

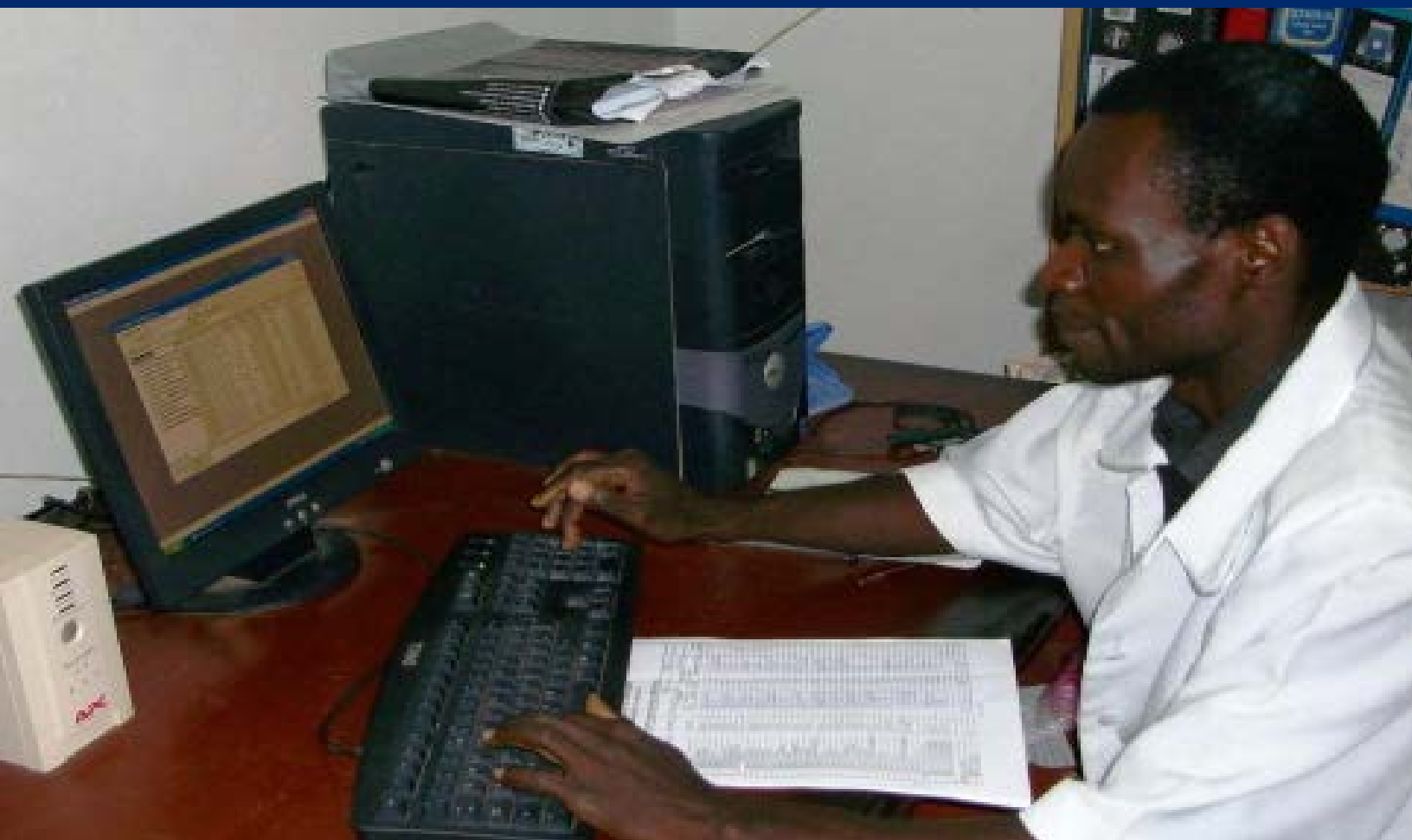


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Malawi: Assessment of the Integrated Logistics Management Information System

Review of the Processes and Software Tools



SEPTEMBER 2013

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PRESIDENT'S MALARIA INITIATIVE



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USAID | DELIVER PROJECT, Task Order 4

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USAID | DELIVER PROJECT, Task Order 7

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Abstract

In February 2013, the Ministry of Health (MOH), with technical assistance from the USAID | DELIVER PROJECT, Task Order 4 and Task Order 7, conducted an assessment of Malawi's integrated logistics management information system (LMIS) for medicines and related health commodities.

The assessment reviewed key features of the overall system design that impact the LMIS; the processes of LMIS data collection, recording, reporting, and use; the software solutions that are used to manage the data; and the underlying resources needed to sustain the LMIS. This report, presented to the MOH, includes the findings of the assessment, as well as short- and long-term recommendations to improve the LMIS processes and technology solutions in Malawi.

Cover photo: Matthews Chimtenga, pharmacy technician at Rumphi district, enters data from stock cards and from facility reports into *Supply Chain Manager* software.

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Acronyms

3PL	third party logistics (provider)
AIDS	acquired immune deficiency syndrome
ART	antiretroviral treatment
ARV	antiretroviral
CCM	community case management
CDC	Centers for Disease Control and Prevention
CHAI	Clinton Health Access Initiative
CHAM	Christian Health Association of Malawi
CMST	Central Medical Stores Trust
DFID	Department for International Development (U.K.)
DHMT	District Health Management Team
DHO	district health office
DPT	district pharmacy technician
EMR	electronic medical record
ERP	enterprise resource planning
HIV	human immunodeficiency virus
HMIS	health management information system
HR for SCM	human resources for supply chain management
HSA	health surveillance assistant
HTSS	Health Technical Services and Support (MOH)
ICT	information communication technology
IMCI	Integrated Management of Childhood Illness
KPI	key performance indicator
LMIS	logistics management information system
MOH	Ministry of Health
NSSD	National Stock Status Database
RMS	regional medical stores
RIV	Requisition and Issue Voucher
SC4CCM	Supply Chains for Community Case Management

SCMgr	Supply Chain Manager (software)
SKU	stockkeeping unit
UNFPA	United Nations Population Fund
UNICEF	United Nations Children’s Fund
USAID	U.S. Agency for International Development
VCT	voluntary counseling and testing
VEN	vital, essential, non-essential

Acknowledgments

The authors of this report gratefully acknowledge the support given to this activity by all the organizations that participated in the assessment and that provided insight into the performance of the logistics management information system (LMIS) for health commodities in Malawi. Key participants included the Health Technical Services and Support (HTSS)/Pharmaceuticals section of the Ministry of Health (MOH); HTSS/Diagnostics section; Reproductive Health Unit; Department for HIV and AIDS; National Malaria Control Program; National TB and Leprosy Program; MOH Information and Technology unit; Central Medical Stores Trust; and partner organizations, including the Christian Health Association of Malawi, Clinton Health Access Initiative, O&M IT/S and Management Services Ltd.; United Nations Children’s Fund (UNICEF); Baobab Health Trust; and D-Tree International. Special thanks is extended to all the district pharmacy technicians, district health officers, and health facility personnel who provided valuable input and were instrumental in facilitating the data collection process. The findings in this report are based on their contributions.

In addition, we extend special thanks to the following MOH data collectors: Ivy Zingano for her leadership and dedication throughout the assessment, and Charles Chimanya and Dorica Chirwa for their collaboration and insight during the site visits. Their input and support contributed immensely to this assessment.

We would also like to thank the USAID | DELIVER PROJECT Malawi staff members for their invaluable support during the assessment, particularly Elias Mwalabu, Evance Moyo, Veronica Chirwa, Phillip Kamutenga, and Malcolm Clark. We also extend our sincere appreciation to the U.S. Agency for International Development for its continuing assistance.

