

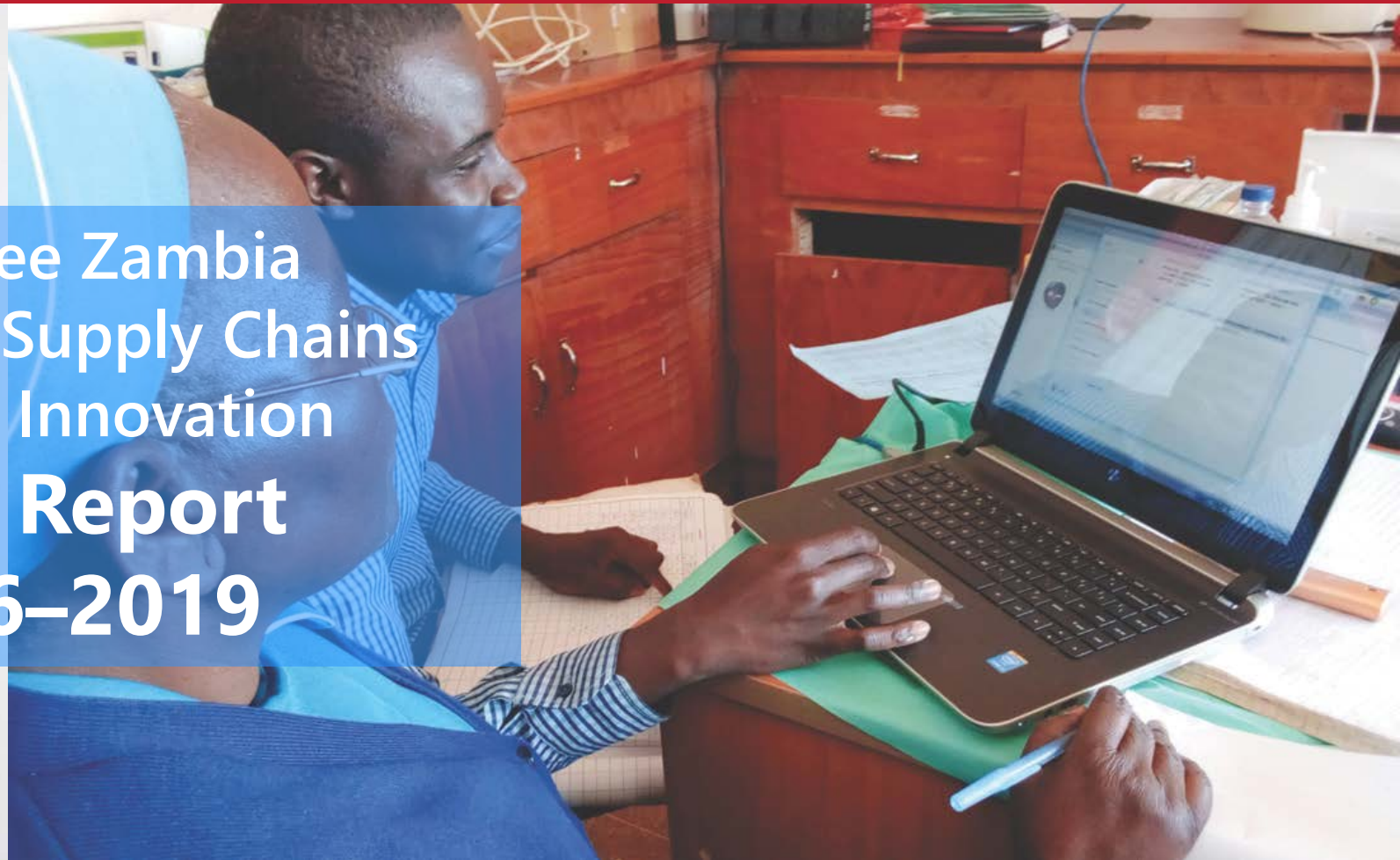


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AIDSFree
Strengthening High Impact Interventions
for an AIDS-free Generation

AIDSFree Zambia Improving Supply Chains through Innovation **Final Report** **2016–2019**



AIDSFree

The Strengthening High Impact Interventions for an AIDS-free Generation (AIDSFree) Project is a five-year cooperative agreement funded by the U.S. President's Emergency Plan for AIDS Relief (PEPFAR) with the United States Agency for International Development (USAID) under Cooperative Agreement AID-OAA-A-14-00046. AIDSFree is implemented by JSI Research and Training Institute, Inc. with partners Abt Associates Inc., Elizabeth Glaser Pediatric AIDS Foundation, EnCompass LLC, IMA World Health, the International HIV/AIDS Alliance, Jhpiego Corporation, and PATH. AIDSFree supports and advances implementation of the U.S. President's Emergency Plan for AIDS Relief by providing capacity development and technical support to USAID missions, host-country governments, and HIV implementers at local, regional, and national levels.

As of February 2019, the International HIV/AIDS Alliance is Frontline AIDS.

Strengthening High Impact Interventions for an AIDS-free Generation (AIDSFree) Project. 2019. *AIDSFree Zambia: Improving Supply Chains through Innovation Final Report, 2016-2019*. Arlington, VA: Strengthening High Impact Interventions for an AIDS-free Generation (AIDSFree) Project.



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Sarah Mulaya, Laboratory Technician Chilenje Hospital, Lusaka, Zambia



Acronyms

AIDSFree	Strengthening High Impact Interventions for an AIDS-free Generation
ARV	antiretroviral
CCB	change control board
CE	Central Edition
CP	cooperating partner
CRS	Catholic Relief Services
CSC	Commodity Security Centre
eLMIS	electronic logistics management information system
FE	Facility Edition
GHSC	Global Health Supply Chain
IPs	implementing partners
LMIS	logistics management information system
M&E	monitoring and evaluation
MOH	Ministry of Health
MSL	Medical Stores Limited
OJT	on-the-job training
PEPFAR	President's Emergency Plan for AIDS Relief
PSM	Procurement and Supply Management
R&R	report and requisition
SDP	service delivery point
TSS	technical support and supervision
USAID	United States Agency for International Development
ZNDC	Zambia National Data Center





BACKGROUND

Natasha Mulenga & Paul Mvula, Pharmacists, Levy Mwanawasa UTH Lusaka, Zambia

Introduction

The United States Agency for International Development (USAID) Zambia has supported the development and implementation of an electronic Logistics Management Information System (eLMIS) for the management of health care commodities since 2011. The most recent mechanism for technical and implementation support was provided through the AIDSFree project led by JSI Research & Training Institute, Inc. (JSI) from 2016–2019.

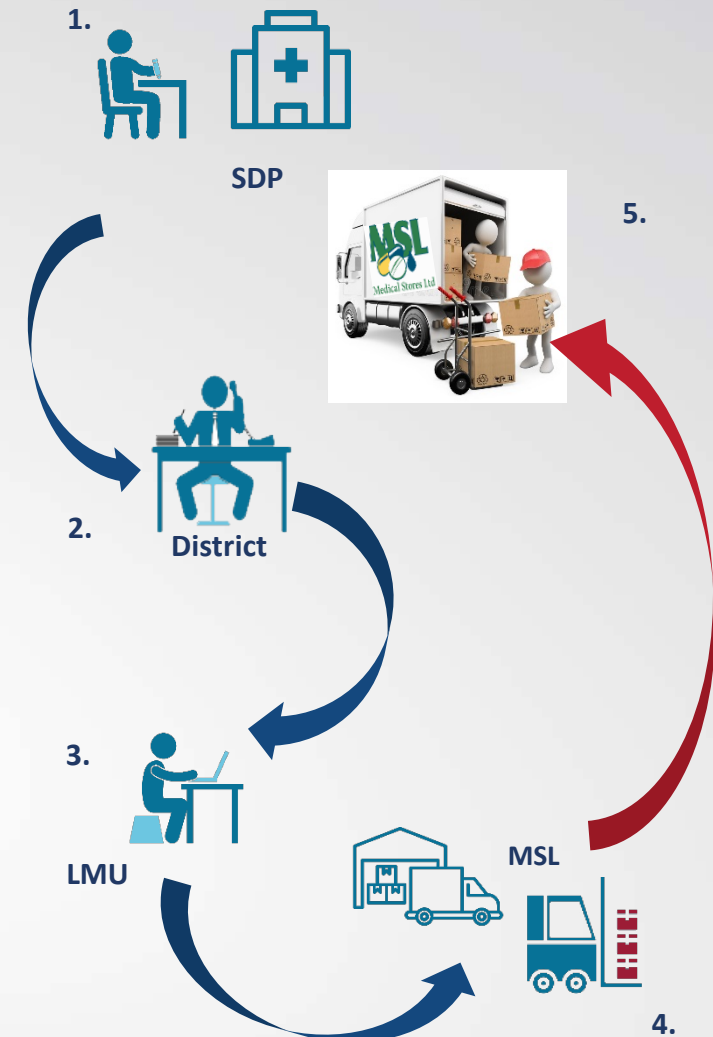
Through the use of information technology, AIDSFree built the capacity, efficiency, and effectiveness of the supply chain, to ensure the ongoing availability of health commodities for the Government of the Republic of Zambia and beneficiaries of the health system.



Medical Stores Limited—Lusaka and
Chipata Warehouses

Logistics Management Information System

Prior to the introduction of eLMIS, Zambia's logistics management information system (LMIS) was entirely paper-based. Service delivery points (SDPs) collected logistics data manually, via stock control cards and daily activity registers. Data was then sent via report and requisitions to the district health office through courier services for approval, or directly to MSL by the hospitals. Once approved, reports were sent to the Logistics Management Unit, where data specialists manually entered the reports into Supply Chain Manager software for order processing. Once processed, the orders were forwarded to the Central Medical Stores for order fulfillment, and then dispatched to the SDPs.



