Pharmaceutical Management of Malaria Medicines Survey in Kenya (President's Malaria Initiative)

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About SPS

The Strengthening Pharmaceutical Systems (SPS) Program strives to build capacity within developing countries to effectively manage all aspects of pharmaceutical systems and services. SPS focuses on improving governance in the pharmaceutical sector, strengthening pharmaceutical management systems and financing mechanisms, containing antimicrobial resistance, and enhancing access to and appropriate use of medicines.

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ACRONYMS AND ABBREVIATIONS

ACT	artemisinin-based combination therapy
AL	artemether-lumefantrine
DHMT	District Health Management Team
DMOH	District Medical Officers for Health
DOMC	Division of Malaria Control
DPF	District Pharmaceutical Facilitator
GoK	Government of Kenya
KEMRI	Kenya Medical Research Institute
KEMSA	Kenya Medical Supplies Agencies
MEDS	Mission for Essential Drugs and Supplies
mg	milligram
MoH	Ministry of Health
MSH	Management Sciences for Health
PHMT	Provincial Health Management Team
PMI	President's Malaria Initiative
PMM	Pharmaceutical Management for Malaria
PSM	Procurement and Supply Management
SOPs	standard operating procedures
SP	sulfadoxine-pyrimethamine
SPS	Strengthening Pharmaceutical Systems (Program) [MSH]
USAID	U.S. Agency for International Development

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EXECUTIVE SUMMARY

Over the years, the Ministry of Public Health and Sanitation, Ministry of Medical Services, and development partners have been heavily invested in the procurement of malaria medicines and medical supplies as well as in activities to strengthen procurement and supply management (PSM) to support these commodities. In an effort to account for and optimize these investments, an initiative to collect and communicate data on critical aspects of pharmaceutical management was launched. In November 2008, a pilot exercise was conducted in Kenya to test the feasibility of collecting data on selected PSM indicators and the applicability of institutionalizing these indicators among DOMC's monitoring and evaluation system.

Six districts were selected for the pilot survey from the four malaria epidemiological zones of Kenya. These were Kilifi and Suba (endemic), Bomet and Uasin Gishu (highland epidemic prone), Garissa (arid epidemic prone), and Nairobi (low risk). A total of 48 public/mission facilities (eight facilities per district: five dispensaries, two health centers, and one hospital) were surveyed. At least two private retail facilities were surveyed in each district. Five groups of indicators (core, systems strengthening, data for quantification, district-level supervision, and facility-level supervision were assessed.

Analyses of unexpired antimalarial medicines stock availability in surveyed facilities on the day of the visit revealed overall results of 54.2% to 58.3% for the various artemether-lumefantrine (AL) weight bands across the different levels of care. Analysis for facilities with **at least one** of the AL weight bands revealed higher scores of 83.3%, 58.3%, and 78.3% (for hospitals, health centers, and dispensaries, respectively). On the day of the visit, 16.7% of hospitals and health centers and 0% of dispensaries had **only one** AL weight band. Hospitals sampled were better stocked with all ALs than health centers and dispensaries. Conversely, stock-outs were lowest in hospitals and highest in health centers. The high levels (66.7% to 81.3% of sampled facilities) of stock-outs, meaning more than seven consecutive days, experienced throughout all levels of care in the selected survey period (October 2007 to September 2008) show that stock-outs have been experienced widely over time in the country, especially in dispensaries. These results are consistent with the low number of treated patients to number of notified malaria cases. This is especially significant in the dispensaries, which record more patients with uncomplicated malaria than other levels of care.

Inventory management was a composite of many indicators (expiry, leakage, and storage practices, and differences between dispatch and receipt of supplies, between recorded availability and physical inventory as well as updated bin cards). The expiries experienced for AL 12s and AL 18s in the dispensaries signal the need for inventory management training, with emphasis on expiry tracking. The symbolic detection of AL leakages in three out of 46 private facilities suggests the need for further investigation over a bigger sample size to obtain more representative information. Results obtained from the survey scored dispensaries slightly higher (46.7%) on acceptable storage practices than health centers and hospitals (33.3%) and also higher (66.7%) than health centers (33.3%) in updating facility records.

The need for standard operating procedures (SOPs) is evident from the low score of their availability. SOPs for medicine storage were available in 0.0% to 20.7% of sampled facilities, and SOPs for reporting were available in 15.4% to 20.7% of sampled facilities across all

levels of care. Their availability and use will optimize the impact of supportive supervision (presently recorded highest at dispensary level). Regularity of report submission to higher levels (from facilities to district) recorded an impressive response, but needs to be streamlined for harmonized outputs. In view of the deployment of artemisinin-based combination therapy (ACT) to the mission facilities and the possibility of the same to the private sector, attention needs to be focused on the reporting policies and practices of all facilities in Kenya, with preparation for and dissemination of simple, yet comprehensive, templates to be used in recording malaria medicine management activities.

Recommendations from this survey include—

- Strengthening the office of the district pharmacist to undertake pharmaceutical management activities.

- Building capacity for all cadres of health workers on information and inventory management.

- Harmonizing procurement cycles for government and all partners through a basket mechanism, which should be formalized through consensus building.

- Reviewing the current malaria training programs to include a PSM component.

- Immediately institutionalizing a management process for PSM through production and compliance with SOPs and harmonized reporting formats. This process will be handled by DOMC's monitoring and evaluation department.

- Supportive supervision for PMM by the Provincial health management teams (PHMTs) and DHMTs to all levels of care needs to be maintained, and PSM tools need to be integrated into the routine supervision visits with a focus on availability/stock-outs, expiry, and the use of the inventory management tool for antimalarial medicines management.

- The DOMC needs to establish a focused monitoring system based on the supervision reports from the provincial and district levels. The monitoring and evaluation department should manage the revision of supervision tools and checklists as changes emerge.

- The DOMC should collaborate with the Kenya Medical Research Institute (KEMRI) and other partners to carry out health facility surveys to ascertain the extent to which health facilities are complying with the national guidelines for the diagnosis, management, and treatment of malaria in Kenya.

- The DOMC should collaborate with the Division of Pharmacy on the wastage and leakage surveys/drug quality surveys to investigate occurrence, spread, causes, and enabling factors as well as pragmatic ways of curbing the incidence.

Commendable efforts were made in obtaining data for this exercise. However, data on some indicators, such as number of cases and medicines used in the treatment of severe malaria, were difficult to obtain because of a lack of reporting tools. The suitability of the developed

data screen and database in recording, processing, and transforming the data to give useful information is aptly demonstrated by the plausible results shown by the analyses.

The wide scope of indicators included in this pilot study suggests that it may not be feasible to have all of them represented in routine monitoring visits or quarterly surveys. Key selected indicators on PSM, such as availability and stock-out of antimalarial medicines and inventory management tools, should immediately be incorporated into the DOMC routine supervisory visit tools at both provincial and district levels. It is recommended that the PMI end-use tool surveys take the form of a large-scale, biannual activity that will focus only on core PMM issues, which include supply and availability, inventory management, information management, training, and supervision for antimalarial medicines PSM. The next survey is proposed to be carried out in June 2009.

In conclusion, the November 2008 survey confirms the feasibility and applicability of collecting data on selected antimalarial medicines. This survey is a predictor of success in carrying out large-scale and more representative surveys.

