

# Event-Based Surveillance Training Manual



First Edition (2023)

# Acknowledgements

The Africa Centres for Disease Control and Prevention (Africa CDC) developed an event-based surveillance (EBS) framework that serves as a guide to Public Health Institutes in the African Union (AU) Member States (MS) interested in implementing EBS. To enhance operationalization of the EBS framework in the AU MS, the Africa CDC, with technical expertise from SACIDS Foundation for One Health (SACIDS) and the Eastern, Central, Southern Health Community (ECSA-HC) developed an EBS training package and manual to enhance EBS implementation at different levels of the health system.

Informed by an evaluation to identify the gaps, challenges, and stages or level of EBS implementation in Member States, this training package helps meet the need for standardised training materials. Additionally, this package takes a One Health approach by allowing for the training of EBS officers from the human, animal, and environment health sectors, empowering them to operationalize coordinated EBS that can be further cascaded to subnational and community levels.

Africa CDC is grateful to SACIDS, ECSA-HC, WHO, US CDC, European CDC, AU MS, and all those who contributed directly and indirectly to the development of these EBS training modules through their individual and institutional capacities.

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## Executive summary

The Africa CDC envisions a safer, healthier, integrated, and stronger Africa, whereby African Union (AU) Member States (MSs) are capable of promptly detecting and effectively responding to infectious disease outbreaks and other public health threats. Africa CDC identified event-based surveillance (EBS) as a critical approach needed to support and strengthen the continental early warning and response (EWAR) capacity. In line with its mandate and with guidance from the 2nd edition of the EBS framework, Africa CDC developed this training package to support Member States with implementing EBS to improve their EWAR capacity.

EBS is defined as the organised collection, monitoring, assessment, and interpretation of mainly unstructured ad hoc information regarding health-related events or risks which may represent an acute risk to human, animal, plant, or environment health. EBS complements existing indicator-based surveillance and both surveillance types, as part of epidemic intelligence, improve a country's EWAR capacity. The Framework for Event-based Surveillance offers guidance to health practitioners seeking to implement EBS in their countries.

This training manual covers nine modules including an overview of public health surveillance, the four types of EBS (community, facility, media scanning and hotlines), the steps and process of EBS, considerations for the implementation of EBS monitoring and evaluation and the management of EBS data for improved coordinated response.

## Objectives of this manual

1. To build competent workforce for countries to operationalize EBS at different levels of the health system
2. To impart knowledge, understanding, and application of EBS in identification, notification, and response to health risks
3. To enhance multisectoral, One Health collaboration in EBS
4. To act as a reference resource for countries



# Module 1: Background

The material in this module is not explicitly covered in the EBS framework but is considered important contextual background for implementers of EBS in Africa. This module aims at providing learners with knowledge on existing legal instruments and surveillance frameworks that support EWAR. It also highlights the different surveillance approaches (e.g., IBS and EBS) how they complement each other and contribute to overall epidemic intelligence needed to detect, report, and respond to health-related events.

The time allocated for this module is 30 minutes and at the end of this session the facilitator is expected to allow for 5 minutes of questions and answers.

The methodology for instruction is PowerPoint presentation and interactive discussions.

**Equipment needed:** Laptop, flipcharts, markers, and projector

## Key objectives of this module:

- To describe the International Health Regulation (IHR) 2005
- To improve understanding on the different approaches of surveillance and how they complement each other
- To describe the Integrated Disease Surveillance and Response (IDSR) strategy and its relevance to EWAR
- To facilitate understanding on how the IDSR, Africa CDC EBS framework and IHR complement each other

The African continent has experienced many infectious disease epidemics over the past decades that have caused marked morbidity, mortality and disability to humans and disruption to the economies of affected countries. These include the COVID-19 pandemic and outbreaks of Ebola, cholera, measles, yellow fever among others<sup>1</sup>. Examples of other emergencies include extreme weather events (e.g., tropical storms, flooding, and drought), massive animal die-offs, and civil unrest<sup>23</sup>.

However, many of these events go unnoticed or are detected late on the continent. Strengthening countries' surveillance and response systems is pivotal to improving health security nationally, regionally, and globally.

## Benefits of a having a robust surveillance system include being able to:

- Detect and manage acute public health events (including infectious diseases) at their sources of origin before they could spread further
- Monitor epidemiologic trends
- Evaluate effectiveness of health-related interventions and programs
- Determine the burden of disease in populations

<sup>1</sup> [Ebola Response Impact on Public Health Programs, West Africa, 2014-2017](#)

<sup>2</sup> <https://www.afro.who.int/news/man-made-disasters-natural-hazards-cost-africa-15-billion>

<sup>3</sup> <https://pubmed.ncbi.nlm.nih.gov/9170231/>

## **Legal and Surveillance Frameworks and Strategies**

This section refers to public health related frameworks and strategies developed by the World Health Organization and Africa CDC; however please note that global reporting mechanisms and standards do also exist for other health sectors. For example, please refer to the World Organisation for Animal Health (WOAH) Terrestrial and Aquatic Animal Health Codes as well as the Performance for Veterinary Services for more information on the animal health sector-related regulations.

### **IHR 2005 and Surveillance**

The International Health Regulations (IHR) represent an agreement among 196 countries globally to work together on Global Health Security. It is a binding and legal instrument, which urges all state parties to develop minimum core public health capacities to detect, assess and report, and respond to public health risks and emergencies in ways that are relevant and restricted to public health risks without unnecessary interference with international traffic and trade. Countries are required to use existing national structures and resources to meet their core capacity requirements which include capacity for surveillance, reporting, notification, verification, response, and collaboration.

The IHR was revised in 2005 aimed at expanding the usual infectious disease notification to include surveillance for public health events of various points of origin. This document urges all signatories to strengthen their capacities for the rapid detection of public-health risks, as well as prompt risk assessment, notification, and response to these risks.

### **IDSR Strategy**

Integrated Disease Surveillance and Response (IDSR) is a surveillance approach that was proposed by the WHO Regional Office for Africa (AFRO) in 1998. The main objective of this strategy is to improve public health surveillance and response for priority diseases, conditions and events at the community, health facility, intermediate, and national level in African countries.

The first edition of the IDSR technical guideline was launched in 2002 and later in 2010, the document was revised to include emerging diseases, non-communicable and community-based surveillance. This second edition was developed and launched to support the attainment of IHR.

In 2018 the third edition was released, which recommends thresholds for action on priority diseases, public health events and conditions and for responding to alerts. Additionally, this revision supports the integration of a multisectoral, One Health approach and the establishment of early warning and response modalities like EBS.

### **Africa CDC EBS Framework**

The Africa CDC EBS framework was developed in 2018 and revised in 2023 with the aim of providing guidance to stakeholders interested in implementing EBS using a multisectoral, One Health approach. To that end, the document is arranged in interlinked modules and annexes that can be modified and adapted as needed by users. The framework does not replace any other available EBS materials, but rather builds on existing relevant or related documents and serves as a practical guide for the implementation of EBS in Africa. The framework aligns to the third edition of the WHO Joint External Evaluation<sup>1</sup> for the following indicators: 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

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<sup>1</sup>[Joint external evaluation tool: International Health Regulations \(2005\) - third edition](#)

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). As countries begin to implement and demonstrate EBS functionality they will ensure an increase in JEE scores and progress towards meeting the requirements outlined in the IHR<sup>1</sup>.

Additionally, in African Union Member States that have adopted IDSR, the document is a complement to and can enhance the implementation of IDSR, especially for the 3rd edition (2019) that includes components related to EBS.

## Approaches in Health-Related Surveillance

(a) **Passive surveillance.** This refers to a system whereby a health institution receives routine reports submitted from facilities (e.g., hospitals, clinics, water-treatment plants, and health units), the community or other sources. In this approach, there is no active search for cases.

b) **Active surveillance.** It involves an ongoing search for cases in the community or facilities. This may involve regular contacts with key reporting sources, by making telephone calls to health care workers at a facility or laboratory or physically moving to the source and carrying out record reviews of data. Examples include active search for cases of measles and polio, during outbreaks. EBS makes use of this approach.

(c) **Integrated disease surveillance.** It is an approach that aims at collecting health data for multiple diseases, using standardised tools. IDSR is an example of a data collection and analysis system in the public health sector that relies on two main channels of information or signal generation: **indicator-based surveillance (IBS)**; and **event-based surveillance (EBS)**.

### Health-related surveillance makes use of 2 main surveillance mechanisms:

1. Indicator-based surveillance (IBS)
2. Event-based surveillance (EBS)

## Indicator-based surveillance

Indicator-based surveillance is a more traditional way of reporting diseases to public health officials. IBS involves reports of specific diseases from health care providers to health officials. Such information may be described as structured information because the information obtained is standardised. It could be defined as the systematic (regular) collection, monitoring, analysis, and interpretation of structured data produced by many well-identified, mostly health-based, formal sources.

The data are collected and reported at regular intervals and are better suited for monitoring disease trends over time. IBS can help document the start of a regular seasonal outbreaks of endemic disease through the designation of a seasonal alert and epidemic thresholds for outbreaks. Data collection in IBS is mainly passive. It is collected during routine services and shared using specific structured tools. Data are analysed in comparison with baseline values and thresholds to determine unusual disease patterns. This is the most common form of surveillance of diseases and other public health events.

