TRANSLATING HEALTH POLICY INTO PRACTICE: SUCCESSES AND CHALLENGES AT IMPLEMENTATION IN BUNGOMA SOUTH DISTRICT, WESTERN KENYA.

By

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Dedications

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Abbreviations

ACT	Artemisinin Based Combination Therapy
ADR	Adverse Drug Reaction
AL	Artemether-Lumefantrine
AQ	Amodiaquine
CBS	Central Bureau of Statistics
CHW	Community Health Worker
CQ	Chloroquine
DHMT	District Health Management Team
DHRIO	District Health Records Information Officer
DOMC	Division of Malaria Control
DPF	District Pharmaceutical Facilitator
DPTWG	Drug Policy Technical Working Group
EDL	Essential Drugs List
IEC	Information Education Communication Material
IM	Intramuscular
IPT	Intermittent Preventive Treatment
KEMRI	Kenya Medical Research Institute
KEMSA	Kenya Medical Supplies Agency
KMIS	Kenya Malaria Indicator Survey
PPB	Pharmacy and Poisons Board

PSK	Pharmaceutical Society of Kenya
RDTs	Rapid Diagnostic Tests
RHFs	Rural Health Facility
SP	Sulfadoxine pyremethamine
WHO	World Health Organisation

Abstract

Background: Malaria is one of the most common infectious diseases in the world with more than 40 percent of the world's population at risk and one of the greatest public health concerns especially in sub Saharan Africa. In Bungoma South district, malaria is the leading cause of morbidity, accounting for 49 percent of the top ten diseases in the district. In 2006, Kenya implemented a new malaria treatment policy recommending the use of Artemether-Lumefantrine (AL) as the first line of treatment. National guidelines on the diagnosis, treatment and prevention and job aids were developed and disseminated to health workers alongside in-service training. The survey investigated whether the treatment of uncomplicated malaria conformed to the national treatment guidelines on diagnosis, treatment and prevention of malaria in Kenya.

Methods: In September 2009, 17 in face to face interviews were conducted in 17 health facilities in Bungoma South, with 31 health workers who routinely performed consultations at the out patient departments in their facilities as well as with 3 representatives of the District Health Management Team. Data on health facility inventory control practices and stock status was retrospectively collected from the records available. The main outcome measures were: availability of antimalarial drugs on the survey day, stock-outs in past six months, presence of AL wall charts, and health worker's exposure to in-service training on AL and access to new national malaria treatment guidelines

Results: Only 35 percent of the health facilities had access to job aids and current treatment guidelines and that 76 percent of the health workers had been trained on malaria case management. AL was almost universally available in all the health facilities on the day of survey, all facilities had recorded stock outs of AL six months prior to the survey and the duration of the stock outs was substantial lasting two months on average. Amodiaquine was not readily available in the health facilities.

Conclusion: These results offered evidence that treatment practices in uncomplicated malaria after policy change, do not fully conform to the national treatment guidelines on diagnosis, treatment and prevention of malaria in Kenya. The targets set for key implementation indicators by the division of malaria control, in terms of availability of recommended drug and training of health workers, have not been fully achieved. If the government does not ensure uninterrupted supply of recommended treatment, high quality focused training and appropriate patient education enhanced, and if provider prescription practices do not fully conform to the recommended treatment guidelines, the major potential public health benefits of AL may not be realized. These findings are important in providing evidence for decision making in future policy review.

1.0 Introduction

Malaria is one of the most common infectious diseases in the world with more than 40 percent of the world's population at risk (Hay et al 2008), and one of the greatest public health concerns especially in sub Saharan Africa. Malaria occurs due to infection by protozoan parasites of the genus *plasmodium*. These are transmitted from human to human through the bite of an infected female anopheles mosquito. There are four species that commonly infect man; *Plasmodium malariae, Plasmodium ovale, Plasmodium vivax, P.falciparum* and more recently *Plasmodium Knowlesi* (Bronner 2009). *P. falciparum* is the most widely prevalent species and is commonly found in tropical and subtropical regions (Hay et al 2008).

There were an estimated 247 million malaria cases among 3.3 billion people at risk in 2006, causing nearly a million deaths, mostly of children under 5 years. 109 countries were endemic for malaria in 2008, 45 within the WHO African region (World Malaria Report-2008). The bulk of these cases are found in sub Saharan Africa, which accounts for 80 percent of the estimated over 1 million deaths occurring annually worldwide (Oketch et al 2008). Malaria is the leading cause of morbidity and mortality in Kenya, accounting for 30percent of all out-patient attendance in the country's health facilities and 20 percent of in-patient admissions (MOH, 2006).

The incidence of fatal *P. falciparum* infections has been increasing in Africa since the early 1990s, coincidental with the rapid expansion of resistance to first line therapies. Chloroquine was the mainstay of malaria treatment in Africa, but since the 1980s its clinical efficacy has precipitously declined. The alternative therapy sulfadoxine-pyrimethamine (SP) has had a short effective therapeutic life and the Artemisinin based combination therapy has proved highly efficacious in Africa and is now recognized as the therapy of choice for countries with failing monotherapies (Zurovac et al 2005).

The biggest challenge to malaria control activities throughout the world is the development, spread and intensification of antimalarial drug resistance (William et al 2004). Drug resistance refers to the continued growth of a parasite in the presence of a standard dose of a drug to which it was previously sensitive. The drug or its metabolite selectively eliminates susceptible parasites and leaves parasites that have become resistant to it, i.e. mutants. Resistant parasites therefore multiply in the host and with time become the dominant parasite population (James & Gilles, 1985). Increased resistance of *P. falciparum* parasites to

commonly used antimalarials like chloroquine resulted in many endemic countries changing their malaria treatment policy in the 1990's. Therefore, malaria-endemic areas and national malaria control programmes must deal with the challenges of changing malaria treatment policies in response to high levels of drug resistance to previously used anti-malarial drugs, such as chloroquine (CQ) and sulphadoxine-pyrimethamine (SP). The current 'gold standard' for treatment of uncomplicated P. *falciparum* malaria is use of artemisinin based combination therapy (ACT) (Williams et al 2009).

However there are other factors that affect the promptness and effectiveness of treatment which are closely related to the introduction, increase and spread of resistance (Bloland and Ettling 1999). The main determinant of the length of the useful therapeutic life (UTL) of a drug is the pace of development of resistance. Hastings (2001) postulates that this pace depends on a number of factors: (i) the starting frequency of resistance, (ii) the level and pattern of drug use, (iii) the drug's pharmacokinetic properties, (iii) the number of genes required to encode resistance, (v) the level of sexual recombination in the parasite population, (vi) intra-host dynamics; (vii) the genetic basis of resistance, and (viii) the number of individual parasites in an infection (Amin 2005).These factors together contribute to the emergence of resistance to existing antimalarial drugs. The level and pattern of drug use will be determined by the exposure of the health care workers to training, uninterrupted supply of recommended treatment options and client adherence to medication. The pharmacokinetics of the drugs will influence bioequivalence and bioavailability of the medicine which if not properly monitored will result in sub therapeutic levels which will consequently contribute to the development of resistance.

The formulation of a national drug policy is based on clear goals of therapy which include achievement of clinical cure, prevention of malaria in certain populations, interruption of transmission and prevention of progression to severe disease and death. These goals eventually become the standard against which the effectiveness of policy recommendations can be measured. This process of rational policy formulation and implementation is complex and involves collection of scientifically valid evidence and presentation of this in a manner that will garner political support through consensus building about the need for a change. (Williams et al 2004; Bloland & Mettling 1999; Ervin, 2000).

Changing and implementing a new drug policy is further complicated when the transition includes familiar drugs that are commonly prescribed in a country, are easy to administer, inexpensive, and readily available (Zurovac et al 2005; Bloland et al 1998). 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 (WHO 2001). In response to combating drug resistance in Africa, WHO has lowered the resistance-threshold for treatment policy change from 25 percent to 15 percent as assessed by standard WHO protocols, in children under 5 years of age, meaning that a more effective treatment should be adopted before 15 percent resistance to the old treatment is reached (WHO 2003).

WHO currently recommends the following therapeutic options: artemether/lumefantrine, artesunate plus amodiaquine, artesunate plus sulfadoxine/pyrimethamine (in areas where SP efficacy remains high), artesunate plus mefloquine (in areas with low to moderate transmission), and amodiaquine plus sulfadoxine–pyrimethamine, in areas where efficacy of both amodiaquine and SP remains high (mainly the countries of West Africa). This non-artemisinin-based combination therapy is reserved as an interim option for countries that, for whatever reason, are unable immediately to move to ACT (WHO 2001).

By 2001, 32 countries worldwide had adopted one of the above five combination therapies, several as first-line treatment and a few as second-line. By June 2008, all except four countries and territories worldwide had adopted ACT as the first-line treatment for the treatment of *P.falciparum (*World Malaria Report 2008).

The spread of resistance to CQ led to its withdrawal from use in most countries in sub-Saharan Africa in the 1990s. In 1998, Kenya replaced CQ with SP as first line therapy (Mwai et al 2009). In 2006, Kenya introduced a second malaria treatment policy after protracted debate on whether or not to change the first line treatment for uncomplicated malaria from SP to another effective drug. There were difficulties in translating data with gross geographical, temporal and methodological variations, into national treatment policy. The process was further complicated by limited options, unknown adverse effects of replacement therapies, cost, as well as limited guidance on factors pertinent to changing the drug policy for malaria (Bloland et al 2003).Kenya implemented a change in policy for the treatment of

uncomplicated malaria from SP to the ACT Artementher-Lumefantrine (AL) in 2006. AL was supplied by the Kenyan Ministry of Health (MoH) to all government health facilities, starting from the lowest level dispensaries to mid level health centres, higher level district hospitals, provincial hospitals and the national referral hospitals (Wasunna et al 2008).

The process of change begins with the recognition of a failing drug regimen. Formulation of a national anti-malarial policy largely relies on the goals of therapy, and current management practices will impact on achievement of clinical cure and prevention of progression to severe disease. It is therefore imperative to ensure that clinical practices conform to the guidelines for policy implementation to succeed.

1.1 Research Question

What are the successes and challenges at implementation of the malaria treatment policy in Bungoma South?

2.0 Literature Review

2.1 What does Changing Malaria Treatment Policy mean?

According to WHO 1994, a national anti malarial treatment policy consists of evidence based recommendations on rational use of available antimalarials in any given country following the emergence of resistant strains of plasmodium species. The focus of policy change is to guarantee access to antimalarials that are safe, affordable, effective, and acceptable and of good quality. (Williams et al 2004).

At the simplest level, the point at which national malaria-treatment policy should be changed is that point when the goals of therapy are no longer being adequately met (Bloland 1999). Selecting the most appropriate and efficacious drug is only one of many facets for changing malaria treatment policy. Effective policy change is a long, involved process that extends for months to years and requires input from a multitude of stakeholders, both public and private. The process of decision making for selecting replacement drug and altering national malaria treatment policies is complex. Little information is usually available to guide the process and documentation describing how specific countries have addressed these challenges is limited. Determination of policy occurs through complex interactions between key stakeholders: public and private agencies, consumers, regulatory authorities and the scientific community (Bloland and Mettling 1999; Williams et al 2004). While global guidelines offer information on the best drugs to use, there have been only a few studies published about the process of change in countries in which policy changes have been made (Williams et al 2009). A good understanding of the decision-making process underlying the formulation and implementation of malaria treatment guidelines, together with a better understanding of the policy environment, will facilitate more effective promotion of policy change (Durrheim et al 2003).

