TECHNICAL BRIEF

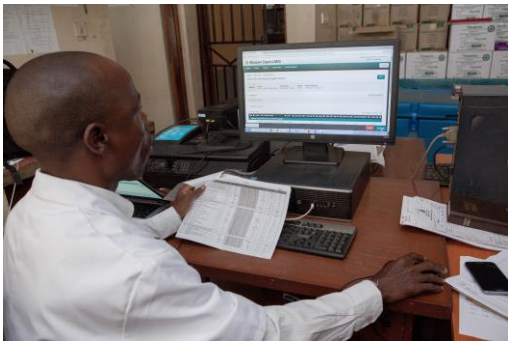
OpenLMIS Deployment in Malawi Enhances Health Commodity Data Collection

Background

Since 2005, the Malawi Ministry of Health had used Supply Chain Manager (SCMgr), a stand-alone Microsoft Access-based application installed in 33 data entry sites, to collect essential health commodity logistics data nationwide. Over time, SCMgr proved inadequate for meeting routine supply chain data collection needs. Faced with its high administrative costs, inability to provide centralized technical support for users, and incompatibility with the then-latest version of Microsoft Office, the Ministry of Health sought to upgrade and replace the system.

In 2013, the Ministry of Health conducted a detailed requirements-gathering workshop that established the desired functionality and implementation timeline for a robust electronic logistics management information system (eLMIS) that would replace SCMgr. Workshop participants agreed that the selection of a sustainable, scalable software solution was a priority, and the Ministry decided that OpenLMIS version 3.0 was the most viable option to meet data collection needs. OpenLMIS version 3.0 provided Malawi with a robust, expandable solution that offered an enhanced web-based platform, facilitated real-time data visibility at the national level, supported central administration and monitoring functionality, and established a more responsive ordering process. As an open source application, OpenLMIS offered added benefits such as lower cost through unlimited installations and regular product enhancement from the development community without obligation to a specific vendor. At the time of selection, neighboring countries with similar supply chain challenges had successfully deployed earlier versions of the application.

Implementation



A pharmacist enters data into OpenLMIS.
Photo credit: MovingMinds Malawi

In February 2017, the USAID Global Health Supply Chain Program-Procurement and Supply Management (GHSC-PSM) project and the Malawi Ministry of Health convened an in-country steering committee tasked with establishing a plan to implement OpenLMIS version 3.0, which was at that time the latest iteration of the software. The committee comprised members of various departments within the Malawi Ministry of Health—including Health Technical Support Services (HTSS), the Central Monitoring and Evaluation Department (CMED), the Central Medical Stores Trust (CMST), and the Electronic Government (E-Government) Department of Malawi. Through support of organizations such as VillageReach, a nonprofit specializing in the facilitation of health care access in rural

areas within developing countries, GHSC-PSM provided technical guidance to help these government departments assess their needs and facilitate the customization and implementation of OpenLMIS as the data collection solution for the national health supply chain system. Between February and the launch of the software in July 2017, GHSC-PSM also oversaw the migration of five years of historical data into OpenLMIS and coordinated training of more than 100 staff from districts, central hospitals, health centers, and CMST on the new system. The steering committee served as the Ministry's advisory board in making critical decisions, for example, on identifying the sources of master data including health facilities and health products to be managed in OpenLMIS.

Drugs used to treat people living with HIV are stored at Ntchisi District Hospital pharmacy. *Photo credit: MovingMinds Malawi*

Activities and Results

In August 2017, GHSC-PSM collaborated with Malawi's Ministry of Health and VillageReach to roll out the first usable version of OpenLMIS countrywide. A total of 38 data entry sites were strategically placed throughout the country to capture data for all of Malawi's health facilities, replacing SCMgr in collecting health facility data for that reporting period.

Since its implementation, the deployment of OpenLMIS has resulted in greater access to and usage of data in over 650 (95 percent) of Malawi's 684 health facilities for more than 300 essential health commodities across six national health program areas. Exhibit 1 below shows the number of products reported in OpenLMIS. Collection and availability of this significant amount of data continues to translate into informed decision-making on key supply chain interventions including quantification, supply planning and monitoring of uptake of new medicines; this is especially the case for the tuberculosis (TB), reproductive health, HIV, and malaria programs.

The increase in the number of products reported for TB and HIV programs was due to the introduction of new medicines. The transition to these new medicines was simplified by OpenLMIS, particularly for the TB program. Users were encouraged to order the new drug formulations within OpenLMIS and could, in one system, track their ordered quantities. Following the introduction of OpenLMIS, Malawi's national nutrition program could also introduce new products and easily maintain stock data on these products.