INTRODUCTION

Malaria is a major health problem in Kenya. It is reported to be the leading cause of death of children under age five and is responsible for one of every four child deaths. Over the past few years, several funding streams have supported commodity procurement and management, including the Government of Kenya (GoK) (through the DOMC; Global Fund to Fight AIDS, Tuberculosis and Malaria; USAID; World Health Organization; and Department for International Development). In December 2006, Kenya was announced as a focus country for PMI.[1]

There has been heavy investment in the procurement of malaria medicines and commodities as well as in activities to strengthen PSM to support these commodities. In an effort to account for and optimize these investments, an initiative to collect and communicate data on critical aspects of pharmaceutical management to inform programming was launched. A pilot data collection exercise conducted in Kenya in November 2008 had the following objectives—

- Initial testing of the feasibility of collecting data on selected antimalarial medicines indicators and the applicability of processing these data to give reliable information

- To assess the status of pharmaceutical management indicators for antimalarial medicines in Kenya

- To investigate the feasibility of institutionalizing the PMI end-use tool among other DOMC monitoring and evaluation and supervisory tools

[1] Other PMI countries are Angola, Benin, Ethiopia, Ghana, Liberia, Madagascar, Malawi, Mali, Mozambique, Rwanda, Senegal, Tanzania, Uganda, and Zambia.

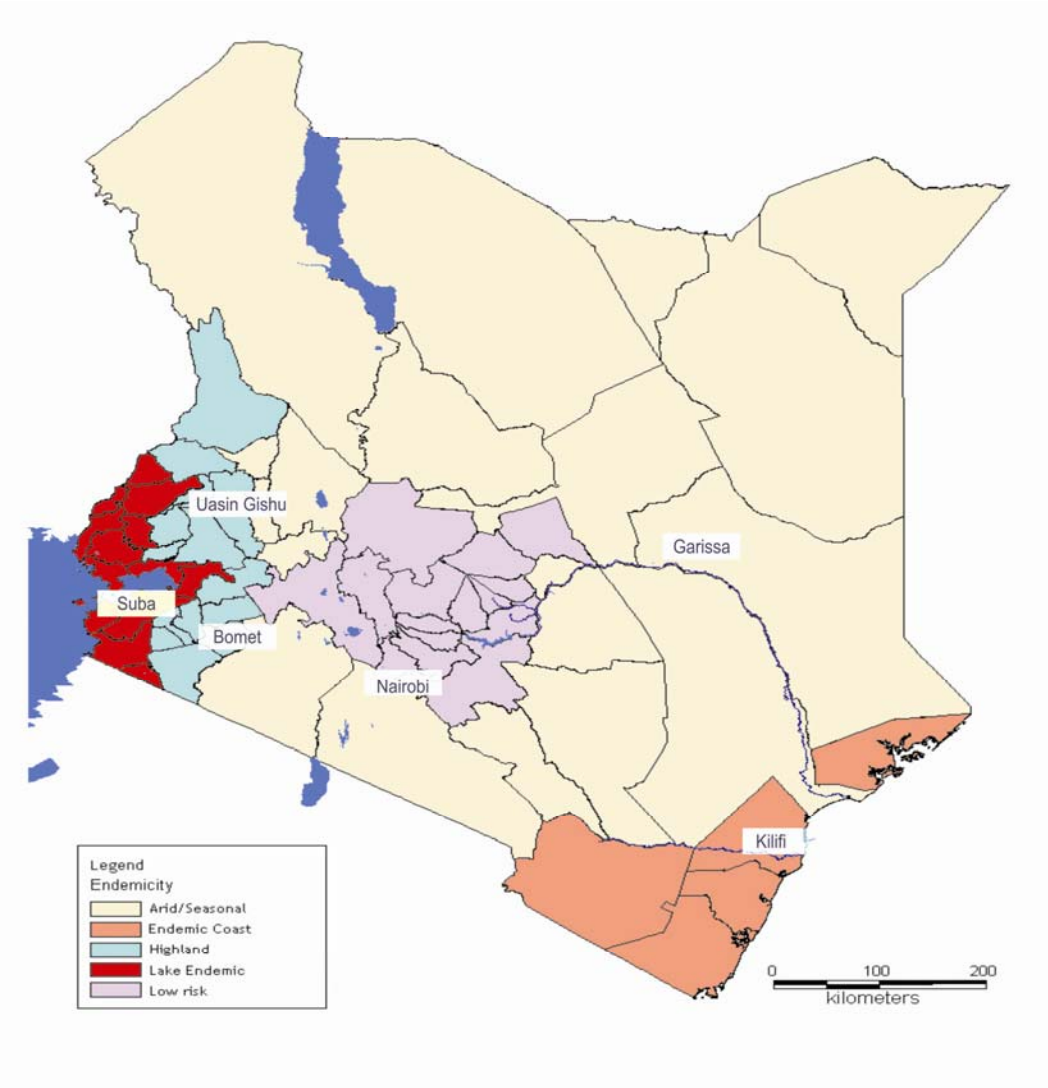
BACKGROUND

The four malaria epidemiological zones in Kenya are (see Map of Kenya)—

- Endemic along the shores of Lake Victoria and the south coast with perennial malaria transmission
- Epidemic prone highlands, which are highly populated, with seasonal transmission
- Arid/semiarid lowlands, which are sparsely populated
- Highlands around mountainous areas with very low risk of transmission

Six districts were selected for the pilot survey from the four malaria epidemiological zones in Kenya. These were Kilifi and Suba (endemic), Bomet and Uasin Gishu (highland epidemic prone), Garissa (arid epidemic prone), and Nairobi (low risk).

Three classifications of health care delivery levels were surveyed in each of the six districts—five dispensaries, two health centers, and one hospital. At least two private retail facilities were surveyed in each district.



Map of Kenya Showing Malaria Zones and Selected Districts

METHODOLOGY

The sampling frame was the national level, specifically the malaria epidemiological zones as classified by DOMC, with two main considerations: the endemicity of the district (for malaria) and the population of people served (for malaria or fever) by the health facilities. In principle, a multistage, stratified random sampling procedure was applied, with programmatic adjustments (annex 2). The stages in stratification were to (1) divide by epidemiological zone, (2) select the malaria districts to be visited in each of the four zones (six districts in all), and (3) choose the facilities in each of the districts selected.

The forms for collecting data comprised five groups of indicators (core, systems strengthening, data for quantification, district-level supervision, and facility-level supervision) (annex 1).

The main groups of personnel involved were core supervisors (composed of staff from the government and supporting agencies, including a consultant);[2] field personnel (six team coordinators and 18 data collectors); data personnel (one database developer/analyst, three data entry workers, and three data validators); and two support staff members for logistics and administration.

Field staff received an intensive two-day training course at central level, with a pilot testing (and feedback) of the tools incorporated. The training for the data processing staff was a one-day practical training. In addition to training presentations and exercises, a draft training manual was used to augment the training.

[2] Personnel involved in the exercise included the DOMC staff, KEMSA, Ministry of Public Health and Sanitation, Ministry of Medical Services, and supporting organizations (MSH/SPS and John Snow Inc./ Partnership for Supply Chain Management System).