Determinants of policy change

During the process, it is very important to also pay attention to economic, political, legal/regulatory, socio-behavioural, environmental, and other contextual factors that impact the process of change (Durrheim et al 2003; Ervin 2000). Competition for scarce resources among various national sectors; lack of adequate planning; national and regional political agendas; cost, efficacy, availability, safety and acceptability of the replacement drug/s; ineffective communication and limited trust between scientists and policy makers; status of

the public health care system in general; legal and regulatory statutes; fluidity of national borders; degree of decentralization; local epidemiological context; and vested interests of stakeholders (particularly the pharmaceutical industry) are some of the factors that can significantly influence the process of drug policy formation and implementation (Williams et al 2004).

Another important determinant is the efficacy and effectiveness of selected replacement drugs. Designing a rational and appropriate anti-malarial drug policy does not guarantee proper use by providers or consumers. The operational effectiveness of a new drug policy needs to be evaluated by determining its acceptability to users and the ability of all levels of health care provision to adequately utilize it. This will greatly influence the effectiveness of policy implementation and should be put into consideration. Replacement drug selection is a crucial aspect that is guided by safety, therapeutic efficacy, cost and availability, simplicity of regimen and potential of widespread use. After selection the drug needs to be incorporated into the Standard Treatment Guidelines, Essential Drugs List and the National Formulary. Procurement and new drug introduction is affected by remaining stocks of drug to be replaced as most countries are averse to wasting existing stocks.

The state of health care systems in delivering basic services is very crucial for the success of the introduction of a new policy. Do the systems favor or inhibit the ability to implement new malaria drug policies? Resource constraints result in countries using drugs of limited effectiveness. The cost of implementing a new policy is important in determining policy change. For successful implementation, the system must be robust enough to adequately diagnose, correctly prescribe, treat and refer patients and properly monitor and respond to adverse drug reactions (Williams et al 2004).

Attrition of trained personnel further complicates the implementation plan as personnel have to be retrained consequently slowing down the process. Deficient management skills especially in drug management strain the smooth flow of implementation of the new policy. Activities like drug supply leakage, informal patient charges, mismanagement of user fees within the public health care system can negatively influence the success of the malaria treatment policy.

Despite written guidelines, prescribers often prescribe and dispense drugs inconsistently especially in the private sector with little effective regulation of prescribing practices.

Drug distribution systems can also pose a challenge in implementing policy changes. This is important in ensuring that the new drugs are available when and where needed and stock orders are filled and previous treatment physically removed from health facilities.

An important parameter that needs to be put in place is drug safety. Pharmacovigilance is a huge challenge in developing countries as in these environments health surveillance infrastructure is poorly developed. With the introduction of a new treatment policy, pharmacovigilance systems need to be put in place to focus on life threatening adverse events and minor side effects which may compromise compliance. In Kenya, the Ministry of Medical Services (MOMS) is charged with the responsibility of ensuring the availability of safe, efficacious and good quality medicines. To achieve this, MOMS through the Pharmacy and Poisons Board (PPB) has been implementing strategies aimed at ensuring drug safety. The PPB has developed a guideline for the National Pharmacovigilance System in Kenya and is in the process of a national roll out of the same. (Ministry of Public Health and Sanitation and Ministry of Medical Services Unpublished 2009).

The lead time to policy change greatly influences adoption and implementation of policy. This refers to the time from the initial acknowledgement of resistance to the actual change of malaria drug treatment policy. The final important aspect influencing policy change is the reticence of the prescribers to change therapy. Even with abundant data suggesting that chloroquine had lost efficacy in East Africa, most countries in the region were reluctant to change their malaria treatment policy. Kenya for instance changed its first-line antimalarial policy from CQ, was the mainstay of treatment for 50 years since its introduction in the 1930s, to SP combinations in 1998 even though resistance had been documented as early as 1979 (Amin 2005; Foghs et al 1979). Key issues revolving the decision were availability of affordable alternatives, indecision about ideal timing and emotional historical attachment to chloroquine (Williams et al 2004).

2. 2 Antimalarial Policy change in Kenya.

Kenya experienced a long and difficult process from the initial detection of chloroquine resistance to the implementation of SP which was officially launched in August 1998, (MOH, 1998 Unpublished). Several key features were observed in the 20 years following the detection of the initial chloroquine resistant infection in Kenya to semi effective implementation of a revised recommended first line drug SP. Constraints faced included confusion about what constituted failure and it was not clear how much evidence was

required to change the existing policy. This was further compounded by the lack of standardized data on drug resistance and the lack of clear guidelines on how to compare resistance data. Delay in involving the pharmacy department and drug regulatory authorities further retarded the necessary legal sanctioning of the drug policy change (Shretta et al 2000).

Decisions about appropriate therapies were based largely on efficacy data from in vivo studies that aim to quantify levels of resistance among locally acquired parasite populations. A range of models were proposed to assist policy revision using data derived from efficacy studies and based upon a variety of assumptions including expert opinion of changing disease burden, costs and compliance (Sudre et al 1992; Schapira et al 1993; Bloland & Ettling 1998; Goodman et al 1999; Shretta et al 2000).

There were difficulties experienced in translating evidence into rational policy. First and foremost changing treatment policies is an expensive process both in terms of money required for the purchase of the new medicines and conduct relevant training and time in terms of meetings held for review and planning. Other challenges include: poor communication between key stake holders- where researchers fail to translate scientific results into usable programmatic language; lack of adequate data and evidence to inform the process of policy formulation and implementation prescribing practices that differ largely from policy; inadequate resources both financial and human which not only influence the choice of drugs but also the ability to adequately train health staff and ensure drug supplies.

In Kenya policy change has occurred twice since the 1970s. Chloroquine resistance was first reported in non immune tourists in Kenya in 1978 and escalated through to the 1980's (Foghs et al 1979). Chloroquine remained the treatment of choice for uncomplicated malaria infections until revised guidelines were launched in 1998 despite a huge amount of scientific evidence on its failure. SP was then adopted which was later replaced by Artemether-Lumefantrine (AL) in 2006 when SP failed to clear infections in 75percent of patients, 14 days after treatment between 2001 and 2002 (WHO 2006, Shretta et al 2000).

Following the official transition from CQ to SP in 1998, the MoH's Division of Malaria Control (DOMC) in Kenya and research partners conducted a series of surveillance studies on the sensitivity of SP and amodiaquine (AQ), the recommended first and second-line treatments for uncomplicated malaria respectively. By 2001, the year the National Malaria Strategy was officially launched, concerns were raised about growing evidence of a decline

in SP clinical efficacy as measured through the then standard WHO day 14 clinical and parasitological sensitivity test. By mid-June 2001, 6 of 15 (40percent) studies undertaken by DOMC and 3 of 6 (50percent) by other partners showed that SP clinical and parasitological failure rates by day 14 were in excess of 25percent (the WHO suggested change rubric of 25percent failure rate is commonly used in the sub-region to inform antimalarial drug policy changes). Conversely, there appeared to be better day 14 cure rates (≥ 75percent) across studies where AQ was tested (19 of 20 studies). In June 2001 there was a convention by the DOMC and its partners to discuss strategies principally around how better to deliver medicines through the retail sector. However, the meeting also raised the urgent need to assemble the evidence on SP failure rates noting that "...plans for the introduction of a replacement [were] now urgent..." A second meeting was held just four months later to "...review the national antimalarial drug policy and build a national consensus on malaria treatment..."; however, it wasn't until the final quarter of 2003, that the status of SP was deemed desperate requiring the formation of a national task force; at this time, seven out of nine studies (more than 75 percent) conducted between 2002 and 2003, including those examining patients through to day 28, showed SP failure rates in excess of 25 percent. Whilst it was accepted that a change to a new first line therapy was urgently required, the possibilities for replacements were limited. The decline in the clinical efficacy of SP in Kenya was happening within the context of an international push towards ACT in countries where monotherapies were failing (Amin et al 2007).

By early 2003 the pattern of declining efficacy was confirmed. An average SP treatment failure rate of 33 percent by day 14 among children less than 5 years was way above the WHO recommended failure rate of 25 percent for action that a country should change policy. From 1998 to 2003 AQ failed to clear infection in 10percent of cases by day 14 but by day 28, failure rate was as high as 40percent. On the other hand in 2001, the therapeutic efficacy of AL in Kilifi was 95 percent. Widespread resistance to antimalarial monotherapies in Kenya prompted a second change in the national malaria treatment policy in favor of a more effective artemisinin-based combination therapy (ACT), artemether-Lumefantrine (AL). In November 2003, the Drug and Policy Technical Working Group (DPTWG) collated efficacy data of the first line treatment SP and second line treatment AQ. The pooled data documented showed a sharp decline in the efficacy of SP.

Based on this national information and the WHO recommendation of changing to combination therapy for countries experiencing drug resistance, the Drug Policy Technical

Working Group (DPTWG) recommended an antimalarial treatment policy change to ACT as the first line therapy for uncomplicated malaria. (M o H 2005, Unpublished).

By the end of 2003, policy makers agreed that SP was ineffective and that the best line of action against *P. falciparum* malaria was an ACT. By April 2004, the Government of Kenya (GoK) announced its plan to recommend an ACT, as its first-line malaria treatment.

Malaria treatment guidelines

In April 2005, Kenya adopted the policy change in malaria treatment policy, with the distribution of AL under the new policy beginning in June 2006. In March 2006, the revision process of the previous malaria case-management guidelines was completed. The new guideline recommended AL as first line treatment for uncomplicated malaria for patients weighing 5kg and above, quinine for children below 5kg and pregnant women with SP being reserved only for intermittent preventive treatment in pregnancy (IPT) and amodiaquine no longer recommended for the treatment of malaria. The new recommendations state that all febrile children five years and below in high malaria risk areas receive presumptive treatment with AL. For patients five years and older seen at health facilities where malaria diagnostics are available, either microscopy or Rapid Diagnostic Tests (RDTs) should be performed to rule out any other cause of fever. At health facilities where malaria diagnostics are not available, all patients should be treated with AL in the absence of another obvious cause of fever (Wasunna et al 2008).

AL dosing regimen packaging specifications

When compared to previous conventional monotherapies e.g. SP, AL has a complex six dose treatment regimen over three days. The packaging of AL differs between four weight categories although the tablet strength is the same for each of the weight categories. With this in mind the introduction of AL into clinical practice requires an extra effort to ensure adheherence to diagnostic, prescription, drug dispensing and medication use counseling. The new guidelines have specified counseling and drug administration tasks that health workers need to perform when prescribing and dispensing AL in terms of importance of diet, what to do in case of vomited doses, side effects and administration of the first dose under the health workers supervision.

2.3 Programmatic activities before the implementation process

The key programmatic activities of the implementation process relevant for health facility and health worker's ability to deliver AL policy included: 1) revision of national malaria case-management guidelines, 2) provision of in-service training for health workers, 3) the distribution of guidelines and wall charts to health workers and 4) AL supply to the facilities. The national treatment guidelines took over 23 months to revise, the cascade training took nine months to complete and while drug distribution from central stores to facilities was relatively quick, it remains to be seen how a revised facility, pull-based ordering system will operate in the future. These activities must be carefully managed to avoid health workers being confronted with new drugs without information on how to prescribe and dispense them, or trained health workers without the resources to implement the new policy or a patient population told that old medicines don't work but who cannot access new medicines.

Training of health workers

In-service training of health workers on the new guidelines was organized in a cascade manner, starting at the national level by training 48 provincial trainers in April 2006 who subsequently trained 405 district trainers who, by September 2006, were charged with training 60percent of all front-line health workers nationwide. Trainings at each level followed the same curriculum and were organized as 3-day workshops with approximately 30 participants per training course. The teaching modalities included lectures and theoretical case scenarios but did not involve any clinical practice. One day of the training was devoted to the management of uncomplicated malaria. Implementation of the new treatment policy by health workers was scheduled to begin, following the launch of the new policy, on September 25, 2006.

