Global Health Security (GHS) Surveillance Analysis and Data Use

Synthesis Report

January 2, 2024

Country Health Information Systems and Data Use (CHISU) is USAID's flagship data and information system program to strengthen host country capacity and leadership to manage and use health information systems to improve evidence-based decision-making.

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Introduction

The Global Health Security Agenda (GHSA) is a global effort to strengthen countries' capacities to prevent, detect, and respond to epidemics, pandemics, and other emerging infectious disease threats. The GHSA is intended to accelerate action and spur progress toward implementation of the World Health Organization's (WHO) International Health Regulations (2005) (IHR) and other global health security frameworks. The WHO's Joint External Evaluation (JEE) is a voluntary, collaborative, multisectoral process to assess country capacities to prevent, detect and rapidly respond to public health risks.

Strengthening national surveillance systems' capacity to identify and manage public health threats is a key component of global health security. Moreover, integrating information from multiple sources —including human and animal health, agriculture, security, defense, law enforcement, development assistance, foreign affairs, research, and finance— better addresses public health emergencies and provides evidence to prioritize resources and evaluate programs.

To enhance and expand USAID's approach to Global Health Security, WHO's Integrated Health Services Department and USAID's Office of Health Systems in the Global Health Bureau jointly identified integration gaps in routine health and non-routine data for decision making in public health surveillance.

Study approach

USAID's Office of Health Systems then commissioned their Country Health Information System and Data Use (CHISU) program to conduct a study to 1) assess the gaps in disease surveillance data and its use for public health emergencies, and 2) identify opportunities for strengthening integration of surveillance data with the national routine health data, and non-health data. The overall purpose of the study was to provide the basis for reforms in health system processes and encourage allocation of resources to improve public health surveillance activities.

Objectives

USAID commissioned this study, which included following objectives:

1. To document data sources, systems, and processes used in selected countries to respond to public health threats
2. To assess gaps in data use and integration of disease surveillance and health management information system (HMIS) data for public health emergencies

3. To provide recommendations on how to integrate surveillance systems that address global health security issues into routine health and non-health data systems to improve prevention, detection, and response to public health threats

Design

To achieve these objectives, CHISU designed a cross-sectional qualitative study with the following country inclusion criteria:

1. The country had a USAID country mission or U.S. Centers for Disease Control and Prevention (CDC) country office.
2. Because this study is based on the results of JEEs, the country needed to have conducted the JEE in the last five years (between 2017 and 2021).
3. The country needed to have a current Global Health Security Index (GHSI) report with an overall score below the global average of 38.9. The assumption was that countries with above-average GHSI scores have the necessary tools and capacity to prevent and respond to public health emergencies while countries with below-average scores do not. Focusing on countries with challenges would provide evidence of gaps in systems, processes, data integration, and data use, and insight into why these countries are not able to attain the average score.
4. The presence of an existing health information management system for routinely collected aggregated health program data. The system could be paper-based, digitized, or hybrid.
5. A national public health institute that was a member of the International Association of Public Health Institutes (IANPHI). This criterion was important because national public health institutes provide leadership and coordinate public health efforts nationally.

Using these criteria, the study team selected **Burkina Faso, Burundi, Ghana, Kenya, and Madagascar** and CHISU presented the activity scope to USAID missions in those countries to obtain concurrence so that the study could proceed.

Methodology

The study team used purposive sampling to identify key informants for the interviews in the various countries. Other key informants were identified through snowballing from initial contacts. Study respondents included persons who had knowledge or experience with the country's national health information system, disease surveillance systems, and/or One Health approach.

Table 1: Study Sites and Timeframes

Country	Field work period	Date of validation meeting
Burundi	21st February 2023 - 11th July 2023	3rd July 2023
Madagascar	8th December 2022 - 28th June 2023	26th May 2023
Burkina Faso	29th September 2022 - 13th June 2023	1st June 2023
Kenya	16th September 2022 - 16th August 2023	12th July 2023
Ghana	19th September 2022 - 4th August 2023	Stakeholders validated the report. No meeting was conducted.

Local CHISU consultants led data collection through 1) a desk review and 2) key informant interviews (see table above for dates of data collection). Key informant interviews targeted government units that focus on disease surveillance, HMIS, port health, bilateral and multilateral agencies, animal health, environment, and laboratories. Once the consultants completed data collection and articulated findings in a report, CHISU organized validation meetings with key stakeholders in each country to obtain concurrence on the results and fill in any gaps that may have been missed from the desk review and interviews.