Paper-based logistics
management information
system



Limitations of the Paper-Based System

Using a paper-based system to track Zambia's health commodities posed numerous challenges:

- Over 2,000 facility reports were received by MSL every month with no mechanism to aggregate the information and make it easily accessible.
- Most operational processes were manual.
- Human resources were inadequate.
- Reports contained arithmetic errors.
- Courier services took up to 15 days to deliver reports.
- Managers had limited real-time visibility of data.

As a result, health facilities suffered stockouts of essential health commodities.

"I remember a time when we depended on bulk ordering because commodities could not be tracked down to the health facilities. Paper reports were easily misplaced, and one could not query orders or correlate physical counts to the reports."

Keegan Mwape,
Principal Pharmacist for the
Northern Province of Zambia



End-to-End Automated Supply Chain Solutions

To address the limitations of the paper-based system, Zambia opted to introduce an electronic Logistics Management Information System which automated and enhanced logistics transactions.

Process Automation

Automated Transactions

- Electronic inventory management, reporting, approvals, and order processing

Automated Data Transmissions

- Electronic data transmission and notifications at any desired interval

One-Click Reports

- Logistics reports (reporting status, consumption, stock status, custom reports)

Quality Control

- Data quality control and requisition tracking



eLMIS Central Edition

The eLMIS Central Edition (CE), introduced in February 2014, is a web-based application that is used to collect and manage logistics data at central level. Logistics data is entered into CE at district levels and hospital level. CE enables supply chain managers to make more timely and impactful supply chain decisions.

The objectives of the CE implementation were to:

- Improve access to accurate, timely and routine consumption data.
- Enhance real-time logistics management capabilities covering point of origin to point of consumption.
- Enable demand forecasting, capacity planning and modeling based on consumption.

The implementation of eLMIS CE exposed the following weaknesses:

- Inadequate facility-level forecasting and quantification information.
- The need for automated inventory management at facility level.
- The need for improved data quality and timely reporting at facilities.
- Ineffective supportive supervision due to lack of facility level data visibility.
- Inefficient distribution, planning, and scheduling.



End-to-end logistics process automation

Automating health commodity logistics from the central warehouse (Medical Stores Limited, or MSL) to service delivery points (SDPs)

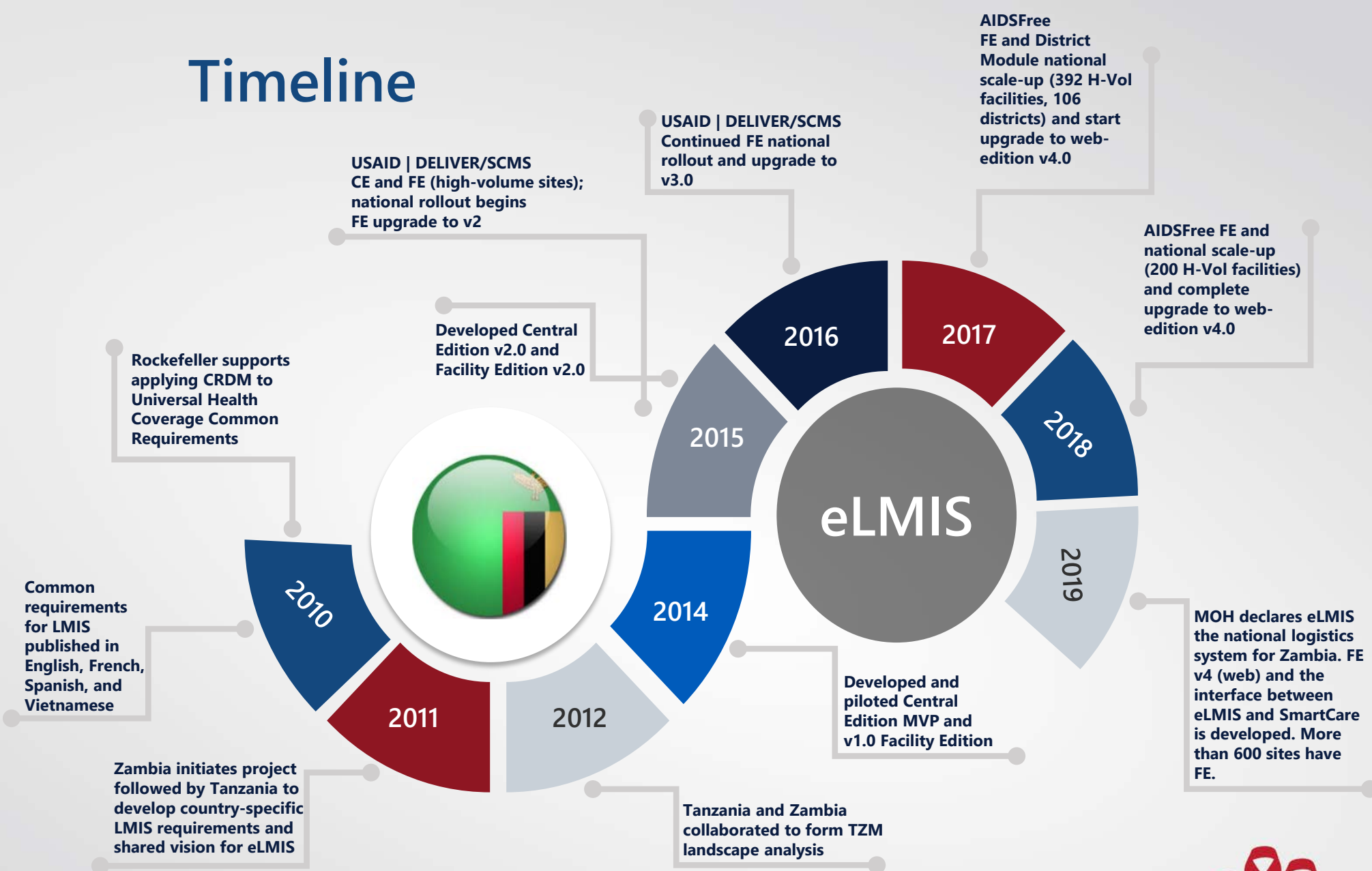
eLMIS Facility Edition

eLMIS Facility Edition (FE), the second version of eLMIS, was introduced and piloted in 48 health facilities across Zambia, followed by a rollout to 100 high-volume facilities after the evaluation assessment in March 2015. eLMIS FE software is designed to support critical logistics information of distribution systems. The aim of this version is to automate the facility-level transactions and logistics reporting.

The objectives of FE implementation were to:

- Improve data quality and commodity availability
- Improve order processing turnaround time
- Increase timely and accurate submission of reports and orders
- Improve stock monitoring at all levels of the supply chain.

Timeline





AIDSFree Zambia

AIDSFree staff, Lusaka, Zambia

AIDSFree Zambia: HIV Epidemic Control

Through above-site interventions, AIDSFree contributed to the reduction of new HIV infections and increased recruitment and retention of HIV-positive clients on antiretroviral therapy. The efficiencies brought about by the eLMIS had a positive impact on the availability of life-saving medicines and the responsiveness of Zambia's health system.

"Before eLMIS, to dispense ARVs (antiretrovirals) to one client would take up to eight minutes because of the amount of writing involved. I could only attend to 20 patients on average per day. Now, I am able to attend to twice as many patients as before because of eLMIS."

Fred Hamalambo,
Katima Mulilo Health Centre
Pharmacist

Project Approach

Under AIDSFree, the Project used the eLMIS to build the capacity, efficiency, and effectiveness of the supply chain, ultimately ensuring the availability of adequate health commodities for the Government of Zambia and beneficiaries of the health system.

To ensure sustainability of the system, AIDSFree Zambia conducted routine monitoring, review, and updating of processes to measure and document progress. This included an analysis of the costs of operating the system. Throughout implementation, AIDSFree focused on adoption and ownership of the eLMIS.

"Because logistics data is available in real-time, I am able to redistribute overstocked commodities accordingly in my province. Managing health care commodities has never been easier."

Rosette Kunda,
Lusaka District Pharmacist



Objectives

Data Use

To increase use of logistics data for key decision making for continuous improvement of supply chain performance to meet patient demand and attain 95-95-95 targets at health facilities nationwide.

eLMIS Implementation

To deploy eLMIS at facility and district levels to improve logistics data management for increased product availability to patients.



Integrated Repository

To ensure that the eLMIS system acts as a robust integrated data repository that is user-friendly and able to interface with other health systems.



Commodity Security

To ensure easy-to-use interface for operations and support personnel for key decision making and improvement of commodity security.



Sustainability

To develop and implement a plan for sustained use of eLMIS as a national commodity management system in Zambia.

