Africa CDC's blueprint to enhance early warning surveillance: accelerating implementation of event-based surveillance in Africa

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Key words: event-based surveillance, framework, training manual, early warning surveillance, Zambia, Kenya.

Contributions: KM provided technical expertise and coordinated the guidance development and manuscript draft. AB, provided technical expertise to the guidance and manuscript draft. TWN, PN, DS and YK acquired the data from Africa CDC and AU Member States. All authors provided critical conceptual input, analyzed, and interpreted data, and critically revised the report. KM and WN verified the data. All authors had full access to all the data in the study and had final responsibility for the decision to submit for publication.

Conflict of interest: the authors declare no potential conflict of interest.

Availability of data and materials: Africa CDC EBS resources are available on the Africa CDC website and can be accessed there. To gain access to a complete export of other data sets presented in this article, please contact AfricaCDCEBS@africa-union.org to sign a data access agreement.

Acknowledgements: the authors alone are responsible for the views expressed in this article and they do not necessarily represent the decisions, policy, or views of Africa CDC, Global fund, the Government of Kenya, The Zambia National Public Health Institute or any other institution or organization represented by the co-authors. We thank all members of the EBS framework Africa CDC, EBS unit and the EBS technical working group, especially Calvin Sindato and Mohamed Ally Mohamed, for supporting with some of the coordination of the validation meetings. We further thank the Governments of Cameroon, Uganda, Zambia, the Gambia, Tanzania, Nigeria, Egypt and Lesotho for facilitating the validation and piloting of this framework. All technical working group members listed in the Framework: https://africacdc.org/download/africa-cdc-event-based-surveillance-framework-2

Received for publication:6 July 2023.
Accepted for publication: 8 August 2023.

Journal of Public Health in Africa 2023; 14:2827
doi:10.4081/jphia.2023.2827

Abstract

Event-based surveillance (EBS) is a core component of early warning surveillance. In 2018, Africa CDC developed the first edition of an event-based surveillance framework to guide African Union Member States in implementing EBS. Country experiences during the COVID-19 pandemic demonstrated the value of data from non-traditional sources for real time situational awareness; at the same time revealed the huge gaps in strengthening this arm of surveillance. Learning from these lessons and to begin to close those gaps, Africa CDC convened subject matter experts from African Union Member States and technical partners to develop the second edition of the EBS framework, 2023 and its training materials. The revised version includes additional sections such as, the multi-sectoral one health collaboration in EBS, monitoring and evaluation, cross border EBS, and use of event management systems. The current manuscript provides an overview of the 2023 Africa CDC EBS framework and highlights experience in two countries that have successfully employed this resource in their implementation efforts.

Introduction

Event-based surveillance (EBS) is a core component of early warning surveillance and is the organized collection, monitoring, assessment, and interpretation of primarily unstructured ad hoc information regarding health events or risks, which may represent an acute risk to human, animal, plant, or environment health.[1,2] Country experiences during the COVID-19 demonstrated key gaps in event- based surveillance including, sub-optimal reporting from non-traditional sources such as communities, private health facilities and other socially connected community settings (churches, schools etc).[3]

One of the key needs for the optimal implementation of event-based surveillance is availability of an operational framework and training materials for event-based surveillance. Recognizing this, in 2018, Africa Centres for Disease Control and Prevention (Africa CDC) convened Member States and technical partners to co-create an operational guideline and training materials for event-based surveillance.[4] These materials were to be used in adjunct with the Integrated Disease Surveillance and Response (IDSR) strategy in the 43 member states that adopted IDSR.[5-7] Learning from the lessons of the COVID-19 pandemic in Africa, Africa CDC reconvened Member States and technical partners in 2022 to begin a revision that culminated in the publication of the Second Edition of the EBS Framework, 2023 and related training materials (Both are available at: https://africacdc.org/download/africa-cdc-event-

based-surveillance-framework-2/). These will serve as a resource to African Union Member States seeking to implement event-based surveillance using a multi-sectoral, One Health approach. The current publication provides an overview of the 2023 Africa CDC framework and two case-studies describing the utility of the first edition of the Africa CDC EBS framework in two African Union Member States.

