Kenya Annual Malaria Report

July 2011 to June 2012

Ministry of Public Health and Sanitation
Division of Malaria Control

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This annual report covers a successful and significant year in the history of malaria control in Kenya with remarkable achievements in universal coverage with long lasting insecticidal nets (LLIN) in western Kenya.

It was also the second year of implementation of the affordable medicines facility for malaria (AMFm) whose main objective is to increase prompt access to quality antimalarials. Resource mobilization efforts also bore fruit in these tough economic times beginning with the successful signing of phase I of the Global Fund to fight AIDS Tuberculosis and Malaria (Global Fund) Round 10 grant worth US $ 38 million for two years, in addition to US$ 36 million from the United States President's Malaria Initiative for the 2012 fiscal year, and significant funding to scale up indoor residual spraying (IRS) in endemic districts from the United Kingdom Department for International Development (DFID) from mid 2013. The malaria partnership has grown with more partners from private sector and civil society joining the various technical working groups and participating in implementation activities at district level. The partnership was instrumental in coordinating malaria epidemic preparedness and response activities as part of the drought and famine mitigation response in Northern and North Eastern Kenya.

Our ultimate goal is to achieve the vision of a malaria free country, however, the gains made over the past year will need to be improved upon and sustained through sustainable financing and innovations at community level. This annual report highlights some of the challenges faced by the programme and in particular the need for parasitological diagnosis of malaria – which will be in part addressed by the funding committed for the following financial year 2012/2013; and the need to strengthen reporting and monitoring of malaria outcome and impact indicators.

I would like to extend our gratitude and appreciation to all our partners who have supported the programme through funding, technical assistance, research, training, implementation activities and programme management. Let us continue to work together to achieve further progress and impact on malaria in Kenya.

A MALARIA FREE KENYA – IT IS POSSIBLE

Dr. David O. Soti
Programme Manager

Executive Summary

Over the past 10 years, Kenya recorded significant gains in reducing malaria morbidity and mortality. The use of insecticide treated nets in particular contributed to the overall reduction in child mortality by more than one third in that period. Building these achievements, key activities in 2011/2012 included procurement and distribution of 7.6 million nets, indoor residual spraying in 13 malaria endemic districts, and increasing access to prompt treatment with effective artemisinin combination treatments in the private sector. This report summarizes achievements in malaria control in the year beginning July 2011 through June 2012.

Malaria morbidity and mortality

Malaria was one of the most diagnosed ailments in out-patients with 12 million (31 percent) cases diagnosed between July 2011 and June 2012. Of these, about 35 percent were confirmed through testing mainly by microscopy

Malaria prevention

In the first phase of the mass net distribution campaign, 7.6 million (72 percent) of 10.6 million long lasting insecticidal nets (LLINs) earmarked for universal coverage were distributed in Western, Nyanza and some districts in Rift Valley provinces, while 1.7 million LLINs were distributed to pregnant women and infants through MCH clinics in targeted districts countrywide. In addition, over half a million subsidized nets were distributed through community-based social marketing channels. The target for universal coverage was to have at least 1 LLIN for every two persons. In areas where the mass distribution occurred, a post campaign evaluation survey found that in only 67 percent of households was the required 1 net for every two persons; 13 percent had less, while 20 percent had no LLINs. The increase in net coverage was however not matched by an increase in use (37 percent) attributed in part to shortage of funds to support net use communications. Three million nets will be distributed in the second phase of the mass net distribution campaign in Coast province and parts of Rift Valley province. In order to increase uptake of intermittent preventive treatment in pregnancy (IPTp), a mentorship programme for health workers using supervisors as mentors to provide on the job training and supportive supervision and community mobilization to increase awareness of malaria in pregnancy and antenatal care were implemented. Service delivery data indicate that 71 percent of targeted women who attended antenatal care took two doses of IPTp.

Prompt diagnosis and treatment

Sixteen million doses of artemether-lumefantrine (AL) and 250,000 rapid diagnostic tests (RDT) were distributed to public and private not-for-profit health facilities countrywide. The number of RDTs distributed was small compared to an estimated 8 million required annually to compliment microscopy. Malaria testing rates from weekly integrated disease surveillance data were on average low at 37 percent and positivity rates averaging 30 percent. The affordable medicines facility for malaria (AMFm) whose main objective was to increase access to quality ACTs especially in the private sector was implemented for the second year. An evaluation in December 2011 showed that Kenya was one of 5 countries that achieved and surpassed targets set for availability, price and market share of quality assured ACTs.

Epidemic preparedness and response

Epidemic preparedness and response (EPR) activities were initiated in arid and semi-arid districts to mitigate risk of malaria epidemics following the long rainy season between March and May which has become unpredictable due to frequent occurrences of drought. The capacity for EPR in the districts is however still low compared with the highland epidemic prone districts where sentinel health facility-based malaria surveillance is already established. Most sentinel facilities reported shortages of malaria rapid diagnostic tests affecting surveillance. Despite these challenges, no malaria epidemics were reported.

Surveillance, monitoring, evaluation and operations research

A national malaria surveillance plan was developed in 2011 using WHO guidelines. The plan and tools were piloted in February 2012 followed by a phased implementation. To enhance understanding of monitoring and evaluation at district and provincial levels, the Division of Malaria Control (DOMC) and MEASURE Evaluation supported the training of key health workers on monitoring and evaluation. In a follow-up evaluation six months later, officers trained reported applying the knowledge gained in their daily work. The DOMC also carried out a community based survey to evaluate the first phase of the mass LLIN distribution campaign and two facility based surveys to evaluate quality of malaria case management and availability of antimalarials. In an effort to address drug stock-outs, *SMS for life*, a mobile phone based platform for reporting and monitoring stocks at district level was piloted in 87 public facilities in five districts from August 2011 for a period of six months and demonstrated that district health teams could use the tool to eliminate total stock-outs of AL.

Data from insecticide resistance monitoring showed increasing phenotypic resistance to pyrethroid insecticides by *An. gambiae* s.l. This evidence was used to initiate changes to use alternative insecticides for IRS in order to manage resistance to available insecticides for malaria vector control. Therapeutic efficacy monitoring of first and second line ACTs showed that both AL and dihydroartemisinin-piperaquine had corrected cure rates greater than 95 percent at boths days 28 and 42 in western Kenya.

Advocacy communication and social mobilization

World Malaria Day 2012 was celebrated in Msambweni District under the theme "Sustain Gains, Save Lives: Invest in Malaria". The occasion marked the launch of the mass net distribution campaign in the region but also in keeping with the theme brought to fore the fragility of the gains made in malaria control over the past decade with uncertainty over sustained financing.

Programme management

Resource mobilization for programmatic activities was relatively successful. In October 2011, a US$38 million grant covering two years from the Global Fund was signed, the United States President's Malaria Initiative (PMI) committed 32 million dollars through September 2012 and the United Kingdom Department for International Development (DFID) about 10 million dollars for malaria prevention commodities and programme management. The biggest threat to malaria control in Kenya is the uncertainty of financing to sustain gains made over the past decade. The programme will continue to explore avenues to diversify sources of funding for malaria control activities while continuing efforts to ensure available resources including

commodities are effectively utilised to ensure maximal impact. Such activities include the scale up diagnosis based treatment of malaria using RDTs and a nationwide quality assurance for diagnostics and the strengthening of district and regional capacities for malaria surveillance, monitoring and evaluation.

Abbreviations

ACP	Alphacypermethrin
ACT	Artemisinin based combination treatment
ACSM	Advocacy Communication and Social Mobilization
AL	Artemether-lumefantrine
AMFm	Affordable medicines facility for malaria
AMT	Oral Artemisinin Monotherapy
ASAL	Arid and semi-arid lands
CCM	Community case management
CDC	Centres for Disease Control and Prevention
CHEW	Community health extension worker
CHW	Community health worker
DDSR	Division of Disease Surveillance and Response
DFID	Department for International Development
DHIS 2	District Health Information Software 2
DHMT	District Health Management Team
DMCC	District malaria control coordinator
DOMC	Division of Malaria Control
DQA	Data Quality Audit
DRH	Division of Reproductive Health
EARN	East Africa Roll Back Malaria Network
EMA	Essential Malaria Actions Guide
EPR	Epidemic preparedness and response
FY	Financial Year
Global Fund	The Global Fund to fight AIDS, Tuberculosis and Malaria
HMIS	Health Management information System
IPTp	Intermittent preventive treatment in pregnancy
HRP2	Histidine Rich Protein 2
IR	Insecticide Resistance
IRS	Indoor residual spraying
IVM	Integrated vector management
KEMRI	Kenya Medical Research Institute
KEMSA	Kenya Medical Supplies Agency
KES	Kenya Shilling
LCH	Lambdacyhalothrin
LLIN	Long lasting insecticidal net
LMIS	Logistic Information Management System
M&E	Monitoring and Evaluation
MCH	Maternal and Child Health
MCHIP	Maternal and Child Health Integrated Programme
MICC	Malaria Interagency Coordinating Committee
cMIP	Community Malaria in Pregnancy Programme
MIP	Malaria in Pregnancy
MIS	Malaria Indicator Survey

NMS	National Malaria Strategy
PCR	Polymerase Chain Reaction
PMCC	Provincial Malaria Control Coordinator
PMI	United States President's Malaria Initiative
PSI	Population Services International
Q	Quarter
QA	Quality Assurance
QAACTs	Quality Assured ACTs
QC	Quality Control
RDT	Rapid Diagnostic Test
RIA	Rapid Impact Assessment
SBM-R	Standards Based Management and Recognition
SMEOR	Surveillance, Monitoring and Evaluation and Operations Research
SMS	Short Message Service
SO	Stock-out
TWG	Technical Working Group
UK-AID	United Kingdom aid
UNHCR	United Nations High Commission for Refugees
UNICEF	United Nations Children's Fund
US$	United States Dollar
USAID	United States Agency for International Development
WHO	World Health Organization

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Introduction

Epidemiology of malaria in Kenya

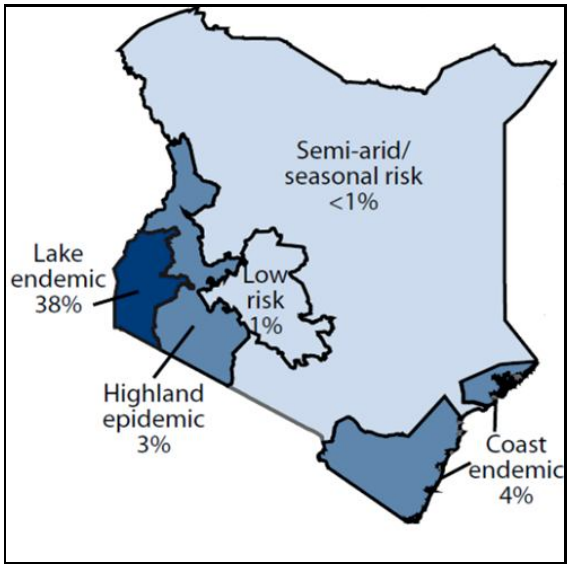
The epidemiology of malaria in Kenya has been changing over the years. A comparison of previous malaria maps and recently updated malaria prevalence maps shows the shrinking of malaria endemic areas and expansion of low transmission zones. Currently, between 60 and 70 percent of the country where 78 percent of the population lives has a parasite prevalence of less than 5 percent. There has also been a steady decline in transmission in endemic areas characterized by an increase in the age group with the highest prevalence from children less than five years old to those between 5 and 10 years of age[1]. Nevertheless, according to routine data from public health facilities, malaria accounts for about 30 percent of outpatient attendance, 19 percent of admissions and is a leading cause of death in children under five.

There are four malaria epidemiological zones in Kenya with diversity in malaria risk determined largely by altitude, rainfall patterns and temperature. Malaria prevalence by zone is shown in figure 1.

a) Endemic zones are areas of stable malaria transmission around Lake Victoria in western Kenya and along the coast. Transmission is intense throughout the year, with annual entomological inoculation rates ranging from <10 to >100.
b) Seasonal malaria zones include and semi-arid areas of northern, eastern and south eastern parts of the country which experience short periods of intense malaria transmission during the rainfall seasons which may result in epidemics.
c) Highland epidemic zones are areas of seasonal malaria transmission in the western highlands of the Rift Valley. Malaria epidemics are common and occur when climatic conditions favour vector breeding.
d) Low risk zones cover the central highlands of Kenya including Nairobi where traditionally, low seasonal temperatures inhibit sporogony. However, the increasing temperatures and changes in the hydrological cycle associated with climate change are likely to increase the areas suitable for malaria vector breeding with the introduction of malaria transmission in areas where it had not existed before.

[1]Division of Malaria Control, Kenya National Bureau of Statistics and ICF Macro.(2011). *2010 Kenya Malaria Indicator Survey,* Nairobi, Kenya DOMC, KNBS and ICF Macro.

Figure 1: Malaria prevalence in children 0-14 years by epidemiologic zone in 2010



Source: Malaria Indicator Survey 2010

Plasmodium falciparum is the most predominant cause of malaria in Kenya with 1 in 6 of these infections being mixed with other species such as *P. malariae* and *P. ovale*. Infections with *P. vivax* are rare. The main malaria transmitting vectors include the Anopheles gambiae complex (*An. gambiae .s.s, and An. arabiensis*) and *Anopheles funestus*. Nearly 29 million (70 percent) Kenyans live in areas of any malaria risk while 8.6 million (21 percent) live in areas of perennial high malaria transmission in western Kenya.

Background

In April 2008, the United Nations Secretary-General called for efforts to ensure universal coverage with malaria prevention and treatment programmes by the end of 2010 while aiming at reducing mortality due to malaria to near zero by 2015. The Kenya National Malaria Strategy (NMS) 2009-2017 includes universal coverage with prevention and treatment as key strategies for the reduction of malaria morbidity and mortality by at least two thirds of the 2008 levels by 2017. A review of documents relevant to this process was conducted. Most documents were available in electronic format and were obtained from DOMC and partners and are highlighted in table 1. The reference section contains a detailed list of these documents. This annual report summarizes the current status of malaria in Kenya and provides an insight into malaria control efforts made from July 2011 to June 2012 by all partners.

Table 1: Information sources for the 2011/2012 Malaria Report

- Programme implementation reports
- Malaria Indicator Survey 2010
- Post mass LLIN distribution campaign evaluation Report 2012
- AMFm end line evaluation Report 2012
- *SMS for Life* report 2012
- Quality of care survey reports, 2010, 2011 and 2012
- HMIS for data on clinical and confirmed malaria cases and service delivery indicators (antenatal clinic attendance, IPTp uptake, LLINs delivered to pregnant women and infants)
- Programme expenditure reports
- Disbursements from the Global Fund
- Malaria specific activity budgets from donor partners

Goal and objectives of malaria control

Although it exerts a huge toll on humanity, malaria is entirely preventable and curable with prompt institution of effective therapy. A combination of globally recommended malaria interventions are used in Kenya for malaria control. These are a) vector control using integrated vector management including LLINs, IRS, larval control and environmental management; b) prompt diagnosis and treatment with effective medicines at all levels of the health system; and c) prevention and treatment of malaria in pregnancy. Public health education is also a key component of malaria control aimed at enhancing uptake and appropriate use of interventions. The NMS 2009-2017 elaborates the following 6 key objectives for malaria control in Kenya:

1. To have at least 80% of people living in malaria risk areas using appropriate malaria preventive interventions including LLINs, IRS in targeted areas, and IPTp by 2013

2. To have 80% of all self-managed fever cases receive prompt and effective treatment and 100% of all fever cases who present to health facilities receive parasitological diagnosis and effective treatment by 2013

3. To ensure that all malaria epidemic prone districts have the capacity to detect and preparedness to respond to malaria epidemics annually by 2010

4. To strengthen surveillance, monitoring and evaluation systems so that key malaria indicators are routinely monitored and evaluated in all malarious districts by 2011

5. To strengthen advocacy, communication and social mobilization capacities for malaria control to ensure that at least 80% of people in malarious areas have knowledge on prevention and treatment of malaria by 2014

6. To strengthen capacity in programme management in order to achieve malaria programmatic objectives at all levels of the health care system by 2013

Current Malaria Status and Implementation of Interventions

This section presents the status on the performance of monitoring and evaluation (M&E) indicators associated with the goal and objectives of malaria control for activities implemented between July 2011 and June 2012.

PART A: IMPACT

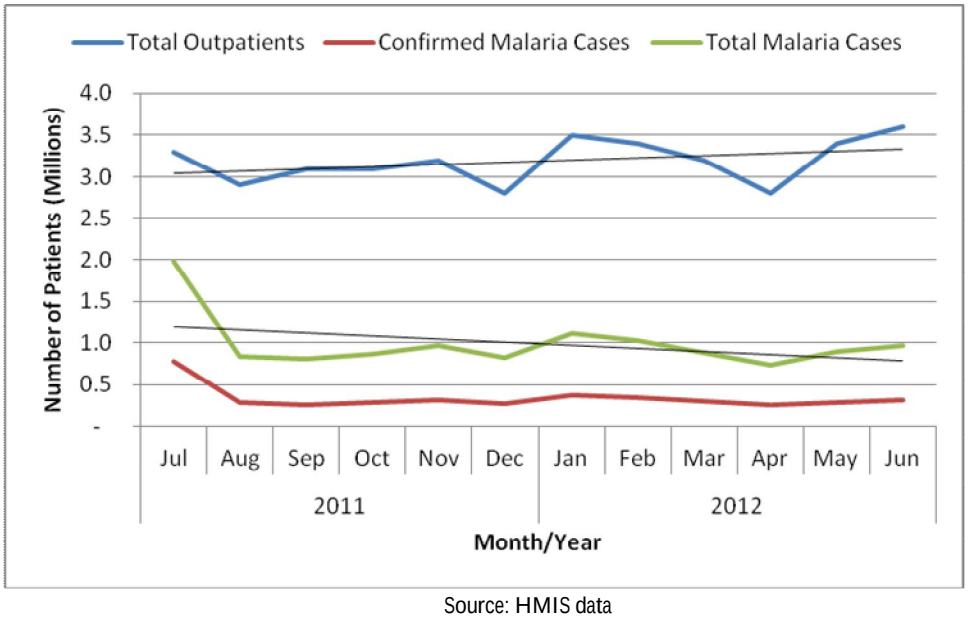
1. Reduce Morbidity and Mortality due to Malaria

Morbidity and mortality data was obtained from the routine HMIS operating on District Health Information Software 2(DHIS-2) from June 2011. This data originated from health facilities, was collated at district level and then uploaded onto the HMIS database. Malaria in patient and mortality data is not presented as the data for the period under review was yet to be uploaded onto the DHIS.

1.1. Outpatient malaria cases

Malaria is still one of the commonest diagnosed ailments in out-patient departments in Kenya. About 12 million (31 percent) cases of malaria were diagnosed out of 38 million out-patient visits between July 2011 and June 2012. The proportion of malaria cases as a proportion of all outpatients was relatively constant ranging from 27 to 30 percent throughout the 12 months except in July 2011 when the malaria cases comprised 60 percent of all outpatients. On average 900,000 malaria cases were reported each month of which about 300,000 (30 percent) were reported as confirmed cases (figure 2).

Figure 2: Outpatient and malaria cases July 2011 to June 2012



Source: HMIS data

1.2. In-patient malaria cases and malaria mortality

In-patient and mortality data was not available in the HMIS database at the time of compiling this report. The data was in the process of being recoded to conform to the international classification of diseases-10 (ICD 10) prior to being uploaded for use.

