Assessment of Availability of Antimalarial Medicines in the Kenyan Public Sector during the Initial Period Following Policy Change: May 2007

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ACRONYMS

ACT	artemisinin-based combination therapy
AL	artemether-lumefantrine
CMS	Central Medical Store
DOMC	Division of Malaria Control
GFATM	Global Fund to Fight AIDS, Tuberculosis and Malaria
GoK	Government of Kenya
IPT	Intermittent Preventive Treatment for pregnant women
IV	Intravenous
KEMRI	Kenya Medical Research Institute
KEMSA	Kenya Medical Supplies Agency
MEDS	Missions for Essential Drugs and Supplies
MoH	Ministry of Health
MSH	Management Sciences for Health
RPM Plus	Rational Pharmaceutical Management Plus (Program)
USAID	U.S. Agency for International Development
WHO	World Health Organization

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Field Teams

Bondo	**Kwale**	**Greater Kisii**	**Makueni**
Kenneth Bukachi	Andrew Nyandigisi	Jackson Mwangi	Roselyne Thuo
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EXECUTIVE SUMMARY

As a leading cause of morbidity and mortality, malaria continues to pose an enormous health and economic burden in Kenya. Recognizing this fact, one of the key strategic interventions of the Kenya National Malaria Strategy is to provide early diagnosis and prompt treatment of malaria using effective antimalarial medicines. To achieve the national targets associated with this strategy, the Division of Malaria Control (DOMC) with donor and partner support has carefully adopted, planned, and implemented a policy change to incorporate the use of the artemisinin-based combination therapy (ACT), specifically artemether-lumefantrine (AL), as first-line treatment for uncomplicated malaria.

In March 2004, in preparation for Kenya's policy transition to ACTs, RPM Plus carried out a two-part assessment to identify bottlenecks in the Kenya Medical Supplies Agency (KEMSA) and Mission for Essential Drugs Supply (MEDS) distribution systems and to quantify the frequency and extent of antimalarial medicine stock-outs (Tetteh et al., 2004). The assessment provided evidence that the Government of Kenya (GoK) health system was facing key challenges that were bound to affect implementation of the new policy, such as inadequate funding to procure antimalarials, inadequate antimalarial quantities in the supply pipeline, lack of data on commodity needs, inaccurate stock record keeping and below 100 percent availability of antimalarial medicines at health facilities. In response to the findings, the DOMC and its stakeholders instituted interventions including procuring adequate ACTs and other antimalarials using Global Fund to Fight AIDS, Tuberculosis and Malaria (GFATM) grant funds; outsourcing transportation to increase the efficiency of distribution; training health facility staff in inventory management; and developing an information system to determine antimalarial medicine consumption and to project needs.

The primary objective of the 2007 study was to assess the availability of recommended antimalarial medicines—particularly AL—eight months after the new treatment policy launch in September 2006. In addition, this report summarizes the operational arrangements the DOMC and stakeholders instituted for the procurement, distribution, storage, inventory management, and consumption reporting of the medicines.

The results of this assessment indicate that many of the Ministry of Health (MoH) facilities have a high availability of AL and other antimalarial medicines; however, facilities within the mission sector system do not have good medicine availability. The assessment also found that distribution efforts in the mission sector were not successful in maintaining a continuous supply of antimalarial medicines during the assessment period. As for the integrity of inventory management practices, on average, mission facilities fared worse than their MoH counterparts, with only 11 percent concordance between stock on record and physical count compared with 35 percent for MoH health centers.

In comparison to the 2004 assessment, the 2007 availability of antimalarial medicines in the MoH facilities was similar, but the percentage of time out-of-stock was much lower in 2007 compared to 2004. Availability of antimalarial medicines in mission facilities in 2007, however, was not as high as in 2004, and the average percentage of time out-of-stock was also higher in 2007 than 2004. Again, in 2004, the average percentage of records corresponding with physical

count was 49 percent in the MoH and 60 percent in mission health facilities, which shows a steep decline in 2007 and an urgent need to improve record keeping and inventory management practices. Because AL is a high-value product being provided free of charge at MoH and mission facilities, good record keeping is essential to minimize pilferage and wastage of the life-saving medicines.

MEDS identified the main factors related to poor availability, high stock-outs, and poor inventory management of AL and other antimalarials in the mission sector as the lack of support for AL distribution as originally agreed with the MoH, as well as the fact that the Christian Health Association of Kenya's health worker training in case management is not reaching the majority of mission facilities.

MEDS needs to receive additional support for distributing government-funded AL to the mission sector in the next phase of the roll-out of the new antimalarial policy. In addition, a larger number of MoH and mission facilities should receive planned DOMC/partner training in case management and basic medicine management. Qualitative investigation has shown that to increase the availability of antimalarial medicines, and AL in particular, to 100 percent in MoH facilities, additional attention will have to be paid to diagnosing malaria accurately, building capacity for quantification at the health facility level, and improving KEMSA's delivery and transportation.

An immediate recommendation is to institute a distribution performance monitoring system. Such a system would ensure that any problems in KEMSA and MEDS distribution are flagged and resolved quickly. In addition, the Ministry of Health and its partners in pharmaceutical management need to analyze KEMSA's timeline for moving facilities to a "pull" distribution system, so they can determine the appropriate support needed to fast-track the process.

SECTION ONE: INTRODUCTION

Background

Malaria continues to pose an enormous health and economic burden in Kenya as a leading cause of morbidity and mortality. Recognizing this fact, the GoK, in consultation with local and international stakeholders developed the Kenya National Malaria Strategy in 2001 (DOMC 2001) and has since been working to ensure progress towards a reduction in malaria morbidity and mortality (MoH 2007). The goal of the national malaria strategy is to reduce the level of malaria infection and death by 30 percent by 2006, and to sustain this improved level of control to 2010. While challenges remain in malaria control, significant successes have already been achieved through implementing various malaria control interventions (MoH 2007).

One of the key strategic interventions of the malaria strategy is to provide early diagnosis and prompt treatment of malaria using effective antimalarial medicines. To achieve the national targets associated with this intervention, since 2004, the Ministry of Health's DOMC, with the support of donors and partners, has carefully adopted, planned, and implemented a policy change to incorporate the use of the ACT, artemether-lumefantrine, as first-line treatment for uncomplicated malaria. While the rollout of government-procured ACTs has been limited to public sector facilities before phasing into other levels of care, ensuring their uninterrupted supply requires a concerted effort from all key stakeholders for continued planning, coordination, resource mobilization, implementation, and monitoring, particularly in the area of distribution management.

In March 2004, in preparation for Kenya's transition to the use of ACTs, the Rational Pharmaceutical Management (RPM) Plus Program carried out a two-part assessment to identify bottlenecks in the KEMSA and MEDS distribution systems and to quantify the frequency and extent of antimalarial medicine stock-outs (Tetteh et al. 2004). The assessment provided evidence that the GoK health sector system was facing key challenges (e.g., inadequate funding for procurement of required quantities of antimalarials, inadequate antimalarial quantities in the supply pipeline, lack of data on commodity needs, inaccurate stock record keeping and below 100 percent availability of antimalarial medicines at health facility level) that were bound to affect implementation of the new policy. In response to the findings, interventions that the DOMC and its stakeholders instituted included the procuring adequate ACTs and other antimalarials using GFATM grant funds; out-sourcing transportation to increase distribution efficiency; training health facility staff in inventory management; and instituting an information system to determine antimalarial medicine consumption and to project needs.

Rationale for the Assessment

While the assessment's primary objective was to evaluate the availability of recommended antimalarial medicines (particularly AL) after the new treatment policy launch in September 2006, Section Two also summarizes the operational arrangements instituted by the DOMC and stakeholders for the procurement, distribution, storage, inventory management, and consumption reporting of the medicines.

SECTION TWO: EXISTING OPERATIONAL ARRANGEMENTS FOR PROCUREMENT, DISTRIBUTION, MANAGEMENT, TRACKING, AND RE-SUPPLY OF ARTEMETHER-LUMEFANTRINE

Antimalarial Treatment Policy

Table 1 summarizes Kenya's 2004 antimalarial treatment policy, which includes the use of artemether-lumefantrine for first-line treatment of malaria.

Table 1: Kenya's Current Malaria Treatment Policy

Condition	Recommendation	Dosage Form	Strength
Uncomplicated malaria (First-line treatment)	Artemether-lumefantrine	Tablet	20 mg artemether + 120mg lumefantrine
Uncomplicated malaria (Second-line treatment)	Quinine	Tablet	200mg 300mg
Severe and complicated malaria			
Pre-referral treatment	Artemether injection	Injection	Adult: 80 mg/ml Pediatric: 20 mg/ml
	Artesunate injection	Injection	60 mg/1 ml ampoule
	Artesunate rectal caps	Suppositories	100mg 400mg
Intravenous/ intramuscular phase	Quinine	Injection	300mg/1ml ampoule 600mg/2ml ampoule
Continuation phase	Quinine	Tablet	200mg 300mg
Prevention of malaria in pregnancy	Intermittent preventive treatment (IPT) using SP	Tablet	sulfadoxine 500mg + pyrimethamine 25mg
Treatment of uncomplicated malaria in pregnancy	Trimester 1: quinine Trimester 2 & 3: quinine or artemether-lumefantrine	Tablet Tablet Tablet	300mg 300mg 20 mg artemether + 120mg lumefantrine
Treatment of complicated malaria in pregnancy	The treatment of pregnant women with severe malaria shall be the same as the treatment of severe malaria in the general population.		

Source: DOMC 2006a

Procurement

Table 2 summarizes the determination of antimalarial medicine quantities, costs, and ensuing procurement arrangements.

Table 2: Summary of Procurement and Central Receipt Processes

Commodity	Agency Responsible	Process	Periodicity	Procurement Agent, Order and Receipt Process
Artemether-lumefantrine tablets	Division of Malaria Control, MoH	With support from technical partners, national level quantification is undertaken for the four different weight category packs using the most reliable method(s)	Annually, proceeding the procurement period. The current procurement period for AL is 12 months (July–June)	The current procurement agent, the World Health Organization (WHO), places the order through sole-sourcing and consigns commodity to KEMSA. Delivery by manufacturer is to Jomo Kenyatta International Airport. The GFATM consortium[1] is responsible for port clearing and forwarding to KEMSA central level warehouses.
Quinine tablets and injectables	Division of Pharmacy, MoH	MoH leads a workshop with all programs present. KEMSA is always present at the meeting. Programs determine their commodity needs, quantities, and costs.	Annually, preceding the procurement period. The current procurement period for quinine is 12 months (July–June)	KEMSA places order through a competitive bidding process and acts as consignee. Delivery by manufacturer is directly to KEMSA warehouses.

[1] Currently, all quantities of AL procured are funded through GFATM funds. At this time, it is not clear whether future funding sources of AL will use the same agencies to procure, clear, and receive the medicines.

Artemether injection Artesunate injection Artesunate rectal caps	Individual health facility administrations	Intra-facility quantification processes carried out	Facility dependent	Procurement is done by facility administration through their committees. Delivery is to facility by local manufacturers, wholesalers/ distributors
Sulfadoxine Pyrimethamine	Division of Malaria Control	MoH workshop described above determines quantities and costs of SP	Annually, proceeding the procurement period. The current procurement period for SP is 12 months (July–June)	KEMSA places order through a competitive bidding process and acts as consignee. Delivery by manufacturer is directly to KEMSA warehouses.

Source: DOMC 2006b

Using funds from the Round 4 GFATM malaria grant to Kenya, the DOMC placed two orders for the annual supply of artemether-lumefantrine for the July 2006–June 2007 period with Novartis Pharma AG[2] in early 2006. The WHO Kenya country office served as procurement agent.

The orders of AL were received in staggered deliveries, apportioned, and distributed to facilities in GoK and mission health sectors through KEMSA who had a mandate to distribute 70 percent of AL received to government health facilities; MEDS supplied faith-based health facilities with the remaining 30 percent. In addition, KEMSA distributed AL to other major players, such as government parastatals, universities, and community-access pilot programs run by the Sustainable Healthcare Foundation and the U.S. Agency for International Development's (USAID) Regional Economic Development Services Office.

Distribution

The determination of distribution quantities to 2,223 government health facilities was based on a *smart-push*[3] concept and allocations were made by the DOMC on the basis of malaria endemicity and level of health care. Mission facilities, which usually operate by determining what type and quantity of medicines they need and by subsequently placing their orders with MEDS (*pull system)*, were expected to order required quantities of AL when needed.

[2] At present, there is only a single source of artemether-lumefantrine pre-qualified by WHO, namely Coartem®, from Novartis Pharma AG.

[3] Hospitals in Kenya and rural health facilities in select provinces operate a pull system; however, due to the fact that AL was a new treatment without consumption data, DOMC and KEMSA determined the distribution quantities to the facilities.