	2012	2013	2014	2015	2016	2017	2018
Essential Medicines	**215**	**216**	**243**	**255**	**255**	**261**	**265**
HIV/AIDS	**15**	16	21	21	20	21	30
Malaria	**12**	12	13	13	13	16	16
Reproductive Health	**11**	12	12	12	12	12	12
Tuberculosis			13	13	13	16	25
Nutrition							5
Total	**253**	**256**	**302**	**314**	**313**	**326**	**348**

Exhibit 1: Number of products reported in SCMgr between 2012 and 2017, and in OpenLMIS since 2017

The CMST receives and processes orders from the districts and central hospitals for essential medicines and TB program commodities via OpenLMIS. As seen in the chart below, though there have been significant fluctuations in the amount of orders placed through the system, trend lines indicate gradually increasing usage of OpenLMIS for ordering.

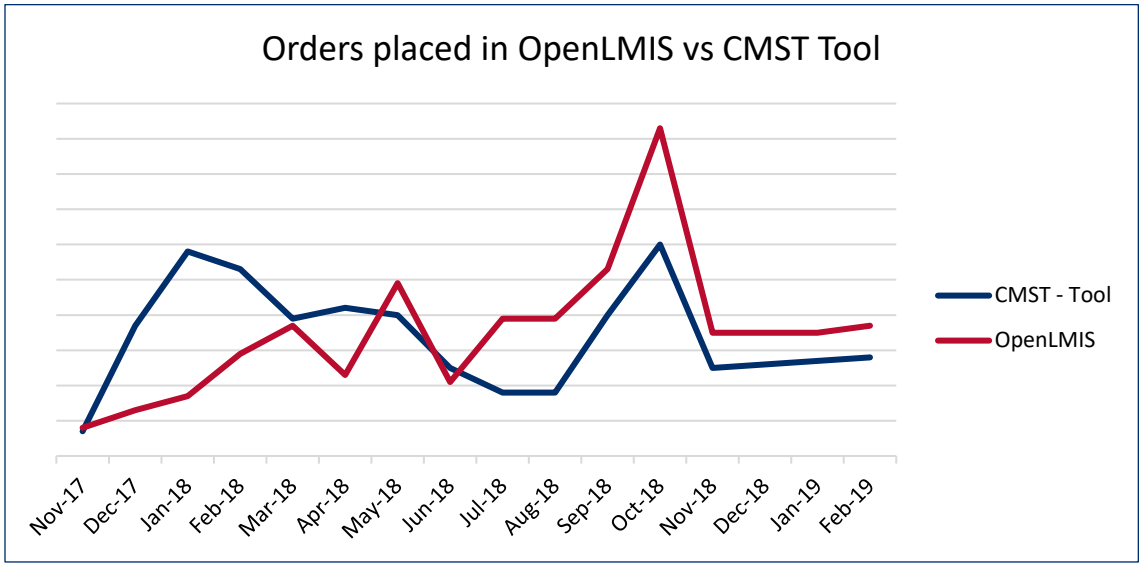


Exhibit 2. Number of orders placed in CMST ordering tool and in OpenLMIS, November 2017 - August 2018

OpenLMIS enables instantaneous visibility into the LMIS data as it is being generated by the users, while SCMgr required that databases from 33 data entry sites be emailed to a central coordinator, then aggregated and extracted before being shared via a mailing list. The data transmission process is now completed simply by hitting the "Submit" button in OpenLMIS from each site, drastically reducing the effort required to aggregate reports at the central level. Because OpenLMIS enables instantaneous viewing of automated reports for all users who have access to the application, managers conducting supportive supervision are now able to generate various reports to inform discussions with the sites they visit.

Prior to the introduction of OpenLMIS, the Ministry of Health used three systems for health logistics systems reporting operations: SCMgr for reporting; Microsoft Excel for data aggregation, analysis, and report generation; and the CMST online tool for ordering commodities. With the introduction of OpenLMIS, the country's first web-based logistics management information system, users can report, place orders, and view LMIS reports in one application. As you can see in Exhibit 3, OpenLMIS has maintained high reporting rates despite being a new system with a user interface and validation requirements unlike any in the previous system.