Executive Summary

During the past few years, the existing logistics management information system (LMIS) for health commodities in Malawi has underperformed because of the economic and financial challenges faced by the country. Within government services, generally, and health services, specifically, these forces have contributed to low morale and decreased productivity. Because of these challenges, as well as non-performance issues within key agencies involved in the supply chain, a number of donors removed their financial support—for a temporary, but indefinite period—from the Ministry of Health (MOH) supply chain to parallel supply chains managed by partners.

All effective supply chains are driven by accurate and timely logistics data that is related to demand, inventory, and pipeline information. Without quality logistics data, supply systems are more likely to have problems, such as stockouts, which makes the system unresponsive to health facility and patient needs; and imbalances, which undermine facility services to patients and the supply system accountability. Malawi has had all these problems, necessitating a plan of action to assess, redesign, and strengthen the MOH's LMIS. This is, largely, an effort to bring the LMIS back to acceptable performance and to provide a solid foundation for supply planning.

This report documents the first activity in the plan of action developed jointly between the MOH's HTSS and the USAID | DELIVER PROJECT. In February 2013, the project and HTSS assessed the existing LMIS design features, processes, and technology solutions to determine strengths and weaknesses. The assessment involved key informant interviews at the national- and district levels, site visits to select districts and health facilities, and stakeholder workshops on February 8 (focused on LMIS technology solutions) and February 18–19, (focused on LMIS processes and performance). The key findings from the assessment showed that the LMIS has some important strengths, as well as critical weaknesses related to data collection, management, and use. It is also significantly constrained by factors external to the data or the LMIS design, such as funding and human resource capacity limitations. The evaluators developed recommendations after extensive consultation with and participation of stakeholders.

Key Findings

The key findings were that the system design and processes, as documented in the 2003 *Health Commodities Logistics Management System Procedures Manual*, are primarily sound and are still valid; recent trainings for health workers and supervisors has resulted in improved LMIS data collection and reporting. However, compliance with written procedures is weak. The list of commodities to be reported by lower-level health facilities for resupply is too long and is not prioritized. Hospitals do not have inventory control parameters; instead, they use parameters more appropriate to health centers, which manage far fewer products. In addition, although existing technology solutions—Supply Chain Manager (SCMgr) software and the National Stock Status Database (NSSD)—are institutionalized and used routinely at the district and national levels, they are no longer adequate and should be replaced with a fit-for-purpose integrated electronic LMIS (eLMIS).

Furthermore, external factors have a negative impact on the LMIS, including inadequate financing of health commodity procurement and distribution, which has resulted in a disconnect between reported demand and available supply and reduced confidence in the overall logistics system. Because not enough trained personnel with supply chain responsibilities are available at the facility-, district-, and central level, health workers are overburdened and inadequately supervised. A lack of dedicated transport resources and limited Internet availability disrupt the timely submission of LMIS reports and the ability of supervisors to conduct site visits. Also, the lack of clear procedures and dedicated resources for IT support—including repair or replacement of non-functioning hardware, performance of maintenance and security updates, and purchases and maintenance of software licenses to enable these updates—impact the security and integrity of data, as well as the availability and reliability of computers for use with SCMgr software or any future eLMIS.

Recommendations

Based on the findings and input from stakeholder workshop participants, the following recommendations are expected to improve the performance and use of the LMIS:

1. Replace the existing technology solutions (SCMgr and NSSD) with a fit-for-purpose integrated and online eLMIS that can exchange data with other systems (i.e., DHIS2, Central Medical Stores Trust [CMST], enterprise resource planning software, etc.) and leverages the promise of cStock, a mobile short message service (SMS) and web-based resupply and reporting system now used by health surveillance assistants in Malawi for a limited number of commodities. A preliminary business case for a new eLMIS is part of this report.
2. To reduce the number of stockkeeping units (SKUs) on LMIS reports, and to guide procurement decisions that are based on funds availability; prioritize essential medicines, based on criteria such as vital, essential, non-essential (VEN) analysis, and ABC¹ (most valuable or fast moving versus least valuable or slow moving) categorization.
3. To streamline management of the hundreds of different health commodities, hospitals must be supported with technical assistance to determine the appropriate inventory control parameters for large hospitals to use in managing their stock— instead of forced ordering, use a standard or continuous review.
4. Focus HTSS's attention on supervision capacity, including improved access to transportation and funding resources at the district level.
5. Identify program-specific data potentially required for the eLMIS (e.g., purpose of test, patient per regimen, lab equipment type/status, cold chain, etc.).
6. Clarify standard procedures at health facilities on how to record receipts on stock cards from all suppliers and how to record issues to health surveillance assistants (HSAs).
7. Review the unit of issue by SKU to determine if tablets or tins/packs should be used on LMIS records.
8. Revise the procedures manual to include updated roles and responsibilities for HSAs/drug store clerks; develop and institutionalize appropriate job descriptions.

¹ ABC analysis is an inventory categorization method in which items are divided into three categories, A, B and C: A being the most valuable or fastest moving items, C being the least valuable or slowest moving ones.

9. Based on recommendations 2, 7, and 8, print and distribute a revised procedures manual (at least two per facility); for health centers, print and distribute carbonless copy paper booklets of the revised LMIS 01A reports.
10. Monitor progress and advocate for adopting eGovernment policy and electronic transactions legislation. Legislation is particularly important for enabling electronic signatures and related approvals within a future eLMIS.
11. Establish and communicate procedures for reporting computer hardware/software issues and appropriate timelines for resolution.
12. Based on recommendation 11, assign budgetary resources and dedicated staff or contractors at each district to—
 - a. Purchase current operating system and antivirus licenses, as necessary.
 - b. Purchase and replace computer parts, as necessary.
 - c. Perform regular software security updates and resolve hardware/software issues within a reasonable time.

Risks

Although these recommendations are achievable, it is unclear whether there are sufficient resources and support within the MOH to implement an eLMIS and other required interventions. The HTSS/Pharmaceutical staff has had a significant turnover, including a leadership transition; therefore, they do not have an identified champion to move the recommended interventions forward.

Any initiative as complex as an eLMIS implementation will require strong, dedicated leadership; and extensive involvement from the HTSS/Pharmaceutical staff, as part of the governing/steering committee and project implementation team.

Just as important, it is unlikely that the funding is adequate, or that CMST has the institutional capacity for procuring and distributing most essential medicines. This issue alone, if not addressed by the MOH and development partners, will jeopardize the impact of these recommended interventions.

Background

During the past few years, the existing logistics management information system (LMIS) for health commodities in Malawi has underperformed because of the economic and financial challenges faced by the country. Within government services, generally, and health services, specifically, these forces have contributed to low morale and decreased productivity. These challenges, as well as non-performance issues within key agencies involved in the supply chain, resulted in a number of donors removing their financial support—for a temporary, but indefinite period—from the Ministry of Health (MOH) supply chain to a parallel supply chain managed by the USAID | DELIVER PROJECT. In addition, United Nations Children’s Fund (UNICEF) and SDV Malawi Ltd. (a local logistics firm) established another parallel supply chain for HIV commodities; the Central Medical Stores Trust (CMST) now provides storage, but SDV continues to distribute to facilities.

All effective supply chains are driven by accurate and timely logistics data related to demand, inventory, and pipeline information. Without quality logistics data, supply systems are more likely to have problems, such as stockouts, which make the system unresponsive to health facility and patient needs; and imbalances, which undermine facility services to patients and the accountability of the supply system. Malawi has had all these problems. Poor LMIS reporting rates are an ongoing challenge; according to the December 2012 LMIS reporting scorecard, the reporting rate from service delivery points was only 58 percent.