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<sup>1</sup> [International Health Regulations \(2005\) - third edition](#)

### Some examples of IBS systems include:

- **Facility-based surveillance:** health facilities routinely and regularly report to the next level on prioritised conditions.
- **Case-based surveillance:** ongoing and rapid identification of identifiable cases for case follow-up. It is applied to conduct surveillance of communicable diseases including those targeted for elimination/eradication and during outbreaks.
- **Sentinel surveillance:** for specific conditions in a specific cohort, such as a geographical area or population subgroup, to estimate trends in a larger population.
- **Syndromic surveillance:** active or passive system that uses standard case definitions, based entirely on clinical features, without any laboratory diagnosis.
- **Laboratory-based surveillance:** conducted at laboratories to detect events or trends, which may not be seen as a problem at other locations.
- **Disease-specific surveillance:** involves surveillance activities aimed at targeted health data for a specific disease for vertical surveillance.

### Event-based surveillance

Event-based surveillance (EBS) is an organised collection, monitoring, assessment, and interpretation of mainly unstructured, ad-hoc information regarding health events or risks, which may represent an acute health risk. Such information could be reported by several sources which may be formal and informal. This process could also involve stakeholders from multiple sectors including human, animal, environment, as well as other sectors relevant to public health.

We define EBS as the organised 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. As part of EWAR, EBS receives health-related data from sources within and outside the various health sectors, providing a sensitive and flexible mechanism to trigger an immediate investigation and control efforts. The types of EBS include hotline, media scanning, facility, and community EBS, which are defined and described in the subsequent sections of this training manual.

### Early Warning and Response

EWAR is the organised mechanism to detect any abnormal occurrence or any divergence from the usual or normally observed frequency of phenomena as early as possible from both structured and unstructured data. This includes the processes of data collection, verification, risk analysis and communication between the relevant sectors for appropriate response. In places where health services are not well established; where the use of formal services is limited; and for rare conditions or health-related events, indicator-based surveillance would not efficiently detect all health risks early enough to trigger a timely response. The principle of EWAR is to have in place a surveillance system capable of detecting and reporting all acute public health risks early enough from all available sources to trigger a timely response.

Data collected through EWAR must aim to inform and trigger health responses to acute health events of all origins —human, animal, environmental, radiological, and chemical, food poisoning, or natural calamity. EWAR relies on two main channels of information: IBS and EBS which together contribute to epidemic intelligence.

## Epidemic Intelligence

Data from EBS should be a component of epidemic intelligence (EI). Epidemic intelligence is the systematic collection, analysis, and communication of any information to detect, verify, assess, and investigate events and health risks with an early warning objective. EI spans beyond diseases and pathogens as it is inclusive of all events (e.g., radionuclide, environmental, etc.) that could pose a threat to health. EI should integrate both sources of information (IBS and EBS) to efficiently detect acute health events and/or risks. Ideally, a centralised EI unit (which oftentimes can be a surveillance unit) at the national level should be available to collect, collate, and analyse information collected through each type of EBS, or from the designated reporting modalities. Such an EI unit should be able to routinely receive, analyse, and visualise data from both IBS and EBS sources. Where available, an Emergency Operation Centres (EOC) can act as EI hubs by receiving, analysing, and visualising multiple data streams, including EBS, IBS surveillance data.

EI hubs should be staffed with a trained workforce capable of analysing and interpreting data in real time to inform decision-making and response. Such EOCs can be embedded within a Ministry of Health epidemiology, surveillance, or equivalent department, rather than existing as a standalone space, and can operate continuously for routine health surveillance. EOCs should be inclusive of focal points (FPs) from other relevant sectors, especially if a multisectoral, One Health approach to event monitoring and response is of interest. The relationship between EWAR, EI, IBS and EBS is illustrated in figure 1.

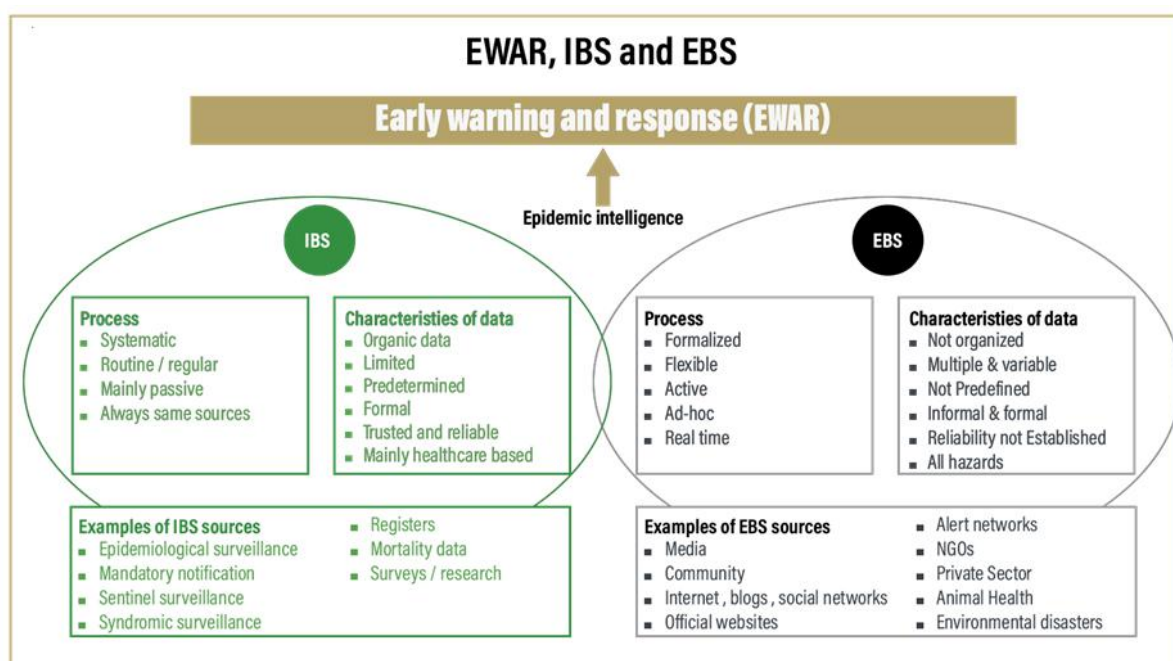


Figure 1: The relationship between early warning and response (EWAR), epidemic intelligence (EI), event-based surveillance (EBS), and indicator-based surveillance (IBS). Image adapted from [https://apps.who.int/iris/bitstream/handle/10665/112667/WHO\\_HSE\\_GCR\\_LYO\\_2014.4\\_eng.pdf](https://apps.who.int/iris/bitstream/handle/10665/112667/WHO_HSE_GCR_LYO_2014.4_eng.pdf)



## MODULE 2: Steps and process of EBS

This module correlates with Chapter 1 of the EBS framework and is aimed at providing learners with an in-depth explanation of the steps of EBS.

The time allocated for this module is 45 minutes and at the end of this session the facilitator is expected to allow for 15 minutes of questions and answers.

The methodology for instruction is PowerPoint presentation and interactive discussions.

**Resources needed:** Training room, Laptop, flipcharts, markers, and projector

### Objectives of the module:

- To describe the steps of EBS.
- To describe the process of risk assessment.
- To interpret the risk assessment algorithm and categorise overall risk of events.

### Steps of EBS

EBS can be broken down into five main steps: detection, triage, verification, risk assessment, and alert for action and response. It is important to note that although the final reporting is made after risk assessment, each step of EBS constitutes a brief report.



### Step 1: Detection

Detection is the process of capturing information through various modalities (e.g., in the community, via media reports, etc.) on potential health events through the process of EBS. EBS practitioners use a list of predefined signals to help identify potential health events. A **signal** is data and/or other information considered by the EWAR system to represent a potential acute health risk, such as an outbreak. Signals may consist of reports of cases or deaths (individual or aggregated), potential exposure of human beings to biological, chemical, or radiological and nuclear hazards, or occurrence of natural or man-made disasters. Signals can be detected through any potential source (health or non-health, informal or official) including the media. Example signals listed by sector and EBS type are in Annex 8.

As part of detection, key information needs to be collected and recorded, or logged, for immediate reporting to the next level. The person responsible for handling the initial contact should collect the following information about the occurrence using a reporting form (See Annexes 1-4):

- Unique identifier (e.g., person's name/animal ID)
- Geographical area (e.g., village, district) name
- Date of reporting and source information/contact details of reporter

- Date and time when event occurred
- Description of event
- Any actions taken

Signals can be detected through official and unofficial sources.

#### **Official sources**

Signals detected through official sources are reliable and do not need further verification.

##### **The following are examples of official sources:**

- Websites of governmental sectors including, but not limited to, Ministries of Health, Agriculture, Environment, and Foreign Affairs
- Official pages/accounts on social media for governmental and official organisations: most organisations have official accounts on social media which can be considered a reliable source of information

#### **Unofficial sources**

Signals detected through unofficial sources are not reliable and need to be verified, though they may be a good source for acute health events.

##### **The following are examples of unofficial sources:**

- Newspapers and news bulletins
- Online content of TV and radio channels
- Community leaders
- Social media

Social media platforms such as Facebook and Twitter are Internet-based applications that allow individuals to communicate in a network which boosts information sharing. Information from social media, which at first must be verified, may offer a direct channel to confirmed events. Unofficial websites for international organisations, which also function as aggregators of information, include ProMED, the Global Public Health Information Network (GPHIN), HealthMap, and MEDISYS, among others.

