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The journey of strengthening mortality surveillance in Uganda through multisectoral guideline development

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Abstract

Background Understanding who dies, where, and from what causes is essential for public health planning and outbreak preparedness. In Uganda, mortality surveillance has historically been constrained by fragmented systems, weak coordination, and underreporting, limiting the use of mortality data for decision-making. In response, the Ministry of Health developed national mortality surveillance (MS) guidelines to strengthen mortality data collection, integration, and use.

Methods A national situational analysis and desk review of existing mortality data systems and tools were conducted. The systems reviewed included the Health Management Information System (HMIS), electronic Integrated Disease Surveillance and Response (eIDSR), Mobile Vital Registration System (MVRS), electronic Community Health Information System (eCHIS) and the District Health Information System (DHIS2). The mortality data reported in DHIS2 between January and June 2025 were analysed via Excel and are reported in tables. A national technical writing team reviewed existing paper-based and digital tools, developed standardized tools, and aligned the guidelines with regional and global frameworks. The guidelines were validated and formally endorsed.

Results Key gaps identified included weak governance, fragmented data flows, inadequate tools and indicators, and limited digital interoperability. The guidelines established multisectoral coordination committees, standardized all-cause death review tools, mortality registers, and gate passes, integrated non-health actors into national systems, and institutionalized quarterly mortality data reviews.

Conclusion Uganda's national MS guidelines address critical coordination and data quality gaps and provide a replicable model for strengthening mortality surveillance and informing public health action in similar settings.

Keywords Mortality surveillance, Mortality data, Guidelines

1 Introduction

Mortality surveillance serves as a foundational element of resilient health systems, enabling governments and institutions to generate timely, reliable data on who dies, where, when, and from what causes. More than a data collection exercise, it is a strategic



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public health function that supports evidence-based decision making, epidemic preparedness, health equity monitoring, and resource prioritization [1]. Without robust mortality surveillance, health systems operate in informational blind spots, are unable to detect emerging threats, track health outcomes, or evaluate the effectiveness of interventions [2]. This is a major concern in low- and middle-income countries (LMICs), where weak civil registration and vital statistics (CRVS) systems and fragmented health information infrastructures often compromise the completeness, accuracy, and utility of mortality data [3].

Uganda presents a typical case, in which multiple disease specific, partner-driven, and non-interoperable mortality reporting mechanisms have led to parallel data flows, limited completeness, and underutilization of mortality information [4]. Despite decades of health system investments, Uganda has lacked a unified mortality surveillance framework capable of capturing all deaths, especially those occurring in communities, which account for an estimated 63% of total deaths [5]. The rates of formal notification and medical certification remain exceptionally low; only approximately 1% of community deaths are notified annually, and less than 7% of all reported deaths are medically certified [6]. These deficiencies hinder timely detection of public health threats, complicate efforts to assess disease burden, and reduce the effectiveness of response strategies.

The COVID-19 pandemic, Ebola Virus Disease outbreaks, and other public health emergencies in Uganda further exposed major weaknesses in the existing mortality data ecosystem. Challenges like delayed detection of mortality clusters, lack of consistent data definitions across digital tools, and limited data integration from key stakeholders such as the Uganda Police Force, funeral service providers, and implementing partners continue to manifest [4]. These events show how important it is to have a national system for tracking deaths that is coordinated and uniform.

In response, the Ministry of Health (MoH), in collaboration with national and international stakeholders, initiated the development of comprehensive national Mortality Surveillance (MS) guidelines. The process was grounded in evidence and aligned with global frameworks, including the World Health Organization's Verbal Autopsy Standards [7], the International Classification of Diseases (ICD-11) [8], and the Africa CDC Continental Framework on Mortality Surveillance [9]. Through a participatory, multisectoral approach, guidelines were developed to provide a standardized framework for the systematic collection, analysis, interpretation, and use of mortality data to inform evidence-based public health actions.

While global mortality surveillance frameworks exist, few studies have documented the systematic, country-led process of developing such guidelines [10], especially in sub-Saharan Africa [11]. This paper aims to fill that gap by detailing Uganda's journey in designing and institutionalizing a national mortality surveillance framework. We describe the methods, stakeholder engagement processes, tool development, coordination mechanisms, and strategic decisions that informed the final guidelines. The lessons shared herein offer significant insights for other LMICs striving to strengthen their mortality surveillance systems.

2 Background

Uganda is an East African country with a population of approximately 45.9 million people. The national health system comprises both public and private sectors. The public health structure is organized hierarchically, starting with Village Health Team (VHT) members and Community Health Extension Workers (CHEWs) at the community level. These are followed by Health Centre (HC) II facilities at the parish level, HC III facilities at the sub-county, HC IV facilities at the county level, district hospitals, regional referral hospitals, and national referral hospitals, which provide the most specialized services in the country. The private sector includes a range of facilities from clinics to hospitals and is named on the basis of both ownership (which could either be purely private or private not for profit) and the scope of services they offer. Mortality surveillance is conducted across all these levels through reporting systems.

