Enhancing Death Registration System Through Electronic Medical Records in Zambia

INTEGRATING INRIS WITH SMARTCARE TO IMPROVE MORTALITY DATA AND PUBLIC HEALTH DECISION-MAKING

Death Registration Office, Ndola, Zambia. Maiwase Phiri, Assistant registrar, Ndola. Photo Credit: Juan Arredondo.

EXECUTIVE SUMMARY

Zambia is transforming its death registration process by integrating the Integrated National Registration Information System (INRIS) with SmartCare, the country's national electronic medical records (EMR) system. This initiative addresses challenges related to incomplete data and delays in death reporting.

Key achievements include:

- Implementation of an electronic death notification system, reducing reporting delays by 88%
- Increased coverage of civil registration services to 83% of the population across 81 out of 116 districts
- Development of a real-time mortality surveillance dashboard, enhancing data accessibility for public health decision-making

Expected long-term impacts include improved disease surveillance, data-driven interventions and accurate reporting of causes of death, ultimately strengthening Zambia's civil registration and vital statistics (CRVS) system.

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DEFINING THE ISSUE

Accurate and timely death registration is essential for public health planning, resource allocation and disease surveillance. In Zambia, challenges such as paper-based death reporting and notification result in less timely, incomplete data, missing forms and limited interoperability between civil registration and health systems—hindering effective mortality surveillance and response. As a result, policymakers and healthcare providers lack reliable data to inform interventions, particularly for high-burden infectious diseases like cholera, HIV, malaria, tuberculosis and maternal mortality. To address this gap, Zambia has initiated an effort to integrate its civil registration system, the Integrated National Registration Information System (INRIS), with SmartCare, the country's national electronic medical records (EMR) system. At the same time, efforts are underway to consolidate disparate mortality sources into a national data warehouse. The national data warehouse, owned by Zambia's Ministry of Health, is a centralized repository designed to integrate all health-related data sources, facilitating easy access and sharing of information.

Department of National Registration, Passport, and Citizenship (DNRPC) in Lusaka, Zambia. Photo Credit: Juan Arredondo

PROJECT DESCRIPTION

In collaboration with international partners, Zambia is implementing an integrated mortality system by linking health facilities' EMR data with INRIS' e-death notification and the national data warehouse. This effort aims to consolidate mortality data into one source for easy availability and use.

The integration enables seamless and automated linkage of e-death data from the civil registration and health systems—reducing delays and enhancing data accuracy, availability and use. Key components of the initiative include:

- Developing an operational requirements specification
- Implementing an e-death notification system for timely reporting
- Designing a robust mortality data model in the national data warehouse

Best practices include:

- Effective stakeholder engagement
- Alignment with national data policies
- Leveraging the national data warehouse to enhance data management, integration and analysis of mortality data

This initiative is critical for enhancing data use and improving public health decision-making. It enables policymakers to allocate resources more effectively, strengthen disease surveillance and respond to health threats with timely, data-driven interventions. Additionally, it enhances the timeliness of death notifications and expands civil registration coverage, ensuring that more deaths are accurately notified and captured within INRIS.

IMPLEMENTATION APPROACH

The successful integration of Zambia's disparate mortality system required a structured and collaborative implementation approach. By leveraging digital solutions and engaging key stakeholders, Zambia has significantly improved death registration accuracy, timeliness and completeness, increasing coverage from less than 4% to 42%. Additionally, the system has streamlined cause-of-death coding, reducing the average processing time from 60 days to 7 days. These enhancements have significantly strengthened public health decision-making and CRVS data quality. This section outlines the key implementation phases.