Objectives





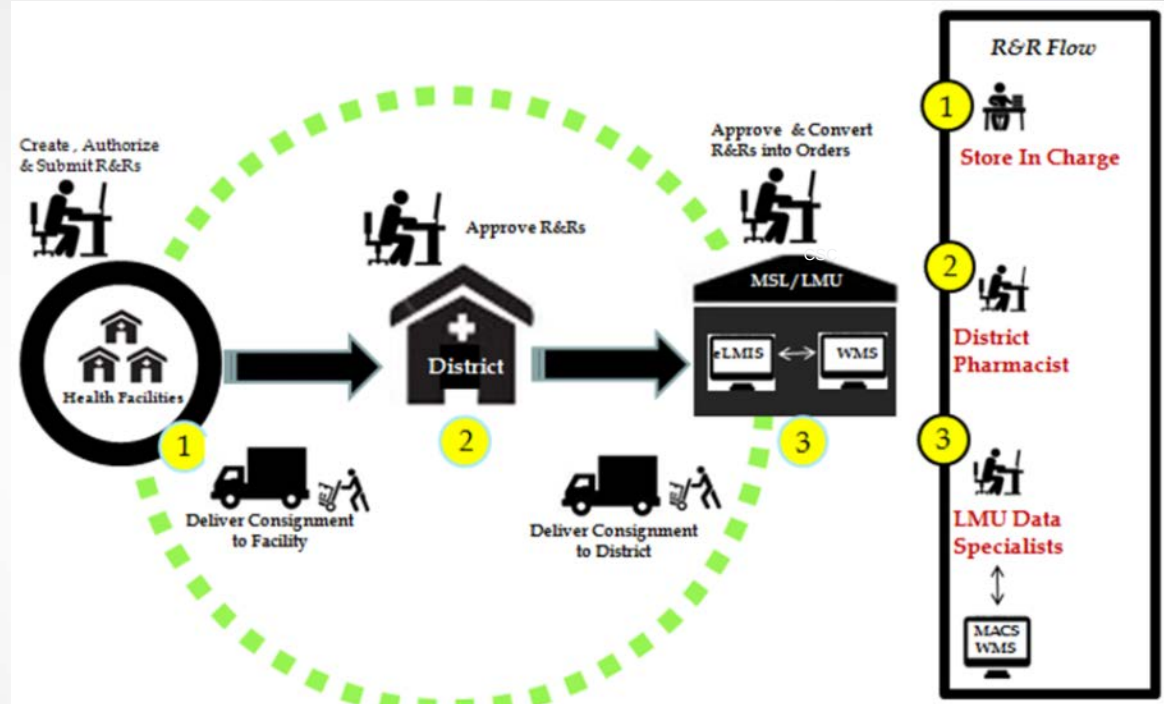
Objective 1: Integrated Repository

Adapting Automation and Innovation: Responding to Changing Needs and Ensuring the Solution Continues to Evolve

- Ensured interoperability with warehouse management software and electronic health record systems.
- Developed and deployed eLMIS FE version 3.0, with the continuous improvement and enhancement of the software.
- Developed District Module, which allows district health offices to enter data on behalf of sites that do not use eLMIS FE.
- Developed Web FE version 4.0, which includes batch tracking, tracking of expired medications, and essential medicine dispensation.

Key Software Development Achievements

eLMIS Workflow

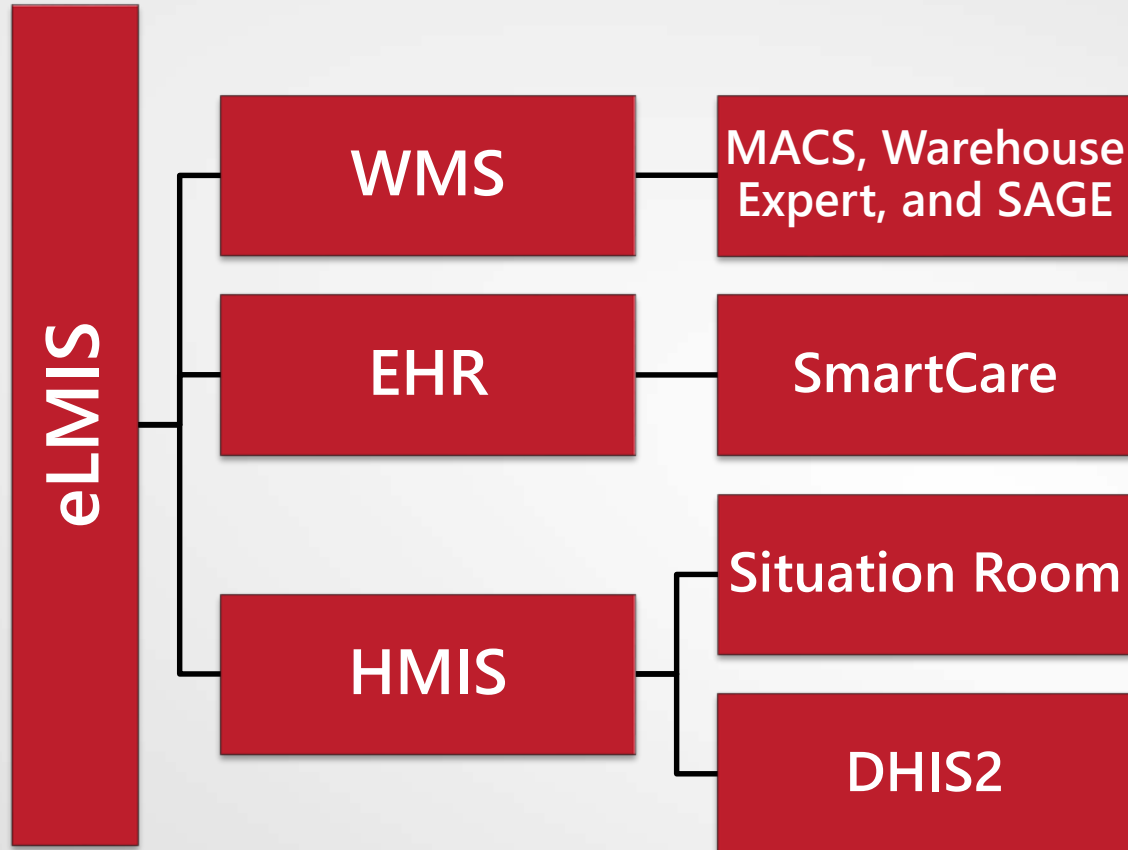


END-TO-END UPGRADE

Achieving complete end-to-end automation of facility-level data requires automated management.



eLMIS Interoperability



SmartCare–eLMIS Integration

This interface allows the two systems to share information between each other.

- Patient registration, clinical updates and e-prescription are entered in SmartCare
- SmartCare sends e-prescription to eLMIS
- eLMIS dispenses drugs following first-in, first-out policy using real-time stock availability
- eLMIS sends data on stock dispensed back to SmartCare to complete patient file.

eLMIS FE Version 4 includes:

- Batch tracking/GS1 barcode capability
 - Enforce first in, first out, minimize expirations
 - Enable traceability for rational drug use
 - Enable automated POD reconciliation
- Essential medicines/all pharmaceutical products dispensation
- Web-based implementation of FE at SDP (on LAN)
- Enhanced facility-level reports and analytics.



Objective 2: eLMIS Implementation

Improved Efficiency through Sustainable eLMIS FE Implementation

eLMIS Facility Edition Implementation

eLMIS FE Deployment

- eLMIS FE at a total of 664 sites (deployment to over 360 sites under AIDSFree)
- MOH present at 100% of deployments
- Thirty-seven eLMIS Super Users trained (MOH and partners)
- Forty-six super users deployed and migrated 80 sites on their own.
- eLearning platform developed and deployed in 2018

Technical Support

- Technical supportive supervision to resolve Helpdesk referrals
- eLMIS Super Users fully transitioned to GOZ
- Key actions: Validation of eLMIS use at all dispensing testing points, addressing hardware challenges, enabling daily supportive supervision, on-the-job training, and power back-up installation

Helpdesk Commissioning

- Helpdesk commissioned for all networks
- Toll-free with MTN, Airtel, and Zamtel
- Average of 1,862 calls received monthly; ~85% resolved on call; 15% logged for follow-up with supportive supervision



Accomplishments

The FE was piloted in 48 health facilities across Zambia beginning in June 2014. After successful pilot results in March 2015, FE was deployed to an additional 616 sites by the end of September 2019. The 664 facilities with FE:

- Represent 23% of total facilities nationally.
- Cover over 80% of facilities with the highest health commodity consumption nationally.

Two modules to the FE were developed to increase usability and to respond to the realities in the field.

- The hub module was developed for use at Kalingalinga hub to capture and resupply ART products for facilities within Lusaka district, which require weekly resupply.
- The district module offered an offline platform for DHOs to enter reports on behalf of facilities that do not have FE.

In 2019, Zambia upgraded to FE version 4.0, which is web-enabled with offline capabilities. The upgrade enables all health commodities to reach the recipient and further reduce wastage. New functionalities include:

- Batch number and expiration date tracking
- Global track and trace best practices

"Ordering commodities is now seamless with an electronic system. I can send reports with just a click of a button. With FE, I can monitor all health commodity inventory and use the data available to plan ahead and avoid stockouts. Also, I can use FE as a supervisory tool to see what my team is up to and how often they use the system."

Morgan Musongole,
Pharmacy Storeroom Head at University
Teaching Hospital



Implementation Process

Site assessments for deployment

- MOH conducted a selection of facilities following a criterion that weighs facilities based on their placement in the national grid, the catchment area in which they are located and how many programs the facility runs. After the selection, the list of facilities to be deployed to was sent to AIDSFree.

Network deployment

- AIDSFree mapped out the facility's infrastructure for network deployment. Software was loaded on laptops and they were placed in their designated departments. depending on facility size a minimum of three computers are given to the facility, two client laptops and one server.

User training

- This is an orientation to eLMIS. Users are trained in basics of health commodity logistics, data flows from FE to CE and how both FE and CE manage logistics data. After which practical lessons on usage of FE are given. Conducting training on location and not off site provides a natural environment for staff and it is cost effective.

On-the-job training and data initiation

- On-the-job training (OJT) and data initiation is a two-part orientation. The first phase of OJT is a meeting with staff in which a system run-through is conducted. For the second phase, the team goes into specific departments training staff on how to operate the system in their specific program areas.