KEMSA's incorporated the AL distribution into the agency's existing transport arrangements and delivery schedules, and as such, AL was distributed by KEMSA-contracted transporters who deliver essential medicines every other month to hospitals and quarterly to rural health facilities.

The distribution system design for essential medicines within both agencies is summarized in Box 1 as follows.

Box 1. Distribution System Design for Antimalarial Medicines

Degree of Centralization

Both KEMSA and MEDS operate under a typical central supply model where they procure and distribute medicines from a central level. Artemether-lumefantrine is received at the either the central medical stores (CMS) or MEDS and is delivered to or collected by the health facility.

Distribution Network

Although KEMSA previously operated a four-level CMS network (supplier—CMS—regional depot—district store—hospital/rural health facility), AL and other antimalarial medicines are now distributed directly to health facilities because of the short shelf life of ACTs.

MEDS typically operates a one-level CMS network with direct interaction with the client facility.

Combination of Push and Pull System

Following an initial push of AL to all health facilities within the KEMSA distribution network, some facilities currently place orders, while others passively receive pre-determined quantities. On the other hand, all facilities (hospitals, health centers, and dispensaries) order quantities from MEDS to suit their needs.

In general, all hospitals (provincial government, district, sub-district, mission), regardless of their province, are operating a pull system for AL and other antimalarial medicines. In addition, GoK rural health facilities in two provinces, Coast and North Eastern, operate a pull system following technical assistance from the Danish International Development Agency. Lower-level staff in these provinces have been capacitated and are competent in assessing needs and managing inventory and receive regular supervision and performance monitoring. All GoK rural health facilities in the remaining five provinces, Rift Valley, Western, Central, Eastern, and Nyanza, continue to receive kits with quantities predetermined by the DOMC.

Re-supply Interval

Currently, in line with the pull design, KEMSA's re-supply interval for AL and other antimalarials is every other month to GoK hospitals and quarterly to rural health facilities. The delivery/collection of antimalarial medicines within the mission network is variable.

Delivery versus Collection Systems

KEMSA assumes the responsibility of delivering all antimalarial medicines to designated health facilities. With MEDS operations, the majority of clients, which are faith-based organizations, nongovernmental organizations, and nonprofit institutions, are responsible for collecting their antimalarial medicine supplies, including AL.

Transport

KEMSA is currently managing an outsourced transport contract for distributing medicines and commodities including antimalarials. The outsourcing of transportation is believed to have improved the efficiency of distribution. MEDS has its fleet of trucks used to deliver commodities, if needed.

Inventory Management

MoH's Division of Pharmacy has a mandate to ensure capacity and tools for managing medicines at health facilities. At the health facility level, a paper-based system exists for managing inventory and includes tools such as bin cards, ledgers, S11 and S12 forms, and KEMSA order forms. A wide range of health workers including pharmacists, pharmaceutical technologists, store workers, nurses, public health officers, and clinical officers manage medicines and other malaria commodities.

Using USAID and GFATM round 2 funding, between December 2005 and May 2006, the DOMC built the capacity of 1,211 health facility staff to improve antimalarial record keeping. RPM Plus and KEMSA helped develop training material and facilitated workshops and evaluations (Tetteh et al. 2007).

Information Management

At the beginning of AL distribution, the DOMC put into place an interim national system for AL consumption tracking with RPM Plus technical and financial support. The system creates a clear paper trail for receipt, storage, and issue of AL by all government and mission health facilities. Daily activity registers were developed and printed for use at facility level and were distributed nationwide with the medicines. In addition, forms were developed and distributed, and staff dispensing AL at the facility level were instructed to record the use of the medicines. At the end of every month, facility staff summarize the AL dispensed and stocks remaining and reports the information to district-level pharmacy staff, who in turn forward aggregated monthly summaries to the DOMC by day 10 of the next month. At the DOMC, data would be entered into an Access database, analyzed, and reports forwarded to KEMSA.

The DOMC instituted the AL consumption tracking process as an interim system until the Division of Pharmacy institutes a tracking system for all medicines. The DOMC's intention was that the system would provide data to district pharmacists/pharmaceutical technologists to enable them to proactively monitor and react to stock levels and compare data with average consumption at health facilities within their districts. At the central level, the data would be used to advise KEMSA on resupply quantities throughout the year; monitor GFATM and other drug management efficiency indicators; and guide national-level quantification exercises.

SECTION THREE: METHODOLOGY

The methodology for this assessment was based on the Drug Availability Study within the *Pharmaceutical Management for Malaria Manual*, an indicator-based assessment tool developed by RPM Plus in collaboration with USAID (RPM Plus 2004). An indicator-based approach allows users to assess defined functions and activities within a pharmaceutical system through the use of a step-by-step approach to the collection and analysis of data (MSH 1995). The use of sample data forms and formulas for deriving the indicators are a key part of the approach. Based on the results, areas within the defined function that need specific action for improvement are identified and recommendations made.

Within this assessment, the following indicators were selected to measure the availability of antimalarial medicines for the treatment of malaria in MoH and mission facilities.

- Average percentage of a set of unexpired antimalarial medicines available in MoH and mission health facilities
- Average percentage of time out-of-stock for a set of antimalarial medicines available in MoH and mission health facilities
- Average percentage of stock record counts that correspond to physical counts for a set of antimalarial medicines available in MoH and mission health facilities
- Median health worker estimated monthly consumption of first-line antimalarial by pack size
- Median time (in days) between 1) start of AL distribution (July 1, 2006) and first delivery of AL to facility/service level; 2) first and second delivery of AL; and 3) second and third delivery of AL

Three data collection techniques were used for this assessment: document reviews, key informant interviews, and physical inventory checks.

Development of the Tracer List

The list of antimalarial medicines within the current malaria treatment policy, their formulations, and strengths was drawn up into a tracer list. The list, consisting of nine[4] antimalarial medicines that were likely to have been found within the government and mission health systems during the assessment, was provided by KEMSA and the DOMC and is shown in Box 2.

[4] The two dosages of quinine tablets and quinine injections counted as one tracer item each.

Box 2. Antimalarial Medicines Tracer List

Amodiaquine 50 mg/5ml syrup
Amodiaquine HCL 200 mg tablet
Artemether-lumefantrine (Coartem) 20 mg/120 mg tablet (6x1)
Artemether-lumefantrine (Coartem) 20 mg/120 mg tablet (6x2)
Artemether-lumefantrine (Coartem) 20 mg/120 mg tablet (6x3)
Artemether-lumefantrine (Coartem) 20 mg/120 mg tablet (6x4)
Quinine dihydrochloride BP injection 300 mg/1ml ampoule
Quinine dihydrochloride BP injection 600 mg/2ml ampoule
Quinine sulfate 200 mg tablet
Quinine sulfate 300 mg tablet
Sulfadoxine-pyrimethamine 500 mg/25 mg tablet

Preparation of Data Collection Tools

Data collection tools were adapted from RPM Plus's *Pharmaceutical Management for Malaria Manual* for this assessment. These tools included the Inventory Data Form (DAS-2) and Stock-Out Data Form (DAS-3) appropriate to the level of care. In addition, data collection tools to collect general information previously used for availability assessments were adapted after a process of scrutiny, pilot testing in the field, and revision. The set of data collection tools used at the various sites is listed below. Copies are available in Annex 2.

MoH hospitals

- General Questionnaire
- DAS-2C: Inventory Data Form
- DAS-3C: Stock-Out Data Form

MoH health centers

- General Questionnaire
- DAS-2B: Inventory Data Form
- DAS-3B: Stock-Out Data Form

MoH dispensaries

- General Questionnaire
- DAS-2A: Inventory Data Form
- DAS-3A: Stock-Out Data Form

Mission hospitals/health centers/dispensaries

- General Questionnaire

- DAS-2: Inventory Data Form
- DAS-3: Stock-Out Data Form

General questionnaires administered at the health facilities explored issues pertinent to implementation of the new antimalarial treatment policy, existing fees for malaria consultations, and treatments and/or prescriptions in adults and children. These questionnaires also explored procurement sources, receipt of AL and donations of antimalarials, as well as stock levels and expiry dates of antimalarials.

Inventory data tools investigated existing inventory control systems, availability of tracer list antimalarial medicines, unposted receipts and issues, physical counts, and expired stock.

Stock-out data tools investigated the number of days tracer list antimalarials were out-of-stock for each month. Data were collected for a seven-month retrospective period.

Table 3 below provides a summary of the assessment methodology.

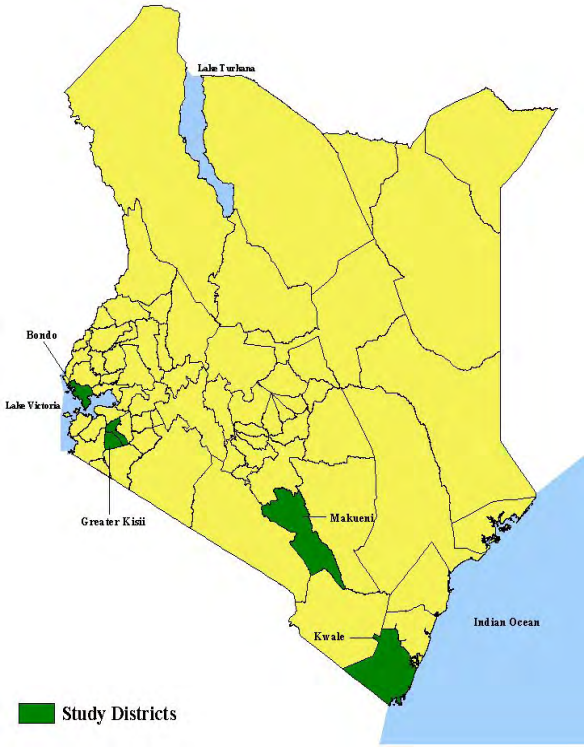
Table 3. Summary of Methodology

Methodology	Activities
MoH health facility key informant interviews	**Target persons**: Clinical/nursing officer in charge; pharmacist/dispensing technician Examined implementation of policies including availability of malaria treatment guidelines, prescription charges of antimalarials (what is supposed to happen versus what is actually happening) and existing charges.
MoH health facility quantitative assessment of medicine availability	**Target sites**: District/sub-district hospital/health centre/dispensary Examined inventory management of first-line and other essential antimalarial medicine stock on hand, quantity issued/dispensed, and losses and adjustments since October 2006. Examined stock cards/records and determined reasons for stock-outs, safety stock levels, and lead time for procurement.
Mission health facility key informant interviews and quantitative assessment of medicine availability	**Target sites/persons:** Mission hospital/health center/dispensary including interviews with clinical/nursing officer in charge; pharmacist/dispensing technician Examined implementation of policies including availability of malaria treatment guidelines, prescription fees for antimalarials (what is supposed to happen versus what is actually happening), and existing charges. Examined inventory management of first-line and other essential antimalarial medicine stock on hand, quantity issued/dispensed, and losses and adjustments since October 2006. Examined stock cards/records and determined reasons for stock-outs, safety stock levels, and lead time for procurement.

Sampling

As part of ongoing efforts to monitor progress towards targets set in the national malaria strategy (such as prompt access to antimalarial medicines among children under five), the DOMC and partners routinely conduct operational research within four sentinel districts of Kenya, which were targeted for this assessment. The districts are broadly representative of the country's demographic characteristics and the four main *Plasmodium falciparum* transmission zones. The districts are Greater Kisii (Kisii Central and Gucha districts) representing a highland area of seasonal transmission; Kwale district, representing a coastal area of moderate seasonal transmission; Bondo district, representing a lakeside area of intense perennial malaria transmission; and Makueni district, representing an semi-arid area of acute seasonal transmission (Figure 1).

Figure 1: Map of Kenya Showing the Four Study Districts



The KEMRI/Wellcome Trust Research Programme's Malaria Public Health and Epidemiology Group supplied a list of all health facilities in the four districts, which was used as the sampling frame. The list consists of all public and private health facilities in the districts, with all facilities geopositioned using hand-held global positioning systems. The list is updated regularly through a combination of publicly available information such as the Health Management Information System health facility lists and KEMSA's medicine distribution lists. In addition, regular telephone calls to the respective district health management teams and field visits by KEMRI researchers augment available data used to construct this composite data set.

A random sample of approximately 30 MoH and 3 mission facilities was selected for each district for the assessment. Facilities were stratified into hospitals, health centers, and dispensaries and proportionately selected to represent their distribution within each district (i.e., if dispensaries accounted for 60 percent of MoH facilities in a given district, then the final sample of 30 MoH facilities in that district was selected to contain this proportion of dispensaries). Annex 1 includes a list of the sample facilities.