### **Step 2: Triage**

After detection, any EBS information identified needs to go through a process of triage in order to retain only the information deemed pertinent to early detection purposes, i.e., the *signals*.

**Questions to ask during the triage process include:**

1. Is the reported information relevant to early warning (i.e., could this signal be a genuine health threat?)
2. Was the signal previously reported (i.e., is the signal a duplicate?)

There may be instances where information for the same event is reported simultaneously from different sources or are reported repeatedly from the same source, which may represent the severity of the threat. Due to its high sensitivity, EBS is likely to generate information which may not be relevant for early warning. It is therefore important that health authorities detecting and/or receiving reports, triage the incoming information based on relevance. The established country priority event list should guide the decision of whether or not information could signify a genuine health threat. Because EBS operates as a sensitive surveillance system, authorities should continue to encourage the reporting of information even if they may be later discarded as “non-events.” Once information is triaged, it becomes a “signal”. Any signal that has the potential to be relevant to EWAR and is not a duplicate must then be **verified**.

**Step 3: Verification**

Verification is the determination that a signal is valid (i.e., it is not a false alarm or a false rumour). **As a general rule, signals should be verified within 24 hours of detection.** However, countries may decide whether this 24-hour window of verification is appropriate, or whether it should be shortened or extended according to the severity and priority of each defined signal, as well as existing surveillance capacities. Criteria for verification may include asking questions to those who have reported the signal to ensure that they have correctly understood the signal (e.g., information regarding person, place, and time). **All signals detected must be verified to become an event** (Figure 2); however, signals from official sources (e.g., sources of information approved to provide information to the public on behalf of the state or a governmental institution like Ministry of Health websites, the WHO website, the AU twitter handle, etc.) do not have to go through the verification step as they are already considered verified and thus “events”.



*Figure 2. This model can be used to determine the outcome of signal verification once sufficient information has been collected and validated.*

Verification of a signal should be done at the lowest possible administrative level, following the existing surveillance system structure in the country, usually at the local level nearest to the location of the signal. Verification will vary depending on the source and the event, but could include:

- Contacting local health authorities;
- Contacting the original source;
- Cross-referencing information with other sources;
- Visiting the site of occurrence to establish the authenticity of the information; or
- Consulting the internet to determine if official information is available.

Prior to EBS implementation, official FPs should be assigned as contacts to help with the verification process. A list of official FPs should be prepared and should include experts in different sectors and subject matters to assist in the verification of signals according to the type (e.g., human, animal, environmental) and location of the event. It is recommended to assign EBS FP(s) at the intermediate and local levels to handle receipt and verification of signals, and to communicate and share information with other stakeholders in other relevant sectors for events involving things like zoonotic diseases or environmental hazards. The list below includes examples of official points of contact for event verification and characterization. Other stakeholders within additional sectors at all levels can be included to foster a One Health approach. Though this list may overlap with typical EBS information sources, these sources are useful for collecting additional information to corroborate an event:

- Ministry of Health, Agriculture, Environment or other relevant ministries, and the healthcare system
- Epidemiology units
- Laboratory units
- Intermediate and local-level health facilities, particularly those conducting facility event-based surveillance (FEBS)
- Communities conducting community event-based surveillance (CEBS)

### **Request for Verification**

Requests for signal verification to the EBS FP(s) or health authority responsible for verification can be done in different ways, such as by landline phone, mobile phone, email, wireless device, SMS, fax, or a cross-platform messaging service such as WhatsApp. A country may choose to implement any tool but should consider available resources needed to use these tools. For example, the use of email requires a reliable internet connection. Tools used for reporting must allow for prompt notification to ensure that verification and response to health events are not delayed. Electronic reporting through a web-based application may be a good alternative to manual methods, depending on existing resources and capacities of the existing surveillance system. Electronic systems can support registration, reporting, verification, response, and analysis. It can guarantee immediate, parallel reporting to all relevant levels that have access to the system and may also generate automated reports.

Systematic verification of all signals detected through EBS is essential in order not to overburden the surveillance or health systems with false signal investigations or responses, or with unreliable information. **It is important to note that, during the process of verification, the responsible authority could perform a second level of triage by verifying again if the reported signal is relevant to EWAR.** Once a signal is verified to be true and becomes an *event*, this information

should be updated in the logbook, or register. At this point individuals at the local level should promptly start collecting further information in the field in accordance with existing guidance to inform a risk assessment. These may include taking photos or laboratory samples, conducting physical examinations, and recommending laboratory testing.

#### **Step 4: Risk Assessment**

Risk Assessment is a systematic process for gathering, assessing, and documenting information to assign a risk level to a health event. Risk assessment is conducted after the validation of a signal as an event. **A risk assessment should be conducted within the first 24 hours of signal verification (within 48 hours of signal detection) and should be repeated as new information becomes available** until the end of the response to an event. As new information about the situation can arise at any time, the ongoing risk assessment ensures that the appropriate response is triggered, and that it reflects the level of risk the event poses to health. Resources must be set aside to train staff in risk assessment. It is conducted by the lowest administrative level with capacity, typically the intermediate and/or national levels, after receiving the report of an event. The Africa CDC human (Figure 4 and Annex 6) and animal health (Annex 7) risk algorithm can be adapted for this purpose. Additionally [ECDC](#) and [WHO](#) have also developed rapid risk assessment tools that can be referenced as well.

##### **Key steps for conducting rapid risk assessment are:**

1. The EBS FP at the intermediate level (e.g., District medical officer) convenes a multi-disciplinary team.
2. The team then conducts rapid risk assessment, based on pre-defined risk questions, by considering Hazard, Exposure and Context.

#### **Hazard Assessment**

This refers to the identification of the characteristics of a health hazard and the associated health threat. Hazards include biological, chemical, radiological, physical, and nuclear events. The assessment process includes:

**Use available clinical and epidemiological features for laboratory confirmed agents, when available. In all other cases, start with listing possible causes based on:**

- a) The initial description of the event.
- b) Known burden of diseases in the affected community; and
- c) Type and distribution of existing hazards (e.g., the number and location of chemical plants and the chemicals they use).

##### **Possible questions to ask:**

- a) Is this threat unusual or unexpected?
- b) Is this event new in the country?



- c) Is this occurring in an unusual or unexpected setting, mode of transmission, and/or population group?
- d) Are there novel clinical manifestations that result in severe illness, disability, and/or death?
- e) Is the threat likely to cause severe disease in this population/group?

Considering the pathogen, exposed population, and availability of treatment where the event is occurring, will more than 20% of people infected develop severe illness, severe disability, and/or die?

### **Exposure Assessment**

This refers to the evaluation of the exposure of individuals and populations to likely hazards. The key output of the assessment is an estimate of the: (a) number of people or groups known or likely to have been exposed, and (b) number of exposed people or groups who are likely to be susceptible (not immune).

#### **Information required to evaluate exposure includes:**

- a) Mode of transmission/exposure (e.g., direct contact, droplet, sexual, occupational).
- b) Incubation period (known or suspected).
- c) Estimation of the potential for transmission (e.g., R0 basic reproduction number); Immune status of the exposed population.
- d) Disease burden in and distribution of vector or animal hosts/reservoirs for vector-borne and zoonotic diseases.
- e) Dose (e.g., amount ingested/absorbed/inhaled) and duration of exposure

#### **Possible questions to ask:**

- a) What is the probability of spread beyond the location of occurrence?
- b) Is exposure geographically widespread or limited to specific sub-groups (e.g., immunodeficient, comorbidities, socially/economically vulnerable, location)?
- c) Does infection/exposure occur from a low dose?
- d) Is this readily transmitted person-to-person (e.g., by airborne)?
- e) If an animal event, is there a potential for the pathogen to spread from animals to humans?
- f) Are treatment or prevention measures available for animals or people?
- g) Does the event/pathogen cause severe morbidity or mortality in humans?
- h) Does the agent have the potential for person-to-person transmission?

### **Context Assessment**

This refers to the evaluation of the environment in which the event is taking place. This may include: (a) The physical environment such as climate, vegetation, land use (e.g., farming, industry) and water systems/sources (b) Health of the population (e.g., nutritional status, disease burden and previous outbreaks), (c) Infrastructure (e.g., transport links, healthcare, public health

infrastructure), (d) Cultural practices and beliefs and/or (e) Political environment (civil wars, terrorist attacks)

**Context assessment should consider all factors that can affect the risk level of the event including social, ethical, technical, scientific, economic, environmental, and political. For example:**

- a) For measles, outbreak spread depends upon factors like the current immunisation coverage in the population, the capacity to quickly organise mass vaccination campaigns if coverage is low, general hygiene and access to health care, the MS surveillance capacity to rapidly detect and isolate cases, and population movement and behaviour.
- b) For water contamination events by chemical agent, the risk of human intoxication will depend on factors like local water use practices, seasonality (cold or hot, rainy, or dry), the flow of the water source, capacity to quickly broadcast risk and prevention messages to the public, and public acceptability of control measures.