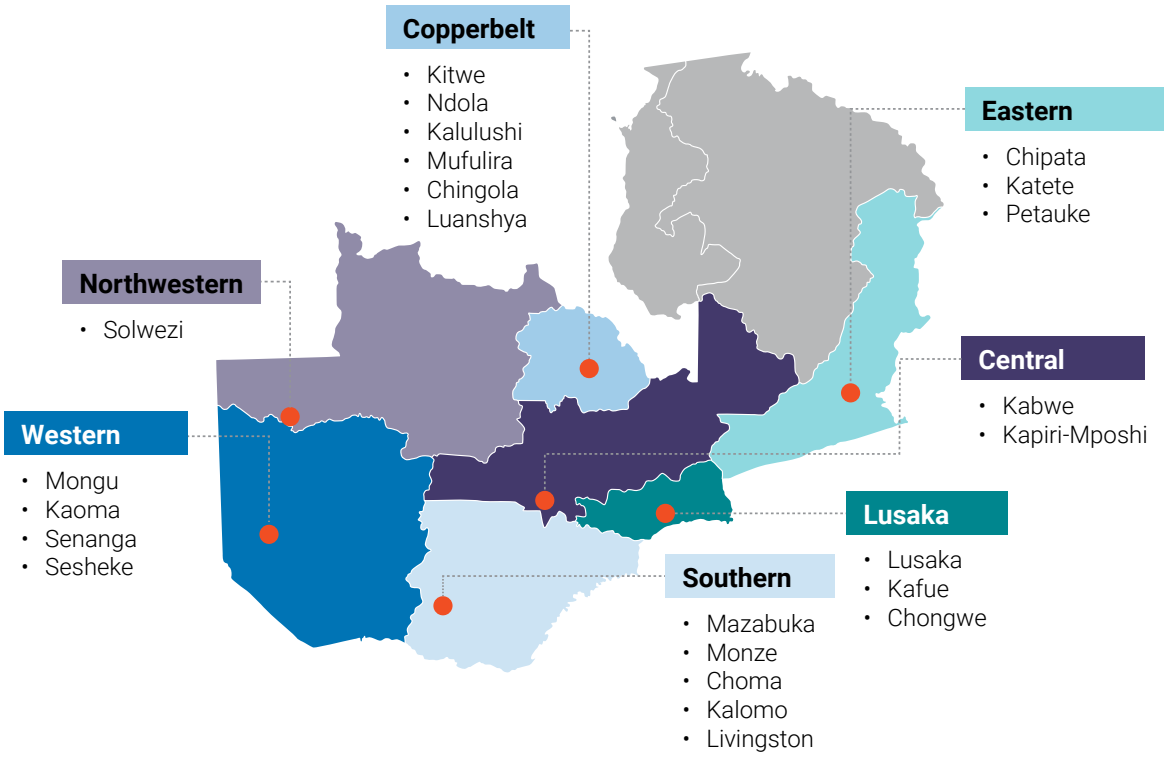
DEPLOYMENT OF INRIS AND COVERAGE

INRIS was deployed in key districts, prioritizing district-level hospitals to reliably capture deaths within healthcare facilities and bring civil registration services, such as death certification, closer to communities.

IMPLEMENTATION OF E-DEATH NOTIFICATION FOR TIMELY REPORTING

A joint initiative by the Ministry of Health (MoH) and the Department of National Registration, Passport and Citizenship (DNRPC) resulted in an e-death notification system that electronically captures death notifications as soon as they are reported and submits the data to the CRVS system in real time, reducing delays in data availability and alerts. The e-death notification is being rolled out in select districts where INRIS is deployed. MoH mortality surveillance officers also e-notify deaths in their coverage districts. Various partners, including the Data for Health Initiative, are supporting the equipping of INRIS kits in select district registration offices and hospital mortuaries to enable e-notification of deaths within INRIS.

Figure 1: A map showing e-death notification sites in Zambia



STAKEHOLDER ENGAGEMENT AND COLLABORATIVE REQUIREMENTS GATHERING

Following the implementation of INRIS and the e-death notification system, a consultative process was conducted with the MoH, DNRPC and ZNPHI. These stakeholder engagements aimed to review and optimize existing workflows, with the goal of ensuring timely availability of CRVS data for public health use.