Delivery of AL, national revised treatment guideline and wall charts to health facilities.

Simultaneously it was planned that between June and September 2006 all government facilities were to receive supplies of AL and the process of discontinuing supplies of amodiaquine and substantial rationing of SP was to be initiated. Thereafter, all hospitals were supposed to make orders based on AL consumption (pull-system) while the lower level health centers and dispensaries, with the exception of two provinces (Coast and North Eastern) that entirely function on the pull-system, were supposed to receive a predetermined quantity of AL every three months (push-system).

Finally, wall charts reflecting AL case-management recommendations were developed to serve as job-aids. These charts, together with new guidelines, were to be delivered to health workers either through District Health Management Teams (DHMT) or during the in-service training sessions.

Between October and December 2006, a health facility survey undertaken in four sentinel districts revealed that the coverage of health workers and health facilities with programmatic activities for the new policy had been variably achieved. In addition, the implementation of some activities had delayed and the short interval between rolling out the AL drug supply and the timing of the survey did not allow for evaluation of the stability of the AL supply chain and estimates of stock-out durations.

In 2007, six months after the initial survey, a repeat survey was undertaken in the same districts to evaluate health facility and health worker readiness to deliver AL policy following completion of all implementation activities (Njogu et al 2008). Ideally by this time, all facilities should have been stocked with adequate and continuous supplies of AL, all health workers should be trained on AL use, and access to job aids, such as guidelines and wall charts should be universal.

Findings of this study revealed that policy implementation targets had not been met: 67 percent of facilities recorded stocks out of at least one pack size of AL, 47 percent of health workers were trained, 59 percent had access to guidelines, and only 19 percent of facilities had AL case management wall charts. This is in comparison to the lower targets of 80 percent or 60 percent which are commonly set; as specified by the Kenyan MoH to evaluate key implementation indicators such as proportions of facilities without stock out of antimalarial drugs and coverage of trained health workers on AL use.

Another survey by Wasunna et al in 2007 assessed why health workers don't prescribe ACT. Findings of this study indicated that some reasons for non adherence to policy change were insufficient supplies of AL, high cost of AL, contradictory training messages that confused health workers, lack of follow up supervision and the availability of non recommended anitmalarials like amodiaquine caused prescription confusion.

Wasunna et al in 2007 conducted a qualitative study to assess why health workers don't prescribe ACT. In this study, insufficient supply of AL, cost of AL, availability of non recommended drugs and training messages that contradicted the recommended guidelines contributed to health workers non adherence.

The studies conducted earlier have gone a long way in trying to address some of the challenges arising as a result of policy change. Most of the studies have addressed the health workers readiness to implement and deliver the recommended treatment as well as assessed the availability and accessibility of AL to the communities.

However, none of the studies assessed the state of the inventory control practices of the health facilities with regard to the uninterrupted availability of AL. Without proper consumption records and submission of reports to the Logistics Management Unit (LMU) of the Division of Malaria Control, it would be impossible to accurately quantify the requirement of each facility or region. This directly impacts on the stock status of AL at any facility.

Another limitation of the earlier surveys is that they were limited to health workers and the knowledge and attitudes of the patients towards the new treatment have not been captured considering that if the patients do not adhere to the treatment prescribed we will fail to achieve our goals of therapy which will eventually contribute to the emergence of resistance and subsequent change of policy which in itself is a long expensive process as discussed earlier. In contributing to non adherence to instructions, the role of the support staff in the out patient departments of the health facilities has not been mentioned in earlier studies yet they continue to play a critical role in ensuring that the right medicine with appropriate dispensing messages reach the end user- the patient.

This study therefore, further addresses the challenges of implementation at the health workers level and the trends in the implementation of key AL indicators since the new policy introduction in 2006.

2.4 Justification

The Kenya Division of Malaria Control (DOMC), Ministry of Health (MoH), recognizes that irrational diagnosing, prescribing, and dispensing by health workers and non-adherence by patients and caregivers will lead to development of resistance, treatment failure, unreported adverse drug reactions, and waste of financial resources due to irrational prescription.

In comparison to previously used antimalarial monotherapies, the brand of AL currently being distributed for use in the public sector, has peculiarities that need to be considered when it is used. These peculiarities include the fact that it is expensive, it has a complicated

dosage regimen (presented in different packages of 6, 12, 18, and 24 tablets for treatment by patient weight band), and health workers lack experience with its use.

According to the Kenya Malaria Indicator Survey (KMIS-2007), only 29 percent of patients received the recommended ACT. The results also indicated that non-recommended medicines (SP, chloroquine, amodiaquine) are still in use for the management of childhood fevers two years into the new policy. In particular chloroquine, whose use as a first line therapy was stopped twelve years ago, was still used for treatment of children (MOPHS, KMIS Unpublished-2007). How the facilities receive these non recommended medicines is undocumented.

In light of the above challenges it is important to understand the context in which policy is formulated, to identify successful strategies for implementation and keep learning from critical analysis of the implementation process at its various stages through the studies conducted. To ease the process of change, and ensure effective translation of policy into practice, it is imperative to routinely assess the extent to which the policy is being practiced at the service delivery points, and the challenges faced by health workers during the initial stages of its implementation.

Many studies have been carried out to ascertain the effectiveness of ACTs in the management of uncomplicated malaria. However very few have been carried out to document the effect of change from previous policies, to the formulated policies into actual clinical practice and determine the challenges associated with its implementation in order to inform future evidence based decision making in revising policy.

Some of the studies carried out, (Njogu et al; Wasunna et al and Zurovac et al 2008), revealed that introduction of free efficacious ACT in the public health sector in Kenya and other countries had major potential public health benefits for Africa which may not be realized if provider prescription practices do not conform to the recommended treatment guidelines. These studies investigated factors affecting health workers' non-prescription of AL. Some of the key reasons reflected on problems in the underlying health system were inadequate staffing levels and drug supply. However, other key reasons mentioned that specifically related to the process of policy introduction were inappropriate training messages delivered and continued supply of non –recommended antimalarials to health facilities. Health workers negative perception to AL was also a contributing factor to non prescription. Safety was not a concern for the health workers and they implied that AL was more tolerable compared to

quinine and AQ. From these studies it was evident that Changes in clinical practices at the point of care might take longer than anticipated (Zurovac et al 2008).

If research is not appropriately translated into policy and eventual practice, and appropriate research findings translated into corrective action, it amounts to wastage of huge amounts of resources in terms of time, money and human resource that has gone into the research. Failure of appropriate translation into practice will increase the strain on the already burdened health care systems because evidence collected from research is not used to inform critical decision making processes for example, appropriate selection and change of drugs for treatment. This results in failure to achieve therapeutic goals resulting in progression of disease from uncomplicated to severe disease in an individual. For the community, decreased productivity will be seen as a direct result of increased hospital admissions due to severe disease and ill health which will decrease income generation and increase poverty levels because a big proportion of the income will be used in seeking treatment and the inability to work due to sickness. In general the rate of economic growth of the affected region will decrease.

For the health system, inappropriate translation of research results in increased burden of disease which can be reduced if treatment policies are adhered to. Failure to adhere to policy will fan the emergence of resistance to the recommended drug and due to limited options for the treatment of malaria, malaria morbidity and mortality rates may reach disastrous levels. This will call for an increased expenditure in terms of treatment for the affected populations in a resource limited country like Kenya. Other health care services and programs will suffer neglect if most of the resources are diverted to control malaria initiatives.

None of the studies assessed the inventory control practices of health care workers and their possible effect on drug availability in the health facilities or the medication use counseling practices of the health workers. This study in addition to assessing the prescribing practices of health workers also assessed the dispensing encounters between the health worker and the patient as well as the availability and utilization of inventory management tools.

It is therefore important to monitor the extent of policy implementation by conducting detailed studies of health facility performance, health worker preparedness to implement policy and the patient knowledge and readiness to adhere to treatment as a measure of this implementation. This step is critical because policy change and implementation does not necessarily translate into adequate quality case-management of patients at the point of care.

Information obtained from this operational research study will be of great value in improving the current antimalarial policy implementation in Kenya. These research evaluations should be followed by corrective actions on existing interventions and testing cost-effectiveness of novel interventions capable of improving and maintaining health worker performance and health systems to deliver artemisinin-based combination therapy in Africa.

Here, the results of the health facility carried out describe how effectively the Kenyan MoH did in attaining its implementation goals and discuss what additional programmatic activities may be required in the future to improve upon the implementation process.

2.5 Broad Objective

To describe the successes and challenges at implementation of the malaria treatment policy in Bungoma South district, Western Kenya as a measure of translation of health policy into practice.

2.5.1 Specific Objectives

- To determine the coverage of training on malaria case management for health care workers
- To establish the availability and utilization of current National Malaria treatment Guidelines (2008 edition).
- To establish the availability of ACT medicines and Inventory management tools at health facilities.
- To describe factors that affect health workers adherence to the national malaria treatment policy and guidelines.

3.0 Study Design and Methodology

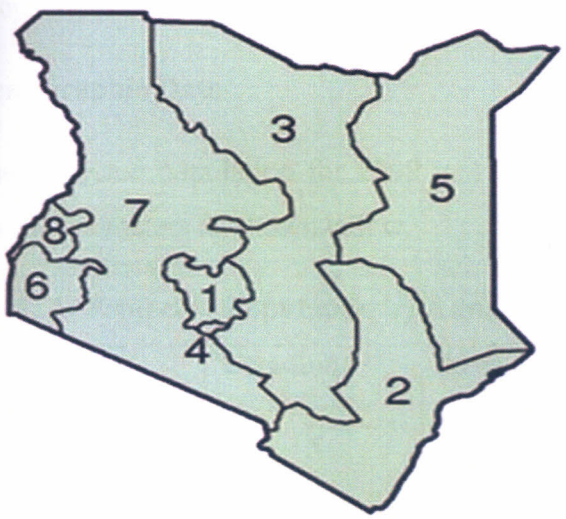
3.1 Study Area

District profile

Topography

Bungoma South district is one of the nineteen districts forming Western Province. It covers an area of 664.3 km^2. It lies partly within the Lake Victoria Basin with an altitude rising above 1200m above sea level. River Nzoia is the main river draining the district. It runs southwards with rivers Sio and Khalaba as its main tributaries. It is classified as ***Endemic.*** It is and area of stable malaria because it has altitudes ranging from 0 to 1300 meters, and is located around Lake Victoria in western Kenya. It has rainfall, temperature and humidity patterns which are the determinants of the perennial transmission of malaria. Transmission is intense throughout the year.

Figure 1 Map of Kenya



The above map shows the 8 provinces Kenya. The numbers are: (1) Central Province, (2) Coast Province, (3) Eastern Province, (4) Nairobi, (5) North Eastern Province, (6) Nyanza Province, (7) Rift Valley Province, and (8) Western Province. Figure 2 shows the map of Bungoma district.

Figure 2 Map of Bungoma District

Climate

The district experiences equatorial type of climate. The temperatures vary within a minimum of 22°C to a maximum of 30°C. It also experiences two rainy seasons long April to June and short September, October rains respectively. The mean annual rainfall varies from 1200mm to 1800mm. This warm, wet and humid environment is suitable for the breeding of the anophelines responsible for the transmission of malaria

Demographic Data

The projected population for 2009 is 410,685 with a population density of 618 people per square kilometers as shown below.