RESULTS

Primary data was obtained by direct recording onto the data collection tools provided, with validation of entries by the data collectors and team coordinator before they left the survey facility. The data was then centrally entered into a direct data screen template created for the data entry clerks, with validation running concurrently by the data validators.

Data analysis was conducted with the provision of indicator-data source linked guidelines. Analyses were undertaken for global (complete list of facilities irrespective of level of care) and stratified (by levels of care) results. Tables and graphs were generated for all results.

Findings

Core Commodity Indicators

Indicator 1: Percentage of private retail facilities with Government of Kenya Ministry of Health (MoH) ACTs on the day of visit[3]

Rationale: To determine whether ACTs meant for public sector facilities leaked into the private retail sector.

The public pack ACTs were requested for and purchased as evidence if available using simulated patient presentations. Out of a 46 private retail facilities visited across all six districts in the survey, three facilities (6.5%) were found to have GoK ACTs (table 1). The percentages varied from 0.0% to 25.0% of facilities visited across the six districts. However, the total number of private facilities in the study was too low (limitations of time and concurrent survey in the public facilities) for any conclusions about the extent of the problem to be ascertained.

Table 1. Percentage of Private Retail Facilities with GoK (MoH) ACTs

District	No. of Facilities Visited	No. of Facilities Found with GoK ACTs	% Facilities Found with GoK ACTs
Code A	2	0	0.0
Code B	4	1	25.0
Code C	5	0	0.0
Code D	2	0	0.0
Code E	4	1	25.0
Code F	29	1	3.4
Total	46	3	6.5

[3] Numerator: Number of private retail facilities with GoK ACTs in stock on the day of supervisory visit; Denominator : Total number of facilities visited

Indicator 2a: Percentage of facilities with unexpired malaria medicines on the day of the supervisory visit[4]

Rationale: To measure the availability of quality malaria medicines in the health facilities visited.

The results were analyzed by the different malaria medicines and by the different levels of care (hospitals, health centers, and dispensaries). The global analysis showed that ACTs were present in over half of the facilities (table 2a): 58.3% (AL 6s) and 54.2% (AL 12s, 18s, and 24s). The availability of sulfadoxine-pyrimethamine (SP) was recorded as 89.6%.

Table 2a. Percentage of Facilities with Unexpired Malaria Medicines on the Day of the Supervisory Visit

Product	% Hospital	% Health Center	% Dispensary	% Overall
AL 6s	83.3	58.3	53.3	58.3
AL 12s	83.3	41.7	53.3	54.2
AL 18s	83.3	33.3	56.7	54.2
AL 24s	83.3	41.7	53.3	54.2
Quinine injection	100.0	75.0	70.0	75.0
Quinine tablets (200 mg)	50.0	50.0	56.7	54.2
Quinine tablets (300 mg)	83.3	75.0	70.0	72.9
SP	100.0	91.7	86.7	89.6

The stratified results for each level of care revealed that the hospitals sampled were more often stocked than health facilities and dispensaries for all medicines except quinine tablets (200 mg).

Analysis of facilities with at least one of the AL weight bands showed the availability scores as 70.8% overall (hospitals [83.3%], health centers [58.3%], and dispensaries [78.3%]) (table 2a1). Only 16.7% of hospitals and health centers were recorded as having just one of the AL weight bands. No dispensaries were recorded in that category (table 2a2).

[4] Numerator: Number of facilities/medical stores with unexpired product in stock on the day of supervisory visit; Denominator: Total number of facilities visited

Indicator 2a1: Percentage of facilities with unexpired ACTs (at least one AL weight band) on the day of the supervisory visit[5]

Table 2a1. Percentage of Facilities with Unexpired ACTs (at least one AL weight band)

Facility	No. of Facilities	Denominator	% Facilities
Hospital	5	6	83.3
Health center	7	12	58.3
Dispensary	22	30	73.3
Overall	34	48	70.8

Indicator 2a2: Percentage of facilities with unexpired ACTs (only one of the four AL weight bands) on the day of the supervisory visit

Table 2a2. Percentage of facilities with unexpired ACTs (only one AL weight band)

Facility	No. of Facilities	Denominator	% Facilities
Hospital	1	6	16.7
Health center	2	12	16.7
Dispensary	0	30	0.0
Overall	3	48	6.3

Indicator 2b: Percentage of facilities with malaria medicine stock-outs on the day of the supervisory visit[6]

Rationale: To measure the availability of quality malaria medicines in the health facilities visited (Indicator 2a).

The results of this indicator are opposite (expectedly) of those obtained for availability. By levels of care, the health centers sampled had the highest stock-outs of AL 12s, 18s, and 24s, although the dispensaries sampled had the highest stock-outs of AL 6s (46.7%). Hospitals and health centers included in the survey had the highest stock-outs of 200 mg quinine tablets (50.0%) (table 2b).

[5] Numerator: Number of facilities/medical stores with unexpired AL (at least one and only one) in stock on the day of supervisory visit; Denominator: Total number of facilities visited

[6] Numerator: Number of facilities/medical stores with malaria medicine stock-outs on the day of supervisory visit; Denominator: Total number of facilities visited

Table 2b. Percentage of Facilities with Malaria Medicine Stock-Outs on the Day of the Supervisory Visit

Product	% Hospital	% Health Center	% Dispensary	% Total
AL 6s	16.7	41.7	46.7	41.7
AL 12s	16.7	58.3	46.7	45.8
AL 18s	16.7	66.7	43.3	45.8
AL 24s	16.7	58.3	46.7	45.8
Quinine injection	0.0	25.0	30.0	25.0
Quinine tablets (200 mg)	50.0	50.0	43.3	45.8
Quinine tablets (300 mg)	16.7	25.0	30.0	27.1
SP	0.0	8.3	13.3	10.4

***Indicator 2b1: Percentage of facilities with malaria medicine stock-outs on the day of the supervisory visit (stratified by level of care)* (table 2b1)[7]**

Table 2 b1. Facilities with Complete Stock-Out of All AL Weight Bands

Facility	No. of Facilities	Denominator (Total Number of Facilities Visited)	% Facilities
Hospital	1	6	16.7
Health center	5	12	41.7
Dispensary	8	30	26.7
Overall	14	48	29.2

Indicator 2b2: Percentage of facilities with complete antimalarial medicine stock-outs on the day of the supervisory visit[8]

Analysis (table 2b2) for complete stock-out of the entire AL weight bands in facilities showed health centers in the survey sample recording highest (41.7%). Dispensaries and hospitals scored 26.7% and 16.7% respectively.

[7] Numerator: Number of facilities/medical stores with malaria medicine stock-outs on the day of supervisory visit; Denominator: Total number of facilities visited

[8] Numerator: Number of facilities/medical stores with malaria medicine stock-outs on the day of supervisory visit; Denominator: Total number of facilities visited

Table 2b2. Percentage of Facilities with Complete AL Stock-Outs on the Day of the Supervisory Visit

Facility	% Facilities
Hospital	16.7
Health center	41.7
Dispensary	26.7
Overall	29.2

Indicator 3: Percentage difference between recorded availability of medicines as per stock card and recorded inventory in facilities[9]

Rationale: To measure the degree to which stock record systems reflect the real status of medicines stock; to determine the magnitude of the discrepancy between records and the real stock; and to measure the appropriate use of the stock card and potential delays or omissions in reporting stock movements.