**Possible questions to ask:**

- a) Are effective treatments and control measures available in the Member State?
- b) Even if treatment and control measures exist somewhere in the world, answer “no” if they are not immediately and widely available in the specific setting where the event is occurring.
- c) Is there an ongoing socio-political crisis that could hinder mobilisation of resources or possible interventions?
- d) Are the affected areas accessible to responders? (Free of hostility)

### **Risk characterization**

Once the EBS unit has carried out the hazard, exposure, and context assessments, a level of risk should be assigned. This process is called risk characterization. For some units, risk characterization results in mathematical output from a quantitative model or comparison with an external standard value. But an equally acceptable process may result in a risk characterization based on the expert opinion of the EBS unit, with input from SMEs. Several tools have been developed to assist with the risk assessment and characterization process (e.g. WHO [manual for the rapid risk assessment of acute health events](#)<sup>1</sup>, [ECDC Operational tool on rapid risk assessment](#)<sup>2</sup>, Tripartite [Joint Risk Assessment Operational Tool](#)<sup>3</sup>). Below we list two generic tools, a risk matrix and risk algorithm, that have been adapted from WHO and Africa CDC methodology, respectively. Countries are encouraged to explore and adapt the methodologies that fit best for them.

This **risk matrix** combines estimates of the likelihood of event spread with estimates of the event consequences. As the majority of acute health event risk assessments are qualitative, the categories used in the matrix are not based on numerical values but on broad descriptive definitions of

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<sup>1</sup> [WHO: Rapid risk assessment of acute public health events](#)

<sup>2</sup> [Operational tool on rapid risk assessment methodology - ECDC 2019](#)

<sup>3</sup> [Tripartite: Joint Risk Assessment tool](#)

likelihood and consequences (see Figure 3 and Tables 1-2). When applying the matrix, the definitions of likelihood and consequence can be refined to fit with the national or intermediate-level context in each country.

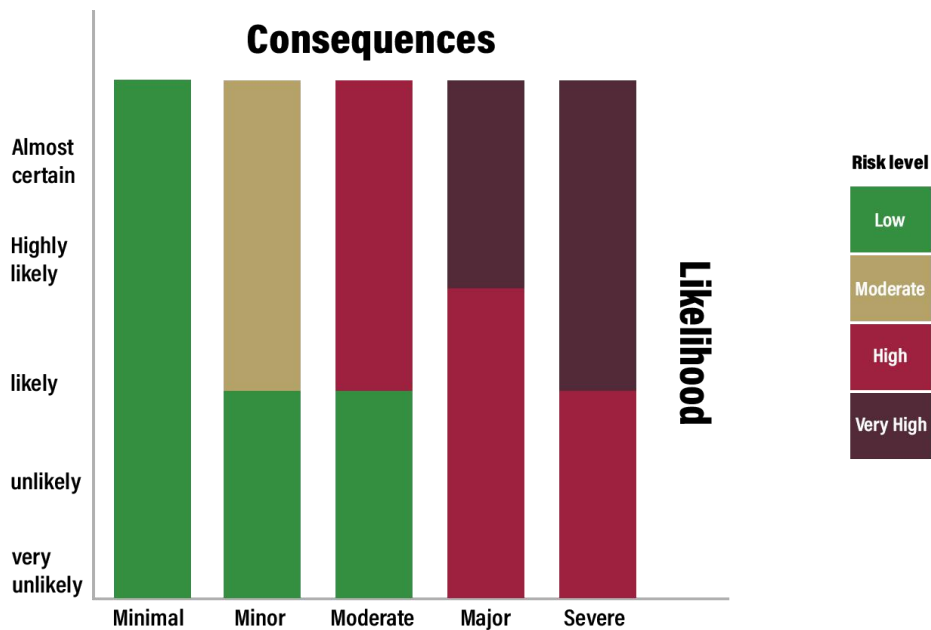


Figure 3. Risk characterization matrix

Table 1. Estimates of likelihood

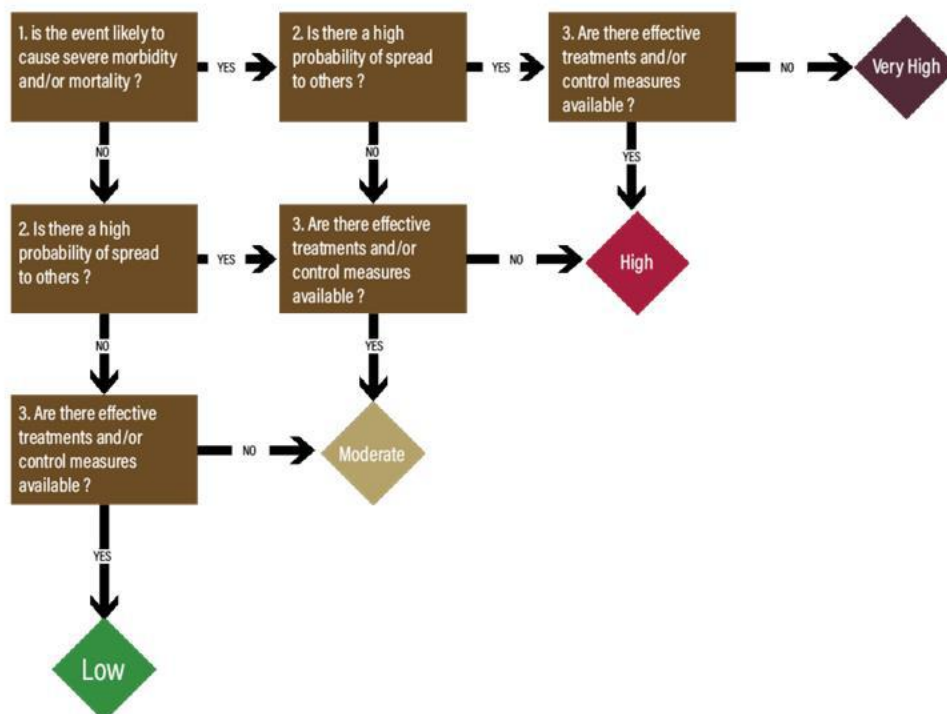
Level	Definition
Almost certain	Is expected to occur in most circumstances (e.g., probability of 95% or more)
Highly likely	Will probably occur in most circumstances (e.g., a probability of between 70%-94%)
Likely	Will occur some of the time (e.g., a probability of between 30% and 69%)
Unlikely	Could occur some of the time (e.g., a probability of between 5% and 29%)
Very unlikely	Could occur under exceptional circumstances (e.g., a probability of less than 5%)

Table 2. Estimates of consequences

Level	Definition
Minimal	<ul style="list-style-type: none"> <li>- Limited impact on the affected population</li> <li>- Little disruption to normal activities and services</li> <li>- Routine responses are adequate and there is no need to implement additional control measures</li> <li>- Few extra costs for authorities and stakeholders</li> </ul>
Minor	<ul style="list-style-type: none"> <li>- Minor impact for a small population or at-risk group</li> <li>- Limited disruption to normal activities and services</li> <li>- A small number of additional control measures will be needed that require minimal resources</li> <li>- Some increase in costs for authorities and stakeholders</li> </ul>

<b>Moderate</b>	<ul style="list-style-type: none"> <li>- Moderate impact as a large population or at-risk group is affected</li> <li>- Moderate disruption to normal activities and services</li> <li>- Some additional control measures will be needed and some of these require moderate resources to implement</li> <li>- Moderate increase in costs for authorities and stakeholders</li> </ul>
<b>Major</b>	<ul style="list-style-type: none"> <li>- Major impact for a small population or at-risk group</li> <li>- Major disruption to normal activities and services</li> <li>- A large number of additional control measures will be needed and some of these require significant resources to implement</li> <li>- Significant increase in costs for authorities and stakeholders</li> </ul>
<b>Severe</b>	<ul style="list-style-type: none"> <li>- Severe impact for a large population or at-risk group</li> <li>- Severe disruption to normal activities and services</li> <li>- A large number of additional control measures will be needed and most of these require significant resources to implement</li> <li>- Serious increase in costs for authorities and stakeholders</li> </ul>

This **risk algorithm** is a series of questions that reflect upon the hazard, exposure, and context assessments and allow for a risk determination to be made based upon the responses to these questions.



**NOTE :** if there are specific groups at increased risk of infection, consider performing separate risk assessment for each group. If in doubt for any questions, select higher risk answer.

**Figure 4. Risk Assessment Algorithm**

The risk assessment team should decide how frequently the risk assessment should be updated. Usually, if there is an observed change that entails escalation, or de-escalation, of interventions, the risk assessment should be reviewed and updated.

### **Step 5: Alert**

Regardless of the source, once an event has been verified and the risk assessed, the responsible authorities should be alerted to respond to the event accordingly. This involves the immediate communication or notification of the event to the authorities designated for response and further action. The type of action taken will be dependent on the level assigned from the rapid risk assessment (Table 3).



