

## Case Report

# ACROSS SECTIONAL STUDY ON THE DEVELOPING A FRAME WORK FOR MONITORING AND EVALUATING DIGITAL HEALTH INITIATIVES IN UGANDA'S MINISTRY OF HEALTH

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Received 06<sup>th</sup> May 2025; Accepted 07<sup>th</sup> June 2025; Published online 30<sup>th</sup> July 2025

### ABSTRACT

**Background:** Uganda's Ministry of Health (MoH) has embraced the potential of digital health, evidenced by the proliferation of eHealth platforms, electronic medical records (EMRs), and mobile health (mHealth) tools in both public and private healthcare settings. This study developed a framework for monitoring and evaluating Digital Health initiatives in Uganda's Ministry of Health. **Methods:** This study employed a quantitative research design to investigate the monitoring and evaluation (M&E) landscape of digital health initiatives within Uganda's Ministry of Health (MoH). Quantitative methods were chosen for their ability to produce generalisable findings and provide measurable insights into perceptions, practices, and gaps in M&E systems (Bryman, 2016). The study focused on three key categories of participants. These included policymakers and technical advisors at the MoH, representatives from donor agencies and implementing partners involved in digital health, and healthcare providers who regularly interact with digital health tools at facility level. Participants were selected through purposive sampling based on their direct involvement and expertise in digital health implementation and oversight (Patton, 2015). Data collection was carried out using a structured survey administered through Google Forms. The survey was designed to be accessible online, allowing participants from different departments and locations to respond conveniently. **Results:** The study reported that Digital technologies have transformed healthcare systems across the globe, offering new opportunities for improved health services delivery, data management, and decision-making. However, despite significant investments and donor support, the country faces persistent challenges in measuring the effectiveness, scalability, and sustainability of these digital interventions. The study recommended developing a unified, modular M&E framework, institutionalizing stakeholder co-designs, strengthening capacity through tiered training, investing infrastructure and Offline tools and securing a sustainable financing among others. **Conclusion:** Uganda's digital health M&E ecosystem has evolved significantly, supported by frameworks such as the HSDP III and DHIS2. However, implementation is hindered by limited capacity, unclear guidelines, and fragmentation. The findings demonstrate a clear need for an integrated and flexible M&E framework that is both standardised at the national level and adaptable to local contexts. Stakeholders are willing to engage, and technologies already exist that can bridge current gaps if properly coordinated and funded.

**Keywords:** Digital health refers to the use of information and communication technologies to support healthcare, improve health outcomes, and enhance the delivery of healthcare services. It encompasses a wide range of technologies and applications, including mobile health (mHealth), health information technology (IT), telehealth, and wearable devices. Digital health aims to make healthcare more efficient, accessible, and personalized.

### INTRODUCTION

The rapid advancement of digital technologies has transformed healthcare systems across the globe, offering new opportunities for improved health service delivery, data management, and decision-making. In low- and middle-income countries (LMICs), particularly in Sub-Saharan Africa, digital health initiatives have emerged as critical enablers of accessible and equitable healthcare (WHO, 2023). Uganda's Ministry of Health (MoH) has embraced the potential of digital health, evidenced by the proliferation of eHealth platforms, electronic medical records (EMRs), and mobile health (mHealth) tools in both public and private healthcare settings. However, despite significant investments and donor support, the country faces persistent challenges in measuring the effectiveness, scalability, and sustainability of these digital interventions. Without a comprehensive and context-sensitive monitoring and evaluation (M&E) framework, it remains difficult to track progress, optimise resource allocation, and inform policy decisions effectively. This study sought to develop a robust M&E framework for digital health initiatives within Uganda's MoH. The proposed framework is expected to serve as a structured tool to guide performance tracking, outcome evaluation, and continuous improvement of digital health systems, ensuring alignment with national health priorities and global best practices.