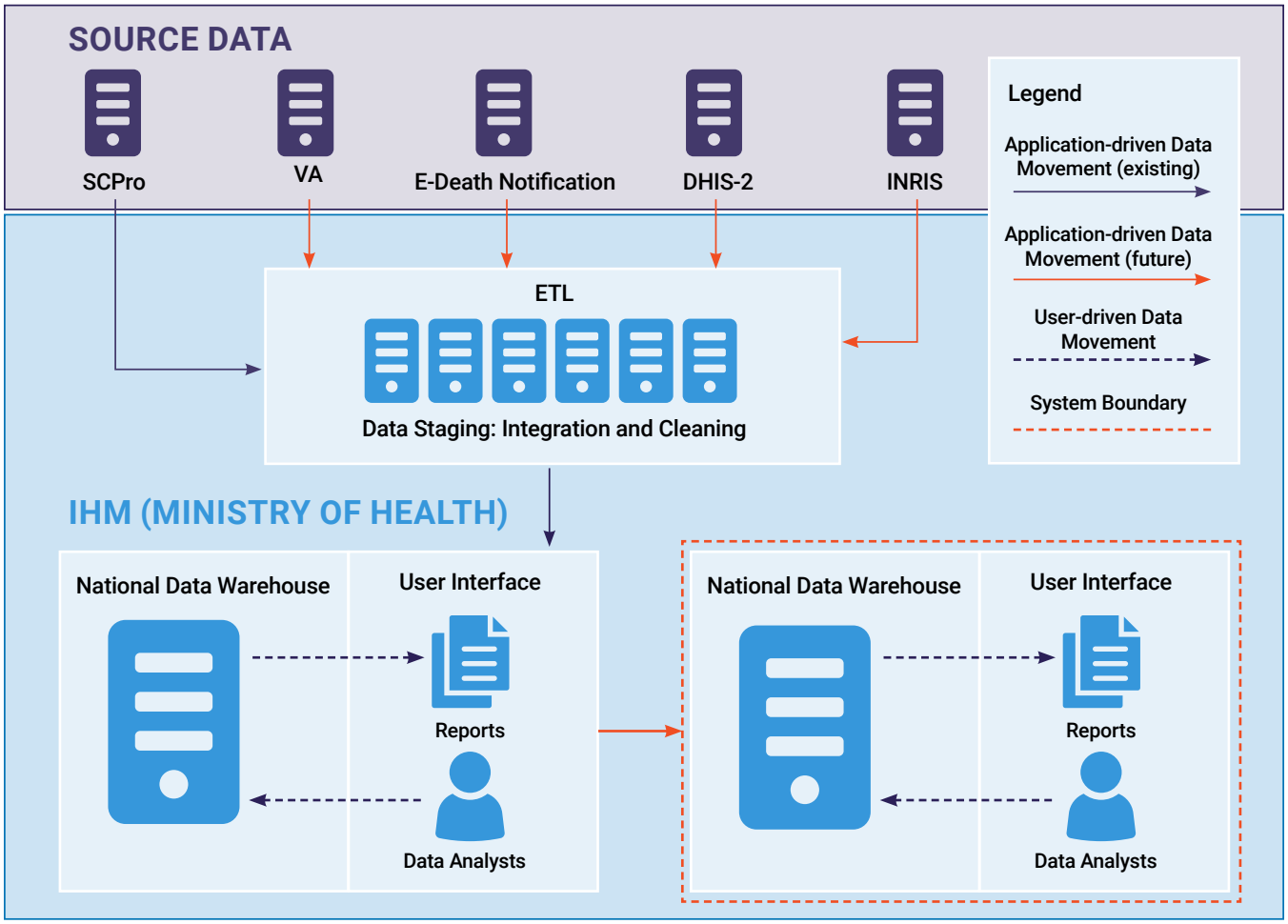
STAKEHOLDER	ROLES AND RESPONSIBILITIES
Zambia Ministry of Health (MoH)	The MoH is responsible for completing medical certification of cause of death and electronic notification of deaths and facilitates paper-based notification of deaths.
Department of National Registration, Passport and Citizenship (DNRPC)	DNRPC provides technical support to staff conducting death notification and provides/collects death notification forms. DNRPC is working with the Ministry of Local Government and Rural Development and the MoH to ensure registration of all deaths, including those that take place in rural areas and away from burial sites under local council jurisdiction.
Zambia National Public Health Institute (ZNPHI)	ZNPHI collaborates with stakeholders to investigate mortality trends and patterns.

Death Registration Office, University Teaching Hospital, Lusaka, Zambia. A body lies in the mortuary of the University Teaching Hospital (UTH), awaiting registration and processing to be entered into the system of death registries. Photo Credit: Juan Arredondo.

DEVELOPMENT OF A SCALABLE NATIONAL INTEGRATION ARCHITECTURE

A scalable national integration architecture was developed to ensure seamless data exchange between INRIS, SmartCare and the national data warehouse. Multi-institutional stakeholder meetings helped define data use requirements. This process led to developing a standardized mortality data model and a dedicated mortality data mart, a subset of the data warehouse that enhanced data accessibility and analysis.

Figure 2: A notional architecture for data integration



What is a Mortality Data Mart?

A mortality data mart is a smaller set of data pulled from Zambia's main health system. It focuses only on death-related information like when, where and why people die, so health teams can easily use it for planning and decision-making. This helps ensure timely and routine use of mortality data for planning and action.

ELECTRONIC MEDICAL CERTIFICATION OF CAUSE OF DEATH (MCCD)

Accurate and timely information on causes of death is essential for effective mortality surveillance and public health planning. A critical tool in this process is the medical certification of cause of death (MCCD), which ensures standardized and reliable recording of death causes. A key component of strengthening mortality surveillance is medical certification of cause of death (MCCD), the international gold standard for documenting causes of death. The draft e-MCCD system has been developed within SmartCare to improve the transmission of cause-of-death forms for timely coding, thereby enhancing the availability of cause-of-death data. It is currently in the validation phase, with pilot tests planned in various settings, including urban, rural and high-volume facilities.