Table 3. Percentage Difference between Recorded Availability of Medicines on Stock Card and Recorded Inventory in Facilities

Product	% Hospital	% Health Center	% Dispensary	% Overall
AL 6s	38.4	45.7	23.4	30.7
AL 12s	54.4	28.3	24.0	29.9
AL 18s	49.6	39.0	22.6	30.5
AL 24s	55.1	43.4	30.0	36.0
Quinine injection	35.8	35.2	44.0	40.8
Quinine tablets (200 mg)	27.9	50.0	32.5	35.4
Quinine tablets (300 mg)	42.9	19.9	33.9	32.2
SP	56.0	28.4	19.5	27.0

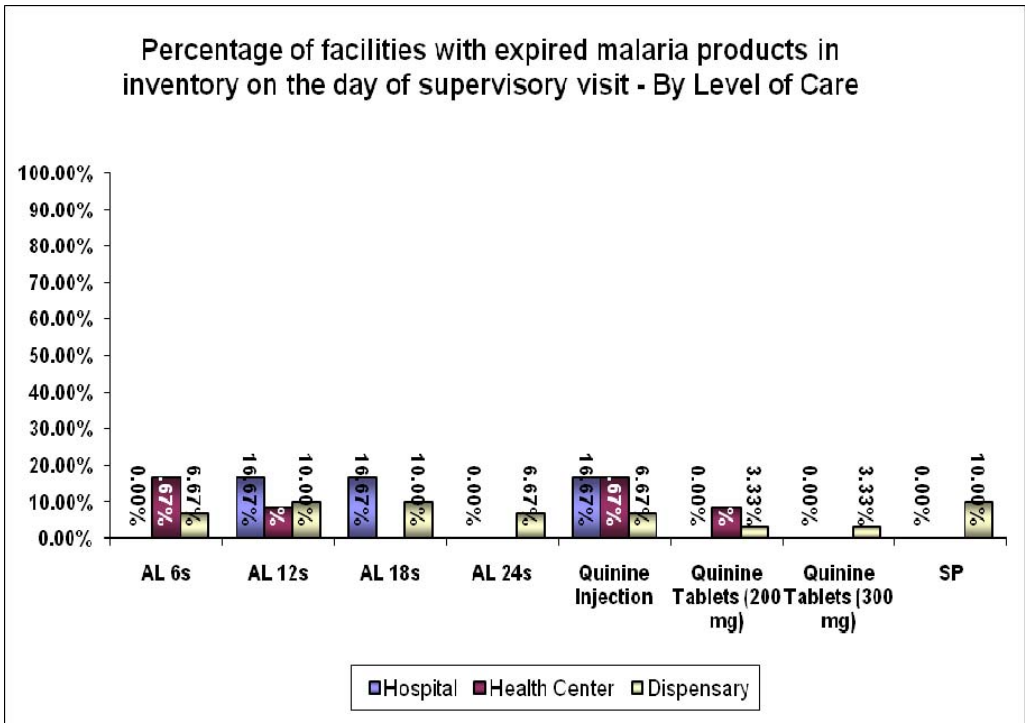
The results from the survey show that widespread discrepancy was recorded for all the medicines, with quinine injection recording the highest (40.8%) and SP the lowest (27.0%) (table 3). The level of discrepancies noticed were not uniform across the levels—they differed for each of the medicines.

[9] Numerator: Stock card count – actual count (in store); Denominator: Stock Card count; Entries with a zero denominator were set to 100%; Those with > 100% were set to 100% and those with negative were set to positive

Indicator 4: Percentage of facilities with expired malaria medicines in the inventory on the day of the visit[10]

Rationale: To measure the quality of inventory management of malaria medicines in facilities.

Figure 4. Percentage of Facilities with Expired Malaria Products in Inventory on the Day of the Supervisory Visit by Level of Care



The results of this analysis show that expiries cut across all different malaria medicines and all levels of care (figure 4). AL 12s and AL 18s recorded the greatest number of expiries (16.7%) in hospitals. When the antimalarial medicines policy was launched, the dispensing guidelines recommended adherence to the designated weight bands for AL. The AL 12s and 18s ACTs had the lowest demand. This accounted for most of the (few) expiries[11] noted in this survey. However, this does not preclude the need for training health workers on expiry tracking as part of inventory management.

[10] Numerator: Number of facilities/medical stores with expired malaria drugs on the day of supervisory visit; Denominator: Total Number of facilities visited

[11] Refer to full country version—Report of the Kenya PMM Survey, Quantification Indicators

Indicator 5: Percentage difference between quantity of malaria medicines dispatched and quantity received between July and September 2008[12]

Rationale: To monitor the distribution system and identify problems, such as theft, spoilage during delivery, and compliance with delivery SOPs.

The figures obtained showed percentage differences ranging from 2.2 % (SP) to 5.3% (AL24s) between the Delivery Note, which is the dispatch document, and the Bin Card, which is the record of receipt (table 5). In most instances, the differences were explained as variations in the time of recording supplies when there were clarifications or adjustments to be made with KEMSA. However, SOPs for receiving are not available in the health facilities (Indicator 9). There is need to institutionalize the discrepancy report form as a means for recording the difference between the quantity of antimalarial medicines dispatched and the quantity received.

Table 5. Percentage Difference between Quantity of Malaria Medicines Dispatched and Quantity Received between July and September 2008

Product	Percent
AL 12s	5.2
AL 18s	5.2
AL 24s	5.3
AL 6s	5.1
Quinine injection	2.2
Quinine tablets (200 mg)	0
Quinine tablets (300 mg)	2.2
SP	2.2
Overall	3.4

Indicator 6: Ratio of treatments dispensed to notified malaria cases per quarter by level of care[13]

Rationale: To measure the extent to which the quantities of medicines dispensed are proportional to the number of cases reported and to trigger further exploration to evaluate rational use.

[12] Numerator: Quantities dispatched – quantities received; Denominator: Quantities dispatched
[13] Numerator: Total Number of treatments dispensed; Denominator: Number of notified malaria cases

Table 6. Ratio of Treatments Dispensed to Notified Malaria Cases per Quarter by Level of Care

Level of Care	No. of Notified Malaria Cases (X)	No. of Treatments Dispensed (Y)	Ratio (Y/X)
Hospital	14,913	9,850	0.7
Health center	15,928	7,827	0.5
Dispensary	28,842	12,864	0.5
Overall	59,683	30,541	0.5

The ratio of treated malaria cases to those notified in the registers is lower in the dispensaries and health centers sampled (0.5) and highest in the hospitals (0.7). However, collectively, the dispensaries had a high number of notified malaria cases (28,842) in the period under review; the importance of low treatment ratios in the dispensaries is significant to malaria control (table 6). This low treatment rate is consistent with the low availability (and high stock out) recorded above in the same facilities sampled in this survey. There is need to increase supply to the lower level of care for first line malaria treatment.

System Strengthening Indicators

Indicator 7: Percentage of health facilities receiving supportive supervision for logistics and inventory management during the last six months[14]

Rationale: To measure capacity building efforts for improved inventory management.

