

Design, Implementation, and Use of Pharmaceutical Logistics Management Information Systems (LMIS)

The Purpose

This technical highlight describes promising practices in assessing, designing, and implementing a LMIS based on SIAPS Program's experience. The promising practices are supported by case examples of LMIS implementation from Bangladesh, Swaziland, and West Africa.



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BACKGROUND

Logistics management information systems (LMIS) play an increasingly critical role in the ability of various countries' Ministries of Health to increase responsiveness of their supply chain, reduce costs, and fulfill people's demand for better quality health services and improved health outcomes through informed decision making and actions. During design of overall supply chain systems, acquiring the information that is needed to support all functions of the supply chain must be a priority area. However, more often than not, this is not the case, particularly in low-resource settings. Public health supply chain managers in developing countries do not have regular access to reliable real time information for procurement and supply management decision making. Typically, these managers rely on past experience, guess work, and very poor information systems, usually paper-based, and sometimes without access to available data. To address these problems, reliable procurement and supply chain management information systems should be implemented.

Adequate LMIS and user requirement assessments, including option analysis, have rarely been conducted in low- and middle-income countries. Sometimes unnecessary data is being collected and vice versa, adding extra work at the point of data capture; therefore, relevant pieces of supply chain information are missed which leads to guess work and inadequate data for supply chain decisions; this leads to frequent stock-outs and over stock which wastes resources.

Common LMIS challenges that Ministries of Health (MOHs) in low-resource settings face include the following:

- Inadequate technical knowledge and skill sets on how to approach the design and implementation of LMIS that fits supply chain requirements
- Inadequate resources for structural, resource, and organizational support such as workforce and budget¹

SIAPS SYSTEM STRENGTHENING APPROACH

The SIAPS approach for LMIS design and implementation is centered around the pharmaceutical system strengthening approach which is based on the evidence-based and time-tested problem-solving logic of “diagnosis, option analysis, intervention design, implementation and management, performance monitoring, and outcome measurement,” considering overall health system strengthening, capacity building, and sustainability.^{ii,iii}

PROMISING PRACTICES: LMIS DIAGNOSIS, INTERVENTION DESIGN, AND IMPLEMENTATION

When the Swaziland LMIS was originally designed, facilities were asked to send their stock reports and requisitions without the knowledge on how and when to send. In addition, there was not a particular office or group that received the reports and analyzed and presented them for decision making. In addition, ad hoc stock information coming from facilities was not being used for procurement decisions. After a thorough assessment and desk review of the Swaziland supply chain system, the LMIS at all levels of the health system involved with supply chain decisions needed to be revamped. This included distribution decisions being made through RxSolution (warehouse management software being used at CMS), supply plan decisions that link to procurement, and supply chain performance monitoring that links to government decision makers and donor partners like the Global Fund to fight AIDS, Tuberculosis and Malaria.

Major gaps identified were the absence of organizational structure at central medical store and inadequate human resource capacity at health facility level which are responsible for LMIS implementation, data analysis, validation, information sharing and use, and performance management. One of the options forwarded to decision makers was the establishment of central LMIS office/Data Management Unit (DMU) that would be responsible for the overall LMIS implementation in the country. The recommendation was endorsed by the Ministry of

Public Services, which is responsible for human resources. Setting up the DMU helped successful implementation of LMIS, increased data analysis, and use for supply chain decisions.

Building the capacity of health workers through training, supportive supervision and mentorship helped the successful implementation of the redesigned LMIS nationwide. The intervention has increased LMIS reporting rate from 56% in 2012 to 97% in 2014 at health facility level. Using LMIS data for resupply of ARVs, 100% of orders from facilities have been fulfilled; stock-outs of widely consumed key ARVs (more than 85% of patients are using them) were avoided; all patients were able to get three months refill of ARVs according to the country’s dispensing protocol (used to get two-weeks refill during shortages). Every quarter, procurement decisions were being made using LMIS data. This saved the government close to 6.25 million dollars in unnecessary procurement.