### BACKGROUND

Uganda has made commendable progress in digitising its health sector, spurred by strategic documents such as the Uganda National eHealth Policy (2017) and the Health Sector Development Plan (HSDP III, 2020/21–2024/25). These frameworks underscore the government's commitment to leveraging digital technologies to achieve Universal Health Coverage (UHC) and the Sustainable Development Goals (SDGs) (MoH, 2020). However, implementation has been fragmented, with various actors deploying parallel systems lacking interoperability and standardised assessment mechanisms (Asiimwe *et al.*, 2022). While certain digital interventions, such as the District Health Information Software 2 (DHIS2) and the Electronic Logistics Management Information System (eLMIS), have seen widespread adoption, others remain limited in scale or poorly integrated. The absence of a harmonised M&E approach hampers the ability of the MoH and development partners to derive actionable insights from the plethora of data generated. Additionally, it hinders coordination, accountability, and long-term sustainability. An evidence-based, contextually relevant M&E framework is thus essential to foster coherence, transparency, and performance improvement across digital health interventions in Uganda.

### LITERATURE REVIEW

Globally, several models and frameworks have been proposed to assess digital health performance, including the WHO/ITU National eHealth Strategy Toolkit (2012), the Health Metrics Network

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Framework (WHO, 2011), and the MEASURE Evaluation framework (USAID, 2019). These tools emphasise elements such as stakeholder engagement, governance, capacity building, interoperability, and outcomes measurement. Recent scholarship also calls for the integration of user-centred metrics, sustainability indicators, and data governance mechanisms in evaluating digital health systems (Labrique *et al.*, 2022; Scott & Mars, 2023). In the East African context, studies by Wanyama *et al.*, (2021) and Namazzi *et al.*, (2022) highlight the critical gaps in M&E capacity and coordination in Uganda’s digital health ecosystem. These include limited data use culture, insufficient technical expertise, and over-reliance on donor-driven reporting requirements. Moreover, evaluations are often conducted retrospectively, without real-time feedback mechanisms, thereby constraining course correction.

Existing M&E practices in Uganda’s MoH tend to focus on routine health information systems and vertical programme indicators, with limited adaptation to the unique dynamics of digital health initiatives. There is a growing consensus that an effective M&E framework must be context-specific, inclusive of multiple stakeholders, and agile enough to accommodate technological revolution (WHO, 2023; Uganda MoH, 2020).

**METHODOLOGY**

This study employed a quantitative research design to investigate the monitoring and evaluation (M&E) landscape of digital health initiatives within Uganda’s Ministry of Health (MoH). Quantitative methods were chosen for their ability to produce generalisable findings and provide measurable insights into perceptions, practices, and gaps in M&E systems (Bryman, 2016). The study focused on three key categories of participants. These included policymakers and technical advisors at the MoH, representatives from donor agencies and implementing partners involved in digital health, and healthcare providers who regularly interact with digital health tools at facility level. Participants were selected through purposive sampling based on their direct involvement and expertise in digital health implementation and oversight (Patton, 2015).

Data collection was carried out using a structured survey administered through Google Forms. The survey was designed to be accessible online, allowing participants from different departments and locations to respond conveniently. It consisted of short-answer questions, multiple-choice options, and checkbox formats, covering key themes such as clarity of existing M&E frameworks, perceived effectiveness, alignment with national priorities, challenges in implementation, and desired indicators for performance monitoring. The online format not only facilitated efficient data collection but also enabled broad participation without the logistical constraints of in-person administration. This method ensured that insights could be gathered from both senior and mid-level staff within the Ministry.

Responses from the Google Forms survey were exported and analysed using the Statistical Package for the Social Sciences (SPSS). Descriptive statistics, including frequencies and percentages, were employed to summarise the data. Cross-tabulations were also conducted to explore patterns in responses across roles and levels of experience with M&E tools.

Ethical approval for the study was secured from the appropriate Institutional Review Board, and all participants provided informed consent. The survey was anonymous, and confidentiality was maintained throughout the data handling process. Participants were fully briefed on the purpose of the study and their rights.

The use of a structured survey as the sole data collection tool provided a consistent and replicable means of gathering reliable information to inform the development of a robust M&E framework for digital health in Uganda.

**FINDINGS**

This section presents the findings derived from a Google Forms survey distributed among staff of Uganda’s Ministry of Health (MoH). The data are presented according to the research objectives, including response rate, demographic characteristics, and a deeper analysis of the themes that emerged.

**Response Rate and Demographics**

A total of 29 individuals participated in the survey. This sample included a diverse set of stakeholders from the MoH, including policymakers, technical advisors, M&E specialists, IT officers, and frontline health workers. This diversity enhances the credibility of the data and reflects the complex and multi-layered nature of digital health implementation.