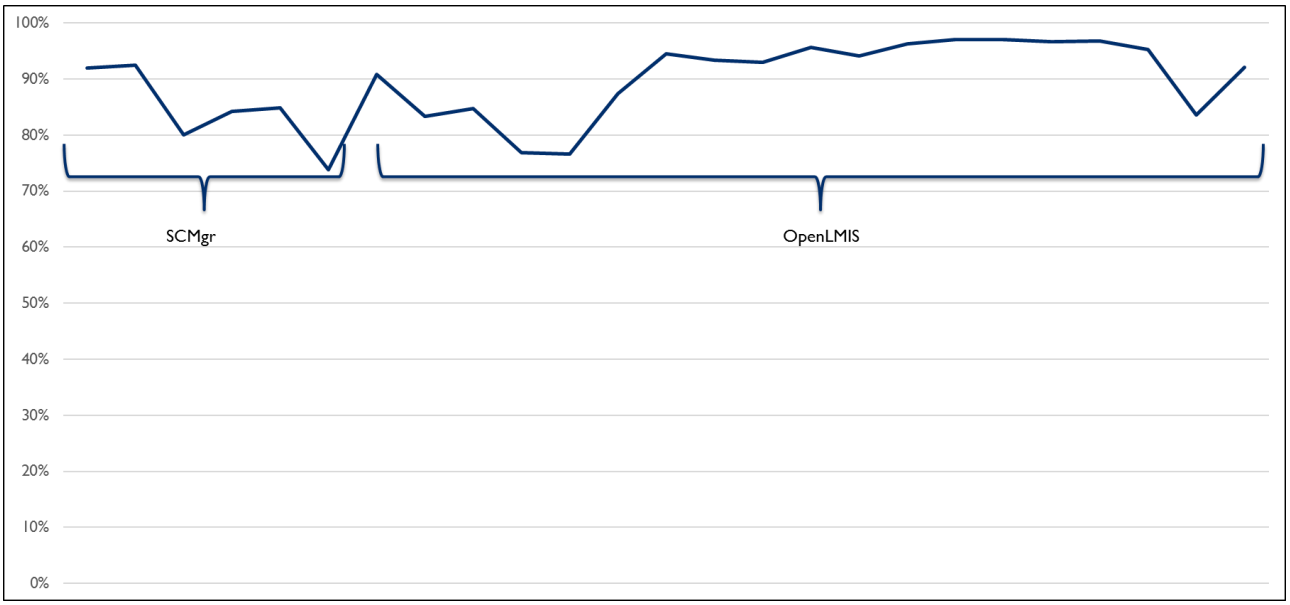


Exhibit 3: Reporting rates: January 2017 - February 2019 showcasing the high reporting rates sustained after implementation of OpenLMIS

OpenLMIS facilitates data-driven decision-making that takes historical ordering and consumption data into account when suggesting order quantities, resulting in increased transparency, accountability, and cost savings across Malawi's supply chain; this functionality was not available in the old system. The system has improved the country's performance in key supply chain metrics, including improved data quality and shortened lead times for reporting functions, and now operates in 56 data entry sites.

Challenges

As with any new system implementation, the transition from SCMgr to OpenLMIS presented some logistical and user adoption challenges. Together, Malawian government officials and GHSC-PSM field office personnel collaborated to alleviate these obstacles to adoption.

Ntchisi District Hospital, Central Malawi.
Photo credit: MovingMinds Malawi

Technical challenges. OpenLMIS requires sites where it is used to have electricity, functioning computers, internet connectivity of at least 2G, and staff who can conduct basic functions on a computer. To address technical limitations at lower-level health facilities, OpenLMIS was initially introduced at 28 district offices, five central hospitals, and five data entry hubs. At the same time, to address poor internet connectivity and limited offline functionality, GHSC-PSM provided monthly internet bundles and requisite hardware support to data entry hubs. Secondly, to ensure user capacity to work within the system, the project conducted training-of-trainer and direct training sessions for users on OpenLMIS and provided deployment support to staff at health facilities for the initial reporting into OpenLMIS prior to rollout. Over time, the Ministry of Health, in collaboration with GHSC-PSM, identified additional sites and trained staff to use OpenLMIS to submit their monthly LMIS reports.

As the world's first adoptee of OpenLMIS 3.0, the country encountered system performance issues common to the earliest iterations of new versions of open source software. In the months following the implementation, the global OpenLMIS community worked on the issues brought to its attention through Malawi's implementation difficulties, eliminating bugs and consistently improving system functionality.

User resistance to change. In the months after implementation of OpenLMIS, the government encountered some user adoption challenges. The likely causes of resistance to the transition stemmed from three key factors:

1. The Ministry of Health's increased capacity to conduct oversight of LMIS components such as quantities received and quantities ordered, requiring greater user accuracy.
2. The requirement for mandatory reporting of all records. OpenLMIS requires all users to report on all products managed by their respective site; they are not able to proceed to advanced report stages without entering this information.
3. The quick transition from SCMgr to OpenLMIS did not leave much time for robust change management strategy implementation. As with any abrupt change, this generated some resistance on the part of users. However, it also forced users to dive in and use the system in the absence of alternatives, which promoted immediate uptake.

To address these issues, senior officials within the Ministry of Health worked actively with users to address their concerns. By March 2018, monthly field visits to all OpenLMIS usage sites were replaced by ad hoc field visits to select sites, and the number of users continued to increase.