Furthermore, the Central Medical Store in collaboration with SIAPS and other partners facilitated supportive supervision and mentorship visits, focusing on inventory management and LMIS at 66 health facilities and 2 central warehouses in the country. With this intervention, health facilities in one region showed an improvement in stock card updates from 56% in 2014 to 74% in 2015. In addition, LMIS reporting rates have increased to 92% in the reporting quarter, from 87% in the previous quarter in 2015.

While Swaziland has the highest HIV prevalence in the world (31%) and 55% of women above 15 years of age are living with HIV, the availability of lifesaving ARVs have been fully secured through the SIAPS-supported intervention.

In **Mali**, in 2012, SIAPS undertook an assessment of the LMIS and found a lack of strategic information for decision making which includes poor LMIS data quality, poor reporting systems, stakeholders unable to see or access data, as well as poor capacity for pharmaceutical management at the operational level. These issues constituted major obstacles to the effective functioning of Mali’s pharmaceutical supply and services. To address these obstacles, SIAPS collaborated with the key supply chain stakeholders and other implementing partners to redesign and implement the LMIS, focusing on improving data quality, improving the reporting system that links to supply chain

decisions, , and increasing data visibility and information sharing through a web-based dashboard for informed supply chain decisions. Currently, 51 out of Mali's 60 districts are using a web-based LMIS in generating stock information for decision making.

In **Lesotho**, in 2012, using data for decision making in supply chain management was poor due to untimely and often inaccurate data, low submission rates, and a lack of standardized, user-friendly data collections tools, causing stock-outs of HIV related commodities and other medicines. SIAPS provided support in intervention design and implementation through supportive supervision and mentorship. The intervention resulted in improved reporting rate from 61% in the last quarter of 2012 to 94% in the fourth quarter of 2014. The data accuracy of the reports also increased from 68% in the third quarter of 2014 to 92% in the fourth quarter of 2014. From January to March 2015, the central medical store in Lesotho, in collaboration with partners, conducted 77 supportive supervision and mentoring visits to health facilities in all 10 districts of Lesotho. Additionally, 150 health care workers were mentored on inventory management and LMIS using health facility visit approaches. In four districts, the visits were incorporated into the Supply Chain Management Leadership Development Program training to ensure ownership, sustainability, and continuous supply of medicines at service delivery points. The program participants form clusters made of two to four facilities that work together to complete the action plans that were developed during the visits. The overall support to these districts helped surpass the national target of keeping complete information from 90% to 93% and the percentage of facilities using country-appropriate LMIS tools for logistics and patient data at end of March 2015 reached 92%, surpassing the set target of 90%.

In **South Africa, Lesotho, and Swaziland**, RxSolution (an automated information system with inventory, warehouse, and information management features) is being used widely at central, provincial, and health facility levels. In **South Africa**, it is being used in 280 facilities across the country. Use of RxSolution continues to significantly improve data availability, quality, and transmission to decision makers—this results in improved inventory management, medicines

availability, and better patient care. For example, in Free State Province, SIAPS supported the introduction of the remote demander module (serving as LMIS) interfacing with RxSolution to facilitate the automated generation of reports and orders based on consumption data. In Limpopo Province, SIAPS customized RxSolution to help manage direct deliveries for ARVs and oncology agents to over 40 hospitals. The system enables the procurement unit to routinely monitor supplier performance.

In **Bangladesh, Swaziland, and West Africa region** the manual LMIS system was designed and implemented with the support from USAID/SIAPS. However, there was overwhelming workload particularly at central level to analyze LMIS data coming from a large number of facilities and generate reports for decision making. In addition, the data was of poor quality, and accessibility was limited. Because of these challenges, there was strong desire to design and implement innovative technologies that enhance quality information accessibility and visibility for managers to make faster and better supply chain decisions. A thorough assessment of LMIS users and systems requirements was conducted to identify best possible options to address requirements. One of the options recommended was the introduction of a web-based LMIS that tracks stock information to make it available on the Internet. SIAPS helped to identify best options to develop and implement the system that enables better and faster supply chain decisions (see case studies below).