PART B: PERFORMANCE BY OBJECTIVE

1. Malaria Prevention

Objective: By 2013, to have at least 80% of people living in malaria risk areas using appropriate malaria preventive interventions

Strategies

- Universal distribution of LLINs through appropriate channels (1 LLIN for 2 people)
- Indoor residual spraying in the targeted areas
- Support malaria-free schools initiative
- Provision of IPTp at antenatal clinics and community levels

Planned activities

The key activity planned for 2011/2012 was the distribution LLINs to achieve and maintain universal coverage in Western, Nyanza, Coast and parts of Rift Valley Province. During this period, 7.6 million LLINs were successfully distributed to households in Western province, Nyanza province and some districts in Rift Valley Province while 1.4 million nets were distributed to pregnant women and infants through maternal and child health clinics. The other activity planned and completed was a single round of IRS in 13 endemic districts in Nyanza province. Activities to support the malaria free schools initiative were not implemented in 2011/2012. A one-tine LLIN distribution was carried out in 2010/2011 to all boarding schools in endemic areas. Table 2 outlines performance against indicators and targets for malaria prevention through vector control. .

Table 2: Targets and indicators for vector control

Objective	Indicator	Target	Achievement*
Achieve universal coverage with LLINs in malaria endemic zones	At least 1 LLIN for every 2 people in a household	100% of targeted households own at least 2 or more LLINs	67%
LLINs consistently used by household members	Proportion of population using LLINs	80% population use LLINs	Pregnant women: 53% Children <5y: 25% Household: 37%
Cover all household dwelling structures in 5 endemic districts with IRS	Proportion(%) of targeted structures sprayed	100% of targeted structures sprayed	98%

** LLIN data from post mass campaign survey in Western, Nyanza and some Districts of Rift Valley province (DOMC, 2012)[2].*

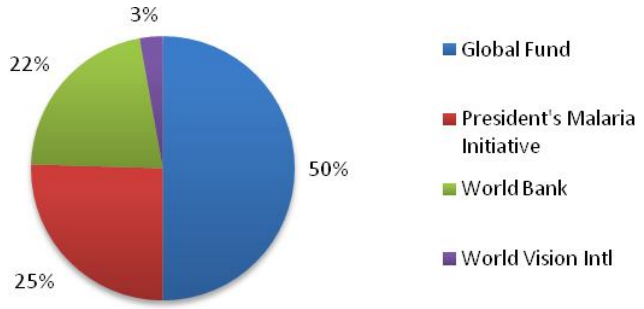
1.1. Achieve and Maintain Universal Coverage with LLINs

In 2010, the Ministry of Public Health and partners in malaria control successfully mobilized resources for the procurement and mass distribution of 10.6 million nets including limited public awareness campaigns. The Global Fund provided funds for 5.3 million, United States President's

[2] DOMC (2012) '*Evaluation of the 2011 Mass LLIN Distribution Campaign*' Nairobi, Ministry of Public Health and Sanitation

Malaria Initiative (PMI) 2.7 million, the World Bank 2.3 million and World Vision International 300,000 LLINs. Figure 3 shows the proportion of LLINs contributed by donor. In addition, DFID through the local WHO office donated US$ 730,000 to support micro-planning at district level in preparation for distribution of 5.4 million nets provided by the Global Fund.

Figure 3: Donor Contributions of LLINs



1.1.1. Mass distribution of LLINs

Planning for the mass distribution campaigns began in 2009 to January 2011 and targeted all districts in Nyanza Western and Coast provinces and 24 malaria epidemic prone districts in Rift Valley province. Pre-registration of households at village level took place from March to June 2011 and the distribution of 7.6 million LLINs in districts in Western, Nyanza and in malaria epidemic prone districts in Rift Valley Provinces was conducted from July to September 2011. Delivery of the balance of 3 million nets began in October 2011 and continued through May 2012. The distribution of these nets to the remaining districts in Rift Valley and Coast provinces was planned for the second half of 2012. Table 3 shows the number of nets distributed in 2011 by funding agency and target district.

Table 3: LLINs distributed in mass campaigns in 2011/2012

Funding Source For LLIN	Quantity (millions)	Targeted Districts
Global Fund	4.5	All in Western Province except Vihiga, All in Nyanza Province except Kisii, Nyamira Plus Transmara and Narok in Rift Valley Province
PMI	2.7	Koibatek, Marigat, Vihiga, Kisii, Nyamira and Mwea
World Vision	0.4	Loima District and West Pokot, Pokot North and Pokot East

1.1.2. Routine distribution and social marketing of LLINs

Pregnant women and infants in endemic, epidemic prone and some areas of seasonal risk received LLINs through antenatal and child welfare clinics. About 1.7 million nets were distributed in this time falling short of the targeted 2.4 million nets due to delayed deliveries. In the same period 570,000 nets were distributed in rural communities for sale at a subsidized cost by community based organizations.

1.2. Indoor Residual Spraying

1.2.1. IRS in targeted endemic districts

A single round of IRS was successfully carried out in 13 districts of Nyanza Province in the 3rd quarter of 2011/2012 reporting period. The population in these districts was projected to be 2.1 million in 2012 but more than 2.4 million people were found and 98% of the targeted 654,000 structures sprayed. IRS was supported by a grant from PMI and implemented by Research Triangle International (RTI) in collaboration with the Nyanza province public health team, respective district health officials and environmental enforcement officers from the national environmental management authority (NEMA). A net census was carried out as part of the IRS activity and at least 1 million nets were counted giving a crude estimate of 0.88 LLINs for every 2 people just falling short of the universal coverage target of 1 net for every 2 persons. A summary of IRS achievements is shown in table 4.

Table 4: Coverage with both IRS and LLINs in IRS target districts

District	Estimated population	Sprayed Structures	% target structures sprayed	# LLINs in Households	Crude LLIN Coverage (Target =1 net/2 people)
Homabay	276,985	73,504	96.9%	126,371	0.91
Suba	115,133	32,282	95.2%	45,767	0.80
Mbita	114,540	31,070	97.5%	51,380	0.90
Ndhiwa	233,159	63,242	98.5%	88,590	0.76
Nyando	83,838	22,477	95.8%	41,561	0.99
Muhoroni	179,354	49,285	97.8%	77,594	0.87
Nyakach	177,495	48,113	99.4%	69,480	0.78
Rongo	261,738	64,423	99.0%	107,562	0.82
Nyatike	150,063	39,943	97.4%	48,082	0.64
Migori	217,542	52,270	98.9%	89,199	0.82
Uriri	128,324	32,998	98.5%	50,358	0.78
South Rachuonyo	284,491	77,634	99.5%	112,203	0.79
North Rachuonyo	213,174	56,051	99.8%	93,440	0.88
TOTAL	**2,435,836**	**643,292**	**98.3%**	**1,001,587**	**0.82**

1.2.2. IRS Business Plan 2012 - 2016

In 2011/2012, the DOMC with technical assistance from WHO developed a US$ 130 million IRS business plan covering the implementation period from July 2012 to June 2016. The objective of developing the plan was to mobilize resources for the expansion and implementation of a comprehensive vector control intervention including universal coverage with LLINs in 8 counties in western Kenya with a total population of about 8 million and which also have the biggest malaria burden in Kenya. The business plan includes present support from PMI for IRS and has already been used for successful consultations with DFID which has resulted in a commitment of about US$50 million to expand IRS activities. The plan also includes entomological, epidemiological and socio-behavioural operational research studies and monitoring activities to evaluate impact of IRS on malaria transmission and disease burden in the region.

1.3. Malaria in Pregnancy

Two main interventions for the prevention of malaria in pregnancy (MIP) are use of LLINs and IPTp with SP. Distribution of LLINs to pregnant women occurred throughout 2011/2012 at antenatal clinics including areas covered during the mass campaign. The focus of activities in 2011/2012 year was to increase coverage and use of preventive measures and in particular IPTp through training and mentorship of health workers to improve service delivery and community education of pregnant women to increase antenatal clinic attendance. All activities were supported by PMI through Jhpiego's Access Uzima programme and the Maternal and Child Health Integrated Programme (MCHIP) and implemented jointly by the Division of Reproductive Health (DRH) and the DOMC. The performance against indicators and targets for MIP activities is shown in table 5.

Table 5: Malaria in Pregnancy Indicators and Targets

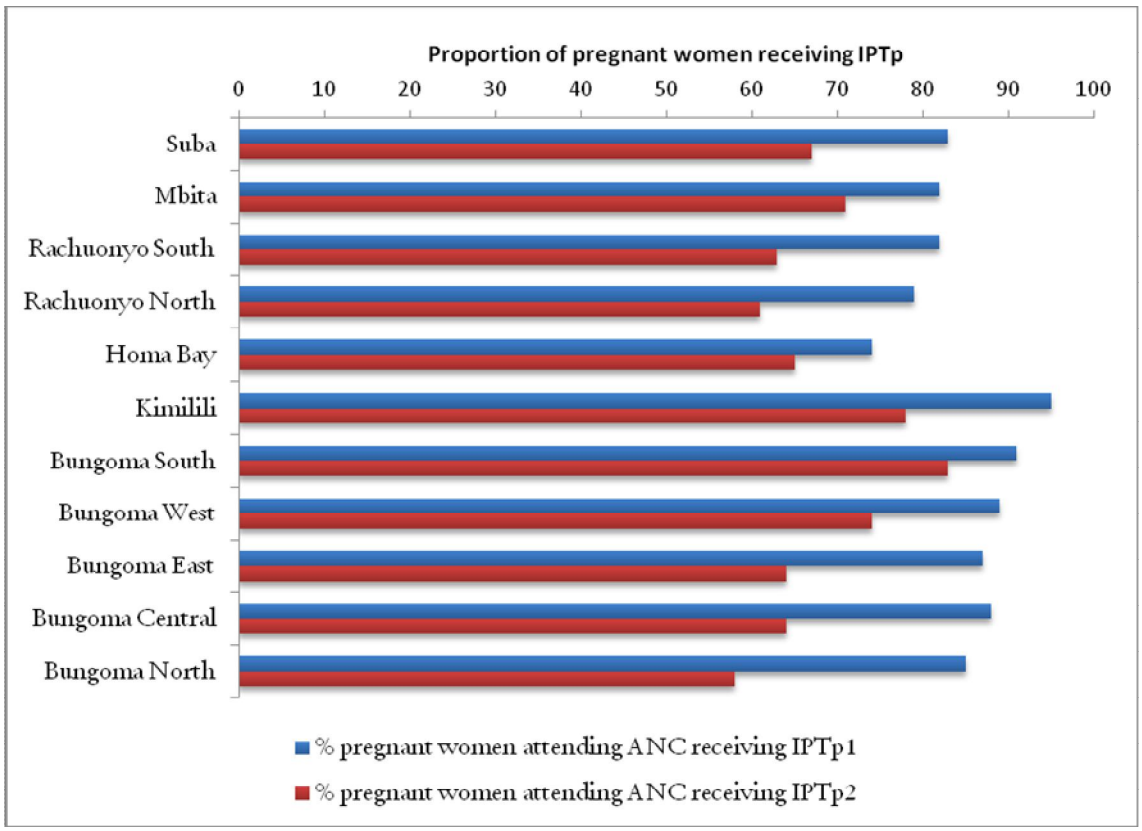
Indicator	Target	Achievement	Comments
Number of IPTp guidelines distributed	6,000 copies of malaria treatment guidelines incl. IPTp	6,000 (100%) copies distributed and disseminated	-
Number of health care workers trained in IPTp	Orientation of 4940 health workers on simplified IPTp guidelines Training of 300 CHEWs in 2 counties	5759 health workers (117%) 309 (103%) CHEWs trained	Health workers including laboratory personnel participated
Number of pregnant women who had at least 1 ANC visit	540,000	446,120 (82%)	Target calculated as 4% of projected population in target districts
Number of pregnant women who received IPTp 2	462,400	309,280 (71%)	Target assumes 15% pregnant women with HIV and who will be on cotrimoxazole

1.3.1. Orientation of health workers on simplified MIP guidelines

The orientation of health workers on the simplified MIP guidelines used an innovative approach different from the usual didactic training. First, the simplified guidelines were brought to the attention of all health workers through an official circular jointly signed by the Directors of Medical Services and Public Health and Sanitation through provincial and district health managers. National programme officers from DRH and DOMC then trained 102 clinicians and nurses as *clinical mentors.* The mentors then became team leaders of groups of three including two district health team members. A total of 96 such groups were formed and a minimum of two teams allocated to a district. Each mentorship team then visited an allotted number of facilities to provide on-job training for health workers using the circular, national treatment guidelines and a simplified MIP orientation package. The teams reached over 5,700 out of targeted 4,900 health workers in 1,165 out of 1,235 health facilities providing ANC services. Follow-up supportive supervision was conducted to assess the quality and consistency of information disseminated to the health workers and also to provide any technical assistance required. An important outcome of the training was an improvement in the documentation of IPTp2 uptake (Figure 4). Previously

health facilities reported higher uptake of IPTp2 compared with IPTp1 due to the banding together of all doses of IPTp given after the 2nd dose making the data difficult to interpret.

Figure 4: Uptake of IPTp in a sample of districts in Western and Nyanza Provinces



1.3.2. Capacity building of districts to implement community-based malaria in pregnancy (cMIP) activities

Twelve districts in Western and Nyanza provinces were selected for capacity building to implement community based prevention of malaria in pregnancy (cMIP) activities. The DOMC, DRH and MCHIP trained 12 district community health services focal persons as trainers of trainers who in turn trained 308 CHEWs from the entire districts. The CHEWs then trained 1074 CHWs on cMIP and use of community data collection tools. Some of the CHWs activities include the registration of pregnant women, monthly follow-up of LLIN use and IPTp uptake and the referral of eligible pregnant women to antenatal care clinics.

2. Prompt Diagnosis and Treatment of Malaria

Objective: To have 80% of all self-managed fever cases receive prompt and effective treatment and 100% of all fever cases who present to health workers receive parasitological diagnosis and effective treatment by 2013

Strategies

- Capacity building for malaria diagnosis and treatment at health facilities
- Access to affordable malaria medicines through the private sector
- Strengthening Home Management of Malaria using the community strategy through community health workers

Prompt diagnosis and administration of effective treatment for malaria prevents the progression from mild to severe disease and death. In preparation for the scale up of diagnosis based treatment, the DOMC developed malaria laboratory quality assurance (QA) and quality control (QC) manuals for use at all levels and an in-service training curriculum on laboratory diagnosis of malaria for laboratory workers. Case management trainings targeting private sector health workers and community health workers in malaria endemic districts in western Kenya were also planned but only partially implemented due to resource constraints. Other activities implemented include post-market surveillance of antimalarials in public and private sectors, semi-annual quality of care surveys and the *SMS for Life* pilot in 5 districts. The performance against indicators and targets for these activities is shown in table 6.

Table 6: Case management indicators and targets

Indicator	Target	Achievement*	Comment
Proportion of health workers trained on malaria case management	5880	28%	Disbursement delays from Global Fund, Target to be achieved in the next financial year
Proportion of health facilities having no stock-out of ACTs / for 7 consecutive days in past 3 months*	100%	91%	Stock-out defined as simultaneous absence of all 4 AL packs
Proportion of patients with fever presenting to health facility who are tested for malaria with RDT or microscopy. *	100%	37%	Testing rates in health facilities with diagnostic capacity was 58%
Proportion of patients with fever presenting to health facility who are managed in accordance with national malaria guidelines*	100%	28%	Performance at facilities with available diagnostic and treatment capacities was 44%**
Proportion of patients with confirmed diagnosis of malaria who are prescribed ACT*	100%	86%	Quinine and other antimalarial 2.2% None 0.6%

**Data from the fourth quality of case management survey (Kigen et al, 2012a)[3]*

***Includes confirmatory testing, treatment of test positive with AL and test negative not treated for malaria*

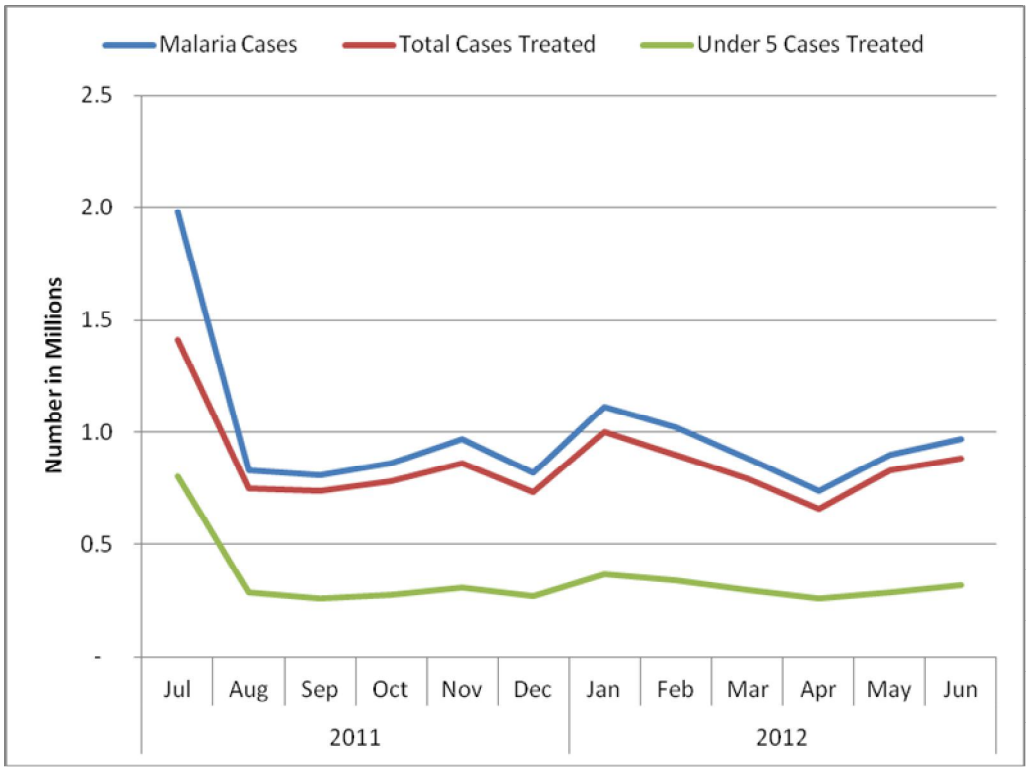
[3]Kigen, S., et al (2012a) 'Monitoring outpatient malaria case management under the 2010 diagnostic and treatment policy in Kenya-brief progress report' Nairobi, DOMC, Ministry of Public Health and Sanitation.

2.1. Building Capacity for Malaria Diagnosis and Treatment

2.1.1. Malaria Treatment

Over 16 million treatments of artemether-lumefantrine (AL) and 250,000 RDTs were procured and distributed to public and private not for profit health facilities in 2011/2012. Funding for the procurement of these commodities was from the Global Fund Round 4 grant and PMI. There were also donations of 15,000 doses of dihydroartemisinin-piperaquine (DHAP) and 100,000 60mg vials of injectable artesunate from the Government of the People's Republic of China. The Government of Kenya procured 17 million quinine tablets and 1 million ampoules of quinine injection all of which were distributed to public health facilities. Malaria treatment data obtained from HMIS shows that on average 90 percent of patients diagnosed with malaria are treated with an antimalarial with children under five years comprising 35 to 40 percent of those treated (figure 5).