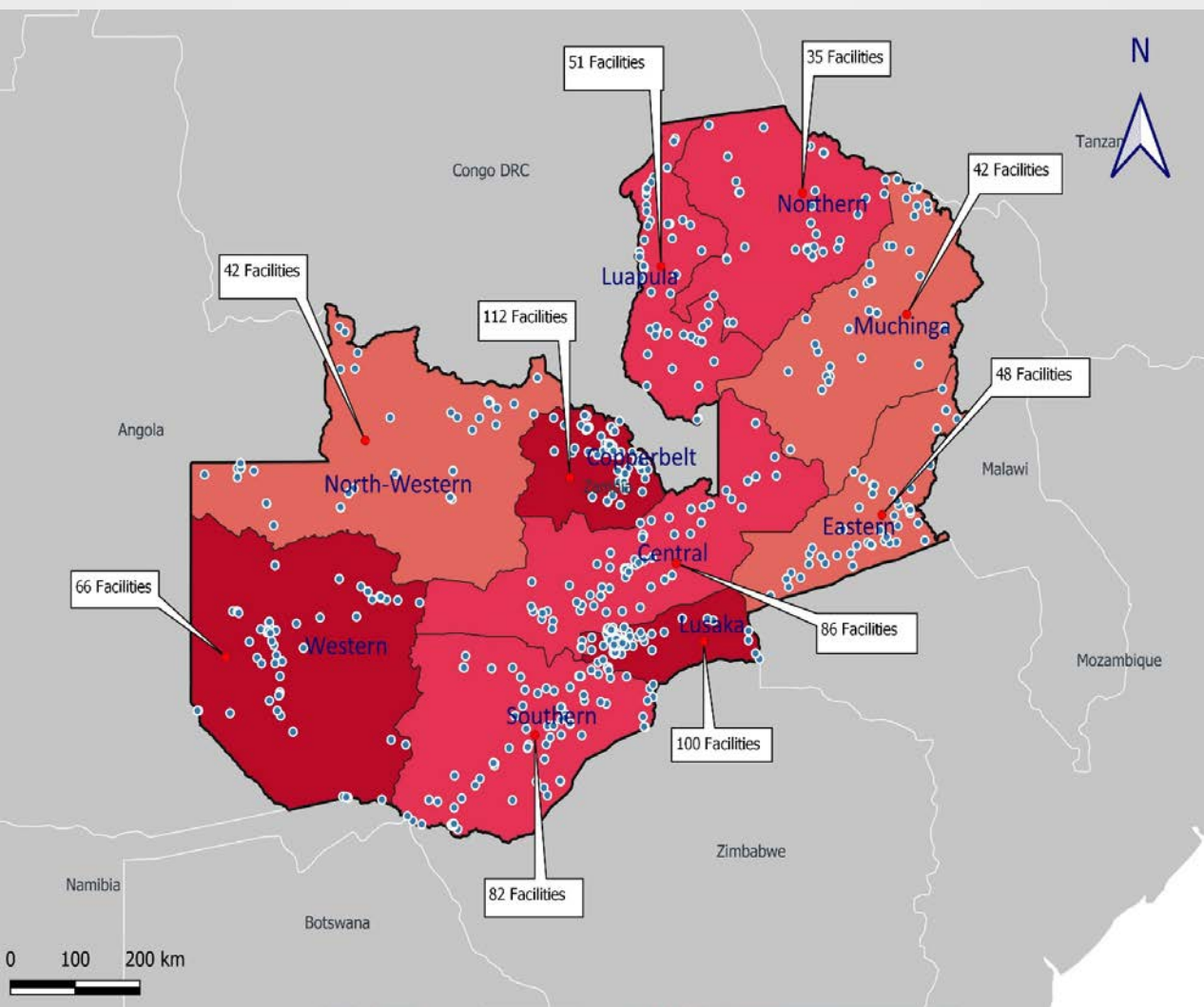
Technical support

- Technical support can either be a reorientation on the system or IT support, which involves network or hardware issues. District health officers can contact AIDSFree with queries about the system; AIDSFree also identifies and reaches out to facilities using a performance-based system. Depending on the support required, AIDSFree either provided a solution from a remote area or sent a team to the facility.

Monitoring and evaluation

- M&Es were also conducted. These processes enabled the project to monitor the interventions and track the changes in program performance over project life span. Two evaluations were also conducted (mid and end-line) which showed the progress of the system intervention and recommendations for transition.

Geographic Coverage

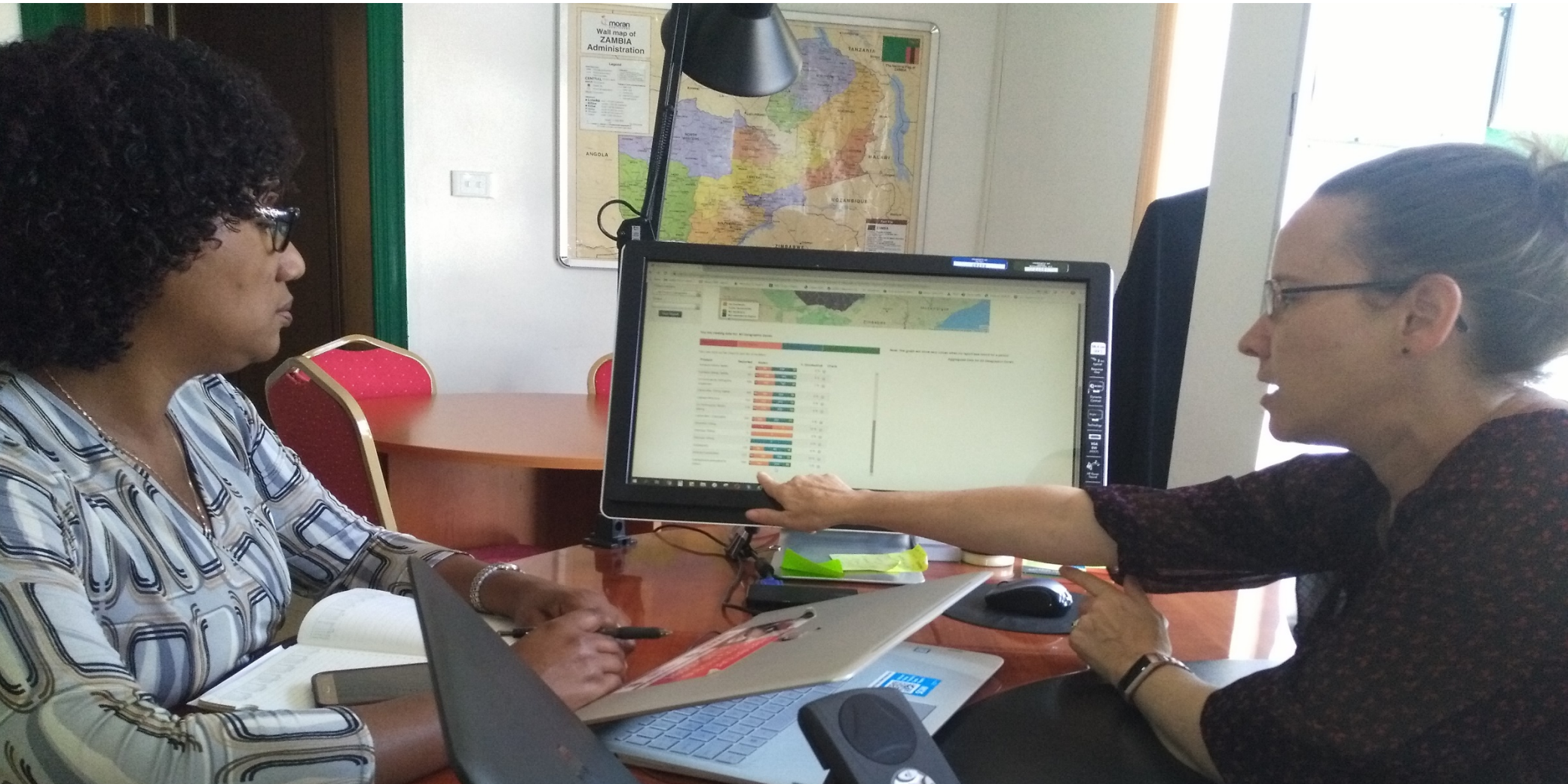


Zambia has a total of 10 provinces and 118 districts and more than 2,600 health facilities. eLMIS FE has been implemented in 664 facilities across the country. Lusaka and Copperbelt provinces were considered high priority because they encompassed over 40% of the country's population and contained many high-volume facilities. Although eLMIS FE had only been implemented in 23% of the facilities, these facilities accounted for more than 80% of the consumption of health commodities.

664 facilities with FE:

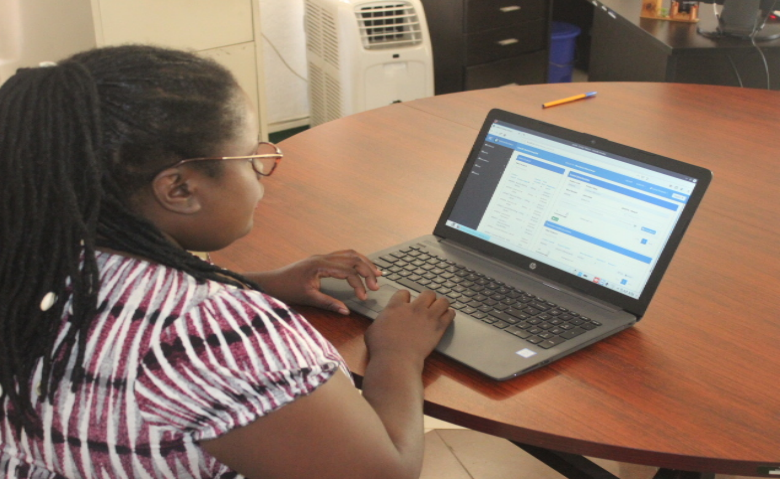
- 23% of facilities in the country
- 30% of all ART sites in the country
- 83% of all ART patients reported through FE sites





Objective 3: Data Use

Increased Data Utilization Improving Supply Chains



Lubasi Manjabila, AIDSFree Staff, Systems Support Officer
Lusaka Zambia

AIDSFree trained 1,951 MOH staff and 98 partner staff over the course of the project. This figure illustrates the increase in monthly user sessions from mid-line till end-line evaluation. The increase in users demonstrates improved data accessibility. Further, system automation increased data accuracy and quality, and made data available in real time. Users grew more reliant on the system over time.