3 Methods

3.1 Study aims

This paper aims to document and describe Uganda's journey in the design and institutionalization of a national mortality surveillance framework within the public health system. Specifically, the study sought to: (i) conduct a situational analysis of existing mortality data sources, reporting practices, and system gaps across different levels of the health system; (ii) engage key stakeholders through consultations to identify priorities, and feasibility considerations for mortality surveillance strengthening; (iii) develop standardized mortality surveillance tools and processes responsive to national and subnational requirements; (iv) align the proposed framework with relevant international and regional mortality surveillance standards and guidance; and (v) validate the framework and tools through expert review to ensure usability, acceptability, and applicability for routine mortality surveillance in Uganda.

3.2 Data collection

The development of the national mortality surveillance guidelines employed a participatory, multisectoral, and evidence-informed approach. The process was iterative and grounded in both global mortality surveillance standards and Uganda's contextual realities. It combined document reviews, national-level situational analysis, stakeholder consultations, technical working sessions, and pilot tool revisions, followed by validation workshops as outlined below. All methods were performed in accordance with the guidelines and regulations as stipulated in the Uganda public health Act.

3.3 Phase 1: Situational analysis and desk review

An initial situation analysis was conducted to understand the status, strengths, and limitations of existing mortality surveillance systems in Uganda. This included the following: (1) A desk review of national health data reporting systems; the Health Management Information System (HMIS), the District Health Information System 2 (DHIS2), electronic Integrated Disease Surveillance and Response (eIDSR), and electronic Community Health Information System (eCHIS). During the system reviews, the focus was on examination of mortality data quality, completeness, and flow pathways across community and health facility levels. Mortality data quality and completeness were assessed by comparing the summed number of deaths recorded at outpatient and inpatient service

delivery points with the total number of deaths reported for the same monthly reporting period, to identify discrepancies and reporting gaps. Data flow pathways were mapped by tracing the movement of death-related information from identification at community or facility level through notification, reporting, aggregation, and subsequent use or feedback at district and national levels. (2) Review of partner-led mortality audit mechanisms (e.g., for HIV, TB, maternal/perinatal deaths) and the extent of data integration into the national repository. Partner-led mortality reporting mechanisms were assessed against the criterion that all recorded deaths, regardless of the supporting partner, should be captured within the national mortality repository. Integration was determined by reviewing whether partner-generated mortality data were routinely reported through, linked to, or reconciled with national reporting platforms (HMIS/DHIS2) at district and national levels; (3) The analysis also reviewed mortality-related policy documents, including the Uganda national mortality surveillance roadmap developed in 2024 [4] and relevant outbreak reports (COVID-19, Ebola, and anthrax outbreaks). The gaps in death notification, cause-of-death certification, and public health response identified at this stage informed the next stage of the stakeholder consultations.

3.4 Phase 2: stakeholder consultations

All stakeholders involved in the collection and use of mortality data were mapped, and a total of 08 workshops/meetings were convened between 2024 and 2025. The stakeholders came from across government ministries, departments and agencies, civil society, academia, and development partners (Table 1). These engagements focused on identifying gaps, harmonizing priorities, and cocreating the content, structure, and institutional framework for the guidelines. Reporting gaps were identified through structured stakeholder presentations during consultation workshops. Stakeholders described ongoing mortality surveillance activities, data collection tools, reporting channels, data-sharing arrangements with the Ministry of Health, and data use practices. Data collection tools

Table 1 Stakeholders engaged in the consultations

Stakeholder category	Stakeholders
Government ministries and agencies	Ministry of Health: Department of Integrated Epidemiology, Surveillance (IES &PHE), and Public Health Emergencies, Clinical Services, Reproductive Health, Planning Department- Division of health information (DHI), Standards, Compliance, Accreditation and Patient Protection Department (SCAPP), Multisectoral collaboration, Non communicable diseases (NCDs), Communicable diseases - HIV, Tuberculosis (TB), & Malaria, Uganda National Health Laboratory and Diagnostic Services (UNHLDs), Community Health, Health Promotion, Uganda National Institute of Public Health (UNIPH), the Regional Referral Hospitals (RRHs), General Hospitals, Health workers). Ministry of Internal Affairs, National Identification and Registration Authority (NIRA), Uganda Police Force, Uganda Peoples Defence Forces (UPDF), Ministry of Local Government, Ministry of Finance
Subnational representatives	District Health Officers, City Health Officers, Biostatisticians, Surveillance Officers
Development and implementing partners	WHO, Africa CDC, CDC Foundation, African Field Epidemiology Network (AFENET), Johns Hopkins Program for International Education in Gynaecology & Obstetrics (JHPIEGO), Infectious Diseases Institute (IDI), Baylor Foundation Uganda, Makerere University School of Public Health Monitoring and Evaluation Technical Support Program (MakSPH-METS Program)
Private sector actors	Coalition for Health Promotion and Social Development (HEPS-Uganda), Uganda Health Care Federation (UHA), Uganda Funeral Services Association
Academia	Makerere University School of Public Health
Community representatives	Village Health Teams, Religious Leaders, Local Council (LCs)

were shared with the Ministry of Health and benchmarked against national standards, enabling cross-sectoral comparisons to identify gaps, overlaps, and inconsistencies in mortality reporting. Priority harmonization was achieved through facilitated discussions, recognizing that partners collected mortality data for diverse programmatic and reporting needs, often with limited plans for data sharing. Stakeholders jointly reviewed their objectives alongside Ministry of Health priorities and national mortality surveillance goals. Through consensus-building discussions, common priority areas were identified, and agreement was reached on aligning data collection and reporting practices to support national mortality monitoring while accommodating partner-specific needs.