Overall, about 63.0% of facilities surveyed reported that they had received supportive supervision during the quarter of July to September 2008. A stratified analysis shows that 75.0% of health centers, 60.7% of dispensaries, and 50.0% of hospitals sampled in this survey received supportive supervision during this period (figure 7, table 7).

[14] Numerator: Number of facilities receiving supportive supervision for logistics and inventory management during the review period; Denominator: Total number of facilities visited (for stratification, denominator is the total number of facilities in that level)

Figure 7. Percentage of Facilities Receiving Supportive Supervision for Logistics/Inventory Management during Defined Review Period

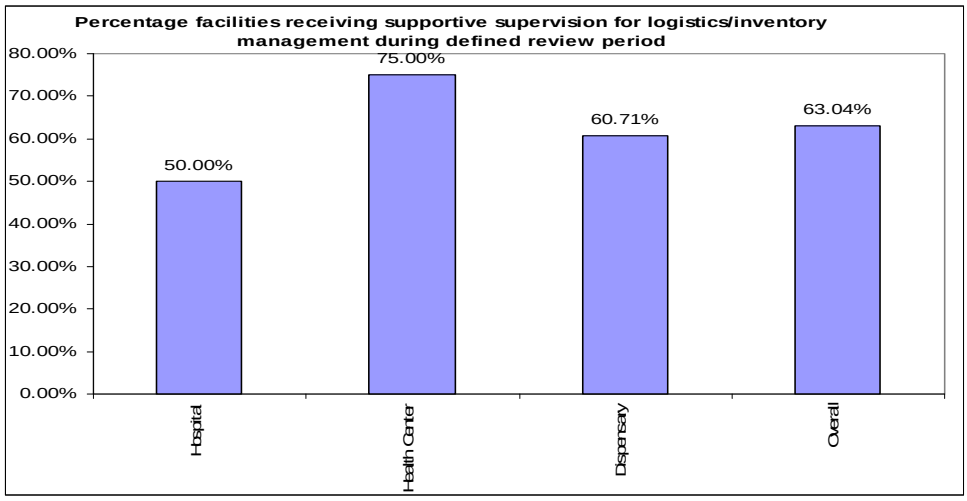


Table 7. Percentage of Health Facilities Receiving Supportive Supervision for Logistics/Inventory Management during the Last Six Months

Level of Care	Count	Percent
Hospital	3	50.0
Health center	9	75.0
Dispensary	17	60.7
Overall	29	63.0

Indicator 8: Percentage of staff trained at each level of the supply chain in case management, inventory management, quantification, supervision, and other relevant areas (table 8)[15]

Rationale: To determine the availability of human resources trained in managing supply chain issues, malaria case management, and diagnosis at each level of the health care system

Table 8. Percentage of Appropriate Staff Trained at Each Level of the Supply Chain

Cadre	Diagnosis by Microscopy %	Inventory Management %	Malaria Case Management %	Quantification %	Supervision %
Clinicians	5.9	4.2	50.0	5.2	16.8
Pharmacy staff	0.0	44.4	44.4	33.3	11.1
Nurses	2.4	10.5	20.8	7.2	5.3
Laboratory staff	70.3	0.0	0.0	0.0	0.0
Stores staff	0.0	25.0	0.0	25.0	25.0

[15] Numerator: Total number of staff trained; Denominator: Number of staff in that group

Table 8a. Percentage of Appropriate Staff Trained in Hospitals

Cadre	Diagnosis by Microscopy %	Inventory Management %	Malaria Case Management %	Quantification %	Supervision %
Clinicians	3.1	0.0	51.4	0.0	15.5
Pharmacy staff	0.0	35.7	42.9	35.7	14.3
Nurses	0.0	4.2	5.6	4.5	4.2
Laboratory staff	66.7	0.0	0.0	0.0	0.0
Stores staff	0.0	0.0	0.0	0.0	0.0

Table 8b. Percentage of Appropriate Staff Trained in Health Centers

Cadre	Diagnosis by Microscopy %	Inventory Management %	Malaria Case Management %	Quantification %	Supervision %
Clinicians	20.0	16.7	50.0	22.2	11.1
Pharmacy staff	0.0	100.0	100.0	100.0	0.0
Nurses	9.1	22.4	44.7	4.7	3.5
Laboratory staff	76.5	0.0	0.0	0.0	0.0
Stores staff	0.0	0.0	0.0	0.0	0.0

Table 8c. Percentage of Appropriate Staff Trained in Dispensaries

Cadre	Diagnosis By Microscopy %	Inventory Management %	Malaria Case Management %	Quantification %	Supervision %
Clinicians	0.0	16.7	33.3	16.7	50.0
Pharmacy staff	0.0	66.7	33.3	0.0	0.0
Nurses	3.7	19.3	46.6	18.2	10.2
Laboratory staff	72.2	0.0	0.0	0.0	0.0
Stores staff	0.0	100.0	0.0	100.0	100.0

High percentages for staff training were recorded in inventory management for pharmacy staff in health centers (100.0%) and dispensaries (66.7%). However, low percentages of staff training in hospitals (35.7%) were recorded. Laboratory staff (in diagnosis by microscopy) also recorded high training levels (70.3%) (tables 8a, 8b, and 8c).

Indicator 9: Percent of facilities with standard operating procedures for management of malaria medicines and supplies[16]

Rationale: To measure the availability of standard operating procedures.

A total of nine facilities (one hospital, two health centers, and six dispensaries) had a form of SOPs for medicine reports. Three health centers and six dispensaries had SOPs for storage. However, these were not standardized SOPs (figure 9, table 9).

Figure 9. Stratified Percentage of Facilities with Standard Operating Procedures for Management of Malaria Medicines and Supplies

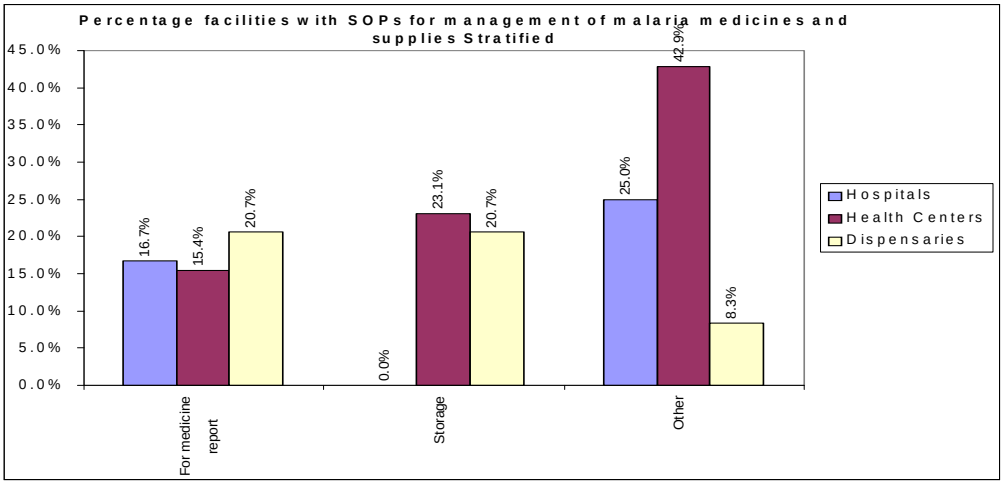


Table 9. Facilities with Standard Operating Procedures for Management of Malaria Medicines and Supplies

SOP Type	Hospital	Health Center	Dispensary
For medicine report	1(16.7%)	2 (15.4%)	6 (20.7%)
Storage	0 (0.0%)	3 (23.1%)	6 (20.7%)
Other	1 (25.0%)	3 (42.9%)	8.3%

Indicator 10: Percentage of facilities with appropriate and acceptable storage conditions[17]

Rationale: To measure existing storage conditions.

