africa. The defects are more likely for those who have multiple seizures before effective treatment for cerebral malaria.

Another study done in Kenya[6] showed that after severe malaria, some children may have neurocognitive impairments that are evident as long as nine years later. These impairments may become more evident as children progress and face more complex cognitive and linguistic demands socially and educationally. Therefore malaria leads to a lot of school absenteeism in the children as well as negatively impacting on their education and future development.

1.3 MALARIA CONTROL STRATEGIES

The current malaria prevention and control strategies in Kenya are: -

- Access to prompt and effective treatment
- Management and prevention of malaria during pregnancy
- Use of insecticide treated nets and other vector control methods
- Epidemic preparedness and response in 16 epidemic-prone districts

These are supported by two cross cutting strategies namely Information, Education and Communication and Monitoring and Evaluation including research[7].

1.4 MALARIA TREATMENT

1.4.1 History of Malaria Treatment

Malaria or 'Roman fever' was common in the vicinity of Rome and cyclical epidemics of malaria continued in Greece, Italy, many parts of Europe and other continents through many centuries. At the beginning of the seventeenth century came the discovery of the value of 'Peruvian bark' for treatment of fevers. The use of this remedy spread rapidly all over Europe and it soon became obvious that this drug easily cured only certain fevers. In the seventeenth century, Morton and Sydenham in England and later Torti in

Italy differentiated between the true intermittent fevers and others that failed to respond to the drug, which was then known under the name of 'Jesuit's powder'[6].

In 1735, Linnaeus gave the tree producing the Peruvian bark its scientific name of Cinchona. Quinine, the active principle of it, was not isolated until 1820 by Pelletier and Caventou in France[6]. Quinine has been used for more than three centuries and until the 1930s it was the only effective agent for the treatment of malaria. Many of the anti-malarial drugs are derivates of this compound. It is the only drug, which over a long period of time has remained largely effective in treating the disease. It is now only used for treating severe *falciparum* malaria, partly because of undesirable side effects.

Chloroquine was a very effective drug both for treatment and prophylaxis. It was first used in the 1945 shortly after the Second World War and was effective in curing all forms of malaria, with few side effects when taken in the dose prescribed and it was low in cost. Unfortunately, most strains of *falciparum* malaria are now resistant to chloroquine and more recently chloroquine resistant *vivax* malaria has also been reported.

Atebrin (Mepacrine) was developed in the early 1930s. It was used as a prophylactic on a large scale during the Second World War (1939-45) and was then considered a safe drug. It had a major influence in reducing the incidence of malaria among troops serving in Southeast Asia. It is now considered to have too many undesirable side effects and is no longer used.

Mefloquine (Lariam) was first introduced in 1971 and is related structurally to quinine. The compound was effective against malaria, resistant to other forms of treatment, when first introduced and because of its long half-life was a good prophylactic. Widespread resistance has now been reported[7] and is associated with an 'acute brain syndrome' consisting of fatigue, asthenia, seizures and psychosis.

Halofantrin (Halfan) belongs to a class of compounds not related to quinine. It is an effective antimalarial drug introduced in the 1980s, but due to its short half-life of 1 to 2 days, is not suitable for use as a prophylactic. Unfortunately, resistant forms are increasingly being reported and there is some concern about its side effects especially neuropsychiatric disturbances and prolongation of QT_C interval and arrhythmias that could be fatal.

Malarone was released in the late 1990s and is a combination of proguanil and atovaquone. Proguanil was first synthesized in 1946 and is still used as a prophylactic in some countries. Atovaquone became available in 1992 and when combined with proguanil there is a synergistic effect, and the combination is at the present time a very effective antimalarial treatment. The drug combination has undergone several large clinical trials and has been found to be 95% effective in otherwise drug resistant *falciparum* malaria. How long it will be before resistant strains of malaria appear remains to be seen and it is also very expensive.

Proguanil and pyrimethamine (antifolate) act by sequential inhibition of enzymes of folate metabolism. Resistance to these drugs has developed over the past 30 years and is now wide spread. Resistance develops very rapidly and remains stable due to a single point mutation. Resistance is seen for both *vivax* and *falciparum* malaria.

1.4.2 Malaria Treatment in Kenya

Despite considerable efforts to control or eradicate malaria, the disease continues to spread in part due to the development of drug-resistant *P. falciparum* strains, which have become unresponsive to most quinoline and

antifolate drugs, particularly in sub Saharan Africa. The spectrum of antimalarials in East Africa had until recently been confined to chloroquine (CQ), amodiaquine (AQ) and sulfadoxine/pyrimethamine (SP); drugs that are cheap, widely available and accessible, but also strongly implicated in resistance.

The national malaria treatment policy in Kenya has been changed twice. The first change was in 1998 when the first line drug was changed from chloroquine to Sulfadoxine-Pyrimethamine (SP). The next change was from SP to Artemisinin-based Combination Therapy (ACT). This was announced in 2004 but was officially launched in August 2006. This change was necessitated due to increased parasite resistance to SP and was in line with WHO recommendations. Kenya was therefore due to implement the use of ACTs for the management of uncomplicated malaria within a few weeks of this study was done.

Various factors including inadequate dosage and presumptive treatment have been implicated in the development of drug resistance but it is not clear whether these factors are known to the HCW responsible for the treatment of malaria. Awareness by HCW of the factors associated with the development

of resistance is crucial in addressing the problem of antimalarial drug resistance.

Currently WHO recommends the use of artemesinin based combination therapy since artemesinins produce a very rapid therapeutic response (reduction of the parasite biomass and resolution of symptoms). They are active against multidrug-resistant *P. falciparum* malaria and are well tolerated by the patients. To date, no parasite resistance to these compounds has been detected.

The following are the therapeutic options currently recommended by the WHO:

- Artemether/lumefantrine (Coartem)
- Artesunate plus amodiaquine
- Artesunate plus sulfadoxine/pyrimethamine (in areas where SP efficacy remains high)
- Amodiaquine plus sulfadoxine/pyrimethamine, in areas where efficacy of both amodiaquine and sulfadoxine/pyrimethamine remains high (mainly limited to West Africa).
- Artesunate plus mefloquine, an additional recommended combination treatment, which is reserved for areas of low transmission.

1.4.3 Malaria Treatment Policy at the Time of Data Collection

This treatment policy had been in effect since 1998 and was the one officially in use at the time of this study[19]. However due to widespread resistance, the MoH had recommended the use of amodiaquine in the interim period instead of SP as the HCW awaited the launch of ACTs.

- The first-line treatment for uncomplicated malaria was a combination of a Sulpha-component and Pyrimethamine (SP).
- Second-line treatment was with Amodiaquine
- Severe malaria was treated with parenteral Quinine

1.4.4 Kenya's New Malaria Treatment Policy

This policy was officially launched in September 2006 and is in effect to date.

- The first-line treatment for uncomplicated malaria is a combination of Artemeter and Lumefantrine (Coartem)
- Second-line treatment is with oral Quinine
- Severe malaria is treated with parenteral Quinine

Coartem was picked as the drug of choice from the wide range of available ACTs due to the following reasons: -

- The unique advantage of being a fixed combination drug. It is co-formulated and thus achieves a better compliance with patients as opposed to drugs, which are co-packaged. Patients have been known to share their medication with other people especially when they have many tablets.
- Its therapeutic efficacy is 95%
- It contains *artemether*, which is fast acting but has a short half-life in the body and hence is less likely to induce the development of resistance with *lumefantrine*, which is slowly eliminated from the body.

Malaria treatment is one of the main malaria control strategies. However there have been some challenges facing effective treatment. These are: -

- Prompt and effective treatment within 24 hours
- Quality of the drugs
- Cost issues
- Availability of the drugs
- Self-medication
- Development of resistance

1.5 DRUG RESISTANCE

1.5.1 Introduction

Drug resistance in malaria is defined as the *ability of a parasite strain to multiply or survive in the presence of concentrations of a drug that would normally destroy parasites of the same species or prevent their multiplication.* Drug pressure has been identified as one of the key factors in the emergence of resistance to antimalarial drugs. Selection of resistant strains can occur when a drug is misused [11, 12] or used alone extensively. This is why drug combinations have recently been proposed to delay the emergence and spread of drug resistance [13, 14, 15], an approach already used for highly drug resistant infectious diseases such as tuberculosis or AIDS.

The development of resistance to drugs poses one of the greatest threats to malaria control and has been linked to recent increases in malaria morbidity and mortality. Drug resistance has been confirmed in only 2 of the 4 human malaria parasite species, *P. falciparum* and *P. vivax*.

Drug-resistant *P. falciparum*

Chloroquine resistant *P. falciparum* (CRPF) was first reported independently in 3 to 4 foci in Southeast Asia, Oceania, and South America in the late 1950's and early 1960's[19]. Since then, chloroquine resistance has spread to nearly all areas of the world where falciparum malaria is transmitted.

P. falciparum has also developed resistance to nearly all of the other currently available antimalarial drugs, such as sulfadoxine/ pyrimethamine, mefloquine, halofantrine, and quinine. Although resistance to these drugs tends to be much less widespread geographically, in some areas of the world, the impact of multi-drug resistant malaria can be extensive.

Tests for Drug Resistance

There are 4 basic methods for testing malaria for drug resistance: in vivo tests, in vitro tests, molecular characterization, and animal models. Of these, only the first 3 are routinely done.

In Vivo tests: In these tests, patients with clinical malaria are given a treatment dose of an antimalarial drug under observation and are monitored over time for either failure to clear parasites or for reappearance of parasites.

In Vitro tests: In these tests, blood samples from malaria patients are obtained and the malaria parasites are exposed to different concentrations of antimalarial drugs in the laboratory. Some methods call for adaptation of parasites to culture first, while others put blood directly from patients into the test system.

Molecular Characterization: For some drugs (SP and similar drugs, atovaquone), molecular markers have been identified that confer resistance. Molecular techniques, such as polymerase chain reaction (PCR) or gene sequencing can identify these markers in blood taken from malaria-infected patients.

Types of Drug Resistance

WHO has developed a simple scheme for estimating the degree of resistance that involves studying the parasitemia over 28 days. Smears on day 2, 7 and 28 are done to grade the resistance as R1 to R3. In a case of normal response parasite count to fall to 25% of pre-treatment value by 48 hours and smear should be negative by 7 days.

- **Sensitive (S):** The asexual parasite count reduces to 25% of the pre-treatment level in 48 hours after starting the treatment and complete

clearance after 7 days, without subsequent recrudescence - Complete Recovery.

- **RI, Delayed Recrudescence:** The asexual parasitemia reduces to < 25% of pre-treatment level in 48 hours, but reappears between 2-4 weeks.
- **RI, Early Recrudescence:** The asexual parasitemia reduces to < 25% of pre-treatment level in 48 hours, but reappears before 2 weeks.
- **RII Resistance:** Marked reduction in asexual parasitemia (decrease >25% but <75%) in 48 hours, without complete clearance in 7 days.
- **RIII Resistance:** Minimal reduction in asexual parasitemia, (decrease <25%) or an increase in parasitemia after 48 hours.

1.5.2 Factors Contributing to the Development and Spread of Drug Resistance

The following factors have been identified to contribute to antimalarial drug resistance: -

1. **Drug Use Patterns**

This is when there is large-scale antimalarial drug use, inadequate dosing, lack of adherence to treatment guidelines, self-medication and non-

compliance to treatment which all contribute to the development of resistant strains.

2. Drug Characteristics

Drugs with long elimination half-life remain in circulation at sub-therapeutic levels long after the primary infection has cleared. In endemic areas, this contributes to development of resistance resulting from exposure of new infection to sub-therapeutic levels of the drug.

3. Human Host Factors

Due to various factors, semi-immune populations may be cured of malaria despite the presence of some resistance to antimalarial drugs. However, non-immune populations end up with severe morbidity and mortality in the presence of any resistance to the antimalarial drugs.

4. Parasite Characteristics

Polymorphism in two genes of *P. falciparum* genome is implicated in the development of chloroquine resistance.

5. Vector and Environmental factors

These factors may influence the proliferation of resistant strains of *P. falciparum* with the resistant strains being more fit for reproduction in certain anopheles mosquitoes than sensitive strains. Also, vector migration could introduce new and resistant parasite genomes in new areas.

1.5.3 Consequences of Drug Resistance

The main consequence of developed antimalarial drug resistance is that the treatment of malaria fails therefore leading to increased morbidity and mortality especially among children and pregnant women. This ends up being an additional cost to the patient and the health system. The patient will need to spend more money for different medication as well as the additional suffering and possible death due to the illness. The health system has to use more resources to treat the same patient, which is not economical.

With resistance, malaria control and treatment becomes more difficult especially in Africa, as few affordable alternatives are available. There is therefore a need to devise strategies to contain the spread of drug resistance so as not run out of treatment options.

1.6 DRUG USE PATTERNS

These are both health care worker and patient related factors and contribute to the development of resistance. There are some factors that determine the drug use patterns among health workers. These are: -

1. Adherence to Treatment Guidelines

Adherence to guidelines enables the HCW to be able to make a proper diagnosis, give the right treatment as well as proper patient counselling and drug dispensing. HCW may be able to diagnose malaria but end up giving the wrong treatment either by

- Using drugs not recommended in the guidelines
- Using inappropriate drugs or
- Giving the wrong dose or wrong duration of treatment.

2. Capacity of Health Facilities

The capacity of health facilities also influences how the HCW deals with a patient. There should be a laboratory facility to assist with the diagnosis of malaria. Drug unavailability also influences the prescribing practices, as only available drugs will be prescribed. The presence of guidelines and weighing machines also improve the treatment practice of HCW.

3. Presumptive Treatment

This is the practice of treating any febrile illness in a malaria endemic region as malaria. This ensures that one does not miss the diagnosis of malaria. However the result is that, a lot of people get treated for malaria unnecessarily leading increased chances of developing drug resistance.

4. Polypharmacy

This is the practice of healthcare workers of prescribing an average of five drugs per every patient visit. This is done with the aim of ensuring all possible causes of the infection are covered with the appropriate drugs. This leads to a problem of compliance as the number of medications they receive overwhelms the patients.

5. Self Medication

This is a wide spread problem with antimalarials as many are available as over the counter drugs. People are able to self diagnose themselves with malaria, walk to the nearest shop and buy an antimalarial drug without having to see a healthcare worker.

6. Non Compliance to Treatment

This is when patients fail to complete the full dose of treatment. Once the symptoms start to resolve, they feel that they are fully recovered and thus do not see the need to complete the full duration of treatment. This practice encourages the development of resistant strains.