Table 3. Risk levels and recommended actions

Level	Recommended actions
Low risk	Managed according to standard response protocols, routine control programs and regulation (e.g., monitoring through routine surveillance systems)
Moderate risk	Roles and responsibility for the response must be specified. Specific monitoring or control measures required (e.g., enhanced surveillance, additional vaccination campaigns)
High risk	Senior management attention needed: there may be a need to establish command and control structures; a range of additional control measures will be required some of which may have significant consequences
Very high risk	Immediate response required even if the event is reported out of normal working hours. Immediate senior management attention needed (e.g., the command and control structure should be established within hours); the implementation of control measures with serious consequences is highly likely

Table 4: Example of risk assessment levels, notification types, and actions to be taken

Risk Assessment	Notification Type and Whom to Notify	Action
Low	Nation/Intermediate level to list on an Event Management System (EMS), or equivalent, tracker. No additional dissemination or notification is needed	Continue to monitor; repeat risk assessment if situation changes
Moderate	Nation/Intermediate level to list on an EMS, or equivalent, tracker. Standard alert issued, distribute situation report to relevant levels	Discuss with affected level about needs
High	Nation/Intermediate level to list on an EMS, or equivalent, tracker. Urgent alert issued, expanded distribution may be needed to relevant levels, sectors, and partners.	Immediate deployment at level effected; consider national-level deployment (as requested) in consultation with affected locations
Very high	Nation/Intermediate level to list on an EMS, or equivalent, tracker. Emergency alert, expanded distribution issued to relevant levels, sectors, and partners including the general public	Immediate deployment and use of country logistics to affected locations

The most critical component of early warning and response systems is the response element. This has been widely covered in IDSR manuals (<https://apps.who.int/iris/handle/10665/112667>) and other WHO documents and will not be addressed in this document.

## Module 3: Considerations for EBS Implementation

When a National Public Health Institute (NPHI), or equivalent health authority responsible for surveillance initiates EBS implementation, careful consideration should be given to multisectoral and cross-border collaboration as well as the requirements needed to initiate and sustain EBS. This module correlates with Chapter 2 of the EBS framework and is aimed at providing learners with an overview of the considerations that should be made when implementing EBS in the country.

The time allocated for this module is 1.5 hours, which includes 20-30 minutes for presentation, 10 minutes for questions and answers and at least 1 hour to enact one of the two case studies listed at the end of the module.

The methodology for instruction is PowerPoint presentation, interactive discussions, and case study.

**Equipment needed:** The facilitator will require a laptop, LCD projector, screen, and a pointer; PowerPoint presentations; one copy of the EBS training module facilitator guide; flip charts, and marker pens. The participants will each require a copy of the EBS training module participant manual, and associated case study materials.

### Objectives:

- Awareness of the considerations that should be given thought to when establishing an EBS system, including placement, information flow, and resources;
- Ability to describe the benefits of multisectoral, One Health and cross-border collaboration in EBS;
- Ability to demonstrate how to develop a signal list;
- Understanding of all the workforce related considerations including training, mentorship, and supportive supervision;
- Understanding of how to adapt and use EBS during different phases of an epidemic or pandemic.

### Considerations for EBS Placement and Resources

When initiating the implementation of EBS, countries must consider the appropriate unit or department where this function will sit. Ideally, a centralised EI unit (which oftentimes can be a surveillance unit) should be identified or created at the national level to monitor, collect, analyse, and act upon information collected through each type of EBS. Where available, Emergency Operation Centres (EOCs) can act as an EI unit or hub that receives, analyses, and visualises data from multiple sources, including EBS and IBS surveillance data. EI units should be staffed with a trained workforce capable of analysing and interpreting data in real time to inform effective decision making. EI (or EBS) units can also be housed within an NPHI, or equivalent health authority embedded within an epidemiology, surveillance, or equivalent department, rather than existing as a standalone programme. EI units should include focal points (FPs) from all relevant

sectors performing surveillance, especially if a multisectoral, One Health approach to event monitoring and response is of interest.

Where possible, EBS as an integral component of routine surveillance activities, should use existing resources and infrastructure set aside for routine surveillance. One of the resource requirements for EBS implementation is the availability of a training manual and training curricula which should be developed to facilitate training of lower administrative levels. Additional resources may be allocated to ensure that regular refresher training takes place.

Another set of resources required for the implementation of EBS is data collection/recording tools. Events reported to health authorities can be recorded using existing surveillance data collection tools where available, to ensure that data collected through EBS is integrated into existing data platforms. For the purpose of this document, it is recommended that countries use available tools where applicable, like the IDSR District Log of Suspected Outbreaks and Rumours (see adapted version in Annex 4) to collect data on signals and events. Supervisory or monitoring tools available for similar routine surveillance functions can also be utilised to monitor EBS functions at intermediate and local levels.

Resources may also be allocated to establish a reporting tool to enable the rapid transmission of information from communities, facilities, and other sources to designated health authorities at the intermediate level. These reporting tools may be electronic or/and paper-based but should be clearly defined among all administrative levels so as to ensure consistent EBS reporting and feedback.

#### **Resources for EBS implementation include:**

- EBS training manual
- EBS training curriculum/guidelines and associated resources to carry out training and refresher trainings at lower administrative levels
- Data collection tool for signals and events collection
- Monitoring/supervision tools
- Reporting tool to ensure immediate reporting from lower levels
- Communication and reporting tools such as cell phones, computers, laptops, tablets, an electronic platform
- Fuel for vehicles to conduct verification and/or field investigation

### **Multisectoral, One Health and Cross-border Collaboration**

Of the seven public health emergencies of international concern (PHEICs) that were declared between 2005 and 2022, six are concerning zoonotic diseases, or diseases that can be transmitted between animals and humans. Given that many emerging and re-emerging diseases in humans are zoonotic or of animal origin, there is increasing awareness that early warning and response measures need to be initiated further upstream. Looking at events impacting the environment or animal populations can not only help detect and prevent disease spill over events into the human population but can also improve EWAR for priority events that solely impact the environment, and animals.

Several global and continental One Health initiatives have been established to support and strengthen the integration of the One Health approach in Member States. To help strengthen governments and organisations with mainstreaming multisectoral, One Health policies at global, regional, and country levels, the Food and Agriculture Organization of the United Nations (FAO), World Organisation for Animal Health (WOAH), United Nations Environment Programme (UNEP) and WHO, referred to as the “Quadripartite”, have established a One Health High-Level Expert Panel (OHHLEP). Further, to advance the One Health in mitigating health threats on the African continent, the African Union established a One Health Coordination Group on Zoonotic Diseases.

In alignment with these global and continental agencies, when planning for EBS implementation, public health authorities should consider establishing an EBS technical working group to foster collaboration with other programs, sectors, or entities using a multisectoral, One Health approach. This should be strengthened by establishing formal data sharing linkages through the establishment of Multisectoral, One Health Coordination Mechanisms (MCMs) and data sharing policies. Sectors can include those ministries that are responsible for health (e.g., animal, environment, border) as well as go beyond to include other sectors that focus on disaster management, education, finance, transportation, community engagement, social welfare, and others. The multisectoral EBS technical working group is strategically placed to establish a priority list of signals and mobilise resources for capacity building across all sectors. Pathways for collaboration, coordination and communication need to be prioritised, because they can be very useful in detecting and reporting signals both within and across sectors. For example, signals related to the death of animals at the community level could reflect a potential zoonotic disease or environmental contaminant that could impact both human and animal health. Thus, community health workers (CHWs) and community animal health workers (CAHWs) should both be trained to detect and report these signals. Cross-communication between the human, animal, plant, and environment sectors ensures that these signals are ultimately reported through EBS. Similarly, collaboration with the Ministry of Education may ensure that school-related illnesses are reported to health authorities.

### **Cross-border Considerations**

In addition to establishing multisectoral, One Health collaborations within a country, it is important to also see where the same linkages can be made across country and regional borders. The cross-border ecosystem remains particularly vulnerable and at risk to health threats due to a variety of factors including the intensified movements and interactions that can happen between humans, animals, and commodities on both sides of the border. These are further complicated by variations in surveillance structures and national guidelines. The cross-border ecosystem represents a territorial entity made up of several local or regional authorities that are co-located but belonging to different nation states. The EBS process in this setting involves establishing a permanent and systematic communication mechanism for effective information exchange regarding events taking place near country and regional borders. This can be organised through a network of NPHIs or other institutions with a surveillance mandate through bilateral agreements or under the umbrella of the African Union or a regional economic community. Cross-border EBS can be established at the national-level through media scanning and hotlines or at the community level within the “grey” zones where both countries co-exist and interact in trade, farming, education, etc.

Collaboration may take many forms when implementing EBS, some of which are outlined in Table 5.