As part of its work plan for 2013, the USAID | DELIVER PROJECT developed a plan of action for teaming with the MOH HTSS/Pharmaceutical in the redesign and strengthen the LMIS for the MOH. This is, primarily, an effort to bring the LMIS back to a state of acceptable performance (targeting a 90 percent or better reporting rate) and to provide a solid foundation for supply planning.

This report documents the first activity, conducted in February 2013, which assessed the existing LMIS design features, processes, and technology solutions to determine strengths and weaknesses.

Assessment Methodology

The assessment methodology included key informant interviews at the central-, district-, and facility level. At the central level, interviews were conducted with staff within the MOH HTSS units (Pharmaceuticals, Diagnostics), MOH Information Technology unit, and program units (HIV/AIDS, tuberculosis, malaria, reproductive health, and Integrated Management of Childhood Illness). Other government units and personnel interviewed included the CMST and the Secretary for eGovernment. The team also interviewed partner representatives from Baobab Health Trust; Christian Health Association of Malawi (CHAM); Clinton Health Access Initiative (CHAI); D-Tree International; O&M Associates Financial Management Services, Ltd.; Supply Chains for Community Case Management (SC4CCM); and UNICEF. See appendix A for a list of central-level informants.

The assessment also used customized questionnaires to gather qualitative data, based on informant profiles in eight districts—Chitipa, Dedza, Kasungu, Lilongwe, Mangochi, Mzimba South, Salima, and Thyolo—with visits to district health offices (DHOs), district hospitals, and health centers. In addition, site visits were made to Kamuzu Central Hospital and Nkhoma Hospital (a CHAM

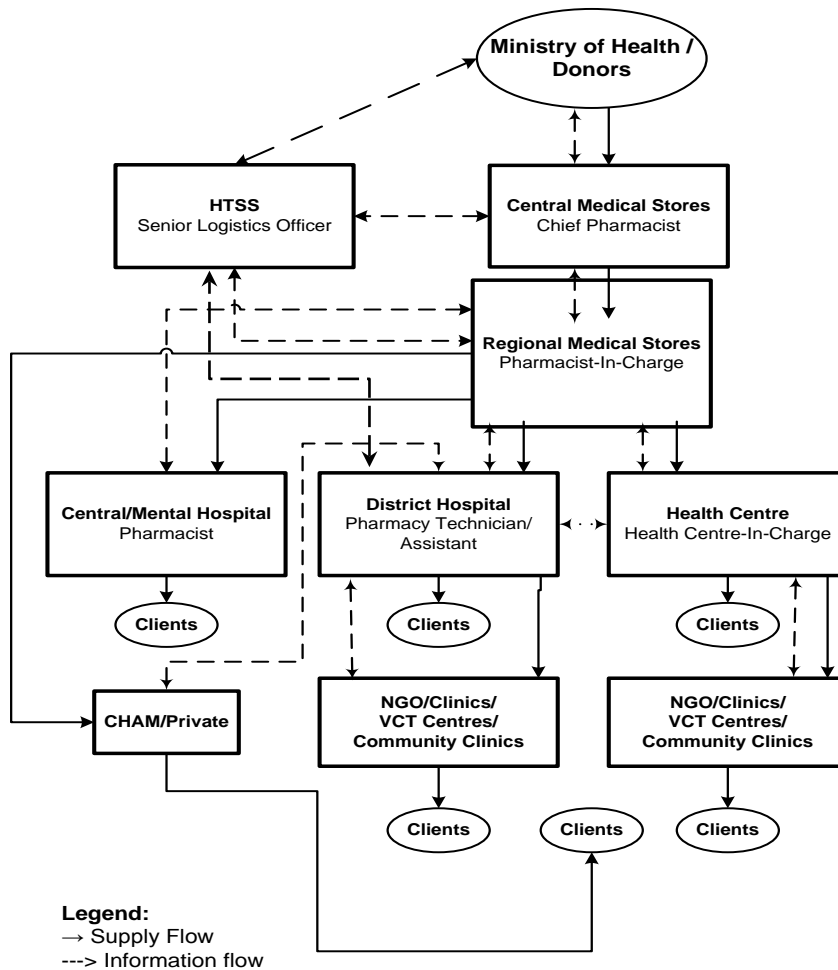
facility). Informants included district health management teams (DHMT), district pharmacy technicians (DPT), and personnel responsible for drug management at health facilities, as well as health center in-charges.

Two stakeholder workshops were also conducted. The first (February 8) focused on LMIS technology requirements and solutions, and the second (February 18–19) focused on broader issues around the LMIS processes and performance. The second workshop was used to validate findings, as well as to develop consensus on recommendations and next steps.

Structure of the Pipeline: Commodities and Data

The design of the integrated health commodity supply chain in 2003 (figure 1) assumed a central role for the CMS; which, at that time, was a unit within the MOH. The MOH or development partners provided products or funding for procurement. The CMS received them; distributed to three regional medical stores (RMSs) located in the northern, central, and southern regions of the country; and distributed once a month directly from the RMS to health facilities, including those managed by members of the CHAM. The health centers serve clients and also issue a limited number of products to health surveillance assistants (HSAs) and other community-based service providers.

Figure 1: System Design: Commodity and Data Flow



Distribution was based on the LMIS data reported by health facilities and calculated by DPTs, who submit monthly facility-specific requisitions to the RMS. The LMIS data is captured at the district level, entered into the computer-based Supply Chain Manager (SCMgr) database, then exported and emailed to the Health Technical Services and Support/Pharmacy (HTSS/Pharmaceutical) at the MOH every month. HTSS/Pharmaceutical consolidates the district data into a central SCSMgr master database and uses the data to measure key performance indicators and to inform annual quantification. To monitor the national pipeline for all commodities, data from SCSMgr is exported into the National Stock Status Database (NSSD), which also contains stock status data submitted by CMST each month.

Note that this system design does not include vaccines or tuberculosis (TB) drugs; they flow through separate vertical supply chains. Antiretroviral (ARV) drugs and HIV rapid test kits are included in LMIS reports, but they are distributed separately once a quarter. In addition, although laboratory commodities are included in the LMIS reports, a new system was designed—but not yet implemented—to accommodate the unique characteristics of many laboratory commodities.

All essential medicines are provided free to clients of public-sector facilities (CHAM and other private-sector facilities charge clients fees for non-program commodities); districts maintain budgets for health facilities to procure medicines from the CMS or, if the CMS cannot fulfill orders, from private distributors. However, many program commodities—contraceptives, vaccines, ARV drugs, TB drugs, antimalarial drugs, etc.—are free to the client and are provided without charge to both public-sector and CHAM facilities.

Findings

LMIS Strengths

The LMIS design, as currently documented in the 2003 *Health Commodities Logistics Management System Procedures Manual*, is fundamentally sound, contains essential data elements, defines reporting periods, defines inventory control (forced order maximum/minimum), and defines roles and responsibilities and essential records, etc. Appropriate procedure manuals with documented roles and responsibilities, as well as job aids for each process, are available.

Systems are in place for printing and distributing many LMIS forms (stock cards, Requisition and Issue Voucher (RIV), Med-194, delivery note, etc.). Malawi also has established technology solutions for collecting, managing, and analyzing LMIS data, including SCMgr and the NSSD—both single-user Microsoft Access-based databases. At both the district- and national level, SCMgr routinely consolidates and uses LMIS data to inform resupply and national quantification. To help determine when to initiate new procurements or requests for donations from suppliers, NSSD monitors the national stock status. A relatively new mobile system—*eStock*—manages reporting and resupply data for 19 community case management commodities used by HSAs. *eStock* uses SMS from mobile phones and a web portal; it is currently being scaled up to 15 districts.