3.5 Phase 3: technical working group and tool development

A national technical writing team comprising 20 people, coordinated by the Department of Integrated Epidemiology, Surveillance, and Public Health Emergencies within the Ministry of Health, led the development process. The team reviewed existing tools (paper and digital) used to collect and report mortality data in communities, health facilities, specialized institutes and across other actors (Table 2). This was achieved through small-group work within the national technical writing team. Members were organized into groups of five and tasked with mapping existing paper-based and digital mortality data tools, listing all data elements, and identifying gaps in data capture, including elements not configured in electronic platforms. Tools were systematically compared using a tools matrix to assess similarities, differences, and coverage across settings. Findings from each group were presented in plenary sessions for discussion, validation, and incorporation of additional inputs, which informed the standardization and development of revised mortality data collection and reporting tools. Building on the limitations of the existing tools, the team also reviewed and standardized an “all-cause death review form”, developed mortality registers for health facility and community use, and a dead

Table 2 Mortality surveillance tools reviewed and new tools developed

Level	Primary tools reviewed	Secondary tools	New tools
Community	Integrated Community Case Management (VHT/ICCM HMIS 006)	Quarterly village report (HMIS 097b)	Community Mortality Register
Health facilities	Face Sheet (OPD 009), treatment sheet (IPD 001), IPD 003, New-born Inpatient register (MCH011), TB treatment register (HMIS 009), drug resistant TB register (HMIS TB014) Integrated Maternity register (MCH006), Integrated PNC and Maternity register used in Post Natal ward (MCH008), OBGYS theatre register (MCH013), Integrated Nutrition Register (INR NUT 001), operating theatre register (HMIS SUR003), mortuary register (HMIS 007), Palliative care register (OPD 008)	Weekly epidemiological surveillance report (HMIS 033B), Monthly report from the various outpatient departments (HMIS 105), Monthly report from all inpatient departments (HMIS 108), Health Unit Quarterly Report (HMIS 106a)	Health Facility Mortality Register Dead body movement clearance note “gate pass” All-cause death review form
Specialized Institutions: Uganda Cancer Institute (UCI), Uganda Heart Institute (UHI), Uganda Blood Transfusion Service (UBTS)	Specialized inpatient register (SPE021), UCI Death Registry Book, UCI Necropsy Request Form (UBTS002)		
Others	NIRA: Notification of death (Form 12), Police: Request for post mortem examination (Form 48 A), postmortem report (Form 48B), Form 48 C Funeral homes: (Job record book, Contract form)	None	

body clearance “gate pass” (Table 2). Mortality data elements captured by each primary tool are contained in additional file 4.

Revisions to digital platforms (eCHIS, eIDSR, DHIS2) were proposed to improve the capture, notification, and reporting of deaths at all levels. A change form was, for example, submitted to the Division of Health Information at the MOH by the IES & PHE department to enable this modification to be performed (see Additional file 1). This change form informed the update of eCHIS with mortality surveillance data requirements, allowing for structured reporting of the manner of death by community stakeholders. The eIDSR system was also configured to enable death notifications via SMS (code 6767), including the generation of line lists for mortality events.

3.6 Phase 4: integration with global and regional frameworks

The guidelines were aligned with global and regional frameworks to ensure consistency with international standards. Key references included the WHO’s Verbal Autopsy Standards, the International Classification of Diseases, 11th Revision (ICD-11) and the African CDC’s continental mortality surveillance framework. These were adapted to the Ugandan context to ensure compatibility with local systems, workflows, and institutional capacity.

3.7 Phase 5: validation and endorsement

Draft guidelines and tools were reviewed through national validation workshops and technical meetings. Draft guidelines were submitted to the Communicable & Non-Communicable Disease Control Technical Working Group (CONCOD) through an official request, and copies were circulated to members in advance for review. Validation criteria focused on technical accuracy, alignment with national policies, feasibility of implementation, and clarity of roles and coordination mechanisms. Endorsement thresholds required incorporation of all substantive technical comments and consensus approval by CONCOD, after which the revised guidelines were submitted to the Senior Management Committee for final review and approval following incorporation of additional feedback. Validation discussions also resolved cross-institutional coordination mechanisms, leading to the establishment of a multitiered Mortality Surveillance Coordination Committee (MSCC) structure at the national, regional, district, and health facility levels.

3.8 Data analysis

Both qualitative and quantitative analysis approaches were employed. Data from the review of mortality data tools, national mortality data systems (HMIS, DHIS2, eCHIS, and eIDSR) and mortality reporting trends from January–May 2025 were summarized and presented via descriptive narratives and summary tables. This period was selected because reporting was consistent for the health facilities. Stakeholder consultations were thematically analysed to identify gaps in death identification, notification, complete and accurate reporting, data utilization and coordination. The findings were triangulated with prior outbreak investigations and policy documents to inform the structure of the national mortality surveillance guidelines.