Figure 5: Outpatients treated for malaria

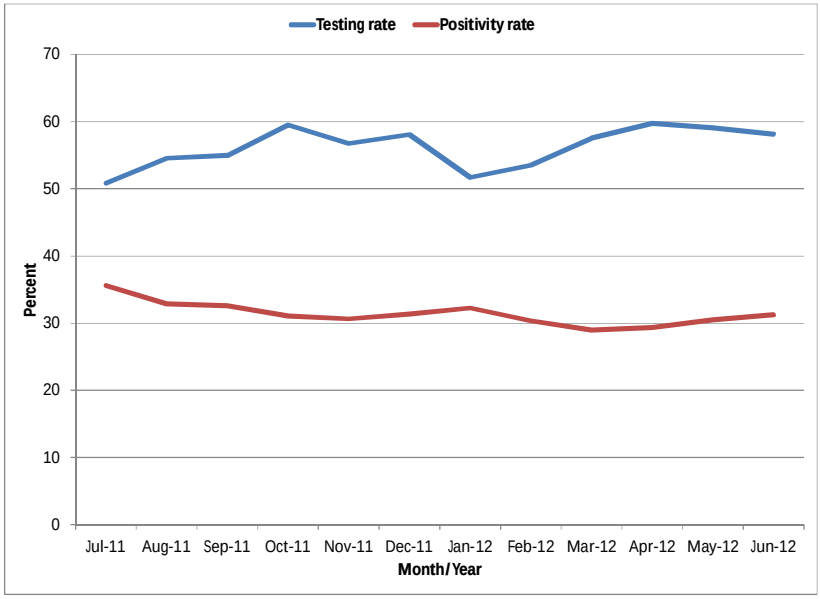


Source: HMIS

2.1.2. Malaria Diagnosis

Malaria testing and test positivity rates were calculated from weekly data reported through the integrated disease surveillance and response[4]. The data presented in figure 6 shows that testing rates were about 56 percent (range 51 – 60) in from July 2011 to June 2012. The main method of parasitological testing in surveillance reports is microscopy. The test positivity rate was on average 31 percent (range 29 – 36 percent).

Figure 6: Malaria testing and test positivity rates



Source: Weekly IDSR reports

2.2. Affordable Medicines Facility for Malaria (AMFm)

Kenya is one of 8 countries in the pilot phase of the AMFm, a public-private financing mechanism hosted by the Global Fund that subsidizes the cost of quality assured ACTs for both public and private sector buyers in endemic countries. The objective of the AMFm subsidy is to (1) to increase ACT affordability, (2) to increase ACT availability, (3) to increase ACT use, including among vulnerable groups, and (4) to reduce the sale and use of oral ineffective and artemisinin monotherapies by gaining market share for quality assured ACTs. Poor access to effective treatment negatively affects the programme objective of reducing morbidity and mortality to malaria through prompt and effective treatment. Kenya was successful in its application to participate in the AMFm whose grant was signed in July 2010 and officially

[4] Unlike HMIS data, weekly surveillance data includes number of patients tested. The two data sets do not tally over the year with the weekly surveillance database generally showing 10-40 percent fewer cases than the monthly HMIS database due to low intra-district reporting rates.

launched by the Minister for Public Health and Sanitation Hon. Beth Mugo on August 26th2010 and scheduled for implementation over 24 months to August 2012. Table 7 shows the implementation status of interventions supporting the achievement of the AMFm objectives.

Table 7: Implementation status of AMFm supporting interventions

Activity	Funding availability*	Status
Develop and print education and communication manual	Full	Complete
Community meetings in 558 locations	Partial	Manual developed, meetings planned for in October
Facilitate 186 road shows	Full	Complete
5 radio messages	Full	Complete
4 TV messages	Full	Complete
400,000 posters	Full	Complete
Private sector health care provider training	Partial	732 trained, 5150 to be trained between October and December 2012
Monitoring supervision	Partial	To be done alongside the training
Training effectiveness survey /OR	None	Planned for in November 2012
Reporting system for Pharmacovigilance	Partial	Set up by PPB and DOMC, reporting ongoing
Pharmacovigilance supervisory visits	Partial	Ongoing
Drug quality testing	Full	Ongoing
Field inspection visits by NDRA	Partial	10 visits done
ACT procurement for community strategy	Full	Completed
Train 80 CHEWs and 2000 CHWs	Partial	60 CHEWs trained 500 CHWs trained, remaining trainings planned for in September
Supervision of CHWs	Partial	To be done after training

Full-funds fully disbursed, Partial-funds partially disbursed, No-no funds disbursed for activity by the Global Fund

2.2.1. Findings from the AMFm Endline Evaluation[5]

In December 2011, an end line evaluation of the AMFm pilot in Kenya was carried out evaluating performance against 6 bench marks: availability, price, use and market share of quality assured ACTs; availability and market share of oral antimalarial monotherapies (except sulphadoxine-pyrimethamine (SP) and quinine). Use of ACTs was not evaluated during the pilot. A summary of evaluation findings in 8 AMFm countries is shown in table 8. From July 2010 to December 2011, 28.4 million co-paid ACTs were delivered to Kenya representing 0.9 treatments per person at risk of malaria. The public and private for profit sectors both procured 14 million doses each. However, due to restrictions on AMFm ACT orders placed on the private sector by the Global Fund, only 56 percent of total doses ordered by the private sector between July and December 2011 were delivered.

Availability: From baseline to end line evaluation, the availability of quality assured ACTs (QAACTs) in public and private outlets countrywide increased by 34 percentage points to 66 percent surpassing the benchmark target for success of 20 percentage points. Much of the change was in the availability in the private sector which rose by nearly 40 percentage points.

Price: The recommended retail price for subsidized ACTs was Kshs. 40 (US $ 0.46) for the adult dose. The median price of QAACTs in the private for-profit dropped significantly between

[5]The Global Fund to Fight AIDS, Tuberculosis and Malaria (2012) *Preliminary Report of the Independent Evaluation of AMFm Phase 1*(July 2012). Available at www.theglobalfun.org/en/amfm/independentevaluation/

baseline and end line, from Kshs. 230 for an adult treatment dose to Kshs. 50 (US $ 0.58) which was Kshs.10 more than the recommended price. Subsidized AMFm ACTs in the private sector cost about the same as sulphadoxine-pyrimethamine (Kshs 45).

Market share: The market share of QAACTs as opposed to those that are no pre-qualified increased by 31 percentage points to 57 percent with similar access in rural and urban areas. This surpassed the 10 percentage point increase set as a benchmark for success. The evaluation also showed that the country has been successful in enforcing the restriction of sale of non-recommended oral artemisinin monotherapies (AMT) whose market share was 0.9 percent at baseline and declined further to near zero at end line.

Table 8: Overview of benchmarks for success for evaluated AMFm Phase 1 countries

Overview of benchmarks for success for evaluated Affordable Medicines Facility - malaria (AMFm) Phase 1 countries	Ghana			Kenya			Madagascar			Niger			Nigeria			Tanzania			Uganda			Zanzibar		
Benchmark 1: QAACT availability	**U**	**R**	**T**	**U**	**R**	**T**	**U**	**R**	**T**	**U**	**R**	**T**	**U**	**R**	**T**	**U**	**R**	**T**	**U**	**R**	**T**	**U**	**R**	**T**
Indicator 1: Proportion of outlets in enumerated ares with QAACT in stock ***Benchmark: ↑20% points from baseline***	☑	☑	☑	+	☑	☑	-	-	-	-	-	-	+	+	+	☑	☑	☑	☑	☑	☑	☑	+	☑
Indicator 2: Same as 1 but in private for profit sector ***Benchmark: ↑20 percentage points from baseline***	☑	☑	☑	☑	☑	☑	-	-	-	-	-	-	+	☑	+	☑	☑	☑	☑	☑	☑	☑	☑	☑
Benchmarks 2 and 3: Price of AMFm subsidized ACTS																								
Indicator 3: Ratio of mediam price of QAACTs with AMFm logo to median price of most populat non-QAACT (tablets) ***Benchmark <3***	±	±	±	☑	☑	☑	☑	☑	☑	☑	☑	☑	±	±	±	☑	☑	☑	-	-	-	☑	☑	☑
Indicator 4: Difference between medial price of AMFm subsidized ACTs and median price of antimalarial monotherapies (tablets) ***Benchmark: Decrease***	☑	☑	☑	ns	ns	ns	ns	ns	ns	ns	ns	ns	☑	☑	☑	ns	ns	ns	ns	ns	ns	☑	☑	☑
Benchmark 4: Use of ACTs																								
Indicator 5: Percentage increase in children under age 5 years with fever in the last 2 weeks who received ACT																								
Benchmarks 5 and 6: Market share of QAACTs																								
Indicator 6: Total volume of QAACTs sold or distributed in the last week as a proportion of all antimalarials sold or distributed ***Benchmark: ↑10-15 % points from baseline***	☑	☑	☑	☑	+	☑	☑	-	±	-	-	-	na	na	na	-	+	+	+	+	+	☑	☑	☑
Indicator 7: Total volume of QAACTs sold in the private for profit sector in the last week as a proportion of all antimalarials sold or distributed ***Benchmark: ↑10-15 percentage points from baseline***	☑	☑	☑	☑	☑	☑	☑	±	±	-	-	-	na	na	na	☑	☑	☑	☑	☑	☑	☑	☑	☑
Indicator 8: Total volume of AMT sold or distributed in the last week as a proportion of total volume of all antimalarials sold or distributed ***Benchmark: Decrease from baseline***	May have dropped 1 % point			May have dropped 1 % point			Zero at baseline and endline			Near 0 at baseline, 0 at endline			na	na	na	Zero at baseline and endline			Zero at baseline and endline			☑	☑	☑
Length of time subsidized ACTs were in country prior to endline collection																								
Number of months between initial arrival of co-paid ACTs and mid-point of endline data collection	**15.5**			**15**			**14**			**9.5**			**9.5**			**13.5**			**7**			**6.5**		

T=Combined; na = not available; ns = number too small

☑ = clearly exceeds benchmark

+ = achieved benchmark (in the absence of statistical significance)

± = borderline with respect to benchmark

- = falls short of benchmark

Source: Preliminary Report of the Independent Evaluation of AMFm Phase 1 (July 2012)

2.2.2. Future of the AMFm

As the pilot drew to an end, stakeholders in Kenya held a series of meetings to look at post AMFm pilot scenarios[6]. The Global Fund and the AMFm key financing agencies will make a decision by the end of 2012 on the fate of the pilot. Overall, the 5 out of 8 countries have successfully demonstrated that the AMFm as implemented achieved and surpassed targets set for each of the objectives. Stakeholders in Kenya acknowledged that the AMFm had generally increased affordability and access to effective ACTs and eased pressure on the public health system and strongly recommended its continuation and expansion to other countries. Other recommendations made for the future of the AMFm are summarized in table 9.

Table 9: Recommendations for the future of the AMFm

Global negotiations to further reduce the cost of ACTs Evidence shows that lower costs of ACTs in the private sector can be passed on to patients. Global efforts should be made to make further reductions on ACT costs to ensure affordability by the poor.
Support for local manufacturers of ACTs to achieve ACT pre-qualification Strategic support for the development and promotion of local manufacturing capacity (such as facilitation with pre-qualification) will ensure sustainability of access to affordable treatments.
Support for malaria diagnostics Consider options for subsidizing malaria diagnostics to increase uptake of diagnosis before treatment and support for strategies to ensure uptake.
Emphasis on forecasting and quantification of needs Tools for forecasting and quantification of need would enable better planning, assessment of viable ventures and potential markets for the private sector. It will also provide a rationale for capping quantities of ACTs that appeared arbitrary during the pilot.

2.2.3. Training of health workers

As a supporting intervention for the AMFm 733 (12 percent) of the targeted 5,880 private sector health workers were trained on malaria case management. Training was carried out by training institutions and consultancy firms and targeted health workers in Nyanza and Western Provinces. The remaining 5,160 health workers will be trained in the following financial year when funding becomes available. About 100 laboratory technicians and technologists received refresher trainings on malaria microscopy at the KEMRI/Walter-Reed Project Centre for Excellence in microscopy in Kisumu in an on-going effort to improve the quality of malaria diagnosis.

2.3. Strengthening Community Case Management of Malaria

Community case management (CCM) of malaria using AL was initiated in two districts (Lamu and Malindi) at the Coast in 2007 by the Ministry of Health and with support from the International Federation of Red Cross and Red Crescent Societies, the Canadian and Kenya Red Cross Societies. CCM in these districts continues to be expanded in scope and with the decline in malaria

[6]AMFm Multi-country Stakeholder Consultation Report (September 2011)

prevalence; community health workers (CHWs) in the region will be the first to introduce diagnosis based treatment of malaria at community level. The introduction of CCM in 12 high malaria burden districts in western Kenya planned for implementation in 2011/2012 was not implemented due to the delayed disbursement of resources needed to train at least 2000 CHWs. With available funding, 500 CHWs were trained (table 10). The remaining CHWs are targeted for training in FY 2012/2013

Table 10: CHW trained for Community Case Management

Nyanza			Western		
District	**County**	**CHW Trained**	**District**	**County**	**CHW Trained**
Rarieda	Siaya	42	Teso South	Busia	42
Ugenya	Siaya	42	Samia	Busia	42
Siaya	Siaya	42	Mumias	Kakamega	42
Rachuonyo South	Homa Bay	39	Kakamega East	Kakamega	41
Suba	Homa Bay	42	Bungoma South	Bungoma	42
Homa Bay	Homa Bay	42	Bungoma East	Bungoma	42
		249			**251**

3. Epidemic Preparedness and Response (EPR)

Objective: To ensure that all malaria epidemic prone districts have the capacity to detect and preparedness to respond to malaria epidemics annually by 2010

Strategies

- Capacity building for epidemic preparedness and response
- Disease surveillance capacity strengthening

Planned activities

EPR activities have been traditionally focused in highland epidemic prone districts where epidemics are predictable. However, arid and semi-arid land (ASAL) districts are also epidemic prone though outbreaks are unpredictable since they only occur during periods of excessive rainfall exacerbated by floods often preceded by prolonged droughts. About 17 million Kenyans (40% of 2011 population estimates) live in areas of seasonal malaria transmission, a half of who live in the western highland epidemic prone districts and the other half in the expansive arid and semi-arid regions of northern and eastern Kenya. In 2011 the arid north was well into the second year of the worst drought to affect the region in 60 years, compounded by famine and a raging war in Somalia bringing vulnerable displaced people to the region. Malaria epidemics can occur with the onset of rains and the last in the region in 2006 resulted in over 1,500 deaths. In September 2011, the DOMC and various partners including WHO, United Nations Children's Fund (UNICEF), United Nations High Commission for Refugees (UNHCR), non-governmental organizations working in the region and donors such as DFID and the United States Agency for International Development (USAID), implemented a malaria epidemic preparedness and prevention programme in arid districts to minimize the likelihood of present and future epidemics. Forty five highland epidemic prone districts and 75 ASAL districts were targeted for EPR activities in 2011/2012.

Activities planned in this implementation period included the establishment of EPR teams in all districts with seasonal malaria transmission, the selection of at least five sentinel facilities with high patient turnover and diagnostic capability to conduct weekly malaria surveillance. DHMTs in epidemic prone districts were also trained on planning and response to malaria epidemic threats. The performance against indicators and targets EPR activities is shown in table 11.

Table 11: Epidemic Preparedness and Response Indicators and Targets

Indicator	Target	Achieved N (%)	Comment
Proportion of target districts with functional sentinel facilities for epidemic detection and response	45 highland epidemic prone districts 75 ASAL districts	40 (33%)	5 or more functioning sentinel facilities required for malaria surveillance. Achieved only in highland districts.
Proportion of districts with at 5 least sentinel facilities reporting updated surveillance graphs (alert thresholds) for detecting epidemics	45 highland epidemic prone districts 75 ASAL districts	30 (25%)	Malaria surveillance data consistently reported weekly in at least 5 facilities
Proportion of target districts with an Epidemic Preparedness and Response plan	45 highland epidemic prone districts 75 ASAL districts	45 (37.5%)	Target achieved only in highland epidemic prone districts
Proportion of target districts with updated EPR guidelines	45 highland epidemic prone districts 75 ASAL districts	45 (37.5)%	Target achieved only in highland epidemic prone districts

3.1. Capacity building for epidemic preparedness and response

3.1.1. EPR activities in arid and semi-arid land (ASAL) districts

DHMTs in ASAL districts were trained for the first time on surveillance and EPR planning in November 2011 as part of the drought and flooding disaster mitigation plan for northern Kenya. Following the training, district teams were expected to initiate weekly malaria surveillance, monitoring and reporting of confirmed malaria trends. They also were supplied with rapid diagnostic tests and additional doses of AL in preparation for any outbreaks. Public information campaigns using electronic media and community mobilization were also implemented to encourage prompt diagnosis of fever cases and treatment in the region. Although malaria epidemics were averted, efforts are still needed to strengthen district capacities to continue to malaria surveillance and develop epidemic preparedness and response plans.

3.1.2. EPR in highland epidemic prone districts

There are currently 45 highland epidemic prone districts curved out of the original 16 in 2006. All health facilities or at least a minimum of five well distributed health facilities in epidemic prone districts are expected to should carry out malaria surveillance using malaria cases confirmed by microscopy or RDT. If all facilities carry out malaria surveillance, in due course they will have sufficient data to be able to set thresholds for early epidemic warning. Between July 2011 and June 2012, 40 of 45 (89%) highland epidemic prone districts reported carrying out malaria surveillance in 5 or more functional sentinel facilities. The surveillance weeks run by calendar year from January to December and the data is forms part of the integrated disease surveillance reports from the districts. When sufficiently conducted, surveillance graphs as shown in the example from 5 sentinel facilities in highland epidemic prone Bomet (plus Chepalungu) district are generated to inform local health teams about the malaria situation (figures 7-11). Data from Sigor District Hospital showed an increase of malaria cases that reached the epidemic alert line from week 21 – 26 while in Longisa, the increase in malaria cases occurred much later in the year from week 43 – 45. The distribution of facilities in the district shows the importance of spread of sentinel areas.

Whereas there were increases in malaria cases in 3 health facilities at different times of the year, two health facilities recorded no increases. Malaria outbreaks in epidemic prone districts can be detected early in hot-spots and responded to in a timely manner, enabling judicious use of resources. The data also underscores the importance of year round monitoring as the rise in cases can occur at any time of the year and not necessarily in the peak epidemic period from week 20 – 30.

