

THE MALARIA END-USE VERIFICATION REPORT



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PRESIDENT'S MALARIA INITIATIVE



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ACRONYMS AND ABBREVIATIONS

AB	Antibiotic
ACT	Artemisinin-Based Combination Therapy
AL	Artemether-Lumefantrine
AM	Antimalarial
AQ	Amodiaquine
AS	Artesunate
BS	Blood slide
EUV	End Use Verification Tool
FBO	Faith-based Organization
FEFO	First Expiry First Out
HC	Health Centre
HMIS	Health Management Information System
HW	Health Worker
M&E	Monitoring and Evaluation
MOH	Ministry of Health
MSH	Management Sciences for Health
NGO	Non-Government Organization
NMCP	National Malaria Control Program
OPD	Outpatient Department
PMI	President's Malaria Initiative
QN	Quinine
RDT	Rapid Diagnostic Test
SOP	Standard Operating Procedure
SP	Sulfadoxine-Pyrimethamine
SPS	Strengthening Pharmaceutical Systems (Program)
SURE	Securing Ugandan's Rights to Essential Medicines
USAID	U.S. Agency for International Development

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INTRODUCTION

This report presents the results of the assessment of the malaria supply chain and the malaria case management at the health facility level in Uganda. The data was collected as part of the routine assessment of the availability and use of malaria commodities and management of malaria cases under the President's Malarial Initiative (PMI). The EUV assessment summarized in this section was conducted during June 2010 in 20 health facilities at four levels of care: - Regional referral hospital, HC IV, HC III and HC II. Results from the analysis of data collected during the end use verification survey are presented in two broad theme areas, namely: (1) Supply chain management, and (2) Malaria case management. The goal of PMI is to reduce malaria deaths by half in 15 target countries in Africa by reaching 85 percent of the most vulnerable groups — children under 5 years of age and pregnant women — with proven and effective malaria prevention and treatment control measures: insecticide-treated mosquito nets, indoor residual spraying, lifesaving anti-malarial drugs, and treatment to prevent malaria in pregnant women Uganda is one of the 15 countries benefiting from PMI.

In Uganda the End-Use Verification (EUV) survey was implemented by SURE Program with support from the Strengthening Pharmaceutical Systems Program (SPS). The survey results will inform the Ministry of Health, National Malaria Control Program (NMCP) and PMI on availability of malaria medicines and malaria case management, which can be used to strengthen the health care system.

SURE is a 38 million US\$ program under USAID with the overall goal of improving availability of essential medicines and health supplies to the Ugandan population.

The objectives of the End-User Verification survey;

1. To verify general availability of key malaria medicines and commodities;
2. To provide evidence that malaria medicines and commodities are reaching the people they are intended for,
3. To monitor supply chain management of malaria medicines and commodities so that problems can be promptly identified and corrective action taken;
4. To contribute to the establishment of an effective supply chain monitoring system; and
5. To provide regular information concerning malaria case management.

METHODOLOGY

Data was collected through a cross sectional survey of 20 health facilities randomly selected in 4 districts. The districts were also randomly sampled from four regional clusters grouped according to levels of malaria incidence. Data on Malaria incidence was obtained from routine Health Management Information System (HMIS) reports in the Ministry of Health. The four districts were Jinja, Masaka, Arua and Kabale.

Five facilities were selected from each district, and these included one regional referral hospital, one HC IV, one HC III, one HC II and one NGO or private-non-for-profit facility. Two pharmacist from regional referral hospitals and four SURE staff were indentified and trained in use of the EUV data collection tool. All the team leaders had earlier completed data collection in a similar survey assessing supply chain management of essential medicines and rational drug use in the district facilities.

The data collection tool was adapted from the conventional EUV tools that comprised of seven forms summarized in table 1.