When to Change Treatment Policies

As a response to increasing levels of antimalarial resistance, WHO recommends that all countries experiencing resistance to conventional monotherapies, such as chloroquine, amodiaquine or sulfadoxine–pyrimethamine, should use combination therapies, preferably those containing artemisinin derivatives (ACTs – artemisinin-based combination therapies) for *falciparum* malaria.

As yet another step towards combating drug resistance in Africa, WHO has lowered the resistance-threshold for treatment policy change from 25% to 15% as assessed by standard WHO protocols, in children under 5 years of age, meaning that a more effective treatment should be adopted before 15% resistance to the old treatment is reached.

1.7 PREVIOUS POLICY CHANGE: HOW IT WAS EFFECTED

Chloroquine resistance was acknowledged at a meeting organised by the Kenya Medical Research Institute[17]. However the consensus was that since CQ still relieved the symptoms of uncomplicated malaria and was safe and inexpensive, it should be retained as the first-line therapy for the treatment of uncomplicated malaria. By 1991, many studies[18,19,20,21] had reported treatment failures and at this point the Ministry of Health recognized the more urgent need for revised guidelines for the management of uncomplicated malaria and established a technical committee in 1991.

At a meeting of the technical committee in July 1995 [22], it was established that new national clinical guidelines could not be produced without first resolving the issue of chloroquine resistance. In July 1995, there continued to be some reluctance on the part of other members of the MoH to change the policy, as alternatives to CQ were considered to have higher incidences of side effects and were at the time more expensive.

After the March 1997 recommendation that SP replace CQ only in areas of *holoendemic malaria, a second committee* was formed in September 1997 to consider the implications of implementing this policy. It was decided in

October 1997 that the policy change from CQ to SP would be a national recommendation, with the caveat that SP would be the treatment of choice in 'areas where malaria is CQ resistant' but chloroquine would continue to be recommended in 'areas where malaria is CQ sensitive'[10] . This left some ambiguity about which drug should be employed given the limited coverage of existing sensitivity data, the dynamic nature of changing sensitivity and poor access by practitioners to empirical data.

There were some problems in the process of implementation. Many Provincial Medical Officers of Health (PMOs) had not been briefed about the emerging data and their public health significance and thus some maintained that CQ was still an effective antimalarial and they would continue to use the drug. This was probably due to ineffective mechanisms of communicating research evidence to those directly involved in wider health sector policy development and implementation.

The reluctance to abandon CQ was based, in part, on its low cost, wide availability and acceptance. CQ results in rapid initial improvement in clinical symptoms which has contributed to its widespread acceptance and

the perception that it remains effective, leading to an unwillingness of both health workers and patients to discontinue using it.

Also, the higher cost of second line treatment such as SPs and ACTs was cited as prohibitive for most sub-Saharan countries.

The lesson that can be learnt from this experience is that, developing consensus agreement around drug resistance evidence is paramount and often requires stakeholders not intuitively obvious to the process. Also, converting policy to practice is not easy. It involves many parts of the health sector and represents an interactive process that should begin well before launching a policy revision [23].

There is also the issue of the training of health workers on the new treatment introduced. Experience has shown that training of the HCW is crucial to them following the new guidelines. The new guidelines should be disseminated in such a way, that they are immediately accessible to all HCW even those at the periphery. Of importance is the continuing supervision and monitoring of the HCW to ensure that the guidelines are being followed correctly.

Drug use pattern is one of the factors associated with the development of resistance and is to some extent influenced by the HCW. This study intends to establish if there is a relationship between health worker treatment practices and the development of drug resistance. It will also identify any other health worker related factors leading to the possible development of antimalarial drug resistance.

CHAPTER TWO: LITERATURE REVIEW

Effective treatment is one of the control strategies for malaria yet the threat of resistance looms large over it. Therefore the prevention of the development of drug resistance to the current available treatments is of paramount importance. HCW are the link between drugs and the patients and therefore play a crucial role in treatment failure and the development of drug resistance. This chapter looks at some studies which have tried to look at the possible role of HCW in malaria treatment failure through under dosing, presumptive treatment, polypharmacy and lack of following treatment guidelines among other factors.

Results from a study in Kenya showed that only 20% of the total amount of SP consumed in this population is administered to children less than 5 years old yet in most areas of Kenya, disease risks decline with increasing age. This shows that malaria in children is not handled well hence the high morbidity. It also showed that use of the informal retail sector was common (47% of first actions), though most visits to shops and chemists (77%) resulted in treatment with an antipyretic not an antimalarial [24]. This study shows the need to ensure that children under five get treated properly for malaria to decrease mortality rates. In light of the proposed new and more

costly anti-malarial drug combinations, these findings have major implications for the effective allocation of limited financial resources at household level. as the children will be the ones to suffer.

In another study to find out why health workers do not prescribe antimalarial medicine according to evidence- based guidelines, it was found that only 56.9% children received the recommended treatment [25]. It was established that program interventions like in-service malaria training, provision of guidelines and wall charts and more frequent supervision were associated with better treatment quality. This study showed that there is need for strategies to redress the HCW deficiency in malaria treatment and find ways to strengthen and maintain good HCW practices.

A study in Ghana showed that there was a discrepancy between knowledge and practice of malaria treatment. This was shown by the under- and over-dosing of CQ in children and adults and a high tendency to polypharmacy. It emphasized the need to pay greater attention to the supervision of clinical workers at health facilities and the need for continuous education. It also established that the gains in knowledge following training deteriorated within one year [26].

A study on the quality of care in private clinics revealed that only 68% of antimalarial drugs are prescribed in an appropriate dose and regime in these clinics. Presumptive treatment of malaria was carried out in about 40% of the patients. Due to the varying quality of care, the HCW supported the need to develop interventions to improve the quality of care to patients [27].

A study on antimalarial prescribing practises showed that only 9.8% of prescriptions in private health care facilities contained correct doses of CQ compared to 54% in government health facilities[28]. There was also the tendency to polypharmacy especially in the private sector.

Another study in western Kenya showed that lack of medicines, absence of updated guidelines and laboratory facilities and inadequate training combined to produce a very limited scope of prescription practices. There was lack of adherence to the national treatment guidelines. More than 94% of all prescriptions involved CQ and penicillin either alone or in combination yet by 1994, *P. falciparum* was known to be highly resistant to CQ in this area. Less than 1% of diagnosed malaria cases received antimalarials other than CQ[29]. It also raised the issue that national treatment policies appear to percolate slowly down to the periphery and highlighted

the need for effective efforts to strengthen diagnostic practices at the peripheral levels of the health care system.

Results from a study in western Kenya showed that under dosing antimalarials accounted for 26% of cumulative treatment failures. HCW tend to give medication based on age not weight. This study showed that, when based on body weight, only 25% of the patients received the recommended dose [30]. Under dosing is one of the few controllable determinants of the rate at which antimalarial drug resistance develops. It is critical to ensure that treatment guidelines result in adequate doses at the initial deployment of antimalarials when countries alter first-line treatment for non-severe *falciparum* malaria.

A study on the efficacy of artemisinin monotherapy was done in 227 patients with uncomplicated falciparum malaria[31]. The results showed that artemisinin monotherapy offered rapid recovery and fast parasite clearance, but recrudescence was frequent. Extending the duration of monotherapy from 5 days to 7 days did not reduce recrudescence. This study strengthens the case for combination therapy as the way forward in malaria treatment. However a study in Nigeria[32] showed that monotherapy with artemisinin

derivatives was relatively common. Of the patients given antimalarials, 77% of them were prescribed monotherapy. Only 20.8% were prescribed combination therapy which ranged from CQ with SP and SP with mefloquine. Only 3% of these received artemisinin combination treatment. This was despite the Nigeria's national standard moving to artemisinin combination treatments for malaria. This only highlights the fact that the health workers do not follow the treatment guidelines.

In Ghana, a study done to audit the prescribing practices in health care facilities[33] showed that prescribing patterns were worse in the health centres than at the district hospital in terms of polypharmacy, use of injectable drugs and antibiotics. An average of 4.8 drugs was prescribed per patient. The study showed the need to ensure availability of diagnostic facilities and participation in refresher training for the staff so that their practices can improve.

Another study highlighted the difficulties that arise within the context of drug policy change such as, a regimes appropriateness to all target groups, acceptability and compliance issues[34]. It emphasised the need for better co-

operation between public and private sectors to ensure that the new policy is well accepted and used appropriately by all health sectors.

A study done in Mali[35] on the use of antimalarials showed that even when the peripheral health providers are well trained in correct use of antimalarial drugs, additional measures targeting consumers are required to improve drug use patterns. This is because the consumers tended to prefer the non-recommended treatments and also antimalarial drugs were widely available from unsanctioned sources and with erroneous advice on the dosage. Therefore patient education by the health providers is very important.

In Kenya, a study done on microscopy and outpatient malaria case management[36] showed that 95.5% of patients with a positive malaria result and 79.3% of patients with a negative result received antimalarial treatment. This study raises the issue of ambiguous clinical guidelines that permit the treatment of older children and adults with a negative blood slide. This is one of the factors leading to irrational treatment practices.

CHAPTER THREE: STATEMENT OF RESEARCH PROBLEM

3.1 PROBLEM STATEMENT

The development of resistance to drugs poses one of the greatest threats to malaria control and has been shown to contribute to the current increases in malaria morbidity and mortality in sub-Saharan Africa. Drug use patterns by HCW are one of the factors contributing to the development of resistance and specifically the aspects of monotherapy, dosage and adherence to guidelines.

How the HCW prescribes and counsels patients on drug use may have an impact on the factors associated with drug use patterns. There is already resistance to SPs and now ACTs are the drugs of choice for first line treatment of uncomplicated malaria. There is a great need to ensure that resistance to ACTs does not develop rapidly. There is need to evaluate how HCW practices may contribute to the development of resistance. This will help policy makers put in place mechanisms to deal with this problem and be able to target HCW education accordingly.

Such information on HCW treatment practices was particularly crucial at the time of data collection because Kenya was on the verge of implementing the new malaria treatment policy, which needed the participation of HCW to succeed. Measures needed to be put in place right away to reduce the chances of the development of resistance to ACTs.

In view of the new treatment policy implementation, this study sought to evaluate if current HCW malaria case management practices contribute to the development of resistance by influencing drug use patterns. This way the policy makers will be able to deal with arising issues and hence prevent the rapid development of resistance to ACTs.

3.2 JUSTIFICATION FOR THE STUDY

Malaria places a heavy burden in Kenya'. The statistics are as follows: -

- 20 million Kenyans- more than half the population- are regularly affected by the most deadly malaria parasite: *P. falciparum*.
- Malaria accounts for an average of 29% of all outpatient visits and 19% of inpatient treatments each year.
- Each year, an estimated 34,000 children under five years die from the direct consequences of malaria infection. This means that approximately 96 children die each day from malaria.
- Pregnant women suffer severe anaemia, have low-birth weight babies and run a higher risk of death from malaria.
- It is estimated that each household spends $20 annually on the clinical management of malaria.
- An estimated 170 million working days are lost each year as a result of malaria.

The development of malaria resistance is a real threat to us in Africa. Without effective treatment, the effects of malaria are profound. Treatment failure of SPs in Kenya ranged from 1:4 to 1:3 in 2003 hence the recommendation of a new malaria treatment policy. Prescribers' adherence

to treatment guidelines remains critical to the success of any treatment policy. Adherence to the recommended national guidelines for the treatment of malaria is important in improving HCW treatment practices.

Few studies have tried to look at the possible role of HCW practices in contributing to the development of resistance. There is need for this information so that the magnitude of it can be established and recommendations made to assist in the implementation of the new national malaria treatment policy.

There is also the aspect of the capacity of the health facilities and their ability to aid the HCW to have good treatment practices. For the proper diagnosis and management of malaria, a health facility should have a functional laboratory with necessary equipment, available drugs and available guidelines and wall charts.

3.3 STUDY OBJECTIVES

General:

To establish the knowledge, attitudes and treatment practices of health care workers in malaria and their relationship to drug use patterns, which are associated with the development of drug resistance.

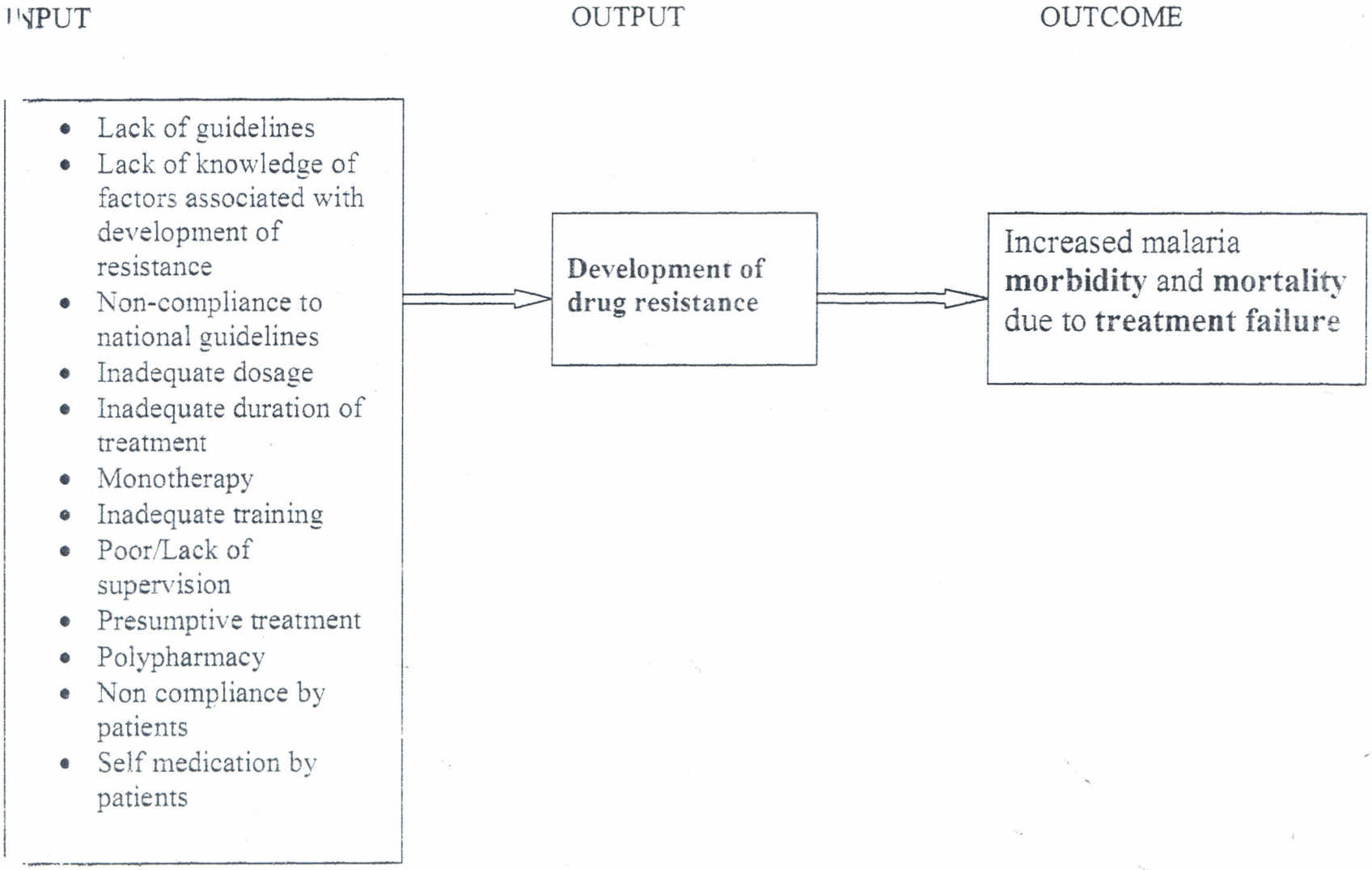
Specific:

1. To identify the current prescription practices in malaria of health care workers in relation to the current recommended national malaria treatment policy.
2. To assess the knowledge of HCW on malaria and on the factors which contribute to the development of drug resistance.
3. To assess the attitude of health workers towards the implementation of the new malaria treatment policy using ACTs.
4. To assess the practices of health workers in malaria case management.
5. To assess the capacity of health facilities in facilitating HCW treatment practices as per the recommended guidelines.
6. To make recommendations to assist in the monitoring and evaluation of HCW treatment practices in policy implementation.