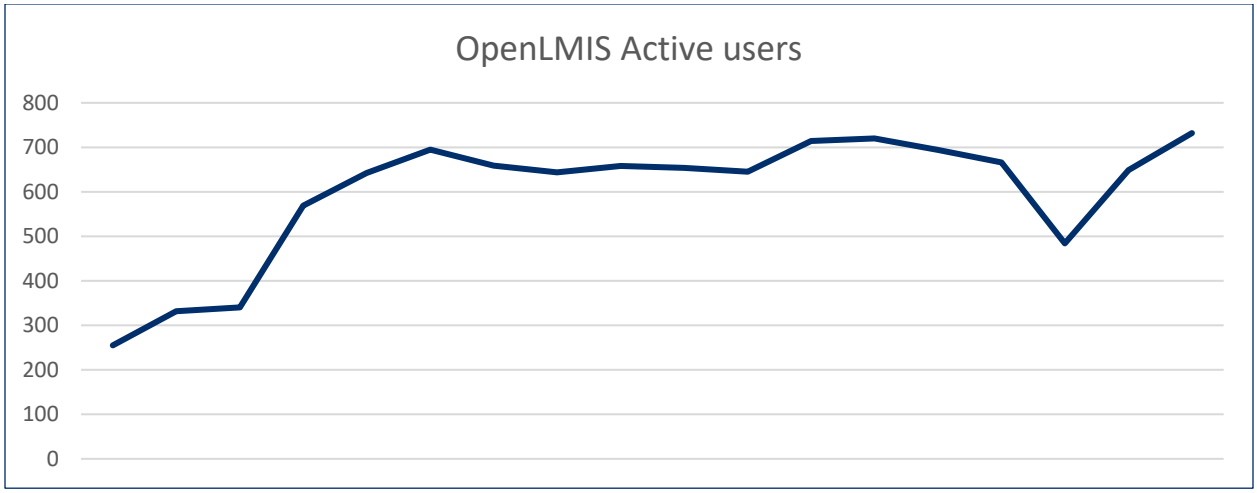


Exhibit 4. Number of OpenLMIS users as recorded in Google Analytics from September 2017 - February 2019

Looking Ahead

As acceptance and usage of OpenLMIS increases, the Malawian government, in concert with other donors, must identify mechanisms that will ensure continuity of system operations and continued buy-in at the user level. To this end, the Ministry of Health and GHSM-PSM are focused on coordination, technical support, and sustainability.

Coordination. The initial requirements-gathering workshop mandated that OpenLMIS implementation be undertaken with the user in mind and with an understanding of the existing ecosystem. The establishment of an OpenLMIS steering committee comprising entities within the Malawi Ministry of Health—including the Central Monitoring and Evaluation Department (CMED), HTSS, CMST, and the E-Government Department of Malawi—also reinforced the importance of collaboration with users in system design. GHSC-PSM mapped the existing supply chain infrastructure to ensure OpenLMIS met the country's supply chain needs and that the existing ecosystem was considered during design so it would not need later modification to achieve full functionality. In 2019, the Ministry of Health and GHSC-PSM are continuing to collaborate as OpenLMIS is installed in additional health facilities.

Technical support and sustainability. Convenient availability of technical support to troubleshoot system problems or failures on behalf of system users is a project imperative. Though OpenLMIS is an open source software and has an active global developer community, GHSC-PSM has secured a local vendor to provide routine customer support. Such engagement will build local capacity to understand OpenLMIS, provide continuous user support, and, most importantly, engender relationships in the global OpenLMIS community that will be beneficial as the country seeks to improve OpenLMIS in accordance with changing needs and priorities.

Local initiatives to certify interoperability between the various health systems are also critical to ensuring sustainability of the OpenLMIS application. GHSC-PSM is working with Kuunika and other in-country stakeholders to integrate OpenLMIS with District Health Information System 2 (DHIS2), a system that tracks health services data from all health facilities in Malawi. This will provide a platform to validate and triage service data stored in DHIS2 against logistics data stored in OpenLMIS, increasing confidence in data quality and resulting in better-informed healthcare decision-making. As CMST is exploring options to introduce a new Enterprise Resource Planning (ERP) system, the teams can leverage the interoperability capacity of OpenLMIS, thus making it possible to electronically auto-transfer orders from OpenLMIS to CMST's ERP system.

A patient receives medicine at the Ntchisi District Hospital pharmacy dispensary. *Photo credit: MovingMinds Malawi*

Going forward, OpenLMIS will be a key component in improving quality of care and health outcomes. Thus far, average reporting rates remain above 90 percent and overall quality of data generated continues to improve as software training becomes more widespread, health facility employees' reporting efforts are increasingly independent, and hardware and connectivity are becoming more dependable. These factors contribute to commodity security efforts and help to ensure that patients can access the health services and medicines they need when they visit health facilities.