Table 1: Projected Population by Administrative Units 2009

Division	Locations	Area (Km^2)	Population	Density (Km^2)
Kanduyi	5	319.4	229,541	719
Bumula	10	344.9	181,144	525
Total	**15**	**664.3**	**410,685**	**618**

Source: CBS, Bungoma South 2009

Table 3: Distribution of Health Facilities by level of care

	Hospital	**H/Centre**	**N/Home**	**Dispensary**	**Totals**
Kanduyi	1	1	2	10	14
Bumula	0	2	0	7	9
Totals	**1**	**3**	**2**	**17**	**23**

Table 4: Distribution of Health Facilities by ownership

Ownership	**Hospital**	**H/Centers**	**N/Homes**	**Dispensary**	**Total**
GOK	1	1	0	13	15
MISSION	0	2	1	3	6
PRIVATE	0	0	1	1	2
Total	**1**	**3**	**2**	**17**	**23**

3.3 Top 10 Diseases Bungoma South District (January – August 2009-10-02)

Table 5 Top 10 Diseases Bungoma South District

NO	DISEASE	CASES (NO.)	PERCENT (percent)
1	Malaria	114,524	49
2	Disease Of Respiratory Infections	36,449	16
3	Skin Diseases	12,653	5
4	Diarrheal Diseases	12,179	5
5	Pneumonia	6,984	3
6	Accidents	6,830	3
7	Typhoid Fever	4,650	2
8	Dental Diseases	3,278	1
9	Urinary Tract Infection (UTI)	2,909	1
10	Ear Infections	2,070	1
11	All Others	30,898	14
	TOTAL	**233,424**	**100**

SOURCE: DHRIO, BUNGOMA SOUTH

According to the statistics malaria is the leading cause of morbidity in Bungoma district accounting for 49percent of all diseases reported. This high burden could cause a reduction in the economic growth of the region due to decreased productivity as a result of illness. It has been estimated that malaria could cause an average annual reduction of 1.3percent economic growth in Africa with many families spending a significant proportion of their income on treating malaria (WHO 2006). Other high ranking causes of morbidity are respiratory infections, skin diseases, diarrheal diseases and accidents. Apart from morbidity, malaria also imposes a significant burden on the health care system. It is also possible that not all reported cases are true malaria cases as most health facilities lack appropriate diagnostic facilities.

The study was conducted in the outpatient department of 17 health facilities in Bungoma South District. Bungoma South is classified as a high malaria risk area and malaria case management recommendations should be in accordance with the national treatment guidelines.

3.3.1 Methodology

A non experimental design was employed in carrying out this survey. The study was a qualitative in nature. The qualitative methods used in the survey included semi structured interviews, observational methods and analysis of documents. A cross-sectional retrospective, approach was adopted because it allowed for an enormous amount of information to be collected in a short period.

The survey was carried out in September 2009.

Setting: The study was conducted in the outpatient department of 17 health facilities (See annex 2)

Participants: healthcare workers and patients.

Main outcome measures: Coverage of training for health workers, availability of AL, national malaria treatment guidelines, and job aids.

Definitions:

Health worker- Personnel routinely providing outpatient consultations in health facilities.

Treatment: recommended (antimalarial as recommended by national treatment guidelines for the diagnosis, treatment and prevention of malaria).

The research team comprising two surveyors(Investigator and research assistant) collected the data based on the following two methods:

First the health worker or facility in charge was interviewed to collect information on their personal characteristics, human resource capacity at facility, work experience, exposure to guidelines and training on malaria case management. Secondly, the health facility was assessed for availability of antimalarial medicines, current treatment guidelines and malaria treatment wall charts/job aids available and seen on day of survey.

3.3.2 Survey Instruments

The instruments (questionnaires) were designed to collect information on:

- Human resource capacity
- Health workers status of training
- Availability of AL at the health facilities on the day of survey.
- Availability of job aids, wall charts and the national malaria treatment guidelines
- Health Facility Inventory Control practices
- Methods used in diagnosis of malaria at the health facilities.

3.3.3 Survey Indicators

The four indicators listed below, were used to assess the use of antimalarial medicines for malaria case management of uncomplicated malaria in the selected public health facilities in Bungoma South district, Western Kenya.

1. Proportion of health workers at the outpatient with exposure to training on malaria case management on the survey day.
2. Proportion of public sector health facilities visited that had a copy of the current official treatment guidelines for malaria and visible AL job aids on the survey day.
3. Percentage of health facilities that had stocks of AL by weight band on the day of the survey.
4. Percentage of health facilities that recorded stock outs in the last six months and the duration of the stock outs.

- Sources of data: Inventory records (Bin Cards), patient registers, prescriptions and key informants (health care workers and patients).

3.4 Population, Sampling and Sample Size

3.4.1 Population – Sampling Frame

To select a sample of health facilities for the survey, a complete list of all public and private health facilities in the district was used. The list was compiled from the District Health Management Information System (HMIS) office, Bungoma South.

Table 5: Sampling of public Health facilities by level of care.

Facility type	Sampling Frame	Sample Size
District Hospital	2	**2**
Health Centers	3	**3**
Dispensaries	12	**12**
Total	**17**	**17**

3.4.2 Sampling and Sample Size estimation

Sampling of health facilities

Sample size calculation in a cross sectional study is based on the standard statistical approach to determination of sample size for a (descriptive) cross sectional survey such as this one requires that if the sample size is less than 30 all the study subjects are considered. Purposeful sampling approach was carried out in the selection of the health facilities.

Criteria for selection of facilities was based on: 1) Ownership of the health facilities, whether government , private or facilities; only government owned health facilities and faith based n facilities were assessed. 2) For a health facility to qualify it had to receive drug supplies from KEMSA. Fifteen government owned health facilities and two faith based health facilities receiving supplies from KEMSA were selected to ensure a fully representative sample. See Annex 4 for the final list of facilities that were sampled.

Sampling of health workers.

The total number of health workers 76 located in 17 health facilities in Bungoma South (DHRIO) formed the basis of the sampling frame. Three criteria were applied to these health workers to qualify for inclusion in this study: 1) they were working in health facilities where AL was available on the day of the survey, 2) they were routinely providing outpatient consultations at their facility and were available on the day of the survey, 3) they were routinely involved in prescribing or dispensing antimalarials at the out- patient department in their facility.

The study excluded: health care workers in other departments in the health facility and who did not provide routine outpatient consultations.

76 health workers met the first and the last criteria but only 31 met all the three criteria. All the 31 who qualified agreed to participate in the survey. 21(68 percent) were nurses, 6(19 percent) were patient attendants and support staff, 3(9.7 percent) were clinical officers and 1(3.3 percent) pharmacist. Of the 31 health workers 22 (70percent) were working in dispensaries. The other 9 were working at the health centre 8 and 2 at the district hospital (District Pharmaceutical Facilitator).

Table 6: Health worker characteristics

Cadre	Total Number	Dispensary	Health Centre	District Hospital
Nurses	21	18	3	
Clinical officers	3	0	3	
Pharmacists	1	0	0	1
Support staff	6	6	0	
Total	**31**			

3.5 Induction of Research Assistant

The survey team comprising of a team of 2 members (Investigator and research assistant) went through an intensive one-day session focusing on the objectives of the survey, interviewing methods, the contents of the survey tool, and on field data collection and verification methods.

4.0 Data Collection

Actual field work was conducted between 22nd September and 1st October, 2009. Data collection was undertaken through the use of a semi structured questionnaire. (see annexes 3) and face to face interviews with key informants. A semi structured interview guide (questionnaire) was developed, which allowed flexibility within the discussions and explored health workers challenges about the implementation of the new treatment policy.

The health worker interviews were augmented with additional interviews with key informants responsible for implementing the new treatment policy in the district. These included the members of the DHMT (District pharmaceutical facilitator- DPF, DHRIO, and the District Public Health Nurse-DPHN). Areas specifically covered with the DHMT included content of the training messages, drug supply and programmatic constraints in the implementation of AL in the district. The FTF interviews were conducted in both English and Kiswahili. Each session lasted 45 minutes to 1 hour 30 minutes. Interviews with the patients lasted for 10-15 minutes.

After verbal informed consent was obtained from the in-charges of health facilities and health workers data collection was done using two methods. First, a health facility assessment was undertaken to collect retrospective information on the timing and the quantity of AL receipts since the first delivery to the facility, availability of AL on the survey day and duration of stock out period during six months prior to the survey. Availability and stock-outs were also assessed for SP, amodiaquine and quinine. The presence of malaria microscopy, rapid diagnostic tests and any displayed case-management wall charts was recorded. Second, interviews were conducted with the available health workers who routinely perform outpatient consultations at each facility.

Sources of data were Inventory Records (Bin Cards, outpatient registers, Daily activity registers (DAR) and monthly summary reports submitted to the district. If records or relevant officers were not initially available, the research team made call backs to validate or augment data.

4.1 Data management and statistical analysis

Data were double entered by one independent data entry clerk using MS Excel and SPSS. Results from all the sampled facilities were combined and descriptive analysis reporting using simple frequencies was undertaken at the health facility. This data was analysed using

SPSS. Since the sample size was less than 30, and there were no comparison groups no statistical tests were used. Data obtained from health workers, DPF, DPHN, and DHRIO were compared for the purposes of triangulation. For example, the responses obtained for the stock status and training messages were compared between the health workers and the DPF. This process ensured completeness and validity of the findings from each source. Internal validity of the data was assured by comparing responses at two different stages. Finally, the trends of key AL implementation indicators were assessed with reference to the results of the initial 2006 and 2007 surveys.

4.2 Ethical approval

Ethical approval for this study was provided by the Kenyatta National Hospital ethical review committee. All health workers gave individual verbal consent to participate in the study and the permission was sought from the patients before the exit interviews were conducted.

5.0 Results

5.1 Background description of health facilities and health workers.

5.1.1 Description of the health facilities

17 health facilities were assessed; these included those managed by the Faith Based Organizations (FBO) and the Ministry of Health, all the facilities assessed receive their supplies form KEMSA. Private health facilities were not assessed. Out of the 17 health facilities, 12(70.6 percent) were dispensaries, with health centres and district hospitals accounting for 3(17.6 percent) and 2(11.8 percent) respectively. The capacity to diagnose parasitological malaria was available in 7 (41.2 percent) health facilities which were providing malaria microscopy. None of the health facilities stocked rapid diagnostic test kits. 10 of the health facilities based the malaria diagnosis on clinical findings only. On infrastructure, 16(88.2 percent) health facilities reported that they had a suitable waiting area for their patients, 12(70.6 percent) said that they had a confidential medication counselling area, 10(58.8 percent) had a suitable hand washing area and only 6(35.3 percent) had running or portable water in the dispensing and prescribing areas. 16 (88.2 percent) of the health facilities had adequate lighting.

