Question 1: *How have systems thinking approaches and tools been incorporated in activities to improve health equity? Were these approaches useful in achieving health equity goals? If so, what are the pathways by which these approaches helped to address the root causes of inequity?*

Accelerating the achievement of health equity goals through a one record per citizen electronic medical record system in Eswatini

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HEALTH SYSTEMS STRENGTHENING ACCELERATOR

Context

Eswatini's healthcare system has evolved to overcome multiple challenges that lead to inequity. Among the challenges are fragmented and incomplete data, poor coordination among healthcare workers, limited access to medical information, siloed service delivery, and parallel data collection.

The Kingdom of Eswatini has implemented an electronic medical record (EMR) system, the Client Management Information System (CMIS), to address these challenges. Health disparities make optimal health difficult. Healthcare disparities have been reduced through CMIS' implementation of *one record per citizen*.

Health equity was enhanced by implementing CMIS across all Eswatini health services and making it accessible across all facilities. CMIS has been implemented in rural and urban health facilities with support from the United States Agency for International Development (USAID), the World Bank, and Global Fund to Fight AIDS, Tuberculosis and Malaria. As a result of maintaining one record for every citizen across the continuum of care, the government has improved healthcare delivery and ensured equitable health status among citizens.

Activity Description

The Ministry of Health's Health Management Information System (HMIS) Unit chose to develop a customized solution because it allowed them to tailor CMIS to the Eswatini population's needs and challenges. This ensures a more targeted approach. As a result, the system's functionality, security, and privacy measures have been improved, so sensitive health information is protected. A centralized architecture has been developed to enable comprehensive care coordination and reduce disparities caused by fragmented or incomplete records by using a one-record-per-citizen approach. Additionally, this has allowed for enhancements and customization to address evolving health equity needs, making it a valuable tool for reducing disparities, improving health outcomes, and promoting equitable access.

The CMIS project team consists of Ministry of Health (MOH) and Data.FI project experts with expertise in software development, networking, data use, and analytics. A user-centered approach was used to develop the CMIS software using agile methodologies. Based on stakeholder input and program needs, a monthly 'sprint' software development cycle was used. Health equity goals were accelerated in two years through expanded health information exchange, an integrated laboratory diagnostics system, deduplication algorithms for other systems' data sources, and comprehensive data collection beyond HIV to include non-communicable diseases (NCDs), key populations, communities, vaccinations, PMTCT, stock management, and prescriptions.

There is a national population registry interface that enables the system to address the health needs of all citizens and non-citizens in the country. Close collaboration between the MOH and the Ministry of Home Affairs enabled this integration. A seamless registration process can be achieved by searching and retrieving demographic information from any citizen or non-citizen with a national Personal Identification Number (PIN).

Health care innovations adopted by the system include SMS reminders for appointments and communication with patients. Patients with a valid phone number in the system are eligible to receive SMS communication regarding their appointment information, which ensures access to healthcare, regardless of location.

Based on the availability of equipment, the system was implemented in additional rural and urban health facilities. The deployment strategy included site readiness, training, Go-Live support, post-live support, and scheduled follow-up supportive supervision once the centralized architecture was in place and the system was accessible through a browser-based interface.

To provide high-speed wireless connections, the CMIS uses a microwave network, which uses high-frequency radio waves to transmit and receive voice, video, and data information over a line-of-sight wireless connection. Although this technology offers a high capacity for transmitting large amounts of data, it is also prone to weather conditions, leading to downtime. A secure private connection to the Government Wide Area Network (WAN) was set up using the MTN mobile data network to bridge the gap of CMIS network downtimes. CMIS application access was made secure by configuring APN connectivity and whitelisting the CMIS server IP address. SIM cards were assigned to each gadget, tablet, and router. Local ISP provided 1500GB pooled data to all SIM cards as part of private sector partnership. Due to this, more mobile devices can be connected within the package's consumption limit.