**Table 1: Respondents by Role**

Role	Frequency	Percentage (%)
Policymaker	6	20.6
Technical Advisor	5	17.2
M&E Specialist	3	10.3
IT Officer	3	10.3
Administrator	3	10.3
Public Relations Officer	3	10.3
Health Worker	2	6.9
Others (combined)	4	13.8
<b>Total</b>	<b>29</b>	<b>100.0</b>

**Table 2: Years Worked at MoH**

Duration	Frequency	Percentage (%)
0–5 years	16	55.2
5–10 years	11	37.9
10–20 years	2	6.9
<b>Total</b>	<b>29</b>	<b>100.0</b>

The majority (55.2%) had worked with the Ministry for 0–5 years, which may influence their perceptions regarding newer digital systems. However, the presence of senior staff (over 10 years of service) helped to balance the findings.

**FINDINGS PER OBJECTIVE**

**Familiarity with and Engagement in Digital Health Tools**

Respondents showed high levels of interaction with Health Information Systems (75.9%), Electronic Health Records (51.7%), and mHealth Apps (41.4%). These findings point to an ecosystem increasingly digitised in terms of data collection and health reporting. Analysis: Despite the reported use of these systems, usage of telemedicine (10.3%) was remarkably low, reflecting a limited reach of remote consultation services—possibly due to infrastructural limitations or low demand. High interaction with DHIS2 demonstrates its central role in Uganda’s health data ecosystem.

## Clarity and Structure of Existing M&E Frameworks

Most respondents rated the clarity of existing M&E frameworks as average (mean score = 3.24 out of 5). Only 10.3% rated the frameworks as 'very clear.' Interpretation: The moderate clarity rating suggests that while the frameworks exist and are being implemented, they may not be sufficiently understood by all stakeholders, especially at the district and facility levels. This affects fidelity and consistency of implementation.

Respondents described the frameworks as structured around strategic documents such as the HSDP III and the Uganda Digital Health Strategic Plan. However, weaknesses such as fragmented reporting systems and limited interoperability were frequently cited.

## Effectiveness in Tracking Digital Health Initiatives

More than 70% rated the current M&E practices as moderately or very effective. However, qualitative feedback highlighted multiple constraints: lack of real-time feedback, fragmented systems, and underuse of collected data for program improvement. There is a disconnect between perceived effectiveness and actual utility. Although systems like DHIS2 collect significant amounts of data, these are not consistently transformed into actionable insights.

**Table 3: Effectiveness Rating of M&E Practices**

Score	Frequency	%
1	0	0.0
2	2	6.9
3	12	41.4
4	9	31.0
5	6	20.7
<b>Total</b>	<b>29</b>	<b>100.0</b>

## Alignment with National Priorities

An overwhelming 89.7% of respondents believed that M&E frameworks align with Uganda's health priorities, especially the SDGs and Vision 2040. However, qualitative responses highlighted gaps, including misalignment with budgets and failure to track vulnerable populations. Alignment appears theoretical rather than operational. Most digital health M&E frameworks follow strategic blueprints, but the extent of practical application and integration into district planning processes is still limited.

## Challenges and Opportunities

A major barrier identified by respondents was limited resources, cited by 79.3% of participants. This includes insufficient budget allocations for M&E activities, underfunded infrastructure, and heavy reliance on donor financing. Inadequate stakeholder engagement was flagged by 75.9%, indicating that critical factors such as local governments, implementing partners, and community representatives are often excluded from design, implementation, and feedback loops. Poor data systems and infrastructure were reported by 62.1% of respondents. Key issues included unreliable internet access, electricity disruptions, and non-functional digital tools at health facility levels, especially in rural areas. Additionally, 65.5% of respondents noted a lack of training for healthcare workers, citing insufficient digital literacy and limited technical support for navigating complex reporting systems.

Despite these challenges, several opportunities emerged. Respondents identified the integration of digital literacy training into national and district-level programmes as a critical intervention to bridge the skills gap. The deployment of offline-first mobile tools (e.g., CommCare, DHIS2 Tracker) was seen as a realistic solution to connectivity challenges in remote areas. Furthermore, AI-powered dashboards were cited for their potential to automate data analysis and enhance real-time decision-making. Incorporating digital health M&E into pre-service training for medical and public health students was also recognised as a long-term strategy to institutionalise monitoring culture.