Donors are committed to supporting supply chain technical assistance services and to funding the full supply of some high-priority program products. They also established parallel systems when the CMST was unable to meet both demand and performance levels.

The supply chain workforce recently expanded. In 2012, about 1,100 HSAs were trained to manage drug stores at the health facilities; typically, HSAs are from nearby villages and; therefore, are more likely to stay in the community, potentially reducing the attrition of skilled supply chain personnel at health centers. In addition, facility in-charges, district pharmacy technicians, and district health officers were trained to monitor and supervise supply chain personnel and processes. A mentoring program and monitoring and supervision tools were developed to further improve supervision. Finally, supply chain management curriculum was recently included in the diploma course for pharmacy technicians and in the new course for pharmacy assistants at Malawi College of Health Sciences. Pharmacy assistants, a new cadre within the health sector, will work in health facilities that manage the drug stores. Training HSAs in this role was to be a temporary measure to bridge the existing gap in human resource for supply chain management, because it will take years before an adequate number of pharmacy assistants have been trained and placed.

In some districts, LMIS data does move routinely, especially if the district has designated transport resources and/or schedules for LMIS data collection and for supervision. However, all districts face challenges in timely reporting. Many districts, but not all, can access the Internet to submit monthly LMIS data to HTSS/Pharmaceutical.

The policy environment governing electronic transactions and eGovernment services is progressing; the Government of Malawi has drafted an eGovernment policy and electronic transaction legislation, which are important enablers for establishing a more robust and integrated LMIS technology solution. Within the MOH, the LMIS is recognized, at least in theory, as a subsystem of

a broader health management information system (HMIS), although no practical integration has been attempted. Data from both systems are maintained and managed separately.

The CMST is currently expanding its *Sage Accpac* financial management system with a broader suite of *Sage Accpac* enterprise resource planning (ERP) modules, including inventory control and warehouse management.

LMIS Weaknesses

According to the December 2012 LMIS Reporting Rate Scorecard, only 58 percent of health facilities reported their LMIS data for the month. Timeliness of reporting is also problematic, with districts forced to choose between reporting incomplete data to the HTSS/Pharmaceutical on time, or waiting for late reports from health facilities before they submit complete data. The quality of the data is erratic, with calculation errors, as well as incorrect recording of data on stock cards and LMIS reports. These problems have many root causes.

The lack of integrated information systems have resulted in poor data visibility and inconsistent use for decisionmaking. Current technology solutions (SCMgr and the NSSD) are outmoded, not user-friendly, are incompatible with the latest Microsoft Windows and Office products, are difficult to update with new products, and lack the appropriate data security controls. Backups are not automated; passwords must be shared and cannot be changed. No established routine or budget is available for basic IT skills training for users, for hardware and software procurement, or for maintenance; this results in a dependence on partners, such as the USAID | DELIVER PROJECT for help with basic hardware/software issues. Also, access to the Internet is inadequate in some districts, causing some disruption in timely email transmission of the monthly LMIS database to HTSS/Pharmaceutical; although most districts have found work-around solutions.

At the district level, LMIS data are rarely used for decisionmaking. While some districts reported using LMIS data to inform budget requests and decisions about redistribution or procurement from the private sector, this was not general practice in all districts. Generally, data were not used during supervision visits to validate data reported via the LMIS reports with data recorded on stock cards. With the exception of delivery notes, feedback reports are not routinely provided to health facilities.

Although the data reported in the LMIS monthly reports are usually adequate, the LMIS does not have any information about cost per item, which makes it difficult for facilities or districts to determine what they can afford to order. To compound the problem, CMST prices its catalog in U.S. dollars, but facility and district budgets are in Kwacha; a volatile exchange rate has further disrupted decisionmaking. In addition, the LMIS reports for health centers contain 189 stockkeeping units (SKUs) (including products not in stock at the RMS) and they are eight pages long. These commodities are not prioritized and they are treated the same—health workers must enter data for every item. The list of commodities, and, therefore, the number of pages (requiring lines of zeros to be repeated for items that are seldom stocked), are too long; this results in a high reporting burden and data entry errors. For hospitals, the problem is compounded by the much larger variety of commodities they must stock; the current procedures manual requires hospitals to report on an extensive list of commodities—far more than health centers manage. Without adequate automation of inventory systems, the inventory management burden on pharmacy technicians is significant and not suited to the hospital's needs.

The lack of prioritization of commodities according to vital, essential, non-essential (VEN), or ABC categorization of fast versus slow moving products within the LMIS, results in inefficiencies and poor targeting of funds for procurement. Although the CMST catalog includes VEN categories,

formal policy guidance is not available for the commodities considered most important to maintain in full supply. Facilities, districts, and even donors must rely on their own judgment when deciding how to spend scarce funds on health commodities.

LMIS reports are not pre-printed or provided with carbonless copy paper for duplicate copies. Health facilities without photocopying machines, printers, or computers rely on the district pharmacy technician to print and provide copies of the reporting forms. Monthly reports are disrupted if the DPT does not have access to a working printer—which happens occasionally—or if the DPT fails to provide a blank LMIS report form. Lack of pre-printed carbonless copy forms also makes it more difficult for facilities to retain a copy of the report for their own records.

No clear method is established for moving LMIS reports from health centers to the district level, or for orders from the districts to the appropriate RMS. While some districts have assigned resources to collect the monthly reports—ambulances, supervisors using motorcycles, etc.—many facilities rely on staff, using their own resources, to deliver their reports to the district. Sometimes, friends or other people traveling into the district center will deliver the LMIS reports, but the reports may not reach the DPT in a reasonable time, if at all. It is common for reports to sit at a guard station or reception desk at the district hospital for weeks. District personnel typically have to travel to one of the three RMS facilities to submit facility orders, although some districts reported using fax machines.

The procedures manual requires that receipts be recorded on the stock cards in the receipts column, but the manual only mentions receipts from the RMS and from districts, because other sources of supply were not planned. Therefore, entering all receipts, regardless of source, is not consistently followed. Some facilities do not record donations from other sources, or receipts from private vendors, which means they cannot report actual stock status or record and report issues data; the result is the under-reporting of true demand. In addition, health facilities have been given inconsistent information about how to record stock issued to HSAs. Some health-facility staff record this data correctly as issues, while others were told to record them as adjustments, which is incorrect. This results in artificially low consumption data and inaccurate data for losses and adjustments.

According to the procedures manual, the unit of issue should be recorded on stock cards and LMIS reports as tablets or pieces (for condoms). However, because of the high volume of tablets or pieces, these records do not have enough space to accurately and clearly record data, and the high volume results in large figures that can lead to calculation errors. In addition, common inventory management practice stipulates that the unit of issue of a SKU should be the smallest pack size. Tablets, as a unit of issue, should be recorded only in a dispensing ledger. Because the data for the LMIS reports come from stock cards and not dispensing ledgers, the procedures manual and the LMIS reports should be revised to capture the smallest pack size as the unit of issue, with an option for estimating partial pack size, if warranted (reporting one-half or one-quarter of a tin of 1,000 as issued, for example).

For LMIS data at the CMST, inventory management data is currently managed in *CHANNEL* software, which the United Nations Population Fund (UNFPA) provided free of cost. CMST recently expanded its use of the *Sage Accpac* financial management system; they implemented the full *Sage Accpac* ERP system, including inventory control and related warehouse management system (WMS). However, investments by UNFPA to build a data interface between *CHANNEL* and *Sage Accpac* financial—with directives from the MOH indicating a preference to maintain *CHANNEL* as the WMS—has left CMST with the possibility of having redundant systems that require double data

entry. Maintaining both systems undermines CMST's autonomy and will result in increased cost of ownership for implementation and operations.