Figure 3: A snapshot of a mortality surveillance dashboard with dummy data

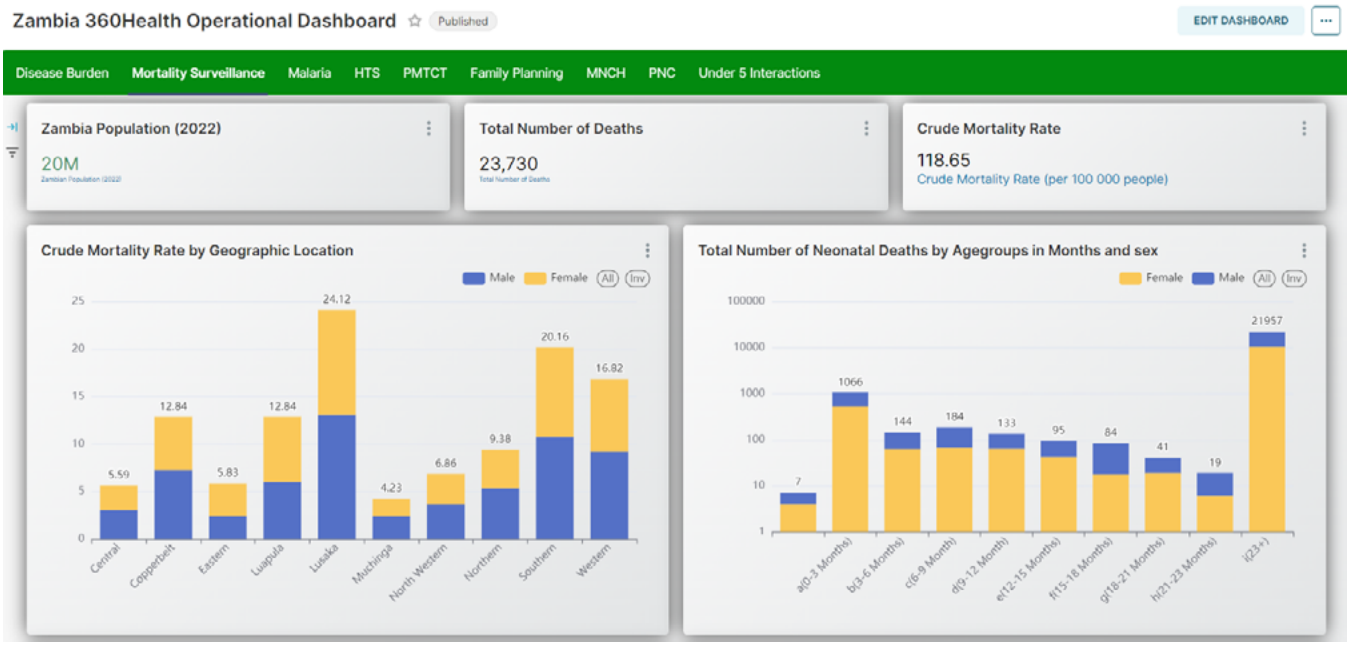
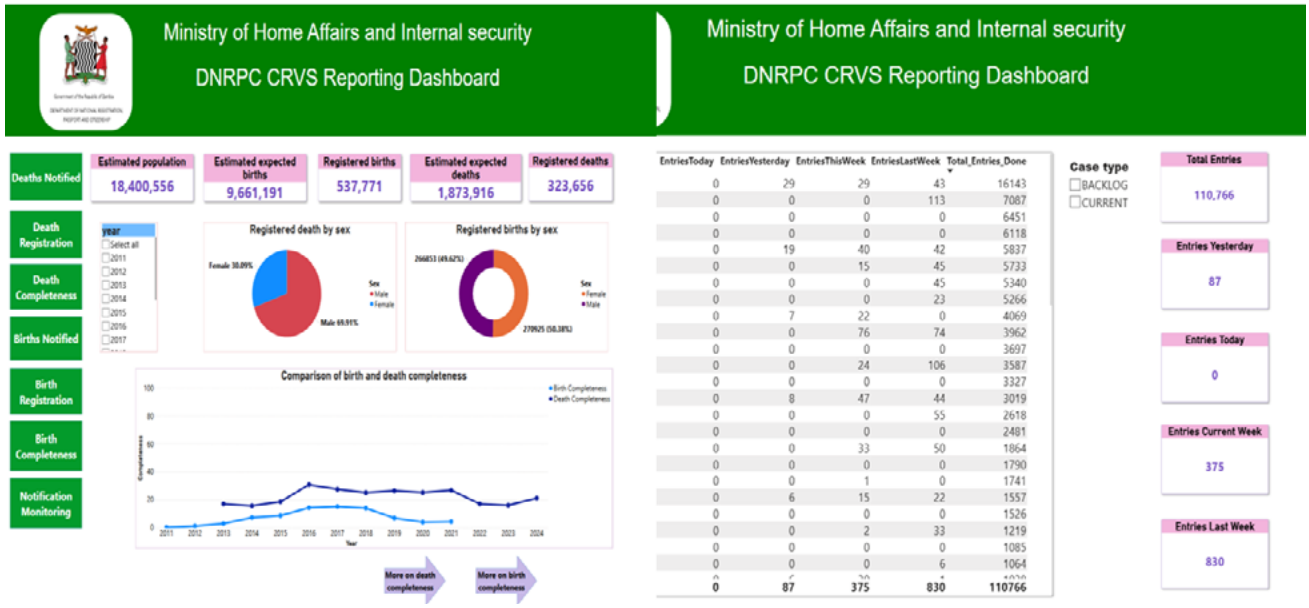