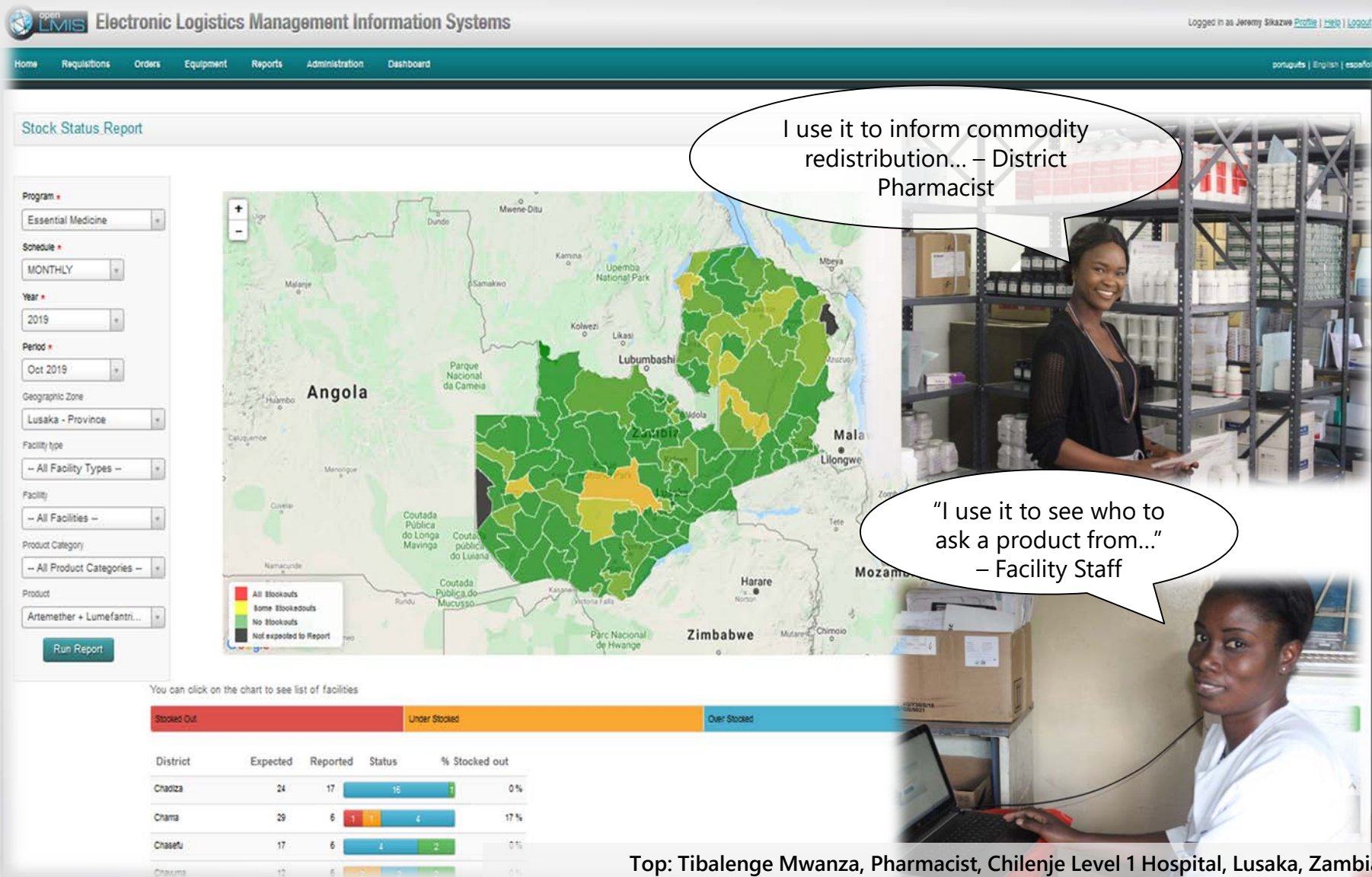
Improved Data Accessibility

eLMIS CENTRAL EDITION AVERAGE USER SESSIONS



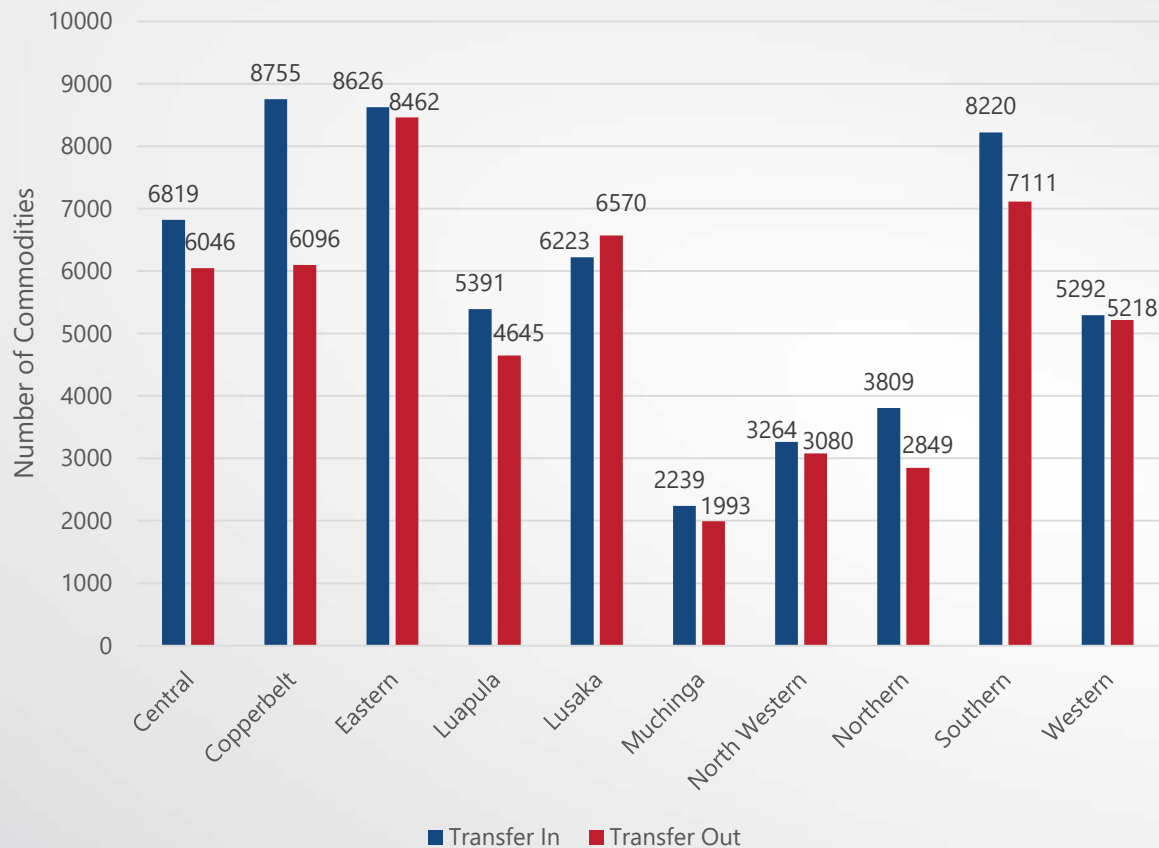
User sessions increased by 58%

User Feedback



Top: Tibalenge Mwanza, Pharmacist, Chilenje Level 1 Hospital, Lusaka, Zambia
Bottom: Odia Mayiki Solange, Laboratory technologist, Mpika Urban Clinic, Mpika, Zambia

Number of Commodity Transfers in all Programs by Province



The chart illustrates decision-making based on visibility of supply chain operations for all stakeholders through regular dissemination of supply chain performance. This empowered managers to investigate supply chain problems, redistribute products when necessary, and manage the supply chain efficiently.



Objective 4: Commodity Security

Using data to improve commodity security

Using Data to Improve Commodity Security

Easy-to-use interfaces for operations and increased decision-making based on logistics data have improved partner collaboration and commodity security.



Merina Chizimu, Bright Shiyongu, Oliver Kalota & Obed Simaundu, CRS Training, Lusaka Zambia

Partner Collaboration

- Monthly Change Control Board meetings led by MOH and MSL
- Biweekly GHSC-PSM eLMIS review meetings
- GHSC-PSM monthly SC partner meetings
- Forecasting and quantification meetings
- MOH PSC TWG meetings
- Ad hoc meeting/data requests