Number	Name	Purpose
Form 1	Facility Identification	Identification information for facilities
Form 2	Facility Questionnaire	General information on the supply and management of commodities. Training of staff.
Form 3	Malaria Case Management Form	Assesses malaria case management (diagnosis and treatment of malaria), by examining records from 20-30 patients
Form 4	Stock Status Collection Form	Information on stock management and stock outs
Form 5	Difference between Quantity Ordered and Quantity Received	Compare the quantity of commodities ordered by a facility with what is has received
Form 6	Difference between Quantity Sent and Quantity Received	Compare the quantity of commodities sent by a facility with what was received
Form 7	Storage Conditions Assessment	To assess the storage conditions of health commodities

Table 1: Data collection forms for the End-Use Verification Tool.

Data collection was done using both paper version and EpiSurveyor Mobile technology. The EUV tool was uploaded into the phones for data collection and data was collected by both methods from each facility. The survey thereby served to pilot the use of mobile phones for data collection.

Internet enabled phones was used, which needed internet connectivity during downloading of the forms to the phones and also during uploading the forms into DataDyne server, creators of EpiSurveyor Mobile technology. EpiSurveyor Mobile is a free mobile-phone and web-based data-collection system developed by DataDyne. Previously, as data collectors surveyed dispensaries, they collected information with a paper system and later entered data into electronic form. EpiSurveyor Mobile streamlines this process by allowing data collectors to enter the data directly into their phone at the health facility, upload the information and automatically generate a database that stores the data online. The types of phones used for this exercise were Nokia E71, and Nokia 6300 phones. The Nokia E71 was selected because of their additional capability to use the Global Position System (GPS) feature and the keyboard being large enough to allow for easy and quick typing. EpiSurveyor was used to perform basic (uni-variate) data analysis, however data was exported to Excel and SPSS for bi-variate and multi-variate analysis. Data collection methods included review of medical records namely the OPD patient registers and the laboratory registers for malaria case management information, the stock card for verification of stock status for malaria commodities, and order forms plus the delivery invoices for orders and delivery information. Other data was obtained through interviews of health workers, while observation method was used to capture storage conditions of medicines.

Indicators

Data was collected for 17 supply chain and 20 malaria case management indicators that were designed to best measure access and supply chain management of essential malaria treatment commodities

RESULTS AND OBSERVATIONS

Supply Chain management

Supply chain management is measured as stock availability, expired stock, stock outs in the last three months and updated stock cards. Table 2 summarizes result of 4 indicators on stock management in facilities. About half of the items have updated stock cards. In the survey an updated stock card is defined as a stock card with an entry in the last week, which means that updated does not equal correctly updated. It is likely that out of the updated stock cards much fewer are actually correctly updated stock cards. Medicines are more likely to have available and updated stock cards compared to laboratory items and health supplies.

Less than half of items have in average experienced at least one stock out lasting longer than three days over the past three months. The most common medicines to stock out were AL 2x6, AL 3x6, AL 4x6 and quinine tablets with more than 3/4 of facilities experiencing stock outs of these medicines over the three months period. Microscope slides and IV cannula were found fully available over the three months period. Availability on the day of the survey was 60 (25-93) percent.

Availability of AL formulations was generally low. On the day of survey 1/3 of facilities had AL 3x6 available, 2/3 had AL 1x6 and about half the facilities had AL 2x6 and AL 4x6. Availability of the second choice for malaria treatment, Quinine tablets, was also low with less than half of facilities having it available on the day of survey. The low availability contributes heavily to irrational treatment of malaria in the country, because clinicians often prescribe other available medicine, which is not the appropriate for treatment of malaria. Expired medicine was hardly observed for the surveyed items at the day of the survey. The few expired items included SP, quinine injection, IV giving set, IV cannula and Diazepam injections.