Training Data Collectors

DOMC, RPM Plus, and KEMSA staff facilitated the training of data collectors for field work on May 14–15, 2007. The two-day training updated the data collectors on the status of AL procurement, distribution, and use, as well as the objectives of the availability assessment. The team reviewed the data collection tools and data collection techniques.

Four teams of data collectors received the list of sample facilities and their locations, including a back-up list to replace facilities that could not be assessed for whatever reason. Each team was headed by either a qualified public sector pharmacist or a KEMSA liaison officer[5] whose role was to check data quality and resolve queries and data inconsistencies at the end of each day. Each team would visit one district each. The list of teams, schedule of work, and sequence of field work was discussed and finalized.

On the second day of training, the data collection teams carried out a field test in Mbagathi District Hospital and Kangemi Health Centre, both in Nairobi. In addition to testing the general questionnaire, the field test exposed data collectors to the practicalities of administering the tools in a field setting and provided a good review of data collection techniques, such as record reviews and physical inventory checks. The field test also provided insight into what to expect during the actual assessment. Lessons learned from the field test were used to further modify the general questionnaire to be administered at health facilities.

Logistics and administrative matters were addressed before the teams traveled to the study districts.

Data Collection, Collation, and Management

The assessment was conducted simultaneously in each district from May 16–31, 2007. Data collection covered the period between October 2006 and April 2007. The teams assessed the storage and dispensing areas at each facility.

Two independent clerks entered data collected into a custom-made Microsoft Access 2003 data entry system and verified them into a final repository. Data were analyzed using a combination of Microsoft Excel 2003 (Microsoft Inc, Redmond, USA), SPSS for Windows version 13 (SPSS Inc, Chicago, USA) and STATA version 9.0 (STATA Corporation, College Station, TX, USA).

[5] The liaison officers act as an interface between the facilities and KEMSA. They ensure that facilities receive adequate amounts of commodities in a timely manner; they handle complaints in liaison with District Health Management Teams, district pharmacists, and the provincial medical office. They are trained in inventory, storage, and commodity management.

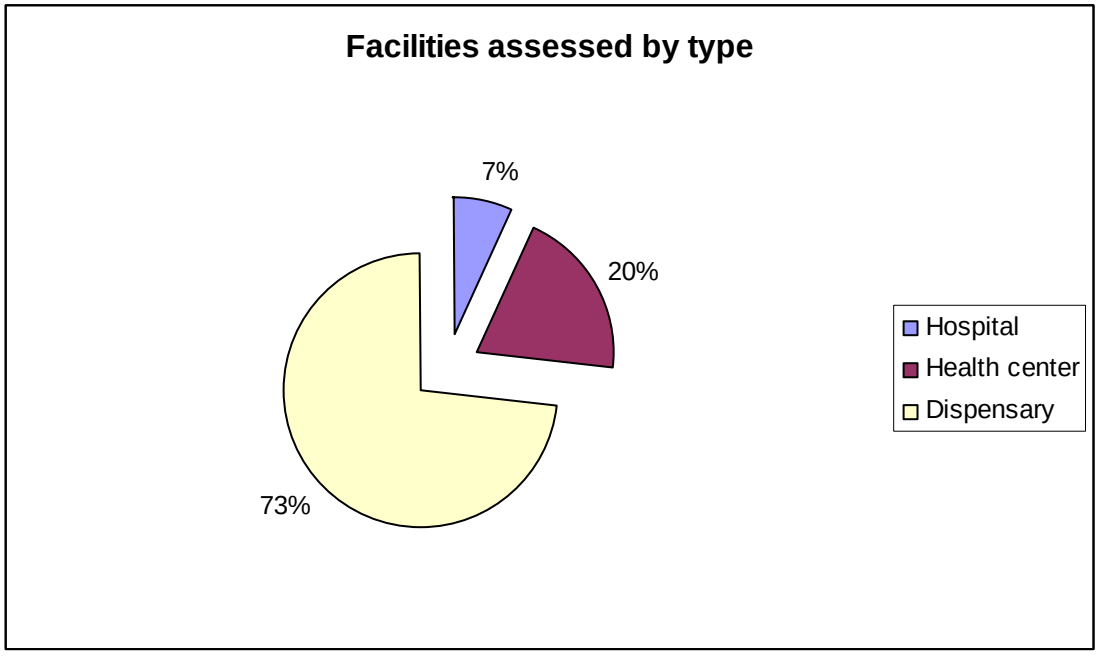
SECTION FOUR: FINDINGS, INTERPRETATION, AND DISCUSSION

General Findings

Out of an original list of 131 target facilities, data collectors successfully located and assessed 105 for a coverage rate of 81 percent. Data teams made replacements[6] for facilities that could not be reached, and 126 facilities (117 MoH and 9 mission facilities) were assessed and included in data analysis**.**

Figure 2 below shows the breakdown of MoH health facilities.

Figure 2. MoH Facilities Assessed by Type



The proportional breakdown of health facilities assessed (hospitals versus rural health facilities, which comprise health centers and dispensaries) was chosen in line with the overall proportion break down of health facilities in the sentinel sites to allow the findings to be generalized. Over the past few years, there has been a proportional increase of rural health facilities in comparison to hospitals. In 2004, the reported number of health facilities nationwide was 155 hospitals and 1,867 rural health facilities (Tetteh et al. 2004). In 2006, first-line antimalarials were distributed to 144 MoH hospitals, 2,046 MoH rural health facilities, 67 mission hospitals, and 869 mission rural health facilities (DOMC 2006b)[7]. This represents a proportional breakdown of 7.3 percent hospitals, 20.0 percent health centers, and 72.7 percent dispensaries, in line with the sample breakdown in Figure 2 above.

[6] Reasons for facility replacement from the back up list included: nonfunctional facilities; inability to trace some of the facilities due to inadequate information; inability to reach facilities due to heavy rains in some parts of the country; duplicate facility names pointing to inadequacies in the original database; and newly opened but nonoperational facilities.

[7] At the time of the assessment, there was a plan to increase the number of facilities within the KEMSA list of MoH customer facilities by 1,000.

Indicator 1: Average percentage of unexpired antimalarial medicines available in MoH and mission health facilities

Description and Use of the Indicator

This indicator measures the efficiency of the procurement and distribution system. The assessment defined a listed antimalarial medicine as available if even one unit of unexpired product was in stock. Because expired medicines are inappropriate for use, they were not counted as available stock. Theoretically, 100 percent of the antimalarial medicines investigated through this assessment should have been unexpired and available at the different health facilities. It is important to note, however, that this indicator provides only a snapshot of the availability of recommended antimalarial medicines at the time of the study. The desired change over time of this indicator is an increase.

Methodology

To determine the percentage availability of the listed antimalarial medicines, existing inventory control systems—including manual ledgers and tally/bin/stock record cards—were examined.[8] Where none of the above-mentioned inventory control systems existed, monthly returns, vouchers, and drug requisition forms were examined.

Results and Discussion

Average Percentage Availability

Table 4 shows the availability of all antimalarials assessed in each facility type. The availability data in this table are recorded as an average percentage, calculated by dividing the number of unexpired product found in stock by the total number of products for which availability was assessed, and multiplying by 100.

Table 4: Average Percentage Availability of a Set of Unexpired Antimalarial Medicines in Four Districts

Facility Type	Greater Kisii	Kwale	Bondo	Makueni	Total
MoH Hospital (N=8)	90.9	81.4	100.0	72.2	86.1
MoH Health Center (N=24)	84.8	67.4	84.4	64.4	74.9
MoH Dispensary (N=85)	70.1	83.7	88.2	73.3	78.8
Mission Facility (N=9)	66.7	72.2	83.8	22.8	57.1
Total (N=126)	74.3	81.4	88.1	66.3	76.9

Table 4's aggregated data shows that of the routinely stocked antimalarial medicines, availability on the day of the assessment was better in MoH facilities than in the mission sector. The finding in

[8] None of the sites had operational computerized inventory control systems during the assessment.

mission facilities is surprising in comparison to findings in a similar survey conducted three years prior (Tetteh et al. 2004), where mission facilities had an average of 93.8 percent of all antimalarial medicines required to be in stock.

In the survey of all facilities, where nine antimalarial medicines were normally stocked, the highest average percent availability of medicines across all facility types was found in Bondo and the lowest was found in Makueni.

Table 5 below shows the percentage of facilities within each facility type that had each antimalarial medicine available on the day of the assessment. In addition, the table shows a comparison of push versus pull facility types.

Table 5: Percentage of Facilities with Recommended Antimalarial Medicines Available on Assessment Day

Tracer Medicine	MoH Hospital (N=8)	MoH Health Center (N=24)	MoH Dispensary (N=85)	Mission Facility (N=9)	Push Facilities* (N=84)	Pull Facilities** (N=42)
AL 6x1	100.0	66.7	80.0	77.8	75.0	85.7
AL 6x2	87.5	70.8	80.0	77.8	71.4	92.9
AL 6x3	87.5	95.8	91.8	66.7	89.3	95.2
AL 6x4	100.0	83.3	76.5	88.9	84.5	69.0
Sulfadoxine-pyrimethamine 500mg/25mg tablets	100.0	100.0	97.6	88.9	98.8	95.2
Amodiaquine 200mg tablets	100.0	95.8	90.6	77.8	90.5	92.9
Amodiaquine suspension 50mg/5ml	75.0	100.0	90.6	88.9	95.2	83.3
Quinine sulfate 200mg tablets	62.5	91.7	90.6	77.8	91.7	81.0
Quinine sulfate 300mg tablets	87.5	29.2	30.6	11.1	35.7	26.2
Any quinine tablet	100	95.8	92.9	77.8	94.0	90.5
Quinine injection 300mg 1ml ampoule	25.0	0.0	9.4	0.0	4.8	14.3
Quinine injection 600mg 2ml ampoule	87.5	75.0	81.2	44.4	75.0	83.3
Any quinine injectable	100	75	87.1	44.4	77.6	90.5

* All health centers and dispensaries in Greater Kisii, Bondo, and Makueni
**All facilities in Kwale, plus all hospitals and mission facilities in the other districts

Availability of Artemether-Lumefantrine (Coartem)

Typically, different strengths of the same formulation of a medicine would be treated as a single product, and having one strength of the formulation would suffice; however, in this assessment of AL availability it was important to determine the availability of the four different dose categories of Coartem, because the dose-specific blister packaging is intended to make it easier for the patient to use and therefore foster adherence.

The availability of the recommended AL formulation irrespective of the dose category was good in surveyed facilities, with average of 93.8 percent of surveyed hospitals; 79.2 percent of surveyed MoH health centers; 82.1 percent of surveyed MoH dispensaries; and 77.8 percent of surveyed mission facilities having AL in stock.

Whereas the findings show that all hospitals demonstrated good availability of the 6x1 treatment, the percentage of rural and mission health facilities with the 6x1 treatment was lower. 6x1 treatments are typically used for uncomplicated malaria in children under three years, who according to a recent survey,[9] make up approximately 36.1 percent of total attendances for malaria in outpatient departments (Table 6). Availability of the 6x2 treatments showed the same trend. Therefore, there is a need to improve the availability of 6x1 and 6x2 dose categories in rural health facilities and mission sector facilities to ensure that there is stock available to treat the crucial under-five population. Mission facilities showed a low availability of 6x3 treatments, and the results show a decreasing trend of availability for 6x4 treatments from hospitals to dispensaries located in the periphery where the burden of malaria is greatest.

Table 6: Dosage of AL by Age Group and Outpatient Proportion

Dosage	Age Group	Percent of Outpatient Cases
6x1	<3 years	36.1
6x2	3–8 years	17.2
6x3	9–13 years	7.5
6x4	>14 years	39.2

An analysis of availability of AL in push versus pull facilities shows a general trend of AL being more available on the day of the assessment in facilities that pull AL than in those that receive predetermined quantities of AL. Due to both the ability of pull facilities to determine the type and quantity of medicines needed and to place orders based on estimates, and the underuse of diagnostic services in malaria management, low availability of AL (6x4) is likely due to overdiagnosis of malaria in adults and overprescription of AL.

Availability of Sulfadoxine-Pyrimethamine

While in the past, anecdotal evidence suggested that sulfadoxine-pyrimethamine was not widely available for IPT use in pregnancy, Table 5 shows that all facility types had high availability of sulfadoxine-pyrimethamine on the day of the survey: 100 percent of MoH hospitals, 97.6 percent of health centers, and 88.9 percent of mission facilities.