The Africa CDC event-based surveillance framework

In the year 2020, Africa CDC constituted a technical working group (TWG) aimed at revising the 2018 version of the Africa CDC EBS framework. Members of the TWG came from the African Union Member States implementing event-based surveillance, Africa CDC Regional Coordinating Centres, World Health Organization, World Organization for Animal Health, Food and Agricultural Organization of the United Nations, Resolve to Save Lives, US Centers for Disease Control and European Centre for Disease Prevention and Control. The process of the development of the Africa CDC framework involved several meetings and workshops with the TWG and Member States (Table 1). The 2023 Africa CDC framework aims to guide Member States to implement EBS holistically and includes operational guidance for implementing media scanning, hotlines, communities, and health facilities event-based surveillance building on the first edition. The 2023 Africa CDC EBS framework will guide countries to implement, monitor and evaluate EBS more effectively and in a more standard manner.

The framework is arranged in interlinked chapters and annexes that can be modified and adapted, as needed, by users and aligned with the third edition of the World Health Organization (WHO) Joint External Evaluation for the following indicators:[8] strengthened early warning surveillance systems that are able to detect events of significance for public health and health security (Indicator D2.1); improved communication and collaboration across sectors and between National, intermediate and local public health response levels of authority regarding surveillance of events of public health significance (Indicator D2.2); and improved national and intermediate-level capacity to analyse data (Indicator D2.3).

Key additions to the revised edition include the sections for Monitoring and Evaluation (M and E) and data management and event management systems (EMS) for EBS. The M and E section guides Member States on how to develop and implement a M and E plan with robust indicators to monitor and evaluate progress. A theory of change relating the results chain model components to potential indicators is included in this section. Also available in the revised framework is a scorecard that will enable Member States to assess existing capacity and progress toward EBS implementation. The revised framework also includes guidance for optimal use of electronic EMS. Event Management Systems can help public units to manage information generated by signal reports, triage/verification and response and linking to notifiable disease systems thereby enabling these countries to better use event-based surveillance to guide timely and effective action. The Africa CDC has developed an EMS built-in District Health Information Software 2 (DHIS2), which is an open-source web-based platform and has been designed for routine data entry and tracking of signals and events, analysing data, generating and archiving of reports and other relevant system generated products, for example, outbreaks briefs and situation reports. The system can also link to other media scanning engines for example the Epidemic Intelligence from Open Sources (EIOS), EpiTweetr,[9] etc. which allows for signals detected within these engines to be tagged and imported into the EMS for easy data entry.

To date, 20 African Union (AU) Member States have implemented the Africa CDC framework, 15 of which were supported by Africa CDC. In addition, more than 2,000 surveillance officers (from human, animal, and environment sectors) from at least 16 AU Member States have been trained on EBS using the framework. Africa CDC also provided training to some key regional actors like ECSA-HC (East Central and Southern Africa Health community) and SACIDS for One Health who have now mobilized resources and scaling up continental roll-out of EBS [https://www.openaccessgovernment.org/africa-strengthening-public-health-surveillance-systems/107243/]. Africa CDC has also established event-based surveillance communities of practice in three AU regions: Northern, Southern and Central. Twenty-nine AU Member States are part of these communities and are benefiting from the sharing of information about public health threats in the regions. This year, communities of practice will be extended to all five regions and all 55 AU Member States will be on-boarded in these communities to improve seamless exchange of information within the regions. Two case studies are presented to illustrate the benefit of the Africa CDC framework and training materials.

Case study 1. Kenya, a multi-sectoral approach to event-based surveillance

Kenya is one of the first countries that were trained by Africa CDC in 2018 using the first edition of the framework. Working in collaboration with Africa CDC, the United States Centers for Disease Control and Prevention (US CDC) and other partners, the Ministry of Health adapted the Africa CDC EBS framework and:

Designed a one health approach for implementing EBS in communities and health facilities.

Operationalized a multi-sectoral and multi-disciplinary technical working group for EBS composed of experts and officers from veterinary, human, and environmental sectors to guide implementation.

Developed an electronic platform, "*m-Dharura"* which is a mobile phone-based application with a web version for EBS data capture, reporting, analytics, and visualization. This tool was being used by 11,749 community health volunteers, 223 personnel from the veterinary sector, 2,617 healthcare workers, 131 learning institutions, 154 emergency operations centre (EOC), and 203 partners as of April 2023. A total of 26,223 signals of acute public health risks were reported through the platform during the same period (Table 2).