In 2013-14, to increase the use of actual consumption data in determining health facility needs in **Angola**, SIAPS supported the central medical store (CMS) in the revision of monthly LMIS reporting and requisition forms. The CMS took ownership of the new system, providing final inputs to the forms and organizing internal training for staff. Information contained in the revised forms is being incorporated into the electronic patient management system. Currently, the new reporting forms are being implemented in 6 of 18 provinces. SIAPS also collaborated with CMS and Hospital Esperança to analyze the hospital's routinely collected patient and stock management data for the previous 12 months, and then establishing a data feedback mechanism with the hospital team to effectively utilize the feedback for intervention, such as minimizing the risk of ARV

stock-outs and drug resistance. SIAPS also supported the implementation of tools to monitor procurement and stock levels of antimalarial and HIV and AIDS products. In addition, findings from the end use verification surveys were used to support requests for improved availability and use of essential medicines.

In **Burundi**, SIAPS supports developing and implementing LMIS for data analysis so that health professionals can effectively plan and monitor service delivery. Burundi's MOH has been able to analyze monthly requisitions from all 45 districts and provide feedback. As a result of supervisory and coaching visits in 2013, through the support of SIAPS, reporting timeliness has been maintained at over 90% during this project year; as a result facilities were able to receive their orders on time.

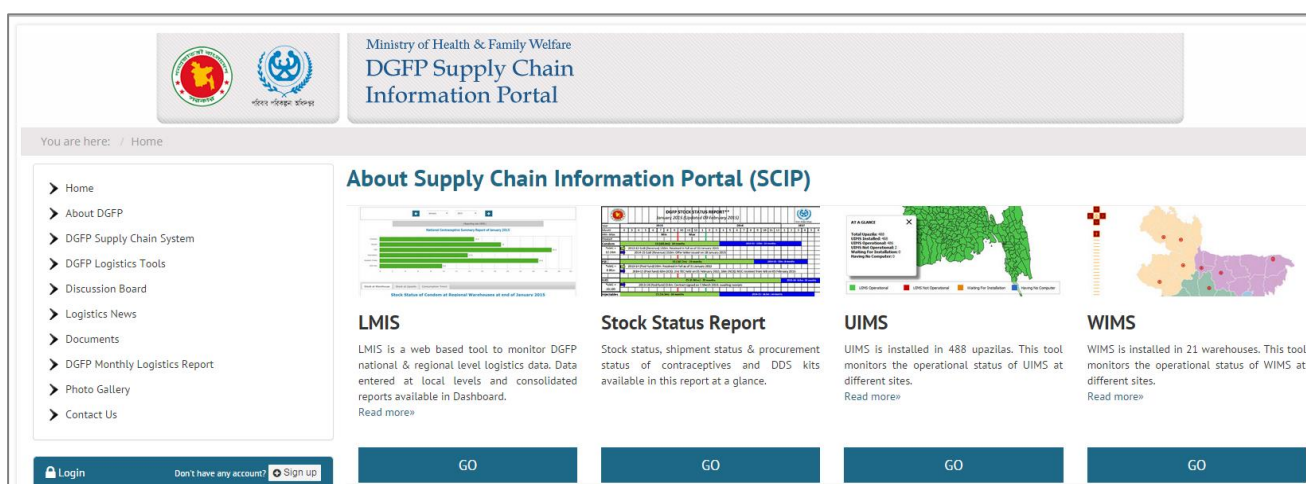
Since the launch of **Guinea's** new electronic malaria reporting system, supported by SIAPS, the time it takes to transmit reports has significantly improved. As of July 2014, districts were consistently reporting data for more than 90% of facilities in PMI zones, from a baseline of 30% in 2012. The Guinea CMS and SIAPS continue to review reports and provide detailed feedback. Additionally, supervisions have been initiated in collaboration with Stop Palu and CMS to check the validity of data documents. This work-intensive tracking mechanism is critical for improving the quality of reporting over time. Detailed country case studies for Bangladesh, Swaziland and Western Africa regions are presented below.