4 Results

4.1 Gaps identified

4.1.1 *Weak leadership, governance and coordination for mortality surveillance*

Uganda's mortality surveillance landscape has historically suffered from fragmented leadership and a lack of centralized coordination. Although the Health Management Information System (HMIS) began capturing mortality data in 1985, its use has remained minimal and passive. In 1998, the Ministry of Health, with partner support, introduced the Maternal and Perinatal Death Surveillance and Response (MPDSR) system. However, this mechanism was predominantly paper-based and focused on maternal and child deaths. Over time, multiple vertical programs, such as those for HIV/AIDS, TB, and malaria, began implementing their own mortality audits on the basis of HMIS data, but these remain isolated initiatives with little integration into a national surveillance system. The absence of a government-led platform for mortality surveillance, with clear accountability and oversight for strategic direction, has limited the realization of the benefits of mortality surveillance to the country.

This governance gap persisted despite the creation of the Department of Integrated Epidemiology, Surveillance, and Public Health Emergencies (IES & PHE) at the Ministry of Health in 2017. While the department recognized the need for integrated surveillance to support early outbreak detection and trend analysis, structural mechanisms for coordination across programs, partners, and ministries remained weak. This gap became even more apparent during the 2025 Ebola virus disease (EVD) outbreak in Uganda, where the index case was identified through mortality surveillance activities at Mulago National Referral Hospital. A sample from a deceased patient tested positive for EVD, triggering a national outbreak response. Following the outbreak declaration on 30th January, there was an urgent need to intensify mortality surveillance in high-risk districts and high-volume facilities across the country. This situation further intensifies the need for a unified and integrated mortality surveillance system that ensures timely death notification, standardized data capture, and coordinated action. These lessons reinforced the need for the IES & PHE departments to champion an integrated approach to mortality surveillance under its national mandate.

4.1.2 *Disparate and incomplete mortality data streams*

The second major gap identified was the fragmentation of mortality data sources and the limited capture of deaths. In Uganda, mortality is categorized into two main settings: health facilities and the community (deaths occurring outside formal medical institutions). While the majority of deaths occur in community settings, reporting from these areas remains grossly inadequate. Most community deaths are undocumented due to weak reporting systems, the absence of structured tools for data capture, and limited integration with the national health information architecture (Fig. 1). While there are good intentions for implementing mortality surveillance by different players, as indicated in Fig. 1, the majority of community mortality data do not reach the MoH central repository, hence not contributing to the database used for comprehensive analysis to serve the purpose of mortality surveillance.

The fragmentation of data streams became evident during recent public health emergencies in Uganda. During the COVID-19 pandemic (2020–2021), Uganda, like most LMICs, was unable to estimate excess mortality due to a lack of disaggregated, real-time

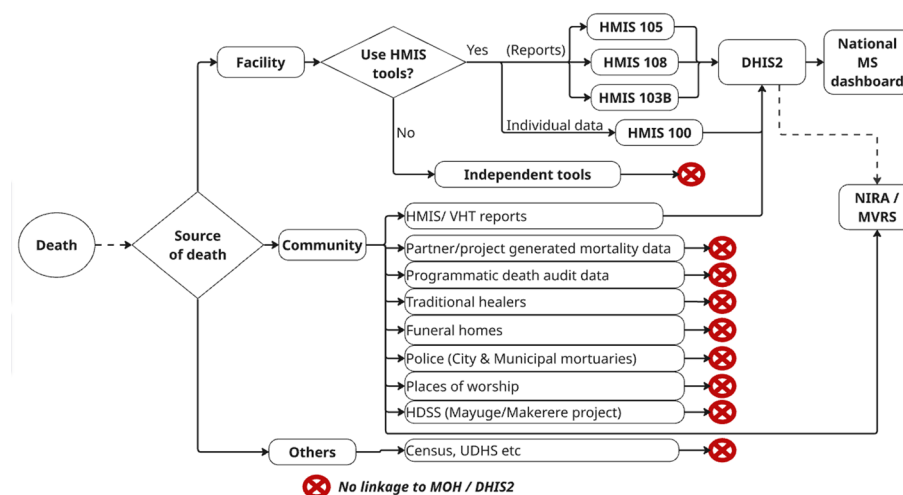


Fig. 1 Data flow chart showing that the majority of community mortality data do reach the MoH central repository. HMIS- Health Management Information System, DHIS2 - District Health Information Software 2, NIRA - National Identification and Registration Authority, MVRs- Mobile Vital Registration System, HDSS- Health and Demographic Surveillance Site, UDHS - Uganda Demographic and Health Survey, VHTs- Village Health Teams

death data. Similarly, during the Ebola virus disease outbreak in Mubende District in 2022 and the anthrax outbreak in Kyotera district in 2023, delayed recognition of abnormal death patterns due to poor community-level mortality surveillance contributed to a slow outbreak response. These gaps highlight the urgent need to capture mortality data from all settings in a standardized, timely, and nationally integrated manner.

4.1.3 Inadequate mortality data management tools and indicator definitions

Mortality surveillance is also hindered by deficiencies in the data management infrastructure. A desk review of national HMIS tools revealed that many lacked designated fields for documenting deaths as health outcomes. Health workers often had to improvise in recording deaths on inpatient or outpatient registers, leading to inconsistencies in how mortality events were captured and reported. This variation compromised data quality and created institutional blind spots mostly in facilities without mortuaries or body-holding areas.

Most health facilities also lack a standardized mortality register, which is a tool that should serve as a comprehensive book of all deaths occurring in the facility. Without it, compiling death line lists or identifying patterns is nearly impossible, as death can occur in various departments in the health facility. Additionally, not all the dead end up in the health facility mortuary, where a mortuary register exists, considering that the majority of health facilities do not have mortuaries.