Case study 2: Zambia, use of Event Management Systems for event-based surveillance

Africa CDC supported Zambia in 2018 to train the national and regional surveillance officers on EBS. Today, Zambia has:

Adapted the Africa CDC framework, developed and published the EBS national guidelines for Zambia with support from Africa CDC and Eastern, Central and Southern Africa Health Community (ECSA-HC).

Domesticated and implemented an EMS developed by Africa CDC. This EMS is supporting the capture, analysis and reporting of signals detected through the different EBS approaches. One hundred and sixteen district officers from all the health districts have been trained on the event management system and are now

reporting detected signals and events through this electronic platform. From November 2022 to April 2023, a total of 425 signals were captured by this system, 255 (60%) of which were verified as events (Table 3).

Finalized EBS and EMS training curricula and integrated the 7-1-7 timeline matrix in the EMS for improved monitoring of timeline indicators.

Conclusions

Africa CDC's blueprint for early warning surveillance is a partnership approach with the World Health Organization Regional Office for Africa (WHO AFRO), US CDC, regional partners and Member States providing guidance for this blueprint. Event-based surveillance is a much needed, yet sub-optimally implemented component of Early Warning Surveillance. EBS has improved detection of public health threats and shortened the response time of outbreaks in Kenya and Zambia, currently implementing the Africa CDC EBS framework. The revised framework is intended to further accelerate the implementation of EBS in all 55 African Union Member States while also ensuring a multi-sectoral one-health approach. This is but the first step towards achieving optimal implementation of this surveillance enabling countries to be better prepared for the next pandemic. For event-based surveillance to work well, it needs to be implemented holistically and linked to indicator based, laboratory and response systems.

List of abbreviations

EBS: Event-based Surveillance
IDSR: Integrated Disease Surveillance and Response
Africa CDC: Africa Centres for Disease Control and Prevention
WHO: World Health Organization
M and E: Monitoring and Evaluation
EMS: Event Management System
DHIS2: District Health Information Software 2
EIOS: Epidemic Intelligence from Open Sources
AU: African Union
U.S. CDC: United States Centers for Disease Control and Prevention
EOC: Emergency Operations Centre
ECSA-HC: Eastern, Central and Southern Africa Health Community
WHO AFRO: World Health Organization Regional Office for Africa

Table 1. Timeline of the Africa CDC second edition of event-based surveillance framework development.

Dates	Activity	Description
January 2021	First stakeholder meeting	Africa CDC convened Member States and stakeholders implementing the EBS framework. The outcome of the workshop was the establishment of a technical working group and the documentation of gaps in the implementation of initial EBS framework
February to May 2021	Gap analysis	Review of critical gaps in early detection within MS. This was done through the assessment of official and unofficial reports received from AU Member States
June 2021	Development of framework outline	Stakeholder meeting with partners, Member States (those implementing the Africa CDC framework) and regional actors to agree on new components and concepts to be included in the revised framework.
August 2021	Draft second edition of the framework developed	Zero draft of framework developed and shared with all technical working group members for feedback
September 2021 to July 2022	Piloting of framework in 5 AU MS	Piloted the utilization of the revised framework in 5 AU MS; Cameroon, Tanzania, The Gambia, Uganda, and Malawi
August 2022	EBS framework 2nd edition completed	Inputs following piloting in Member States incorporated
October 2022	Validation of final version of the framework	Organized a workshop that brought together technical subject matter experts, partners and Member States to review and validate the final version
December 2022 to February 2023	Graphic design and translation to four AU languages (English, Portuguese, French and Arabic)	Recruited a firm to review (editorial review), design and translate documents to four AU languages
March 2023	EBS framework launched	Africa CDC brought together over 150 delegates from Member States, regional and global partners to launch the framework and share success stories on the implementation of EBS on the continent.

Table 2. Signals and events captured and processed by Kenya (Jan 2021 to April 2023).

Level of detection	Signal detected	Signals verified	Signal verified to be true events	Risk assessment	Events responded to
Community	24914	21192	7423	6280	5521
Health facility	1309	1169	662	645	627
Total signals captured	26223	22361	8085	6925	6148

Table 3. Signals and events captured and processed by Zambia through the Event Management System (November 2022 to April 2023).

Level of detection	Signal detected	Signals verified	Signal verified to be true events	Risk assessment	Events responded to
Community	24914	21192	7423	6280	5521
Health facility	1309	1169	662	645	627
Total signals captured	26223	22361	8085	6925	6148

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