CASE EXAMPLE I: BANGLADESH SUPPLY CHAIN INFORMATION PORTAL DESIGN AND IMPLEMENTATION

Bangladesh required the presence of an efficient logistics management information system that provides real-time information on availability of commodities that allows managers to react quickly and efficiently to avoid stock-outs of family planning products and increase the contraceptive prevalence rate. After a thorough assessment of users and systems requirements, Bangladesh through the support of USAID funded Strengthening Pharmaceutical Systems (SPS) program, implemented by Management Sciences for Health (MSH), has designed and implemented a web-based logistics management information system that includes electronic tools at the upazila (sub-district) level (the Upazila Inventory Management System [UIMS]) and also at the central level (the web-based Supply Chain Information Portal [SCIP]). Central, regional, and upazila-level managers of the Directorate General of Family Planning (DGFP) enter logistics data, such as consumption and stock on hand, into the UIMS. This information is then consolidated and uploaded to the web-based portal. A key feature of the portal is an interactive dashboard which presents easy-to-understand charts, alerts, maps, and tables on stock levels throughout the country to foster effective and efficient decision-making. The portal, which became operational in 2011, is the first of its kind for information management in the public sector.

Bangladesh Supply Chain Information Portal Dashboard

Analysis showed that implementing the electronic LMIS tools had two major positive effects: data is used to make more informed decisions and stock-outs have been reduced. For example, potential stock-out was reduced by more than 85 percent at both upazila stores and service delivery points, while under-stock of the same commodities was also reduced by 60 percent at both levels. Any type of stock-out (stock-out, potential stock-out, and under-stock) of injectables and IUDs has gone down significantly in 2013 in comparison with 2009. The availability of logistics data has improved decision making at several levels of the system. At the national level, the SCIP data have allowed the Directorate General of Family Planning to adopt a more scientific approach to quantification that considers different policy scenarios to produce a more accurate forecast of needs. The SCIP provides logistics information that gives a clear picture on actual consumption and whether commodities are available at satisfactory levels. DGFP now organizes quarterly logistics coordination forum meeting and yearly forecasting working group meeting, where all relevant stakeholders, including donors, are present. Data from the SCIP allows in-depth, interactive discussion among partners to prepare, review, revise, and update the national needs for contraceptives to revise forecasting, fund-gap analysis, and supply planning.