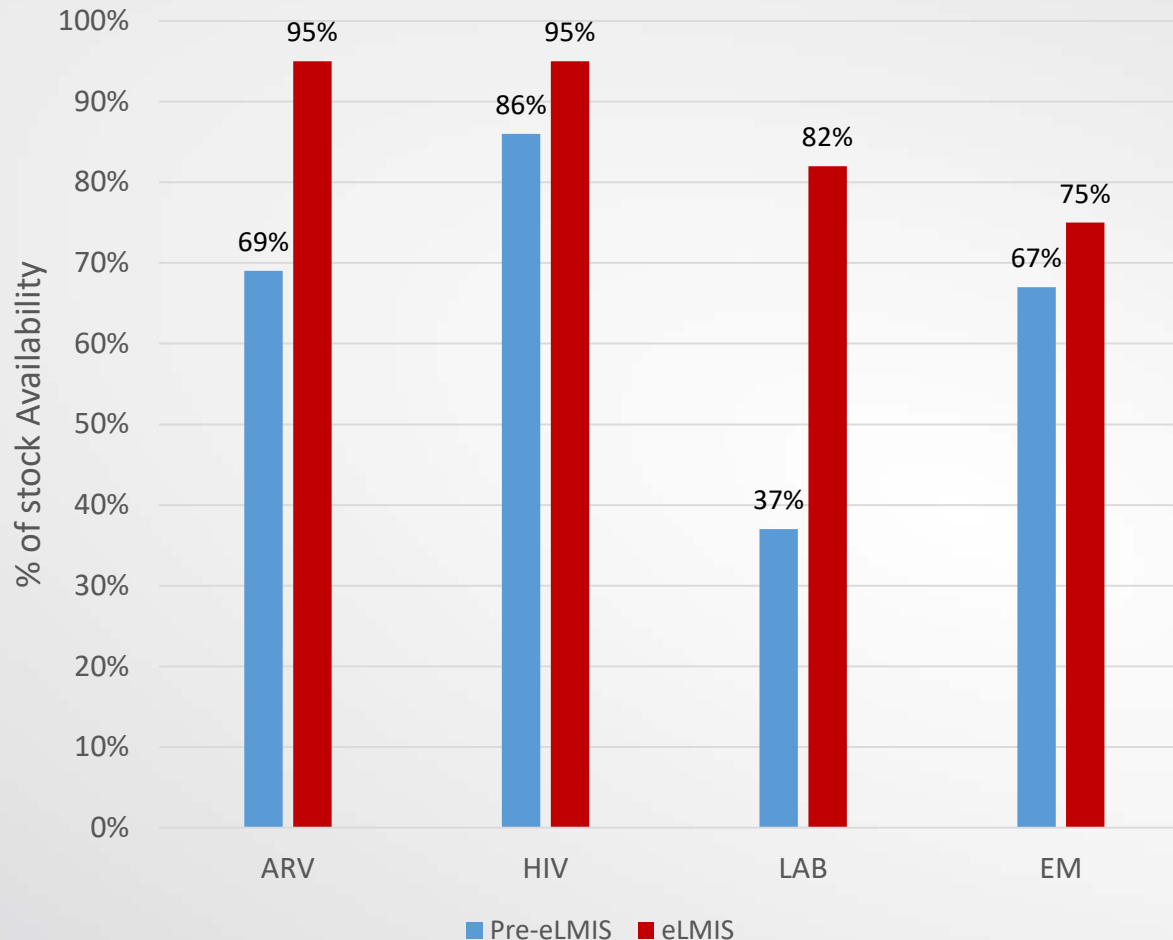


Commodity Security

- Improved stock availability: FE sites showed 16% more stock availability over non FE sites
- Transfer of commodities to avoid costly emergency orders
- Decreased expiries resulting in reduced wastage



Stock availability at health facilities with FE improved over time



During the End-line Evaluation, AIDSFree compared overall stock availability at sites where FE was deployed.

Stock availability at sites with FE deployed improved by 17% (weighted average across all commodity areas).

Pre-eLMIS period: 2012 – 2013
eLMIS period: 2018 – 2019



Objective 5: Sustainability

Building Sustainable Systems from Day One



Martha S. Musonda, Mirriam Mwila & Mukumbi Kabeshe, Pharmacists University Teaching Hospital Lusaka Zambia

eLMIS Sustainability Pillars



Governance



Software Development



Implementation



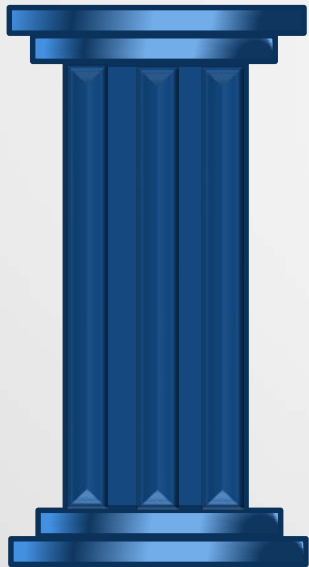
Monitoring /Support



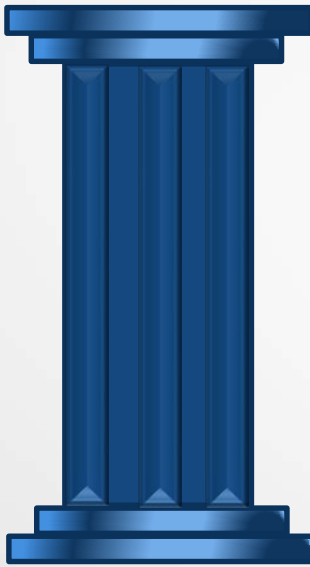
Data Use



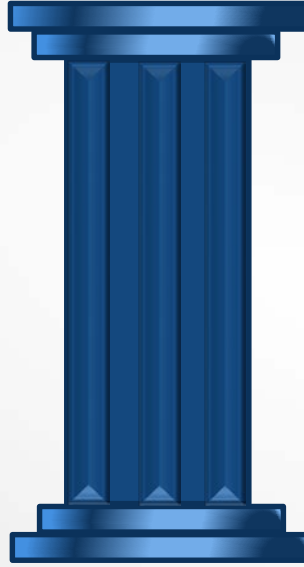
Financing



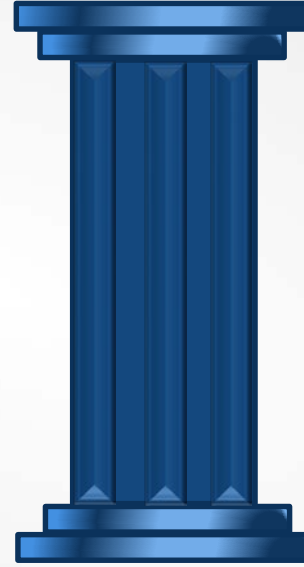
MOH establishes and manages governance framework and Change Control Board process



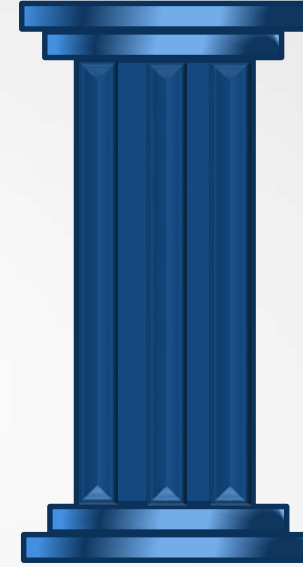
Zambian government hires software developer and provides guidance on priorities



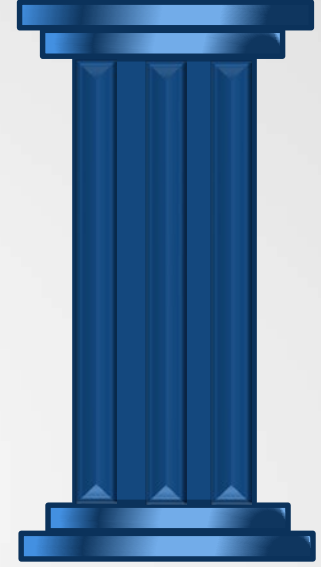
MOH deploys eLMIS without partner support



MOH provides all end-user support

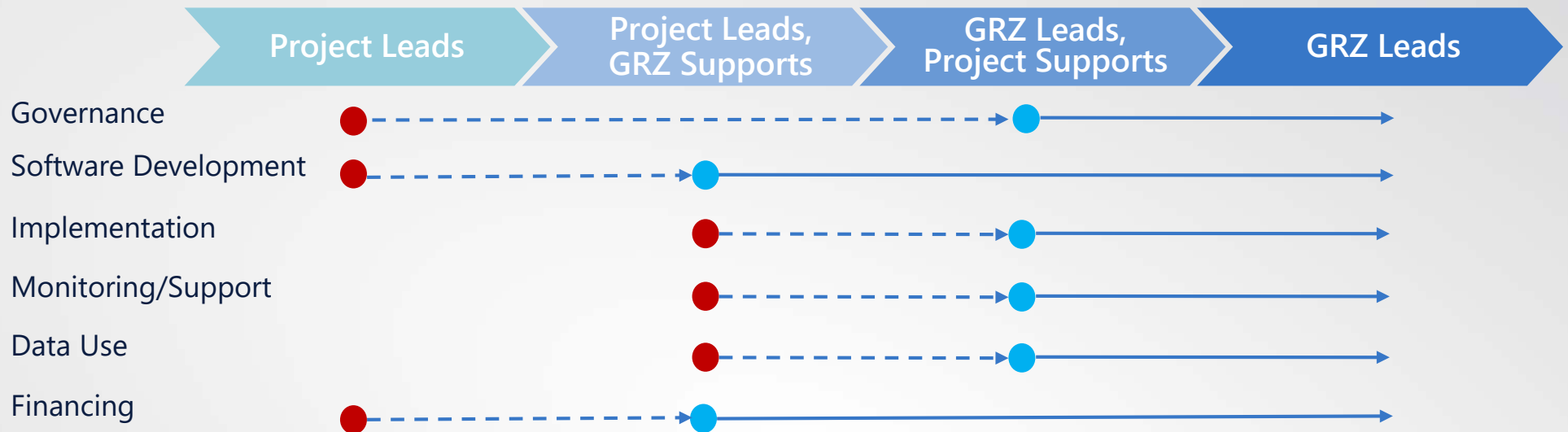


MOH leadership uses eLMIS data to monitor and supervise facilities



MOH incorporates costs of eLMIS implementation and support into their annual budgeting process

Sustainability Continuum



KEY

Project Leads: Only the project is doing this activity

Project Leads, GRZ Supports: GRZ is starting to be involved in this activity

GRZ Leads, Project Support: GRZ is taking leadership in this activity but project is still involved

GRZ Leads: GRZ leads this activity without any project intervention

Red dot: Status of activity at the start of AIDSFree

Blue dot: Status of activity at the end of AIDSFree

Dashed blue arrow: Progression during AIDSFree

Solid blue arrow: Progression required after AIDSFree

SUSTAINABILITY MILESTONES

Governance: GRZ leads CCB and notifies all partners of decision on eLMIS

Software Development: GRZ hires software developer and provides guidance on priorities

Implementation and Monitoring/Support: 31 MOH staff certified as eLMIS super users, have deployed system without AIDSFree, and provide support to users through WhatsApp

Data Use: MOH leadership using eLMIS data to monitor and supervise facilities

Financing: Some provinces are incorporating costs of eLMIS implementation and support into 2020 budget.