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Activity Description

With the deduplication algorithm enhancement in the CMIS, data quality and reliability improved, reducing the risk of errors and inconsistencies. Healthcare providers now have access to accurate and up-to-date health information, promoting informed decisions and continuity of care. In this way, healthcare workers are able to provide personalized and effective care without relying on fragmented or incomplete medical records. Through the centralized architecture, individuals received coordinated and consistent care across multiple settings. Care gaps were addressed, duplication of services and commodities was reduced, and patient outcomes improved, leading to a more equitable healthcare system.

As a result of the CMIS, Eswatini citizens receive healthcare in health facilities more actively and contribute to health equity. By granting consent to access their medical records, individuals had convenient access to their own health information, enabling them to make informed decisions and take ownership of their health. Patients were empowered to participate in their care and had the tools to advocate for their health needs, leading to a more equitable healthcare environment.

The upgrade of the CMIS has enabled patient-focused care for key populations. Additionally, healthcare providers can tailor interventions based on their unique health needs. By targeting health disparities, marginalized populations will receive the support and resources they need to improve their health. Moreover, the integration of key population data within the national CMIS facilitated better coordination and collaboration among healthcare providers.

With microwave and APN technologies, the project was able to overcome infrastructure limitations and connect all healthcare facilities. Enhancing connectivity supported equitable health by facilitating real-time data sharing between frontline healthcare workers, providing timely and efficient care, and supporting collaborative decision making.

Evidence

Figure 1. Waterfall analysis of TX_CURR and associated indicators extracted from CMIS for the national population

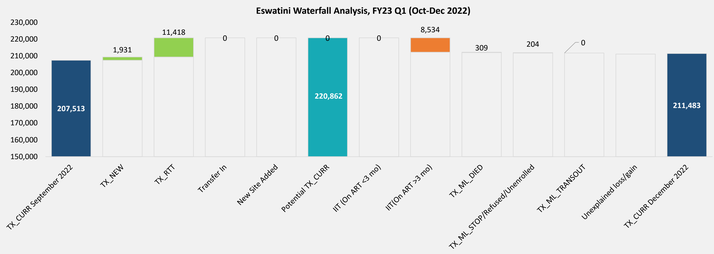
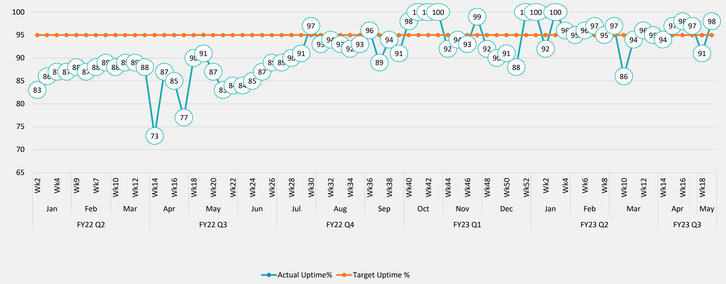


Figure 2. CMIS community module being showcased to USAID Mission during their visit to a key population hotspot outside the capital city

EVIDENCE, CONTINUED

Figure 3. CMIS uptime tracker with APN network coverage as a backup



Facilitators

Facilitators of the project's success:

- Healthcare providers and staff felt a sense of urgency and commitment as a result of MOH's leadership and buy-in.
- Support from USAID facilitated the transition to digital health systems and drove implementation.
- A pivotal role was played by the Global Fund in procuring hardware and other infrastructure that enabled the system to function across the country.

Challenges

- The lack of governance led to proliferation of disparate electronic tools and systems in healthcare.

Lessons Learned

- In order to implement health information systems, strengthening the Health Information Systems Coordinating Committee (HISCC) is essential. Roles and responsibilities must be clearly defined, as well as decision-making authority. Participation from diverse stakeholders promotes collaboration and buy-in.
- The Pause and Reflect workshops with end-users and stakeholders proved to be extremely successful when implementing CMIS systems. Participants had the opportunity to reflect on their needs, concerns, and expectations during these workshops. End-users and stakeholders were involved in these workshops, creating a sense of ownership and collaboration.
- By implementing a redundant APN alongside the microwave network, we ensured uninterrupted connectivity and data accessibility.

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