Figure 4: A visual representation of the e-notification reporting dashboard with real-time data



IMPACT

The integration of Zambia's death registration system with EMRs and the national data warehouse has already started to show promise in transforming the country's mortality tracking system. However, some of the long-term impacts are yet to be fully realized. Below is a breakdown of the initiative's expected short-term and long-term effects.

SHORT-TERM IMPACT

1. **Improved Timeliness:** The e-death notification system has reduced reporting delays by 88%, synchronizing notifications between MoH and DNRPC. As a result, the average time from death occurrence to registration has decreased from 60 days to 7 days, enabling faster access to vital statistics for public health planning and decision-making.

2. **Enhanced Data Availability:** Integration with the national data warehouse has enabled the development of a real-time mortality surveillance dashboard, improving data accessibility for public health decision-making.

3. **Optimized Workflows:** Stakeholder engagement has streamlined death registration processes, reducing inefficiencies.

4. **Increased Visibility:** A monitoring dashboard has been established to track performance, increasing visibility into CRVS processes and enabling data-driven decision-making. As a result, stakeholders can identify bottlenecks in real time, implement targeted improvements and enhance the overall efficiency and accuracy of vital event registration.

5. **Improved Access:** The expansion of INRIS has improved access to CRVS services in 81 out of 116 districts, covering 83% of the population. As a result, more individuals can now register vital events closer to their communities, reducing barriers to death registration and strengthening the overall CRVS system for better public health and governance outcomes.

LONG-TERM IMPACT (STILL TO BE ACHIEVED)

1. **Data-Driven Decision-Making:** The integrated system will support robust analytics, enabling targeted public health interventions.

2. **Enhanced Disease Surveillance:** Timely and accurate data will facilitate early detection of outbreaks and more effective resource allocation.

3. **Sustainable System Growth:** A scalable architecture will support future technology integrations, ensuring the long-term sustainability of the system.

4. **Accurate Cause-of-Death Reporting:** Once validated, the e-MCCD system will significantly enhance the consistency of cause-of-death data in health facilities, informing the development of tailored public health strategies.

ACTION SUGGESTIONS

Pilot and Validate e-MCCD

- Conduct comprehensive pilot tests in various facilities to finalize the e-MCCD system.
- Gather user feedback and refine the system and training materials before rolling out the system on a full scale.

Expanding e-Death Notification

- Implement a phased expansion plan to cover additional districts.
- Enhance infrastructure and standardize training to ensure consistent, reliable reporting.
- Continue stakeholder engagement with local councils and local district registration offices, as well as other mortality-related surveillance programs, to enhance the facilitation of death reporting and notification into INRIS.

COLLABORATING PARTNERS

Collaborating partners include Zambia's Ministry of Health (MoH), the Department of National Registration, Passport and Citizenship (DNRPC), Zambia National Public Health Institute (ZNPHI), the U.S. Centers for Disease Control and Prevention (CDC) and the CDC Foundation through Bloomberg Philanthropies Data for Health Initiative. This initiative was a collaborative investment effort, with funding for SmartCare and the national data warehouse provided by CDC. UNICEF and Bloomberg Philanthropies supported the improvement of CRVS and the expansion of INRIS. This partnership has been instrumental in strengthening the national CRVS system, improving data accessibility and advancing public health outcomes.

Photo Credit: Juan Arredondo