Results

Data sources, systems, and processes

Our first objective was to identify data sources, systems, and processes used in reporting public health threats. We found that data sources included every country's Ministry of Health (MOH) and its agencies for human health (through the routine health information systems [RHIS]), veterinary services, and port health. In **Kenya**, wildlife services and slaughterhouses also provided data in the country. In **Madagascar**, other vertical health programs, environmental services, and meteorological services also provided data. In **Burundi**, there did not appear to be a clear source of data for animal health. In **Burkina Faso**, the focus was on human health with data obtained from the MOH and its agencies through the health facility registers of aggregated health service data, the STELab, and epidemiological bulletins.

In terms of systems, the integrated disease surveillance system (IDSR) was common across all

countries with **Kenya** and **Madagascar** specifically using an electronic IDSR (eIDSR). All five countries chose the District Health Information System 2 (DHIS2) to aggregate health data. In **Ghana**, the Surveillance Outbreak Response Management & Analysis System (SORMAS) platform, developed by GIZ during the COVID-19 pandemic, has become the primary information system for disease surveillance at the district level. Health facilities were using electronic medical record (EMR) systems to capture transactional data, including cases of public health importance.

Kenya had a logistics management information system (LMIS), patient management system, and vaccine tracking system, and an animal bio surveillance system (LiveHealth eSurveillance health) to capture animal health data. **Madagascar's** IDSR was both paper-based and electronic. Animal health surveillance was managed through a platform called Voozanoo while CommCare was used at the community level to transmit data to DHIS2. **Burundi** also had an early warning system for public health emergencies, while Burkina **Faso** used telegrams to report data as official reports.

All countries in this study outlined a bottom-up approach to reporting, starting from the community level. Community health officers, volunteers, or health workers at the periphery identified cases and reported them to the health facilities. Health facilities then transmitted reports daily, weekly, or monthly, depending on the protocol for the cases identified.

Integration and interoperability

To assess the gaps in data use and integration of disease surveillance and HMIS data for public health emergencies, the study examined both integration and interoperability of systems. The study team defined *integration* as the process of combining data from multiple sources into a single, unified view for analysis, reporting, and decision-making and defined *interoperability* as the ability of different software applications to access, exchange, integrate, and use data in a coordinated manner through shared application interfaces and standards. To address the second objective on assessing gaps in data use and integration of disease surveillance and HMIS data for public health emergencies, we found data integration occurred at different levels through interagency coordination in all five countries. Data integration was mostly administrative in the countries studied, meaning that while integration agreements existed, actual integration of data from the various systems into a unified view was generally not widespread. In **Ghana**, for example, while an interagency data-sharing agreement was in place between the Ghana Health Service, the birth and death registry, and several other agencies, the data had not been integrated to produce a unified view. Similarly, in **Kenya**, there was an interagency data-sharing agreement between local and global agencies such as CDC, USAID, and the U.S. President's Emergency Plan for AIDS Relief (PEPFAR), but data integration still proved to be a challenge. In **Madagascar**, we found that while standard operating procedures (SOPs) for data sharing did not exist, data sharing tended to be ad hoc based on a need or a request for data, which were addressed through a committee. These included an ad hoc multisectoral committee for One Health and an ad hoc multisectoral committee for

antimicrobial resistance. In **Burundi** and **Burkina Faso** little noticeable data sharing coordination between ministries existed. So, while the intention and willingness were in place, the behaviors needed to make integrated data a reality were not yet prevalent, whether agreements were in place or not.

The study team also found that interoperability of disease surveillance and HMIS data was generally lacking in all five countries. In **Ghana**, while application programming interfaces (APIs) for interoperability with DHIS2 existed, they were not yet functional. **Kenya** had a framework for interoperability through the Kenya Digital Health Superhighway, but this had not been implemented at the time of the study. **Madagascar** had plans for interoperability implementation, but Burundi and **Burkina Faso** did not have plans or platforms for interoperability of systems that contain disease surveillance and HMIS data.

Data use and data sharing

In terms of data use, despite data collection processes being in place across the five countries, data use was minimal. In terms of sharing, all countries have some form of data-sharing agreements with WHO, the World Organization of Animal Health (WOAH), USAID, and other international partners. Regional data sharing occurred weekly with the West African Health Organization (WAHO) for West African countries, and occurred between the Indian Ocean Commission and **Madagascar** to promote regional data sharing. In **Burundi**, a national public health emergency operations center was in place to share data with all of the internal and external agencies.

A summary and comparison of the country findings can be found in Annex1 below.

Common trends

The following trends were identified across all five countries:

- **IDSR** is common across all five countries. The WHO Africa Regional Office (AFRO) developed the IDSR framework as a tool to conduct disease surveillance in countries. Some countries have digitized and are using an eIDSR, while others are still using a paper-based system.
- **DHIS2** is used as the routine aggregate health data repository of choice. However, the levels of use were different across countries. For example, Ghana has implemented DHIS2 in health facilities at the lowest level of primary health care delivery. These included health centers on the periphery where facility-aggregated data was entered directly into DHIS2 and further aggregated at the subdistrict and regional levels before being made available at the national level. **Madagascar** also used DHIS2 but only in some parts of the country. Both active and passive human health surveillance was in place. Active surveillance is being suggested here as a result of COVID-19, with contact tracing being critical in order

to find cases and isolate them to prevent the spread of COVID-19. However, broad active surveillance can be resource intensive and while being useful in the early stages of the pandemic, once a threshold was reached it was not sustainable. Improved community-based surveillance is worth considering as a potentially more feasible option.