3.4 HYPOTHESIS

At least 50% of the health care workers have the adequate knowledge, positive attitudes and positive practices in malaria case management.

3.5 CONCEPTUAL FRAMEWORK



CHAPTER FOUR: STUDY METHODOLOGY

4.1 STUDY DESIGN

This study was a descriptive cross-sectional one carried out among the healthcare workers (HCW) in Kilifi District in the Coast Province of Kenya.

4.2 STUDY SITE

The study was conducted in Kilifi district in the Coast Province of Kenya. Kilifi district was chosen because of its high malaria endemicity and high transmission rates throughout the year. Malaria accounts for 37% of the outpatient workload and is a leading cause of childhood mortality[37].

Physical Description and Geography

Kilifi district is one of the seven districts in Coast province. This district borders Taita Taveta district to the west, Malindi district to the northwest, Mombasa and Kwale districts to the south and the Indian Ocean to the east. It covers a total area of 4779.2km^2

Kilifi District stretches along the Kenyan coast south to Mtwapa, near Mombasa, and north towards Malindi, and for several tens of kilometres inland. The District is the second poorest in Kenya, and its inhabitants suffer

from all the usual diseases of the poor and the infectious diseases of the tropics.

The local people are predominantly Giriama, one of the groups making up the nine Mijikenda people of the East African coastal region. Most Giriama are subsistence farmers, eking out a meagre living in a harsh climate on infertile land.

Administrative and Political Units

Kilifi district is divided into seven administrative divisions, which are Kaloleni, Bahari, Chonyi, Kikambala, Ganze, Vitengeni and Bamba. It has a total of thirty-six locations and one hundred and eight sub locations. There are three constituencies, which are Kaloleni (Kaloleni division), Ganze (Ganze, Vitengeni and Bamba divisions) and Bahari (Bahari, Kikambala and Chonyi divisions). The major health facilities within the district are[37]: -

- One district hospital
- One sub-district hospital (Mariakani)
- One mission hospital (St. Lukes' Kaloleni)
- Six health centres namely Bamba, Chasimba, Jibana, Rabai ,Vipingo and Vitengeni

- Twenty seven dispensaries of which two are private and two mission owned

Climate

This area experiences temperatures ranging from 22.5^{0}C to 34^{0}C. However the average temperatures are around 30^{0}C and an average relative humidity of 60%. There are two rainy seasons- the long rains from March to July and the short rains from October to December. Rainfall tends to vary from a low of 400mm to a high of 1100mm.

The majority of the people are peasant farmers with the main food crops being maize, cassava, cowpeas and green grams. The main cash crops are coconuts, cashew nuts, citrus fruits and mangoes. The main livestock are cattle, goats and poultry.

Demographic Patterns

The total population was 544,303 as at the national census of 1999[38]. This was projected to be 634,000 in 2004. The breakdown is as follows:

- No. of males 283,312
- No. of females 313,224
- Sex ratio (F/M) 111:100

- No. of households 90.311
- Household size 6.17
- Infant mortality rate 85 per 1000
- Under 5 mortality rate 141 per 1000
- Average population density 125people/km^2

The population density is highest in Kikambala division with 358 people/km^2 and is the lowest in Bamba division with 23 people/km^2.

Morbidity Data

The top ten causes of outpatient morbidity in the district are displayed in the table below:

	Description of morbidity	Total cases	%
1	Malaria	159,392	37
2	Diseases of the respiratory system	100,019	23
3	Diseases of the skin (including ulcers)	32,796	8
4	Diarrhoeal diseases	22,168	5
5	Intestinal worms	12,677	3
6	Urinary Tract Infections	12,175	3
7	Anaemia	8,607	2
8	Accidents	7,981	2
9	Pneumonia	5,807	1
10	Ear Infections	5,385	1

Table 1: Kilifi District morbidity data (2004)

As shown above, malaria accounts for 37% of the outpatient workload. It is also a leading cause of childhood mortality in the area[7].

4.3 STUDY POPULATION

The study population comprised of all HCW in all public health facilities in Kilifi District who diagnose and treat malaria cases. All HCW who met the criteria were interviewed. They included doctors, clinical officers and nurses.

4.4 INCLUSION AND EXCLUSION CRITERIA

Inclusion Criteria:

- HCW who consented to be interviewed.
- HCW from the relevant facilities.
- Any HCW who treats malaria cases

Exclusion Criteria:

- HCW who did not consent to be interviewed.
- HCW from other non-selected facilities.
- HCW who do not treat malaria cases

4.5 SAMPLING AND SAMPLE SIZE

Sampling Unit

A HCW of whatever cadre who diagnoses and treats malaria cases.

Sampling Frame

All the relevant HCW in the public health facilities of Kilifi District under the supervision of the District Medical Officer of Health (DMOH).

Sample Size Determination

This was calculated using the standard formula as determined by Fisher et al. as shown below:

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

Where

n = Sample size

Z = Standard normal deviate which corresponds to the 95% confidence interval

(± 1.96)

P = Hypothesized proportion of the health care workers estimated to have adequate knowledge, positive attitudes and sound practices in malaria treatment. This was set at 50%

The hypothesized value of 50% proportion was chosen because there is no estimate available in the literature on the study topic. Such a proportion

would also give the maximum required sample size for the given precision and level of significance.

d = Degree of precision == (± 0.05)

Substituting in the above formula gives a sample size of **384** health care workers.

Sampling Technique

The latest staffing data (2006) obtained from the Kilifi District Medical Officer of Health showed that the total number of healthcare workers in the district was 195. The breakdown was as follows: -

	Medical Officers (M.O)	**Clinical Officers (C.O)**	**Nurses**
Kilifi D Hosp	5	10	104
Mariakani Sub-D Hosp	2	5	22
Health Centres and Dispensaries	0	7	40
KEMRI doctors attached to the District Hospital	9		
TOTAL	16	22	166

Table 2: Kilifi District staffing data (2006)

The HCW who actually treat patients in the whole district were only 91 and the KEMRI research facility based at the district hospital also had 9 medical officers who treated patients at the hospital. This number was less than the required sample size and therefore comprehensive sampling was done whereby all the HCW who fitted the criteria in all the public health facilities in Kilifi were interviewed. Of the expected 100 respondents, only 86 were interviewed as the rest were away from their duty stations.

4.6 DATA COLLECTION AND TOOLS

Study Tools

- Questionnaires for the HCW.
- Focus Group Discussions (FGD) with various health care workers to further explore their attitudes and practices.
- Key informant interviews

Data was collected from the health workers using questionnaires during the month of August 2006. Trained interviewers administered the questionnaires. The interviewers had been carefully selected and trained so as to ensure that the interviews are standardized. The structured questionnaire was pretested prior to the commencement of data collection and the necessary adjustments made.

Two focus group discussions were held in the field. The first one was with a group of clinical officers and the other with a group of nurses. This enabled them to give their views on malaria case management and their various experiences as prescribers and dispensers of medication as well as exploring further their attitudes and practices on malaria case management.

4.7 DATA ANALYSIS AND PRESENTATION

The collected data was edited manually before being entered into the computer for analysis using the SPSS-PC package.

Data is presented in counts, percentages, charts and tables. The chi-square (X^2) test of significance was applied to identify factors related to HCW knowledge, attitude and malaria case management practices. Also applied in comparison was the Z- test, the standard normal deviate (SND) test. The level of significance used was 5%.

The data from the FGDs and the key informant interviews has been analysed in themes for easy interpretation.

4.8 ETHICAL CONSIDERATIONS

Permission to carry out this study was granted by the Kenyatta National Hospital Ethics and Research Committee and from the Department of Community Health, University of Nairobi. The DMOH of Kilifi District also gave consent for the study to be carried out. The objectives of the study were clearly explained to the heads of the health facilities in the district who in turn explained to their respective subordinates. After a clear understanding of the study objectives, the consent of the HCW was expected in order to participate in the study. The respondents were assured of the confidentiality of their responses. The HCW also reserved the right to decline to participate in this study.

4.9 STUDY LIMITATIONS

1. The study relied on the interviews and FGDs conducted among the HCW and was short of other techniques like FGDs with the patients themselves or the in charges of the facilities.
2. Not all the HCW in the district were interviewed as some were away on leave.
3. The study was based in Kilifi district and therefore may not be representative of all the health workers in the country.

CHAPTER FIVE: RESULTS

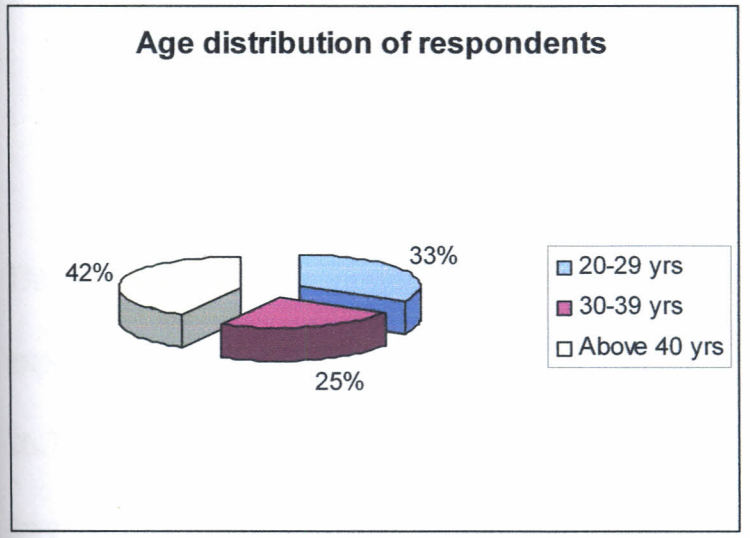
A total of 86 HCW from all the public health facilities in Kilifi District were interviewed.

5.1 PERSONAL CHARACTERISTICS

Out of the 86 respondents, 62.8% were males and 37.2% were female.

The ages of the respondents were distributed as shown in figure 1.

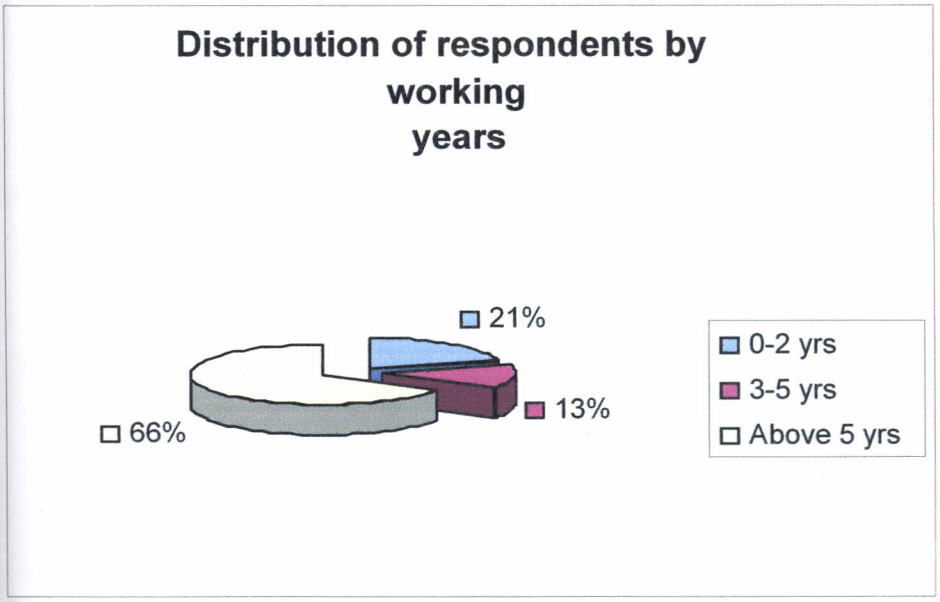
Fig 1: Age Distribution of Respondents (N=86)



The chart shows that the majority of health workers (42%) fall in the age group of above 40 years. The respondents in the 20-29 age group were 33% while those in the 30-39 age group were 25%.

The respondents' number of working years was distributed as shown in figure 2.

Fig 2 Distribution of Respondents by Working Years (N=86)



The majority of the respondents had more than five years working experience. The majority, 62.8% (54) of the respondents were nurses while 26.7% (23) were clinical officers and 10.5% (9) were doctors. The certificate level of training constituted 51.1% of the respondents, 38.4% had diplomas and only 10.5% were university graduates. The nurses were of two different levels of training i.e. certificate and diploma.

Figure 3 shows distribution of HCW according to type of public health facility they work in.