Availability of Amodiaquine

The survey showed that over 90 percent of all MoH health facilities and 77.8 percent of mission facilities stocked amodiaquine tablets. In addition, over 75 percent of MoH facilities and 88.9

[9] Personal communication with Professor Robert Snow, Head of the Malaria Public Health & Epidemiology Group, Centre for Geographic Medicine, KEMRI-University of Oxford-Wellcome Trust Collaborative Programme

percent of mission facilities stocked amodiaquine suspension. The high availability of amodiaquine in health facilities is worrisome, because its availability could jeopardize the use of AL as the recommended first-line treatment for uncomplicated malaria. Since the availability of AL is high, also, the MoH's implementation of the phase-out of artemisinin monotherapies and suboptimal therapies should ensure the enforced withdrawal of amodiaquine from all health facilities.

Availability of Quinine

In the case of quinine tablets, although availability was determined for the 200 mg and 300 mg sulfate tablet doses, during analysis these different tablet strengths were treated as variations of a single item—quinine tablets. Findings show a trend of decreasing availability of quinine tablets within MoH hospitals, MoH health centers, and MoH dispensaries. Availability of quinine tablets was low across mission facilities surveyed.

In the case of quinine injectables, again, although availability was determined for 300mg/1ml presentation and 600mg/2ml presentation, during analysis these different vials were treated as variations of a single item—quinine injectables. Findings show very low availability in mission health facilities (less than 45 percent of facilities surveyed had quinine injectables available).

Indicator 2: Average Percentage Time Out-of-Stock for Antimalarial Medicines in MoH and Mission Health Facilities

Description and Use of the Indicator

A corresponding indicator of availability is a measure of stock-outs during a given period. Used in tandem with Indicator 1 described above, this stock-out indicator measures the stock situation over time. The percentage of time out-of-stock for the antimalarial medicines indicates the procurement and distribution system's ability to maintain a constant supply of medicines and commodities. As mentioned, successful malaria treatment depends on the medicines being available at the service delivery points. The ideal target for this indicator is 0 percent, or no stock-outs, and the desired change is a decrease from baseline.

Methodology

The information for this indicator was gathered from tally/bin/stock cards or manual ledgers in some instances. Time out-of-stock was defined as the number of days that a listed antimalarial was not present in the assessed health facility over the seven months between October 1, 2006 and April 30, 2007. To be considered a stock-out, none of an unexpired medicine was in stock.

Results and Discussion

Average Percentage of Time Out-of-Stock

Table 7 below shows the average percentage of time out-of-stock for the recommended set of antimalarial medicines between October 2006 and April 2007 in health facilities in four sentinel

districts in Kenya. The results were calculated by dividing the total number of days out-of-stock by 365, multiplying by the total number of medicines stocked, and multiplying by 100.

Table 7: Average Percentage Time Out-of-Stock for a Full Set of Recommended Antimalarial Medicines in Four Districts

Facility Type	Greater Kisii	Kwale	Bondo	Makueni	Total
MoH Hospital	4.4	0.4	1.0	0.7	**1.6**
MoH Health Center	11.5	4.7	9.9	10.9	**5.1**
MoH Dispensary	5.4	1.8	3.5	11.2	**10.1**
Mission facility	61.4	0	3.4	10.9	**18.9**
Total	**10.0**	**1.8**	**4.5**	**10.4**	**6.8**

Table 7 shows that stock-outs were generally minimal among the antimalarial medicines investigated, especially in MoH hospitals. Average time out-of-stock was highest for the mission facilities (18.9 percent), although the average is skewed by Greater Kisii, which was out-of-stock over 60 percent of the time on average. This will need to be investigated further.

These figures indicate that the Kenyan population accessing health care in the public and mission sectors has relatively ready access to antimalarial medicines.

Table 8 shows the average number of days out-of-stock by facility type for each antimalarial medicine during the review period.

Table 8: Average Number of Days Out-of-Stock by Facility Type for each Antimalarial Medicine (October 2006–April 2007)

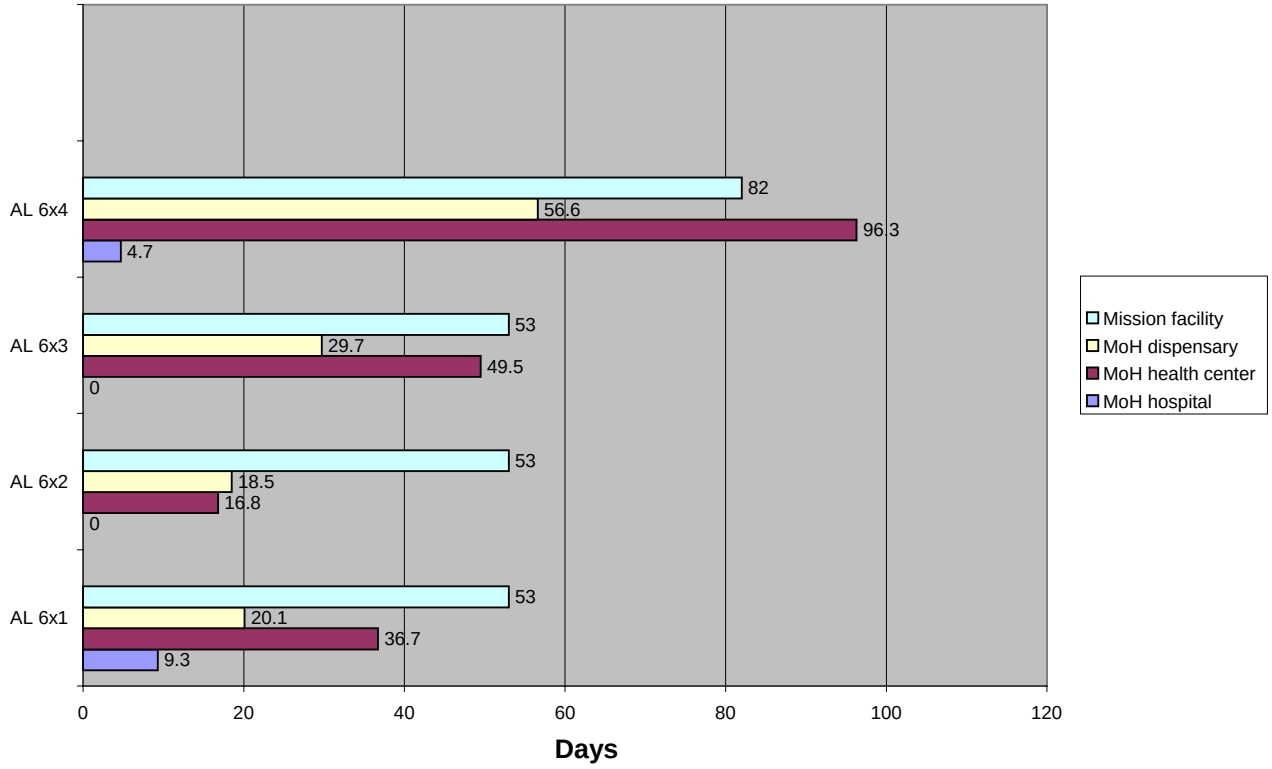
Tracer Medicine	MoH Hospital (N=8)	MoH Health Center (N=24)	MoH Dispensary (N=85)	Mission Facility (N=9)	Push Facilities* (N=84)	Pull Facilities** (N=42)
AL 6x1	9.3	36.7	20.1	53.0	32.0	8.8
AL 6x2	0.0	16.8	18.5	53.0	29.1	0.6
AL 6x3	0.0	49.5	29.7	53.0	49.8	1.5
AL 6x4	4.7	96.3	56.6	82.0	86.3	16.1
Sulfadoxine-pyrimethamine 500mg/25mg tablets	5.5	31.6	27.5	84.8	37.5	15.1
Amodiaquine 200mg tablets	5.6	11.1	12.3	102.8	16.1	15.7
Amodiaquine suspension 50mg/5ml	5.8	10.1	6.8	42.4	10.0	7.9
Quinine sulfate 200mg tablets	18.8	62.0	28.2	53.0	41.8	26.2
Quinine sulfate 300mg tablets	13.3	105.7	28.5	106.0	57.2	16.1
Any quinine tablet	25.8	102.7	33.4	70.7	60.5	25.3
Quinine injection 300mg/1ml ampoule	7.8	121.1	25.0	70.7	48.5	18.9
Quinine injection 600mg/2ml ampoule	2.5	45.8	22.5	53.5	38.0	9.2
Any quinine injectable	7.4	79.3	25.7	47.3	47.3	14.2

* All health centers and dispensaries in Greater Kisii, Bondo, and Makueni
**All facilities in Kwale, plus all hospitals and mission facilities in the other districts

Days Out-of-Stock of Artemether-Lumefantrine (Coartem)

AL is the recommended first-line antimalarial medicine for treatment of uncomplicated cases of malarial reporting to public health facilities and ideally should never be out-of-stock. However, Figure 3 shows the average time out-of-stock of all AL dose categories is more than 50 days in mission facilities.

Figure 3: Average Days Out-of-Stock for AL Dose Categories in 126 Health Facilities

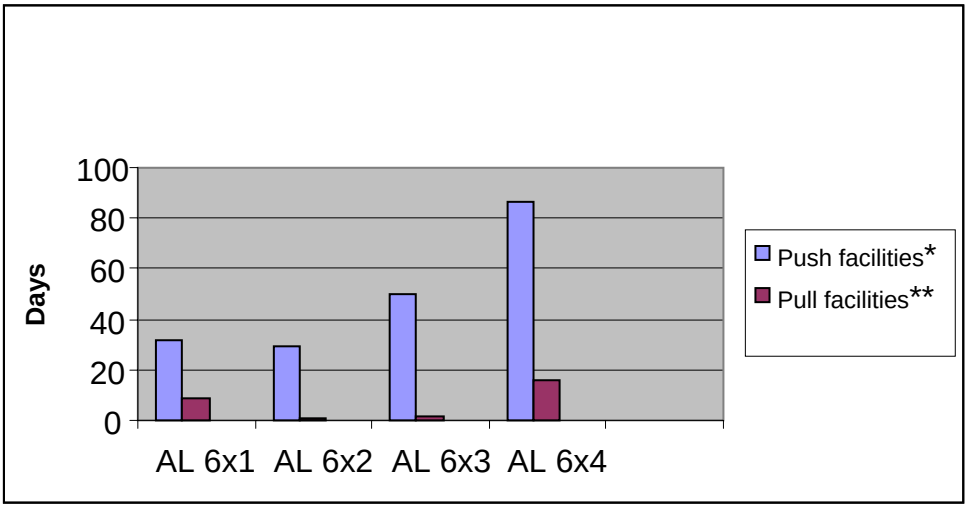


Within MoH facilities overall, the 6x4 dose for over age 14 is the most stocked-out AL treatment. This is consistent with observations from a recent survey in Kenya conducted by the KEMRI/Wellcome Trust, which shows that patients in this category are typically overdiagnosed for malaria and treated unnecessarily (Zurovac et al. 2006). Since most rural health facilities are understaffed and not equipped with adequate laboratory services, the malaria diagnosis is based on clinical signs only, which leads to wasted malaria treatments.

Figure 3 also illustrates that hospitals are experiencing minimal or no AL stock-outs, which can be attributed to the fact that hospitals have qualified staff that know how to manage their medicine inventory. Health centers surveyed experienced more AL stock-out days than dispensaries.

Figure 4 shows that in comparison to facilities operating a pull system, facilities operating a push system tend to have excessive stock-outs of AL.

Figure 4: Average Days Out-of-Stock for AL in Push versus Pull Facilities



MEDS already operates a pull system for all its facilities, and KEMSA is currently in the process of transitioning the entire country to a pull system. To implement the ideal pull system nationwide, certain conditions will have to be in place—

- Lower-level staff must be competent in assessing needs and managing inventory
- Sufficient supplies must be available at supply sources to meet all program needs
- Field staff must be regularly supervised and their performance monitored

Days Out-of-Stock of Sulfadoxine-Pyrimethamine

Table 7 shows that mission facilities averaged a high number of days (54.8) of sulfadoxine-pyrimethamine out-of-stock. The challenges associated with maintaining constant availability of sulfadoxine-pyrimethamine for implementing IPT will have to be further investigated in the mission sector.

The average number of days sulfadoxine-pyrimethamine was stocked-out in MoH hospitals was minimal, and in MoH rural health facilities, sulfadoxine-pyrimethamine was stocked-out for an average of 31.6 and 27.5 days in health centers and dispensaries respectively. Although 100 percent of the MoH health centers and 97.6 percent of dispensaries surveyed had sulfadoxine-pyrimethamine available on the day of the survey, the time out-of-stock findings showed that facilities did not maintain a constant supply, which needs to improve.

Days Out-of-Stock of Quinine

Again, Table 7 shows a high average number of days out-of-stock for quinine tablets and quinine injectables in mission facilities. The capacity within mission facilities to manage medicines and treat malaria in accordance with the malaria treatment guidelines needs to be investigated and improved.