The convergence of challenges such as infrastructure gaps, weak human resource capacity, and underdeveloped data systems indicates that digital health initiatives in Uganda are constrained by systemic weaknesses. These limitations, if unaddressed, will continue to affect the fidelity and impact of digital health interventions. However, the proposed opportunities reflect a forward-looking mindset among stakeholders. Offline-capable systems address the rural-urban digital divide, while AI and visualisation dashboards offer practical methods for real-time feedback and learning. The emphasis on integrating M&E into formal training suggests a recognition of the need for sustainability and institutional memory. The findings suggest that for digital health M&E to be effective, it must be context-sensitive, user-friendly, and underpinned by continuous investment in human and technical capital. Rather than adopting generic global models, Uganda needs tailored solutions that reflect both the existing digital maturity and operational realities of its health system.

These findings resonate with literature that recognises both the potential and limitations of digital health M&E in LMICs. Studies by Namazzi *et al.*, (2022) and Asiimwe *et al.*, (2022) echo the identified challenges of fragmentation, limited feedback mechanisms, and underutilisation of data. The preference for a unified framework may seem contradictory to WHO/ITU's (2012) emphasis on flexibility, but this can be explained by Uganda's current context of fragmentation and donor-dependence. A hybrid model with central standards and local adaptability could bridge this gap. The strong support for stakeholder engagement, training, and dashboard visualisations aligns with Labrique *et al.*, (2022), who advocate for inclusive and transparent evaluation practices.

## CONCLUSION

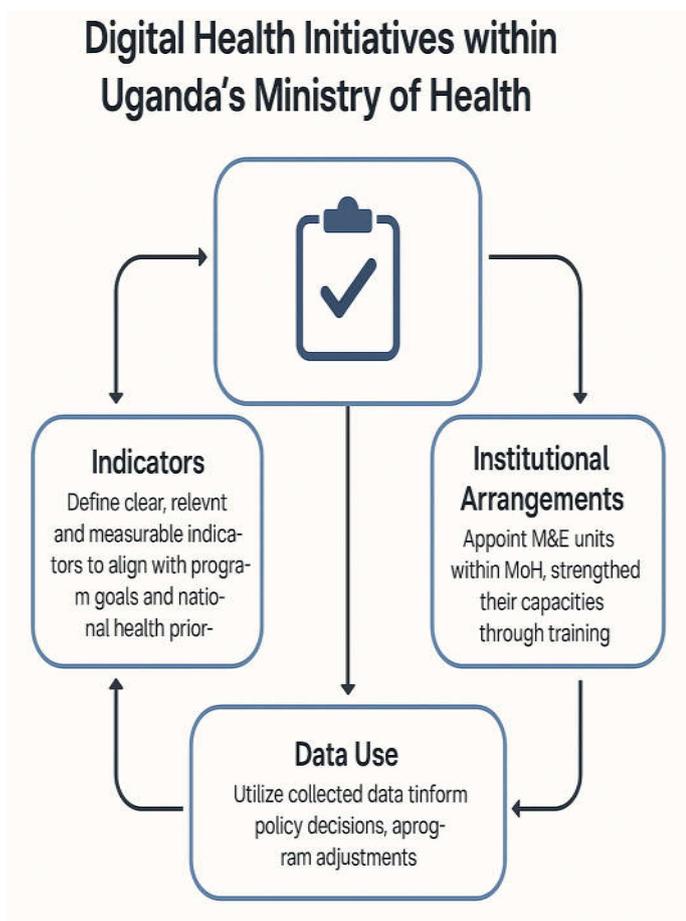
Uganda's digital health M&E ecosystem has evolved significantly, supported by frameworks such as the HSDP III and DHIS2. However, implementation is hindered by limited capacity, unclear guidelines, and fragmentation. The findings demonstrate a clear need for an integrated and flexible M&E framework that is both standardised at the national level and adaptable to local contexts. Stakeholders are willing to engage, and technologies already exist that can bridge current gaps if properly coordinated and funded.