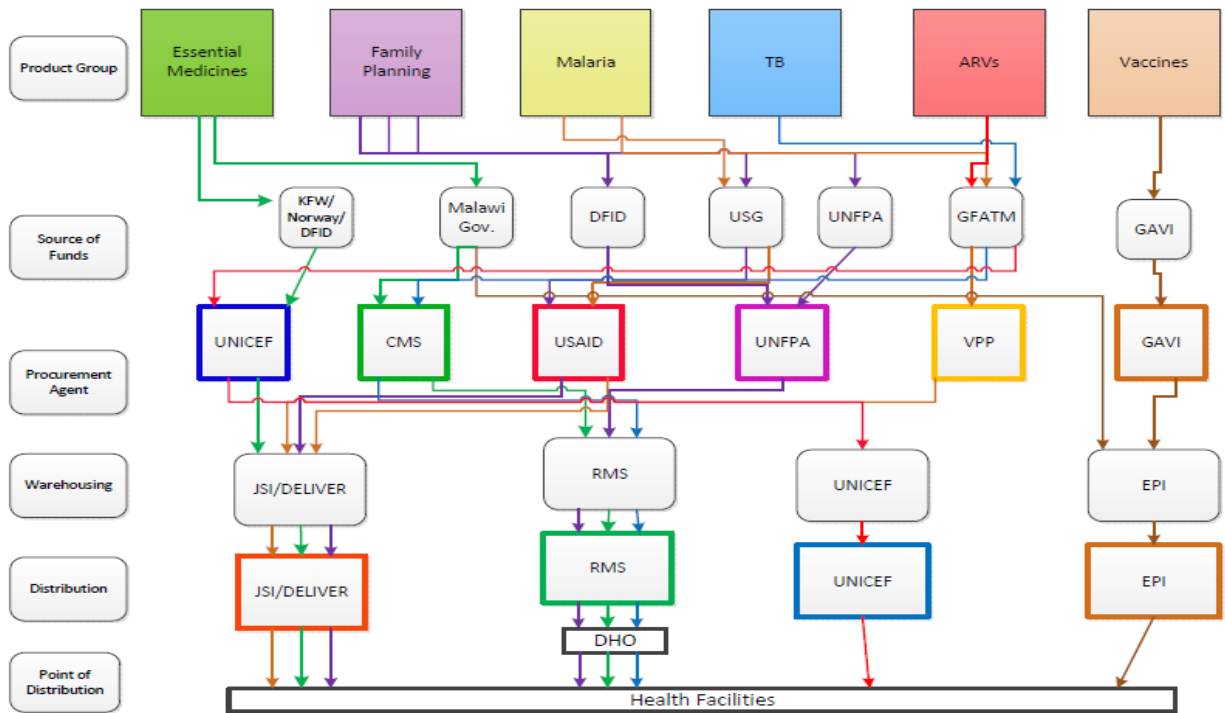
External Constraints

In addition to the weaknesses found in the LMIS, the assessment also identified many constraints that are not directly related to the LMIS, but that undermine the LMIS and, therefore, the performance of the entire supply chain. Of particular note are problems in the funding and supply of commodities, limited human resources (HR) for supply chain management (HR for SCM), insufficient transportation resources and storage space, and meager support for information communication technology (ICT) at the district- and facility level, especially.

Funding and Supply

- *Absence of full supply for many essential medicines:* This overarching problem is related both to the inadequacy of funding, as well as to the insufficient capacity to quantify and procure commodities in a timely and routine way. According to a recent analysis of the pipeline for essential medicines kits, the country only has sufficient stock to last until September 2013. The Department for International Development (DFID) is forward-funding U.S.\$24 million procurement to replace the kits. In principle, these supplies will start to arrive in July/August; although, because the tender does not close until the end of May, this may be optimistic. In addition, still to be settled, are the arrangements for in-country management of the commodities to ensure continued supply. Therefore, the country is already at risk for stocking out if the lead time for the tender is too long, or if the decision on in-country storage and distribution is not finalized soon. Shortages and stockouts have been endemic in the system, undermining confidence in the supply chain, in general, and resulting in low motivation of health center personnel to submit comprehensive monthly reports for all 189 commodities, as currently required.
- *Multiple parallel supply chains (see figure 2) with little coordination and unclear ownership and accountability:* With four different distributors of public health commodities, and a variety of third party logistics (3PL) providers, there is some redundancy and inefficiency in delivering commodities to health facilities. Inefficiencies are further compounded by the need for districts to procure from various private-sector suppliers (wholesalers and distributors) in order to cover gaps in supply. Health workers and DHMTs are confused about the sources of supply and they are uncertain about whom to hold accountable.

Figure 2: Public-Sector Health Supply Chains in Malawi



- Current use of standardized essential medicines kits:* The standardized kits, containing about 60 items, were an emergency response to a breakdown in the national health supply chain. However, because the content of the kits are not adjusted based on consumption, and because they are pushed to facilities, the kits have disrupted the link between the monthly reporting by facilities and the appropriate resupply of many essential medicines. In addition, to avoid shortages or potential expiries at the facility level, the use of kits necessitates regular follow-up by supervisors to redistribute supplies; this increases the management burden on district supervisors. In practice, this type of redistribution has not been routinely feasible.

The distribution of essential medicines kits—currently the responsibility of the USAID | DELIVER PROJECT and, with funding from the Global Fund, John Snow, Inc.—is expected to be shifted to CMST. However, the MOH HTSS/Pharmaceutical and development partners have not prepared or planned enough for this change in responsibility. It is unclear whether CMST has the human, financial, and transportation resources and management capacity needed to meet and maintain the level of service required. In addition, no effective ordering system is in place to transition from the kits and to return to a routine resupply system, based on the LMIS reports from health facilities.

- Poor order fill rates by CMST:* The CMST has a history of underperformance, due, at least partially, to a history of undercapitalization. It has been unable to maintain routine availability for most of its catalog items. CMST’s inability to fulfill orders routinely has eroded confidence in the public-sector health supply chain, resulting in decreased reporting rates from facilities that see little-to-no connection between the LMIS reports they submit and the type and quantity of products they receive. Because of this history of underperformance, some DHMTs have strategically decided *not* to pay outstanding debts to CMST. Instead, they will use the available funds to

procure from private-sector distributors. DHMTs prioritize payment to the private distributors because they must maintain good relations with the distributors they depend on, and they experience no immediate consequences for failing to pay CMST. This compounds CSMT's financial challenges.

Human Resources for SCM

- *No logistics management unit (LMU) at the MOH:* Although health commodities are essential for effective healthcare delivery, no dedicated or influential unit within the MOH is charged with supply chain management and/or is responsible for national quantification and budget preparations for health commodities. In addition, no established positions within the MOH structure are designated as logistics or supply chain directors, managers, or officers. HTSS/Pharmaceutical is understaffed and has a much broader mandate, which means supply chain management receives much less support and attention than required.
- *Inadequate supervision:* Because of the insufficient numbers of skilled staff and the gaps in funds and transportation for routine site visits, supervisors—especially from DHMTs—cannot provide adequate oversight of and support to facilities. To be effective, the supervision of health facilities in inventory control, drug store management, and LMIS records requires a few hours, per facility. But, even when they happen, DHMT supervisory visits are often brief and are not thorough enough. Also, with a shortage of DPTs in most districts, one or two must function as both the district hospital pharmacy technician, as well as the district pharmacist technician charged with supervising health center drug stores and the LMIS.
- *High attrition rate for trained staff, especially at the district- and central level:* As in most countries, trained staff at all levels of the supply chain have high rates of attrition; also, routine or institutionalized SCM training is not available for new or transferred staff at the facility-, district-, or central level. Some DPTs have a degree of skill in supervising and mentoring facilities in supply chain management functions; they also have skills in using data from SCMgr to quantify need and develop evidence-based budgets. However, it is usually the case that few members of the DHMTs have any capacity for SCM supervision or quantification.
- *Gaps in placement of HSAs as drug store clerks:* More than 1,100 HSAs were trained as health center drug store clerks last year, but many gaps remain in placing trained HSAs within health centers. This is particularly true in facilities managed by members of the CHAM, which represents approximately 40 percent of all health facilities. Very few CHAM facilities have accepted HSAs placed by the MOH, preferring instead to have their own pharmacy attendants trained to manage health commodities.
- *Need for revised procedures manuals and job descriptions:* The training and placement of HSAs was an innovative approach to the problem of staff attrition at the health-center level; but, long term, the plan is for a new cadre of pharmacy attendants to replace them. Nonetheless, the roles and responsibilities of this function must be institutionalized with updates in the *Health Commodities Logistics Management System Procedures Manual* and with revised job descriptions for HSAs or pharmacy attendants assuming the role of drug store clerks.