Item	% of facilities with stock card for item updated ¹	% of facilities with stock out for item in the last 3 months ²	% of facilities with expired items on the day of survey	% of facilities with items available on the day of the survey
AL 1x6 (tab)	71%	44%	0%	65%
AL 2x6 (tab)	75%	80%	0%	56%
AL 3x6 (tab)	76%	81%	0%	35%
AL 4x6 (tab)	61%	82%	0%	56%
Dextrose 5% IV infusion	76%	63%	0%	53%
Dextrose 50% 100ml	71%	40%	0%	71%
Diazepam 10mg/2ml	65%	20%	6%	71%
Field Stains A (Bottle)	13%	17%	0%	47%
Field Stains B (Bottle)	27%	29%	0%	53%
Functional Microscope	N/A	N/A	N/A	93%
IV Cannula 18G-22G	33%	0%	17%	75%
IV giving set (15drops/min)	38%	18%	6%	75%
Insecticide Bednet (Net)	30%	25%	0%	60%
Malaria Rapid Diagnosis Test	50%	50%	0%	25%
Microscope slides	13%	0%	0%	65%
Paracetamol 500mg (Tab)	67%	61%	0%	50%
Quinine IM/IV 600mg	72%	39%	6%	72%
Quinine tab 300mg (Tabs)	78%	72%	0%	44%
Sulphadoxine/Pyrimethamine (SP) tab 525mg (Tabs)	72%	53%	6%	64%
Syringe 10ml	33%	15%	0%	72%
Average	54%	42%	2%	60%

Table 2: Stock management indicators.

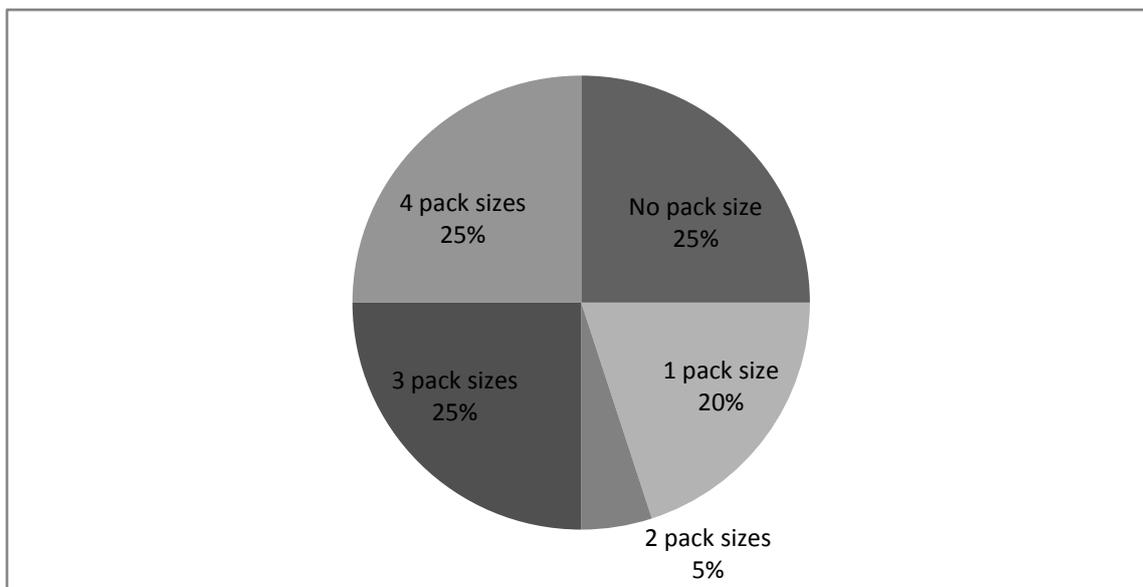
Table 3 presents the availability index of ACTs in facilities on the day of the survey. One in five of the facilities [Rhino Camp HC IV (Arua district), Logiri HC III (Arua district), Villa Maria Hospital (Masaka), All Saint Kagoma (Jinja) and Kirinya Prisons (Jinja district)] were out of stock of all ACT pack sizes on the day of the survey.