Fig 3: Distribution of HCW by Health Facility (N=86)

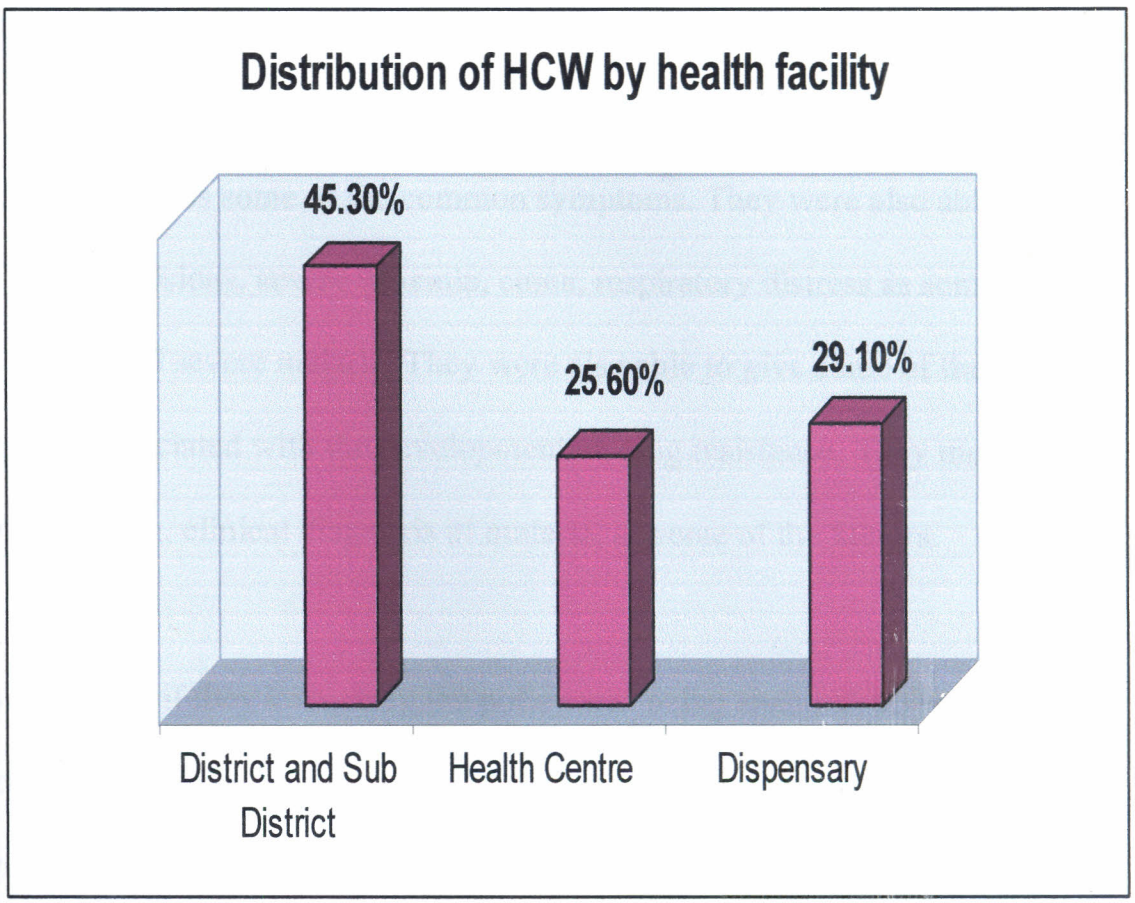


Figure 3 above shows that the majority of health workers in the district are based at the district and sub district level (45.3%).

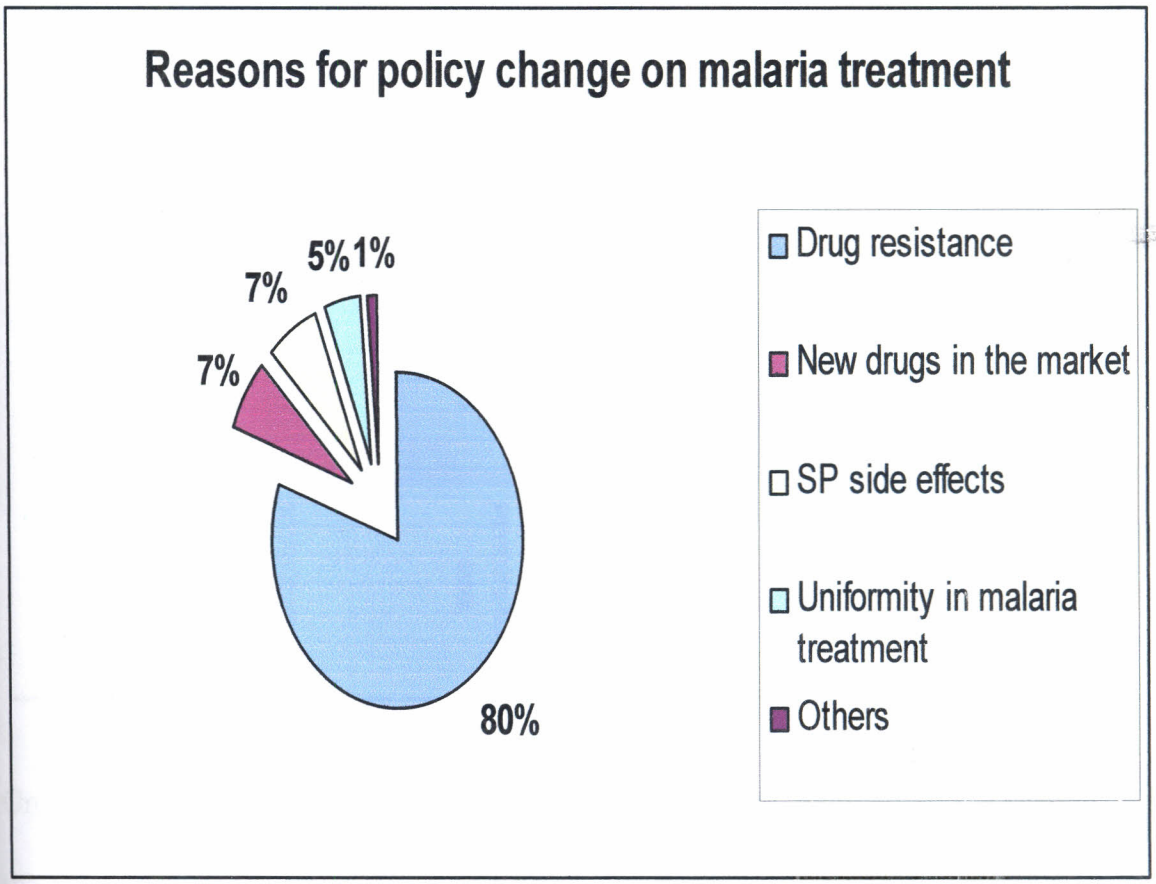
The discussants at the focus group were nurses, clinical officers and doctors who availed themselves during their off duty hours.

5.2 KNOWLEDGE ON MALARIA

Most of the respondents (95.3%) were able to describe the cardinal symptoms of uncomplicated malaria. They mentioned fever, joint pains, chills, nausea as some of the common symptoms. They were also able to name convulsions, severe anaemia, coma, respiratory distress as some of the symptoms of severe malaria. They were also able to give some of the factors that are associated with the development of drug resistance. They mentioned under dosing, clinical diagnosis of malaria, as some of the factors.

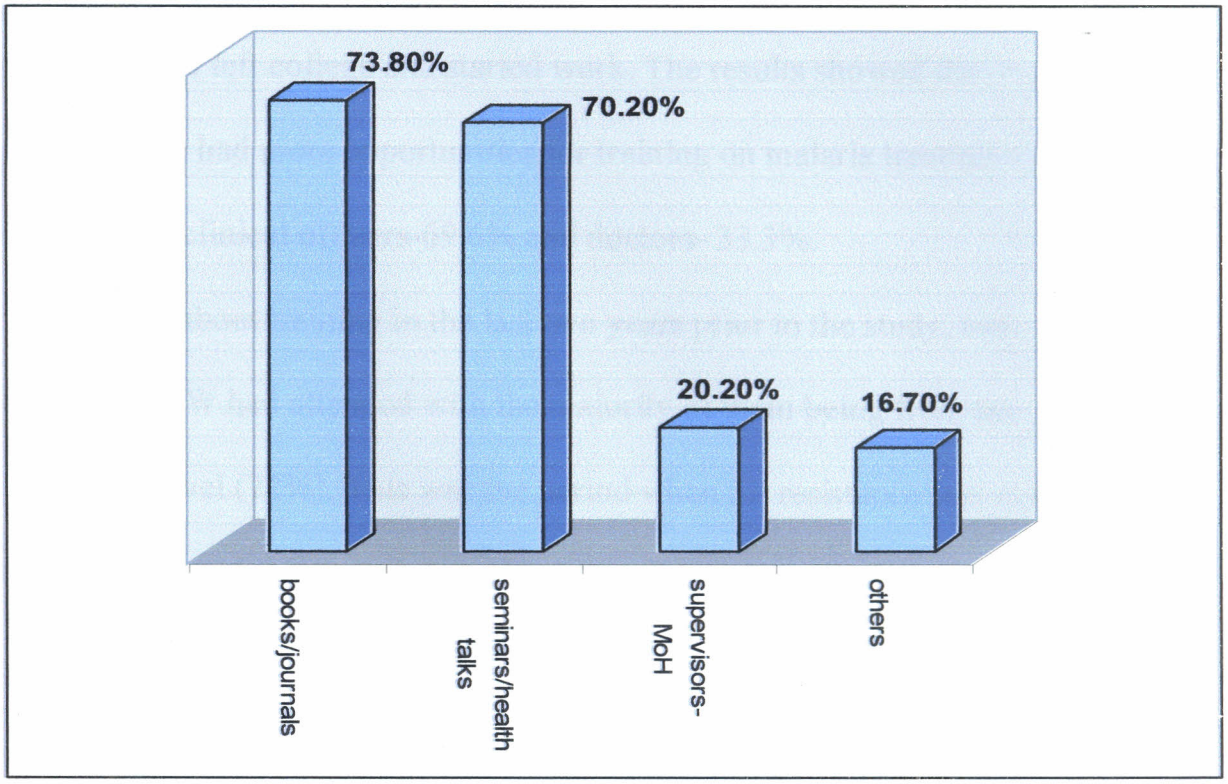
When asked if they knew why the policy was being changed, 93 %(80) said yes while 7% (6) said they did not know. Of the respondents who did not know the reason for the policy change, 83.3% (5) were nurses while 16.7% (1) were doctors. The reasons given for the policy change are as shown in figure 4.

Fig 4: Reasons for Policy Change on Malaria Treatment (N=86)



When asked how they update their malaria knowledge, most of the HCW said that they had several ways of doing so. Most of them did so through books and journals (73.8%) as well as through seminars/health talks/continuous medical education (CMEs) (70.2%) as shown in figure 5.

Fig 5: Sources of Malaria Knowledge among the HCW (N=86)



One of the findings from the key informant interviews showed that most of the HCW did not frequently attend continuous medical education (CME) sessions.

"Most HCW at the district hospital are not really interested in acquiring new knowledge on malaria or any other diseases. We have a lot of information at KEMRI and we are very willing to share it. We plan for continuous medical education sessions and journal clubs but only a few HCW attend".

Only 68.6% of the respondents had an opportunity for training on malaria since they had left college and started work. The results showed that nurses (74.1%) have had more opportunities for training on malaria treatment as compared to clinical officers-69.6% and doctors- 33.3%.

When asked about training in the last two years prior to the study, only 54.7% of HCW had attended with the majority of them being from the dispensary level (72%). This was the period when SP resistance was noted to be on the rise and ACTs had started to come into the market.

When asked if they knew enough about the current malaria treatment, 60.5% (52) said no and almost all the respondents 96% (82) were very willing to be educated further in order to acquire more knowledge on malaria management.

The results they gave were scored using the criteria for assessing knowledge on malaria given in appendix 4 and 95.3% of the respondents were found to have adequate knowledge while 4.7% did not. This was higher than the hypothesized value of 50 percent.

Knowledge on malaria was compared to their personal characteristics and the following was established:

When comparing knowledge by cadre, the majority of the respondents in all the three cadres had adequate knowledge. The results also showed that the cadre with the highest proportion of inadequate knowledge on malaria were the doctors. This is shown in Table 3.

Table 3: Knowledge on Malaria by Cadre (N=86)

Cadre of HCW	Adequate Knowledge	Inadequate Knowledge	TOTAL
Nurse	94.4% (51)	5.6% (3)	100% (54)
Clinical Officer	100% (23)	0% (0)	100% (23)
Doctor	88.9% (8)	11.1% (1)	100% (9)
TOTAL	95.3% (82)	4.7% (4)	100% (86)

When comparing knowledge by sex, the results showed that the majority of male and female respondents had adequate knowledge on malaria. This is shown in Table 4.

Table 4: Knowledge on Malaria by Sex (N=86)

Sex of HCW	Adequate Knowledge	Inadequate Knowledge	TOTAL
Male	96.3% (52)	3.7% (2)	100% (54)
Female	93.8% (30)	6.2% (2)	100% (32)
TOTAL	95.3% (82)	4.7% (4)	100% (86)

When comparing knowledge by working years, the results showed that all the respondents with less then 2 years working experience had adequate knowledge. Also, respondents with 3-5 years working experience had the highest proportion of those with inadequate knowledge. This is shown in Table 5.

Table 5: Knowledge on Malaria by Number of Working Years (N=86)

Number of working years	Adequate Knowledge	Inadequate Knowledge	TOTAL
0-2 yrs	100% (18)	0% (0)	100% (18)
3-5 yrs	90.9% (10)	9.1% (1)	100% (11)
Above 5 yrs	94.7% (54)	5.3% (3)	100% (57)
TOTAL	95.3% (82)	4.7% (4)	100% (86)

When comparing knowledge by level of training, the results showed that inadequate knowledge was highest among those with degrees and lowest among those with diplomas. This is shown in Table 6.

Table 6: Knowledge on Malaria by Level of Training (N=86)

Level of training	Adequate Knowledge	Inadequate Knowledge	TOTAL
Certificate	93.2% (41)	6.8% (3)	100% (44)
Diploma	100% (33)	0% (0)	100% (33)
Degree	88.9% (8)	11.1% (1)	100% (9)
TOTAL	95.3% (82)	4.7% (4)	100% (86)

When comparing knowledge by facility level, the results showed that adequate knowledge on malaria was highest at the dispensary level and lowest at the district and sub district hospital level. This is shown in Table 7.

Table 7: Knowledge on Malaria by Facility Level (N=86)

Level of Health Facility	Adequate Knowledge	Inadequate Knowledge	TOTAL
Dispensary	100% (25)	0% (0)	100% (25)
Health Centre	95.5% (21)	4.5% (1)	100% (22)
District and sub district	92.3% (36)	7.7% (3)	100% (39)
TOTAL	95.3% (82)	4.7% (4)	100% (86)

5.3 ATTITUDE TOWARD THE POLICY CHANGE

The results showed that 80.2% of all the respondents had a positive attitude and supported the introduction of the policy change in first line Malaria treatment. 7% of the respondents had a negative attitude to the treatment policy change while 12.8% of the respondents were undecided.