Although 95.8 percent of the MoH health centers and 92.9 percent of dispensaries had quinine tablets available on the day of the assessment, MoH rural health facilities had high stock-out rates of quinine tablets over time, revealing that the constant supply of these medicines is in question. Data also indicate that health centers and dispensaries are not maintaining a constant supply of quinine injectables.

Indicator 3: Average percentage of stock records that correspond with physical counts for the set of antimalarial medicines in MoH and mission health facilities

Description and Use of the Indicator

The average percentage of stock records that correspond with physical counts is a measure of the quality of the stock record-keeping system. This indicator helps reveal inventory management problems and may point to the need to investigate problems such as wastage (expiry, pilferage, or leakage) and poor record keeping, all of which contribute to poor service delivery and financial losses. The indicator calculates the average percentage of antimalarial medicine inventory records that corresponded exactly with a physical stock count for the same set of medicines. Ideally, this percentage would be 100, indicating perfect record keeping.

Methodology

Data collectors reviewed current stock records for each listed medicine. Where stock records and physical counts did not correspond, data collectors reviewed recent issues or receipts that had not been posted and adjusted the stock records.

Results and Discussion

After adjusting for issue and receipt tickets not yet recorded in health facilities in the four districts surveyed, Table 9 shows the percentage of antimalarial medicines stock record counts that corresponded with physical counts by facility type.

Table 9: Average Percentage of Stock Record Counts Corresponding with Physical Counts for the Antimalarial Medicines in Four Districts

Facility Type	Greater Kisii	Kwale	Bondo	Makueni	Total
MoH Hospital	5	19	17	36	**19**
MoH Health Center	12	60	26	49	**35**
MoH Dispensary	10	34	9	40	**24**
Mission facility	0	6	0	44	**11**
Total	**9**	**33**	**16**	**39**	**25**

Although 121 (over 96 percent) facilities had some form of an inventory control system such as tally/bin/stock record cards, AL registers, manual ledgers, or other improvised systems, data collectors observed that the majority of these records were not updated regularly. The field teams found very little concordance between stock as shown on records and their physical counts, with the majority of records showing more stock than actually existed.

On average, mission facilities fared worse than their MoH counterparts, with only 11 percent concordance between stock on record and physical count. MoH health centers showed better record-keeping practices with 35 percent concordance between stock on record and physical counts for the tracer antimalarial medicines. These figures are down sharply from the 2004 assessment, which showed the average percentage of records corresponding with physical count as 49 percent in the MoH facilities and 60 percent in mission health facilities.

Indicator 4: Median health worker-estimated monthly consumption of first-line antimalarial by pack size

Description and Use of the Indicator

This indicator was developed to capture consumption data for the first-line antimalarial treatment, AL. The indicator was designed to help determine problems related to the availability and use of AL and reveal availability and prescribing and dispensing problems that may point to the need for further investigation. The indicator relies on health worker estimations of monthly consumption, not based on records. Ideally, to manage stock correctly within the dispensing area, every health worker dispensing AL should have a rough sense of the daily and monthly consumption of the product she or he is dispensing.

Methodology

Health workers were asked to estimate the monthly consumption of the different dose categories of artemether-lumefantrine.

Results and Discussion

As would be expected among the MoH facilities surveyed, hospital workers estimated the highest consumption of AL, followed by health centers, and dispensaries, with mission facilities estimated a slightly higher median consumption than dispensaries. Most facilities consumed more 6x1 treatments for children under three years and 6x4 treatments for patients over 14 years.

The consumption analysis did not account for the fact that facilities combine or cut up some treatment doses to make up for stocked-out dose categories.

Table 10: Median Estimated Monthly Consumption of Different Dose Categories of AL in MoH and Mission Facilities

Pack Size	MoH Hospitals	MoH Health Centers	MoH Dispensaries	Mission Facilities
6x1	242	80	66	60
6x2	139	80	41	60
6x3	60	50	30	40
6x4	206	150	68	80
TOTAL	**647**	**360**	**205**	**240**

Passive reporting of health indicators across Kenya is generally poor, with the health management information system usually experiencing reporting rates as low as 40 percent. Even when facilities report, they do so intermittently. Reporting rates for the recently introduced AL registers is below 20 percent. In the face of these challenges, it may become necessary to extrapolate median consumption for a given service level (e.g., MoH dispensaries) to entire service levels or geographical areas. The reliability of this indicator will be vastly improved if health workers are trained on quantification and pharmaceutical management. When health workers know the value of the data recording and reporting they provide, reporting rates will improve. The DOMC is working to improve the logistics management information system for antimalarial medicines, so that a clear paper trail for receipt, storage, and issue of AL by all government and mission health facilities is available to guide resupply and improve availability.

Indicator 5: Median time (in days) between 1) start of AL distribution and first delivery of AL to facility/service level; 2) first and second delivery of AL; 3) second and third delivery of AL

Description and Use of the Indicator

The median time in days between the start of AL distribution and first delivery of AL to facility level is a measure of the distribution system's performance. This indicator was only measured in MoH facilities because they receive all their AL deliveries through KEMSA's transportation system instead of picking it up themselves as the mission facilities do. Hospitals should receive supplies at least once every two months, and rural health facilities at least once per quarter; greater time lags indicate a system problem.

Methodology

The time in days was calculated from the time AL distribution started on July 1, 2007 to when the medicine was reportedly delivered to the health facilities in three waves (time between the first, second, and third deliveries). Because not all the facilities had proper records, the percentage of total facilities for which stock delivery dates were available decreased from 82.5 percent to 71.4 percent and to a final 57.9 percent between the time periods.

Results and Discussion

The box and whisker plots below show the results of the analysis for the MoH facilities for the three time periods (Figures 5a, 5b, 5c).

The median line is represented by the dark bar in the middle of the box; the two outer lines of the box represent the 25^{th} and 75^{th} percentiles, and the whiskers represent the 2.5^{th} and 97.5^{th} percentiles. Although outliers existed, overall, the data show that district and subdistrict hospitals in the sentinel districts received their AL supplies much earlier than the rural health facilities (health centers and dispensaries). The median days to receipt during the initial smart push of AL was 39 days for district and subdistrict hospitals and 73 and 84 days for health centers and dispensaries, respectively. The time interval between the first and second delivery almost doubled to 86 for district and subdistrict

hospitals, 140 for health centers, and 127 for dispensaries, then re-stabilized almost to the initial levels to 45 for district and subdistrict hospitals, and 70 each for health centers and dispensaries.

Figure 5a: Box and whisker plot of time (in days) between first AL distribution July 1, 2007 and first receipt date in MoH facilities

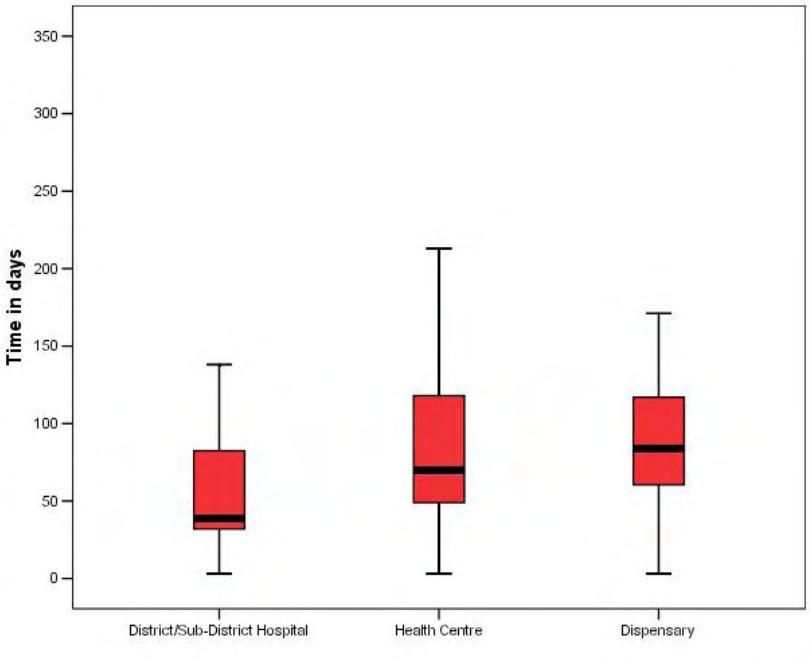


Figure 5b: Box and Whisker Plot of Time (in Days) between First and Second Delivery of AL to MoH Facilities

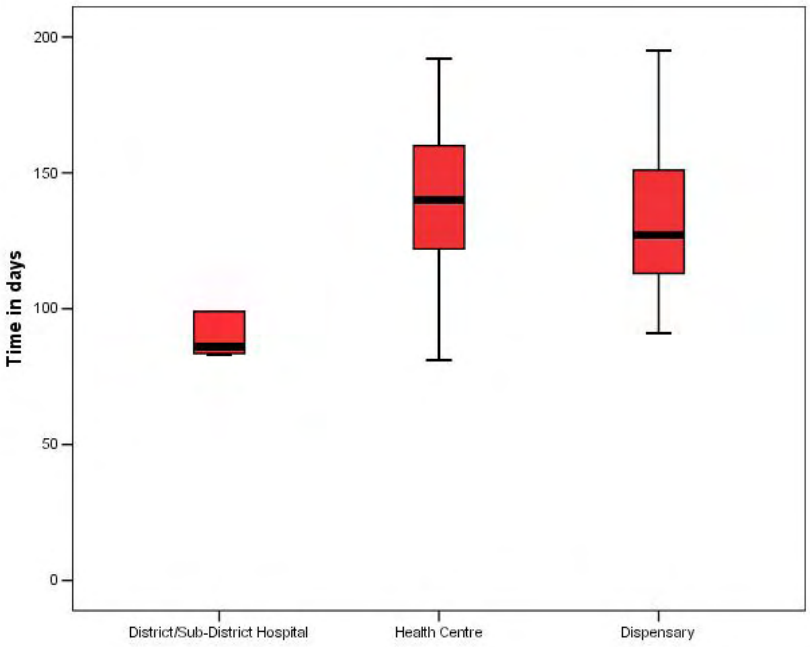
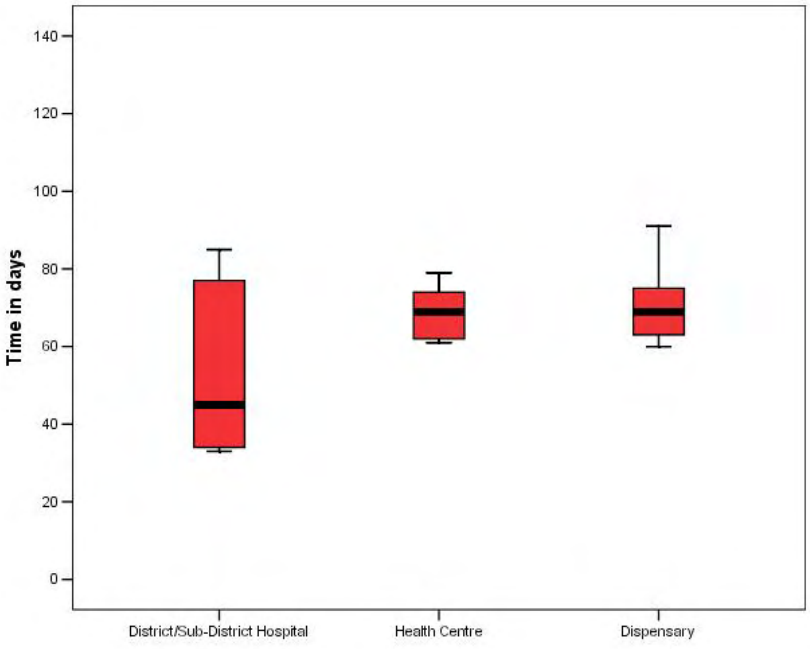


Figure 5c: Box and Whisker Plot of Time (in days) between Second and Third Delivery of AL to MoH Facilities



The findings point to initial success with distribution to district/subdistrict hospitals, which received AL approximately one month after AL distribution began. Also, rural health facilities received their AL supplies within two to three months, which is consistent with the three-month delivery cycles of the kit system. The prolonged period between the first and second deliveries may indicate a lack of

experience with the new medicines within the system and/or a period when KEMSA was facing transportation challenges.

Again, the institution of a distribution performance monitoring system would help ensure consistently efficient operations.

General Observations by Field Teams

In addition to the indicator findings above, data collection field teams made general observations regarding the availability of medicines—

- Some facilities had not been gazetted by the government and were therefore not legally supposed to receive medicines; such facilities were prone to stock-outs because they only received medicines during the first distribution cycle.
- Although facilities were supposed to receive AL supplies under the new policy roll-out plan, a sizeable number had not, which may have accounted for the low availability of AL in mission facilities.
- The majority of facilities surveyed did not have up-to-date inventory control systems.
- Record keeping at the rural health facility level was poor, making data collection for the field teams a daunting task.
- Poor stock control by facilities, especially between the stores and dispensing area, resulted in wide disparities between physical stock count and stock on record.
- Storage facilities were generally inadequate, with small and crowded storage rooms.
- Understaffing in rural health facilities, which were usually manned by one or two health workers, made data collection difficult. Activities at the facilities were interrupted or stopped altogether during data collection.
- Most facilities reported poor communication with the DOMC and did not have copies of reports they had submitted to the division.