**Table 5. Examples of EBS collaboration partners within the Ministry of Health, across sectors, and with other entities.**

<p><b>Collaboration between programs within Ministry of Health</b></p> <ul style="list-style-type: none"> <li>- Emergency response programs</li> <li>- Disease surveillance and control programs (e.g., communicable, endemic, etc.)</li> <li>- Expanded Program on Immunization</li> <li>- Environmental health program/department</li> <li>- Food safety (INFOSAN) and AMR</li> <li>- Infection prevention and control</li> <li>- Central laboratories</li> <li>- Programs that utilise CHWs (e.g., maternal and child health, disease specific initiatives) and promoted health education initiatives</li> </ul>	<p><b>Collaboration across multisectoral, One Health partners</b></p> <ul style="list-style-type: none"> <li>- Ministry of Agriculture, Livestock, and Fisheries (or similar agency)</li> <li>- Ministry of Environment (or similar agency)</li> <li>- Ministry of Wildlife (or similar agency)</li> <li>- Ministry of Education</li> <li>- Ministry of Labour</li> <li>- Ministry of Defence</li> <li>- Ministry of Tourism</li> <li>- Other relevant government agencies (e.g., commerce, foreign affairs, social affairs, interior, natural resources)</li> </ul>
<p><b>Collaboration with other entities</b></p> <ul style="list-style-type: none"> <li>- Implementing partners, donor organisations, multilateral organisations</li> <li>- Non-governmental organisations</li> <li>- Factories and workers' unions</li> <li>- Private medical practices including veterinarians and pharmacies</li> <li>- Civil Society Organisations</li> <li>- Immigration services</li> <li>- Other relevant private sector entities (e.g., professional organizations)</li> </ul>	

## Priority Events and Signal List Development

The process of prioritising what signals and events should be detected and reported is complex and requires input not only from human health-related sectors but also animal (e.g., wildlife, livestock, and other domestic animals), agriculture, environment, and border health/quarantine government sectors among others. It is recommended to create a technical working group made up of representatives from different relevant sectors that can contribute to EBS. This multisectoral technical working group should define a list of priority events to inform EBS implementation and may wish to refer to several disease prioritisation tools (e.g., WHO Setting priorities in communicable disease surveillance<sup>1</sup>, ECDC tool for the prioritisation of infectious disease threats<sup>2</sup>

<sup>1</sup>[https://apps.who.int/iris/bitstream/handle/10665/69332/WHO\\_CDS\\_EPR\\_LYO\\_2006\\_3\\_eng.pdf?sequence=1&isAllowed=y](https://apps.who.int/iris/bitstream/handle/10665/69332/WHO_CDS_EPR_LYO_2006_3_eng.pdf?sequence=1&isAllowed=y)

<sup>2</sup>[https://www.ecdc.europa.eu/sites/default/files/documents/Tool-for-disease-priority-ranking\\_handbook-update-dec-18.pdf](https://www.ecdc.europa.eu/sites/default/files/documents/Tool-for-disease-priority-ranking_handbook-update-dec-18.pdf)



, WOAH's Phylum tool<sup>1</sup>, US CDC One Health Zoonotic Disease Prioritization Process<sup>2</sup>, etc.) that can be adapted to help with this process.

Once a priority list of events has been developed for EBS, signals that would allow for the early detection of these events should be drafted. The WHO defines signals as data and/or information representing potential acute risk to human health, such as an outbreak or occurrence of natural or man-made disasters. Signals recognize patterns and other occurrences, such as clusters of illness, animal deaths, and ill persons presenting with symptoms or signs not usually seen (e.g., treatment failure on standard drug regimen). Signals should be broad, aiming for high sensitivity, and should be framed in a manner that allows for the capture of emerging threats and all hazards. Signals are not meant to be standard case definitions for specific diseases or conditions. In general, to ensure sustainability, the list of signals should be limited in number so as not to burden stakeholders and the entire surveillance and health system. It is also important to note that the process of event and signal selection should be dynamic, readily amenable for additions or deletions as the need arises. It is suggested that a routine review of signals and their definitions be conducted in order to assess their performance and suggest modifications. For communities, signals should be simple and should take into consideration both local language and cultural contexts. It may be worthwhile to field test the signals before full-scale implementation of EBS.

Note: Where EBS incorporates a One Health approach, sector or population specific signals should be developed to capture events that affect different groups (e.g., humans, animals, plants, environment) or are detected by different sectors.

A short list of example signal definitions is listed below; however, we encourage readers to review the more detailed list of signal definitions by sector and facility type listed in Annex 5.

Examples EBS signal definitions:

- Cluster of deaths in a healthcare facility, village/community, farm, wildlife or domestic animal population, construction site, mine, school, prisons, orphanage
- Cluster of disease of unknown aetiology in a healthcare facility, village/community, farm, wildlife or domestic animal population, construction site, mine, school, prison, orphanage, or other institution over a defined period (e.g., two weeks)
- Any unusual event or occurrence in the community which may affect human, animal, plant, and environment health
- Any health-related event that raises concern, fear, and alarm in the community.
- Any event /occurrence which may have a known, suspected, or possible impact on health

## Information Flow

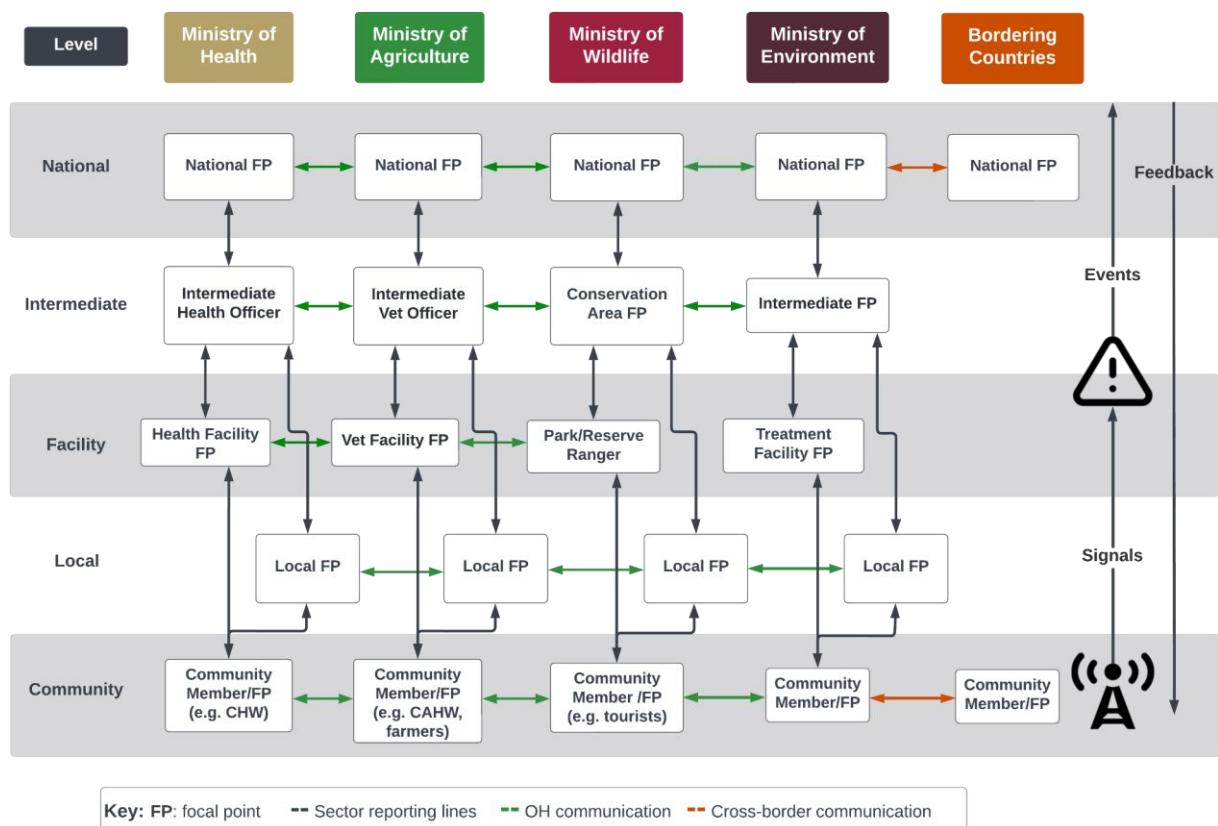
A country can choose to implement all types of EBS covered in this document or choose to incrementally implement EBS, for example initially focusing on media scanning or community event-based surveillance (CEBS), and subsequently adding other types of EBS later. Whatever direction the stakeholders take to implement EBS, it is imperative to ensure there are efficient coordination mechanisms (e.g., MCM, data sharing policy) in place, both between levels of

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<sup>1</sup>[https://www.woah.org/fileadmin/Home/eng/Support\\_to\\_OIE\\_Members/docs/ppt/OIE\\_study\\_priori-catego\\_mission\\_report.pdf](https://www.woah.org/fileadmin/Home/eng/Support_to_OIE_Members/docs/ppt/OIE_study_priori-catego_mission_report.pdf)

<sup>2</sup> <https://www.cdc.gov/onehealth/pdfs/prioritization-fact-sheet-H.pdf>

government and across relevant collaborating sectors, to support the integration, flow, and use of data at all levels. The information flow for EBS reporting and feedback should also align with and leverage on existing surveillance reporting structures. Figure 5 illustrates how information can flow within and across sectors or bordering countries. Most typically signals that are detected at the community level by CHWs, CAHWs, key informants, or other community members are reported immediately to a community level supervisor or “local EBS FP”. Signals or events that are detected at a facility level are reported to the intermediate-level FP. Signals detected in small health facilities may also be reported to the local level. The local-level EBS FP triages and verifies signals, and reports events up to the intermediate level. In the absence of the local level, surveillance officers at small facilities and community health worker supervisors report signals up to the intermediate level or could also be trained to verify facility and community level signals, respectively.



**Figure 5. Flowchart for EBS implementation, indicating the flow of data collected through various EBS sources as well as the feedback loop.**

Signals reported by community members through a hotline may initially be received at the national level but should be referred to the local or intermediate level for triage and verification. All events received at the intermediate level require an assessment of risk and may require consultation with higher administrative levels depending on the magnitude of the event. Once the event has undergone a risk assessment and characterization, an alert should be issued to the responsible authorities that need to undergo any response related activities.

Timely and routine feedback should be provided in a similar fashion. Higher administrative levels should provide feedback to intermediate-level health authorities on reported events. Intermediate-

level authorities should provide feedback about events and signals to reporters at the local level and large health facilities, respectively. Feedback on reported signals should be given to smaller health facilities and stakeholders at the community level by local-level authorities.