5.1.2 Description of Health Workers (HW)

76 health workers who routinely provided general outpatient consultations and dispensing of medication were assessed. 31(40.9 percent) of the HW were interviewed, while 45(59.1percent) were absent from facilities and could not be reached during the survey period. The reasons for their absence included annual leave or study leave, off duty, sickness and both long and short in service training. Some were out conducting mobile clinic outreaches within the community during the measles campaign which was ongoing during the first three days of the survey. Nurses represented the majority 42(55.3 percent) of the health workers in the health centres and dispensaries. 4 health facilities had retired nurses serving in these health facilities. These 4 health facilities were community developed facilities, three of which had been handed over to the Ministry of Health and one was not yet gazetted. Of concern, 19(25 percent) of the health workers who reported that they routinely carried out dispensing practices, were cadres without any formal clinical or pharmaceutical

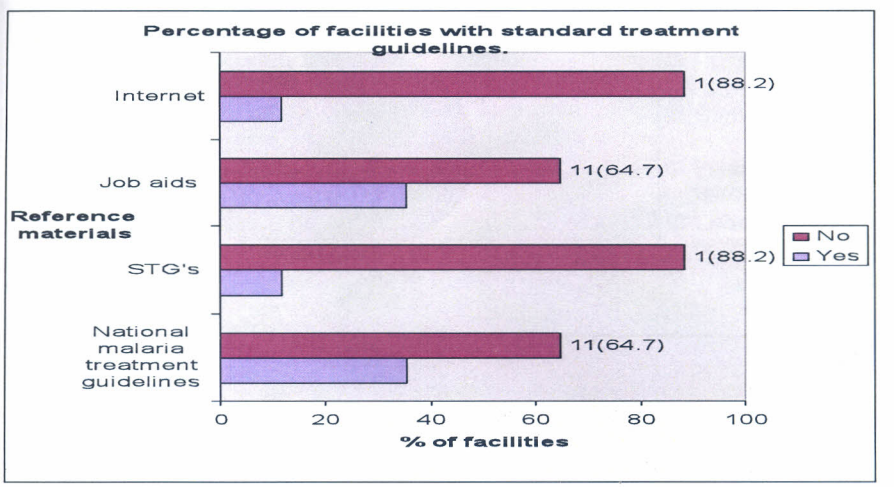
qualifications. These included Community Health Workers (CHWs), support staff, nurse aids, clerks, public health officers and laboratory technicians.

Of the 31 (40.9 percent) health care workers (prescribers, dispensers and members of the DHMT) interviewed, 99 percent were aware of the change in policy of the treatment of uncomplicated malaria.

5.2 Percentage of public sector health facilities visited that had a copy of the current official treatment guidelines for malaria and visible AL job aids on the survey day.

In addition to the National malaria guidelines for the diagnosis, treatment and prevention of malaria in Kenya, seven malaria case-management wall charts were developed by the DOMC to support translation of new guidelines into effective practice. Four of these referred to severe malaria, while three charts were of direct relevance to management of uncomplicated malaria and use of AL. These three included an AL dosing chart, an algorithm for assessing and treating children with fever and a malaria outpatient algorithm for older children and adults. Figure 3 describes the percentage of health facilities that had standard reference materials on the survey day.

Figure 3 Percentage of Health facilities that had standard reference materials on the survey day.



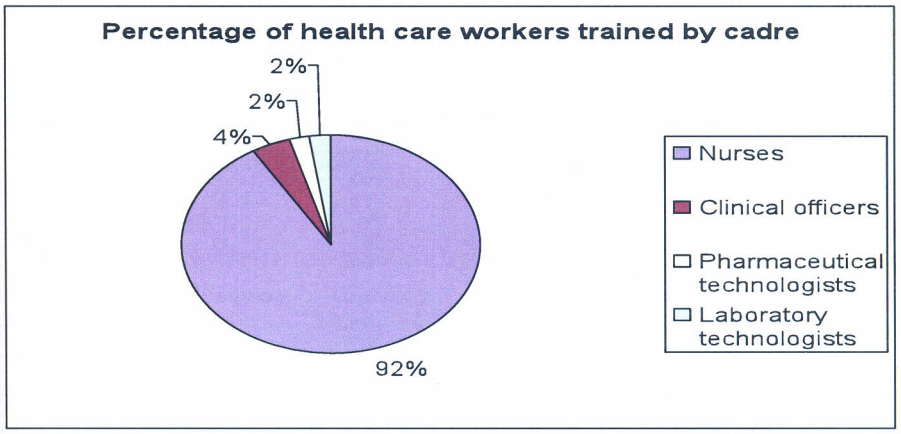
From figure 3, only 6(35.3 percent) health facilities had the National Treatment Guidelines for the diagnosis, treatment and prevention of malaria, Job aids for management of either severe or uncomplicated malaria were only available in 6(35.3 percent) of the health facilities. 88.2 percent facilities did not have Standard Clinical Treatment guidelines. Internet facilities were available in only 2 health facilities (District Hospitals).

5.3 Percentage of health workers at the outpatient who had been trained on malaria case management on the survey day.

The initial MoH's cascade, in-service training organized at the national, provincial and district level to support introduction of AL into clinical practice was completed by the end of 2006. At the district level, front-line health workers were trained during a series of 2-3 consecutive workshops over 2-3 months resulting in training of less than half of the providers. Prior to the 2009 survey the health workers had attended a three day workshop on malaria case management and the training was ongoing even at the time this survey. The results indicated that in 15 rural health facilities 46 health workers had been trained on case management of uncomplicated malaria. 42(91.3 percent) were nurses, 2(4.3 percent) clinical officers and 1(2.2 percent) each, for pharmaceutical technologists and laboratory technologists. The survey revealed that in 88.2 percent of health facilities at least one health worker had received formal training on malaria case management.

Figure 4 represents the percent of health workers by cadre in rural health facilities who had been trained on malaria case management on the day of the survey.

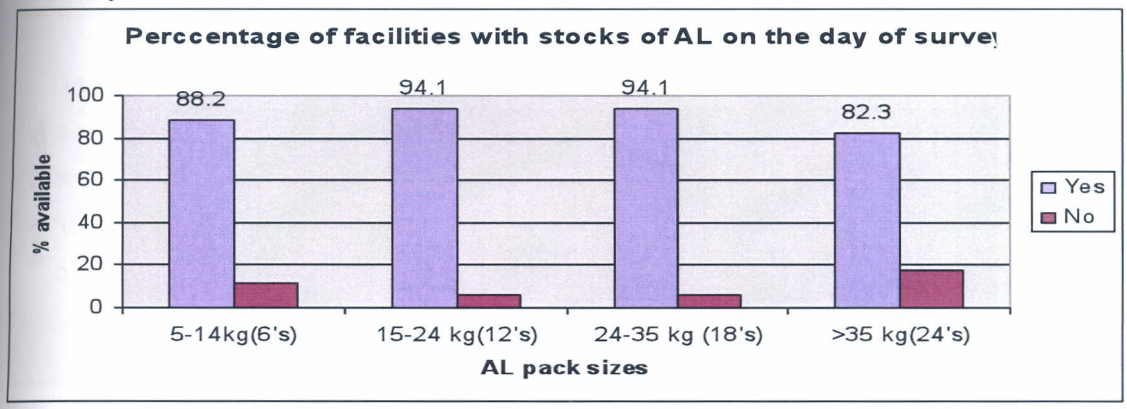
Figure 4 Percentage of health care workers trained on malaria case management by Cadre.



5.4 Percentage of health facilities with stocks of AL by weight band on the day of the survey.

The main precondition of the success of any new drug policy is adequate and uninterrupted availability of the recommended drug at peripheral facilities. On the day of the survey 15(88.2 percent), 16(94.1 percent), 16(94.1percent), and 14(82.4 percent) facilities had stocks of AL 6's, 12's, 18's and 24's respectively, as shown in the figure 5.

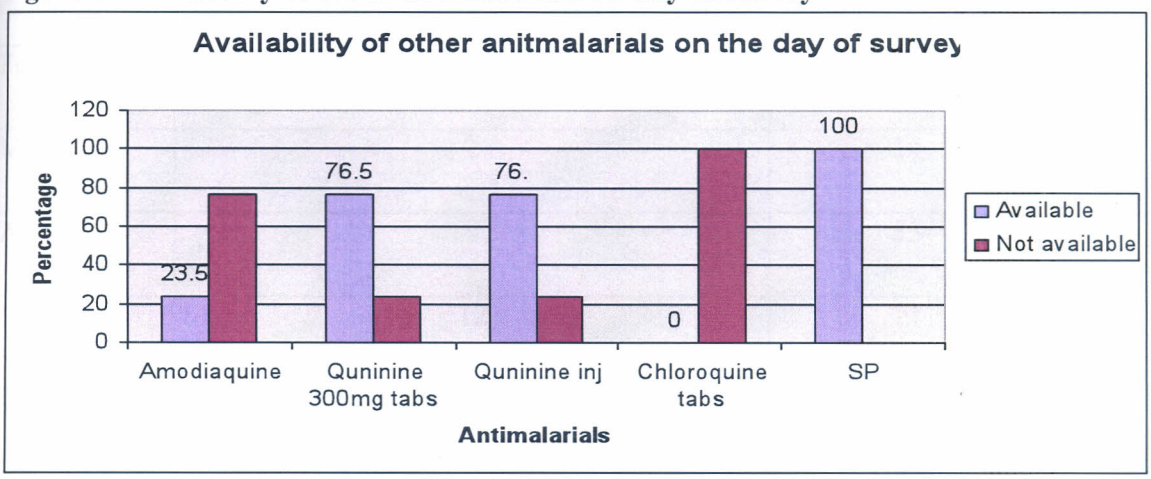
Figure 5: Percentage of health facilities with stocks of AL by weight band on the day of the survey.



Availability of other antimalarials on the day of the survey.

Availability of other antimalarials in the health facilities was recorded as follows: AQ was available in 23.5 percent health facilities, both formulations of quinine were available in 76 percent facilities, SP was universally available and no facility reported having stocks of CQ.

Figure 6 Availability of other antimalarials on day of survey

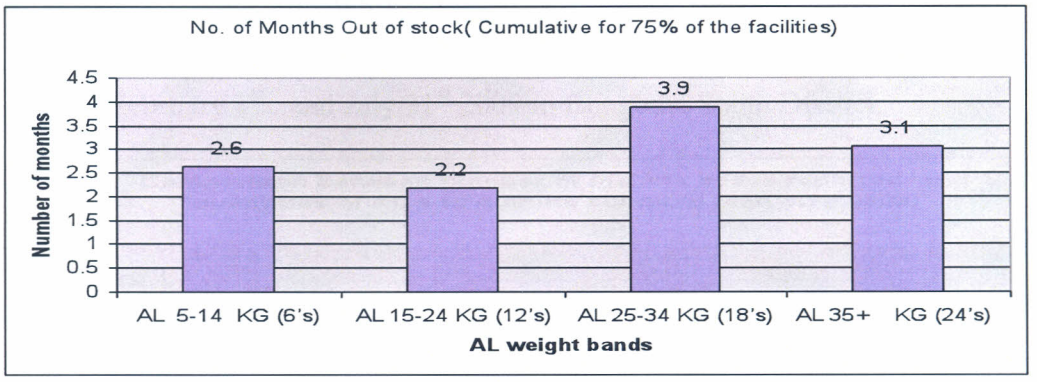


5.5 Percentage of health facilities that recorded stock outs in the last six months and the duration of the stock outs

All the 17 facilities recorded stock outs of AL in the last six months and the duration of stock outs ranged between 2-4 months for each of the facility.

Figure 7 show the number of months out of stock for the different AL weigh bands.

Figure 7: Percent of health facilities that recorded stock outs in the last six months and the duration of the stock outs



The survey findings indicate that the most frequently stocked out item was the AL 25-34 kg weight band which was out of stock for an average of 3.4 months per facility.Table 6 shows the number of facilities with a stock out of more than seven days.

Table 6: No. of facilities with a stock out of > 7 days

Period	No. of facilities with a stock out of > 7 days	percent of facilities
February- 09	2	11
March -09	2	11
April - 09	9	53
May - 09	12	71
June -09	9	53
July-09	4	24

Table 6 indicates that the month of May recorded the highest level of stock outs with 71percent of the facilities having none of the AL weight bands available for use at any one particular time.

5.6 Comparison between the AL stocks received and the number of malaria cases reported between February 1st and July 31st 2009 in Bungoma South District.

Figure 8: Comparison between the AL stocks received and the number of malaria cases seen between February 1st and July 31st 2009 in Bungoma South District.