SECTION SIX: LIMITATIONS OF AVAILABILITY SURVEY

The design of this survey has the following limitations—

- The methodology used was not intended assess the entire pharmaceutical system.
- The review period did not account for seasonal variations, and different results might have been attained if the seven-month review period was extended to a 12-month or even a 24-month period.
- The survey only determined the availability of medicines for treating and preventing malaria. A simultaneous review of prescribing and dispensing practices for malaria and the clinical and cost implications would have been beneficial.

SECTION SEVEN: CONCLUSIONS AND RECOMMENDATIONS

The value of a sentinel approach to data collection and analysis lies in the fact that data from the same districts and preferably the same facilities can be compared across time and space. The current assessment occurred at a time of policy transition, when a new treatment with which the DOMC and partners had little experience had been introduced into the public sector at no cost; therefore, experience is being built on best practices. This availability assessment, carried out in May 2007 by the DOMC with RPM Plus support and with USAID funding, produced a number of conclusions and recommendations.

Procurement and Distribution

One of the objectives of Kenya's national malaria strategy is for 80 percent of the country's health facilities to have continuous and adequate supply of antimalarial medicines, which requires both procurement and distribution systems to perform at a maximum level.

For the procurement period under review, special procurement arrangements for AL were put in place alongside the regular procurement arrangements of the other antimalarial medicines. The special procurement arrangements resulted in efficient procurement.

The assessment results indicate that distribution efforts successfully achieved high availability of AL and other antimalarial medicines in MoH facilities at the time of data collection, but low availability within the mission sector system. Distribution efforts, however, did not result in facilities maintaining a continuous supply of antimalarial medicines throughout the seven-month assessment period. In MoH health facilities and dispensaries, although the time out-of-stock for AL and other antimalarial medicines was minimal in hospitals, the comparatively high stock-out time for the same medicines in rural health facilities reveals an inconsistent supply of medicines. In addition, the average percentage of time out-of-stock for all antimalarial medicines was longer in the mission sector.

MEDS identified a lack of originally promised support from the Ministry of Health for AL distribution as the main barrier to good availability of AL and other antimalarial medicines in the mission facilities. In addition, MEDS officers felt that the Christian Health Association of Kenya's health worker training in case management was not reaching the majority of mission facilities. Because mission facilities operate a pull system, provider knowledge of appropriate prescribing as recommended by the national treatment guidelines is important to enable them properly determine the type and quantities of medicines needed. The next phase of the new antimalarial policy roll-out should address the mission sector more closely.

Within MoH facilities, qualitative investigation has shown that to increase the availability of antimalarial medicines—AL in particular—to 100 percent, additional attention will have to be paid to avoid (1) wastage from overdiagnosis, theft, and leakage; (2) poor quantification in pull facilities or underestimation of needs at the central level in push facilities; (3) delivery/transportation problems; and (4) inadequate training in inventory management.

In comparison to the 2004 assessment, the 2007 availability of antimalarial medicines in the MoH facilities was similar, but the percentage of time out-of-stock was much lower in 2007 compared to 2004. Availability of antimalarial medicines in mission facilities in 2007, however, was not as high as in 2004, and the average percentage of time out-of-stock was also higher in 2007 than 2004.

Figures 6a and 6b below illustrate these findings.

Figure 6a: Comparison of Antimalarial Medicine Availability in Health Facilities in 2004 and 2007

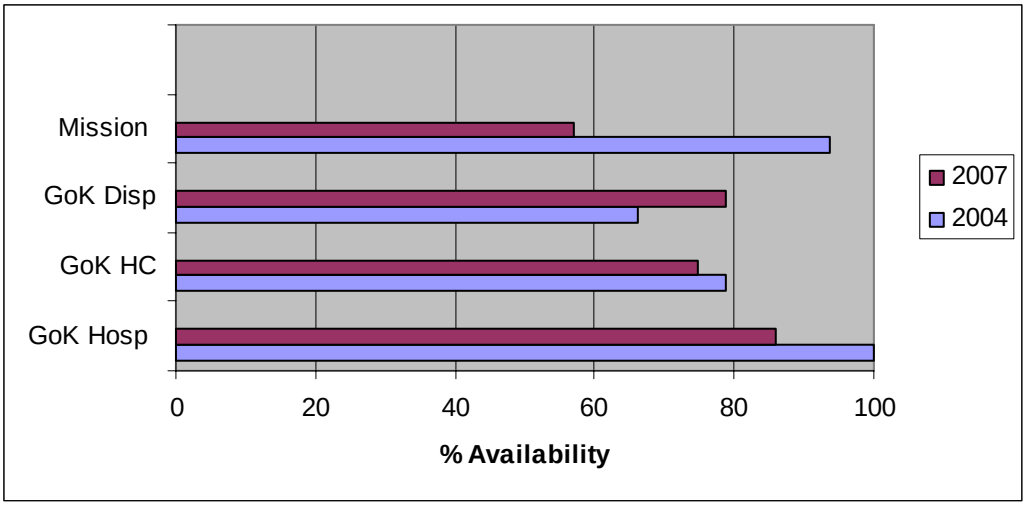
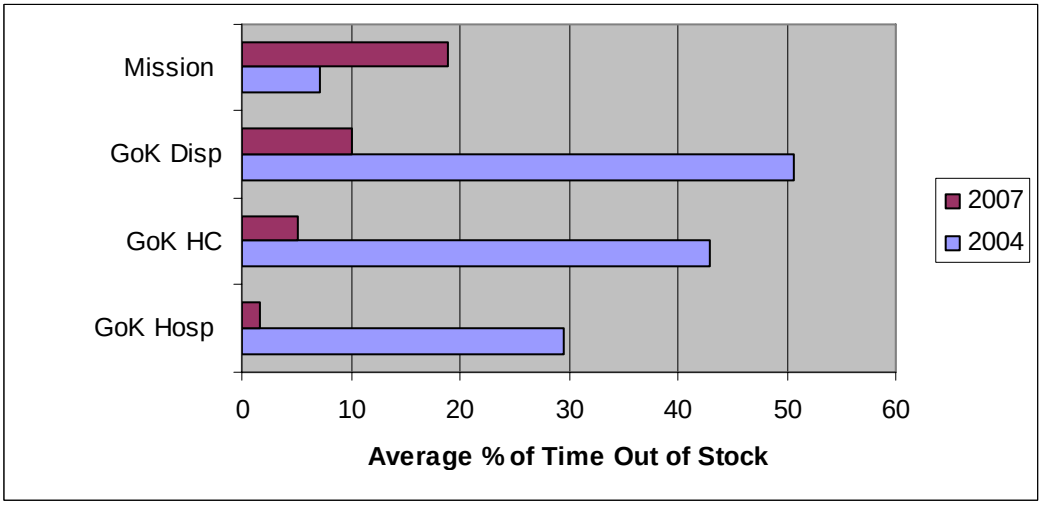


Figure 6b: Comparison of Average Time Out-of-Stock of Antimalarial Medicines in Health Facilities in 2004 and 2007



Inventory Management

On average, mission facilities fared worse than their MoH counterparts, with only 11 percent concordance between stock on record and physical count compared with 35 percent in MoH health

centers; however, the figures in both sectors had decreased since the 2004 assessment, where the average percentage of records corresponding with physical count was 60 percent in mission health facilities and 49 percent in MoH facilities. Clearly, improving record keeping and inventory management practices is urgently needed. AL is a high-value product being provided free of charge at MoH and mission facilities; therefore, good records minimize pilferage and wastage of the life-saving medicines.

Summary

The DOMC's planned nationwide roll-out of case management and basic pharmaceutical management training needs to be fast-tracked. In addition, the Ministry of Health and its partners in pharmaceutical management need to analyze KEMSA's timeline for transitioning facilities to a pull distribution system, so they can determine the appropriate support needed to speed up the process. Finally, a system of distribution performance monitoring needs to be instituted immediately to ensure that any problem within KEMSA or MEDS distribution is flagged and resolved quickly.

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ANNEX 1 – MoH AND MISSION FACILITIES ASSESSED

Bondo district				
Facility name	**Division**	**Location**	**Facility Type**	**Agency**
Anyuongi Dispensary	Bondo	South Sakwa	Dispensary	MoH
Bondo District Hospital	Bondo	Bondo Township	District/Subdistrict Hospital	MoH
Gobei Dispensary	Bondo	Bondo Township	Dispensary	MoH
Kapiyo Dispensary	Bondo	South West Sakwa	Dispensary	MoH
Maternal Child Health(MCH) Health Centre	Bondo	Bondo Township	Health center	MoH
Nyangunda Self Help Dispensary	Bondo	South Sakwa	Dispensary	MoH
Ouya Dispensary	Bondo	South Sakwa	Dispensary	MoH
Uyawi Dispensary	Bondo	Central Sakwa	Dispensary	MoH
Kunya Dispensary	Madiany	East Uyoma	Dispensary	MoH
Madiany Subdistrict Hospital	Madiany	East Uyoma	District/Subdistrict Hospital	MoH
Manyuanda Health Centre	Madiany	West Uyoma	Health center	MoH
Masala Dispensary	Madiany	Central Uyoma	Dispensary	MoH
Misori Dispensary	Madiany	West Uyoma	Dispensary	MoH
Naya Dispensary	Madiany	South Uyoma	Dispensary	MoH
Abidha Health Centre	Rarieda	East Asembo	Health center	MoH
Mahaya Dispensary	Rarieda	West Asembo	Dispensary	MoH
Ndori Dispensary	Rarieda	Central Asembo	Dispensary	MoH
Nyagoko Dispensary	Rarieda	South Asembo	Dispensary	MoH
Ongielo Dispensary	Rarieda	East Asembo	Dispensary	MoH
Saradidi Rural Health Training Centre	Rarieda	Central Asembo	Health center	MoH
Got Agulu Health Centre	Usigu	West Yimbo	Health center	MoH
Got Matar Dispensary	Usigu	North Yimbo	Dispensary	MoH
Mageta Dispensary	Usigu	Mageta Island	Dispensary	MoH
Ulungo Dispensary	Usigu	North Yimbo	Dispensary	MoH
Usigu Dispensary	Usigu	Central Yimbo	Dispensary	MoH
Kagwa SDA Health Centre	Madiany	West uyoma	Health center	Mission
St. Elizabeth Lwak Mission Hospital	Rarieda	Central asembo	District/Subdistrict Hospital	Mission

Greater Kisii district				
Facility name	**Division**	**Location**	**Facility Type**	
Nyamogonchoro Health Centre	Etago	South Mugirango Borabu	Dispensary	MoH
Suguta Dispensary	Etago	Getenga	Dispensary	MoH
Kenyenya Health Centre	Kenyenya	Majoge Masaba	Health center	MoH
Ekerubo Dispensary	Keumbu	Keumbu	Dispensary	MoH
Ibeno Health Centre	Keumbu	Ibeno	Health center	MoH
Keumbu Sub-district Hospital	Keumbu	Keumbu	District/Subdistrict Hospital	MoH
Kiogoro Sub-health Centre	Keumbu	Kiogoro	Health center	MoH
Taracha Dispensary	Keumbu	Keumbu	Dispensary	MoH
Entanda Dispensary	Marani	Ngenyi	Dispensary	MoH
Eramba Dispensary	Marani	Mwagichana	Dispensary	MoH
Gesure Dispensary	Marani	Mwamonari	Dispensary	MoH
Sieka Dispensary	Marani	Mwakibagendi	Dispensary	MoH
Gesusu Sub-district Hospital	Masaba	Nyaribari Masaba	District/Subdistrict Hospital	MoH
Ramasha Dispensary	Masaba	Nyaribari Ikorongo	Dispensary	MoH
Ranganga Dispensary	Mosocho	Etora	Dispensary	MoH
Nyacheki Health Centre	Nyacheki	Bassi Borabu	Health center	MoH
Egetonto Dispensary	Ogembo	Majoge Chache	Dispensary	MoH
Kenyerere Dispensary	Sameta	Mokwerero	Dispensary	MoH
Bokeire Dispensary	Suneka	Bomorenda	Dispensary	MoH
Iyabe Sub-health Centre	Suneka	Iyabe	Health center	MoH
Masongo Dispensary	Suneka	Bomorenda	Dispensary	MoH
Matongo Dispensary	Suneka	Bomariba	Dispensary	MoH
Motonto Dispensary	Suneka	Bomorenda	Dispensary	MoH
Nyamagundo Dispensary	Suneka	Bomariba	Dispensary	MoH
Riotanchi Health Centre	Suneka	Bomorenda	Health center	MoH
Oresi Dispensary	Mwamosioma	Mwamosioma	Dispensary	MoH
Iranda Dispensary	Mosocho	Nyako	Dispensary	MoH
Nyamemiso dispensary	Keumbu	Kiogoro	Dispensary	MoH
Nyanko Dispensary	Keumbu	Kegati	Dispensary	MoH
Nyansira Dispensary	Masaba	Nyaribari Central	Dispensary	MoH
Mosocho Health Centre	Mosocho	Bogeka	Health center	Mission
Our Lady of Lords Mission Hospital	Ogembo	Sengera	District/Subdistrict Hospital	Mission