¹ The definition of updated is that there has been an entry within the last week. Denominator is facilities managing item.

² Denominator is facilities with stock card available for the item.

Facility Code	Presentations of Artemeter/Lumefantrine Tabs				Total
	(AL) 1x6	(AL) 2x6	(AL) 3x6	(AL) 4x6	
Rhino Camp HC IV	0	0	0	0	0
Oduobo HC II	0	1	0	0	1
Logiri HC III	0	0	0	0	0
Anyiribu HC III	0	0	0	1	1
Arua Regional Referral Hospital	0	1	1	0	2
Masaka Regional Referral Hospital	1	1	1	1	4
Villa Maria Hospital-NGO	0	0	0	0	0
Kyanamukaaka-HC IV	1	1	1	1	4
Kinoni HC III	1	1	0	1	3
Kiti HC II	1	1	0	1	3
Jinja Regional Referral Hospital	1	1	1	1	4
Walukuba HC IV	1	0	0	0	1
All saints Kagoma-NGO	0	0	0	0	0
Budiima HC III	1	1	0	1	3
Kirinya Prisons HC II	0	0	0	0	0
Kabale Regional Referral Hospital	1	1	1	1	4
Kamwezi HC IV	1	1	0	1	3
Kyanamira HC III	1	1	1	1	4
Kafunjo HC II	1	0	1	1	3
Hakishenyi-NGO	0	0	0	1	1

Table 3: Artemether/Lumefantrine packs available in the surveyed facilities on the day of survey. 0 = NO AL is available and 1 = YES the AL pack size is available



Graph 1: Number of facilities with no Artemether/Lumefantrine, one, two, three or four pack sizes available on the day of survey

From the data in graph 1, it is evident that 75 percent of facilities surveyed, were able to treat malaria with an AL. It furthermore shows that in five facilities (25 percent), it is not possible to treat malaria with the first choice medicine.

Table 4 below shows months of stock and stock out days for each item. On average stock was available of each item for 0.6 months or it has been stocked out for 22 days over the last three months. The items with the highest month of stock are microscope slides and Field Stain B, but generally stock cards for laboratory items are not widely updated, suggesting that the consumption data obtained from the stock cards can be associated with uncertainty. For all medicines, months of stock are below one month with the exception of diazepam injection with an average of one month stock available in facilities. The table also shows that the number of stock out days is high for most tablets. The lowest number of stock availability was observed for AL 1x6 with 18 days. AL and Quinine, the first and second choice for malaria treatment, are the items with most stock out days according to the results.

Item	Average month of stock available per facility	Duration of stock out (days) over the last 3 months
AL 1x6 (tab) (n=17)	0.1	18
AL 2x6 (tab) (n=16)	0.2	34
AL 3x6 (tab) (n=17)	0.2	36
AL 4x6 (tab) (n=18)	0.1	34
Dextrose 5% IV infusion (n=17)	0.2	38
Dextrose 50% 100ml (Bottle) (n=17)	0.1	22
Diazepam 10mg/2ml (n=17)	1.0	15
Field Stains A (Bottle)Lab (n=15)	0.9	6
Field Stains B (Bottle)Lab (n=15)	2.3	12
IV Cannula 18G-22G (n=12)	0.7	0
IV giving set (15drops/min) (n=16)	0.5	10
Insecticide Bednet (Net) (n=10)	0.6	7
Malaria Rapid RDT (n=4)	0	45
Microscope slides (n=4)	3.8	0
Paracetamol 500mg (Tab) (n=18)	0.1	27
Quinine IM/IV 600mg (n=18)	0.2	17
Quinine tab 300mg (Tabs) (n=18)	0.3	37
Sulphadoxine/Pyrimethamine tab 525mg (n=18)	0.3	24
Syringe 10ml (n=18)	0.6	9
Average	0.6	22

Table 4: Average month of stock available per facility and duration of stock out per item

According to the data in table 5, of the 41 items ordered only 63 percent of them were delivered in the quantity ordered for and for 31 percent of items, the received quantity was less than what was ordered for. Data analysis also showed that for 95 percent of items the received quantity was the same as the quantity shipped. Data for this indicator was limited by the absence of the order forms against which orders are delivered.