When comparing attitude by cadre, the results showed that the majority of respondents in all the cadres had a positive attitude to the policy change. Clinical officers had the highest proportion of those with a negative attitude to the policy change. This is shown in Table 8.

Table 8: Attitude to Policy Change by Cadre (N=86)

Cadre	Positive	Undecided	Negative	TOTAL
Nurse	79.6% (43)	16.7% (9)	3.7% (2)	100% (54)
Clinical Officer	78.3% (18)	4.3% (1)	17.4% (4)	100% (23)
Doctor	88.9% (8)	11.1% (1)	0% (0)	100% (9)
TOTAL	80.2% (69)	12.8% (11)	7% (6)	100% (86)

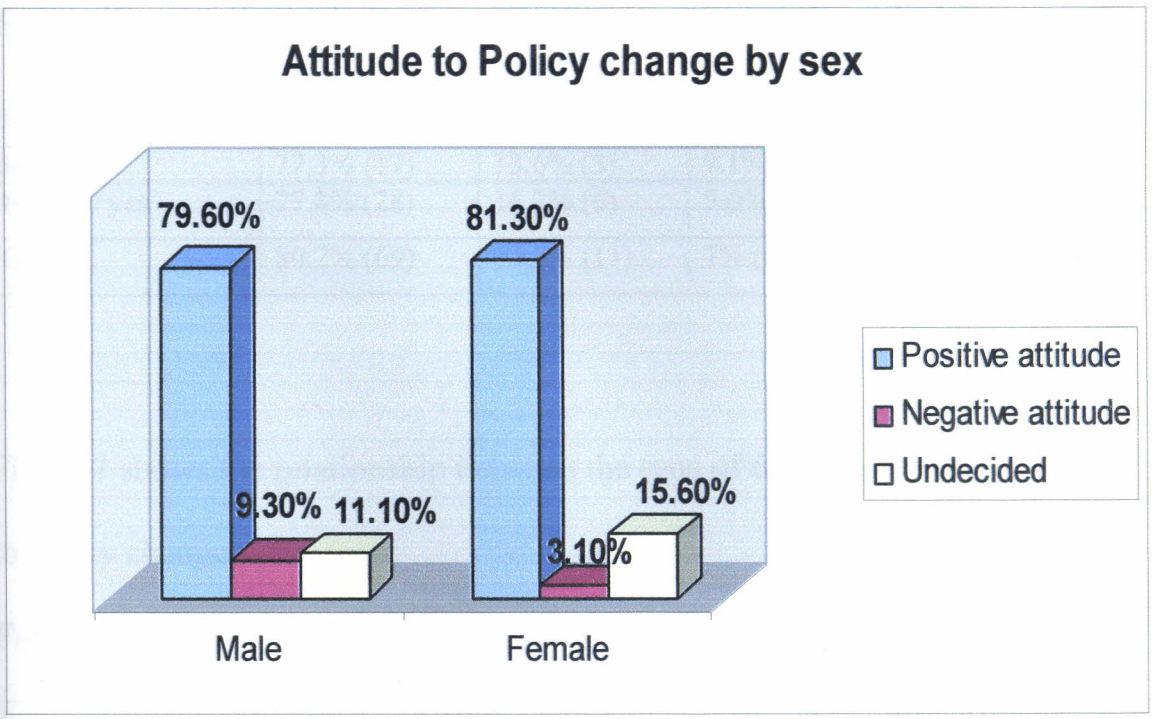
Also, when attitude was compared by working years, the respondents who had been working in the field for 5 years and more comprised the largest percentage of those who were undecided about the policy change. The results also showed that positive attitude to the policy change decreased with an increase in number of working years. This is shown in Table 9.

Table 9: Attitude to Policy Change by Number of working years (N=86)

Number of working years	Positive	Undecided	Negative	TOTAL
0-2 yrs	83.3%(15)	5.6% (1)	11.1% (2)	100% (18)
3-5 yrs	81.8% (9)	9.1% (1)	9.1% (1)	100% (11)
Above 5 yrs	78.9% 45)	15.8% (9)	5.3% (3)	100% (57)
TOTAL	80.2% 69)	12.8% (11)	7% (6)	100% (86)

Figure 6 shows the attitudes of male and female respondents regarding the policy change.

Fig 6: Attitude to Policy Change by Sex (N=86)



The results showed that the majority of respondents in both sexes had a positive attitude to the policy change.

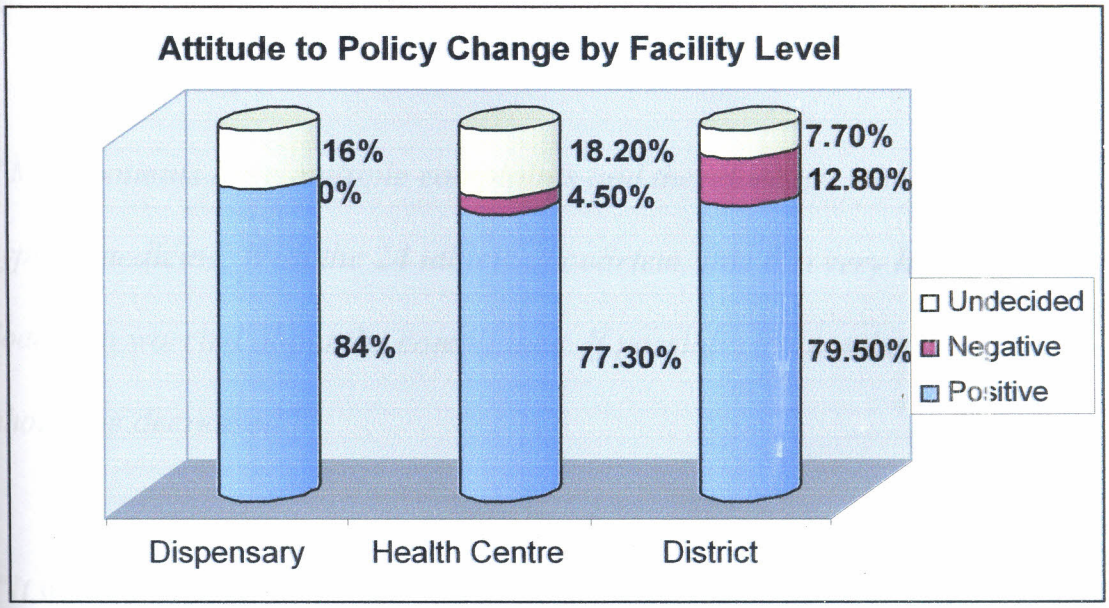
When comparing attitude by age, the majority of respondents in all age groups had a positive attitude to the intended policy change on malaria treatment. This is shown in Table 10.

Table 10: Attitude to Policy Change by Age (N=86)

Age group	Positive	Undecided	Negative	TOTAL
20-29 yrs	85.7%(24)	7.1% (2)	7.1% (2)	100% (28)
30-39 yrs	77.3% (17)	13.6% (3)	9.1% (2)	100% (22)
Above 40 yrs	77.8% (28)	16.7% (6)	5.6% (2)	100% (36)
TOTAL	80.2% (69)	12.8% (11)	7% (6)	100% (86)

Figure 7 shows the relationship between the type of facility and the attitude to policy change.

Fig 7: Attitude to Policy Change by Facility Level (N=86)



The results demonstrate that more than three quarters of all the respondents had a positive attitude to the intended policy change on malaria treatment.

Dispensaries had the highest percentage of positive attitude to policy change (84%).

Findings from the qualitative data also indicated some of the concerns that the HCW had with the intended treatment policy change.

"Will the Government be able to sustain the supply of test kits? If everyone with fever should undergo a malaria test, we will run out of test kits. We will then go back to the clinical diagnosis of malaria because the drugs will be available but not the test kits. Therefore, the MoH should make sure that the test kits are always available so that we can adhere to the new policy".

"Most patients have multiple complaints and therefore get more than one type of medicine. With the 24 tablets of coartem, this is a very heavy tablet load. I'm worried about the compliance. If possible, the number of tablets should be decreased".

"It will make things more laborious for us. We can no longer just diagnose malaria clinically, we have to confirm each case before treatment. It is labour being added to the health worker as you have to see the same patient again when they come from the lab".

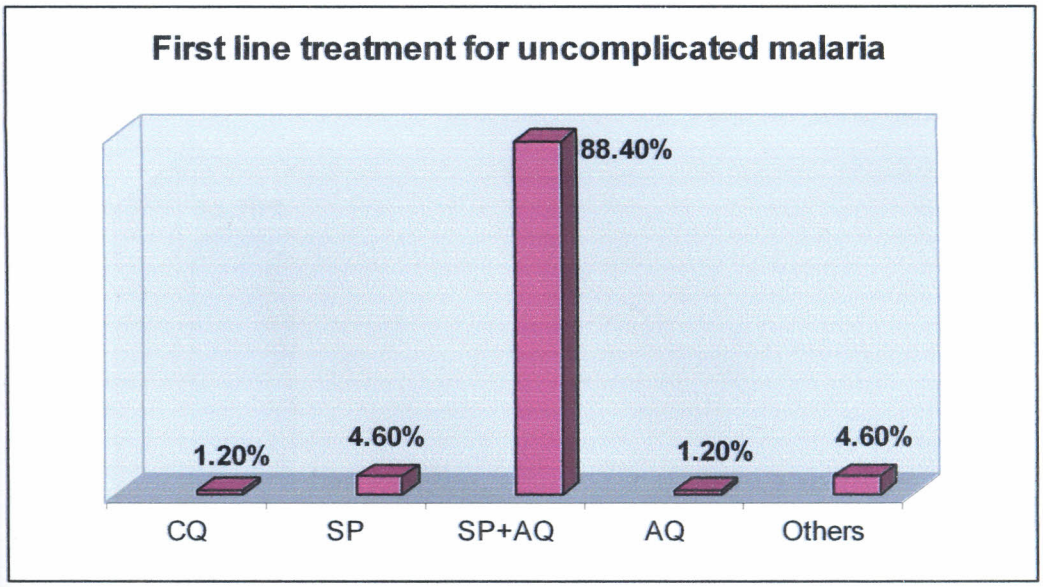
"Although the policy is good, when the drug runs out of stock, it will be very difficult for the patient to buy the drugs themselves because it is expensive. The government needs to ensure that it is always in stock because our patients can not afford it".

5.4 MALARIA CASE MANAGEMENT PRACTICE

The results showed that 9.3 %(8) of the respondents carried out a malaria test all of the time while 21 %(18) did so most of the time and 33.7 %(29) some of the time. 36 %(31) of the respondents said that they do not carry out tests to confirm malaria.

Figure 8 shows the drugs used for first line treatment of uncomplicated malaria by the respondents.

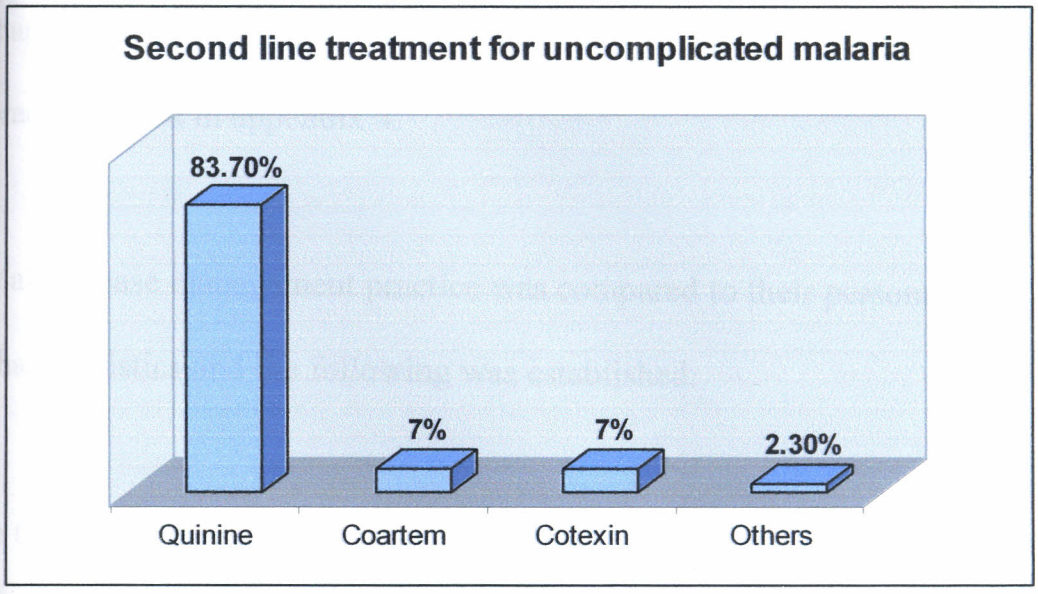
Fig 8: 1st Line Treatment for Uncomplicated Malaria (N=86)



According to the results, 4.6% of the respondents used SPs and 88.4% used a combination of SP and Amodiaquine as first line treatment for uncomplicated malaria. Only 1.2% used Amodiaquine alone and another 1.2% used Chloroquine.

Figure 9 shows the drugs used for second line treatment of uncomplicated malaria by the respondents.

Fig 9: 2nd Line Treatment for Uncomplicated Malaria (N=86)



The results showed that 83.7% of the respondents used quinine, 7% used coartem, 7% used cotexin and 2.3% used other drugs such as halofantrine, mefloquine, doxycycline, neem tree extracts as second line treatment for uncomplicated malaria. When asked about the weighing of children, 72.1 %(62) of the respondents said that they weighed children before prescribing antimalarials while 27.9 %(24) did not. Only 45.3% (39) of the respondents said that they had a copy of the national malaria treatment guidelines on site. 63.6% of respondents based at the Health Centres had a copy, while only 40% of respondents at the dispensary level and 38.5% at the district and sub-district hospital level had a copy.

Out of the 86 respondents, 70.9 %(61) had positive malaria case management practices as scored using the criteria for assessing positive practice given in appendix 4.

Malaria case management practice was compared to their personal characteristics and the following was established:

In the analysis of practice by cadre, the nurses formed the largest proportion of respondents with positive practice. Almost two thirds of all the HCW in the different cadres had positive malaria case management practices. There was no significant association between cadre and malaria case management practice ($p>0.05$). This is shown in Table 11.