Kwale district				
Facility name	**Division**	**Location**	**Facility Type**	
Kibandaongo Dispensary	Kinango	Gandini	Dispensary	MoH
Ndavaya Dispensary	Kinango	Ndavaya	Dispensary	MoH
Vigurungani Dispensary	Kinango	Vigurungani	Dispensary	MoH
Kibuyuni Dispensary	Kubo	Mangawani	Dispensary	MoH
Kizibe Dispensary	Kubo	Mkongani	Dispensary	MoH
Mwaluhamba Dispensary	Kubo	Mwaluphamba	Dispensary	MoH
Mwapala Dispensary	Kubo	Majimboni	Dispensary	MoH
Kwale Subdistrict Hospital	Matuga	Golini	District/Subdistrict Hospital	MoH
Magodzoni Dispensary	Matuga	Tiwi	Dispensary	MoH
Matuga Dispensary	Matuga	Waa	Dispensary	MoH
Vyongwani Dispensary	Matuga	Golini	Dispensary	MoH
Waa Dispensary	Matuga	Waa	Dispensary	MoH
Diani Dispensary	Msambweni	Diani	Dispensary	MoH
Kilimangodo Dispensary	Msambweni	Mwereni	Dispensary	MoH
Lunga Lunga Dispensary	Msambweni	Lunga lunga	Dispensary	MoH
Mafisini Dispensary	Msambweni	Mivumoni	Dispensary	MoH
Majimoto Dispensary	Msambweni	Dzombo	Dispensary	MoH
Majoreni Dispensary	Msambweni	Pongwe/Kidimu	Dispensary	MoH
Msambweni District Hospital	Msambweni	Msambweni	District/Subdistrict Hospital	MoH
Muhaka Dispensary	Msambweni	Kinondo	Dispensary	MoH
Vanga Health Centre	Msambweni	Vanga	Health center	MoH
Kafuduni Dispensary	Samburu	Mwatate	Dispensary	MoH
Mackinnon Road Dispensary	Samburu	Mackinnon Road	Dispensary	MoH
Makamini Dispensary	Samburu	Makamini	Dispensary	MoH
Mazeras Dispensary	Samburu	Kasemeni	Dispensary	MoH
Mwanda Dispensary	Samburu	Mwavumbo	Dispensary	MoH
Samburu Health Centre	Samburu	Samburu	Health center	MoH
Silaloni Dispensary	Samburu	Chengoni	Dispensary	MoH
Taru Health Centre	Samburu	Taru	Health center	MoH
Mtaa Dispensary	Kinango	Mtaa	Dispensary	MoH
Mkongani Dispensary	Kubo	Mkongani	Dispensary	MoH
Kikokeni Health Centre	Msambweni	Kikokeni	Health center	MoH
Catholic Dispensary Diani-Ukunda	Msambweni	Diani	Dispensary	Mission
Mivumoni Dispensary	Msambweni	Mivumoni	Dispensary	Mission
Makueni district				
Facility name	**Division**	**Location**	**Facility Type**	
Kivani Dispensary	Kaiti	Kee	Dispensary	MoH
Ukia Dispensary	Kaiti	Okia	Dispensary	MoH
Kalawa Health Centre	Kalawa	Kalawa	Health center	MoH

Sultan Hamud Health Centre	Kasikeu	Kiou	Health center	MoH
Kithuki Dispensary	Kathonzweni	Kithuki	Dispensary	MoH
Kitise Health Centre	Kathonzweni	Kitise	Health center	MoH
Kwakavisi Dispensary	Kathonzweni	Kathonzweni	Dispensary	MoH
Mwania Chandaria Dispensary	Kathonzweni	Kitise	Dispensary	MoH
Athi Kamuyuni Dispensary	Kibwezi	Masongaleni	Dispensary	MoH
Kanyungu Community Dispensary	Kibwezi	Kikumbulyu	Dispensary	MoH
Kithyululu Dispensary	Kibwezi	Masongaleni	Dispensary	MoH
Masongaleni Health Centre	Kibwezi	Masongaleni	Health center	MoH
Upete Dispensary	Kilome	Kitaingo	Dispensary	MoH
Kavata Nzou Dispensary	Kilungu	Kilungu	Dispensary	MoH
Kisau Health Centre	Kisau	Kisau	Health center	MoH
Tawa Rural Health Training Centre	Kisau	Kiteta	Health center	MoH
Kiboko Dispensary	Makindu	Kiboko	Dispensary	MoH
Makindu Subdistrict Hospital	Makindu	Makindu	District/Subdistrict Hospital	MoH
Yimwaa Dispensary	Makindu	Kiboko	Dispensary	MoH
Kavuthu Dispensary	Mbitini	Kavuthu	Dispensary	MoH
Mutyambua Subhealth Centre	Mbitini	Mutyambua	Health center	MoH
Mbooni Subdistrict Hospital	Mbooni	Mbooni	District/Subdistrict Hospital	MoH
Mtito Andei Health Centre	Mtito andei	Mtito Andei	Health center	MoH
Ngwata Subhealth Centre	Mtito andei	Ngwata	Health center	MoH
Nthongoni Dispensary	Mtito andei	Nthongoni	Dispensary	MoH
Masumba Dispensary	Nguu	Ithumba	Dispensary	MoH
Mweini Dispensary	Nguu	Mweini	Dispensary	MoH
Kako Dispensary	Wote	Kako	Dispensary	MoH
Mumbuni Dispensary	Wote	Wote	Dispensary	MoH
Tulimani Dispensary	Tulimani	Tulimani	Dispensary	MoH
Kathonzweni Misson Dispensary	Kathonzweni	Kathonzweni	Dispensary	Mission
Mukaa AIC Subhealth Centre	Kilome	Mukaa	Health center	Mission
Makueni Catholic Dispensary	Wote	Wote	Dispensary	Mission

ANNEX 2 – DATA COLLECTION TOOLS

General Questionnaire: Health Facilities
Hospitals/Health Centres/Dispensaries/Mission facilities (page 1 of 6)

Facility Code:	**Data Collector Code:**	**Facility Type:**	
Location:	**Date:**	**Currency Used:**	**One U.S. Dollar =**

1. Does the facility have a copy of the national malaria treatment guidelines?

   Yes No

   If yes, what year?_____

   Seen Yes No Where: _____

2. Does the facility have a copy of the Essential Medicines and Supplies Standard Order Form?

   Yes No

   Seen Yes No Where: _____

Data collected from: _____

_____

_____

General Questionnaire (page 2 of 6)

Facility Code:	**Data Collector Code:**

3. Does the health facility charge user fees?

   Yes No

   If yes, what are the general charges? Consultation for OPD _____

   Payment for Card _____

   Overall standard fee_____

4. What are the charges for return treatment for the same illness (malaria) within a month?

5. What are the charges for malaria laboratory tests (Kshs)?

   a. Blood slide _____

   b. Haemoglobin Test _____

General Questionnaire (page 3 of 6)

Facility Code:	**Data Collector Code:**

6. What do you do when you run out of antimalarial stock befor the next order or delivery date?

Artemether/lumefantrine 100mg/20mg tablet (6x1) _____
Artemether/lumefantrine 100mg/20mg tablet (6x2) _____
Artemether/lumefantrine 100mg/20mg tablet (6x3) _____
Artemether/lumefantrine 100mg/20mg tablet (6x4) _____
Sulphadoxine 500mg+ Pyrimethamine 25mg Tablets_____
Amodiaquine HCL 200mg Tablets _____
Amodiaquine 50mg/5ml Syrup _____
Quinine Sulphate 200mg Tablets _____
Quinine Sulphate 300mg Tablets _____
Quinine Dihydrochloride BP Injection 300mg/1ml _____
Quinine Dihydrochloride BP Injection 600mg/2ml _____

7. What is the estimated monthly consumption of artemether-lumefantrine?

(please record by blister)

Artemether/lumefantrine 100mg/20mg tablet (6x1) _____
Artemether/lumefantrine 100mg/20mg tablet (6x2) _____
Artemether/lumefantrine 100mg/20mg tablet (6x3) _____
Artemether/lumefantrine 100mg/20mg tablet (6x4) _____

8. Does the facility receive donated antimalarial drugs? ..

Drug	From whom	For what period

General Questionnaire (page 4 of 6)

Facility Code:	**Data Collector Code:**

9. Does the facility procure antimalarial drug from source outside of KEMSA/Regional Depots/MEDS?

Antimalarial	From where?	Quantity re-ordered/period	Extra comments
Artemether/lumefantrine 100mg/20mg tablet (6x1)			
Artemether/lumefantrine 100mg/20mg tablet (6x2)			
Artemether/lumefantrine 100mg/20mg tablet (6x3)			
Artemether/lumefantrine 100mg/20mg tablet (6x4)			
Sulphadoxine 500mg+ Pyrimethamine 25mg Tablets			
Amodiaquine HCL 200mg Tablets			
Amodiaquine 50mg/5ml Syrup			
Quinine Sulphate 200mg Tablets			
Quinine Sulphate 300mg Tablets			
Quinine Dihydrochloride BP Injection 300mg/1ml			
Quinine Dihydrochloride BP Injection 600mg/2ml			

10. Who decides what non-scheduled antimalarials are to be purchased?

General Questionnaire (page 5 of 6)

Facility Code:	**Data Collector Code:**

11. AL supply, availability, stock out and charges

a. **AL receipt dates** and **quantities** supplied

day month year

1. Date of **1st** receipt? ..... (__|__) (__|__) (__|__)

Quantity received during 1st receipt:

AL 6 tabs package (number of blisters) ..... (____)

AL 12 tabs package (number of blisters) ..... (____)

AL 18 tabs package (number of blisters) ..... (____)

AL 24 tabs package (number of blisters) ..... (____)

How did the facility **receive 1st supply** of AL?

Brought to the facility by KEMSA (Y/N) ..... (__)

Brought to the facility by district authorities (Y/N) ..... (__)

Collected by the facility staff at district headquarters (Y/N)..... (__)

Other (specify) (Y/N) ..... (_____)(__)

2. Date of **2nd** receipt? (day-month-year)..... (__|__) (__|__) (__|__)

Quantity received during 2nd receipt:

AL 6 tabs package (number of blisters) ..... (____)

AL 12 tabs package (number of blisters) ..... (____)

AL 18 tabs package (number of blisters) ..... (____)

AL 24 tabs package (number of blisters) ..... (____)

3. Date of **3rd** receipt? (day-month-year) ..... (__|__) (__|__) (__|__)

Quantity received during 3rd receipt:

AL 6 tabs package (number of blisters) ..... (____)

AL 12 tabs package (number of blisters) ..... (____)

AL 18 tabs package (number of blisters)..... (_____)
AL 24 tabs package (number of blisters)..... (_____)

General Questionnaire (page 6 of 6)

Facility Code:	**Data Collector Code:**

4. Date of 4th receipt? (day-month-year) .....(__|__) (__|__) (__|__)
Quantity received during 4th receipt:
AL 6 tabs package (number of blisters)..... (_____)
AL 12 tabs package (number of blisters)..... (_____)
AL 18 tabs package (number of blisters)..... (_____)
AL 24 tabs package (number of blisters)..... (_____)

b. AL **charges** at health facility

How much are patients > 5 years charged **for a course of** AL**? (KES)..... (__|__|__)**
How much are children < 5 years charged **for a course of** AL**? (KES) ..... (__|__|__)**

c. Is there a **separate AL dispensers book** at health facility? (Y/N).....(__)

If Yes,
Are AL dispensers book entries **up to date**? (Y/N).....(__)

d. Are bin cards available at the facility? (Y/N)…… (__)
If Yes,
Are bin card entries **up to date**? (Y/N).....(__)

12. <u>RDT supply, availability and stock out</u>

Has your facility received RDTs from the MOH/GOK/Donation?
Date of 1st receipt? (day-month-year)..... (__|__) (__|__) (__|__)
Date of 2nd receipt? (day-month-year)..... (__|__) (__|__) (__|__)

	In stock (Y/N)	**Quantity (number)**	**No of stock-out DAYS since 1st receipt**
RDT stock			

DAS-2A: Inventory Data Form: Dispensary
(page 1 of 2)

Facility Code:	**Data Collector Code:**	
Facility Type:	**Location:**	**Date:**

Existing inventory control systems:

Computerized
Manual Ledger
Tally / Bin / Stock Record Cards
Other (specify)

Data Collected from:

Computerized
Manual Ledger
Tally / Bin / Stock Record Cards
Other (specify)

Note:

- **Data collectors should not fill out the shaded rows or columns.**
- ALL blanks should be filled in on this data form.
- Enter N/Av if data for a particular item are not available from the records or from the health care workers.