Shipped vs. Received: Percentage of items falling into categories (n=111)	
• Quantity shipped is greater than what was received	3
• Quantity shipped is less than what was received	2
• Quantity shipped equals what was received	95
Ordered vs. Received: Percentage of items falling into categories (n=41)	
• Quantity ordered is greater than what was received	31
• Quantity ordered is less than what was received	5
• Quantity ordered equals what was received	64

Table 5: Shipped vs. received and ordered vs. received quantities.

Table 6 below shows that 63 percent of staff working with RDTs have been trained, but that only 15 percent of facilities has at least one staff member trained in using RDTs indicating that one of the main reasons that only few facilities are using RDTs may be caused by lack of training. Otherwise, table 6 shows that 80 percent of facilities have at least one person trained in malaria case management, but only 30 percent of facilities have at least one person trained in stock management.

Work area	% facilities with at least one trained person within each area	% staff trained in area where they work
Malaria Case Management	80	36
IPTp	40	26
RDTs	15	63
Microscopy	25	69
Stock Management	30	41

Table 6: Human resource trained in areas related to malaria case management, supply chain and diagnosis.

Data in table 7 shows that supervision including logistics management (47%) is more common than supervision including malaria case management (30%) and that 90% of facilities report that internal supervision takes place. Internal supervision is not recorded in the supervision book, so it is not possible to verify whether it does actually take place. 80% of facilities have reference guidelines for malaria treatment, but only 20% have for stock management. Also, 75% of facilities order to NMS on time. Availability of reference guidelines for malaria case management was reported in 80% of the health facilities, however Standard Operating Procedures (SOPs) for management of malaria commodities were found in 20 percent of the health facilities. The data also shows that in 75 percent of facilities clinical officers prescribe malaria treatment and that nurse assistants dispense medicine

in 30 percent of facilities. Pharmacy technicians and pharmacists dispense in less than a third of the facilities (30 percent).

Service delivery indicators	% of facilities	Number of facilities
1. Percentage of facilities receiving supervision for logistics/inventory management during the previous 6 months	47	19
2. Percentage of facilities receiving supervision for malaria case management during the previous 6 months	30	20
3. Percent facilities where internal supervision is performed	90	20
4. Percentage of facilities with reference guidelines for malaria case management	80	20
5. Percentage of facilities with SOPs for management of malaria commodities	20	20
6. Facilities reporting on time according to NMS or JMS deadlines	75	16

Table 7: Service delivery Indicators: Supervision, reference materials and reporting

Table 8 lists the percent of facilities with different storage criteria fulfilled or not fulfilled. It shows that one of the major challenges is the lack of possibility to monitor storage temperature for medicine and that adequate fire safety is only available in 25% of facilities. Observations in facilities showed that, the main reason for inability to monitor temperature is lack of thermometers in stores. Also, the table shows that 30% of facilities have adequate storage conditions. In only 50% of facilities are damaged or expired medicine separated from useable medicine resulting in a risk that expired medicine by mistake is dispensed to patients. 90% of facilities have store that is secured with lock and which is only accessible for authorized personnel.