Transportation and Storage

- *Inadequate transport resources:* As mentioned earlier, most districts do not have adequate transportation resources (vehicles or fuel) for routine supervision and data collection. Some

districts use ambulances, others have dedicated motorcycles for DPTs to use to visit sites, but these are in the minority. Nonetheless, it does appear that DHMTs have resources available or provided by partners—for example, motorcycles for environmental health officers—but, they have not given priority to health commodity supply chain needs.

- *Lack of dedicated funds for fuel and transport:* Poor data reporting rates and timeliness in submitting routine LMIS reports by health facilities has a root cause in lack of dedicated funds for submitting reports. Many health workers must use their own resources to deliver monthly reports to the district. In some cases, LMIS reports are sent with friends, colleagues, bus drivers, or others; these unofficial carriers drop off the reports with guards or at the hospital reception desk. Often, these reports are lost or discarded, unless the DPT attempts to find them.
- *Impending end of contract for delivering essential medicine kits to health centers:* As mentioned earlier, the transfer of responsibility for delivering essential medicine kits has not included robust preparation or an analysis of CMST's readiness and capacity to take on the task. It is unclear whether CMST has the necessary vehicles, storage space, warehouse management systems, route planning capacity, or funding to meet performance expectations.
- *Inadequate storage capacity at district hospital pharmacies and health centers:* Most health facilities do not have the storage space to maintain optimal inventory levels for all products they are expected to manage; and they often must store expired product because of the long process required for disposal. In addition to space constraints, most drug stores are poorly designed and equipped; they lack sufficient shelving, pallets, material handling equipment, and temperature control. These limitations impede broader supply chain optimization opportunities—such as changing to a bimonthly or quarterly resupply schedule—because these changes would require higher inventory levels.

Information Communication Technology

- *Limited ICT expertise:* Computers are commonly used at the central- and district levels, as well as in hospitals; but these institutions have limited capacity for hosting or administering networks and systems, for providing end-user support (hardware and software), or for ensuring data security using back ups and virus protection. Most skilled ICT personnel work in the private sector and only in large urban areas, so simple problems with hardware or software—such as SCMgr—may remain unresolved for extended periods.
- *Unreliable access to the Internet:* All districts are now linked to the Internet, but wired network access does not necessarily extend to pharmacy stores where most DPTs work and where computers with SCMgr are located. As a result, some DPTs are left on their own when trying to email the monthly SCMgr database to HTSS/Pharmaceutical. In some cases, the USAID | DELIVER PROJECT has purchased wireless modems for DPTs, but these require monthly top-up loads that are not in the DHMT budgets. In other cases, DPTs must download data to a USB drive and go to another location to email the reports.

Recommendations

1. *Replace existing technology solutions—SCMGr and NSSD—with a more robust, integrated, and online eLMIS that leverages the promise of cStock and is able to exchange data with other systems (i.e., DHIS2, CMSTs ERP, etc.).* Although initially targeted for the central- and district level, it should eventually—depending on access to the Internet and availability of technology—extend to hospitals and health centers. The solution must compensate for the existing limitations in ICT, especially at the district level. The next section presents a preliminary business case for an eLMIS.
2. *Prioritize essential medicines.* Base priorities on criteria, such as VEN analysis and ABC categorization, to reduce the number of SKUs on LMIS reports; and, to guide procurement decisions by the facility-, district-, and central level based on availability of funds.
3. *Determine appropriate inventory control parameters and reporting and requisitioning procedures for large hospitals.* Use standard or continuous review, instead of forced ordering, to streamline managing the high number and volume of different health commodities that hospitals must stock.
4. *Focus HTSS's attention on supervision capacity.* Include improved access to transportation and funding resources at the district level. In the long term, establish a logistics management unit within the MOH, preferably reporting to the permanent secretary; and include specific SCM position descriptions, competencies, and career paths.
5. *Identify program-specific data potentially required for an eLMIS—e.g., purpose of test, patient per regimen, lab equipment type/status, cold chain, etc.*
6. *Clarify standard procedures at health facilities.* Include recording receipts from all suppliers on stock card and issues to HSAs.
7. *Review the unit of issue by SKU.* Determine whether tablets or tins/packs should be used on LMIS records.
8. *Revise the Health Commodities Logistics Management System Procedures Manual.* Include updated roles and responsibilities for HSAs/drug store clerks, and develop and institutionalize appropriate job descriptions.
9. *Print and distribute revised procedure manuals and LMIS O1A Report booklets (at least two per facility).* Base this on recommendations 2, 7, and 8; print and distribute carbonless copy paper booklets of the revised LMIS O1A Reports (for health centers).
10. *Monitor progress and advocate for adopting the eGovernment policy and electronic transactions legislation.* Legislation is particularly important for enabling electronic signatures and related approvals for a future eLMIS.
11. *Establish and communicate procedures for reporting.* Include computer hardware/software issues and appropriate timelines for resolution.
12. *Based on recommendation 11, assign budgetary resources and dedicated staff or contractors at each district to do the following:*
 - Purchase current operating system and antivirus licenses, as necessary.

- Purchase and replace computer parts, as necessary.
- Perform regular software security updates and resolve hardware/software issues within a reasonable time.

Risks

Although these recommendations can be achieved, it is unclear if sufficient resources and support within the MOH are available to carry forward an eLMIS implementation and other required interventions. The HTSS/Pharmaceuticals staff has had a significant turnover, including a leadership transition; therefore, it does not have a champion to own and move the recommended interventions forward.

Any initiative as complex as an eLMIS implementation will require strong and dedicated leadership, including extensive involvement from HTSS/Pharmaceutical as part of the governing/steering committee and project implementation team.

Just as important, there is significant doubt about the adequacy of funding, and whether CMST has the capacity to procure or distribute most essential medicines. If the MOH and development partners do not address these issues, they will jeopardize the impact of these recommended interventions.

Preliminary Business Case for an eLMIS in Malawi

Current State

Malawi has established technology solutions for collecting, managing, and analyzing LMIS data, including SCMgr and the NSSD; both single-user Microsoft Access databases. Both solutions have an experienced user base; and a culture of using technology for collecting, managing, and using LMIS data, both for resupply and performance monitoring.

SCMgr is used routinely at both district- and national level to consolidate and use LMIS data to inform resupply and national quantification. Each month, data from facilities—including closing balance; receipts, issues, and losses/adjustments—are entered into SCMgr at the district level; order quantities are automatically calculated. SCMgr prints a *District Aggregate Monthly Report* (order worksheet) for all facilities, which is submitted to the appropriate RMS, with a consolidated Med-194 form, including total quantity and cost information, based on the CMST catalog. SCMgr does not print the MED-194; it must be handwritten.