OUTCOMES & IMPACT OF INVESTMENT

Photo: Ferry Samukozela, Laboratory Technician, Chilenje Hospital Lusaka, Zambia

Overcoming Challenges



INTEROPERABILITY

Over the years, a variety of automated systems from different donors have been introduced to address different aspects of service delivery. To enable better workflows, donor collaboration and MOH support prioritized the interoperability of SmartCare and eLMIS. This was resolved by enabling the applications to share data with one another so that users do not have to enter data in two separate systems.



POWER & NETWORK

Deficiencies in the power and network infrastructure greatly hindered system implementation. Certain parts of the country are not connected to the power national grid, experience excessive load shedding, or do not have internet. Therefore, eLMIS could not be deployed to some facilities. To mitigate this issue, the project piloted limited solar power solutions and back-up power sources such as power inverters to facilities that experienced excessive load shedding.



SYSTEM ADOPTION

The MOH adopted eLMIS as the national electronic logistics system in 2018. Only after the MOH issued directives was the system accepted at all levels. This gave AIDSFree the green light to deploy software enhancements and to start planning for sustainability of the system.

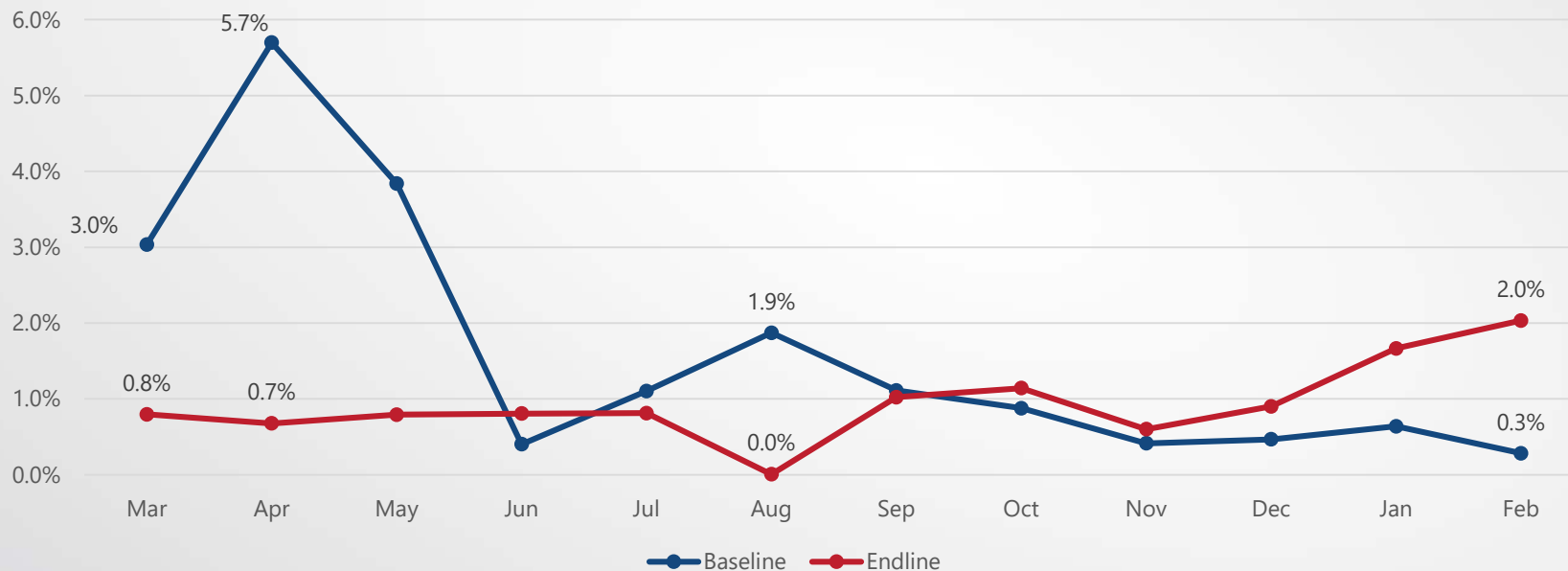


Improved Stock Availability and Controlled Expirations

Stock Status versus Expired Medications

The stock status at SDPs in all program areas has improved and the ratio of expiration to consumption has decreased to 0.3%. This shows the impact of automated inventory management. Health facilities can efficiently manage their stocks.

Aggregated Ratio of Expiration to Consumption



Improved Supply Chain Supervision

Targeted Supervision Visits

Increased visibility into the supply chain enabled supervisors to conduct targeted visits to less performing facilities instead of conducting costly routine visits to all facilities.

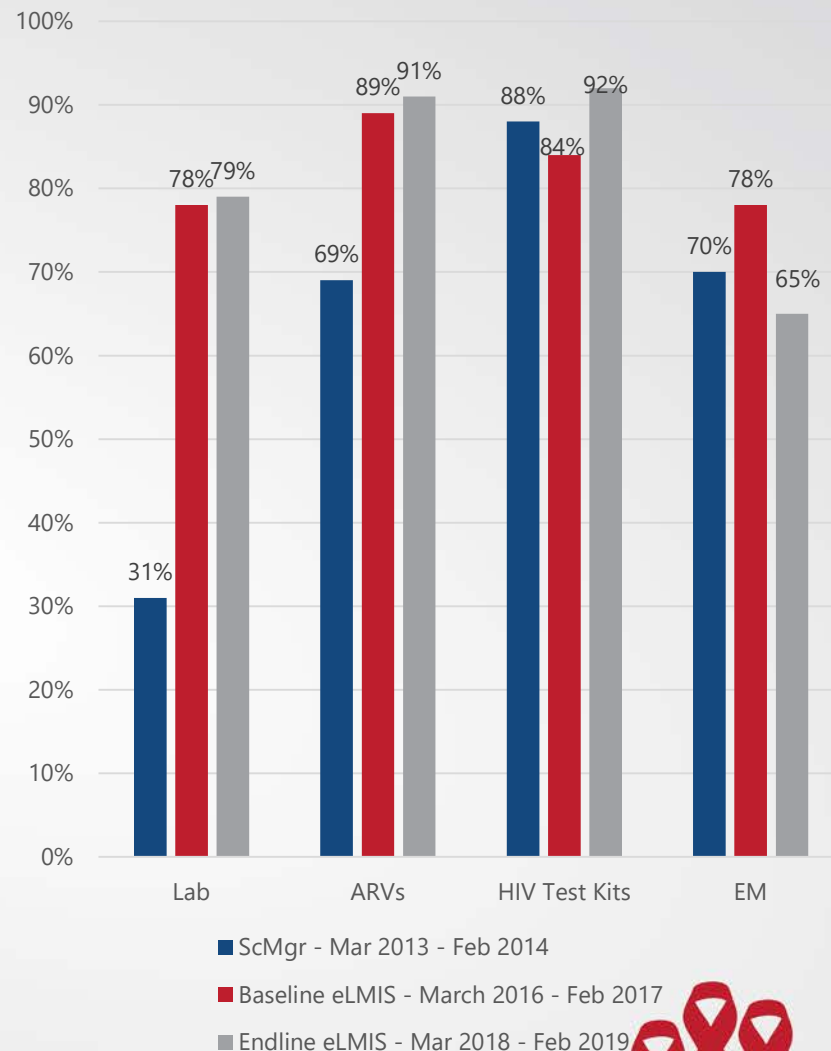
Availability of Routine Data

M&E is now more cost-effective because data is available in real time and accessible remotely.

Collaborative Support to MOH

More partners are using the data in eLMIS to conduct supply chain supervision to MOH facilities. With data being automated, easily accessible and on an open platform, supply chain managers can make quicker and better decisions which in turn improves overall service quality.

Average Percentage of Product Availability by Program



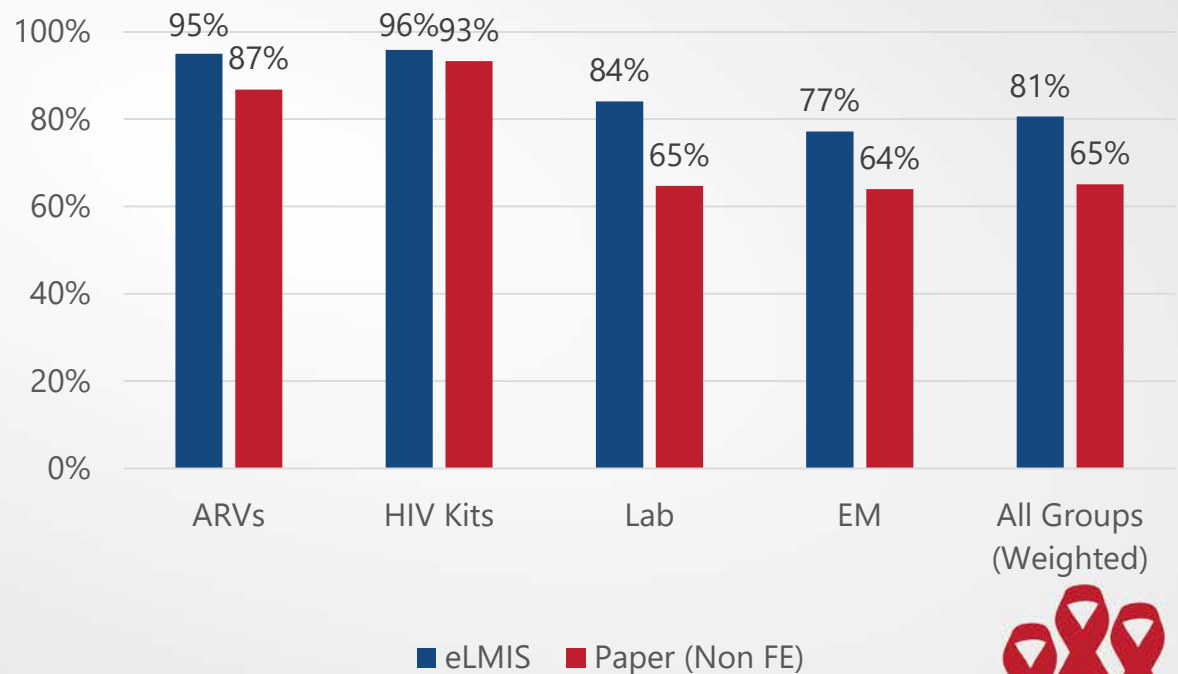


Monde Sikuka, patient at Chilenje Hospital, Lusaka, Zambia

Health Impact

Increased Commodity Availability

The end goal of any successful supply chain is to ensure commodities are continuously available to clients that need them when they need them. Facilities with eLMIS FE have proven to have approximately 15.5% more commodities available than facilities still using the paper-based system.