At the national level, inconsistencies were observed in mortality indicators reported through the national system and repository, the DHIS2. It was not possible, for example, to obtain an accurate national count of deaths for any particular month, as mortality data elements are fragmented across multiple tools and programmatic datasets. Ideally, total deaths for a given month should be derived by summing deaths reported in the monthly outpatient report (HMIS 105) and the inpatient report (HMIS 108). However, discrepancies emerged when comparing summary variables with the totals obtained by aggregating individual data elements within the same reports. For example, in HMIS 105, the variable “105-DT01: Deaths in OPD” is expected to capture the total number of

Table 3 Discrepancies between reported outpatient deaths and aggregated deaths from individual death data elements, January–May, 2025

Data elements in the monthly outpatient report (HMIS105)	Months, 2025				
	Jan	Feb	Mar	April	May
105-DT01. Deaths in OPD (Summary variable)	798	879	399	194	276
105-ES10. Total number of Deaths in Emergency Unit	321	304	301	228	258
105-MA11. Newborn deaths (0–7 days)	498	535	547	837	493
105-MA13. Maternal deaths	82	78	81	82	80
Sum of individual OPD mortality data elements	901	917	921	1147	831

HMIS- Health management Information system, OPD- Outpatient department

Table 4 Discrepancies between reported inpatient deaths and aggregated deaths from individual data elements, January–May 2025

Data elements in the monthly inpatient report (HMIS108)	Months, 2025				
	Jan	Feb	Mar	April	May
108-CI03. No. of deaths	4503	3812	4357	5867	4280
Sum of individual IPD mortality elements	4535	4001	4908	3846	4212

HMIS- Health management Information system, IPD- In-patient department

deaths at the outpatient department. In January 2025, this variable reported 798 deaths, yet the sum of the individual OPD-related death data elements totalled 901 deaths for the same period (Table 3).

A similar issue was noted in HMIS 108, where “108-CI03: Number of deaths” is intended to reflect all inpatient deaths. While it reported 4,503 inpatient deaths in January 2025, a total of 197 individual data elements (see Additional file 2) capturing deaths in the same report revealed 4,535 deaths for the same month. These discrepancies were consistently observed across the months analysed (Table 4).

As a result, DHIS2 users face confusion about which data element to reference when attempting to determine the actual number of deaths at any health facility or nationally within a specific time frame.

Furthermore, a critical mortality indicator, the “proportion of deaths notified”, could not be accurately computed because of the absence of a clear and reliable denominator. This indicator is typically calculated as the number of deaths notified over the total number of deaths within a defined period. However, as shown in the examples above, generating an accurate denominator for total deaths is still a major challenge. Notification is a foundational element of mortality surveillance, yet its measurement is meaningful only when the total number of deaths is reliably known. Without clarity on how many deaths have occurred and how many have been notified, calculating the proportion notified becomes both difficult and methodologically flawed. This weakens the mortality surveillance arm by limiting the analysis and use of data needed to guide timely, evidence-based public health action.

4.1.4 Absence of formal body release protocols for surveillance compliance

During the 2025 EVD outbreak in Uganda, the enforcement of protocols such as the requirement to sample and test all deceased individuals for EVD was complicated by the absence of a formal “dead body gate pass”, which serves as a clearance document to ensure compliance with surveillance and infection control procedures before a body could be released for burial. This gap highlights how the lack of standardized tools delays both routine and active surveillance during emergency response.

4.1.5 Lack of interoperability and feedback mechanisms in digital systems

The fourth major gap was the fragmentation of digital reporting systems and the lack of interoperability between them. A range of digital tools developed or implemented by vertical programs and implementing partners exist for mortality surveillance, mainly for verbal autopsy and community-level death audits. However, these platforms are often proprietary or program specific, with minimal efforts to align with DHIS2, the national health information system. As a result, valuable mortality data remained outside the national database and inaccessible for integrated analysis. Additionally, feedback mechanisms were weak or non-existent. Data collectors at the community and facility levels rarely received updates on how the data they generated were being used. This lack of feedback discouraged consistent reporting and reduced the perceived value of mortality surveillance. For example, verbal autopsy data collected by the WHO, Baylor Foundation Uganda, and Makerere University School of Public Health through the Health Demographic Surveillance Sites and other mechanisms remain underutilized because they do not feed national databases, poor integration and feedback loops. These findings reinforced the need for a unified national approach to mortality surveillance, culminating in the development of Uganda's national mortality surveillance guidelines.