The success of EBS implementation is contingent on the early detection and reporting of signals and events through a country's surveillance and reporting structure. Timely and routine feedback can help to encourage reports and maintain consistent EBS implementation.

**Note:** While each country may classify the intermediate level differently (e.g., region, district, county, etc.), this term refers to the level of a country's surveillance system that is responsible for conducting preliminary investigations and implementing responses to reported health events or suspected outbreaks in a given jurisdiction. In some countries, and in the Integrated Disease Surveillance and Response (IDSR) system, the intermediate level may be the district-level unit and seen as the unit of implementation of public health services. For the purpose of this framework, the term intermediate level will be used to denote this level of the surveillance system. Because of their close proximity to communities and health facilities, health authorities at the intermediate level can be engaged and trained to ensure that events reported to them are accurately assessed for risk. The integration of EBS data into existing national surveillance platforms may also occur at this level.

## **Workforce Considerations**

### **Mapping of the EBS workforce**

The implementation of EBS should identify/map the existing workforce at the national, intermediate, health facility, local, and community levels. The roles and responsibilities and chains of command in EBS of these various actors across all levels should then be defined for clarity of communication flow and minimising duplication. The roles can be broadly categorised into primary and supportive roles. Primary roles are those actions which an actor is expected to lead while supportive roles are those which an actor does to assist others e.g., in gathering information. Both primary and supporting responsibilities are important for the successful implementation of EBS.

Event-based surveillance should be part of routine surveillance and response systems within a country. In addition to health authorities at the national level, those at the intermediate level who typically conduct routine surveillance activities should also be involved in carrying out EBS functions.

At the national level, the NPFI or other health agency responsible for the implementation of EBS must build the capacity of national staff in collaboration with relevant partners and stakeholders. Training should be cascaded from the national level to lower administrative levels and include training on conducting risk assessment and characterization. These health authorities should subsequently act as trainers for the workforce involved in EBS implementation at the local level, in both communities and facilities. Following the initial training, periodic refresher training or capacity building should be offered to all EBS staff on the functions of EBS that they should carry out. These refresher trainings can be combined with ongoing or routine monitoring visits conducted by intermediate-level health authorities. Continuous capacity building will ensure consistent implementation of EBS across all administrative levels.

## Training of the EBS workforce

Training involves equipping employees with the knowledge and skills required to undertake roles and responsibilities in EBS implementation. All the actors in EBS should be trained to have an in-depth knowledge of their tasks. The trainings in EBS are cascaded according to the levels where the national level staff are trained as trainers of trainers (TOTs) for the intermediate level who in turn are TOTs for the immediate lower level and this goes on until the community EBS staff are trained. This cascaded training not only allows the proper packaging of information relevant for each level as per their roles, but also sets stage for the subsequent supervision.

The area covered under the trainings include:

- EBS principles
- EBS advocacy to different stakeholders
- Supporting EBS implementation/operationalization
- Building a network of trained health workforce at country level to enhance peer-to-peer training and sharing of best practices and solutions to challenges
- Developing a sustainable and country owned EBS programme... Note: Training at the national level may take up to five days to complete as it will involve all modules. However, training on health facility EBS and community EBS for healthcare workers (HCWs) and community health workers (CHWs) is recommended to last a day each.

The facilitators identified by the Ministry responsible for health may be supported by officials from the sectors responsible for agriculture, animal, and environmental health. Ideally, a facilitator should obtain training relevant to EBS and be in apposition to provide mentorship during the EBS implementation process.

### TRAINING METHODOLOGY

Training methodologies are strategies for designing and implementing training activities. The EBS training methodologies can be on-job or off-job. In on-job training, employees learn on the job in the actual work environment while in off-job training, the employees are trained outside the actual work setting. The EBS training should adopt a blend of both methods to leverage their strengths while minimizing weaknesses. The initial building the capacities of EBS implementers at all levels (national, intermediate, facility, and Community) should be off job. Subsequent implementation support training should be on-job. The training methodologies can also be categorized based on the level of learner involvement, i.e., passive methods (lectures, reading, and audio-visual), participatory (discussions, demonstrations, and role plays), and practical (coaching, mentorship, and practising) methods. The retention is lowest for the passive methods and highest for the practical methods. In applicability, the passive methods are appropriate at the higher levels (policy) of service delivery while practical methods are best for the lower-level hands on participants.

## Off-job training methodologies

Includes lectures, discussions, demonstrations, role plays, simulations, etc.

1. **Lectures:** Presentations of topics will be introduced and delivered through a range of materials and aids including audio-visuals. Where possible, PowerPoint presentations will be provided. The presentations should be as interactive as possible to encourage sharing of experiences, knowledge, and best practices.
2. **Discussion:** After each presentation, plenary participatory discussions will be held to promote an exchange of information and knowledge. The facilitator will generate a discussion to achieve the desired outcome by:

- Explaining to participants the topic and reason for the discussion.
- Initiating the discussion and stimulating the participants to be actively involved in the process.
- Maintaining the focus of the discussion on the subject matter or relevant issues.
- Drawing on the relevant experience of the participants.
- Managing time and keeping the discussion on track and according to the plan.
- Encouraging effective participation of all participants.
- Listing the ideas coming out of the discussion on the flip chart or board for reference
- Encouraging the frank expression of ideas without fear of victimisation
- Encouraging mutually respectful discussions.

3. **Group work:** Some sessions such as case scenarios of the different EBS types, will be held as group discussions where participants will undertake an in-depth examination of particular issues and how they are viewed from each participant's perspective and experience. Group work will help in improving the analytical [7] skills of the trainees and bringing out new ideas. It encourages learning together and learning from each other.

The principal facilitator and supporting facilitators will serve as resource persons and keep an eye on the smooth working of the groups. After each group work session, representatives from the groups will present the outcomes from the discussions to the rest of the participants. Facilitators will then moderate a plenary discussion to help arrive at a consensus and learn from all groups and facilitators.

4. **Brainstorming:** The facilitator will use brainstorming for a specific idea and facilitate the exploration of innovative thoughts. They will stimulate the participants to bring out new ideas and will help to maintain their quality. All the ideas will be written on a board and then streamlined to generate an orderly summary.
5. **Case Studies:** To demonstrate the principles of how the national health personnel manage reported public health incidents that need urgent attention, case studies of such situations will be presented to generate diverse interpretations in groups, then be considered by the whole group to reach a collective conclusion. This helps learners to work as a team in real situations
6. **Reading Materials:** Participants will be provided with relevant extracts from the Africa CDC's Framework for Event-Based Surveillance, and any other materials that will be deemed necessary by the facilitators.

7. **Teach-back:** Teach-back is a methodology used in assessing the understanding of participants trained on EBS and their ability to effectively convey the subject matter to others by asking them to train other individuals in the presence of facilitators (evaluators of the process).
8. **Knowledge Level Checks:** Pre-training and post-training knowledge level checks will be administered to measure the knowledge gained over a specific training.
9. **Training space setup:** Space will be arranged to have movable tables and chairs arranged in a “U” shape facing the projection area. The furniture should be movable to accommodate break out group work. Space should be ample enough for the facilitators to move around to support the trainers.
10. **Supplies for off-job trainings:** Materials and supplies for the training should include among others:

- Name tags and holders
- Writing pens and notepads
- Copies of the [Africa CDC EBS Framework](#)
- Copies of Reporting and Feedback forms at all levels
- Flipcharts and markers
- Laptop computer and LCD projector to project slides (for facilitator)

In addition, arrangements for the provision of meals and soft drinks (e.g., bottled water, soda) should be made in advance.

### **On-job training methodologies**

In addition to building capacity through off-job training, it is critically important to provide follow up and continuous supportive on-job post- training mentorship and continuous supervision to individuals performing different functions of EBS at all levels of the health system. Includes mentorship, supportive supervision, apprenticeship, etc.

### **Mentorship**

To ensure a network of expertise is continually supporting EBS program staff, implementers should incorporate an element of mentorship. Mentorship is a sustained, reciprocal relationship between a person with significant experience in a field (the mentor) and a person with less experience (the mentee), with the purpose of developing the mentee’s professional and personal capabilities in that field. Mentors provide mentees with advice, support, and counsel, through coaching, teaching, and modelling behaviours needed for mentees to become established members of their professional domain.

Mentors require a deep understanding of the domain in which they operate, as well as the domain of mentorship itself. It is not enough to be an expert in the field. Knowledge of mentoring methods and when to apply them are essential for promoting the growth of the mentee. EBS mentors should have a strong background in epidemiology and surveillance, as well as previous training in, and a deep understanding of, all aspects of EBS. A network of mentors with an in-depth knowledge of EBS and how it is applied in their countries can provide ongoing peer-to-peer support and training of the health workforce. Networks of mentors and mentees can develop and



sustain the capacity of health workers to implement EBS within the country. Mentors should be trained on all aspects of EBS, how to be a mentor, and how to train health workers in EBS.

Mentorship is usually sustained over time and a mentor function as an experienced and trusted advisor to the mentee. The mentor's job is to listen, provide feedback, help their mentee explore the options available, provide them with the resources needed to support their decision-making process, and help them develop new capabilities.