Figure 7: Longisa District Hospital 2011 Malaria Surveillance

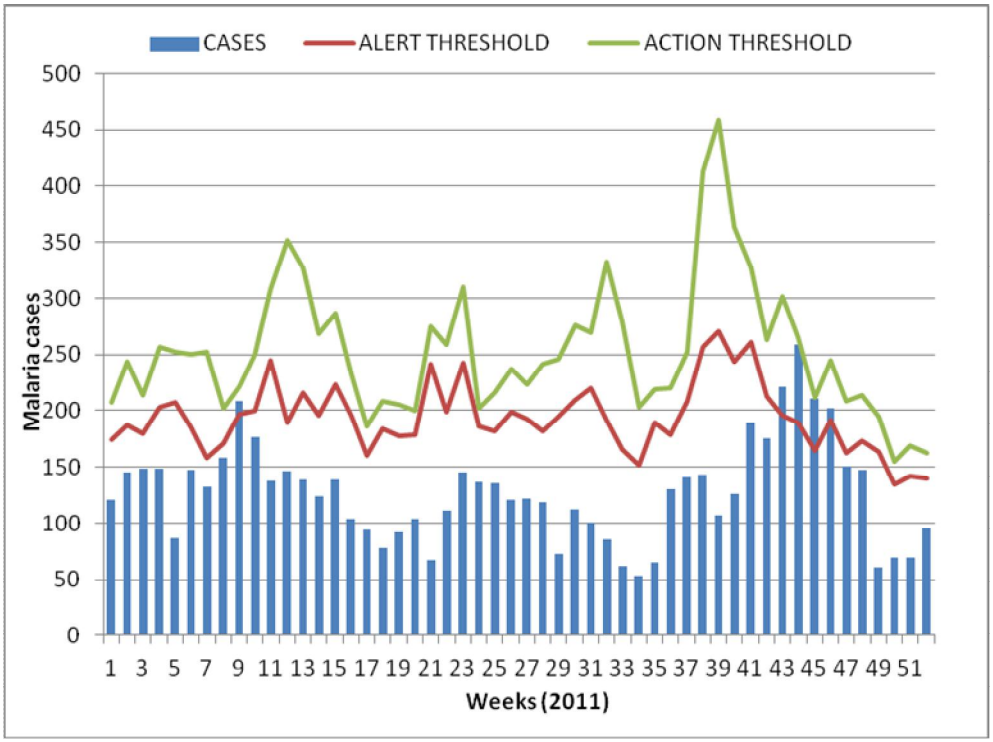


Figure 8: Sigor Sub-District Hospital 2011 Malaria Surveillance

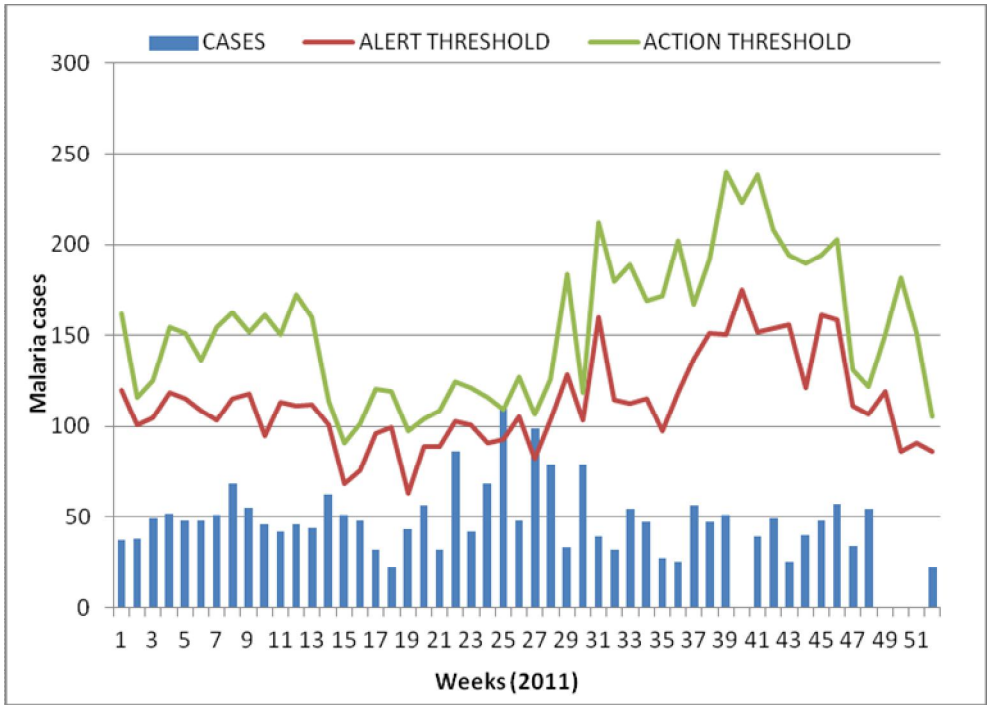

CASES
ALERT THRESHOLD
ACTION THRESHOLD
300
250
200
150
100
50
0
Malaria cases
1 3 5 7 9 11 13 15 17 19 21 23 25 27 29 31 33 35 37 39 41 43 45 47 49 51
Weeks (2011)

Figure 9: Kapkoros Health Centre 2011 Malaria Surveillance

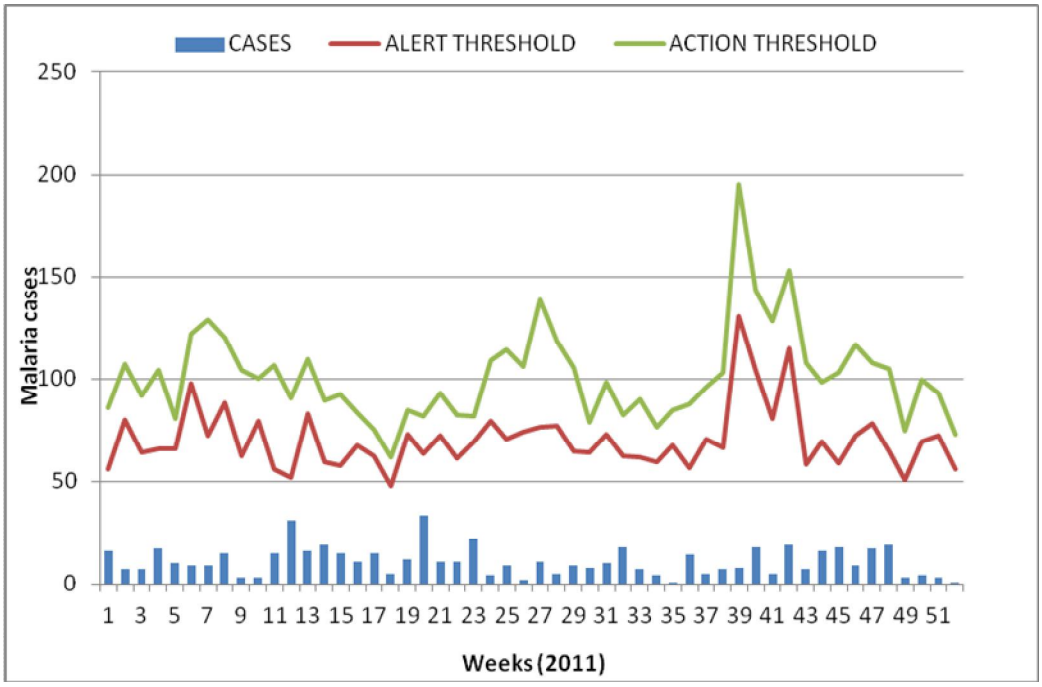


Figure 10: Chebunyo Dispensary 2011 Malaria Surveillance

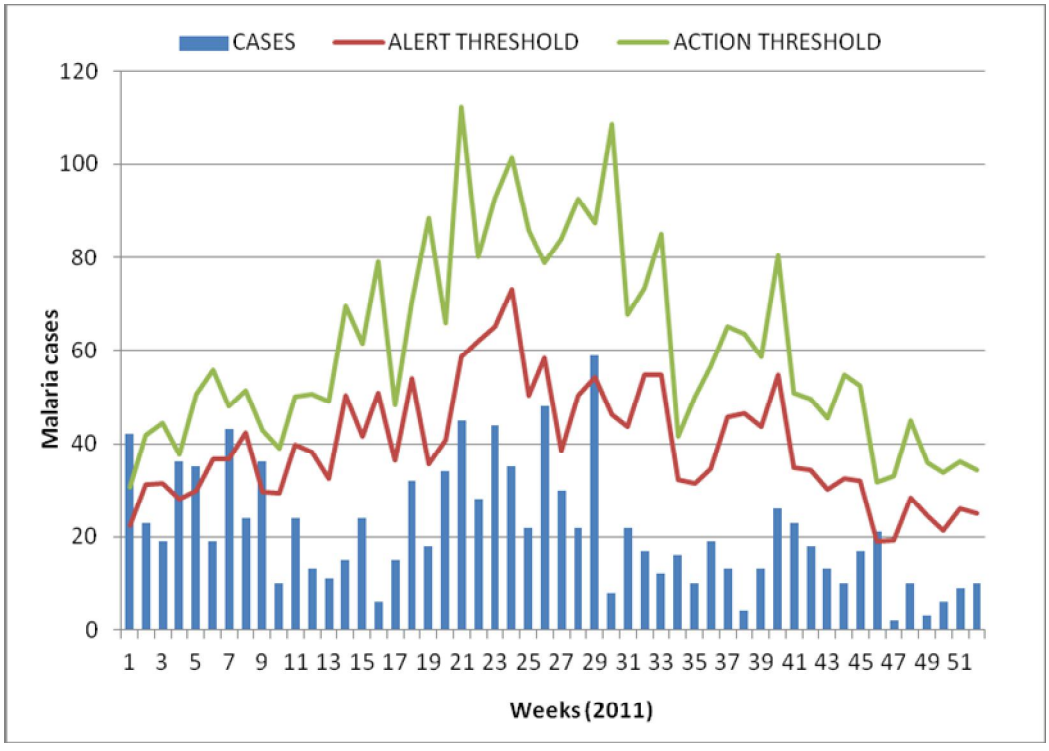
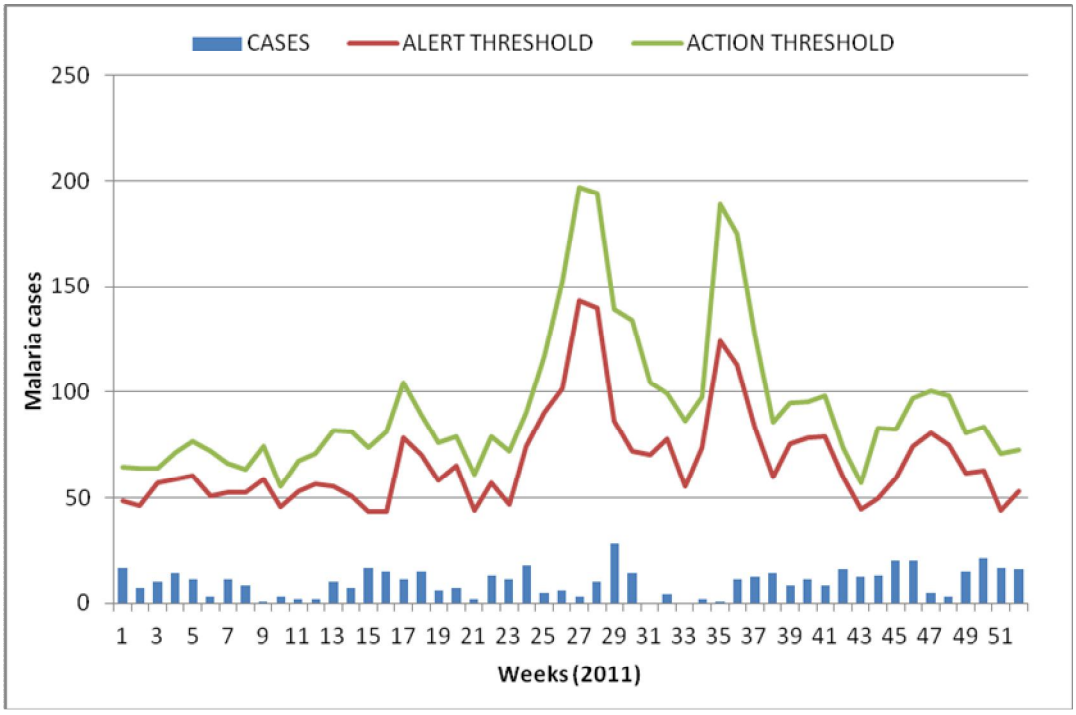


Figure 11: Olbutyo Health Centre Malaria Surveillance



3.2. Disease surveillance capacity strengthening

See section 5.1

4. Surveillance, Monitoring and Evaluation and Operations Research

Objective: To strengthen surveillance, monitoring and evaluation systems so that key malaria indicators are routinely monitored and evaluated in all malaria risk districts by 2011

Strategies

- Capacity strengthening for malaria surveillance
- Strengthen facility and school based malaria sentinel surveillance
- Strengthening malaria data management systems
- Conduct and support community surveys
- Conduct and facilitate health facility surveys
- Operational research and translation

Planned activities

The planned activities for the period under review included the training of district health teams on the use of malaria surveillance tools and monitoring to strengthen the reporting of malaria services and commodities consumption through the routine HMIS. Others were the monitoring of insecticide resistance and antimalarial drug efficacy and the determination of appropriate non-pyrethroid insecticide for IRS. Performance against M&E specific indicators is shown in table 13.

Table 13: Surveillance, Monitoring, Evaluation and Operations Research Indicators and Targets

Indicator	Target	Achievement	Comments
Number of surveys for which results have been presented	3	3 (100%)	Quality of care surveys and MIS 2010
Number of DOMC staff trained in surveillance, GIS and data management	2	1 (50%)	WHO training on malaria surveillance
Number of Staff trained in M&E	56	56 (100%)	MEASURE Evaluation training for national, provincial and district M&E officers
Number of drug efficacy studies completed	1	1 (100%)	Both first line and second line treatments evaluated
Number of vector susceptibility studies conducted	1	1 (100%)	Insecticide resistance monitoring
Number of consultative meeting to define research questions	1	1	Technical working group meeting held
Number of operational research studies conducted	1	1	Alternative insecticides for IRS
Annual research to policy conference held	1	1	Held in October 2011

4.1. Capacity Strengthening for Malaria Surveillance

Following the surveillance meeting organised by the East African Roll Back Malaria Network (EARN) in Rwanda in 2011, Kenya developed a national malaria surveillance plan that has been in implementation since. One of the Key activities in the implementation plan for malaria surveillance was to develop data collection tools that would capture information that would be

used to develop the 9 core graphs recommended by WHO for malaria surveillance. The DOMC in conjunction with MEASURE Evaluation undertook a pilot in 6 districts in January and February 2012 to pilot a tool developed to collect these data. Two models of data collection (mixed and passive) were used, each in three districts to collect information on indicators of interest. In the mixed model, district malaria control coordinators (DMCCs) collected data for the malaria indicators from health facility records and from the District Health Information Software-2 (DHIS2). In the passive model, data for the indicators was only obtained from DHIS2 with no contact with health facilities. The objective was to determine which of the two models was most appropriate within the Kenyan context to collect malaria surveillance data.

The mixed model was better than the passive model in obtaining malaria surveillance data as it was possible to produce 8 of 9 graphs required. However the cost of implementation of the mixed model makes it not suitable as a long term strategy for malaria surveillance data collection. The next steps are to work with the Division of HMIS to incorporate data for malaria indicators in the DHIS2; to train health workers involved in reporting on malaria surveillance indicators on the data requirements and to provide support supervision to strengthen the reporting of quality data.

4.2. Strengthen facility and school based malaria sentinel surveillance

There were no activities implemented under this strategy due to lack of funding.

4.3. Strengthening Malaria Data Management Systems

4.3.1. District Health Information Software–2

The DHIS2 is web based software that was adapted for the collection, aggregation and analysis for health information data by the Division of Health Management Information Systems in 2011. With this system the district health information officer uploads health facility summary data directly on the web interface. Once uploaded, the information can be viewed by provincial and national teams. DHIS2 allows users to know the completeness and timeliness of the data that is being viewed. Since the data is available by health facility, the intra-district reporting rates are also readily apparent. As a web based application, access to the DHIS-2 Kenya database is possible as long as one has an internet connection and rights to access the database. In the future the DHIS2 will be expanded to also include health services delivered at community level.

The DOMC M&E team - with technical support from MEASURE Evaluation - was involved in the definition of indicators and harmonisation of health facility summary tools. For example the term clinical malaria was changed to suspected malaria because of a wide variety of interpretations among health workers particularly those responsible for completing health records. Data on LLINs given to infants will henceforth be recorded in the immunization register instead of the child welfare register which covered children between 12 and 59 months

4.3.2. Rapid Impact Assessment

A rapid impact assessment (RIA) was carried out to determine the impact of malaria control interventions on malaria morbidity and mortality using routine health facility data in 15 districts. The specific objectives of the RIA were:

1. To assess utility of routine health facility data for impact assessments
2. To obtain data for program management and evaluation of malaria interventions

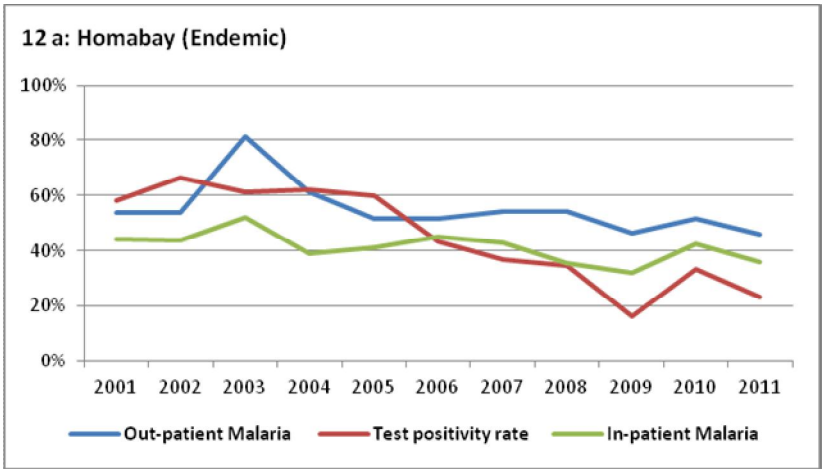
3. To use the results to advocate for increased investment in malaria information management.

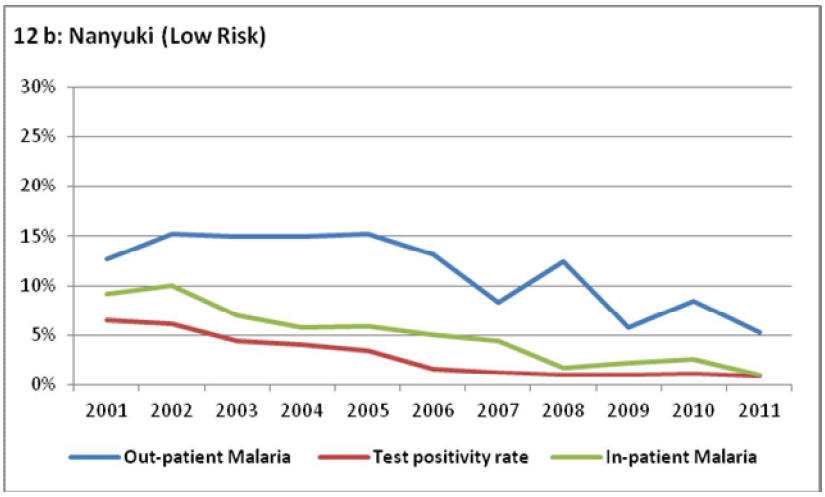
Districts were selected from two main epidemiological zones: Five from endemic areas with malaria transmission throughout the year, and 10 districts from areas of low or seasonal transmission. Two health facilities with in-patient services– a district hospital and a sub-district health centre were selected from each district.

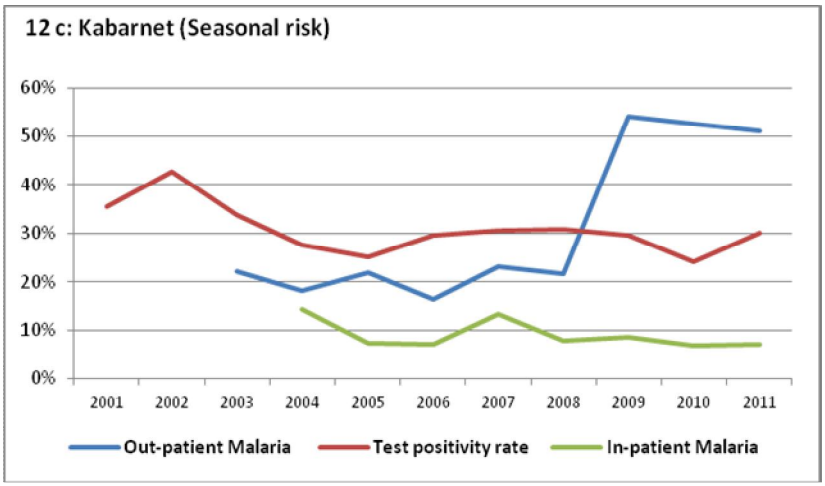
District malaria coordinators and health information officers were given a two day orientation on the rationale for the RIA and the data extraction tools in January 2012. Data collection took place in February 2012 and involved interrogating seven source documents/databases with health facility data from 2001 – 2010. Provincial malaria and surveillance officers and programme officers from the DOMC and HMIS supervised the data collection and collation process at district level. Preliminary analysis of the data showed that availability of datasets varied from 45% - 100%. Recent datasets were more complete, and were also more likely to be electronic. Registers that were not available in electronic form were found to be torn, missing or ineligible for data extraction. Malaria in-patient morbidity and mortality data was difficult to collect due to poor coding, indexing and incompleteness. Laboratory data on malaria testing was available but showed consistently high positivity rates even in areas with little or no malaria transmission (Nakuru and Nyandarua). Information retrieval was easier from electronic databases where used for example Naivasha District Hospital. From 2008, facility based registers have disaggregated morbidity data for children less than 5 years and the rest of the population. The data collection exercise required more time due to the time taken to retrieve old manual registers.