4.1.6 Achievements

In response to the systemic weaknesses identified, the Ministry of Health, in collaboration with national and international stakeholders, developed and approved the National Mortality Surveillance Guidelines. These guidelines provide a standardized framework for the identification, notification, certification, and review of all deaths occurring in both community and health facility settings. Endorsed by the MoH CONCOD Technical Working Group and the MoH Senior Management Committee, the guidelines establish procedural clarity for mortality surveillance and emphasize data use and feedback for evidence-based public health action. Through these guidelines, the following were streamlined:

4.1.7 Establishment of multi-level mortality surveillance coordination committees

To operationalize governance and oversight, the guidelines institutionalize Mortality Surveillance Coordination Committees (MSCC) at four administrative levels: national, regional, district, and health facilities. The National MSCC, chaired by the Director General of Health Services, is responsible for national-level coordination, technical oversight, and inter-agency alignment. Regional MSCCs are led by senior executive consultants at regional referral hospitals, whereas district MSCC and health facility MSCC are chaired by District Health Officers (DHOs) and facility in-charges, respectively. Each committee is multidisciplinary and comprises public health officers, biostatisticians, clinicians, political leaders, and community representatives. Their key functions include guiding implementation, reviewing audit findings, disseminating feedback, and facilitating collective action on the basis of review findings. Each level of the MSCC has clear deliverables that help track performance and assess functionality. At the national level, one key indicator is the regular review and implementation of MS per the approved MS guidelines, as well as the useability of MS data for epidemic prediction/early detection. Regional MSCCs are assessed on the basis of how consistently they compile, analyse, use and submit quarterly mortality statistics, whereas at the district level, functionality is

demonstrated through submission of death and use of review reports and generation of response plans on the basis of the reviews. The functionality of health facility committees is to be monitored through their routine updates to mortality registers and timely submission of weekly and monthly death audit summaries, including getting feedback from the audit/death review findings with the communities that are served by the health facilities. Together, these indicators allow for systematic tracking of progress and show how effectively MS is implemented at every level of the health system.

4.1.8 Standardization of mortality data collection tools

Recognizing the inconsistencies in mortality documentation, the guideline development process led to the review, standardization, and rollout of key data collection tools. A harmonized “all-cause death review form” was adapted from the HIV/TB audit framework that had already been piloted. This form allows for structured documentation of the medical and contextual factors surrounding each death and aligns with the International Classification of Diseases, 11th Revision (ICD-11). It ensures consistent data capture across programs and settings, enabling better mortality coding and cause-of-death analysis. In addition, a “mortality register” was introduced for both the community and health facility levels. This tool serves as the official ledger of all deaths in a given location, supporting mortality line listing, audit preparation, and verification.

4.1.9 Revision of mortality indicators and their definitions

Through the MS guidelines, structured guidance was outlined, clearly defining the variable “total number of deaths”. This is a sum of data elements reporting death in HMIS 105 and data elements in HMIS 108 (see Additional file 3). The alignment addressed ambiguity in definitions and eliminated duplication and omission of data, thereby enhancing accuracy. The guidelines also clearly define the data elements used to calculate total deaths in weekly epidemiological reports, establishing a standard reference point for comparing mortality figures across reporting tools, as these totals are expected to align.

4.1.10 Introduction of operational tools to improve compliance and surveillance integrity

To address the operational gaps revealed during outbreak responses, new tools have been introduced to support compliance and traceability. The dead body clearance form, which is referred to as the “gate pass,” was developed to ensure that all deceased persons within health facilities are documented and, where required, sampled for disease testing before burial. This tool acts as a verification mechanism that links the mortality register with the physical movement of bodies and ensures adherence to infection prevention protocols. It supports the triangulation of deaths across wards, mortuary records, and burial procedures.

4.1.11 Digital integration and interoperability improvements

The guidelines facilitated significant advancements in the integration and interoperability of digital reporting platforms. The eCHIS was upgraded to include structured fields for recording death events at the community level, allowing VHTs to document deaths consistently. Additionally, the electronic Integrated Disease Surveillance and Response system (eIDSR) was adopted for death notifications via the SMS short code 6767,

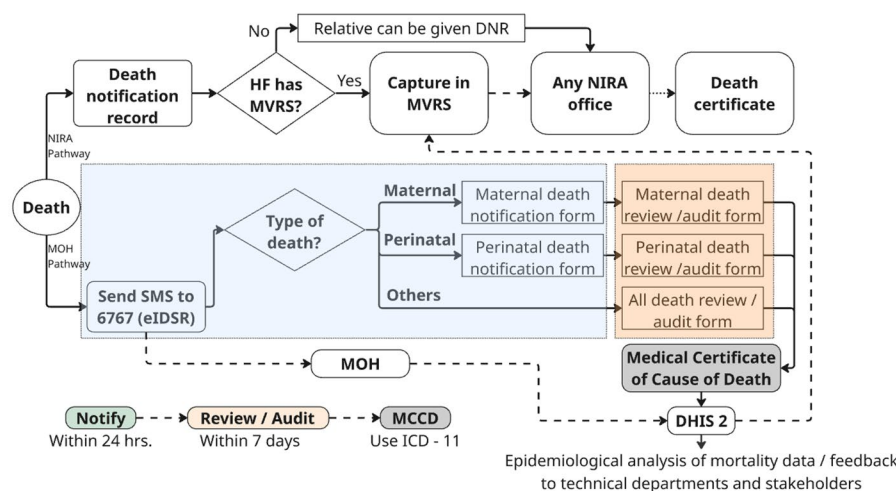


Fig. 2 Integration of digital reporting platforms for capturing deaths at health facilities. APIs enable data exchange between eIDSR and NIRA/MVRS with DHIS2. DNR- Death notification record, HF- Health facility, eIDSR- electronic Integrated Disease Surveillance and Response system.

allowing both health workers and the community to report deaths in real time and generate automated death line lists. Data from eCHIS and eIDSR are then fed into DHIS2. These tools collectively enhance real-time detection of mortality patterns and facilitate prompt investigation of unusual death clusters. It was also agreed that application programming interfaces (APIs) be developed to allow for data exchange from DHIS2 (for medical causes of death) to the NIRA Mobile Vital Registration System (MVRS) (Fig. 2). Through this system integration, a minimum number of variables has been developed to help identify the duplicates.