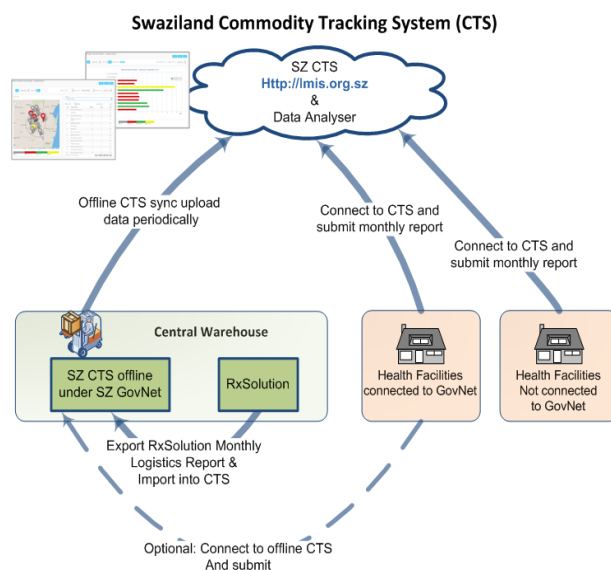


CASE EXAMPLE II: SWAZILAND LMIS AND COMMODITY TRACKING SYSTEM DESIGN AND IMPLEMENTATION

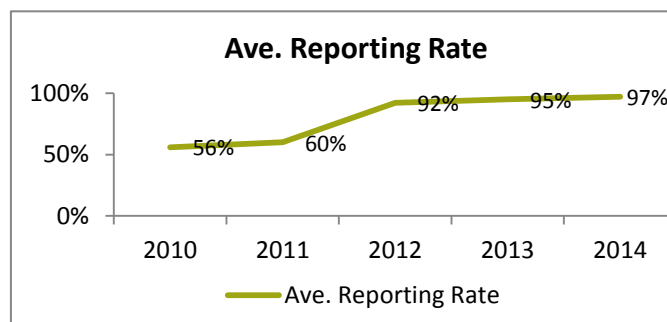
Swaziland has the highest HIV prevalence in the world (25.9 percent). Currently more than 80 percent of eligible ART patients are on treatment. Swaziland’s supply of life-saving antiretroviral medicines (ARVs) has historically been characterized by long lead times for orders, expiry of medicines due to inappropriate stock management practices, and the lack of a reliable logistics management information system (LMIS). To ensure an uninterrupted supply of ARVs, particularly for children and mothers, and to increase treatment as a means of prevention, the Ministry of Health through USAID funded SPS program, implemented by MSH assessed the existing supply chain system. Recommendation from the assessment informed the redesign and implementation of an LMIS at all levels of the health care system, with priority given to HIV, Laboratory, TB, and Family Planning commodities. The Central Medical Store’s (CMS) Data Management Unit was established being responsible for the implementation.

The LMIS was revised in April 2011 to link facilities with the CMS through a maximum-minimum inventory control system. Standardized tools for reporting and requisition were designed, printed, and distributed to more than 180 ART, TB, and Laboratory monitoring facilities across the country. Over 200 staff trained on use of the LMIS tools, and continuous supportive supervision was provided. At the same time, a system and user requirement assessment for the design and implementation of a web based commodity tracking system (CTS/eLMIS) was conducted. After the assessment, the CTS was designed, tested and users have been trained.

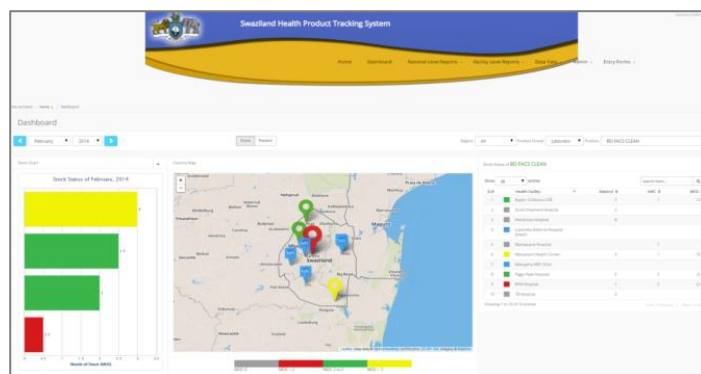
Reporting rates using the revised tools increased from 56 percent to 97 percent, and the order fill rate reached 100 percent for tracer ARVs. Since the LMIS introduction, 100 percent stock availability has been reported for tracer ARVs at facilities. Information coming to the CMS through LMIS has been used for resupply, to develop the national forecast and supply plan, and supply monitoring. The Ministry of Health has used the information for making decisions that has resulted in a savings of \$6.25 million from averting unnecessary procurement. CTS have been used to capture data since January 2013; and currently it accommodates Laboratory, TB, HIV, and Family Planning products.



Swaziland Commodity Tracking System Schematic Diagram



Swaziland LMIS reporting Rate Trend



Swaziland Commodity Tracking System Dashboard

CASE EXAMPLE III. WEST AFRICA: A WEB BASED DASHBOARD FOR EARLY WARNING SYSTEM

In West Africa SIAPS developed and introduced a web-based LMIS with a feature for early warning system (EWS) to collect, aggregate and track information on HIV and AIDS commodities across the six focus countries. The dashboard allows the spectrum of stakeholders—from program managers to Ministry of Health officials to donor agencies—to monitor commodity stock status, anticipates future funding gaps, respond to projected medicine shortages and expiries, and make decisions based on accurate information. The HIV regional dashboard has already been deployed in Benin, Burkina Faso, Cameroon, Niger, and Togo.