Storage criteria	Yes (%)	No (%)	N/A (%)
Medicines and supplies are stores and organized according to first-to-expire, first out FEFO.	80	15	5
Useable malaria medicines and supplies are arranged so that identification labels and/or expiry dates are visible.	70	10	20
Carton and boxes in good conditions. Not crushed due to mishandling or bad storage.	70	0	30
Damaged and expired malaria medicine and supplies is separated from useable medicine.	50	0	50
Medicines and supplies are protected from direct sunlight on the day of survey.	85	5	10
There are no signs of pest infestations in the store (i.e. cockroaches, rats, bats etc.).	25	65	10
Storage area secured with lock and key, but accessible during working hours. Access limited to authorized personnel.	90	5	5
Are there burglar bars on the doors of the drug store?	40	55	5
Are there burglar bars for the windows of the drug store?	80	15	5
Medicines and supplies are stored at the appropriate temperature on the day of the survey, (under 30 degrees).	15	0	85
There are no cracks, holes or signs of water damage in the store.	55	35	10
Store is maintained in good conditions (Look for cleanliness, organized boxes etc).	65	25	10
The current space and organization is sufficient for malaria medicines and supplies.	80	10	10
Is there appropriate fire safety?	25	75	0
If fire extinguisher available, is it serviced?	40	60	0
Are products stored at least 30cm off the wall, 10cm from the floor (where appropriate) and stacked not more than 2.5 meters high?	55	35	10
Are there pallets/shelves available to ensure products are off the floor?	50	40	10
Malaria medicines and supplies are stored separately from insecticides and chemicals.	80	0	20
Overall assessment of storage facilities adequately meeting standards.	30	60	10

Table 8: Storage conditions and adequate standards

Malaria Case Management

According to table 9, malaria treatment is available in all the 20 facilities surveyed, but only in 20% of facilities is malaria RDTs provided. The lower facilities does not offer laboratory services, so the finding suggests that there are several facilities, which are unable to test patients for malaria before initiating treatment leading to a possible overuse of malaria medicine.

Malaria Services provided	% of facilities providing malaria services
Malaria treatment	100%
Severe Malaria Referral	75%
Severe Malaria Treatment	80%
Microscopy	75%
Malaria RDTs	20%
IPT prophylaxis	95%
ITN (bed nets)	45%
Other Malaria Services	10%

Table 9: Percent of facilities providing malaria services

1. Percent malaria cases.	Percent	
1. Percentage of malaria cases in the total patient population examined	31%	n=62450
2. Percentage of total malaria in the total patient cases under age 5	36%	n=19060

Table 10: Malaria cases

Malaria cases accounts for a large part of the total patient populations with 31% of adult patients being diagnosed with malaria and 36% of patient under the age of 5 (table 10).

Malaria is most likely to be diagnosed using blood slides (59% of cases) and by clinical examination. RDTs are only used in 7% of all malaria cases (table 11).

Test result				Percent of total tests performed
	Blood slide	Clinical symptom	RDT	
N/A	4%	100%	9%	36%
Negative	42%	0%	16%	26%
Positive	54%	0%	74%	37%
Total	59%	346%	7%	583

Table 11: Malaria tests performed.

37 percent of all tests performed are positive, 26 percent negative and 36 percent of malaria cases are diagnosed without any malaria test performed.

Malaria case management indicator	% of malaria cases	Total number of malaria cases for the specific indicator
2. Percentage of malaria patients treated with a monotherapy ³	0%	583
3. Percentage of malaria patients who did not receive an appropriate anti-malarial treatment ⁴	14%	583
4. Percentage of malaria patients treated with quinine tabs	14%	583
5. Percentage of malaria patients treated with SP (not for IPTp)	8%	583
6. Percentage of malaria patients treated with quinine injections	8%	583

Table 12: Treatment of malaria cases.

Malaria patients treated with quinine tabs, quinine injections and SP (not for IPTp) were 14 percent, 8 percent and 8 percent respectively. Table 12 also shows that no patients are treated with monotherapy, but 13.6 percent of malaria cases are not treated with an appropriate anti-malarial.

Table 13 and 14 shows treatment related to test performed and test results in patients above age 5 (table 13) and below age 5 (table 14). According to the tables a high percentage of cases are treated with “other treatments” indicating that different anti malaria medicine and combinations are used. AL is often given in combination with antibiotics and this is most common in patients below the age of 5 and especially when malaria is diagnosed clinically without any tests. This indicates overuse of both malaria medicine and antibiotics caused by lack of testing options in HC II’s.