4.1.12 Integration of non-health actors into national reporting systems

Efforts were made to ensure that all actors outside the formal health system involved in handling deaths were integrated into the national mortality reporting system. For example, the Uganda Police Force (UPF), which frequently responds to and investigates community deaths, is recommended to be allocated a dedicated reporting module within DHIS2 to document these events. Similarly, the Uganda Funeral Services Association, which often handles body retrievals upon request by families, proposed that the MoH develop a structured reporting tool for their use moving forward, which would feed into the national repository. This inclusion recognizes that a significant number of community deaths intersect with non-health actors and ensures that such data captured systematically for national surveillance purposes. Similarly, implementers of verbal autopsies in the community recommended that a mechanism be put in place to ensure that the data they generate are fed into the national DHIS2 for use by the Ministry of Health. These efforts will greatly improve the completeness of mortality reporting.

4.1.13 Strengthening the use of mortality data for public health action

Another key outcome of the guideline development process was the elevation of mortality data from passive reporting to an actionable resource for health system strengthening. During stakeholder validation meetings, the MoH technical working group adopted a resolution mandating quarterly mortality data analytics, and major findings from the death reviews be presented to the technical working group for the consumption of all

members. These quarterly reviews will focus on key mortality indicators, such as leading causes of death, seasonal trends, geographic hotspots using mortality rates grounded in the population, and population-level vulnerabilities, among others. The MSCCs are tasked with facilitating feedback loops to health facilities, districts, and communities that they serve.

5 Discussion

This study documents Uganda's efforts to address longstanding systemic challenges in mortality surveillance through the development of comprehensive national guidelines. The findings highlight historical fragmentation, incomplete data capture from community settings, weak coordination, inadequate tools, and poor interoperability of digital systems. These gaps are not unique to Uganda; they mirror common challenges in many low- and middle-income countries (LMICs), where vertical programs, weak civil registration and vital statistics (CRVS) systems, and limited institutional capacity hinder the generation and use of mortality data for public health action [12, 13].

The achievements outlined in this process demonstrate a strategic and multisectoral shift toward an integrated, system-wide approach to mortality surveillance. The establishment of mortality surveillance coordination committees at all administrative levels represents a major governance innovation, addressing the previous leadership vacuum. These structures provide clear mandates for oversight, coordination, and feedback, which are key elements identified as essential for sustainable surveillance systems [9].

Equally important is the standardization of the all-cause death review form, mortality registers, and the dead body clearance form/gate pass, in addition to existing tools. These instruments address long-standing issues of data quality and completeness and are expected to improve both routine reporting and the timeliness of outbreak detection. The integration of death notifications into digital systems and the inclusion of non-health actors like the Uganda Police and funeral services into DHIS2 marked a leap toward real-time, interoperable mortality surveillance. Despite these advances, community-based mortality surveillance faces important implementation challenges. Coverage of VHT services remains non-uniform across the country, with some hard-to-reach and urban settings lacking consistent community-level reporting [14]. High VHT turnover, variable training levels, and competing responsibilities [15] may affect continuity, data quality, and completeness of death notifications. Similar challenges have been reported in other community-led surveillance initiatives [16, 17], pointing to the need for sustained investment in supervision, incentives, and integration of community reporting within formal health system workflows.

Another important shift is the recognition of mortality data as a strategic resource for decision-making. The institutionalization of quarterly mortality data reviews reflects the growing demand for evidence-based planning and demonstrates the potential for mortality surveillance to inform health system improvements, disease control priorities, and equitable resource allocation.

While these achievements are promising, sustainability will depend on continued investment in human resource capacity, digital infrastructure, and cross-sector collaboration. Additionally, integrating mortality surveillance with Uganda's CRVS system and legal mandates for death reporting will further strengthen data completeness and legitimacy.

6 Conclusions

Uganda's development of national mortality surveillance guidelines is a big step towards better tracking and use of death data. The guidelines provide a clear and unified way to make sure every death is recorded and used to guide public health decisions. For the system to work well, Uganda needs to include all-cause mortality tools in DHIS2, support regular reviews of deaths in health facilities, and train staff on death reporting, medical certification, and verbal autopsy. It is also important to regularly check the quality of data, follow up on recommendations, and keep the system updated. Strong coordination at all levels and steady government support will help keep the system running. These efforts not only improve Uganda's public health system but also provide a useful example for other countries facing similar challenges.

Abbreviations

MS	Mortality surveillance
MOH	Ministry of health
HMIS	Health management information system
DHIS2	District health information software; version 2
MCCD	Medical certification of cause of death
MPDSR	Maternal and perinatal death surveillance and response
VHT	Village health team
CHEW	Community health extension worker
EVD	Ebola virus disease
IES&PHE	Integrated epidemiology; surveillance and public health emergencies
MSCC	Mortality surveillance coordination committee
eCHIS	Electronic community health information system
eIDSR	Electronic integrated disease surveillance and response
UPF	Uganda police force
CRVS	Civil registration and vital statistics
LMICs	Low- and middle-income countries
WHO	World health organization

Supplementary Information

The online version contains supplementary material available at <https://doi.org/10.1007/s44250-026-00391-2>.