## RECOMMENDATIONS

- **Develop a Unified, Modular M&E Framework:** Design a core national M&E framework with optional modules tailored to specific program needs. This ensures standardisation while allowing flexibility.
- **Institutionalise Stakeholder Co-Design:** Engage end users, district health teams, and private partners in framework development to ensure practicality, ownership, and usability.
- **Strengthen Capacity through Tiered Training:** Roll out national and district-level training programs, integrate M&E modules into health worker curricula, and establish mentorship networks.

- Invest in Infrastructure and Offline Tools: Provide power backups, internet access, and deploy mobile offline-first tools (e.g., CommCare, DHIS2 Tracker) that auto-sync.
- Enhance Data Visualisation and Use: Develop real-time dashboards with automated alerts to promote timely corrective action and data-driven decision-making at all levels.
- Align Donor Requirements with National Priorities: Establish a national coordination mechanism to harmonise partner-supported M&E tools with government systems.
- Secure Sustainable Financing: Allocate dedicated funding within the national health budget for M&E activities, and explore performance-based incentives for data quality and use.
- Embed Adaptive Learning Mechanisms: Integrate quarterly review processes, feedback loops, and annual framework reviews to ensure continuous improvement.

These recommendations, grounded in both evidence and stakeholder input, provide a practical roadmap for improving the M&E of digital health initiatives in Uganda. Below is the proposed framework:



This Monitoring and Evaluation (M&E) framework aims to guide performance tracking, outcome evaluation, and continuous improvement of digital health systems in Uganda. It is designed to align with national health priorities, global best practices, and the contextual needs identified through stakeholder feedback. The vision of the framework is to establish a harmonised, adaptive, and results-oriented M&E system that supports evidence-based decision-making for improved health outcomes.

The principles underpinning the framework include alignment with the Health Sector Development Plan (HSDP III), the Digital Health Strategic Plan, and the Sustainable Development Goals; stakeholder inclusiveness and co-design; transparency and accountability; system

interoperability and scalability; and continuous learning and adaptability.

The framework comprises several core components. The inputs include human resources such as M&E officers and health workers, financial contributions from the Ministry of Health and donors, robust digital infrastructure including DHIS2 and Uganda EMR, and guiding policies and standard operating procedures.

The main activities consist of routine digital data collection through national systems like DHIS2 and mTrac, provision of ongoing training and mentorship in M&E, hosting quarterly performance review meetings, and active stakeholder engagement through workshops and forums.

The framework outputs include the number of functional reporting systems, the percentage of trained staff, the timeliness and completeness of digital health data submissions, and the frequency of feedback reports shared with stakeholders.

Key expected outcomes involve improved data quality and use at both national and district levels, better interoperability of digital health platforms, increased user satisfaction, and enhanced capacity for tracking essential health indicators such as immunisation coverage and maternal health.

The overarching impact will be a strengthened national health system and the attainment of universal health coverage targets and digital transformation goals outlined in Uganda's Vision 2040. An illustrative indicator matrix includes metrics such as the percentage of digital systems interoperable with DHIS2 (measured bi-annually through audit reports), the percentage of trained health workers (monitored quarterly through training records), and reduction in data reporting errors (tracked annually via data quality assessments).

Institutional arrangements will consist of a National Steering Committee on Digital Health M&E chaired by the MoH, a Technical Working Group for oversight, and designated M&E focal points at district levels to coordinate implementation and ensure data quality. The framework will leverage dashboards for real-time feedback, implement quarterly data reviews for adaptive decision-making, and promote the use of scorecards to inform both policymakers and the public.

Capacity building will be reinforced through the inclusion of digital health M&E in pre-service education, on-site mentorship programmes, and the development of e-learning platforms. Regular evaluation activities will include mid-year reviews, end-of-project evaluations, and national learning forums.

Sustainability will be supported by integrating digital health M&E into the national budgeting process, securing co-financing from development partners, and investing in the maintenance and scalability of digital infrastructure.

Finally, the framework incorporates risk mitigation strategies such as phased infrastructure roll-out, strengthened data protection protocols, and institutional mechanisms to manage staff turnover through documentation and mentoring. This structured framework ensures that Uganda's digital health ecosystem remains coherent, accountable, and continuously evolving in response to national needs and global standards.

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