Commodity types	Patients Above 5													
	Test Performed													
	Blood slide						None		RDT					
	Test Result						Test Result		Test Result					
	N/A		Negative		Positive		N/A		N/A		Negative		Positive	
	Count	N %	Count	N %	Count	N %	Count	N %	Count	N %	Count	N %	Count	N %
Antibiotics	0	0	18	20	2	2	1	1	0	0	1	20	0	0
Artemether/Lumefantrine (AL)	5	71	33	37	35	39	77	62	1	33	0	0	3	27
Artemether/Lumefantrine (AL) Antibiotics	0	0	9	10	19	21	10	8	0	0	0	0	1	9
Other treatment given	2	29	29	33	35	39	37	30	2	67	4	80	7	64
Total	7	100	89	100	91	100	125	100	3	100	5	100	11	100

Table 13: Test performed, test results and treatment given to patients above 5 years old.

³ Monotherapy is treatment with a single drug or therapeutic agent.

⁴ Patients not receiving an appropriate treatment for malaria did not receive any anti malaria medicine.

Treatment with AL is not consistent with the results of the tests performed. The assessment showed that 22 percent of patients with a positive blood slide were treated with AL, but 34 percent of patients with a negative test were also treated with AL. It also showed that for children less than 5 years, 56 percent were treated with AL without having any test done. For adults the percentage of patients receiving AL without any test performed is 62 percent. One of the reasons for these high percentages can be that laboratory tests are not available in several facilities and that the available few laboratories are overworked.

Treatment type	Patients Under 5													
	Test Performed													
	Blood slide						None		RDT					
	Test Result						Test Result		Test Result					
	N/A		Negative		Positive		N/A		N/A		Negative		Positive	
	Count	N %	Count	N %	Count	N %	Count	N %	Count	N %	Count	N %	Count	N %
Antibiotics	0	0	16	29	1	1	1	1	0	0	0	0	0	0
Artemether/Lumefantrine (AL)	1	14	19	34	21	22	40	56	0	0	2	100	8	38
Artemether/Lumefantrine (AL) Antibiotics	0	0	6	11	21	22	20	28	0	0	0	0	2	10
Other treatment	6	86	15	27	50	53	10	14	1	100	0	0	11	52
Total	7	100	56	100	93	100	71	100	1	100	2	100	21	100

Table 14: Test performed, test results and treatment given in patients below age 5.

The proportion of total patients examined in facilities that were diagnosed with malaria was 30 percent. Of these 35 percent were children below 5 years. The main method of malaria diagnosis was microscopy (59 percent), however a significant proportion were examined clinically. Use of RDT was reported at 7 percent, and was only found in 4 facilities. Of the cases diagnosed with malaria, 46 percent of the under 5 and 36 percent were treated with AL respectively.

CONCLUSIONS

Supply chain management

The End Use Verification survey provided an overview of the latest data related to supply chain for malaria commodities and malaria case management indicators in the surveyed 20 health facilities within Uganda. Indicators for supply chain management involved measuring whether facilities had adequate stock of antimalarial medicines, including buffer stock, with optimum shelf life to prevent expiries. The group of supply chain management indicators in this report includes stock availability, stock-outs, expiry, stock management, store management, and ordering/receiving procedures.

Facility order forms and NMS delivery note/invoice were only available in 7 out of the 20 facilities (35 percent). Absence of order forms makes it impossible for facilities to actually cross check whether NMS delivered what they ordered. The survey showed that often facilities receive less quantity than they ordered for, contributing to the risk of stocking out.

Updated stock cards are required for systematic and accurate management of medicines stock in facilities, but only 61 - 76 percent of facilities had updated stock cards for AL products. Laboratory commodities such as RDT, Field Stain A and blood slides were the least reported to have updated stock cards available in facilities.