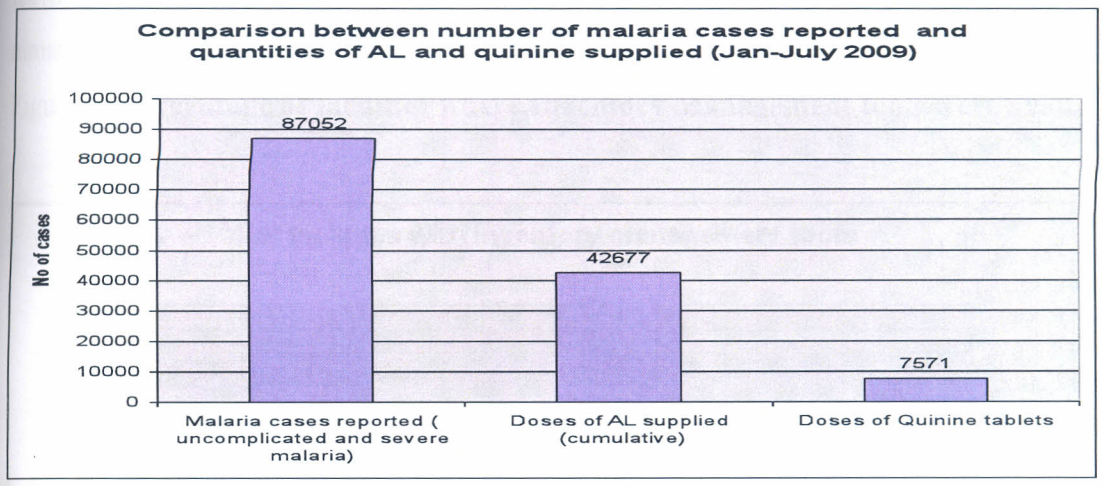


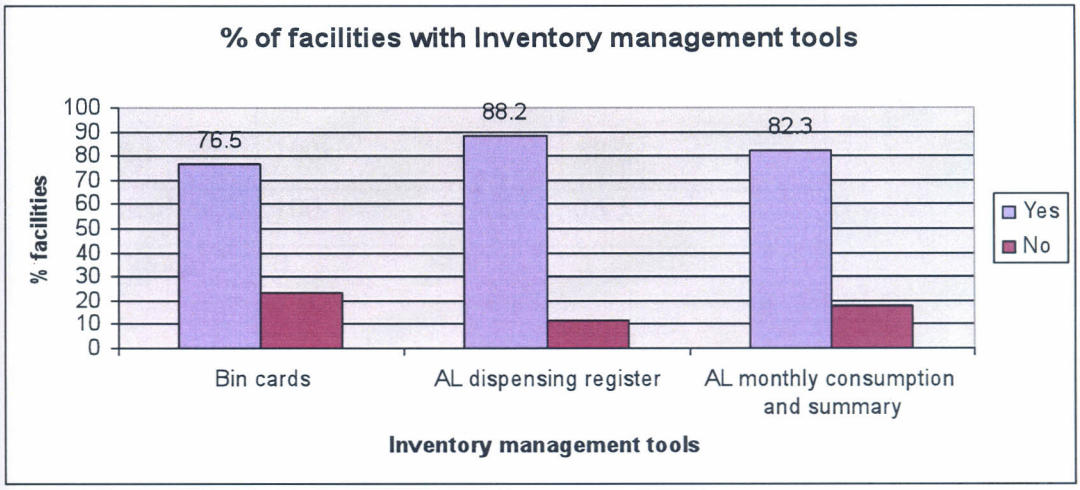
Figure 8 indicates that the supplies received for both AL and quinine, by Bungoma South district in the said period were less than the malaria cases reported. According to the District AL Summary Report (1st February to 31st July 2009), with 75 percent reporting rate, the facilities received 42,677 doses of AL and 8300 quinine doses in comparison to the 87,052 malaria cases reported for the same period.

5.7 Inventory Control Practices.

Inventory Control Practices.

The survey team retrospectively collected information on inventory management at the facilities and the following were the findings: Most of the facilities had inventory management tools available and in use at their facilities, as depicted in figure 9.

Figure 9: **Percentage of facilities where Inventory Management tools were available.**



The survey team further assessed whether or not information related to inventory management for tracking use was collected at the facilities and reported to the Logistics Management information System (LMIS).Table 7 shows a summary of the results.

Table 7: Comparison between the percent of health facilities capturing inventory management data in records and those reporting to the LMIS.

	percent of facilities which captured in records	percent of facilities which reported to LMIS
Physical Stock count	100	88.2
Quantities received	100	76.5
Quantities consumed	100	88.2
Stock outs	100	76.5
Expired stock	0	0

From the survey, it was noted that all the facilities collected and recorded data related to physical stock counts, quantities received, quantities consumed and stock outs within a given duration. However, only 88.2percent reported physical stock and quantities consumed and 76.5 reported quantities received and the stock outs experienced to the LMIS. None of the facilities recorded or reported data on expired stock.

5.8 Percent of facilities diagnosing malaria by microscopy and by Rapid Diagnostic Tests.

The survey findings revealed that none of the health facilities were using Rapid Diagnosis (RDTs) test kits for malaria diagnosis as the RDTs were unavailable.10(58.8 percent) of facilities used clinical diagnosis while only 7(41.2 percent) conducted microscopy to confirm the presence of malaria. One facility in particular had a room available for the set up of a laboratory but lacked the required equipment and trained laboratory personnel.

5.9 Comparison of key AL implementation indicators between 2006, 2007, and 2009

Table 9 presents the key AL implementation indicators reported during the initial 2006 survey, early after AL implementation, during the 2007 survey carried out six months later and the 2009 survey.

Table 8: Comparison of key AL implementation indicators between 2006, 2007, and 2009

Availability of antimalarial drugs on the day of the survey	2006	2007	2009
Any tablet packs of artemether-lumefantrine	169 (87.6)	201 (95.3)	17(100)
All tablet packs of artemether-lumefantrine	112 (58.0)	129 (61.1)	14(82.3)
Amodiaquine (any formulation)	193 (100)	206 (97.6)	4(23.5)
Sulfadoxine-pyrimethamine tablets	183 (94.8)	204 (96.7)	17(100)
Quinine tablets	154 (79.8)	194 (91.9)	13(76.4)
Stock-out of antimalarial drugs in past 6 months			
Any tablet packs of artemether-lumefantrine	NA	117 (66.5)	17 (100)
All tablet packs of artemether-lumefantrine	NA	27 (15.3)	16(94.1)
Amodiaquine (both formulation)	10 (5.2)	4 (2.3)	13(76.4)
Sulfadoxine-pyrimethamine tablets	41 (21.2)	9 (5.1)	0
Quinine tablets	71 (36.8)	26 (14.8)	15(88.2)
AL case-management wall charts (all three charts)	1 (0.5)	40 (19.0)	6(35.3)
Health worker characteristics	**N=227**	**N=654**	**N=76**
	n (percent)	**n (percent)**	**n (percent)**
In-service training including use of artemether-lumefantrine	105 (46.3)	306 (46.8)	67(76.2)
Access to national malaria guidelines	126 (55.5)	385 (59.0)	6(35.3)

In summary, during the three rounds of surveys health facilities were well stocked with all antimalarial drugs, including the no longer recommended amodiaquine which was paradoxically available in nearly all (100 percent in 2006 and 98 percent in 2007 but only available in 23.5 percent inn 2009) facilities. Availability of any tablets of AL was high (88

percent in 2006 and 95percent in 2007 and 100 percent in 2009); however, all four weight-specific packages of AL were less frequently in stock (58 percent in 2006 and 61percent in 2007) but were more frequently out of stock 94.1 percent in 2009. During the previous rounds of surveys stock outs of amodiaquine, SP and quinine were uncommon in the six months preceding the surveys; In 2009 SP was always in stock and Amodiaquine was seldom in stock.

Evaluation of AL stock-out was not possible during the 2006 survey; however, the results from 2007 indicated that stock-outs were more common for AL (15 percent for all AL packs and 67 percent for any AL pack) than for other antimalarials. In 2009 AL stock outs were at 100percent for any pack and 94.1 percent for all packs. There was an increase in coverage of health workers trained on

AL use from 46.8 percent in 2007 to 88.2 percent in 2009 and there was decrease in access to national guidelines. While nearly no facility had AL case-management wall charts displayed in 2006 and only 7 percent of health workers had received supervisory visit including AL in the same year, both of these indicators increased to 19 percent in 2007.

5.12 Summary of Factors affecting health workers Adherence to recommended malaria treatment guidelines.

During the interviews the health care workers gave the following as their major challenges to implementing the new malaria treatment guidelines.

Supplies

1. Inadequate stocks of AL and prolonged stock outs cause the health care workers to revert to previous treatments especially where patients cannot afford AL in the private sector.

2. Drug supply systems currently in place hindered implementation of the policy as the supplies received are not commensurate with malaria prevalence in their facilities.

3. Some health facilities are not gazzetted by the Ministry of Medical Services hence they do not receive supplies from KEMSA and have to rely on the District hospital which cannot meet the needs of the rural health facilities.

"Our health facility is not gazetted; KEMSA does not supply drugs to us. We have to borrow from the district hospital". (HW, Mayanja)

Training and Laboratory Services

4. Some facilities felt that they missed out on important trainings mainly because of concurrent activities running within the ministry of health. The lack of training on malaria case management therefore hindered effective implementation of the policy.

5. Facilities that lack laboratory services have to solely rely on clinical diagnosis; this could contribute to irrational prescription of medicines.

Patient related

6. The complexity of the dosage regimen and a lack of a suitable patient formulation is also a concern for the patients.

7. Dosage form currently supplied for quinine tablets is not suitable for pediatric populations as it cannot be accurately divided. This does not guarantee the uniformity of distribution of the active ingredient and may compromise treatment outcomes.

8. Some health care workers felt that the pill burden especially for adults was high and they said that most patients prefer a single dose and would therefore opt for the ineffective SP in stead.

9. Non adherence by patients to medicines dispensed

"Patients are used to AL. If the drugs are out of stock they do not respond to other antimalarials. It is also difficult to give instructions to children as some caregivers send children alone to hospital" (HW, Ekitale)

"Some patients say that the medicine does not work". (HW, Bukembe)

"Giving quinine in the first trimester in pregnant women is difficult because of its association with abortions". (HW Kimaeti)

"Patients perception towards oral drugs is different because they are used to injections". (HW, Bulondo)

Inventory Management

10. Lack of tools for inventory management
11. High workload at the facilities with very few qualified staff compromises record keeping

6.0 Discussion and Conclusion

6.1 Health Workers training status, availability of National Malaria Treatment Guidelines and Wall Charts.

According to the MOH coverage of trained health workers was targeted at 60 percent. The survey results indicated that 76 percent of the health workers providing outpatient consultations had been trained. This shows that the coverage of training was above the target set. This could have contributed to the increased number of AL prescriptions seen at the health facilities during the survey as compared to the previous surveys which reported an under prescription of Al even when it was available for use at the facilities (Njogu et al 2008). However, 25 percent of those providing outpatient consultations were without any formal clinical training and performed their duties based on, on the job training by the formally trained personnel. The rationality with which these support staff dispense medication could not be estimated during this survey. This could compromise treatment outcomes if a patient does not get the right medicine, in the right quantities and at the right time as seen in one encounter where the support staff dispensing issued an under dose and when further probed said that the right pack size was in the store but had not been issued to the dispensing area by the stores in charge.