Each month, after all data from the facilities have been captured, every district emails an export of its monthly data from its updated SCMgr database to HTSS/Pharmaceutical at the MOH; the data is consolidated from all 28 districts into a master SCMgr database.

After that, data is exported and then imported into NSSD, which also contains monthly stock data provided by CMST. The data is used to monitor the national supply plan and determine when to procure or request additional commodities from suppliers. However, monthly updates from CMST must be requested each month by HTSS/Pharmaceutical staff, are generated manually, and are not provided as routinely as needed.

Both the existing technology solutions (SCM and NSSD) are outdated (see table 1). These single-user solutions are not integrated or networked, which limits data visibility and increases the level of effort in executing data interchange. Users have indicated that they are not user friendly. SCMgr, in particular, is difficult to update with new products, which results in discrepancies between LMIS reports and the commodity lists in SCMgr databases. Neither solution has appropriate data security controls: backup systems are not automated; passwords in SCMgr must be shared and cannot be changed.

Table 1: Strengths and Weaknesses of Existing Solutions

Strengths	Weaknesses
Supply Chain Manager	
Auto-calculation reduces workload	Prone to crashes
Collects essential logistics data	Not user friendly; cumbersome data entry
Aids in making redistribution decisions	Cannot handle the volume of data required

Strengths	Weaknesses
Data is more easily accessible than with paper-based system	No longer compatible with Windows newer than XP and latest versions of MS Office
Data is validated	Stand-alone, single user
Reports are easily generated	Accessible only to select stakeholders
Reduces need for paper	Reports are not easily customizable
Password protected	Product list is updated centrally (hospitals sometimes need to be able to add items to the list)
Data export is possible	Password cannot be changed by user or administrator
	Data export is not easy
	Not networked
	Not integrated (e.g., CMST, health management information system)
National Stock Status Database	
Report customization possible	Limited access as a stand-alone system in a single location; single user
Contains disaggregated data down to the facility level	Long processing time required for each monthly import
Reports are easy to understand	MS Access database limitation on number of records requires archiving of data
	Not secure; not currently password protected
	Data exchange is difficult; not integrated
	Business continuity at risk; no backup
	No hard copy documentation; video rather than physical user manual

The MOH and districts have almost no capacity to host or administer networks and systems, provide end-user support (hardware and software), or ensure data security with backups and virus protection. Simple problems with hardware or software at the district level—for example, SCMgr—can remain unresolved for long periods of time. Because SCMgr data resides on district computers, it is particularly vulnerable to loss or database corruption.

All districts are now linked to the Internet, but network access does not always extend to pharmacy stores where most DPTs work and where computers with SCMgr are located. As a result, some DPTs must manage alone when trying to email the monthly SCMgr database to HTSS. This barrier must be specifically addressed as part of any project plan to implement a new system.

cStock

A relatively new mobile system—*cStock*—an SMS and web-based resupply and reporting system, is used to manage 19 community case management (CCM) commodities that the HSAs and other community health workers distribute. SC4CCM, a project funded by the Gates Foundation and implemented by John Snow, Inc., supports *cStock*. It uses simple text messages from mobile phones and a web portal; it is currently being scaled up to 15 districts. Data are sent through SMS from HSAs; *cStock* calculates resupply quantities and transmits that information to the appropriate health centers where the HSAs collect their commodities. Health center staff send text messages back

through the system to inform HSAs when their orders are ready for pick up. *eStock* also provides customized logistics reports through its web-based dashboard, which empowers managers at different levels with real-time logistics reports for monitoring product availability, day-to-day problem solving, and supply chain decisionmaking; as well as quantification of community-level managed products for CCM, malaria, family planning, and HIV programs. It is expected to be rolled out to all districts by the end of 2014.

Because of the significantly larger number of commodities that health centers are expected to manage, *eStock* cannot be used to report all LMIS data for the 189 products. However, it is a promising system that could be adapted as a monitoring system for reporting the availability of a shorter list of tracer commodities from all health facilities.

Electronic Medical Records Pharmacy Module

A point-of-care electronic medical records (EMR) system, based on OpenMRS, is currently being used to manage clients enrolled in antiretroviral treatment (ART) at 43 facilities in Malawi.

Supported by the U.S. Centers for Disease Control and Prevention (CDC), Baobab Health Trust, in collaboration with the University of Pittsburg and Dimagi—which also developed *eStock*—is developing and implementing the system for the Department of HIV and AIDS.

The goal is to roll out the EMR to all ART sites in the country, including all hospitals and many health centers. The EMR system functionality currently allows prescriptions to be tracked for all patients and dispensing data to be tracked for inpatients. The funders and implementers plan to develop a pharmacy module for all dispensing that also enables inventory management for health commodities.

The proposed EMR pharmacy module is an opportunity for collaboration to ensure that both the EMR and a future eLMIS can exchange data and leverage the functionality of each system to reduce data entry burdens at the health-facility level and to improve data visibility at every level of the supply chain.

District Health Information System, Version 2

Malawi has implemented District Health Information System version 2 (DHIS2) as its backbone HMIS. DHIS2 is primarily used to collect and manage service statistics. It does not provide functionality for transactions and, therefore, cannot be used as an LMIS; but, it is used to monitor a few logistics performance indicators. The system contains patient data collected through routine HMIS reports, which are particularly valuable for validating consumption data reported through the LMIS. This validation is currently challenging because of the lack of integration and the lack of networked versions for the LMIS solutions.

Objectives

In partnership with the MOH, the vertical programs, and development partners, the USAID | DELIVER PROJECT will oversee the design and implementation of a national electronic logistics management system (eLMIS). This system, in various forms, will provide the critical tiers for an information system:

- an integrated, fully networked data management solution for use by data generators to collect, standardize, quality-check, store, and protect logistics data

- an analytical toolkit for analysts, or others involved in processing the raw data, in accordance with standardized thresholds, business rules, and management report input requirements
- a predefined and custom reporting toolkit for administrators, managers, and other decisionmakers
- technical interfaces for exchanging data with other relevant systems (cStock, DHIS2, EMR, CMST ERP, etc.)
- easy-to-use interfaces for normal operations and support personnel.

The objective is to improve the supply chain capability by enabling health facility staff—from district offices, to vertical program managers, to funding partners—to collect accurate and timely inventory and usage data; this will improve access to information for all stakeholders and will enable them to make well-informed decisions. Because this information is national in scope, and is used for program management and policymaking, it is expected to have an enduring impact on supply chain performance and health outcomes.

Future State

The future state requires that the MOH champion the project to ensure full ownership and sustainability of the eLMIS. The over-arching scope of the project will include specific functionality to be provided within the eLMIS, including—

- a system of centralized health commodity data for all levels of the healthcare system using an eLMIS as a data warehouse to capture consumption data from the health facilities and distribution data from CMST and/or other public health commodity distributors
- collection of data from all pilot programs, ensuring data integrity at the point of data entry, from paper-based Request & Requisition (R&R) forms; and opportunities using new technology to capture data via web applications, mobile devices, remote desktops, and manual data entry
- timely and accurate data key performance indicator (KPI) reports for all stakeholders, from the district offices, to the vertical program managers, to the funding partners.

During a one-day stakeholder workshop on February 8, 2013, 25 participants—including users of SCMgr and NSSD—met to discuss the strengths and weaknesses of the existing solutions and to discuss an ideal LMIS future state. The results are presented in table 2.