Table 11: Relationship between Practice and Cadre (N=86)

Cadre of HCW	Positive Practice	Negative Practice	TOTAL
Nurse	74.1% (40)	25.9% (14)	100% (54)
Clinical Officer	65.2% (15)	34.8% (8)	100% (23)
Doctor	66.7% (6)	33.3% (3)	100% (9)
TOTAL	70.9% (61)	29.1% (25)	100% (86)
$X^2 = 0.702$	$df = 2$	$p > 0.05$ (0.704)	

In the analysis of practice by sex, the majority of respondents of both sexes had positive malaria case management practices. There was no significant association between sex and malaria case management practice ($p>0.05$). This is shown in Table 12.

Table 12: Relationship between Practice and Sex (N=86)

Sex	Positive Practice	Negative Practice	TOTAL
Male	68.5% (37)	31.5% (17)	100% (54)
Female	75% (24)	25% (8)	100% (32)
TOTAL	70.9% (61)	29.1% (25)	100% (86)
	$X^2 = 0.409$ $df = 1$ $p > 0.05$ (0.522)		

In the analysis of practice by working years, the results showed that the majority of respondents in each category had positive malaria case management practices. There was no significant association between number of working years and malaria case management practice ($p>0.05$). This is shown in Table 13.

Table 13: Relationship between Practice and Working Years (N=86)

Number of working years	Positive Practice	Negative Practice	TOTAL
0-2 yrs	61.1% (11)	38.9% (7)	100% (18)
3-5 yrs	81.8% (9)	18.2% (2)	100% (11)
Above 5 yrs	71.9% (41)	28.1% (16)	100% (57)
TOTAL	70.9% (61)	29.1% (25)	100% (86)
$X^2 = 1.502$ $df = 2$ $p > 0.05$ (0.472)			

When comparing practice by level of training, the respondents with certificate level of training had the highest proportion of those with positive malaria case management practices. There was no significant association between level of training and malaria case management practice ($p>0.05$). This is shown in Table 14.

Table 14: Relationship between Practice and Level of Training (N=86)

Level of training	Positive Practice	Negative Practice	TOTAL
Certificate	77.3% (34)	22.7% (10)	100% (44)
Diploma	63.6% (21)	36.4% (12)	100% (33)
Degree	66.7% (6)	33.3% (3)	100% (9)
TOTAL	70.9% (61)	29.1% (25)	100% (86)
$X^2 = 1.789$ $df = 2$ $p > 0.05$ (0.409)			

In the analysis of practice by the facility level, respondents from the health centres formed the highest proportion of those with positive malaria case management practices. There was no significant association between type of facility and malaria case management practice ($p>0.05$). This is shown in Table 15.

Table 15: Relationship between Practice and Facility Level (N=86)

Level of facility	Positive Practice	Negative Practice	TOTAL
Dispensary	72% (18)	28% (7)	100% (25)
Health Centre	81.8% (18)	18.2% (4)	100% (22)
District and sub district	64.1% (25)	35.9% (14)	100% (39)
TOTAL	70.9% (61)	29.1% (25)	100% (86)
$X^2 = 2.160$ $df = 2$ $p>0.05$ (0.340)			

When comparing practice by age, the respondents who were above 40 years formed the highest proportion of those who had negative malaria case management practices. There was no significant association between age and malaria case management practice ($p>0.05$). This is shown in Table 16.

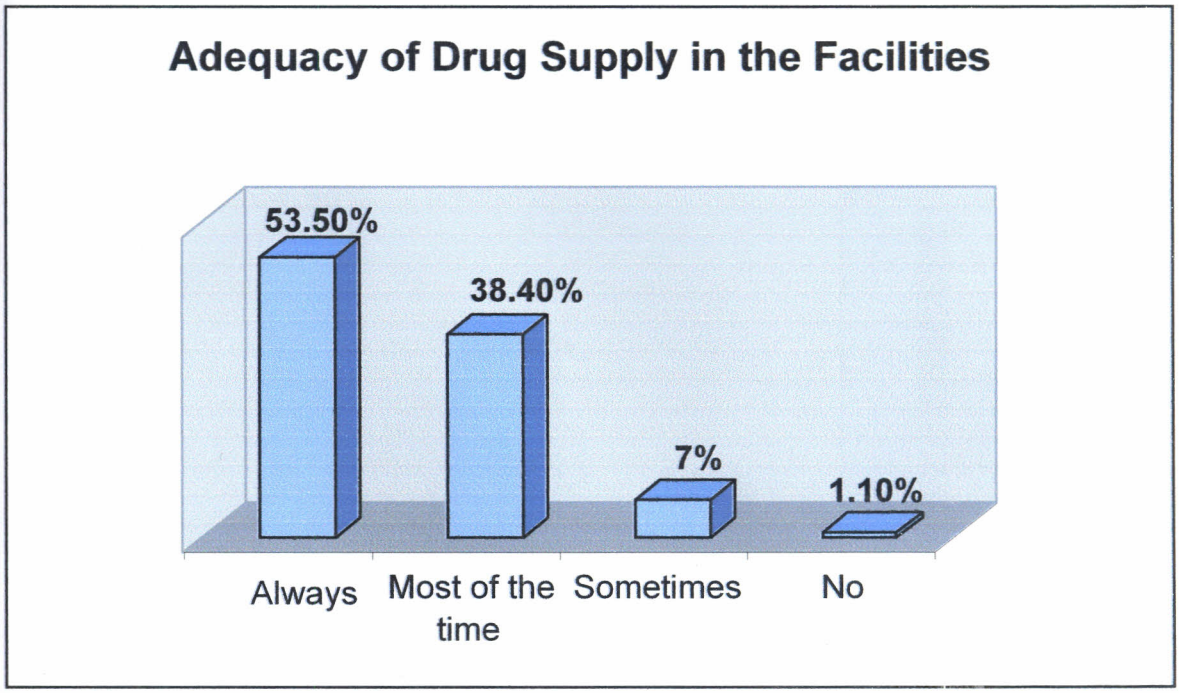
Table 16: Relationship between Practice and Age (N=86)

Age group	Positive Practice	Negative Practice	TOTAL
20-29 yrs	71.4% (20)	28.6% (8)	100% (28)
30-39 yrs	77.3% (17)	22.7% (5)	100% (22)
Above 40 yrs	66.7% (24)	33.3% (12)	100% (36)
TOTAL	70.9% (61)	29.1% (25)	100% (86)
$X^2 = 0.750$ $df = 2$ $p > 0.05$ (0.687)			

5.5 FACILITY SUPPORT SERVICES

This section aimed to establish if the health facilities had all the necessary support services that would facilitate the HCW to manage malaria properly. Figure 10 shows the supply of antimalarials in the facilities as reported by the respondents.

Fig 10: Adequacy of Drug Supply in the Facilities (N=86)



This shows that the majority of facilities (53.5%) have antimalarials all the time. However, a significant portion (56.5%) has drugs most of the time, sometimes or not at all.

Figure 11 shows how the laboratories function in the health facilities as reported by the respondents.

Fig 11: Availability of Laboratory Support Services (N=86)

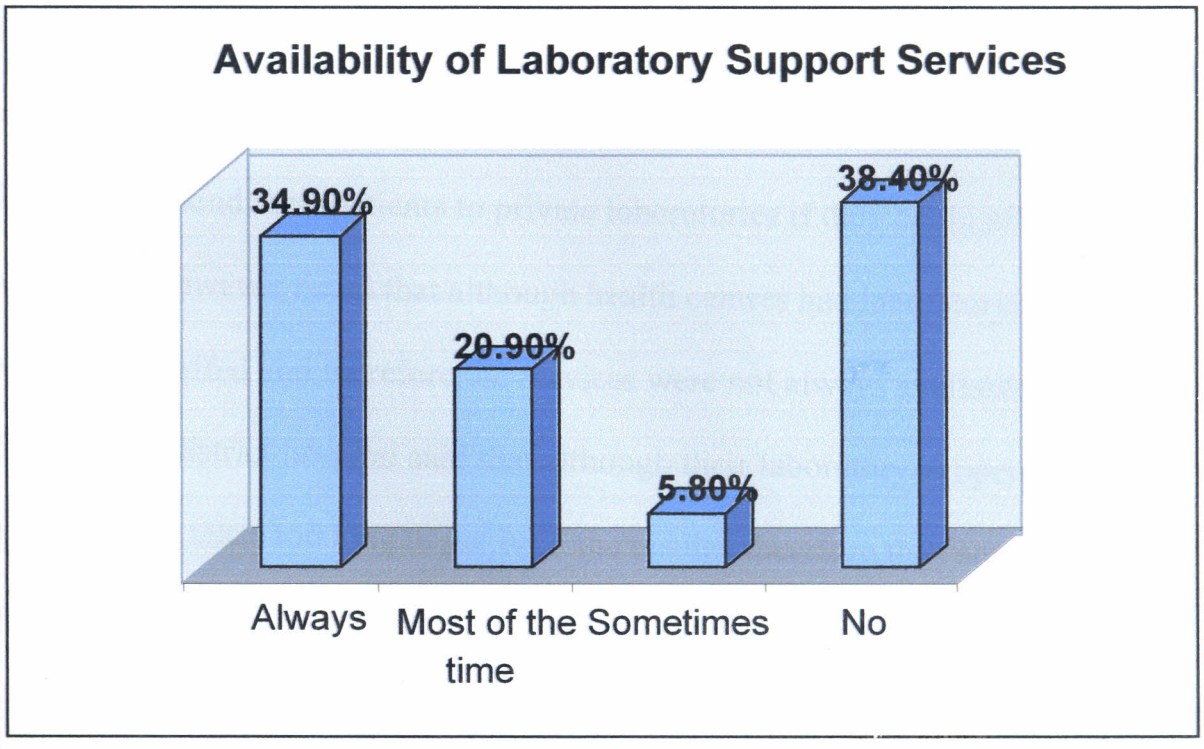


Figure 11 shows that the majority of facilities (65.1%) do not have a laboratory which functions all the time. This means that only 34.9% have access to laboratory services all the time which is way below half.

One of the findings from the qualitative data showed that there were some problems with the laboratory services.

"It takes too long to get results from the lab therefore I prefer to treat malaria clinically to avoid wasting a lot of time for both me and the patient".

Data from the FGD indicated that HCW at the dispensary level lacked laboratory services at their facilities and hence they had to make clinical diagnosis or send their patients to private laboratories if they could afford to pay. It was however noted that although health centres had laboratories, they were understaffed and therefore the services were not always available. The HCW at the district hospital said that although their laboratory is open 24 hours a day it takes too long to get back the results, therefore they sometimes opt for clinical diagnosis.

Other findings from the qualitative data elaborated on the various difficulties faced by the laboratory staff.

"We only have two labs in this hospital with one microscope each. These microscopes are in poor condition because they are not serviced. They can't be spared for service because the laboratories will not be able to function without them. Because of this, the lenses are full of dust and mould. We really have to strain to see well. This creates room for a lot of errors".

"The hospital does not provide new slides. We get used ones from the KEMRI laboratory next door which have been used for wet preparations. We reuse them up to three times. The stains used each time the slide is reused may conflict leading to difficulty in interpretation because some stain permanently. Some times we end up seeing both cocci and malaria parasites on the same slide".

"Our working conditions are very bad. The stools we sit on are broken and uncomfortable. We are under a lot of pressure to maintain standards and get similar results to the KEMRI laboratory in case the patients decide to confirm our results".

"We also have a heavy workload. We carry out between 60 to 70 malaria tests per day. This same microscope is the one that carries out all the other tests requested and by the same person. This causes the long waiting time".

"There is a great shortage of laboratory staff. We only have three staff to run the two laboratories on a 24 hour basis. This leads to low morale among us. Also, we are sent for trainings but the promotions are too slow".

In the analysis of practice by having a copy of the treatment guidelines, the results showed that there was a significant association between having a copy of the treatment guidelines at the facility level and malaria case management practice ($p<0.05$). This is shown in Table 17.

Table 17: Relationship between Practice and Treatment Guidelines (N=86)

Have copy of treatment guidelines	Positive Practice	Negative Practice	TOTAL
Yes	89.7% (35)	10.3% (4)	100% (39)
No	55.3% (26)	44.7% (21)	100% (47)
TOTAL	70.9% (61)	29.1% (25)	100% (86)
	$X^2 = 12.250$ $df = 1$ $p < 0.05$ (0.000)		

CHAPTER SIX: DISCUSSION

Provision of prompt and effective treatment is one of the strategic interventions of the National Malaria Strategy in Kenya. Among the key activities that support this is the provision of effective malaria case management services by healthcare workers. This study was done a few weeks before the nationwide rollout of the new malaria treatment policy using ACTs as the first line treatment for uncomplicated malaria and which also recommends a confirmatory laboratory test for children above five years and adults.

This study showed that the majority of healthcare workers were supportive of the intended malaria treatment policy change but also it revealed some practices and limitations that may hinder the effective rollout of the new treatment policy.

Adherence to Policy

At the time when SP resistance was noted to be very high and plans were underway to bring in ACTs, the government recommended that SPs should no longer be used to treat malaria. Instead they recommended the use of Amodiaquine in the interim period pending the deployment of ACTs. This

ecommendation was done in January 2006. However, the results showed hat the HCW did not adhere to this treatment recommendation from the Ministry of Health. The majority of them (88.4%) used a combination of SP and AQ to treat uncomplicated malaria. Only a small number (1.2%) used AQ to treat malaria as recommended by the MoH. Surprisingly, Chloroquine which stopped being the treatment of choice for uncomplicated malaria about ten years ago was still in use in Kilifi District (1.2%). Some respondents also mentioned that they also prescribed Neem tree extracts to treat malaria. These extracts were obtained from the local herbalists by the patients.

Another worrying finding was that Coartem was already being used as second line treatment for uncomplicated malaria even before being officially started as first line treatment. The recommended second line treatment for uncomplicated malaria is Quinine and therefore the HCW were clearly violating the treatment policy. This is highlighted in a study carried out in Senegal[39] soon after the change in their malaria treatment policy from CQ to SP. It was found out that the nurses had not yet mastered the proper use of the new medications and the prescriptions given were not always in line with the policy. Therefore to prevent these policy violations, the MoH needs to

ensure that all HCW get thorough training on the new treatment policy and the rest of the population educated on the new recommended malaria treatment.

The attitude of the HCW in relation to the policy change in first line malaria treatment is also important because studies have shown that unwillingness of HCW to stop using a particular drug affects the implementation of the replacement drug[23]. This study showed that the majority of HCW in Kilifi District (80.2%) had a positive attitude to the policy change. Fevre et al highlighted that it was important to ensure that all key players are in agreement on the new policy so that they can cooperate fully[34]. Therefore it is imperative that the government ensures that all HCW are well educated on the new treatment policy and that all the various difficulties they have with the new treatment have been sorted out. This will enable them to embrace the new treatment and let go of the old treatment which is no longer effective.