Investment Impact

With USAID's continued support and investment, the Zambian health logistics system has improved:



Commodity Stock Status

- There were fewer stockouts in facilities with FE compared to those without. This is because eLMIS FE sites had a better and more stable inventory management system that is less likely to experience service interruption.



Reporting Rates

- Average reporting rates increased from 80% in 2016 to 98% in 2019 across all program areas. In addition to logistics management interventions, the improvement is attributed to ease of reporting because of eLMIS Facility Edition, which allowed staff to easily generate and send reports to MSL.



Data Quality & Accountability

- Data quality also improved with the use of eLMIS in logistics management. By using the system, the manipulation of historical data such as opening and closing balances from the previous months are not possible. The system created an audit trail of all transactions completed at the health facility for enhanced accountability.





LOOKING AHEAD

Mwape Mukuma, Kazungo Akekelwa & Kampamba Nandele Mumbi Laboratory Technicians, Chilenje Hospital, Lusaka, Zambia



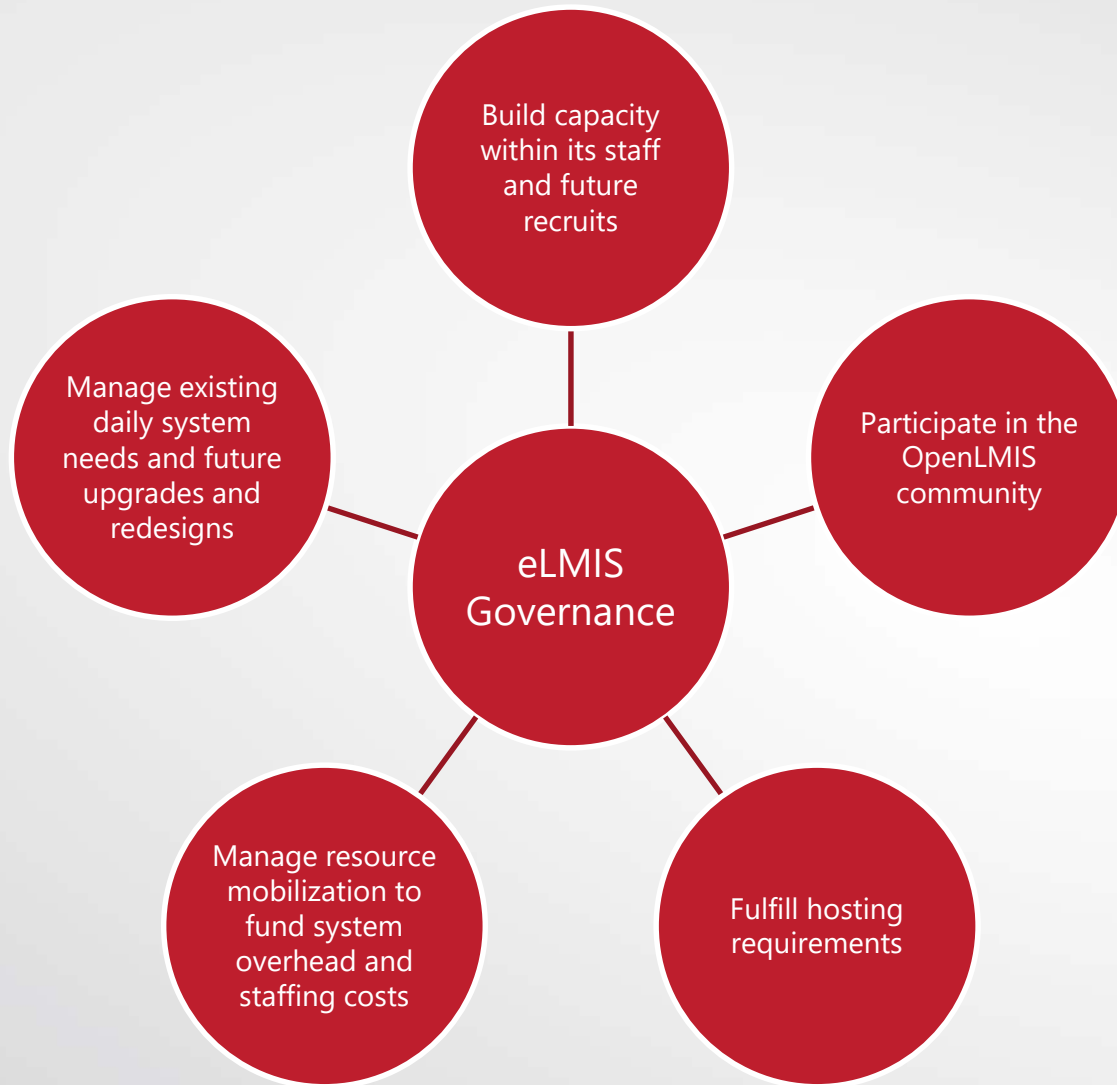
Merina Chizimu, Bright Shiyengu & Rosset Kunda, CRS Training Lusaka Zambia

Lessons Learned

- Governance mechanisms such as the eHealth initiative are critical for ownership and management of eLMIS.
- Building capacity at all levels, from top management to facility users, is a requirement for adoption.
- Continuous improvement is essential to effectively managing the health supply chain and evolving challenges.



Future eLMIS Governance



“Working at the eLMIS call center has given me an opportunity to learn how best as MOH we can take ownership of the system and provide direct support to facility staff. It’s a great and satisfying feeling to assist a facility especially that I can relate to their challenges”.

Rosette Kunda,
District Pharmacist, Lusaka Zambia



eLMIS Data Use and Supervisor training,
Mufumbwe, Zambia

Total Cost of Ownership

The costs involved in operating the eLMIS, currently financed by USAID, include:

- Human resources
- Training
- Technology
- Hosting costs

While the existing costs can provide an important guide to the general scope of costs, future eLMIS costs will vary due to differences in staffing and overhead costs within the MOH. It is anticipated that MOH and other potential donors will provide additional funding for maintenance and deployment of eLMIS nationwide over the next five years. In the interim, donors must continue providing support towards the existing eLMIS infrastructure.



What's Next?

Zambia's health logistics system has undergone significant strides in achieving end-to-end automation. The implementation of eLMIS has created a more efficient, accessible, and accurate logistics management system. In order to consolidate the gains achieved by the automated system, eLMIS will require continued stakeholder collaboration and commitment to sustainability. This will foster better practices and automate the supply chain at all public health levels. Continued investment will ensure the system grows, adapting to the evolving requirements of Zambia's population and health system. To build on the eLMIS success, future investments should target:

Software Enhancements

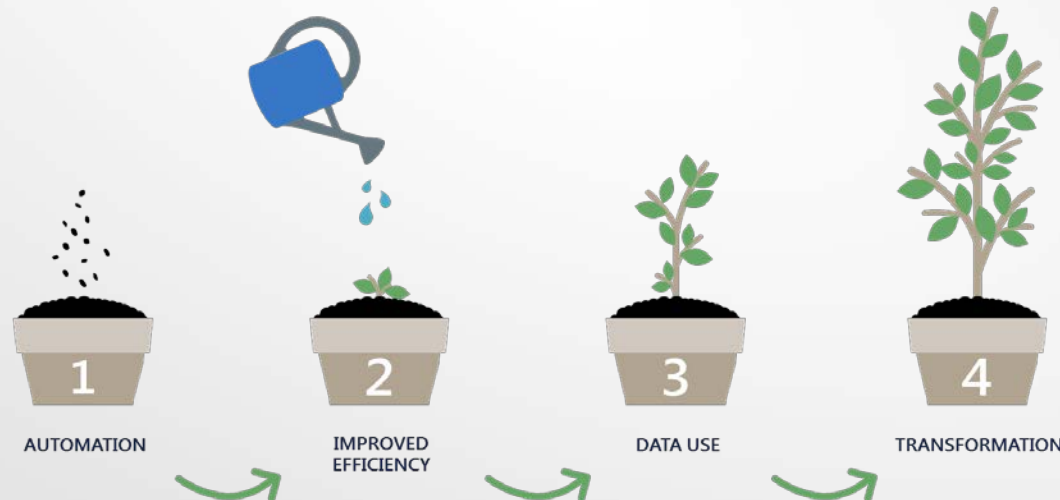
Software enhancements are necessary to automate all levels of the health commodity supply chain. Continued efforts should focus on advancing interoperability and making it more user friendly. Enhancing the system and its training will continue to scale up data use for decision-making.

Implementation Scale-Up

AIDSFree has deployed FE to most of the country's high-volume facilities. Following this, a full country-wide scale-up would be required. FE should be deployed to small facilities, health posts, and private facilities.

Sustainability and Governance

AIDSFree has developed a sustainability plan that will transition governance of eLMIS to MOH. The sustainability plan includes system management and a transition process that not only sustains the system but builds capacity. This will allow the Zambian government to take full ownership of the software at all levels and have the capacity to maintain and build on the system's success.



AIDSFree

2733 Crystal Drive, 4th Floor

Arlington, VA 22202 USA

Phone: 703-528-7474

Fax: 703-528-7480

Email: info@aid-free.org

Web: aidsfree.usaid.gov