[16] Numerator: Number of facilities with SOPs for management of malaria medicines and supplies; Denominator: Total number of facilities visited

[17] Numerator: Number of facilities that meet criteria for acceptable standards in visit 1; Denominator: Total number of facilities visited in visit 1

The following four Yes/No questions were asked for this indicator—

- Are products stored at the appropriate room temperature?
- Is the storage area visually free from harmful insects and rodents?
- Are cartons and products protected from water and humidity?
- Are products arranged in a manner allowing visible identification of labels and expiry dates?

Acceptable standards for measure were met when all four questions were answered Yes: hospitals (33.3%), health centers (33.3%), and dispensaries (46.7%) (table 10).

Table 10. Percent of facilities with appropriate/acceptable storage conditions

Facility Type	Total No. of Facilities with Acceptable Storage Conditions	Percent
Hospital	2	33.3
Health Center	4	33.3
Dispensary	14	46.7
Overall	20	41.7

Indicator 11: Percentage of facilities that experienced a stock-out of seven days or more of malaria medicines during the period of October 2007 to September 2008[18]

Rationale: To measure the continuous availability of medicines in health facilities.

The data for this indicator were obtained from the stock cards in the facilities.

Table 11. Percentage of Facilities that Experienced a Malaria Medicine Stock-Out of Seven Days or More during the Period from October 2007 to September 2008

Product	% Hospital	% Health Center	% Dispensary	% Overall
AL 6s	83.3	91.7	76.7	81.3
AL 12s	66.7	91.7	70.0	75.0
AL 18s	50.0	83.3	63.3	66.7
AL 24s	100.0	91.7	70.0	79.2
SP	33.3	16.7	33.3	29.2
Quinine tablets 200 mg	0.0	0.0	0.0	0.0
Quinine tablets 300 mg	0.0	0.0	0.0	0.0
Quinine injection	0.0	0.0	0.0	0.0

[18] Numerator: Number of facilities that experienced seven or more days of stock-out between Oct. 2007 and Sept. 2008
Denominator: Total number of facilities visited

This indicator gives a wider time frame for checking the history of at least one stock-out of seven or more consecutive days in a 12-month period and therefore reveals a higher number of facilities recording a stock-out for each of the ACTs than the figures for stock-out on the day of the visit (indicator 3). No facility recorded a stock-out of more than seven consecutive days for quinine (200 mg and 300 mg tablets) and quinine injection in the period under review (October 2007 to September 2008) (table 11).

Indicator 12: Percentage of facilities with stock cards updated within the last 30 days[19]

Rationale: To measure medicines management in health facilities.

Overall, 27 of 48 facilities had updated their stock cards within 30 days of the November data collection exercise. A stratified analysis shows that 50% of hospitals, 33.3% of health centers, and 66.7% of dispensaries updated their stock cards within 30 days of the survey visit (table 12).

Table 12. Percentage of Facilities with Stock Cards Updated within the Last 30 Days

Facility Type	Total No. of Facilities with Stock Cards Updated in Last 30 Days	Percent
Hospital	3	50.0
Health center	4	33.3
Dispensary	20	66.7
Overall	27	56.3

Indicator 13: Percentage of facilities submitting regular reports on malaria medicines to higher level during the quarter of July to September 2008[20]

Rationale: To determine whether information on disease trends and medicine use is passed on to the higher level for monitoring and planning purposes by estimating reporting submission completeness within the district.

Most districts surveyed reported some level of submission of reports. The regularity of facilities reporting within a district is as follows (table 13)—

[19] Numerator: Number of facilities with updated stock cards within the last 30 days at the time of the visit; Denominator: Total number of facilities visited

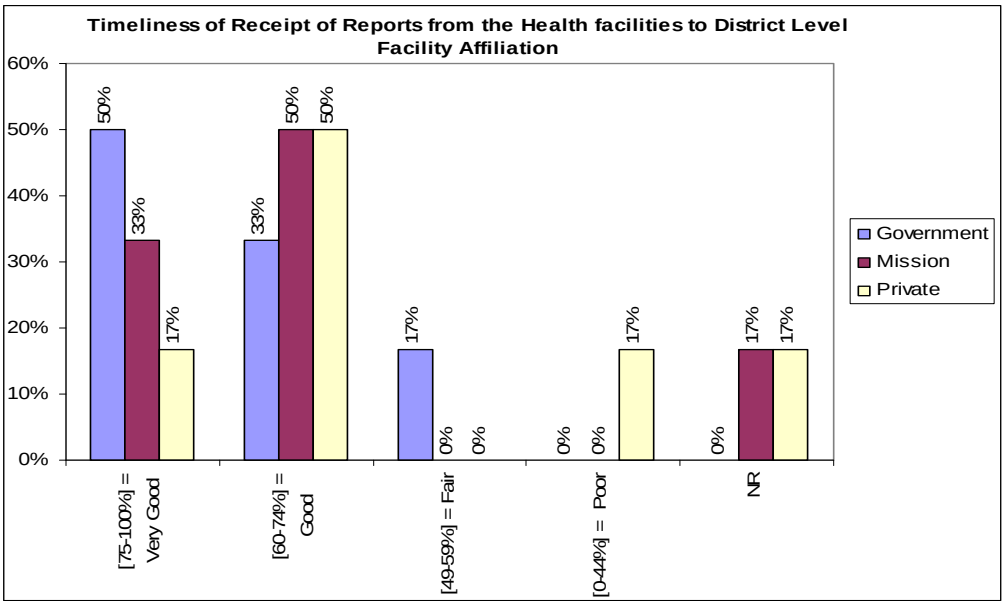
[20] Numerator: Number of facilities submitting reports to higher levels (by level); Denominator: Total number of facilities

Table 13. Regularity of Submission of Reports to the Next Higher Level

Scoring	No. of Facilities Submitting Reports	Percent
Very good (75–100%)	6	33.3
Good (60–74%)	8	44.4
Fair (49-59%)	1	5.6
Poor (0–44%)	1	5.6
No response	2	11.1

A further breakdown of timeliness was calculated from the reporting patterns. Timeliness was considered in terms of submitting reports to the next level by the fifth day of the following month. The stratified analyses according to facility affiliation—government, mission, or private—is shown in figure 13.

Figure 13. Timeliness of Receipt of Reports from the Health Facilities to District-Level Facility Affiliation



The criteria for measuring accuracy and completeness need to be explicitly defined for the next survey as they can be largely subjective.

Indicator 14: Percentage difference between quantity ordered and quantity received for a specified period[21]

Rationale: To determine the magnitude of discrepancy between the quantities ordered and quantities received, and to assess ordering adequacy and product availability and identify related areas of intervention.