Supplementary Material 1.

Supplementary Material 2.

Supplementary Material 3.

Supplementary Material 4.

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Author contributions

C.K., B.O., and A.M. conceptualized the study. C.K., B.O., and M.B. curated the data and conducted the formal analysis. Funding was acquired by C.K. and A.M. Methodology was developed by C.K. and B.O. The original draft was written by C.K. and B.O. C.K., B.O., M.B., and A.M. reviewed and edited the manuscript. All authors approved the final version of the manuscript.

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Data availability

All data generated or analysed during this study are included in this published article and its supplementary information files.

Declarations

Ethics approval and consent to participate

This work was conducted as a policy development and public health practice initiative under the oversight of the Ministry of Health's Department of Integrated Epidemiology, Surveillance, and Public Health Emergencies. Administrative clearance was obtained from the Ministry of Health in accordance with the Uganda Public Health Act. Formal ethical approval was deemed unnecessary under national regulations for policy development and routine public health practice activities. Verbal informed consent was obtained from all individuals who participated in the situational analysis and gap identification process. Participants were informed about the purpose of the activity, the voluntary nature of participation, and the intended use of the information collected. Only publicly available data without personal identifiers from the national health information system were used during the analysis.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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References

1. AbouZahr C, de Savigny D, Mikkelsen L, Setel PW, Lozano R, Lopez AD. Towards universal civil registration and vital statistics systems: the time is now. *Lancet*. 2015;386(10001):1407–18.
2. Africa CDC. Continental Framework on Strengthening Mortality Surveillance Systems in Africa 2024 [Available from: <https://africacdc.org/download/continental-framework-on-strengthening-mortality-surveillance-systems-in-africa/#:~:text=PREF ACE,guiding%20evidence%2Dbased%20policy%20decisions>
3. Adair T, Mikkelsen L, Hooper J, Badr A, Lopez AD. Assessing the policy utility of routine mortality statistics: a global classification of countries. *Bull World Health Organ*. 2023;101(12):777.
4. MOH. National Mortality Surveillance Roadmap 2024_25. 2024 [cited 2025 08/07/2025]. Available from: <https://library.health.go.ug/sites/default/files/resources/National%20Mortality%20Surveillance%20Roadmap%202024-2028.pdf>
5. Zalwango MG, Kyozira C, Nambuya M, Bulamu M, Muruta A. A rapid assessment of mortality surveillance in Uganda. *PLOS Global Public Health*. 2025;5(7):e0003722.
6. Kasasa S, Natukwatsa D, Galiwango E, Nareeba T, Gyezaho C, Fisker AB, et al. Birth, stillbirth and death registration data completeness, quality and utility in population-based surveys: EN-INDEPTH study. *Popul health metrics*. 2021;19:1–15.
7. WHO. Verbal autopsy standards: ascertaining and attributing cause of death. World Health Organization; 2007.
8. WHO. The international classification of diseases. <http://www.who.int/classifications/icd/en/>. 1990.
9. Africa CDC. Operational Guide for Establishing and Implementing Mortality Surveillance in Africa, July 2024 2024 [cited 2025 09/07/2025]. Available from: <https://africacdc.org/download/operational-guide-for-establishing-and-implementin g-mortality-surveillance-in-africa-july-2024/>
10. Liu S, Wu X, Lopez AD, Wang L, Cai Y, Page A, et al. An integrated national mortality surveillance system for death registration and mortality surveillance, China. *Bull World Health Organ*. 2015;94(1):46.
11. Munoz DC, Fruchtmann CS, Miki J, Vargas-Herrera J, Woode S, Dake FA, et al. The need to address fragmentation and silos in mortality information systems: the case of Ghana and Peru. *Int J public health*. 2022;67:1604721.
12. WHO. WHO civil registration and vital statistics strategic implementation plan 2021–2025. WHO civil registration and vital statistics strategic implementation plan 2021–20252021.
13. Yokobori Y, Matsuura J, Obara H, Sugiura Y, Kitamura T, Moyo C, et al. Rapid assessment of the civil registration and vital statistics performance of health facilities in the five districts of Zambia: A cross-sectional study. *Heliyon*. 2021;7(11):e08367.
14. Mays DC, O'Neil Jr EJ, Mworozi EA, Lough BJ, Tabb ZJ, Whitlock AE, et al. Supporting and retaining Village Health Teams: an assessment of a community health worker program in two Ugandan districts. *Int J Equity Health*. 2017;16(1):129.
15. Kimbugwe G, Mshilla M, Oluka D, Nalikka O, Kyangwa J, Zalwango S, et al. Challenges faced by village health teams (VHTs) in Amuru, Gulu and Pader districts in Northern Uganda. *Open J Prev Med*. 2014;4(9):740.
16. Alhassan JAK, Wills O. Public health surveillance through community health workers: a scoping review of evidence from 25 low-income and middle-income countries. *BMJ Open*. 2024;14(4):e079776.
17. Sharp AR, Mpofu N, Lankiewicz E, Ajonye B, Rambau NP, Dringus S, et al. Facilitators and barriers to community-led monitoring of health programs: qualitative evidence from the global implementation landscape. *PLOS Global Public Health*. 2024;4(6):e0003293.

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