The fact that the National guidelines for the diagnosis, treatment and prevention of malaria and the job aids for the management of both severe and uncomplicated malaria were available in only 35 percent of the facilities indicates the lack of proper dissemination or inadequate distribution mechanisms of these reference materials to the health facilities from the central or regional levels. During the survey 10 percent of all the prescriptions reviewed did not conform to the recommended treatment guidelines. The prescriptions required that the patient gets 3 doses of 1.M quinine once a day, and on the third day a full course of AL is dispensed. This practice is worrisome because it could contribute to the emergence of resistance to quinine.

6.2 Availability of ACT medicines at the health facilities.

The main pre requisite when changing any drug policy is the uninterrupted supply of the recommended medicine at the peripheral facilities. The results showed that, more than 80 percent of all the facilities had all the AL pack sizes in stock at the time of the survey. Retrospective analysis indicated that 100 percent of the facilities experienced stock outs of at least one pack in the last six months prior to the survey. The month of May 2009, recorded

the highest level of stock outs with 75 percent of the facilities having none of the AL pack sizes.
The duration of the stock outs recorded was substantial lasting for more than two months for all the AL pack sizes.

The supply of AL requires that all the four AL pack sizes, for different weight bands must be delivered at the facility to ensure appropriate management of the different weight categories of the patients. Even though the tablet strengths for AL is the same across the four pack sizes (120/20 for Artemether/ Lumefantrine respectively), health workers find themselves in a dilemma regarding what to do and how to reconstitute a dose suitable for a specific weight category. It also becomes challenging when it comes to inventory control and record keeping: how do they account for the fractions issued? The challenge increases when the person dispensing has had no formal training on medicines and medicine use.

For the patient, recombined AL packs can compromise adherence, taking into consideration that a weight specific pack is complete with instructions for use and pictorials to ease understanding of dosing frequency. In this regard no clinical guideline, job aid or manual has been developed to provide simple instructions on what the health workers can do to recombine different pack sizes for specified weight bands.

6.3 Availability of other Antimalarials

The results showed a significant decrease in the availability of AQ at the health facilities, 23.5 percent compared to 97.6 percent and 100 percent in 2007 and 2006 respectively. This is an indication that the phase out of AQ from the facilities has succeeded to some extent. The 23.5 percent facilities having AQ in stock reported that the supply was done by KEMSA and that it was part of the CHWs kit. This raises the concern of providing alternative treatment which is a suboptimal treatment option. Re-introduction into the CHWs kit is likely to create an element of confusion among health workers concerning which medicine to use.
However, discontinuing supply of AQ without ensuring an uninterrupted supply of AL can have serious public health concerns in terms of morbidity and mortality of patients due to malaria as health workers will be prompted to revert to non recommended treatment options. In the event of a stock out the health workers reported that they revert to prescription of SP and quinine for treatment of malaria.

The increased prescription of AL has a positive impact in that accurate quantification of AL consumption can be made from the consumption data recorded at the facility level and reported to the National Logistics Management Unit. This will provide a basis for the DOMC to determine quantities for re supply for health facilities in the push system of drug supply. However an increased prescription of AL can also be attributed to presumptive treatment of malaria taking into consideration that 59 percent of the health facilities rely on purely clinical acumen to arrive at a diagnosis. This could lead to irrational prescription of AL, resulting in a waste of resources considering the cost of a single dose of treatment, as well as unnecessary exposure of the patients to medicine and eventually contribute to the development of resistance by *P.falciparum* to AL.

Inventory Control Practices.

Inventory control practices need to be strengthened to ensure that drug use can be tracked and accountability is evident to rule out chances of loss of drugs through pilferage and also enable accurate quantification both at the national and at the facility level. This calls for measures to be taken by the ministry of health to address the shortage of qualified staff at the health facilities.

Reviewing the position paper of the Pharmaceutical Society of Kenya (PSK) on the change of treatment policy of malaria from SP to AL, pertinent issues brought regarding the use of AL have been observed in the three surveys conducted after the implementation. It is still not clear what progression steps need to be taken when prescribing quinine from AL. 10 percent of the prescriptions reviewed had quinine injection (I.M) prescribed once a day for 1-3 days before prescribing AL. This does not conform to what the current treatment guidelines recommend. Another concern for the PSK, which was also noted during the survey, was the lack of a suitable paediatric formulation at the health facilities for both AL and quinine. The quinine tablets supplies from KEMSA could not be accurately divided into equal portions; hence there was a chance of under dosing or overdosing the patient.

The prescribers' adherence to treatment guidelines and patients' adherence to medication is very critical for the successful implementation of any new drug policy. Lack of conformity to the recommended treatment guidelines could be attributed to two specific issues: one the failings during the introduction of this policy with regard to timeliness of trainings, drug supply and supply of inventory management tools to support record keeping and reporting. In

future quality of trainings should be evaluated for the content and a monitoring training and planning approach adopted to assess the impact of continuous training on clinical practices.

6.4 Conclusion

Studies on the implementation of the new malaria treatment policy were undertaken three years after the policy had been changed in Kenya, three years after implementation started in study districts and one year after the last evaluation was completed in 2008. This provided sufficient time to evaluate if the new policy reached the periphery of health system and what coverage of front-line facilities and health workers has been achieved with the planned activities. Ideally, all facilities should be stocked with adequate and continuous supplies of AL, all health workers should be trained on AL use, and access to job aids, such as guidelines and wall charts, should be universal. This was intended to identify the operational difficulties in providing universal coverage with the new policy; lower targets of 80 percent or 60 percent are commonly set; having been specified by the Kenyan MoH to evaluate key implementation indicators such as proportions of facilities without stock-out of antimalarial drugs and coverage of trained health workers on AL use (Amin et al 2007; Ministry of Health (MoH) 2007).

However, findings of our survey have suggested that the policy implementation targets(all health facilities should have the recommended treatment 80% of the time and that at least 60% of all health workers should be trained on malaria case management) have not been fully met: 100 percent of facilities have stock-outs of at least one pack size of AL indicating that the drug is not readily available at all the levels of health facilities assessed, accessibility to the recommended drug is limited owing to the high cost of the drug in the private sector, which majority of the patients cannot afford. 76 percent of health workers are trained, 88.2 percent of health facilities have at least one health worker trained, 35.3 percent of facilities have access to guidelines, and only 35.3 percent of facilities have AL case-management wall charts. However data collected was not adequate to establish the critical mass of health workers trained on malaria case management who were actively translating health policy into practice. This would require further evaluation. The location of the job aids and wall charts in the health facilities could also be assessed in future as a measure of their utilization at the health facilities.

Due to time limits, our evaluation focused only government health facilities and mission facilities receiving supplies from KEMSA, hence the survey cannot give a report on the

progress made in private and mission health sector. We further recommend that future evaluations should include all health sectors in Kenya.

6.5 Recommendations

Availability of AL:

It is recommended that the, Ministry of Medical Services (MOMS):Improves supplies of all four AL products and monitor availability of AL at facilities by giving priority to stock-out indicators referring to the availability of each weight-specific AL product. At this point in time, realistic AL consumption can be established based on the number of AL prescriptions at facilities which has been in practice. The facilities are now able to calculate the quantities consumed per month using the AL dispenser's book.

The AL dispenser's tool was available in more than 90 percent of the facilities visited and it was in use. Hence it will be much easier for the facilities to calculate their average monthly consumption and place orders based on need. This will facilitate monitoring the true consumption of AL. This will eventually inform the introduction of the pull-system resulting in making quantitative facility-based adjustments.

Training on malaria case management and availability of treatment guidelines and job aids.

It is recommended that more training needs to be conducted to ensure that all health workers are trained in line with malaria case management.

Health workers need to be instructed on how to use the available AL even if adequate AL pack sizes are not in stock. It is recommended that simple training manuals or job aids should be developed for the health workers to ease recombination of pack sizes for specific weight bands.

To improve the availability and accessibility to the national treatment guidelines and job aids for the diagnosis, treatment and prevention of malaria, the dissemination and distribution channels of these important reference materials need to be reviewed and improved.

6 Limitations of the Study

1. The duration of the study was limited by time; hence the study team was not able to obtain all data as desired.
2. Most facilities attended to most of their patients in the morning hours or on particular days e.g. market days, hence visits to facilities in the afternoons or after a market day reduced the patient flow and the number of provider client interactions observed and client exit interviews conducted were subject to availability of patients.
3. The availability of key informants during the survey was hindered by the concurrent measles campaign in the district.
4. The sample size could not provide for generalizability in the other populations, it is recommended that the study should be conducted in more districts comparing different zones of malaria endemicity and different levels of health care.

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Appendix

...endix 1.Consent form

...FORMED CONSENT

...llo. My name is Everlyn Wesangula and I am a MSc. student at the ...iversity of Nairobi Institute of Tropical and Infectious Diseases. I am ...nducting a survey about malaria. I would very much appreciate your ...rticipation in this survey. The information you provide will help the ...vernment to better plan health services. The survey will take between 10 ...d 20 minutes to complete. Whatever information you provide will be kept ...ictly confidential and will not be shown to other persons.

...rticipation in this survey is voluntary and you can choose not to answer ...y individual question or all of the questions. However I hope that you will ...rticipate in this survey since your views are important.

...o you want to ask me anything about this survey?

...ay I begin the interview now?

...ignature of Interviewer: _____

...ate:_____

...ESPONDENT AGREES TO BE INTERVIEWED.....RESPONDENT DOES ...OT AGREE TO BE INTERVIEWED

Appendix 2: Assessment tool

NAME OF SITE	
CONTACT ADDRESS AND TELEPHONE	
FACILITY IN-CHARGE AND TELEPHONE CONTACT	
PERSON(S) INTERVIEWED	
ASSESSMENT TEAM	
DATE OF ASSESSMENT	

SECTION A: HUMAN RESOURCE

1. What is the number of staff involved in dispensing all drugs?

Cadre	Number
Pharmacists	
Pharmaceutical technologists	
Nurses	
Other(Please specify)	
Total	

2. What is the number of staff involved in dispensing antimalarials?

Cadre	Number
Pharmacists	
Pharmaceutical technologists	
Nurses	
Other(Please specify)	
Total	

3. What is the total number of clients per day?

4. What is the average number of patients with malaria per day?

5. What is the number of dispensing staff who have left over the last 12 months? [ ]

6. What is the number of prescribing staff who have left over the last 12 months? [ ]

7. What is the number of dispensing staff who joined the facility over the last 12 months? [ ]

8. What is the number of prescribing staff who joined over the last 12 months? [ ]

PART B: TRAINING

9. Have prescribing staff attended any in service training for management of malaria?

Yes	
No	

10. If you answered "YES" to question 8 above,

identify the training programs

Name of training course	**No. of staff trained**	**Date of training**	**No. of training hours**

i. What is the number of staff who attended separate courses in the following areas?

Training	**Cadre**	**# of staff trained**
Diagnosis of malaria		
Medication use counseling		
Detection of adverse drug reactions		
Inventory management		

YES	NO

11. Are you aware that there was a change in the treatment of malaria in the country?

12. What is the current first line of treatment for uncomplicated malaria in Kenya?

13. Has your facility ever received any consignment of AL?

14. A. How many health workers have received training on the treatment of malaria following change of treatment policy?

Before AL delivery	**After AL delivery**

15. What would hinder you from following the current malaria treatment guidelines?

.....

.....

.....

16. What would encourage you to adhere to the current malaria treatment guidelines?

.....

.....

.....

17. What challenges have you faced in implementing the new malaria treatment guidelines?

.....

.....

.....