[21] Numerator: Quantities ordered – quantities received; Denominator: Quantities received

Table 14. Percentage Difference between Quantity Ordered and Quantity Received between July 2007 and September 2008

Facility Type	*No. of Facilities in Level	Total % difference in level
Dispensary	15	105.9
Health center	6	117.4
Hospital	6	391.5
Overall	27	184.2

*Not all facilities were eligible for the assessment by this indicator. All hospitals in Kenya are on the pull system, and three out of the six districts surveyed (Garissa, Kilifi, and Nairobi) are on the pull system.

The 391.5% difference recorded for hospitals versus 117.0% in health centers and 105.9% in dispensaries may have been partly because of demand that was not quantified (excessive). However, the overall result from all the levels of care shows the need to activate rational demand-supply equilibrium (table 14).

CONCLUSIONS AND RECOMMENDATIONS

The November 2008 pilot survey to collect data on the supply and management of malaria medicines is an important step in the present and future impact of the funding streams and interventions deployed toward the control of malaria in Kenya.

A fairly high level of availability of unexpired antimalarial medicine stock was recorded in the facilities on the day of the visit. The extended stock-outs of more than seven consecutive days experienced throughout all levels of care in the designated period (October 2007 to September 2008) showed that there had been some interruption in the country's malaria medicine supply. The findings on the extended stock-out period are consistent with the low ratio of patients treated to the number of notified malaria cases. Redistribution of antimalarial medicines within the districts is important to improving availability at the health centers and dispensaries as well as to minimizing expiry. The District Pharmacists who are responsible for PMM activities need definite resource allocations for logistics, supportive supervision, and on-the-job training to enhance their role in commodity management.

Inventory management was surveyed by a composite of many indicators: expiry, leakage, storage practices, difference between dispatch and receipt of supplies, and bin cards updates. Impending stock-outs at health facilities are a signal for stringent monitoring of the supply system within the district and central level. The occurrences of expiries experienced (more at the dispensary level) signal the need for inventory management training with emphasis on expiry tracking.

There was no detectable problem with differences in dispatch and received quantities other than occasional differences in time entries that fall into different quarters. These were explained in terms of transportation or other delivery delays. There were appreciable differences between recorded availability and physical inventory across all levels of care and for all medicines. The symbolic detection of AL leakages in three out of 46 private facilities suggests that this indicator needs to be further investigated. Results scored dispensaries slightly higher on acceptable storage practices (46.7%) than health centers and hospitals (33.3%), even though there was no subindicator for infrastructure. Dispensaries also scored higher (66.7%) than health centers (33.3%) on keeping up-to-date facility records.

The production, distribution, and use of SOPs, which are currently not widely available, will optimize the impact of supportive supervision. Report submission to higher levels, especially from the public facilities to the district, was impressive but needs to be streamlined for harmonized outputs. In addition, the timeliness, completeness, and accuracy of the reports are subindicators that need to be better surveyed. In view of the AL deployment to the mission facilities and the possibility of the same to the private sector, attention needs to be focused on reporting procedures and practices in Kenya, with the preparation and dissemination of simple, yet comprehensive, templates for recording malaria medicine management activities.

The results of the current training and capacity building levels in different areas (diagnosis, malaria case management, inventory management, quantification, supervision, and others) by different types of staff and levels of care illustrate the need for detailed assessment to direct the redesign of relevant training programs for all staff and for all levels of care in the supply, management, and use of malaria medicines.

Recommendations from this survey include the following—

- The office of the District Pharmacist needs to be strengthened to undertake pharmaceutical management activities. Clear roles and responsibilities for the DPFs should be defined. Funds for system strengthening and logistics should be allocated via the government and development partners. This process should begin by April 2009.

- Capacity building of health workers on inventory management and information management for antimalarial medicines. This process should begin by April 2009.

- Harmonization of procurement cycles for government and all partners through a basket mechanism, which should be formalized through consensus building.

- Review, redesign, and implement malaria training programs with a component on pharmaceutical management for all relevant cadres of staff and all levels of care by June 2009. This will be anchored by the Case and Drug Management Subcommittees.

- Immediate institutionalization of process management for PSM through production and compliance with SOPs and harmonized reporting formats. This process will be handled by the monitoring and evaluation department of DOMC.

- Supportive supervision for PMM by PHMTs and DHMTs to all levels of care needs to be maintained, and PSM tools need to be integrated into the routine supervision visits with a focus on availability/stock-outs, availability, and use of the inventory management tool for antimalarial medicines management.

- The DOMC needs to establish a focused monitoring system based on the supervision reports from the provincial and district levels. The monitoring and evaluation department should manage the revision of supervision tools and checklists as changes emerge.

- The DOMC should collaborate with the KEMRI and other partners to carry out health facility surveys to ascertain the extent to which health facilities are complying with the national guidelines for the diagnosis, management, and treatment of malaria in Kenya.

- The DOMC should collaborate with the Division of Pharmacy on the wastage and leakage surveys/drug quality surveys to investigate occurrence, spread, causes (and enabling factors) as well as pragmatic ways of curbing the incidence.

Commendable efforts were made in obtaining data for this exercise. However, data on some indicators, such as number of cases and medicines used in the treatment of severe malaria, were difficult to obtain because of the lack of reporting tools. The suitability of the developed data screen and database in recording, processing, and transforming the data to provide useful information is aptly demonstrated by the plausible results shown in the analyses.

The wide scope of indicators included in this pilot study suggest that it may not be feasible to have all of them represented in routine monitoring visits or quarterly surveys. Key PSM indicators, such as availability and stock-out of antimalarial medicines and inventory

management tools, should immediately be incorporated in the DOMC routine supervisory visit tools at both provincial and district levels. It is recommended that the PMI end-use tool surveys take the form of a large-scale, half-yearly activity that will focus only on core PMM issues, which include supply and availability, inventory management, information management, training, and supervision for antimalarial medicine PSM. The next survey is proposed to be carried out in May or June 2009.

In conclusion, the feasibility and applicability of collecting data on selected antimalarial medicines indicators have been confirmed by the November 2008 pilot activity. This survey is a predictor for success in carrying out large-scale and more representative surveys.

ANNEX 1. LIST OF INDICATORS

Core Commodity Indicators

Indicator 1: Percentage of private retail facilities with Government of Kenya MoH ACTs on the day of visit

Rationale: To determine whether ACTs meant for public sector facilities leaked into the private retail sector.

Indicator 2a: Percentage of facilities with unexpired malaria medicines on the day of the supervisory visit

Rationale: To measure the availability of quality malaria medicines in the health facilities visited.

Indicator 2a1: Percentage of facilities with unexpired ACTs (at least one AL weight band) on the day of the supervisory visit

Indicator 2a2: Percentage of facilities with unexpired ACTs (only one of the four AL weight bands) on the day of the supervisory visit

Indicator 2b: Percentage of facilities with malaria medicine stock-outs on the day of the supervisory visit

Rationale: To measure the availability of quality malaria medicines in the health facilities visited (Indicator 2a).