Analysis through the EWS showed that, in Togo, at the end of February 2014, there was a risk of stock-out of 11.1 percent of ARV products that would


have affected 5.9 percent of patients currently on ART. The Togo team has used the information for decision making to speed up request for procurement.

In Niger, the dashboard showed that 26.1 percent of ARV products are in risk of expiry (products with more than 24 months of stock). Reports from the software showed that particular products will be available for at least 100 months based on Average Monthly Consumptions (see image above). This has prompted the program managers to seeking ways to transfer the product to another country.

All of the above case studies were adapted from previously published SIAPS posters, annual reports, and conference abstracts.

EARLY WARNING SYSTEM TRACKS HIV/AIDS COMMODITIES IN WEST AFRICA

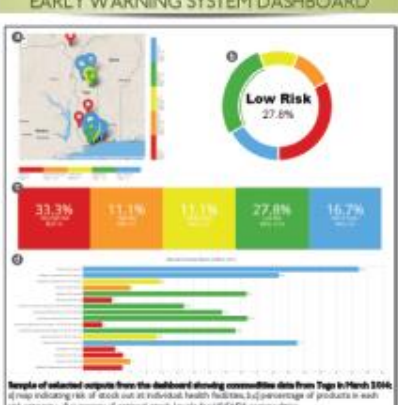
COUNTRY-LEVEL DATA CAPTURED



Country-specific information on the HIV epidemic
National stock levels of ARVs and HIV test kits
Expiration and oversupply tracking
Commodity consumption rates
Shipment status
Available funding for procurement

EXAMPLE: TOGO
Although overall reporting on HIV/AIDS commodities is high in Togo, data provided via paper-based forms were often not reliable or accurate and increased the risk of stock-outs. Using the dashboard, inconsistencies in reporting were identified and enabled SIAPS to help country teams to standardize and improve reporting processes, which in turn helped to minimize the risk of future stock-outs for HIV/AIDS commodities.

DATA AGGREGATED THROUGH EARLY WARNING SYSTEM DASHBOARD



Example of selected outputs from the dashboard showing commodity data from Togo in March 2014. 1: Map indicating risk of stock-out at individual health facilities, 2: Percentage of products in each risk category, 3: Summary of national stock levels for HIV/AIDS commodities.





COMMODITY MANAGEMENT COORDINATED AMONG STAKEHOLDERS

THE EARLY WARNING SYSTEM:

- Signals stock-outs and product expiries
- Standardizes data collection and analysis
- Anticipates future funding gaps

Supports informed decision making

- Ministries of Health and other government stakeholders
- National AIDS Control Programs

BENEFITS OF A DASHBOARD FOR HIV/AIDS COMMODITIES

Better data quality

Improved decision making

More accurate forecasting and quantification

Improved capacity of local partners to anticipate and prevent stock-outs

Strengthened pharmaceutical management systems for improved availability of ARVs

USAID Forward Summit - November 18-21, 2014 - South Africa
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SCALE-UP AND SUSTAINABILITY

- Potential roll out in other PEPFAR countries and regions
- Adapting to other health commodities including those for malaria, family planning, and maternal and child health in Mali, Guinea, and South Sudan
- Technology transfer to WAHO along with adequate technical capacity building to use, maintain, and continue roll-out of the dashboard
- WAHO to use dashboard to manage regional supply of buffer stock

West Africa Early Warning System Dashboard

FURTHER READING

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ⁱⁱⁱ Center for Pharmaceutical Management. 2011. *Center for Pharmaceutical Management: Technical Frameworks, Approaches, and Results*. Arlington, Virginia: Management Sciences for Health.

ABOUT SIAPS | The Systems for Improved Access to Pharmaceuticals and Services (SIAPS) program works to assure access to quality pharmaceutical products and effective pharmaceutical services through systems-strengthening approaches to achieve positive and lasting health outcomes. SIAPS is funded by the US Agency for International Development (USAID) and is implemented by Management Sciences for Health.

The information provided does not reflect or represent the position or views of the US Agency for International Development or the US Government.



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