Table 2: Ideal LMIS Solution for Malawi

Simple and robust system	Generates feedback reports
Supports all levels (central and Central Medical Stores, district, health facilities, development partners)	Identifies gaps in funding and stocks
Provides information, data for decision making for all stakeholders at each level	Provides delivery schedules and quantity issued
Contains all products, as well as tracer list	Provides prompts and alerts
Accessible via database, Internet, cell phones	Enables redistribution

Resides in the <i>clouds</i> and all levels	Accessible real-time at all times
Link to/compare with health management information system, Central Medical Stores Trust, other systems	Ease of accessibility, ease of use
Clear escalation for problem solving	Networked and access based on location
Visibility into status, at all levels, including what is in transit, available, on order, or near expiry at each level	User rights by user profile
Provides hardcopy reports and electronic forms	Automatic backups and recovery system

Business Need

Project Benefits

The identifiable benefits from the project are improved data visibility throughout the supply chain, enabling closer and more-timely monitoring of the supply chain, as well decisionmaking at all levels; from district health officers and district pharmacy technicians, to vertical program managers and MOH officials. Better data visibility will enable decisionmakers to—

- forecast and plan supply, allowing more accurate and timely ordering of medical commodities
- anticipate and avoid stockouts, allowing timely intervention
- identify overstocks, enabling redistribution prior to expiry
- report data to meet funding partner requirements
- compare data with other sources to validate data quality and consumption rates.

Technology Implications

Due to varying levels of access to accurate and timely information, both HTSS/Pharmaceutical and vertical programs have devised ways to collect LMIS data and to calculate usage, forecasting, and supply planning. The current single-user technology solutions for LMIS data in Malawi cannot provide sufficient data visibility across commodity groups, or to all programs and stakeholders. As a result, programs have developed work-around systems that are neither efficient nor sustainable, and that include redundant paper-based and Excel spreadsheets/reports.

If an eLMIS is implemented, a multi-user integrated data collection system will be available; it will be able to receive, store, and support analysis of health commodity data. Access to data will depend on user profiles, instead of the physical location of the user or the data. In addition, the eLMIS will facilitate the introduction of other technologies, such as interpretation of paper report forms through optical character recognition scanning, use of barcode reader data, and routine automated exchange of data with other relevant systems.

Financial Analysis

Financial analysis cannot be done without additional information about user and system requirements and project strategy, which are deliverables for the next eLMIS activity. However, investing in an integrated eLMIS solution that supports strategic planning and provides data for decisionmaking can achieve significant cost savings by better informing quantification and procurement decisions; and by enabling more effectively monitoring the supply chain to mitigate the risk of oversupply and expiry, undersupply and stockouts, and diversion or theft of commodities.

While the benefits identified above are intangible, greater visibility into supply chain operations is expected to reduce costs by reducing commodity expiry and diversion or theft throughout the supply chain; this is particularly true at the health facility by capturing the reason for losses per item and the ability to monitor consumption data versus patient data.

Alternatives

Only two alternatives to pursuing an eLMIS are available: (1) do nothing and maintain the current solutions, or (2) leverage existing opportunities by implementing *Sage Accpac* ERP at CMST to attempt to add functionality to that solution, assuming CSMT is willing to do so. See table 3 for the two analyzed alternatives.

Table 3: Alternatives to eLMIS

Option Description	High-Level Cost Estimate	Advantages	Disadvantages	Risks and Mitigations
Recommended: Implement a new eLMIS based on Tanzania and Zambia model, or a commercial option	To be determined: Upfront investment and ongoing cost of ownership to be assessed during strategic planning process	<ul style="list-style-type: none"> • Greater functionality and interoperability in fit-for-purpose solution • Improved data visibility and use 	<ul style="list-style-type: none"> • Initial investment cost • Significant change management required 	<ul style="list-style-type: none"> • Requires MOH ownership and infrastructure; ownership issue is associated with and dependent on proposed logistics management unit being established; infrastructure—esp. hosting and admin—could be outsourced
Alternative 1: Do nothing and maintain current solutions	Significant costs in troubleshooting	<ul style="list-style-type: none"> • Continuity and familiarity of users 	<ul style="list-style-type: none"> • Short lifespan • Limited ease of use • Ad hoc and uncoordinated investments in automation • No data security • No user support 	<ul style="list-style-type: none"> • Continuing things <i>as is</i> prevents the benefits of integrated data for visibility and use in supply planning, prevention of stockouts and expiry of overstocks, and the availability of data for funding partners
Alternative 2: Custom-develop a <i>Sage Accpac</i> module to manage all LMIS data and reports	High development costs	<ul style="list-style-type: none"> • Additional functionality to an existing/in-process technology 	<ul style="list-style-type: none"> • Management of all logistics data is not within Central Medical Stores Trust 	<ul style="list-style-type: none"> • At least 50% of LMIS data is extraneous to CMST's mandate and core business, but 100% is within MOH and local

			<p>(CMST) mandate</p> <ul style="list-style-type: none"> • Delay of logistics management information system implementation until <i>Sage Accpac</i> enterprise resource planning (ERP) is fully implemented • High cost of custom development and maintenance • Significant change management required 	<p>government mandate.</p> <ul style="list-style-type: none"> • Timeline for deployment of <i>Sage Accpac</i> ERP at CMST is unknown (CMST is doing it on their own). Waiting for deployment and associated modules would indefinitely delay implementation of a Malawi LMIS.
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Appendix A: Key Informants

Name	Title	Organization
Ivy Zingano	(Principle contact)	MOH/ Health Technical Services and Support (HTSS)/Pharmaceuticals
Lindiwe Zaina	IT/MIS Officer	MOH/HTSS/Pharmaceuticals
Charles Chimenya	Logistics Officer	MOH/HTSS/Pharmaceuticals
Dorica Chirwa	Logistics Officer	MOH/HTSS/Pharmaceuticals
Doreen Ali	Program Manager	MOH/National Malaria Control Program
Austin Gumbo	Program Officer, M&E	MOH/National Malaria Control Program
Dubulao Moyo	Program Ass't, M&E and Case Management	MOH/National Malaria Control Program
John Sande	Case Management Officer	MOH/National Malaria Control Program
Jean Mwalabu	Nat'l FP Coordinator	MOH/Reproductive Health Unit
Clifford Dedza	Logistics Officer- Integrated Management Of Childhood Illness (IMCI)	MOH/IMCI Unit
Caroline Ntale	Technical Ass't for Supply Chain & Logistics	MOH/Dept. for HIV and AIDS
Frank Chimbwandira	Department Head	MOH/Dept. for HIV and AIDS
Andreas Jahn	Technical Ass't for M&E	MOH/Dept. for HIV and AIDS
Henderson Mgawi	Drug Mgmt & Logistics Officer	MOH/National TB Control Program
Isaac Chelewani	Drug Mgmt & Logistics Officer	MOH/National TB Control Program
Reuben Mwenda	Deputy Director	MOH/HTSS/Diagnostics
Gibson Kapokosa	IT Manager	MOH/IT
Olive Chikankheni	Secretary for e-Government	GOM Office of the President
Feston Kaupa	Chief Executive Officer	Central Medical Stores Trust
David Chima	IT Manager	Central Medical Stores Trust
Annie Chiombeza	Pharma. Supplies Officer	Christian Health Association of Malawi
Stephen Mjuweni	IT/S Consultant	O&M IT/S and Management Services Ltd.
Frank Mvalo	Managing Consultant	O&M IT/S and Management Services Ltd.
Sam Chirwa	PHC Specialist	United Nations Children's Fund
Ernest Zulu	Pharmacy Technician	Lilongwe District Health Office
Alex Gondwe	Director of Operations	Baobab Health Trust
Oliver Gadabu		Baobab Health Trust
Bertha Simwaka	Executive Director	Baobab Health Trust
Asif Ali	Programme Manager, Drug Access	Clinton Health Access Initiative
Cary Reid	Programme Manager, Malaria	Clinton Health Access Initiative
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