This study also found out that only half of the HCW had access to adequate antimalarials drug supply all the time. Availability of the recommended drugs is very important in ensuring adherence to the treatment policy. This

means that the Government must ensure that all health facilities have adequate drug supplies at all times. This was also shown in a study done in Western Kenya[29] where lack of medicines, absence of updated treatment guidelines, poor laboratory services and inadequate training combined to produce poor treatment practices. Therefore to ensure adherence to the new policy, the HCW must be well trained at the start of the policy change, have frequent in service trainings and have access to functional support services such as laboratories and pharmacies as well as job aids.

Healthcare Worker Capacity

Knowledge

The majority of HCW were found to have adequate knowledge on malaria. Almost all of HCW could accurately distinguish between uncomplicated malaria and severe malaria. HCW mentioned fever, joint aches, headache, and chills as some of the key signs of uncomplicated malaria. They also said that convulsions, coma, severe anaemia, respiratory distress were some of the key signs of severe malaria. This showed that they could adequately identify the different presentations of malaria. Most of the HCW were also able to correctly identify some of the factors which have been shown to have an association with the development of drug resistance. They named under

dosage, use of wrong drugs, presumptive treatment of malaria, lack of compliance as some of the factors. The HCW during the focus group discussion acknowledged that because of their frequent use of presumptive treatment, they were aware that they may not have been dealing with malaria in all the cases they treated as malaria.

The majority of HCW updated their knowledge of malaria through books, journals and continuous medical education. There was also an effort made to train the HCW as the majority of them (68.6%) had attended some form of training on malaria case management. It was also a positive finding that the majority of the lower cadres who form the bulk of the HCW were the ones mostly attending the trainings.

However, it was worrying that the doctors who tend to deal with the complicated malaria cases did not get to have much training. The doctors were also found to have the highest proportion of those with inadequate knowledge among all the cadres. Therefore, the assumption that doctors would be more knowledgeable on malaria case management may affect the implementation of uniform malaria treatment. A study in Ghana[40] found that only 11.6% of pregnant women take antimalarial prophylaxis due to poor

wledge of HCW on the correct dosage and the fear of abortion. This lack staff knowledge was linked to poor uptake of IPT in pregnancy. This phasizes the need for further in- house training or continuous medical ucation to equip HCW with the appropriate knowledge. Therefore all CW regardless of their cadre must have access to regular trainings on alaria so that their treatment practices are correct and up to date.

A study in Nigeria[41] on the knowledge and management of malaria by primary health workers showed that despite their knowledge being adequate, their treatment practices were poor. Also their history taking and physical examinations were found to be rudimentary. This further emphasizes the need for regular education programmes especially for the health workers with many years of experience to help them maintain good clinical skills and refresh their knowledge.

Less than half of the HCW said that they did not know enough about the current malaria treatment policy and the majority (95.3%) were very willing to be educated further on malaria treatment. There have been many changes in the field of malaria because of emerging drug resistance and HCW sometimes get confused and not too sure of which drug is the right one to

use. It is therefore imperative for the HCW to be constantly kept abreast of the developments in the field of malaria treatment and ensure that their practices follow the national treatment guidelines.

Therefore the majority of HCW (95.3%) were found to have adequate knowledge on malaria as scored using the criteria in appendix 4. This was statistically significantly higher than the hypothesised value of 50% ($p<0.05$).

Practices

Personal characteristics like age, sex, cadre, level of training, number of working years were found not to have a significant relationship with malaria case management practice. This means that malaria case management practice does not depend on age, level of training or number of working years, or type of facility one works in. This showed that HCW at the district level still had similar practices as those at the dispensary level despite the ones at the dispensary level having very little access to laboratory services and good drug supply.

In Ghana, it was found that discrepancies did exist between knowledge and practice[26]. High knowledge levels did not automatically translate to correct practices hence the need for continuous supervision and continuous medical education. Similarly, in Tanzania[42] a study on the knowledge and management of malaria showed that the knowledge of the rural medical aides on the signs and symptoms of malaria and which drugs cure malaria was satisfactory. However only, 65% of them could remember the correct dose of CQ for an adult. This proved that their management of malaria was inadequate and showed the need for introduction of treatment charts and guidelines to support the health workers as well health education promotion to the public.

At least more than two thirds of the HCW said that they weighed children before prescribing antimalarials to them. This is a good practice which needs to be enforced. This would ensure that the children get the right dose of antimalarials according to their body weight. This is a critical point as a study done in Western Kenya[30] showed that only 25% of patients received the correct dose of antimalarials based on their body weight. Most of them were under dosed and this is one of the factors known to be associated with the development of resistance.

More than two thirds of the HCW (70.9%) were found to have positive practices in malaria as scored using the criteria given in appendix 4. This *was statistically significantly higher than the hypothesised value of 50%* ($p<0.05$).

Attitudes

Although the majority of the HCW (80.2%) were happy about the treatment policy changes, a substantial number of them believed that the policy change would not solve the problems facing malaria treatment. Some felt that their workload would be increased as they would have to test everyone for malaria as there is no room for presumptive treatment in the new policy. Others felt that they would get reduced incomes as the new drugs were very effective hence the number of patients would go down. The majority of the staff who were undecided about the policy change were nurses while the majority of those with a negative attitude to the policy change were the clinical officers.

The results also showed that the respondents who had been working in the field for 5 years and more comprised the largest percentage of those who were undecided about the policy change. The HCW from the dispensaries had the highest percentage of positive attitude to policy change (84%). This

probably because the policy also introduces the rapid diagnostic test kits (RDT) which makes malaria confirmation possible at the dispensary level. This would enable them to carry out malaria tests easily for their patients, which was not previously possible.

More than two thirds of the HCW (80.2%) were found to have positive attitudes to the policy change. This was statistically significantly higher than the hypothesised value of 50% ($p<0.05$).

Support Services

Laboratory services are crucial to malaria case management. The new policy recommends parasitological confirmation either by microscopy or RDTs for all suspected malaria cases. The results showed that very few HCW (9.3 %) always carried out confirmatory laboratory testing for their patients. This showed that presumptive treatment of malaria by the HCW in Kilifi District is very common. This is similar to what was found in a study by Abuya et al[27] where presumptive treatment of malaria was carried out in 40% of the cases. The laboratory diagnosis rates for malaria were also found to be low in public health facilities (21.2%) in Yemen[43]. Presumptive treatment is a

ractice that needs to be discouraged as it leads to unnecessary use of ntimalarials as not all febrile illnesses are malaria.

'his particular finding is an indication that there will be a problem with .dherence to the new policy as less than half of the HCW (34.9%) have ıccess to laboratory services all the time. If one does not have access to a 'unctional laboratory all the time, then they cannot be able to confirm the presence of malaria routinely. Therefore, in order for the confirmatory testing to be done all the time, there is a strong case for the deployment of RDT kits to health facilities where laboratory services are unavailable or limited. However, because of the high prevalence of malaria in our country, the new policy still advocates for the presumptive treatment of malaria in children under five years and pregnant women. Also, in resource poor settings, there is justification for the presumptive treatment of malaria. This is because the RDT kits are quite expensive and therefore if they are not available, then the HCW will have to treat malaria presumptively.

The HCW also gave various reasons during the FGD as to why they do not carry out confirmatory laboratory tests. High on the list was unavailable laboratory services, defective equipment, lack of laboratory staff and long

waiting times. There is a severe shortage of qualified laboratory staff which needs to be addressed by the Ministry of Health. The laboratories have microscopes that are defective and hardly ever serviced. There are problems with the supply of new slides which forces the laboratory staff to reuse slides. These are practices which are not acceptable and expose them to infection. The government should ensure that all public health facilities have enough microscopes which are fully functional and are well staffed. This way it will be easier for the HCW to adhere to the new policy.

Only half of the HCW said that they had adequate antimalarial supply at their facilities all the time. The rest of the HCW had adequate supply most of the time, sometimes or not at all. Due to the high poverty levels in the district, if the drugs are not available at the facility, then the patients will not be able to afford to buy them at a pharmacy. Therefore all health facilities should ensure that they have adequate antimalarials drug supply for their patients. The services at the public health facilities are more attractive to the general population as they are subsidized by the government.

Therefore at the facility level, factors that influence the success of implementation of policy include the quality of health service personnel,

infrastructure and the resources available. This was shown in Tanzania where the quality of performance was linked to the level of training[44]. It was suggested that in areas where implementation is poor, what needs to be established is whether the problem is lack of knowledge or workplace constraints that prevent translation of knowledge into appropriate practice. This therefore strengthens the case for ensuring that each health facility is adequately able to support the treatment practices of its HCW.

Treatment Guidelines, Job Aids

The results showed that the availability of treatment guidelines at the facility level had a positive effect on malaria case management practice. Less than half of the respondents had a copy of the malaria treatment guidelines at their facility. There was a significant association between having a copy of the treatment guidelines at the facility level and malaria case management practice ($p< 0.05$). This is because the guideline is meant to be a reference tool in case of complications with malaria treatment as well as guiding on dosage. Lack of a reference document like the Malaria treatment guideline ultimately adversely affects the treatment practices in malaria.

Treatment charts, flow charts and other job aids have also been shown to be very helpful in reminding HCW on the proper management of malaria as established by Zurovac et al[25] in a study done in Kenya. Therefore the Government should ensure that all HCW have a copy of the treatment guidelines as well as job aids such as wall charts and treatment algorithms which have been found to improve the treatment practices of HCW.

When asked what they think should be done to reduce the problem of drug resistance, the HCW had several suggestions. They said that there should evidence based treatment of malaria and no more presumptive treatment of malaria. They also said that they needed to be regularly trained and constantly updated on malaria treatment so that they can give the right treatment, correct dosage and the correct duration of treatment to their patients. They also suggested that patients need to be educated on the risks of self medication and the importance of compliance to treatment. They also acknowledged the fact that they would be the ones who need to teach this to their patients. The HCW also said that they need to adhere to the set treatment guidelines and the recommended drugs. They also requested that the government should ensure that the RDT kits are always available to enable evidence based treatment of malaria.

CHAPTER SEVEN: CONCLUSIONS AND RECOMMENDATIONS

7.1 CONCLUSIONS

1. The majority of HCW were not adhering to the recommended malaria treatment at the time of the study. Most of the HCW used SPs and Amodiaquine in combination to treat uncomplicated malaria and not Amodiaquine alone as recommended by the Ministry of Health. Some HCW had also been using coartem as second line treatment for uncomplicated malaria.

2. The majority of HCW were found to have adequate knowledge on malaria. They also knew the cardinal symptoms of both types of malaria and also knew most of the major factors associated with the development of drug resistance. This was higher than the hypothesized value of 50%. Nurses were found to have had more opportunities for training on malaria case management as compared to clinical officers and doctors. Only 68.6% of the respondents had attended training on malaria since they left college. Most of the HCW were very willing to be educated further on malaria treatment.

3. The majority of health workers had a positive attitude to the intended policy change. They acknowledged that it was timely and very necessary. Only a few had a negative attitude or were undecided. The majority of the HCW who were undecided about the policy change were nurses while the majority of those with a negative attitude to the policy change were the clinical officers. The HCW who had been working in the field for 5 years and more comprised the largest percentage of those who were undecided about the policy change. The HCW from the dispensaries had the highest percentage of positive attitude to policy change.

4. More than two thirds of the HCW were found to have positive malaria case management practices although very few of them regularly carried out confirmatory malaria testing. More than a third of the HCW do not carry out any tests to confirm malaria.

5. Less than half of the HCW said that they had a copy of the Malaria treatment guidelines at their facility. There was a significant association between having a copy of the treatment guidelines at the facility level and malaria case management practice.

6. The majority of HCW did not have access to a laboratory which functioned all the time. Most laboratories had defective microscopes, limited microscope slides and were short of staff. Only half of the HCW said that they had adequate antimalarial supply at their facilities all the time.

7. The majority of the facilities did not have malaria treatment guidelines displayed in the room for easy reference. The staff admitted on having to rely on their memory in some difficult cases as there was no quick access to any material on malarial treatment and dosages by age and especially by weight.

7.2 RECOMMENDATIONS

1. All public health facilities should have a copy of the national malaria treatment guidelines. All HCW should also have a personal copy. All the treatment rooms in the health facilities should also have treatment charts, flow charts and other job aids that will help the HCW remember to do the right thing when managing malaria. These visual reminders have been shown to be very helpful.

2. All HCW of whatever cadre who treat patients should have access to regular trainings on malaria management. They need to be educated on how their practices may contribute to the development of drug resistance. With regular trainings, the HCW will be able to manage malaria more effectively and follow the national guidelines. This will help them to be constantly kept abreast of the developments in the field of malaria treatment and ensure that their practices follow the national treatment guidelines.

3. All public health facilities should either have RDTs available or have fully functional, well equipped laboratories with adequate staff as well as antimalarial drug supply all the time.

4. The Ministry of Health should routinely conduct checks and establish the malaria case management practices of HCW and ensure that they are adhering to the national treatment guidelines.

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APPENDICES

APPENDIX 1: STUDY QUESTIONNAIRE

Date _____ Interviewer _____

Name _____ Serial No. _____

Health facility_____

1) Age

1. 20-30 years
2. 30-40 years
3. >40 years

2) Sex

1. Male
2. Female

3) Staff cadre

1. Nurse
2. Clinical officer
3. Doctor
4. Pharmaceutical technician
5. Pharmacist
6. Any other_____

4) Training level

1. Certificate
2. Diploma

3. Degree
4. Others _____

5) Years of service

1. 0-2 years
2. 3-5 years
3. >5years

6) How do you diagnose malaria in a patient?

1. History taking
2. Clinical examination
3. Laboratory test
4. Others _____

7) List three important symptoms of uncomplicated malaria.

_____
_____
_____

8) List three important symptoms of severe malaria.

_____
_____
_____

9) Do you carry out a laboratory test for malaria before giving treatment?

1. No
2. Sometimes
3. Most of the time
4. All of the time

10) Does the laboratory in this facility work?

1. No
2. Sometimes
3. Most of the time
4. Always

11) Do you always have an adequate supply of antimalarials in this facility?

1. No
2. Sometimes
3. Most of the time
4. Always

12) Do you have a weighing scale in your facility?

1. Yes
2. No

13) Do you always weigh children before you prescribe an antimalarial?

1. Yes
2. No

14) What drugs do you use to treat uncomplicated malaria among your patients?

1. Chloroquine
2. Sulfadoxine-pyrimethamine compounds
3. Amodiaquine
4. Any other _____

15) Are you aware of any other drugs, which are available for treatment of uncomplicated malaria? Which ones?