Despite the challenges with data retrieval and quality of data, retrospective health facility data where available can be used to link morbidity and mortality trends, malaria interventions and other contextual factors. Charts from three district hospitals in endemic, seasonal risk and low risk zones (figure 12) illustrate the differences in malaria burden in the regions.

Figure 12: Malaria Out-patient, In-patient and Test Positivity Rates in 3 Districts







4.3.3. Training for District and Provincial Teams on M&E

In an effort to improve skills in malaria M&E in Kenya, the DOMC in collaboration with MEASURE Evaluation organized a 5-day training workshop in Nairobi, Kenya for selected provincial and district health personnel. The workshop covered fundamental concepts and practical approaches to M&E of malaria programs; programmatic applications of the main tools and data systems used to monitor and evaluate malaria programs; development of simple M&E plans; critique of M&E plans; information management; data analysis; and use of information for decision making. The workshop was modelled along the Africa Regional Malaria M&E Workshops held annually in Accra Ghana and funded through MEASURE Evaluation. The training workshop was attended by 53 participants in two groups over two weeks from 15th – 26hAugust 2011. Six months after the training, a survey conducted among trainees found that most had been able to apply the knowledge and skills learned in their daily activities[7]. The participants reported that they found sessions on data for decision-making, data management and analysis, data presentation and interpretation and data dissemination increased their knowledge of malaria and M&E and in a way that was most useful for their work.

[7] DOMC (2012) 'Building Capacity in Monitoring and Evaluation of Malaria Programs: Follow-up Survey Results' Nairobi, Division of Malaria Control and MEASURE Evaluation

4.3.4. Dissemination of MIS findings to malaria endemic regions

The DOMC conducted a second malaria indicator survey in 2010 whose main objective was to measure progress achieved in key malaria indicators since 2007 and to provide a baseline for the NMS 2009-2017. The Report was officially launched at breakfast meeting on 18th August 2011 in Nairobi by the Directors of Public Health and Kenya National Bureau of Statistics. Thereafter the DOMC and MEASUREDHS with support from PMI conducted a two day regional dissemination meeting in Nyanza and Western Provinces in December 2011. The purpose of this dissemination was to share findings with implementing partners and stakeholders in the lake endemic area which has the highest burden of malaria in the country. Specifically, the dissemination meeting also provided an opportunity for partners in the region to share their field experiences, identify gaps with planning and implementation of intervention programmes and develop action plans based on agreed recommendations.

4.3.5. Support supervision

4.3.5.1. Supervision manual

One of the key strategic approaches adopted under NMS 2009-2017 is coordination of implementation of malaria control interventions which are decentralized to the provincial and district levels undertaken by stakeholders at these levels. It was then realized that although supportive supervision was a core function of district health teams, there was no structure to guide the process. DOMC then embarked on a consultative process involving stakeholders at national, provincial, and district levels that culminated in the development of a supportive supervision manual, tools, and checklists to be used at all levels. The manual, planning, and reporting tools were designed to be generic and adaptable for use in integrated supervision. The manual outlines distinct roles of the National, Provincial and District levels in undertaking support supervision. Pretesting of the tool was done in Coast province and the lessons learnt were used to refine the tools. The manual and tools have been printed currently awaits dissemination.

4.3.5.2. Provincial and district supervision

Between January and August 2011, 213 districts in all provinces conducted supportive supervision mainly targeting malaria control interventions. This was the first time a structured checklist covering a wide range of health facility actions and a performance scoring tool were used to conduct supportive supervision. The supportive supervision tool was also used by provincial health teams to conduct district supervisions and objectively evaluate performance using a scoring tool covering key management areas such as planning, data management, and supervision. The objective of the tool was to enable health teams to perform structured visits that ensured constructive feedback was given and that follow-up on key issues could be made by any team visiting the institutions.

Over 3,400 health facilities were visited by district teams while provincial and national teams provided support to 154 districts. Over 90 percent of districts used the malaria supervision checklist with a good proportion using during an integrated supervision. The use of the performance scoring tool was comparatively low at 55 percent by district teams, 70 percent by provincial teams, and 67 percent by the national team. The low use was attributed to a lack of understanding on its use and usefulness. However, the supervision involved immediate feedback and corrective actions where appropriate.

4.4. Conduct and support Community Surveys

4.4.1. Evaluation of the mass distribution campaign

A cross-sectional household survey was carried out between November 2011 and February 2012 to evaluate effectiveness of the mass distribution campaign in already covered districts[8]. The survey covered 4,091 (80%) of the targeted households and received responses from 4,083 (99.8%) of households. Another survey is planned to evaluate the campaign in Coast and the targeted districts in Rift Valley province.

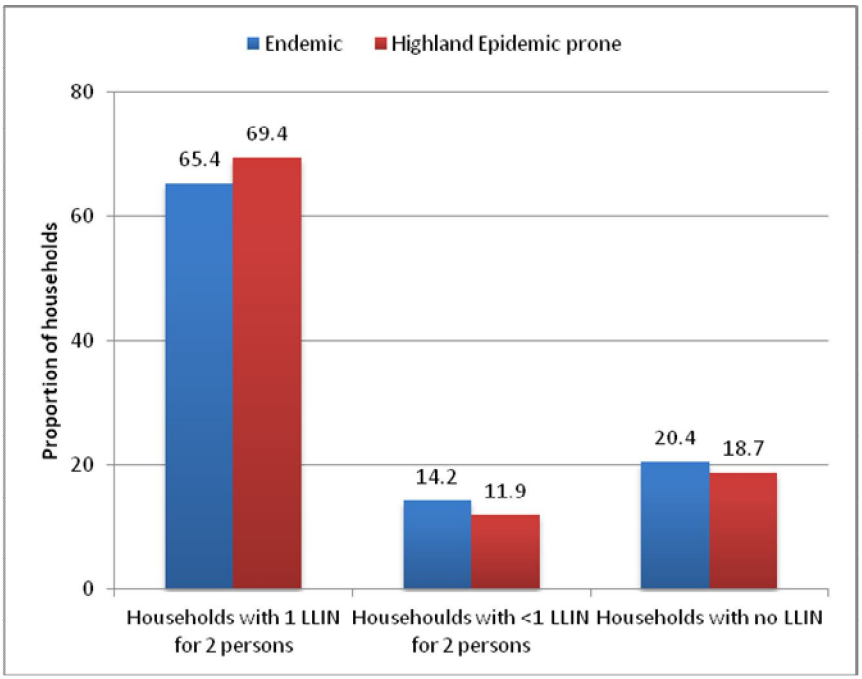
Universal coverage

Universal coverage defined as 1 net for every two persons was evaluated at household level. The survey found that universal coverage was achieved in 67 percent of households in endemic districts and 69 percent of households in epidemic prone districts. There was sub-optimal coverage in more than 10 percent of household in both zones and about 20 percent of households sampled did not have any LLINs (Figure 13). Some of the reasons given by households for not having LLINs included lack of awareness; and being away or unavailable to collect nets at the time of the community distribution.

LLIN ownership in households with children under 5 years

Ownership of more than 1 LLIN was higher in households with children under five years (81 percent) compared with universal ownership (67 percent). More households in rural areas had >1 LLIN than in urban areas (82 percent compared with 72 percent), and 82 percent of households in the lowest wealth quintile had >1 LLIN (average 3.4 LLINs) compared with 67 percent in the highest wealth quintile (average 2.7 LLINs).

Figure 13: Coverage with LLINs post mass distribution



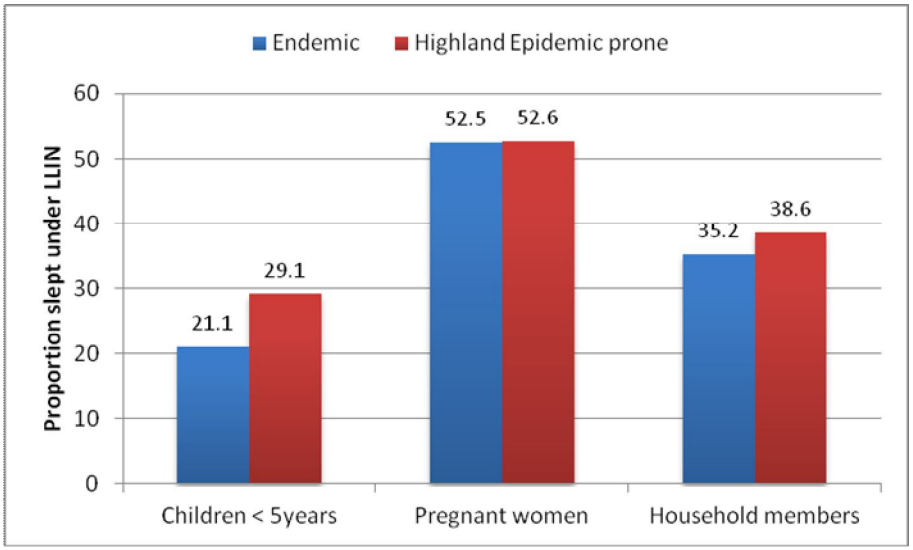
Source: DOMC (2012) *Evaluation of the 2011 Mass LLIN Distribution Campaign*

[8]DOMC (2012) '*Evaluation of the 2011 Mass LLIN Distribution Campaign*' Nairobi, Ministry of Public Health and Sanitation

LLIN use

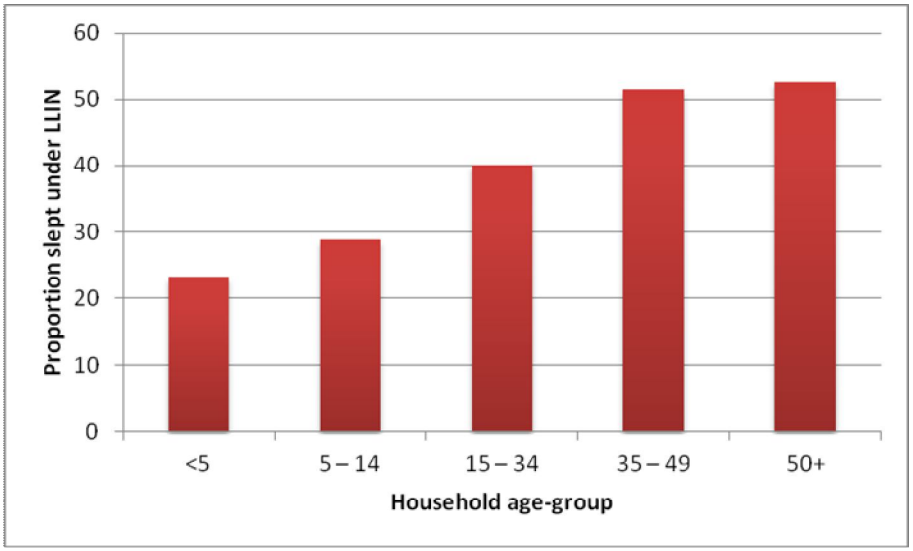
Net use by household members the night before the survey was 35 percent and 39 percent in endemic districts and epidemic prone districts respectively. Fifty two percent of pregnant women reported using LLINs while only a fifth of children under five in endemic areas slept under a net the night before the survey (Figure 14). Although net use among pregnant women is comparable with that found during the 2010 MIS, net use among children less than five years were surprisingly lower than expected. Overall, the utilization rate was low across all age-groups (figure 15).

Figure 14: Net use among individuals living in households with at least 1 LLIN



Source: DOMC (2012) *Evaluation of the 2011 Mass LLIN Distribution Campaign*

Figure 15: Net use by age-group in households with at least 1 LLIN



Source: DOMC (2012) *Evaluation of the 2011 Mass LLIN Distribution Campaign*

4.5. Conduct and Facilitate Health Facility Surveys

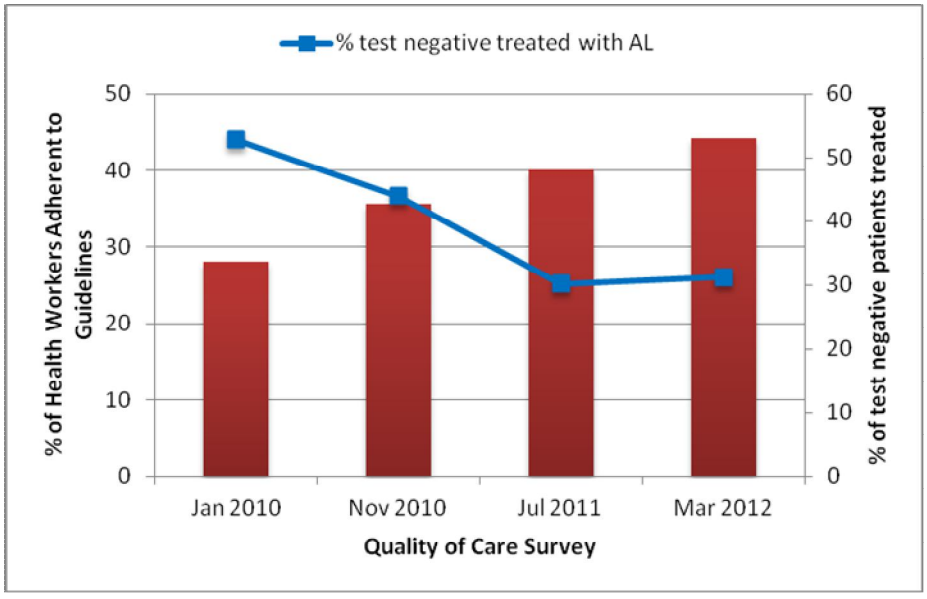
4.5.1. Quality of Care Surveys

Biannual health facility surveys monitoring the quality of out-patient malaria case management have been implemented since 2010 as part of programme monitoring and evaluation. The objective of the surveys is to monitor health worker practice and adherence to malaria case management guidelines and circumstances that influence treatment practices. Four surveys have been carried out since 2010; the baseline survey in January 2010, and subsequent surveys in November 2010, July 2011 and March 2012[9]. The objectives of the quality of care surveys are to determine trends in the national availability of recommended and non-recommended antimalarials and malaria diagnostics in public health facilities and to determine the levels and trends in health workers' adherence to outpatient guidelines for malaria diagnosis and treatment including counselling and drug dispensing practices in public health facilities countrywide.

4.5.1.1. Health worker adherence to treatment guidelines

A composite indicator for adherence to health workers was defined for the surveys and performance was considered if the health worker carried out the following three tasks: 1) febrile patient was tested for malaria; 2) if the test result was positive, the patient was treated with AL, and 3) if the test was negative, the patient was not treated for malaria. Failure to test patients with fever for malaria even when testing was available and treatment of patients with negative results with an antimalarial were the major reasons for poor performance on this indicator. Since 2010 however, the treatment of patients testing negative for malaria has steadily declined while adherence to guidelines has increased from 28 percent in January 2010 to 44 percent in March 2012 (Figure 16).

Figure 16: Health worker adherence to treatment guidelines (composite indicator)



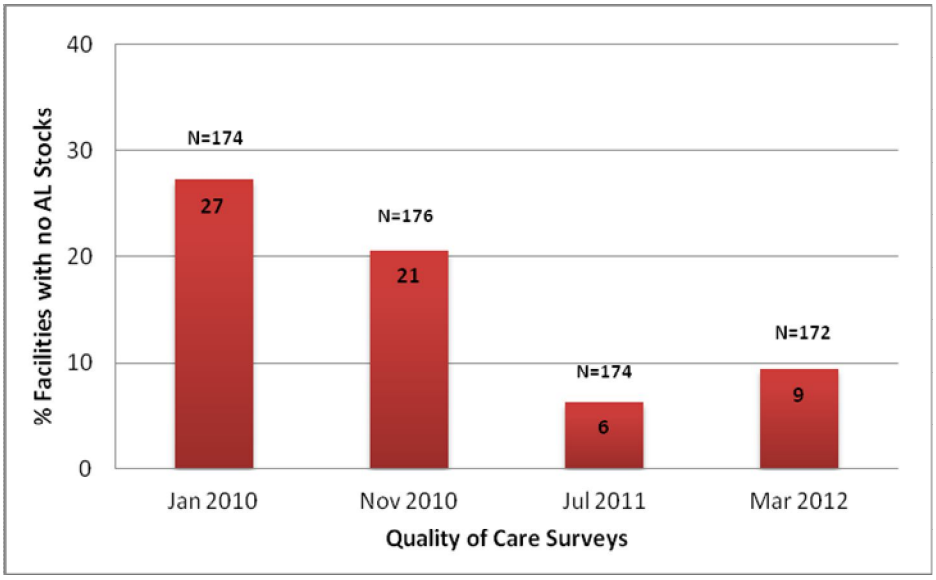
Soure: Kigen, et al (2012a)

[9]Kigen, S., et al (2012a) 'Monitoring outpatient malaria case management under the 2010 diagnostic and treatment policy in Kenya-brief progress report' Nairobi, DOMC, Ministry of Public Health and Sanitation.

4.5.1.2. Stock-outs of AL

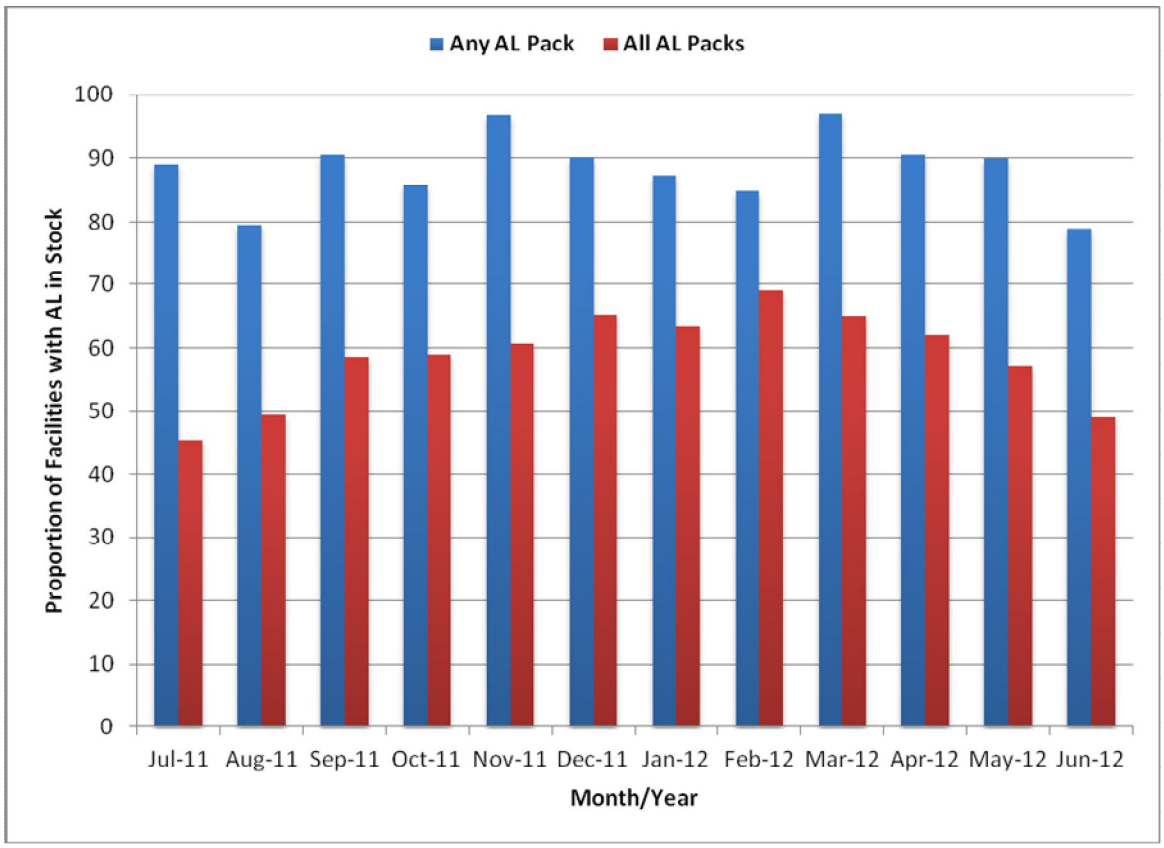
A retrospective assessment of AL stock-outs, defined as the stock-out of various AL packs for at least 7 consecutive days over the previous three months, was carried out during four quality of care surveys (Figure 17). Stock-out status was established from stock cards, physical stock counts and dispensing records. A decline in total stock-outs from 27% observed during the first round declined to 9% measured at the last survey. In addition, monthly monitoring of AL stocks in a national sample of 176 facilities has been supported by Management for Sciences Health and KEMRI-Wellcome Trust Programme since 2010. Data from the monitoring shows that from July 2011 to June 2012, the proportion of facilities reporting total AL stock-outs ranged from 3 – 21 percent (figure 18). The months with the lowest stock-out rates coincided with distribution of AL.