PART C: DISPENSING

18. Does the Dispensary area have the following in place?	YES	NO
Suitable waiting place(space, sitting arrangements)		
Confidential patient medication counseling area		
Hand washing area		
Running and or portable water		
Security- grills on the window and doors, strong doors with robust locks		
Adequate and effective lighting		
19. Reference materials available at the dispensing area: (Specify year of publication)		
National Guidelines for diagnosis , treatment and prevention of malaria for health workers in Kenya		
National standard treatment guidelines		
Job aids(available and displayed)		
Others, specify		

PART D: INVENTORY CONTROL

20. Do you collect drug related data (e.g. stock out of AL, drug consumption)?

21. Are the following AL related data captured in records?

	YES	NO
Physical stock count		
Quantities received		
Quantities consumed per month		
Stock outs		
Expired stock		

22. Is the following data reported to the National LMIS?

	YES	NO
Physical stock count		
Quantities received		
Quantities consumed per month		
Stock outs		
Expired stock		

23. Are the following records available? (Interviewer to be shown)

Records	YES	NO
Bin cards		
AL Dispensers book		
Monthly Consumption record		

24. Are the following items in stock?

		YES	NO
AL	6'S		
	12'S		
	18'S		
	24'S		
Amodiaquine			
Chloroquine			
Quinine tablets			
I.V Quinine			
Others (specify)			

25. In the last six months have the following items been out of stock and for how long?

		Yes	**No**	**Duration**
AL	6'S			
	12'S			
	18'S			
	24'S			
Amodiaquine				
Chloroquine				
Quinine tablets				
I.V Quinine				
Others (specify)				

26. In the last six months have you had?

Expired AL	Yes	No
AL wasted through wrong handling		
Damaged AL		

PART E. PRESCRIBING

27. Does a system to record drugs prescribed exist?

YES	NO

28. Are there functional weighing scales in the treatment areas?

YES	NO

29. Are there functional thermometers in the treatment areas?

YES	NO

30. Are the treatment algorithms/ job aids available and displayed in the treatment areas?

YES	NO

31. Does a system to record medicines dispensed exist?

YES	NO

32. How often do you receive stocks of AL at your facility?

Appendix 3: List of facilities in Bungoma South.

District	Facility	Division	Location	Sublocation	IC_Name	IC_Mob
Bungoma South	Bukembe Dispensary	Kanduyi	Bukembe	Namirembe	Dinah Nasambu	0734-470875
Bungoma South	Bulondo Dispensary	Kanduyi	E. Bukusu	Namwacha	Elijah Mogaka	0720-251212
Bungoma South	Bumula Health Centre	Bumula	Bumula	Bumula	Robert Magomere	0720-842251
Bungoma South	Bungoma District Hospital	Kanduyi	Township	Township	Dr. Mulianga Ekesa	0733-956139
Bungoma South	Bungoma Medical Centre	Kanduyi	Township	Township	Dr. Marumbu Peter	
Bungoma South	Ekitale Dispensary	Kanduyi	E. Bukusu	W. Sangálo	Victorina Makona	0737-647007
Bungoma South	Elgonview Nursing Home	Kanduyi	Township	Khalaba	Valga	0733-843565
Bungoma South	GK Prison Dispensary (Bungoma South)	Kanduyi	Township	Township	Vincent Nyairo	0733-383456
Bungoma South	Kabula Dispensary	Bumula	Kabula	Watoya	Hellen Wabwile	0733-571529
Bungoma South	Khasoko Health Centre	Bumula	Khasoko	Khalaba	Thaddeus Toili	0727-920773
Bungoma South	Kibabii Health Centre	Kanduyi	Kibabii	Tutti	Elizabeth Simiyu	0726-703809
Bungoma South	Kibuke Dispensary	Bumula	Kibuke	Kibuke	Mary Wasikenda	0710-527230
Bungoma South	Kimaeti Dispensary	Bumula	Kimaeti	Syombe	Constance Were	0733-509528
Bungoma South	Machwele Dispensary	Bumula	Kimaeti	Lwanja	Brigid Khaemba	0733-491290
Bungoma South	Mechimeru Dispensary	Kanduyi	E. Bukusu	E. Sangalo	Titus Wangila	0733-953962
Bungoma South	Miluki Dispensary	Bumula	Mukwa	Mukwa	Catherine Wanjala	0734-952661
Bungoma South	Mission of Mercy Clinic	Kanduyi	Township	Township	Jane Makali	0734-767931
Bungoma South	Mumbule Dispensary	Kanduyi	E. Bukusu	Mwikhupo	Beatrice Butali	0720-024688
Bungoma South	Nasianda Dispensary	Bumula	Khasoko	Namatotoa	Florence Akuku	0736-895728
Bungoma South	Nzoia Dispensary (Bungoma South)	Kanduyi	Bukembe	Kongoli	Dr. Wanjala	0733-600211
Bungoma South	Siboti Dispensary	Bumula	Siboti	E. Siboti	Archillus Okumu	0722-653378
Bungoma South	St Damiano Nursing Home	Kanduyi	Township	Khalaba	Sr. Celestine	0735-378820
Bungoma South	Victorious Living Ministries (VLM) Dispensary	Kanduyi	Musikoma	Sibembe	Lucas Tunduli	0723-536868
Bungoma South	Mayanja Dispensary	Kanduyi	Kibabii	Tutti	Clara Masika	

Appendix 4: List of Sampled Facilities

Name of Site	Contact Address	Telephone	Person(s) Interviewed
Ekitale Dispensary	P.O.Box 14 Bungoma	0737647007	Ruth Kasilwa/Fidelis Okumu
Kabula Community Dispensary	P.O.Box 14 Bungoma	733571529	
Machwele Dispensary(Mission)	P.O.Box 1463 Bumula	0716551553/0710193211	Sr.Bridgette Khaemba/Sr.Catherine Masinde Sr.Roselyne Ngoya
Webuye District Hospital	P.O.Box 14 Bungoma	0723843148	Dr.Lucy Mecca, Dr.Hilary Kagwa, Mr.Kusi Tobias.
Kibuke Community Dispensary	P.O.Box 14 Bungoma	710527230	Mary Wasikenda
Bulondo Health Centre	P.O.Box 14 Bungoma	720251212	Elijah Mogaka/Rose
Bukembe Dispensary	P.O.Box 14 Bungoma	710535206	Agnes Nambuye
Kimaeti Health Centre	P.O.Box 14 Bungoma	733509428	Constance Were
Mayanja Dispensary	P.O, Box 14 Bungoma	736392001	Clare Masika
Siboti Dispensary	P.O.Box 96 Malakisi	722653378	Achillus Okumu
Khasoko Health Centre	P.O.Box 33 Buyofu	737986971/0727344264/	Ali Juma. Sr.Florence Bella Biketi
Bumula Health Centre	P.O.Box 14 Bungoma	720842251	Magomere Robert
Nasianda Dispensary	P.O.Box 14 Bungoma	731053698	Florence Okuku
Miluki Dispensary	P.O.Box1191 Bungoma	0734752661	Bernard Nyongesa/Nelly Masolo
Mumbule Dispenary	P.O.Box 14 Bungoma	720024688	Sr.Beatrice Mutali,Sr.Mayabi, Gentria
Mechimeru Health Centre	P.O.Box 14 Bungoma	734812511	Sr.Agnes Barasa
Bungoma District Hospital	P.O.Box 14 Bungoma	0722714821/0728399610	Dr. Wekesa(DPF) Mr.Kiptoo(DHRIO)

Appendix 5: District Health Management Information

District human resource management- Medical/Technical Personnel – Bungoma South District 2009

		GOK						FBO/NGO						Total
	Description	**L 1**	**L 2**	**L 3**	**L 4**	**DHMT**	**DMS T**	**L 1**	**L 2**	**L3**	**L4**	**L5**	**L6**	
1	Consultants (MD)	0	0	0	5	1	1	0	0	0				7
2	Medical Officers	0	0	0	5	0	0	0	0	0				5
3	Dentists	0	0	0	1	0	0	0	0	0				1
4	Dental Technologists	0	0	0	1	0	0	0	0	0				1
5	Community Oral Health Officers	0	0	0	1	0	0	0	0	0				1
6	Clinical Officer (Spec)	0	0	0	8	1	0	0	0	0				9
7	Clinical Officers (Gen.)	0	6	2	5	0	0	0	4	4				21
8	BSN Nursing officers	0	0	0	0	0	0	0	0	0				0
9	Registered Nurses	0	8	3	18	2	1	0	4	8				44
10	Enrolled Nurses	0	55	10	122	0	0	0	7	13				206
11	Public Health Officers	0	2	1	1	2	0	0	0	0				4

		GOK						FBO/NGO						Total
	Description	**L 1**	**L 2**	**L 3**	**L 4**	**DHMT**	**DMS T**	**L 1**	**L 2**	**L3**	**L4**	**L5**	**L6**	
12	Public Health Technicians	0	4	1	0	0	0	0	0	0				5
13	Pharmacists	0	0	0	1	1	1	0	0	0				3
14	Pharmaceutical. Technologist	0	0	0	2	0	0	0	0	0				2
15	Lab. Technologist	0	4	0	12	0	1	0	2	2				21
16	Lab. Technician	0	9	2	6	0	0	0	2	4				23
17	Orthopaedic technologists	0	0	0	0	0	0	0	0	0				0
18	Nutritionists	0	0	0	2	1	0	0	0	0				3
19	Radiographers	0	0	0	4	0	0	0	0	0				4
20	Physiotherapists	0	0	0	3	0	0	0	0	0				3
21	Occupational Therapists	0	0	0	4	0	0	0	0	0				4
22	Plaster Technicians	0	0	0	2	0	0	0	0	0				2
23	Health Record & Information Officers	0	0	0	0	1	0	0	0	0				1
24	Health Record & Information Technicians	0	0	0	3	0	1	0	0	0				4
25	Trained Community Health Workers	350	0	0	0	0	0	50	0	0				400

		GOK						FBO/NGO						Total
	Description	**L 1**	**L 2**	**L 3**	**L 4**	**DHMT**	**DMST**	**L 1**	**L 2**	**L3**	**L4**	**L5**	**L6**	
26	Social health workers	0	0	0	1	0	0	0	0	0				1
29	community health extension workers	0	12	4	0	0	0	0	0	2				18
30	Medical engineering technologist	0	0	0	1	0	0	0	0	0				1
31	Medical engineering technicians	0	0	0	2	0	0	0	0	0				2

Sources: District Human Resource Management Records-Bungoma South

Appendix 6: Bungoma South district malaria threshold levels

BUNGOMA SOUTH DISTRICT MALARIA THRESHOLD LEVELS										
	2000	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**
JANUARY	13801	13657	11090	9241	13442	20380	15957	27,805	7872	10614
FEBRUARY	10311	8332	10010	12444	15548	20512	14697	27806	8153	9510
MARCH	10474	8969	9929	13130	20399	19171	19474	26532	9865	11457
APRIL	11029	8965	9914	10891	22092	22725	20898	21601	10991	12647
MAY	12364	11605	10764	13019	25911	25613	23395	22484	14823	15581
JUNE	12346	12835	10187	13918	34298	22221	28871	27653	15901	202296
JULY	13122	13140	14228	18009	37297	24354	27309	10021	15398	17581
AUGUST	12017	9558	10200	14380	24115	23167	17544	8297	11123	12703
SEPTEMBER	11269	8868	8059	11867	18939	18449	15441	7671	10883	
OCTOBER	11363	8586	7789	14454	18700	16748	19418	9459	10732	
NOVEMBER	10649	8749	7880	11702	17727	13946	19092	8580	9084	
DECEMBER	10066	8091	7320	10655	15432	14128	16419	6655	9585	
TOTAL	**138811**	**121355**	**117370**	**153710**	**263900**	**241414**	**238515**	**204,564**	**134410**	**44228**