- Countries reported cases of public health importance to **health facilities**, with **community health volunteers** identifying them during household visits, which were later managed through the health system.
- **Animal health surveillance** was also passive. Generally, we found that farmers submitted reports to the appropriate agency or in countries where community veterinary services volunteers were in place, they identified cases during farm visits or identified unusual animal deaths in the wild or on farms. We identified a trend of a **bottom-up reporting** process for surveillance, which started at the community level with data being aggregated as they reached the national level. There was some level of interagency data sharing and external data exchange in all five countries, even though, for example in **Burundi**, there were no SOPs for data sharing but data was shared with partners upon request.
- Despite efforts towards the **One Health** approach across sectors, in several cases the formal structures needed to ensure effective coordination of the approach were not in place. This may be partly due to a lack of resources or political will toward implementing the One Health approach, which requires significant resources and reorganization.
- We found administrative efforts towards achieving **interoperability** in several countries, with **Ghana**, **Kenya**, and **Madagascar** all achieving some level of progress. For example, while **Ghana** had a documented enterprise architecture, we found no evidence that it had been costed and was being purposefully implemented. **Kenya** also had similar architecture documentation specifically for the health sector however the status of its implementation was unclear.

Common gaps

The study team identified the following gaps across all five countries:

- **Inadequate human resource capacity** in health information systems units, health program managers at all levels, health facility managers as well as health care workers to handle surveillance data analysis and use and laboratory services. All five countries placed a great deal of focus on the lack of capacity for data analysis and use. For example, data captured at the community level is usually passed on to the facility level but it becomes information that is needed at a higher level rather than what is needed at the community level. As a result, community-level staff with limited data analysis skills are not able to easily recognize what their own data can be used to inform decision making at their level.

- The **JEE recommendations are not being fully implemented.** While documentation was in place, implementation was slow due mainly to limited resources and the institutional structures required to coordinate the One Health approach either not being in place or not functioning optimally.
- All countries have **low-functioning or non-existent multisectoral HIS governance structures**. However, **Kenya** has recently set up a governing body to coordinate all digital health activities in the country.
- Slow implementation of data sharing agreements, where they exist, has **limited progress on interoperability** of disease surveillance data among information systems within the health sector and with other sectors.

Recommendations

Based on the findings from this study, we have developed a few recommendations on how to integrate multisectoral surveillance systems into routine health and non-health data systems to improve prevention, detection, and response to public health threats for each country. The multisectoral governance structure in each country that is charged with pandemic preparedness and response and carries the mandate to work with the various players is best placed to carry out these recommendations.

An important note when reading these recommendations is that, in all five countries, action plans were drawn up after the JEEs were conducted to address the findings; implementation, however, is incomplete or, in some cases, has not yet started. Carrying out the action plans would be a significant step towards advancing the integration of data from surveillance systems into routine health data systems.

The following country-specific recommendations are synthesized from the information collected from participants in the study and validation workshops.

Ghana

Integrate SORMAS with the Lightwave health information management system, the national EMR. This EMR is being implemented in health facilities, and if it exchanges data seamlessly with a disease surveillance tool, it could help support improved prevention, detection, and response to public health threats. Expanding SORMAS to incorporate animal health surveillance could also encourage exchange of data between veterinary services and human health services and result in a more comprehensive disease surveillance approach. This could encourage institutionalizing the One Health approach and decentralizing One Health activities to the subnational level.

Kenya

Develop a national framework for integrating routine and nonroutine data. There is also a need to strengthen response and outbreak investigation and encourage disease reporting for both human and animal health. Linkages with private animal health service providers and wildlife services need to be strengthened before promoting data sharing for zoonotic health.

Madagascar

Improve governance structures for disease surveillance and monitoring, improve standardization of reporting forms, and set up a data exchange platform that can run alongside DHIS2 and ensure that the One Health approach proposed after the JEE evaluation is implemented.

Burundi

Coordination structures for the One Health approach are required in Burundi. These structures should address the JEE findings, ensure that all sectors are participating in pandemic preparedness and response, and facilitate data interoperability among systems. SOPs to enable data sharing across sectors and ministries are also needed.

Burkina Faso

Improve human resource capacity for data analysis, data use, and laboratory functions. Health emergency management should be integrated into the HIS, real-time information sharing should be improved within the MOH, and animal health should be integrated into human emergency services. Support the veterinary services directorate to develop an integrated disease surveillance and response guide for animal health, similar to the guide used to manage human health surveillance.