Indicator 2b1: Percentage of facilities with malaria medicine stock-outs on the day of the supervisory visit (stratified by level of care)

Indicator 2b2: Percentage of facilities with complete antimalarial medicine stock-outs on the day of the supervisory visit

Indicator 3: Percentage difference between recorded availability of medicines as per stock card and recorded inventory in facilities

Rationale: To measure the degree to which stock record systems reflect the real status of medicines stock; to determine the magnitude of the discrepancy between records and the real stock; and to measure the appropriate use of the stock card and potential delays or omissions in reporting stock movements.

Indicator 4: Percentage of facilities with expired malaria medicines in the inventory on the day of the visit

Rationale: To measure the quality of inventory management of malaria medicines in facilities.

Indicator 5: Percentage difference between quantity of malaria medicines dispatched and quantity received between July and September 2008

Rationale: To monitor the distribution system and identify problems, such as theft, spoilage during delivery, and compliance with delivery SOPs.

Indicator 6: Ratio of treatments dispensed to notified malaria cases per quarter by level of care

Rationale: To measure the extent to which the quantities of medicines dispensed are proportional to the number of cases reported and to trigger further exploration to evaluate rational use.

System Strengthening Indicators

Indicator 7: Percentage of health facilities receiving supportive supervision for logistics and inventory management during the last six months

Rationale: To measure capacity building efforts for improved inventory management.

Indicator 8: Percentage of staff trained at each level of the supply chain in case management, inventory management, quantification, supervision, and other relevant areas

Rationale: To determine the availability of human resources trained in managing supply chain issues, malaria case management, and diagnosis at each level of the health care system

Indicator 9: Percent of facilities with standard operating procedures for management of malaria medicines and supplies

Rationale: To measure the availability of standard operating procedures.

Indicator 10: Percentage of facilities with appropriate and acceptable storage conditions

Rationale: To measure existing storage conditions.

Indicator 11: Percentage of facilities that experienced a stock-out of seven days or more of malaria medicines during the period of October 2007 to September 2008

Rationale: To measure the continuous availability of medicines in health facilities.

Indicator 12: Percentage of facilities with stock cards updated within the last 30 days

Rationale: To measure medicines management in health facilities.

Indicator 13: Percentage of facilities submitting regular reports on malaria medicines to higher level during the quarter of July to September 2008

Rationale: To determine whether information on disease trends and medicine use is passed on to the higher level for monitoring and planning purposes by estimating reporting submission completeness within the district.

Indicator 14: Percentage difference between quantity ordered and quantity received for a specified period

Rationale: To determine the magnitude of discrepancy between the quantities ordered and quantities received, and to assess ordering adequacy and product availability and identify related areas of intervention.

Note: All hospitals in Kenya are on the pull system, although only three out of the six districts surveyed (Garissa, Kilifi, and Nairobi) are on the pull system.

ANNEX 2. LIST OF SELECTED DISTRICTS

S/N	District Type	S/N	Name (s) of Districts Selected	Province
A	Endemic malaria	1	Kilifi	Coast
		2	Suba	Nyanza
B	Highland epidemic prone	1	Bomet	Rift Valley
		2	Uasin Gishu	Rift Valley
C	Arid epidemic prone	1	Garissa	North Eastern
D	Low Risk	1	Nairobi	Nairobi
Total Number		**6 Districts**		

ANNEX 3. NOVEMBER 2008 DATA COLLECTION SURVEY PARTICIPANTS

MSH/SPS: Process Facilitators

Dr. Mildred Shieshia	MSH/SPS
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Dr. James Mwenda	MEDS
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ANNEX 4. DATA COLLECTION TOOLS

Core Commodity Indicators

Core Commodity Indicators

Name of Health Facility		Province:		District:	
Type of Health Facility: Hospital, Health Centre, Dispensary, Private Medicine Store:					
Date of Data Collection		Facility Code			

Product	Unit of Count	Total QTY Dispatched period: from Jul.08 – Sep.08	Total QTY Received period: from Jul.08 –Sep.08	Percentage Difference = (Q Disp – Q Rcvd) / Q. Rcvd	Recorded Count (from Stock Card)	Physical Shelf Count in Store	Percentage Difference = (Q Stock Card Count – Physical Count) / Q.	Count in Dispensary	Expired Products	
									QTY	Date
AL 6s	Blisters									
AL 12s	Blisters									
AL 18s	Blisters									
AL 24s	Blisters									
SP	Tablets									
Quinine Tablets (200 mg)	Tablets									
Quinine Tablets (300 mg)	Tablets									
Quinine Injection	Amps									
RDTs										
ITNs										

ONLY FOR PRIVATE FACILITIES: Percentage of facilities visited with stocks of GoK ACTs the day of the visit	Number of private facilities visited:		Number of private facilities visited with GoK ACTs:		Percentage of Health facilities with GoK ACTs:

Interviewee Facility in Charge Comments:

Data Collector Comments:

Name of Data Collector:		Name of Interviewee:		Title	
Telephone:		Telephone:			

System Strengthening Indicators

System Strengthening Indicators

Name of Health Facility | **Province:** | **District:**

Type of Health Facility: Hospital, Health Centre, Dispensary, Private Medicine Store:

Date of Data Collection | **Facility Cod**

1. Did you receive a supportive supervision for logistics/inventory management in the last 6 months?

2. Training of health staff in Malaria related training. *Fill in those Eligible (E) and number trained (T) for each category*

Cadre	Diagnosis (by microscopy)		Malaria Case management		Inventory mgt.		Supervision		Quantification		Other (State)	
	E	T	E	T	E	T	E	T	E	T	E	T
Clinicians												
Pharmacy Staff												
Nurses												
Laboratory Staff												
Stores Staff												
Other (Specify)												
Other (Specify)												

3. Does the health facility have written SOPs for the management of malaria medicines and supplies?

For medicine report		*Any comments?*
Storage		*Any comments?*
Other		*Any comments?*

4. Does the health facility have appropriate/ acceptable storage conditions?

Products are stored at the appropriate room temperature	
Storage area is visually free from harmful insects and rodents	
Cartons and products are protected from water and humidity	
Products are arranged in a manner allowing visible identification labels and expiry dates	

6. Did the health facility submit reports to higher level during the last quarter?

Epidemiologic Report. Morbidity and Mortality Report (HMIS)		*Comments?*
Drug Management Report. Monthly AL summary report		*Comments?*
Standard KEMSA order form		
Other (specify)		

Page 2

7. Did the health facility receive any feedback from higher level during the last quarter?

Epidemiologic Report. Morbidity and Mortality Report (HMIS)		*Comments?*
Drug Management Report. Monthly AL summary report Standard		*Comments?*
KEMSA order form		
Other (specify)		

8. Did the facility experience any stock outs of malaria medicines in the last three months?

Answer Yes or No for each		Please explain the reason(s) for stock out(s):
AL 6s		
AL 12s		
AL 18s		
AL 24s		
SP		
Quinine Tabs (200 mg)		
Quinine Tabs (300 mg)		
Quinine injection		

9. Is there a difference between quantities ordered and quantities received during the last quarter for malaria products? For PULL

Malaria Product		Quantities Received	Quantities ordered (Not applicable for PUSH but please explain supply constraints --to help quantify)		% of Quantities Received / Quantities ordered
AL 6s					
AL 12s					
AL 18s					