Figure 17: Proportion of surveyed facilities reporting total stock-outs of AL



Adapted from Kigen, et al (2012a)

Figure 18: Proportion of facilities with AL in stock in 2011/2012



Source: DOMC/MSH/KEMRI-Wellcome Trust Programme monthly AL stock monitoring data

4.6. Operational Research and Translation

The operation research (OR) unit convened meetings to review the national malaria OR agenda and coordinated the planning of the first Annual Malaria Research to policy conference. The unit also facilitated studies for the monitoring of drug and insecticide resistance.

4.6.1. National Malaria Forum October 2011

The DOMC held the first Kenya National Malaria Forum at the Crowne Plaza Hotel, from October 10–11, 2011. The forum was held in response to the outcome of Malaria Programme Review undertaken in 2009 which underscored the need for a forum that brings together producers and users of malaria-related data and information at all levels of the health care system to discuss and devise data demand and use strategies to inform malaria control strategies and policy in Kenya. The forum aimed to foster a national dialogue on current issues in malaria control within the context of global discourse. A total of 137 participants took part in the forum. The forum was organized in collaboration with the Ministry, WHO, MEASURE Evaluation and PMI

4.6.2. Insecticide resistance monitoring

4.6.2.1. Insecticide resistance project

The insecticide resistance project (IR Project) is funded by the Bill and Melinda Gates Foundation through WHO and it is implemented by the Division of Malaria Control, Kenya Medical Research

Institute and The University of Nairobi. The main objective of the project is to determine the impact of insecticide resistance on the efficacy of malaria vector control interventions. The question is does resistance play a role in the high malaria rates reported in many parts of western Kenya where vector control interventions such as LLINs and IRS are in place. During the course of this project it will be determined whether any variations in malaria rates in the different communities are attributable to insecticide resistance.

Four districts (Rachuonyo, Nyando, Bondo and Teso) were selected for this study and last year baseline resistance profiles were established for 80 randomly selected sub-locations in the four districts. Among these, a total 50 sub-locations half of them with high resistance and the other half with low resistance were selected for the study. In the Epidemiology component of this study, longitudinal monitoring of malaria incidence, prevalence and re-infection rates will be conducted in the 50 sub-locations for up to 4 years. While in the Entomology component insecticide resistance monitoring will be conducted once a year in the 50 sub-locations and entomologic monitoring (vector density, human biting rate and mosquito biting behaviour) will be conducted 3 times a year in 16 selected sub-locations. The first round of entomologic monitoring has been completed while the first round of epidemiologic surveillance is underway.

4.6.2.2. Alternatives to pyrethroid insecticides for IRS

As part of insecticide resistance management, the DOMC explored alternatives to pyrethroids for IRS. Vector susceptibility tests conducted in 2011 in western Kenya showed phenotypic resistance to pyrethroids in *An. gambiae* s.l. vectors (table 14).

Table 14: Summary of vector susceptibility study findings

Species	Region	Permethrin N (%)	Deltamethrin N (%)	ACP N (%)	LCH N (%)	Bendiocarb N (%)
***A. gambiae*s.s.**	Bungoma	**104 (27)**	**104 (61)**	-	-	99 (84)
***A. gambiae*s.l**	Bondo	**1388 (62)**	**1076 (78)**	**774 (65)**	**980 (41)**	-
***A. gambiae*s.l.**	Rachuonyo	**447 (75)**	559 (83)	264 (81)	**482 (65)**	-
***A. gambiae*s.l.**	Migori	29 (93)	-	-	**20 (75)**	-
A. arabiensis	Budalangi	**88 (78)**	79 (86)	-	-	61 (98)
***A. gambiae*s.l.**	Nyando	137 (92)	139 (92)	-	-	160 (98)

ACP–alphacypermethrin, LCH–lambdacyhalothrin, N=number of adult mosquitoes assayed; (%)=proportion susceptible (i.e. mortality rate after 24 hours); mortality < 80% are highlighted in bold.

The DOMC and the Kenya Medical Research Institute/Centers for Disease Control and Prevention (KEMRI/CDC) with funding from PMI conducted a study in villages in 9 clusters in western Kenya. The main objective was to evaluate the efficacy and longevity of action of non-pyrethroid insecticides as alternative insecticides for IRS. Secondary objectives included the impact of IRS on indoor vector densities and the determination of community perception of the insecticides. Efficacy was evaluated monthly using wall bioassays with susceptible (laboratory bred) and wild type *An. gambiae* while vector density was determined using pyrethrum spray catches. The results show that bendiocarb performed better than other insecticides evaluated with 5-6 months efficacy against susceptible laboratory bred *An. Gambiae* (figure 20) and about 3-4 months against

wild mosquitoes as a proxy of decay rates of the insecticides against natural mosquitoes in the communities (figure 21). The results also showed that houses sprayed with bendiocarb had the lowest mosquito densities. Based on this data, IRS from 2013 will be conducted using bendiocarb.

Figure 19: The Application of Bio-assay Cones to a house in Nyalalo Village, Maseno

Photo: KEMRI/CDC Kisumu

Figure 20: Results of wall bio-assays using susceptible *An. gambiae s.s.* strain

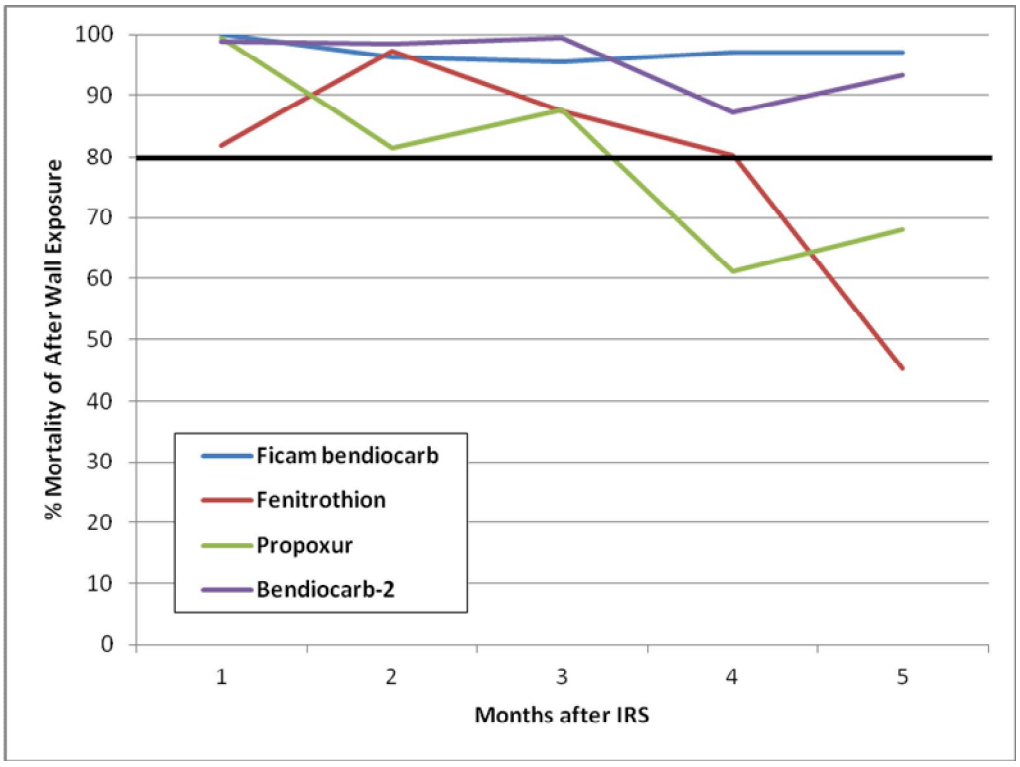
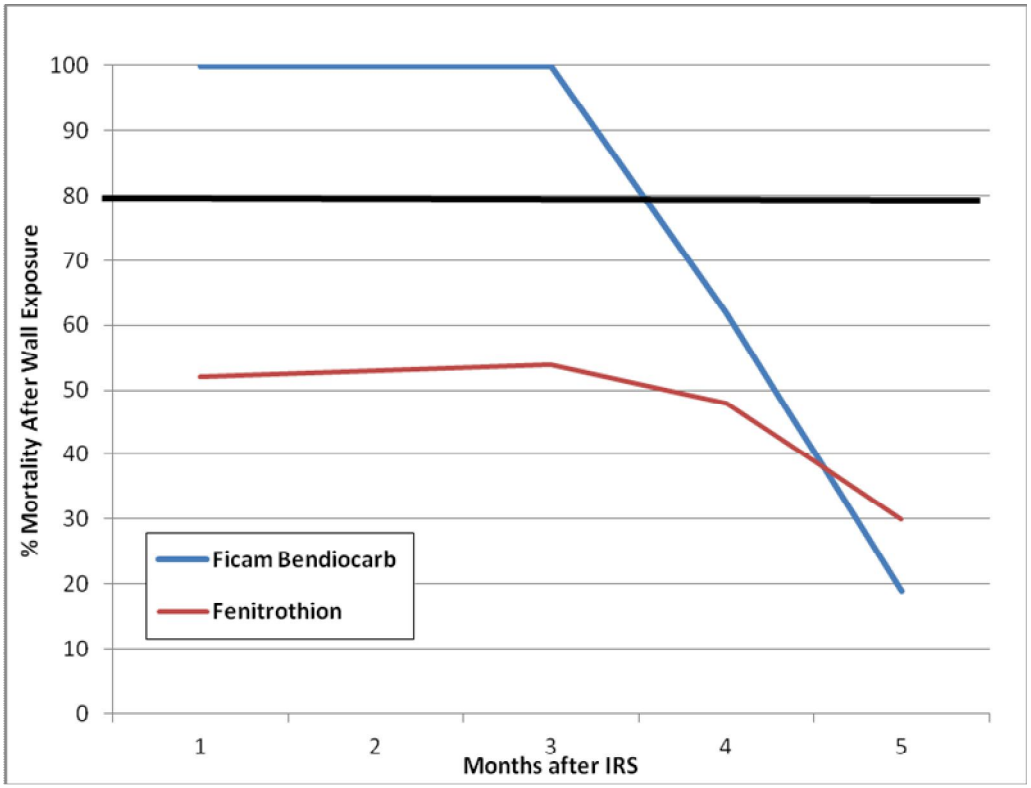


Figure 21: Results of wall bio-assays using wild *An. gambiae s.s.* mosquitoes



4.6.3. Therapeutic efficacy testing of AL and dihydroartemisinin-piperaquine

Effective treatment of malaria is important for reducing malaria morbidity and mortality. Following the change of first line treatment for uncomplicated malaria from SP to AL in 2004, biennial monitoring of AL efficacy was adopted by the DOMC as per WHO recommendations to regularly review efficacy and safety of first line antimalarials. A two-arm 42 day comparative study of AL and the second line drug for uncomplicated malaria DHAP was carried out at two sites in Nyando from 2010 to 2012. The objective of the study was to assess efficacy and safety of both AL and DHAP in children under 5 years with uncomplicated malaria. Polymerase Chain Reaction (PCR) corrected efficacy rates for AL and DHAP are shown in the table 15.

Table 15: Day 28 and 42 PCR corrected efficacy of AL and DHAP 2011

	AL	DHAP
Day 28 cure rate, no. (%)	220 (97.3)	220 (99.6)
Day 42 cure rate, no. (%)	215 (96.3)	221 (99.1)

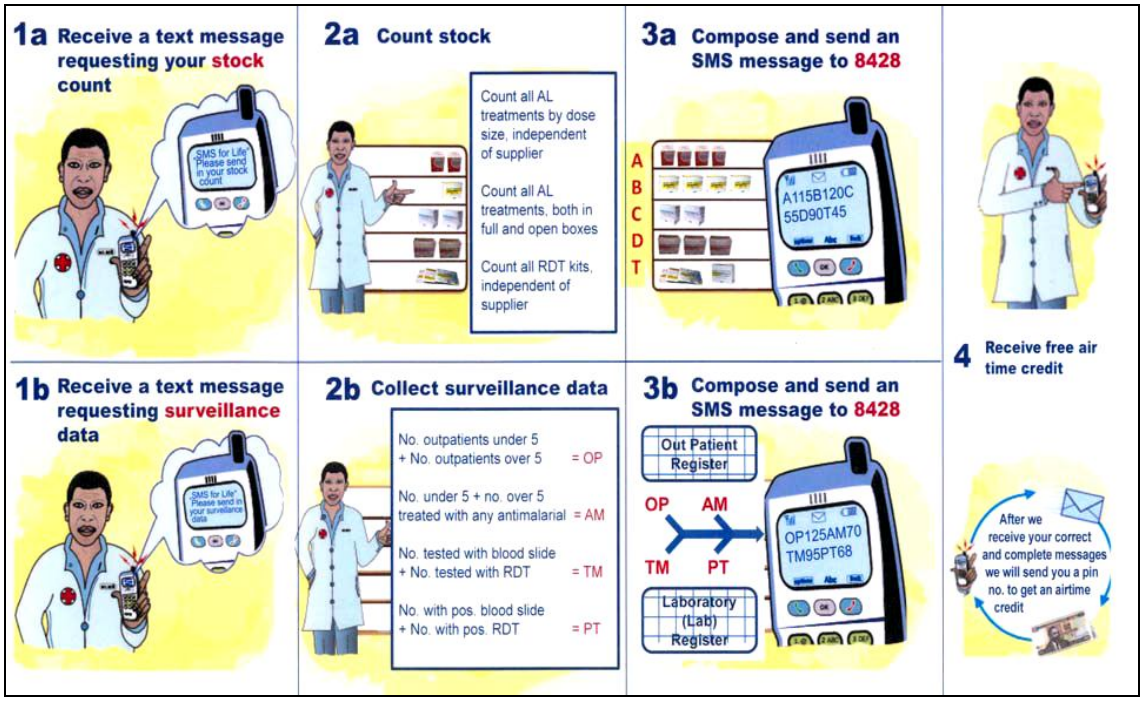
The study was funded by DOMC through support from WHO/DFID and PMI and was conducted by KEMRI Centre for Clinical Research. The results show that AL and DP are efficacious treatments for uncomplicated falciparum malaria in Kenyan children with DHAP

providing prophylactic effect against re-infection as expected. There was no evidence of tolerance to artemisinin as all patients cleared parasites by 40 hrs.

4.6.4. SMS for Life

SMS for Life is an innovative mobile phone application that allows district health managers to visualise malaria medicine stocks in health facilities under them and take timely corrective actions when stocks are too low to prevent stock-outs. The *SMS for Life* pilot in Kenya was similar to the model rolled out in Tanzania where weekly reporting of AL stocks by SMS resulted in district actions that reduced stock-outs to near zero. SMS for Life was piloted in 5 districts (Machakos, Ijara, Vihiga, Manga and Msambweni) with 87 public health facilities participating for 26 weeks between August 2011 and February 2012[10]. In addition to the stocks of AL, the pilot in Kenya also monitored RDT stocks and patient data – number of outpatients, number tested for malaria, number positive for malaria and number treated for malaria. This data was extracted from outpatient registers while stocks were visualised in the drug store. The health worker then used their personal mobile phones to send two weekly messages, one on stock and one on patient data to a toll free number which delivered the data to central database accessible online by the District Health Management Team (DHMT) and Ministry officials. A token of KES 50 worth of airtime was sent to health workers sending both messages in a timely manner.

Figure 22: Communication process between the SMS system and participating health workers



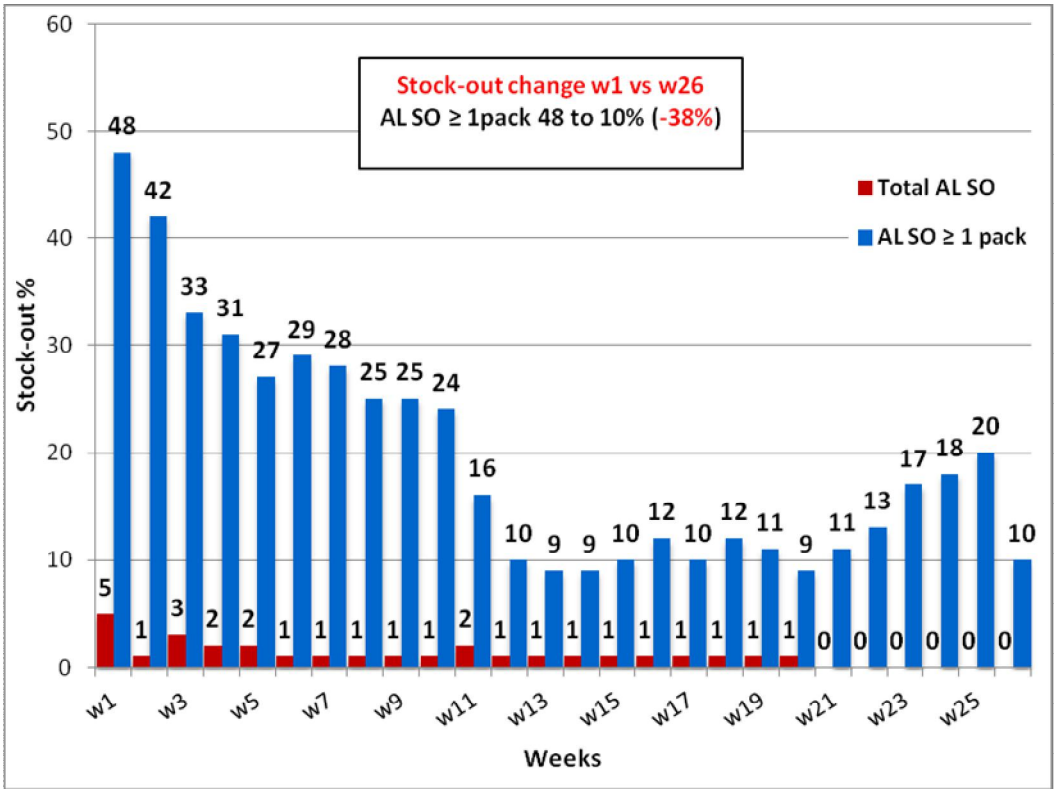
Source: Kigen, S et al (2012b) 'SMS For Life: Kenya Pilot Project Report'

4.6.4.1. Effect on AL Stocks

[10]Kigen, S et al (2012b) '*SMS For Life: Kenya Pilot Project Report*' Nairobi, DOMC, Ministry of Public Health and Sanitation.