Storage standards in facilities as addressed in the survey including cleanliness, arrangement according to FEFO; separation of damaged and expired products; protection from direct sunlight, water, and humidity; security and safety of the storage area. Percentages of facilities meeting adequate storage standards were 30 percent. Storage conditions that were least adhered to included; appropriate storage temperature, appropriate fire safety, presence of pest infestation in store and separation of damaged, expired and reusable medicines. The lack of adequate storage space has compelled health facilities to improvise space in the dispensing area for storage of medicines. In many facilities it is not possible to measure the temperature in the store, making it impossible for staff to ensure that the medicine is stored correctly.

Malaria case management

The data suggests that the main problem with medical treatment of malaria in Uganda is inappropriate use of medicine including use of several antimalarial and in particular the use of quinine tablets. The reason for the high use of quinine can be that some cases are diagnosed with complicated malaria, unfortunately the current recording of prescription does not distinguish

between the status of diagnosis (severe and uncomplicated) of malaria. It is also possible that quinine could have been used in cases where ACT were stocked out. There was no observation of monotherapy in any of the facilities surveyed. The reason for this is likely to be that formulations used in monotherapy were not available in any of the facilities.

Malaria diagnosis in facilities is largely dependent on use of microscopy; the use of RDT for malaria test is still limited to a few facilities. This is because RDT are relatively new in Uganda with less than 2 years since introduction; being new technology facilities had not even received their first supply.

The findings of this survey revealed that less than half of all health workers who routinely perform various case management duties at health facilities have attended case management related training. This explains the big percentage of inappropriate treatment of malaria cases in many facilities.

Recommendation

- R1.** Regular supervision of health facilities by district and central supervisors to actively monitor the supplies and stock management should be improved. This supervision should focus on proper use of stock cards for monitoring stock of malaria medicines, storage of medicines and stock levels.
- R2.** Standard treatment guidelines for malaria should be regularly revised and circulated to all health facilities managing malaria cases. The guidelines are living reference by health workers during the day to day management of malaria cases, especially on the diagnosis, prescription, dosing, and health education for malaria control.
- R3.** Laboratories should be stocked with adequate quantities of appropriate test kits for malaria. Distribution of RDTs or microscopy should be integrated into the push system for medicines and supplies to ensure facilities maintain adequate stock of these vital test kits. NMS should quantify the facility estimate of test kits and regularly deliver them.
- R4.** Facility health workers should be oriented into estimating their average monthly consumption of malaria supplies and medicines, and prepare orders in time to NMS to minimise stock out due to poor estimations and late deliveries.
- R5.** Continued use of mobile phones to collect EUV data is recommended. However, difficulties associated with uploading data, web based data management and data analysis should be fixed by Data Dyne to enable easier application in future.

ANNEX A: DATA COLLECTION TEAM

Names	Designations
1. Dorthe Konradsen	M&E and logistics specialist
2. Bill Elur	M&E LMIS Field Coordinator
3. Paul Ocakacon	Pharmacist
4. Belinda Blick	M&E LMIS Field Coordinator
5. Martha Abigaba	Pharmacist
6. Lawrence Were	Logistics Expert
7. Brenda Nalwadda	M&E Specialist

ANNEX B: FACILITIES SURVEYED

ARUA DISTRICT

Arua Regional Hospital

Rhino Camp HC IV

Logiri HC III

Anyribu HC III (NGO)

Akino HCII

MASAKA DISTRICT

Masaka Regional Hospital

Villa Maria Hospital (NGO)

Kyannamukaaka HC IV

Kinoni HC III

Kiti HC II

JINJA DISTRICT

Jinja Regional Hospital

Walukuba HC IV

All Saints Kagoma HC IV (NGO)

Budima HC III

Kitanaba HC II

KABALE DISTRICT

Kabale Regional Hospital

Kamwezi HC IV

Kyanamira HC III

Kafunjo HC II

Hakishenyi HC II (NGO)