

A software for disease surveillance and outbreak response

Insights from implementing SORMAS in Nigeria and Ghana

A publication in the German Health Practice Collection

Key learnings

- Insights from implementation of the SORMAS application show that integrating infectious disease surveillance with the management of workflows for outbreak response in a single, comprehensive software platform can strengthen countries' disease control capabilities.
- SORMAS is closely aligned with the Africa-wide Integrated Disease Surveillance and Response (IDSR) strategy, and acts as a business process management tool to strengthen strategy implementation and improve the accuracy and efficiency of workflows.
- Alignment with other digital disease surveillance applications and interoperability with digital health platforms such as DHIS2 will contribute to the development of national digital health ecosystems as these develop.
- Through its modular, flexible architecture, open-source software and its recently acquired status as a Digital Global Good, SORMAS and the countries using it are well positioned to keep pace with the emergence of new diseases, such as COVID-19, as well as with medical and IT innovations.

The challenge: weak national capacities for disease surveillance and outbreak response threaten global health security

Global health security is a rising challenge for the 21st century, with the regular emergence of new disease pathogens and the re-emergence of older ones. As the West African Ebola epidemic of 2014-16 showed, infectious disease outbreaks can spread rapidly across borders, resulting in unprecedented social and economic costs and the loss of many lives.

It is essential to strengthen national capacities to comply with the legally binding framework of International Health Regulations (IHR) and to improve implementation of key strategies and approaches, such as the global One Health approach linking human, animal and environmental health, and the Africa-wide Integrated Disease Surveillance and Response (IDSR) strategy, which defines core activities for surveillance and management of outbreaks at country level.

The Ebola epidemic spurred the development of multiple new digital approaches to disease surveillance, the majority aimed at speeding up the transfer of epidemiological data using short message service (SMS) technology on mobile devices, such as cell phones or tablets. However, none of these approaches encompassed all the components and actors involved in a country's disease surveillance and outbreak response strategy, or were able to process the real-time, rapid and multidirectional information flows critical for its success.

The SORMAS (Surveillance, Outbreak Response Management and Analysis System) software, an initiative of the Helmholtz Centre for Infection Research (HZI) in cooperation with the Nigeria Centre for Disease Control (NCDC), grew directly out of the experience of tackling Ebola in Nigeria. It is one of few programmes to provide comprehensive disease surveillance and outbreak management functionalities in a single digital platform. Drawing on the experience of implementing SORMAS in Nigeria, Ghana Community Network Services Ltd. (GCNet) adapted SORMAS for Ghana, working in partnership with the Ghana Health Service (GHS). This case study aims to answer the question: 'How does SORMAS improve countries' outbreak management and digital health ecosystems?'

The response: a digital platform enhances national epidemic preparedness and response capabilities

SORMAS was designed to improve the efficiency and timeliness of disease control measures. What differentiates it from other digital applications in this field is the fact that SORMAS operates as a business process management tool: the entry of a suspected or confirmed case by a health worker at any level of the system automatically triggers a series of actions to ensure that it is managed quickly and efficiently.



→ A Community Health Extension Worker in Nigeria enters a potential new case into the SORMAS application. © GIZ / Brooks Photography

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Multidirectional information flows allow the different actors in the national surveillance and response system to receive information from other network users – such as updates on the status of a patient – and to post new information which is then immediately accessible to all those who need to see it. The platform also sends reminders to users via SMS for tasks that are incomplete or not yet done.

Based on the current and past data held in the platform, algorithms generate early warnings of potential outbreaks when disease cases increase over and above the expected level for a specific place or group of people, over a given period of time. Outbreak response measures are then activated using real-time data and case management functionalities to help manage and control the outbreak.

The flexible, modular design of SORMAS allows for the addition of new diseases and functionalities, which enables the platform to keep pace with the constantly evolving medical and epidemiological state of the art in surveillance and outbreak management. This was demonstrated recently by the rapid activation of a disease surveillance module for the new COVID-19 coronavirus, in response to WHO's declaration of a public health emergency of international concern in January 2020.



→ The Head of Surveillance and Epidemiology at the Nigeria Centre for Disease Control presents data on disease outbreaks from the SORMAS dashboard. © GIZ / Brooks Photography

SORMAS's transition to open-source software in 2016 was a crucial step for enabling other countries and software developers to use and further improve the platform. As a signatory to the [Digital Investment Principles](#), German Development Cooperation through the *Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH* supported this important transformation. In 2019, SORMAS achieved the status of a Digital Global Good, opening the door to new communities of funders and digital programmers engaged in global health security.

What has been achieved

SORMAS has come a long way since the development of the early prototype and its field testing in two Nigerian states in 2014-15: by early 2020, the platform had been introduced in two regions of Ghana, and rolled out to 15 Nigerian states covering a population of some 75 million people – larger by far than the populations of most African countries.

To date, the platform covers more than 12 epidemic-prone, high-priority diseases, including COVID-19, and an 'Emerging Disease X' functionality allows for the immediate inclusion of new diseases as they emerge. The recent introduction of SORMAS in Ghana has demonstrated that, due to its close alignment with Africa's regional surveillance and response strategy (IDSR), few modifications were required beyond the addition of two new disease modules for anthrax and rabies. The public-private partnership formed by GCNet and GHS to implement SORMAS in Ghana is also demonstrating the feasibility of alternative approaches to SORMAS implementation.

Strong national ownership and leadership of SORMAS by the NCDC has helped to leverage additional funding for the further scale-up of SORMAS from the Nigerian Federal Government, as well as from the European Union, the Centers for Disease Control and Prevention of the United States (CDC) and the Bill and Melinda Gates Foundation.

By ensuring interoperability with District Health Information Software 2 (DHIS2) and alignment with other widely-used digital platforms in the region, such as the [electronic IDSR](#) system and [Epi Info](#), SORMAS will contribute to the development of both national and regional digital health ecosystems as these develop.

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