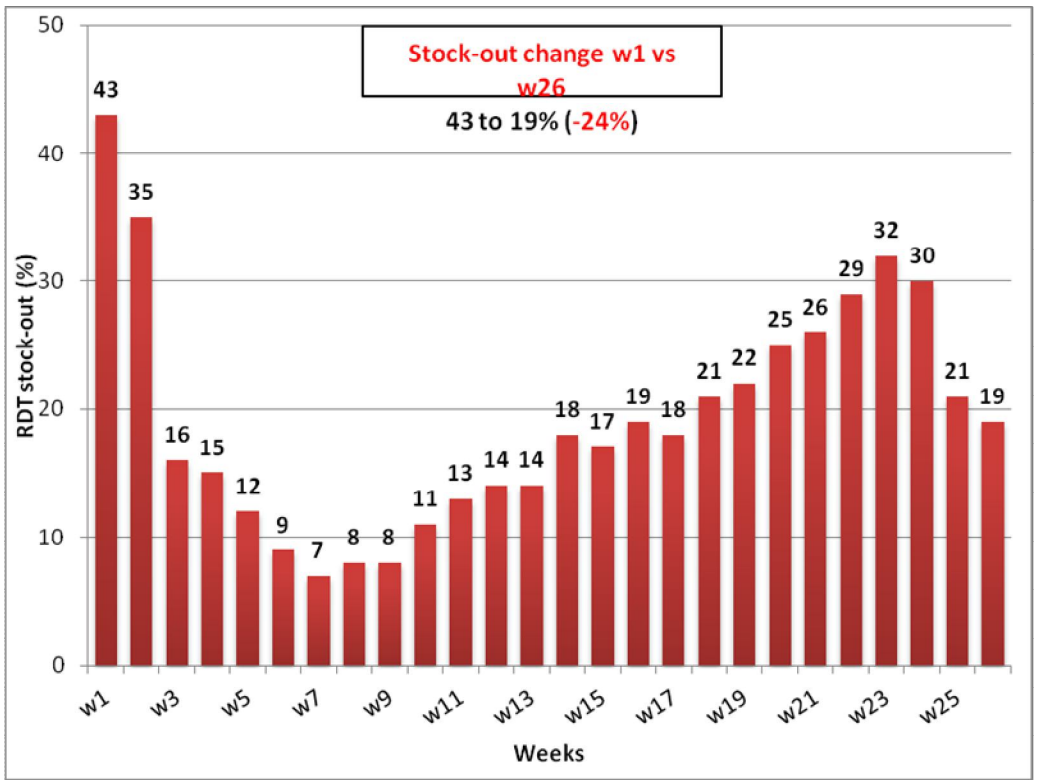
Compared with the first week, all participating districts were able to eliminate total stock-outs of AL and reduce stock-outs of 1 or more packs by 38 percentage points (from 48% to 10 percent) (figure 23). RDT stock-outs rates fluctuated due to challenges of distribution from limited stocks at central level, but were reduced by 24 percentage points at the end of the pilot as shown in figure 24. DHMTs responded to 44% of AL stock-out signals by redistributing commodities between facilities while 43% of signals were resolved by routine supplies and 13% were unresolved. More than 70 percent of RDT stock-out alerts were resolved by redistribution, 13 percent by routine supplies and 15 percent were not responded to. The accuracy of stock reported parameters was 79% while accuracy of stock-out reports was 93%.The findings were similar for all parameters and in all districts.

Figure 23: Trend of total AL stock-outs in *SMS for Life* pilot health facilities



Source: Kigen, S et al (2012b) 'SMS For Life: Kenya Pilot Project Report'

Figure 24: Trend of RDT stock-outs in *SMS for Life* pilot health facilities

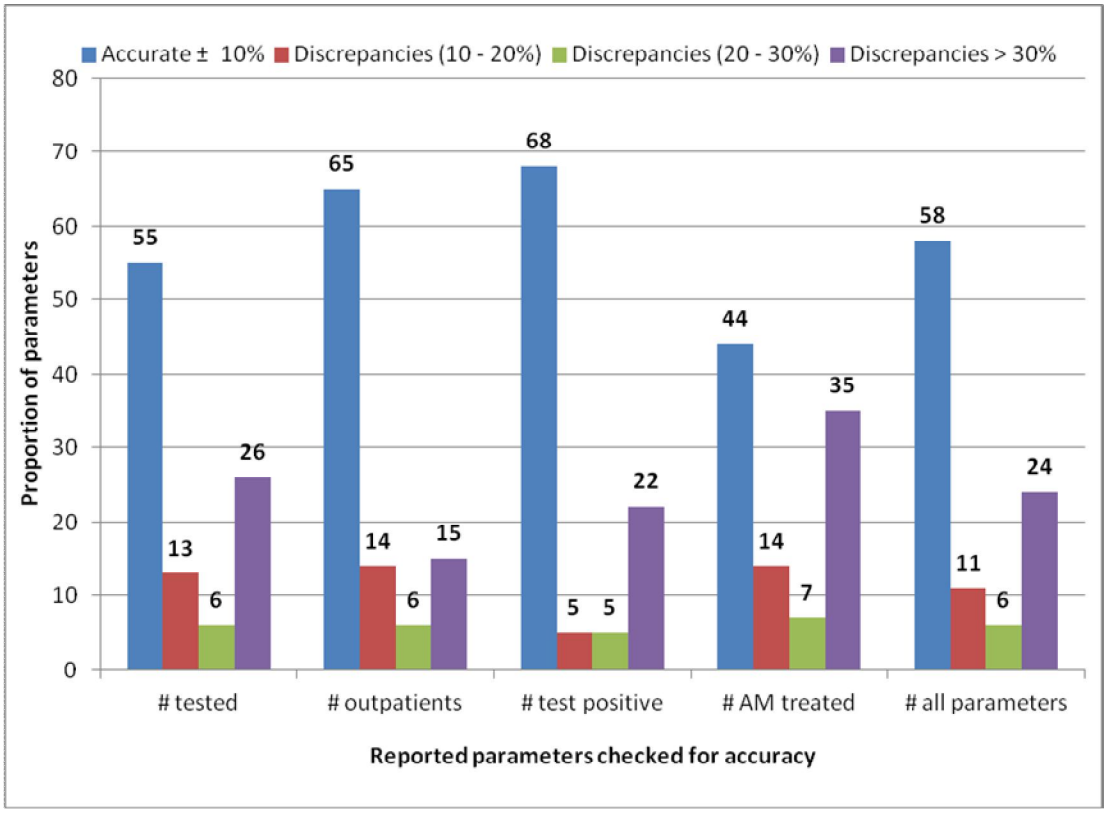


Source: Kigen, S et al (2012b) 'SMS For Life: Kenya Pilot Project Report'

4.6.4.2. Malaria Morbidity data

The *SMS for Life* project also collected weekly morbidity data from health facilities comprising number of outpatient cases, number with suspected malaria, number tested, number positive and number treated for malaria. It was assumed that the data elements were relatively simple to extract from the routine registers however, the results showed that the data had on average a low accuracy (58 percent) with nearly one quarter of the reports (24 percent) having a discrepancy of more than 30 percent (figure 25). The district specific differences in correct reporting were minor ranging from 48% in Ijara to 59% in Machakos District. Although the correctness of reporting improved over the programme time, the low accuracy diminished the utility of the data for monitoring or planning. Quality assurance of morbidity data reported by SMS is therefore essential.

Figure 25: Accuracy of SMS reported morbidity data



Source: Kigen, S et al (2012b) 'SMS For Life: Kenya Pilot Project Report'

5. Advocacy, Communication and Social Mobilization (ACSM)

Objective: To strengthen advocacy, communication and social mobilization capacities for malaria control to ensure that at least 80% of people in malarious areas have knowledge on prevention and treatment of malaria by 2014.

Strategies

- Capacity strengthening for advocacy, communication and social mobilization.
- Support priority implementing partners
- Development of appropriate advocacy for uptake of specific malaria interventions

Planned activities

Key activities planned and accomplished included the printing and dissemination of the national malaria communication strategy, development and production of a community education guide and manual, the commemoration of World Malaria Day 2012 and the development of mass media communications to support AMFm activities, LLIN use, IPTp uptake and malaria epidemic preparedness activities in the ASAL districts of northern and north eastern Kenya. Table 16 shows performance against targets set for the period.

Table 16: Advocacy Communication and Social Mobilization Indicators and Targets

Indicators	Target	Achievement
Number of BCC messages developed	1	1 (100%)
Number of documentaries produced	1	1 (100%)
Produce quarterly advocacy bulletins	4	2 (50%)
Number of guidelines and training material produced	2	2 (100%)
Number of media campaigns conducted	25072 AMFm Radio Spots	34,326 Radio spots (137%)
Number and types of IEC materials produced	AMFm Posters 400,000	AMFm 400,000 (100%)
Proportion of districts conducting malaria field days and world malaria day	265	13 (5%)

5.1. Capacity Strengthening for ACSM

5.1.1. World Malaria Day 2012

World Malaria Day was celebrated on 25th April 2012 in Msambweni District. The year's theme was "Sustain Gains, Save Lives: Invest in Malaria" and the slogan in Kenya was "*Pamoja tuendelee kuangamiza malaria* – let us continue to fight malaria together". While acknowledging gains in malaria control over the past decade, the WHO also noted that gains were fragile and there was need for partners to consolidate and look to sustain gains towards a malaria free future. The WHO also launched the T3: Test, Treat, Track initiative that encourages countries to adopt universal diagnosis and treatment; and to strengthen malaria surveillance. The guest of Honour at the World

Malaria Day celebration was Member of Parliament for Msambweni Hon. Omar Zonga who launched the distribution of 2.3 million LLINs to achieve universal coverage in the coastal region.

5.2. Support priority implementing partners

5.2.1. Community road shows

Three non-governmental organizations specializing in community education were supported to conduct community sensitization campaigns through road shows and community based forums to promote prompt diagnosis and treatment of malaria and the regular use of LLINs to prevent malaria. Using drama, print and film, these road shows were attended by over 2.4 million men women and children in the western and coastal regions of Kenya.

5.2.2. Population Services International and Scouts promotion of LLIN use

Population Services International Kenya (PSI-Kenya) through support from DFID ran a net use campaign on electronic media entitled "*Mbu nje, Sisi ndani*" aimed at addressing the gap between net ownership and usage. From January 2011 to March 2012, PSI-Kenya partnered with the Kenya Scout Association movement to increase net use in 36 malaria endemic districts in Nyanza, Coast, Western, Rift Valley and Central provinces. A total of 21,600 scouts adopted between 7 and 10 homes which they visited regularly to educate members on the dangers of malaria and to encourage them to hang and use their LLINs every night. By the end of the programme the scouts had visited 150,000 homes with over 650,000 people.

5.3. Development of Appropriate Advocacy for Uptake of Specific Malaria Interventions

5.3.1. Essential Malaria Actions Guide for Families

This guide simply explains essential actions crucial in promoting the desired prevention and treatment seeking behaviour to combat malaria. It outlines seven essential malaria actions that fall into four categories: use of long-lasting insecticide-treated nets (LLINs), malaria diagnosis and treatment, prevention of malaria during pregnancy and indoor residual spraying. The guide primarily targets households and can be used by district health managers, health workers and all partners involved in planning and implementing malaria social and behaviour change communication activities at the community level. The guide was developed by the DOMC with technical guidance from C-Change with funding from PMI.

5.3.2. Community Education Training Manual

This training manual was developed with support from the Global Fund AMFm grant. The manual is simple and meant for use by community health workers during community education and inter-personal communication sessions. It addressing key determinants of behaviour change is hoped that it will be an additional tool for promoting community empowerment to adopt attitudes and behaviours that prevent malaria.

6. Programme Management

Objective: By 2013, to strengthen capacity in programme management in order to achieve malaria programmatic objectives at all levels of the health care system

Strategies

- Capacity strengthening for planning, partnerships and coordination at national malaria control program
- Strengthen malaria program management at the district and provincial levels
- Strengthen infrastructure at the national, provincial and district levels
- Strengthen activity and performance monitoring
- Strengthen resource mobilization capacity to improve malaria control financing
- Strengthen human resource capacities in malaria endemic area
- Strengthen procurement and supply management systems for malaria drugs and commodities

The main functions of the unit are resource mobilization for malaria control activities and coordination of the programme partners in planning, implementation of activities and performance monitoring. Decentralization of oversight and coordination to provincial and district levels continued in this year with more districts designating malaria coordinators. The DOMC delegated more planning and coordination functions to these officers. However there was insufficient funding to fully support their operations.

6.1 Capacity strengthening for planning, partnerships and coordination at national malaria control program

6.1.1 Partnership coordination

The Malaria Interagency Coordinating Committee (MICC) is a multi-sectoral body including non-health partners responsible for making decisions on policy and providing oversight and guidance for the implementation of malaria interventions. The MICC is chaired by the Director of Public Health or a designated person and meets quarterly to review the output of technical working groups (TWGs) and subcommittees. Six programme technical working groups and a Global Fund technical committee also meet at least quarterly and report to the MICC. Among the policy recommendations made to the MICC in 2011/2012 include the adoption of alternative insecticides (other than pyrethroids to mitigate insecticide resistance) for IRS as part of the WHO recommendations for insecticide resistance management (table 17).

6.2 Strengthen malaria program management at the district and provincial levels

Eight provincial and majority of district malaria control coordinators have not yet received relevant training on malaria control and programme management. The training manual was however developed with support from WHO. The initial training will be conducted in FY 2012/2013.

6.3 Strengthen infrastructure at the national, provincial and district levels

Resources were not available to support the functioning of PMCCs and DMCCs and to improve infrastructure at the DOMC.

Table 17: MICC and TWG meetings 2011/2012

Agency	Target meetings	Meetings held	Key outputs
MICC	4	3	• Selection of Global Fund sub-recepients for the second principal recipient • Revival of the East African Network for Monitoring Antimalarial Treatment (EANMAT) • Revision of LLINs specifications • Implementation of a dashboard for monitoring progress of Global Fund project activities
Case Management TWG	4	4	• Adoption of injectable artesunate as first line for treatment of severe malaria • Revision of national malaria treatment guidelines • Adoption of lab needs assessment, quality of care, post market surveillance and *SMS for Life* reports • Preparation of an AMFm transitional plan
Vector Control	4	6	• Review of LLIN technical specifications • Plans for universal coverage campaign in Coast and Rift Valley Province • Alternative insecticides for IRS selected • IRS business plan 2012-2017
M & E TWG	4	3	• MIS 2010 Report • Malaria surveillance plan
Malaria in Pregnancy TWG	4	2	• Simplified guidelines for MIP for health workers • Orientation package for community health workers
ACSM TWG	4	2	• Final Malaria Communication Strategy • Adoption Essential Malaria Actions guide
Research TWG	4	2	• Organization of the Malaria Research to Policy forum • Selection of alternative insecticide for IRS selection • Template for reporting on ongoing studies • Priority OR questions

6.4 Strengthen activity and performance monitoring

6.4.1 Performance of the National Malaria Control Program

A number of activities were planned for the 2011/2012 financial year. A detailed table of performance by programme objectives and strategies is shown in Annex 1. The lessons from the performance analysis are as follows:

a) There were activities that have remained unfunded for two years such as the malaria free schools initiative which includes vector control activities and intermittent screening and treatment. These activities will be the focus of resource mobilization efforts in the FY 2012/2013

b) Activities with committed funding were delayed due to requirement to fulfil management requirements by different donors. The DOMC has acquired technical planning, logistics, data management staff to improve grant performance management in FY2012/2013.

c) There was inadequate funding to support for strengthening programme management activities at regional level. The implementation of the new constitution will require strong management capacity at regional level to coordinate planning, resource requirements, implementation and monitoring of activities. The programme and partners will prioritise capacity building for programme management to ensure that malaria control activities are not affected during the transition period.

6.5 Strengthen resource mobilization capacity to improve malaria control financing

6.5.1 Resource mobilization

In 2011/2012 the Global Fund Round 10 grant agreement was signed and the initial disbursements made. PMI, World Bank and DFID funds committed for various activities were disbursed and the DOMC was able to get a commitment from DFID to invest in the IRS business plan from FY 2012/2013.

6.5.2 Financing for malaria activities

Estimated funding for malaria control activities in 2011/2012 in Kenya shillings is shown in table 17 while the expenditures are shown in figure 22. The figures are derived from budgets and expenditure using an exchange rate of Kshs. 84 for 1 United States dollar. About half of the expenditure in the year was on vector control interventions (LLINs and IRS) while a little under 10 percent was spent on antimalarial treatments due to the AMFm subsidy on AL. Although government financing for malaria activities was maintained, there was increased funding for infrastructure and human resources in the health budget that has a positive impact on malaria interventions.

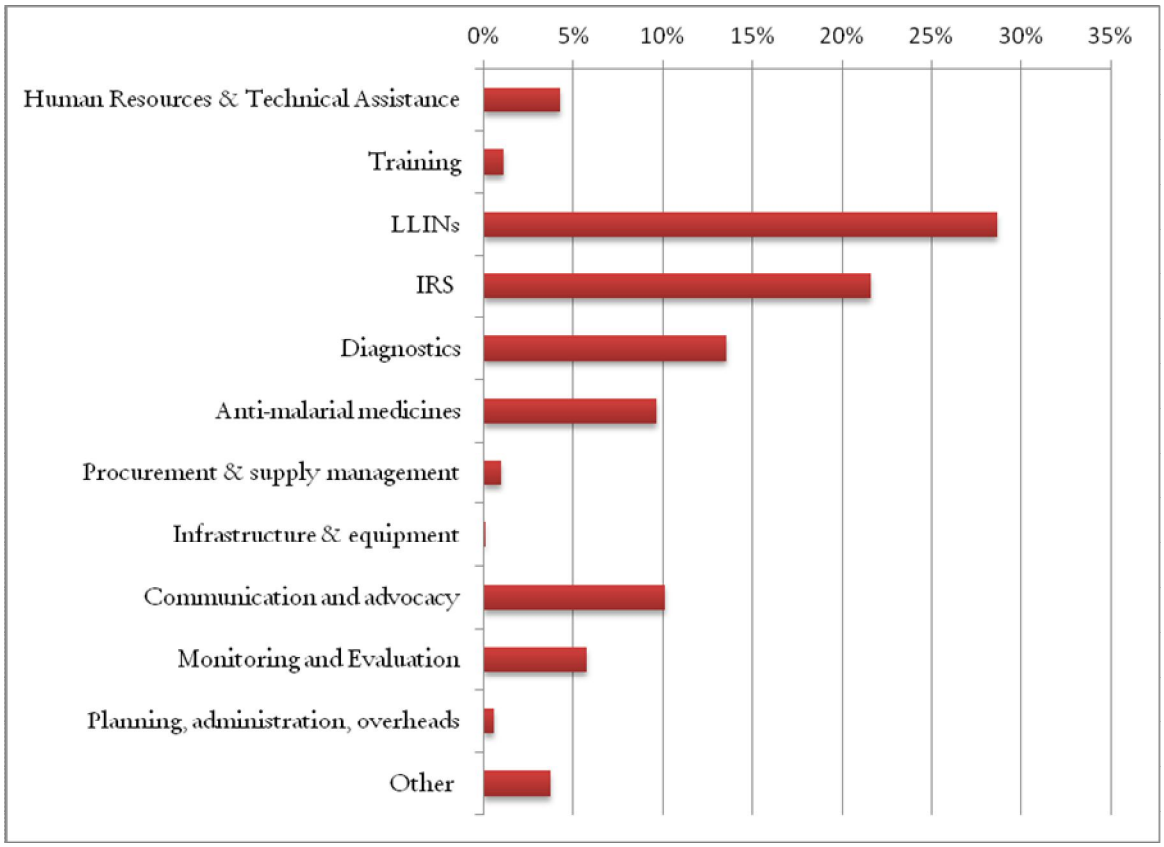
Table 18: Malaria Financing FY 2011/2012

Malaria Financing by Year		2010/2011 (Millions Kshs)	2011/2012 (Millions Kshs)	2011/2012 (≈Millions US $)
Government Contributions	**Total Government Budget**	977,000	1,154,900	13,749
	Recurrent Govt budget	640,000	787,000	9,369
	Health budget	41,500	64,000	762
	Malaria budget	224	224	2.7
External contributions	**Global Fund (All PRs)**	3,242	1,048	12.5
	World Bank	546	756	9.0
	USAID/PMI	3,057	3,062*	36.5
	DFID/WHO	368	1,468	17.5
	UNICEF	-	29	0.3
	Others (NGOs, foundations etc)	-	20	0.2

* USAID/PMI budgets for FY 2012 beginning October 2011 to September 2012

Source: DOMC data, Global Fund enhanced financial reporting & PMI malaria operational plans

Figure 26: Share of Total Malaria Expenditure FY 2011/2012



Source: DOMC data, Global Fund enhanced financial reporting & PMI malaria operational plans

6.6 Strengthen human resource capacities in malaria endemic area

A planned malaria management course for DMCCs was delayed awaiting the completion of a revised training curriculum. Pre-service training of health workers was however enhanced as the DOMC and other programmes with support from PMI engaged the Kenya Medical Training College to update training curricula for middle level health workers with current knowledge on disease prevention and control.