Next steps

First, human resource capacity development is needed in all five countries. A workforce needs assessment should be conducted for each country to assess skillsets, if this has not already been done. Based on an objective assessment, the appropriate training, coaching, mentoring, and supportive supervision programs should be designed to develop skills to manage disease surveillance, pandemic preparedness, and other areas based on country need. In addition to capacity development interventions, a focus on behavior change approaches would be valuable so that the culture of using data for pandemic preparedness and response becomes ingrained in the various stakeholders from community level all the way to national level.

Reviewing and updating the One Health strategies in each country is a logical next step, given that they are on average about five years old. Roadmaps can then be developed for progressive implementation to help identify funding sources.

SOPs and policies for interagency coordination are needed for countries that lack these policies along with support to implement them whether new or existing. Institutionalizing HIS governance is a critical next step. Each country should develop a framework for HIS governance and be encouraged to begin implementing the relevant structures to better coordinate HIS integration. This will encourage multisectoral coordination as well.

Finally, interoperability efforts should be supported technically and financially to maximize global health security across these five countries.

Annex 1: Country data system properties

Component	Ghana	Kenya	Madagascar	Burundi	Burkina Faso
Data sources	MOH and agencies, veterinary services, port health, RHIS	eIDSR, DHIS2, wildlife services, slaughterhouses	RHIS, vertical disease programs, births and deaths, environmental, meteorological, surveillance systems	Communities, health facilities, surveys	Registers, DHIS2, STELab, epidemiological bulletins
Systems	IDSR, SORMAS, EMR, DHIMS2	LMIS, patient management systems, vaccine tracking systems, animal bio-surveillance, LiveHealth e-surveillance app	IDSR (both electronic and paper-based), Voozanoo for animal health (multiagency), COMMCARE, DHIS2	IDSR, DHIS2, early warning system	Weekly telegram official report, national data warehouse using DHIS2
Processes	Bottom-up data reporting from community level	Weekly, case-based, event	Daily, weekly, monthly reporting	Bottom-up through alerts	Bottom-up reporting, daily notifiable disease reporting
Integration Technical integration is lacking. However, there are efforts at integration administratively	Interagency data-sharing agreements, e.g., GHS, BDR, others. No integration of routine health and nonroutine health data	Interagency data sharing with local and global agencies such as CDC, USAID, PEPFAR	No SOPs for data sharing, ad hoc multisectoral committee for One Health approach, multisectoral committee for antimicrobial resistance	Little coordination between ministries	Poor coordination

Component	Ghana	Kenya	Madagascar	Burundi	Burkina Faso
Interoperability	APIs for interoperability with DHIMS2 exist but not functional; plans exist but not implemented	Framework for the Kenya Digital Health Super Highway	Plan exists but not implemented	No platforms for interoperability	Data sharing between the 3 key ministries for One Health is enabled by DHIS2 instances for each ministry through an interoperability layer. STELab was not yet interoperable with the DHIS2 software
Data sharing	Ghana Health Service has Memorandum of understanding (MOU) with some agencies for data sharing. Data sharing with WAHO, WHO, and other partners	Data-sharing agreements between MOH and multiple agencies such as USAID, CDC, National Insurance Fund, etc.	Indian Ocean Commission, other multilateral agencies, UNICEF, WHO, WOAH	National Public Health Emergency Operations Center shares data with internal agencies and external agencies	Data sharing both formally and informally between MOH internally and with other agencies
Recommendations on integrating GHS routine and nonroutine data	• Proposed integration of SORMAS and LHIMS • Expand SORMAS to cater to animal health surveillance • Encourage exchange of data between veterinary services and	• Develop framework for integrating routine and nonroutine data • Strengthening response and outbreak investigation to encourage disease reporting • Strengthening linkages with	• Improve on governance structures for disease surveillance and monitoring • Standardization of reporting forms • Setting up a data exchange platform that runs alongside DHIS2 • Implement the One Health approach	• Set up coordination structure for One Health approach • Advocate for interoperability with DHIS2 • Enable laboratory interoperability with surveillance systems	• Improve staff capacity • Integrate health emergency management into the health information system • Improved real-time information sharing between the central branches of the

Component	Ghana	Kenya	Madagascar	Burundi	Burkina Faso
	human health services • Focus on decentralizing One Health activities to subnational levels • Ministry of Food and Agriculture should share their surveillance data more widely	private animal health service providers, MOH, and wildlife • More prompt sharing of data for zoonotic diseases • Strengthening of event-based surveillance, the common platform between MOH and Directorate of Veterinary Services			Ministry of Health • Integrating animal health into health emergency management • Assist the Veterinary Services Directorate in developing a guide like the SIMR guide for human health

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