DAS-2A: Inventory Data Form: Dispensary (page 2 of 2)

Product	Counting Unit	Record Count	Unposted Receipts	Unposted Issues	Adjusted Total	Physical Count	Expired Stock	Non-expired Stock Available
Col. 1	Col. 2	Col. 3	Col. 4	Col. 5	Col. 6	Col. 7	Col. 8	Col. 9
Artemether/lumefantrine 100mg/20mg tablet (6x1)	*Blister*							
Artemether/lumefantrine 100mg/20mg tablet (6x2)	*Blister*							
Artemether/lumefantrine 100mg/20mg tablet (6x3)	*Blister*							
Artemether/lumefantrine 100mg/20mg tablet (6x4)	*Blister*							
Sulphadoxine 500mg+ Pyrimethamine 25mg Tablets	*Tablet*							
Amodiaquine HCL 200mg Tablets	*Tablet*							
Amodiaquine 50mg/5ml Syrup	*Millilitre*							
Quinine Sulphate 200mg Tablets	*Tablet*							
Quinine Sulphate 300mg Tablets	*Tablet*							

Product	Counting Unit	Record Count	Unposted Receipts	Unposted Issues	Adjusted Total	Physical Count	Expired Stock	Non-expired Stock Available
Col. 1	Col. 2	Col. 3	Col. 4	Col. 5	Col. 6	Col. 7	Col. 8	Col. 9
Quinine Dihydrochloride BP Injection 300mg/1ml	*Ampoule(1 ml)*							
Quinine Dihydrochloride BP Injection 600mg/2ml	*Ampoule(2 ml)*							
Row 1: Total number of products where Col. 6 equals Col. 7:								
Row 2: (% of records corresponding with physical counts: number in Row 1 x / total number of products stocked in Col. 1: 100								
Row 3: % of antimalarial drugs available:								

DAS-2B: Inventory Data Form: Health Center
(page 1 of 2)

Facility Code:	**Data Collector Code:**	
Facility Type:	**Location:**	**Date:**

Existing inventory control systems:

Computerized
Manual Ledger
Tally / Bin / Stock Record Cards
Other (specify)

Data Collected from:

Computerized
Manual Ledger
Tally / Bin / Stock Record Cards
Other (specify)

Note:

- **Data collectors should not fill out the shaded rows or columns.**
- ALL blanks should be filled in on this data form.
- Enter N/Av if data for a particular item are not available from the records or from the health care workers.

DAS-2B: Inventory Data Form: Health Center ((page 2 of 2)

Product	Counting Unit	Record Count	Unposted Receipts	Unposted Issues	Adjusted Total	Physical Count	Expired Stock	Non-expired Stock Available
Col. 1	Col. 2	Col. 3	Col. 4	Col. 5	Col. 6	Col. 7	Col. 8	Col. 9
Artemether/lumefantrine 100mg/20mg tablet (6x1)	*Blister*							
Artemether/lumefantrine 100mg/20mg tablet (6x2)	*Blister*							
Artemether/lumefantrine 100mg/20mg tablet (6x3)	*Blister*							
Artemether/lumefantrine 100mg/20mg tablet (6x4)	*Blister*							
Sulphadoxine 500mg+ Pyrimethamine 25mg Tablets	*Tablet*							
Amodiaquine HCL 200mg Tablets	*Tablet*							
Amodiaquine 50mg/5ml Syrup	*Millilitre*							
Quinine Sulphate 200mg Tablets	*Tablet*							
Quinine Sulphate 300mg Tablets	*Tablet*							

Product	Counting Unit	Record Count	Unposted Receipts	Unposted Issues	Adjusted Total	Physical Count	Expired Stock	Non-expired Stock Available
Col. 1	Col. 2	Col. 3	Col. 4	Col. 5	Col. 6	Col. 7	Col. 8	Col. 9
Quinine Dihydrochloride BP Injection 300mg/1ml	*Ampoule(1 ml)*							
Quinine Dihydrochloride BP Injection 600mg/2ml	*Ampoule(2 ml)*							
Row 1: Total number of products where Col. 6 equals Col. 7:								
Row 2: (% of records corresponding with physical counts: number in Row 1 x / total number of products stocked in Col. 1: 100								
Row 3: % of antimalarial drugs available:								

DAS-2C: Inventory Data Form: PGH/District Hospital/Sub-District Hospital/Mission Hospital (page 1 of 2)

Facility Code:	**Data Collector Code:**	
Facility Type:	**Location:**	**Date:**

Existing inventory control systems:

Computerized
Manual Ledger
Tally / Bin / Stock Record Cards
Other (specify)

Data Collected from:

Computerized
Manual Ledger
Tally / Bin / Stock Record Cards
Other (specify)

Note:

- **Data collectors should not fill out the shaded rows or columns.**
- ALL blanks should be filled in on this data form.
- Enter N/Av if data for a particular item are not available from the records or from the health care workers.

DAS-2C Inventory Data Form: PGH/District Hospital/Sub-District Hospital/Mission Hospital (page 2 of 2)

Product	Counting Unit	Record Count	Unposted Receipts	Unposted Issues	Adjusted Total	Physical Count	Expired Stock	Non-expired Stock Available
Col. 1	Col. 2	Col. 3	Col. 4	Col. 5	Col. 6	Col. 7	Col. 8	Col. 9
Artemether/lumefantrine 100mg/20mg tablet (6x1)	*Blister*							
Artemether/lumefantrine 100mg/20mg tablet (6x2)	*Blister*							
Artemether/lumefantrine 100mg/20mg tablet (6x3)	*Blister*							
Artemether/lumefantrine 100mg/20mg tablet (6x4)	*Blister*							
Sulphadoxine 500mg+ Pyrimethamine 25mg Tablets	*Tablet*							
Amodiaquine HCL 200mg Tablets	*Tablet*							
Amodiaquine 50mg/5ml Syrup	*Millilitre*							
Quinine Sulphate 200mg Tablets	*Tablet*							
Quinine Sulphate 300mg Tablets	*Tablet*							

Product	Counting Unit	Record Count	Unposted Receipts	Unposted Issues	Adjusted Total	Physical Count	Expired Stock	Non-expired Stock Available
Col. 1	Col. 2	Col. 3	Col. 4	Col. 5	Col. 6	Col. 7	Col. 8	Col. 9
Quinine Dihydrochloride BP Injection 300mg/1ml	*Ampoule(1 ml)*							
Quinine Dihydrochloride BP Injection 600mg/2ml	*Ampoule(2 ml)*							
Row 1: Total number of products where Col. 6 equals Col. 7:								
Row 2: (% of records corresponding with physical counts: number in Row 1 x / total number of products stocked in Col. 1: 100								
Row 3: % of antimalarial drugs available:								

DAS-3A: Stock-Out Data Form: Dispensary
(page 1 of 1)

Facility Code:	**Data Collector Code:**	
Facility Type:	**Location:**	**Date:**
Record Type:		

For each product, write the number of days out-of-stock for each month.

Product						**Apr 07**	**Mar 07**	**Feb 07**	**Jan 07**	**Dec 06**	**Nov 06**	**Oct 06**	**Total Days Out-of-stock**
Artemether/lumefantrine 100mg/20mg tablet (6x1)													
Artemether/lumefantrine 100mg/20mg tablet (6x2)													
Artemether/lumefantrine 100mg/20mg tablet (6x3)													
Artemether/lumefantrine 100mg/20mg tablet (6x4)													
Sulphadoxine 500mg+ Pyrimethamine 25mg Tablets													
Amodiaquine HCL 200mg Tablets													
Amodiaquine 50mg/5ml Syrup													
Quinine Sulphate 200mg Tablets													
Quinine Sulphate 300mg Tablets													
Quinine Dihydrochloride BP Injection 300mg/1ml													
Quinine Dihydrochloride BP Injection 600mg/2ml													

Product						Apr 07	Mar 07	Feb 07	Jan 07	Dec 06	Nov 06	Oct 06	Total Days Out-of-stock
Row 1: Sum total days out-of-stock for all stocked drugs:													
Row 2: Count total number of products stocked in Column 1:													
Row 3: Average % time out-of-stock = (number in Row 1 x 100) / (365 x number in Row 2):													

DAS-3B: Stock-Out Data Form: Health Centre
(page 1 of 1)

Facility Code:	**Data Collector Code:**	
Facility Type:	**Location:**	**Date:**
Record Type:		

For each product, write the number of days out-of-stock for each month.

Product						**Apr 07**	**Mar 07**	**Feb 07**	**Jan 07**	**Dec 06**	**Nov 06**	**Oct 06**	**Total Days Out-of-stock**
Artemether/lumefantrine 100mg/20mg tablet (6x1)													
Artemether/lumefantrine 100mg/20mg tablet (6x2)													
Artemether/lumefantrine 100mg/20mg tablet (6x3)													
Artemether/lumefantrine 100mg/20mg tablet (6x4)													
Sulphadoxine 500mg+ Pyrimethamine 25mg Tablets													
Amodiaquine HCL 200mg Tablets													
Amodiaquine 50mg/5ml Syrup													
Quinine Sulphate 200mg Tablets													
Quinine Sulphate 300mg Tablets													
Quinine Dihydrochloride BP Injection 300mg/1ml													
Quinine Dihydrochloride BP Injection 600mg/2ml													

Product						Apr 07	Mar 07	Feb 07	Jan 07	Dec 06	Nov 06	Oct 06	Total Days Out-of-stock
Row 1: Sum total days out-of-stock for all stocked drugs:													
Row 2: Count total number of products stocked in Column 1:													
Row 3: Average % time out-of-stock = (number in Row 1 x 100) / (365 x number in Row 2):													

DAS-3C: Stock-Out Data Form: PGH/District Hospital/Sub-District Hospital/Mission Hospital (page 1 of 1)

Facility Code:	**Data Collector Code:**	
Facility Type:	**Location:**	**Date:**
Record Type:		

For each product, write the number of days out-of-stock for each month.

Product						**Apr 07**	**Mar 07**	**Feb 07**	**Jan 07**	**Dec 06**	**Nov 06**	**Oct 06**	**Total Days Out-of-stock**
Artemether/lumefantrine 100mg/20mg tablet (6x1)													
Artemether/lumefantrine 100mg/20mg tablet (6x2)													
Artemether/lumefantrine 100mg/20mg tablet (6x3)													
Artemether/lumefantrine 100mg/20mg tablet (6x4)													
Sulphadoxine 500mg+ Pyrimethamine 25mg Tablets													
Amodiaquine HCL 200mg Tablets													
Amodiaquine 50mg/5ml Syrup													
Quinine Sulphate 200mg Tablets													
Quinine Sulphate 300mg Tablets													
Quinine Dihydrochloride BP Injection 300mg/1ml													
Quinine Dihydrochloride BP Injection 600mg/2ml													

Product						Apr 07	Mar 07	Feb 07	Jan 07	Dec 06	Nov 06	Oct 06	Total Days Out-of-stock
Row 1: Sum total days out-of-stock for all stocked drugs:													
Row 2: Count total number of products stocked in Column 1:													
Row 3: Average % time out-of-stock = (number in Row 1 x 100) / (365 x number in Row 2):													

Supplementary Stock-Out Data Form:

Use 1 for each product listed

Facility Code:	**Data Collector Code:**	
Facility Type:	**Location:**	**Date:**
Record Type:		

PRODUCT - ……..……

Record the opening stock for each product as of October 1, 2006	
Record all receipts (add up) from October 1, 2006 to April 30, 2007	
Month	**Quantity Received**
October 2006	_____
November 2006	_____
December 2006	_____
January 2007	_____

February 2007 March 2007 April 2007	_____ _____ _____
Record the closing stock as at April 30, 2007	
Record all losses / breakage (look at the particulars column of the tally/bin card to spot these – list separate entries)	
Entry 1	
Entry 2	
Entry 3	

Record the dates for Nil/- stock on the card between October 1, 2006 and April 30, 2007	**Record the corresponding dates for new stock arrivals immediately after the Nil stocks**