6.7 Strengthen procurement and supply management systems for malaria commodities

6.7.1 Quantification of malaria commodities

The annual forecasting and quantification of antimalarials including AL, SP, DHAP, quinine, artesunate and diagnostics was conducted by the members of the Drug Supply Management Sub-Committee of the Case Management TWG. The team used consumption data from the logistics information management system, morbidity data, and gap analysis report for 2011-2016. Quantification for LLINs for routine distribution was conducted based on estimated number of pregnant women and infants born in targeted areas.

6.7.2 Value for Money

The value for money analysis of malaria control during the 2011/2012 financial year looks at economy of investments. Data was available to compare costs of commodities and services

procured in the financial year. As shown in table 19, the costs of commodities procured compared favourably with international bench mark prices set by the WHO, Roll Back Malaria Partnership, UNICEF and The Global Fund.

Table 19: Comparison of malaria commodity costs procured against global benchmarks

Local Procurements		International benchmarks		
Commodity	**Unit Cost US$**	**Commodity**	**Unit Cost US$**	**Source**
Long Lasting Insecticidal Nets				
Conical Polyester (blue) 850 x 220 cm (Area 11.22 m²)	5.57	Standard Conical Polyester 1250 x 250 (Area 17.88m²)	6.64	UNICEF 2012[11]
Conical Polyethylene 850 x 220 cm (Area 11.22m²)	4.9	Standard Conical Polyethylene 1250 x 250 (Area 17.88m²)	8.5	
Rectangular polyester 190x160x210cm (Area 17.74m²)	4.18	Standard Rectangular Polyester 190x180x150 (Area 14.52m²)	3.78	
Rectangular polyethylene 190x160x210 (Area 17.74m²)	5.7	Standard Rectangular Polyethylene 190x180x150 (Area 14.52m²)	4.25	
Artemisinin based combination treatments				
Artemether-lumefantrine 20/120mg 6 dispersible tablets	0.41	Artemether + Lumefantrine 20mg+120mg - 6	0.36	Global Fund 2012[12]
Artemether-lumefantrine 20/120mg 12 dispersible tablets	0.78	Artemether + Lumefantrine 20mg+120mg - 12	0.72	
Artemether-lumefantrine 20/120mg 18 regular tablets	1.03	Artemether + Lumefantrine - 20mg+120mg - 18	1.08	
Artemether-lumefantrine 20/120mg 24 regular tablets	1.22	Artemether + Lumefantrine - 20mg+120mg - 24	1.3	
Malaria Rapid Diagnostic Tests				
CareStart Malaria HRP2	0.4	CareStart Malaria HRP2	0.41	Global Fund 2012
Insecticides				
Lambdacyhalothrin	2.4	Average cost synthetic pyrethroids	2.15	Miller & Tren[13] 2012
Deltamethrin	1.85			
Health worker training				
3 day residential training for one health facility health worker	294	No reference available		

[11] UNICEF (2012) 'Long lasting insecticidal Nets (LLINs) pricing data.' Available from http://www.unicef.org/supply/files/LLINs_price_transparency_June_2012.pdf

[12] The Global Fund to fight AIDS, Tuberculosis and Malaria (2012). 'Price reference Report 2012' Available from http://www.theglobalfund.org/en/procurement/pqr/

[13] Miller, M., and Tren, W. (2012) 'Implications of public-health insecticide resistance and replacement costs for malaria control: challenges and policy options for endemic countries and donors.' *Research and Reports in Tropical Medicine* 2012, Dovepress

Discussion

The overall technical performance of the programme was 69 percent with 61 out of 89 planned activities across all intervention successfully implemented. Lack of implementation of activities was attributed to lack of resources, delays in disbursement of committed resources and delayed delivery of commodities required such as LLINs. Inadequate financing of community mobilization activities around the mass net distribution campaign in western Kenya may have contributed to low coverage (20 percent of targeted households did not have LLINs) and low LLIN use found in the post mass net distribution evaluation survey. Low coverage may have also resulted from the fact that actual population figures on the ground may have been higher than estimates used in planning[14]. The DOMC and partners have initiated discussions to address the shortfall in coverage in the region. Going forward, community health structures will be instrumental in the identification of unreached households as well as the maintenance of a net tracking tool to assist in the planning of future community based distribution campaigns.

Low diagnostic capacity and lack of quality assurance for microscopy as the main method used to confirm malaria affected both malaria case management and surveillance. Nearly two thirds of patients treated for malaria were treated presumptively while laboratory data available showed that of those tested, positivity rates tended to be uniform regardless of malaria epidemiology. Plans to address universal access to diagnosis based treatment were delayed by long procurement lead times for RDTs. However, quality assurance manuals and training curricula for malaria diagnosis were developed in readiness for the roll out planned for the first quarter of 2012/2013. While efforts were made to strengthen malaria diagnosis, total health facility stock-outs of AL ranged between 3 and 21 percent while at the same time there were no reported central level stock-outs. Stock-outs significantly hamper malaria case-management and have been shown to increase child mortality[15]. There are two systems of distribution of AL to health facilities: a pull system where every three months, AL is distributed to rural health facilities based on consumption to rural health facilities in three out of eight provinces and every two months to all hospitals countrywide; and a push system where rural facilities in the remaining five provinces receive predetermined quantities of AL (also based on average consumption) every three months. A study on stock out trends showed that a multiplicity of factors among them poor drug management and inability to quantify need, sub-optimal supply and irrational drug use due to low testing rates caused health facility stock-outs of AL[16].

Monitoring and evaluation of malaria interventions is essential for the measurement of performance against stated programmatic goals and quality data central to M&E. Routine monitoring data is collected through national HMIS and is thus subject to the challenges and

[14] Kilian, A (2010). 'How many mosquito nets are needed to achieve universal coverage? Recommendations for the quantification and allocation of long-lasting insecticidal nets for mass campaigns.' *Malaria Journal*, **9**:330

[15] Hamel, M., et al (2011). 'Reversal in reductions in child mortality in Western Kenya, 2003-2009. *Am J Trop Med Hyg*, 85: 597-605

[16] Sudoki, R et al (2012). 'The magnitude and trend of artemether-lumefantrine stock-outs at public health facilities in Kenya' Malaria Journal, **11**:37

limitations of the system. In-patient morbidity and mortality data for the year under review was not available due to on-going migration and recoding of the in-patient data collected by the HMIS to the web based DHIS2. Delayed reporting of weekly surveillance, routine morbidity and commodity consumption data and missing data were not uncommon at district level. These delays began at health facility level where data was not completed in a timely manner due to shortage of information officers and work load of health workers. The SMS for Life pilot showed that accuracy of morbidity data reported by phone as commonly done with weekly disease surveillance data was low at 58 percent. Efforts to improve M&E and data quality were initiated in 2011/2012 including the training of district officers involved in data management and the provision of resources to the Division of HMIS and DDSR to support regular data quality audits. These audits are aimed at improving the classification and reporting of severe malaria cases; quality and accuracy of malaria surveillance data and the completeness and timeliness of morbidity and service delivery data in the DHIS2.

Activities to strengthen programme management capacity regional and district level were not undertaken due to lack of funding. The on-going decentralization of government structures is likely to negatively impact the planning and implementation of malaria control intervention if capacity to coordinate planning and implementation is lacking. Each of the 47 counties will require technical capacity to prioritise, plan for and implement malaria activities based on the prevailing epidemiology. There is need for the Ministry and partners to support capacity strengthening of these structures to ensure that gains made so far are sustained and built upon by respective counties.

A mid-term review of the NMS was planned for 2013. The review is aimed at taking stock of performance against the goals and objectives, to determine the extent to which key objectives and whether strategies and activities therein remain appropriate.. A critical evaluation of prioritization and allocation of resources for activities will need to be evaluated in light of "orphaned" strategies such as the malaria free schools initiative that have not received significant support. All in all, the DOMC and partners will need to identify changes in strategy if needed to bridge gaps between the goals of the programme and actual status within the context of the global economic crisis and the need to sustain gains made with previous investments.

Challenges and Way forward

Challenges

The main challenge faced by the malaria programme in Kenya is the risk that significant investments made and the resultant gains in controlling the disease may not be sustained and may even be reversed. The threats to the current success include:

Decline in financing required to sustain activities

The current global economic crisis is likely to result in a reduction in the level of financing for activities by traditional donors. There will be continued efforts to diversify sources of funding for malaria interventions including private sector partners and contributions from local communities to sustain gains made at community level.

High costs of presumptive diagnosis and treatment of malaria

Low malaria diagnostic capacity and lack of quality assured malaria diagnosis increase treatment costs associated with malaria. There is need to rapidly implement the planned national scale up of quality assured diagnosis based treatment for all suspected malaria cases.

Drug and insecticide resistance

Emerging resistance to ACTs reported in Asia and increasing insecticide resistance can reverse gains made in malaria control. There is need to continue monitoring the efficacy of antimalarials and insecticides used in the country. In an effort to reduce pressure on pyrethroid insecticides used in LLINs, the programme has adopted alternatives for use in IRS activities in the same areas.

Increasingly non-immune population

As a result of malaria interventions, some previously malaria-endemic or stable transmission areas have become areas of unstable transmission with a resultant loss of partial immunity to malaria among populations previously immune. There is a risk of severe widespread malaria epidemics in these populations if efforts to maintain control interventions in the area and malaria epidemic preparedness and response systems including malaria surveillance.

Slow pace of decentralization of programme management

Programme planning and implementation remains centralised. Due to the varied malaria epidemiology in the country, there is need to strengthen decentralized at county and/or district level. The heterogeneous malaria epidemiology calls for sustained efforts to decentralize programme management in order to enhance appropriate evidence-based targeting of interventions at district/sub-district levels.

Way forward

The following strategies will be strengthened in the context of the NMS 2009-2017 in order to address threats to gains made in controlling malaria in Kenya.

Increase the level of coordination and funding for malaria control

There will be continued efforts to mobilize resources for malaria interventions and to strengthen partnerships including the private sector, and at community level to sustain gains made. For committed funding particularly from the Global Fund, the programme will continue to work with partners to meet targets and conditions set for grant implementation.

Reduce malaria burden in endemic zones in western Kenya

Efforts will be made to further reduce malaria burden in the Lake Victoria endemic zone through indoor residual spraying and maintenance of consequent low prevalence with uninterrupted LLIN universal coverage both guided by an effective system for insecticide resistance monitoring.

Consolidate gains made in areas where malaria transmission has been reduced

There will be need to sustain the gains made in the Coast endemic zone and other focal areas of transmission through maintenance of uninterrupted LLIN universal coverage and targeted interventions based on evidence

Expand quality assured diagnosis based treatment

In the coming year diagnosis based treatment of malaria using RDTs will be scaled up and along with it the development and maintenance of systems for quality assurance for RDTs and microscopy. Roll out of diagnostics will be accompanied by training and supportive supervision to improve drug management at health facility level and to build the capacity of DHMTs to monitor and respond to stock-outs of malaria medicines

Insecticide and drug resistance monitoring

As part of containing the threat of insecticide resistance, a mitigation plan will be developed together with partners to including regular resistance monitoring and use of non-pyrethroid insecticides for IRS in areas covered with LLINs, and the continued monitoring of antimalarial drug efficacy.

Evidence based malaria interventions

The varied malaria epidemiology in the country will need to be continually documented for changes and with it operational research into appropriate cost effective interventions suitable for the various epidemiological zones.

Epidemic preparedness and response

While traditional EPR activities have focused in highland epidemic prone districts with regular cycle of epidemics, there will be need to improve capacity for EPR in arid and semi arid districts prone to unpredictable malaria epidemics, and other areas where malaria transmission has significantly declined though the threats remain. All districts should be prepared to detect and contain malaria epidemics.

Strengthening programme management capacity at regional level

Along with the political and administrative decentralization taking place in the country, there is an urgent need to enhance malaria programme management capacity for managing decentralized malaria control program at county and district level. These managers will be responsible for local planning and implementation of appropriate interventions and activity monitoring.

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Annex

Analysis of the Kenya Malaria Program Performance 2011/2012

NMS OBJECTIVES	NMS STRATEGIES	TECHNICAL PERFORMANCE			REMARKS
		Number of activities planed	Number of activities implemented	Technical performance (% of planned activities implemented)	
1. By 2013, to have at least 80% of people living in malaria risk areas using appropriate malaria preventive interventions	1.1 Universal distribution of LLINs through appropriate channels (1 LLIN for 2 people)	4	2	50%	Mass campaign was not completed due to delayed delivery of LLINs procured with support from the World Bank and delayed disbursement of implementation funds. There were stock-outs of routine LLINs in the 4th quarter of 2011/2012, due to delayed procurement by supporting agency There was no funding to procure and distribute 1.7 million LLINs for schools
	1.2 Indoor residual spraying in the targeted areas	4	3	75%	All IRS activities were completed Larval source reduction activities were not funded in this financial year
	1.3 Support malaria-free schools initiative	-	-	-	No activities were planned in FY 2011/2012
	1.4 Provision of IPTp at antenatal clinics and community levels	5	5	100%	All planned activities were funded and implemented
	OBJECTIVE-LEVEL PERFORMANCE	**13**	**10**	**77%**	
2. To have 80% of all self-managed fever cases receive prompt and effective treatment and 100% of all fever cases who present to health workers receive parasitological diagnosis	2.1 Capacity building for malaria diagnosis and treatment at health facilities	9	7	78%	Anticipated funding from Global Fund round 10 to procure sufficient diagnostics for all levels of cared was not available in the financial year. The delayed availability of Global Fund round 10 funds also affected the completion of the malaria reference laboratory. These activities will be completed in 2012/2013
	2.2 Access to affordable malaria medicines through the private sector	3	3	100%	

NMS OBJECTIVES	NMS STRATEGIES	TECHNICAL PERFORMANCE			REMARKS
		Number of activities planed	Number of activities implemented	Technical performance (% of planned activities implemented)	
and effective treatment by 2013	2.3 Strengthening Home Management of Malaria using the community strategy through community health workers	5	2	40%	ACTs are part of CCM and were procured for CHW kits. Earmarked funds for training CHWs, implementation and supervision of CCM in western Kenya under GF Round 4 AMFm grant was not disbursed and will be completed in 2012/2013
	OBJECTIVE-LEVEL PERFORMANCE	**17**	**12**	**71%**	
3. To ensure that all malaria epidemic prone districts have the capacity to detect and preparedness to respond to malaria epidemics annually by 2010	3.1 Capacity building for epidemic preparedness and response	3	2	67%	Training of HW's at facility level not done
	3.2 Disease surveillance capacity strengthening	4	3	75%	Buffer stocks of commodities were not established at district level.
	OBJECTIVE-LEVEL PERFORMANCE	**7**	**5**	**71%**	
4. To strengthen surveillance, monitoring and evaluation systems so that key malaria indicators are routinely monitored and evaluated in all malarious districts by 2011	4.1 Capacity strengthening for malaria surveillance	4	4	100%	
	4.2 Strengthen facility and school based malaria sentinel surveillance	2	0	0%	Malariometric surveys and sentinel health facilities not set up for monitoring. Funding for this activities will be sought from partners
	4.3 Strengthening malaria data management systems	2	1	50%	Roll out of MIAS to district level unfunded. MIAS was however successfully linked to DHIS2
	4.4 Conduct and support community surveys	7	6	86%	Reanalysis of KDHS data not done
	4.5 Operational Research and Translation	3	2	67%	There was no funding for OR. Funding from DFID has now been committed for studies in 2012/2013.

NMS OBJECTIVES	NMS STRATEGIES	TECHNICAL PERFORMANCE			REMARKS
		Number of activities planed	Number of activities implemented	Technical performance (% of planned activities implemented)	
	4.6 Human resource capacity building in surveillance monitoring and evaluation	1	1	100%	DOMC officers trained on M&E
	OBJECTIVE-LEVEL PERFORMANCE	**19**	**14**	**74%**	
5. To strengthen advocacy, communication and social mobilization capacities for malaria control to ensure that at least 80% of people in malarious areas have knowledge on prevention and treatment of malaria by 2014.	5.1 Capacity strengthening for advocacy, communication and social mobilization.	4	3	75%	Periodic supervision visits at district level were not conducted for lack of funds
	5.2 Support priority implementing partners	7	3	43%	Electronic documentation of best practices for dissemination, support for provincial and district level malaria field days were not conducted due to lack of funds.
	5.3 Development of appropriate advocacy for uptake of specific malaria interventions	4	4	100%	
	OBJECTIVE-LEVEL PERFORMANCE	**15**	**10**	**67%**	
6. By 2013, to strengthen capacity in programme management in order to achieve malaria programmatic objectives at all levels of the health care system	6.1 Capacity strengthening for planning, partnerships and coordination at national malaria control program	5	5	100%	
	6.2 Strengthen malaria program management at the district and provincial levels	1	0	0%	No funding for the training of PMCCs and DMCCs as well as funding to support operational activities.

NMS OBJECTIVES	NMS STRATEGIES	TECHNICAL PERFORMANCE			REMARKS
		Number of activities planed	Number of activities implemented	Technical performance (% of planned activities implemented)	
6. By 2013, to strengthen capacity in programme management in order to achieve malaria programmatic objectives at all levels of the health care system	6.3 Strengthen infrastructure at the national, provincial and district levels	2	0	0%	No funding for infrastructure at DOMC, no support for function of DMCC/PMCCs
	6.4 Strengthen activity and performance monitoring	4	3	75%	Two national and two out of eight planned provincial planning and review meetings were held due to funding constraints.
	6.5 Strengthen resource mobilization capacity to improve malaria control financing	2	0	0%	Recruitment process for planning officer delayed due to delayed due to disbursement delays, round table meetings facilitated by FKE/GBC did not take place
	6.6 Strengthen human resource capacities in malaria endemic area	2	1	50%	Malaria planning course not held as curriculum unfinished.
	6.7 Strengthen procurement and supply management systems for malaria drugs and commodities	2	1	50%	Funding support to sustain the LMIS ran out.
	OBJECTIVE-LEVEL PERFORMANCE	**18**	**10**	**56%**	
OVERALL PERFORMANCE		**89**	**61**	**69%**	