1. _____

2. _____
3. _____
4. _____
5. _____

16) What do you use to treat malaria again if the first drug does not work?

1. _____
2. _____
3. _____
4. _____

17) Have you ever seen the current malaria treatment guidelines?

1. Yes
2. No

18) Do you have a copy of the current malaria treatment guidelines?

1. Yes
2. No

19) Have you had any refresher training on malaria treatment since you started working?

1. Yes
2. No

20) How do you update your knowledge about malaria treatment?

1. Malaria seminars/ health talks
2. Supervisors from MoH
3. Books/ Journals
4. Others _____
5. Never

21) Do you think you know enough about the current malaria treatment policy?

1. Yes
2. No

22) Do you wish to be educated further to acquire more knowledge on malaria treatment?

1. Very willing
2. Reluctant
3. No

23) Have you heard of the intended policy change of the first line treatment of uncomplicated malaria?

1. Yes
2. No

24) What do you think about it?

_____

_____

_____

25) Are you aware of some of the reasons why the policy is being changed?

1. Yes
2. No

26) If yes, what are some of the reasons?

1. _____

2. _____
3. _____
4. _____
5. _____

27) Do you know some of the factors associated with the development of antimalarial drug resistance?

1. Yes
2. No

28) If yes, what are some of them?

1. _____
2. _____
3. _____
4. _____
5. _____

29) What do you think should be done to reduce the problem of drug resistance among antimalarials?

_____

_____

_____

_____

APPENDIX 2: FOCUS GROUP DISCUSSION GUIDE

DATE: **TIME STARTED:**

VENUE: **TIME ENDED:**

Name of Assistant Moderators

1. a
2. b

My name is Dr Koki Kinagwi and I am a postgraduate student at the Department of Community Health of the University of Nairobi. I am carrying out this study as part fulfilment of the degree.

I would like to welcome you all to this participatory group discussion and thank you all for coming. With me are _____ and _____ who will help me record the key issues. We also have a radio cassette recorder to record the discussion so that we do not miss any points.

- I would like us to start the discussion by naming some of the drugs currently available for the treatment of uncomplicated malaria.
- What are some of the factors associated with the development of resistance to antimalarial drugs?
- Do you think that drug resistance is a major problem in the management of malaria?
- Is there any way we can help decrease the development of resistance to the antimalarials?
- What are your feelings about the impending policy change on malaria treatment?
- What problems do you face in treating malaria at your facilities?

I would like to thank all of you for your participation in this discussion. It has been a good and very informative one. I thank you for your contribution, which will be very helpful in the writing of the research report.

APPENDIX 3: CONSENT FORM (for individual respondents)

INVESTIGATOR

DR KOKI MULI-KINAGWI
MPH STUDENT DEPARTMENT OF COMMUNITY HEALTH
UNIVERSITY OF NAIROBI

I am conducting this study for the purpose of identifying the current malaria treatment practices in our public health facilities and their possible relationship to the development of antimalarial drug resistance. Interviews and observation tools will be used for data collection.

The aim of this study is to establish the knowledge, attitudes and treatment practices of heath care workers in malaria and their relationship to drug use patterns, which are associated with the development of drug resistance. This study also aims to offer recommendations to assist in the monitoring and evaluation of HCW treatment practices in malaria treatment. This is intended to contribute towards improved quality of care and ultimately a decrease in malaria morbidity and mortality.

Your participation in the study will be highly appreciated and the information offered will be treated with high confidentiality. If you decline to participate in the study, you will not be intimidated or coerced to do so under any circumstances.

A copy of the report will be presented to the Department of Community Health University of Nairobi and all the participating institutions. Copies will also be provided to the University of Nairobi library services for future references.

I _____ have read and/or been explained and understood the nature of the study and do give an informed and voluntary consent for participation in the study.

Sign_____

Date_____

APPENDIX 4: CRITERIA FOR ADEQUATE KNOWLEDGE AND POSITIVE PRACTICE IN MALARIA CASE MANAGEMENT

- **Criteria for adequate knowledge on malaria**

1. Three important symptoms of uncomplicated malaria	3points
2. Three important symptoms of severe malaria	3points
3. One correct reason why the policy is being changed	1point
4. Three factors associated with the development of resistance	3points

A total of **10** points.

A score of **6** and above was considered as adequate knowledge.

- **Criteria for positive practice in malaria**

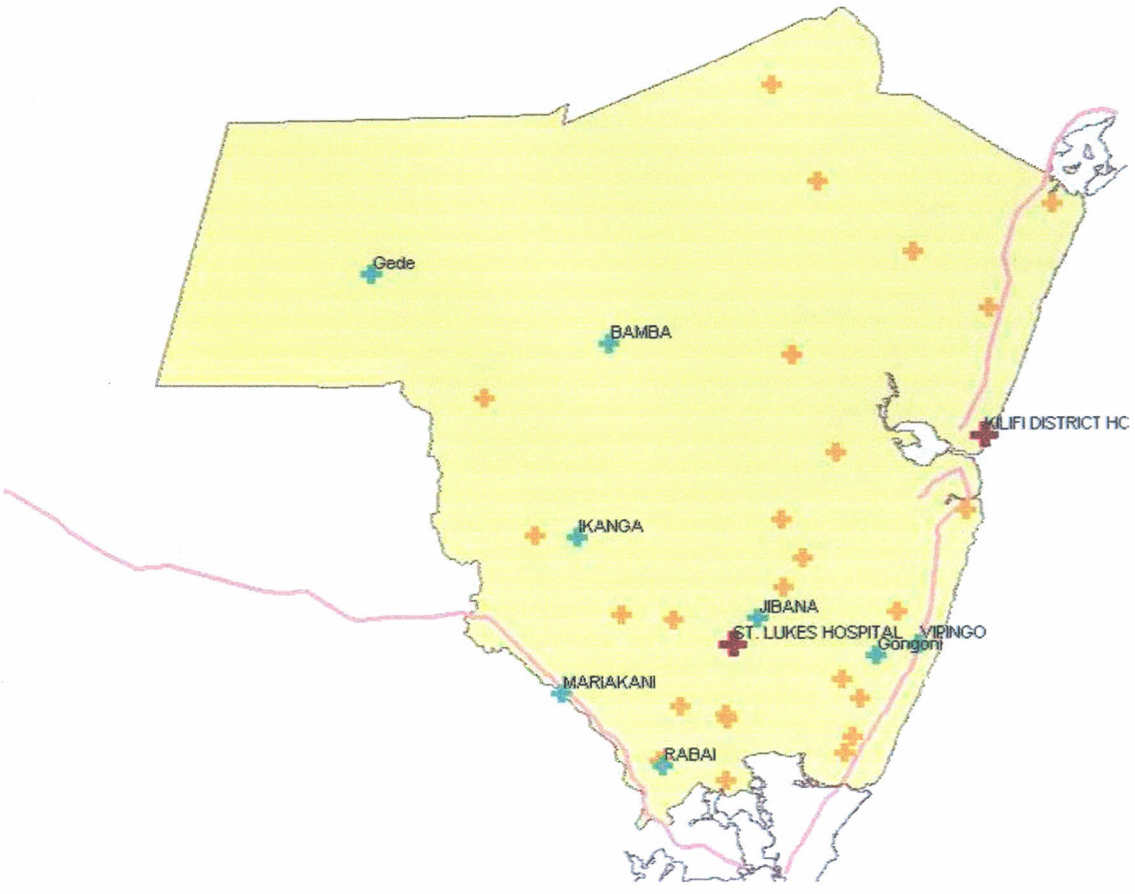
1. Carrying out laboratory test before treatment	1point
2. Weighing child before treatment	1point
3. Treatment with SP/AQ or ACT as first line treatment	1point
4. Treatment with Quinine or ACT as second line treatment	1point

A total of **4** points.

A score of **3** and above was considered positive practice in malaria treatment.

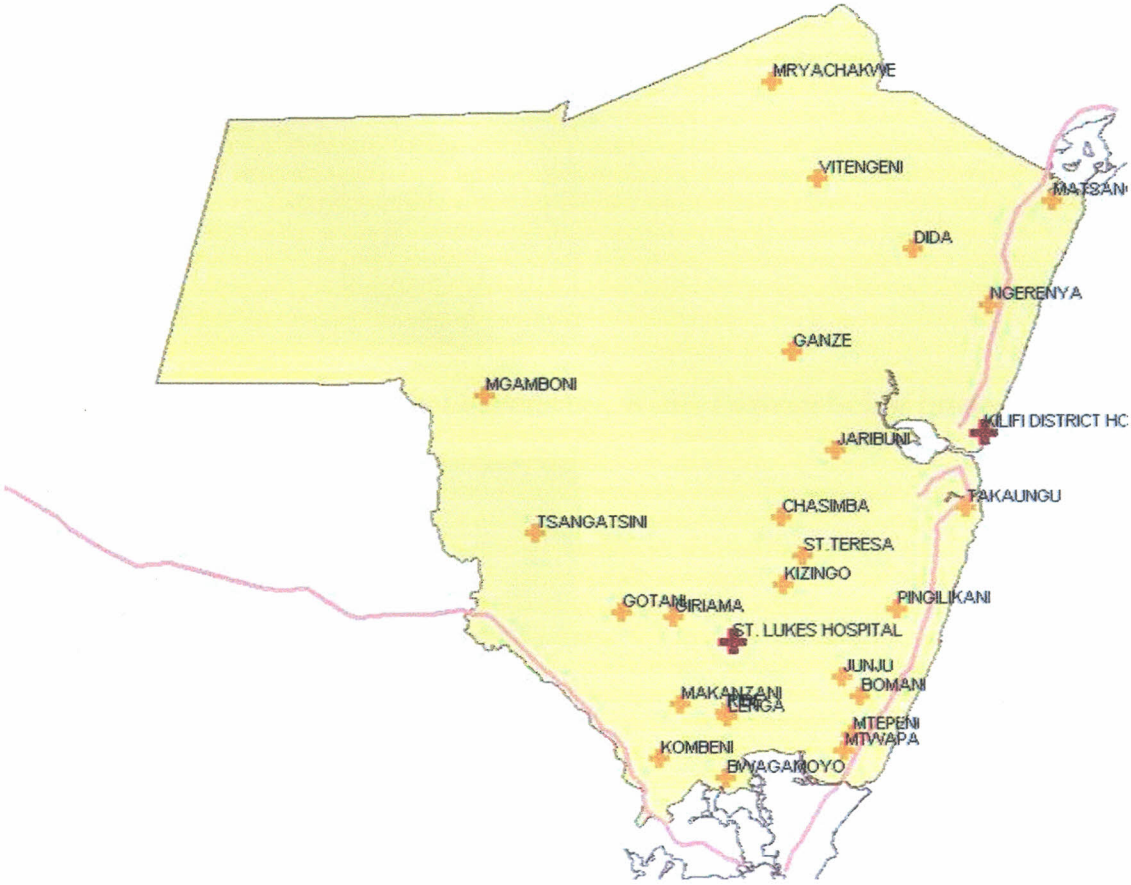
APPENDIX 5: MAP OF KILIFI DISTRICT HEALTH FACILITIES

Health Centres



MAP OF KILIFI DISTRICT HEALTH FACILITIES

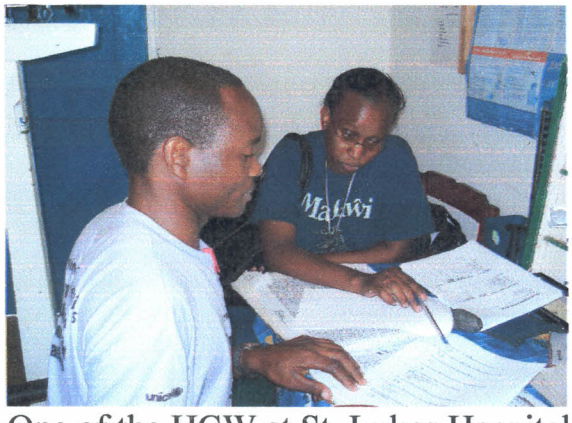
Dispensaries



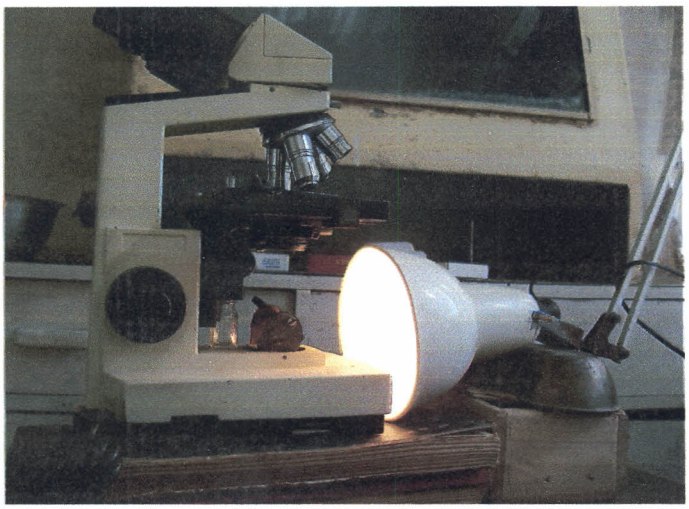
APPENDIX 6: PHOTOS FROM THE FIELD

One of the HCW at Mtwapa Dispensary, Kilifi District being interviewed

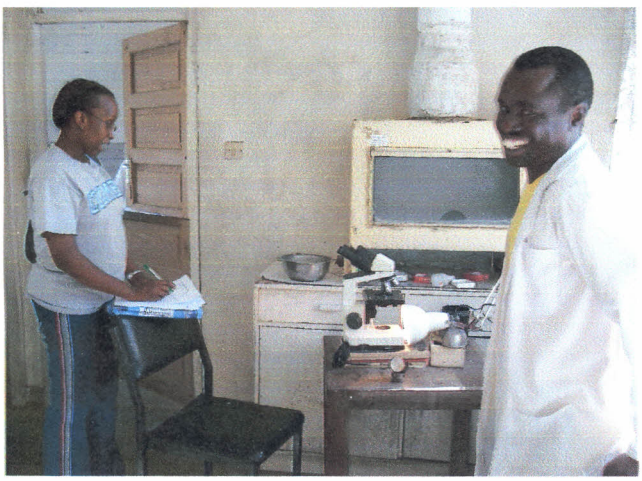
Dr Manya, a nurse and Dr Kinagwi at Bamba Health Centre, Kilifi District



One of the HCW at St. Lukes Hospital, Kilifi District being interviewed



A microscope with an improvised light source at one of the laboratories in Kilifi District.



A defective microscope with an improvised light source at one of the laboratories in Kilifi District.