An EBS mentor is a person with an in-depth knowledge of EBS and how it is applied in their jurisdiction to provide ongoing peer-to-peer support and training of the health workforce. Mentorship develops and sustains the capacity of health workers to implement EBS within areas under them. Mentors should be trained on all aspects of EBS, how to be a mentor, and how to train health workers in EBS. The surveillance FP or his/her nominee (to avoid work overload) can take up the responsibility of EBS mentorship. The mentor should have basic knowledge in surveillance, been trained on EBS, be passionate and motivated to support EBS implementation, available when needed, and have a good working relationship with the mentees.

Mentorship is undertaken by employees at the same level and implementation involves understanding the following considerations:

- What staff or positions will benefit most from mentorship? (e.g., staff such as EBS FPs at local or intermediate levels may be good candidates)
  - Being strategic about deployment of mentorship teams to the different levels of the health system
- What functions and responsibilities might be challenging to staff that are new to EBS, and where mentorship can support these responsibilities?
  - Orientation/training on the use of data/information for routine monitoring and supervision
  - Development and deployment of plans for on-site mentorship visits
  - Building or strengthening relationships between a mentor and mentee through mentorship sessions
- What organizations and professional networks might provide access to qualified mentors?
  - Selecting the appropriate mentors and orienting them on key responsibilities
- What is the ratio of potential mentors to those staff that might require mentorship? It is important that the demands on a mentor's time not be excessive.
- What career benefits might a mentor and mentee obtain through this approach?

### **Supportive supervision**

Supportive supervision is a process of continuously helping staff to improve their own work performance. It is carried out in a respectful and non-authoritarian way with a focus on using supervisory visits as an opportunity to improve knowledge and skills of health staff. Supportive supervision is helping to make things work, rather than checking, to see what is wrong.

#### **Supportive supervision can:**

- Increase staff capacity to collect, manage, and use data
- Help staff to improve their own work performance continuously
- Help to establish a collaborative working environment
- Facilitate an understanding of common goals
- Carry out in a respectful and non-authoritarian way with a focus on using supervisory visits as an opportunity to improve knowledge and skills of staff

- Encourage open, two-way communication, and team-building approaches that facilitate problem solving

<b>Comparison of two supervision approaches</b>	
<b>Non-Supportive Supervision</b>	<b>Supportive Supervision</b>
<ul style="list-style-type: none"> <li>- <b>Focus on finding faults with individuals</b></li> <li>- <b>Supervisor is like a policeman</b></li> <li>- <b>Episodic problem solving</b></li> <li>- <b>Little or no follow-up</b></li> <li>- <b>Punitive actions intended</b></li> </ul>	<ul style="list-style-type: none"> <li>- <b>Focus is on improving performance and building relationships</b></li> <li>- <b>More like a teacher, coach, or mentor</b></li> <li>- <b>Uses local data to monitor performance and solve problems</b></li> <li>- <b>Follows up regularly</b></li> <li>- <b>Only support is provided</b></li> </ul>

Approaches that should be adopted in supportive supervision to increase commitment and performance include:

- Undertaken across levels of service delivery, often, a higher level supporting a lower level
- Supervision should be facilitative, not fault-finding
- Always praise work well done before raising problems
- If you see a problem, check in the supervisee sees the same problem
- Analyse problems with the supervisee to gain a good understanding of the underlying causes
- Let the supervisee suggest possible solutions; this facilitates ownership and acceptance of the solutions

Routine supervision visits are integral to the effectiveness of EBS and should be conducted on a regular basis. Supervisory visits should be conducted by EBS FPs at each administrative level, with staff from higher levels visiting staff at lower ones. “Supportive supervision is helping to make things work, rather than checking to see what is wrong” is a constructive way to approach this supervisory role.

#### **Supervisory visits should:**

- Discuss challenges with EBS implementation (EBS staffing, training, availability of resources needed [equipment/training materials/forms], problems with filling forms and records, etc.)
- Identify challenges and solve problem together
- Provide technical assistance and provide hands-on refresher training as needed
- Praise for success stories and work well done
- Record observations and collect feedback to report up for process improvement

It is critical that each surveillance level (e.g., intermediate, local) includes supervision visits in their annual workplan and a common supervision calendar should be put in place and followed by all surveillance levels. During work planning, budgets should also reflect these supervisory visits. They can be included as part of other visits to reduce costs, but time must be dedicated to ensuring the checklists are covered completely. This should also be accounted for within the program M&E plan - documenting the proportion of planned supervisory visits that are conducted (with checklists and feedback reports by each level) throughout the year.

## Steps for Conducting Supervision Visits

### Before the visit:

- Following the supervision calendar, set up supervision visits and identify appropriate supervisors to conduct the visit
- Review previous monthly reports for the supervisee and check if they were completed correctly, completely and on-time
- Review past supervision checklists for the supervisee to understand past challenges and successes and know what recommendations were made for improvements at the last visit
- Know the EBS Guidelines and be an expert in knowing how the logbooks should be completed

### During the visit:

- Systematically go through the questions in the checklist with the appropriate staff person and document everything clearly
- Ask to see all tools and documents that should be available at the facility and document where they are stored
- Review logbooks
- Review the findings with the supervisee and discuss why things are going well and what challenges exist
- Jointly come up with specific actions for all questions where things are not going according to plan (“no” in the checklist)

An example supportive supervisory checklist is listed in Annex 6 of the framework.

## Workforce incentivization in EBS

Incentives motivate and encourage the EBS implementers to perform well and improve the EBS outcomes. Monetary and non-monetary incentives can be used at individual or team levels and can include:



## **Considerations for epidemic intelligence and EBS during a pandemic**

An optimal EBS system should be able to detect events prior to them evolving into a pandemic or a PHEIC. When an event evolves into a larger outbreak, pandemic or PHEIC in other countries or global regions, the same system can be used to monitor for and detect the introduction of the pathogen as well as the beginning of community transmission (at the early stages of the pandemic) within a country. As the pandemic evolves there may be additional pathogen characteristics or response related activities that can be detected and monitored through EBS. The following is an illustration of how EBS platforms can be enhanced throughout the various phases of an outbreak using COVID-19 as an example.

### **Early Phase: prior to the introduction of the hazard**

When a highly transmissible outbreak has the potential to spread to an unaffected continent, region, or country (e.g., like when COVID-19 had not yet reached the continent of Africa), EBS can be leveraged to strengthen the existing surveillance system to promptly detect the importation of the pathogen of concern as early as possible to quickly isolate cases, quarantine contacts, and delay the establishment of local transmission. The useful strategies to implement at this stage include:

- Updating country priority event/signal lists to detect the event or pathogen of concern;
- Disseminating the updated signal definitions to all PoE, including border communities;
- Establishing hotlines and engaging the public on how to report signals through the hotline
- Establishing/strengthening EBS in health facilities and communities to detect cases;
- Engaging laboratories, pharmacies, and community institutions to identify and report detected cases promptly; and
- Revising other surveillance protocols, especially sentinel surveillance that may relate to this event or pathogen of concern (e.g., strengthening ILI and SARI for COVID-19).

### **Early to Mid-phase: initial cases or clusters being reported**

In this phase, countries are detecting initial cases or clusters of cases linked to a recent importation or occurrence of an event. They are also monitoring for the transition from only reporting imported cases to community local, indigenous transmission and using this information to trigger response and control measures. For COVID-19 specifically, many Member States initiated the following activities in this phase:

- Establishing/strengthening EBS (and IBS) in health facilities and communities to identify and link symptomatic individuals to testing, isolation, and treatment as well as facilitate contact tracing to minimise transmission and poor outcomes.
- Updating signal definitions and media scanning keywords to include updated terminology that describes populations most affected, new symptoms, recent variations in the pathogen, etc.
- Strengthening regional networks and expanded laboratory capacity to include genomic sequencing and monitoring for genetic variation in the viruses circulating.
- Reviewing other surveillance system data (e.g., sentinel surveillance) for unusual trends that might represent unrecognised transmission and monitored for aberrations and increases in cases beyond previously established baselines and thresholds.

## Mid to Late Phase: sustained community transmission

During this phase, the goal is to track the course of transmission in communities, understand the geographic scope of the outbreak, describe the impact of disease (including risk factors for severe disease), and monitor the progress and success of interventions put in place to prevent or control the pandemic. For SARS-CoV-2 specifically, this meant putting in place the following activities in many Member States:

- Updating signal definitions and media scanning keywords to include updated terminology that describes interventions or outcomes of intervention put in place (e.g., vaccination coverage or adverse events following immunisation [AEFI]), changes in the pathogen like new variants circulating, etc.
- Reviewing and updating EBS signal definitions at health facilities and within communities to ensure clusters of cases and unusual respiratory events that can signal a resurgence or emergence of variants are being captured.
- Strengthening all existing surveillance, ensuring the pathogen is incorporated into routine monitoring in preparation for transitioning out of an emergency response. This can also include expanding existing surveillance to include other sample sources like wastewater surveillance for SARS-CoV-2.
- Maintaining and updating sentinel surveillance to monitor trends and establish alert thresholds when resurgence may occur.

## Case Studies

### One Health

#### Objectives

To enable participants, understand how the one health approach supports early detection and reporting of public health threats.

#### Methodology

Group work and presentation: divide the participants into groups of a maximum of 8 persons.

Time: 30 minutes

#### Case Scenario

On 10 June 2021, the Kalangala district surveillance officer received a call from the Chairperson of Lutoboka landing site. He reported that for the last three days, dead fish have been found floating in various parts of the lake and washing up at the landing site and in the neighbouring villages. The cause has not yet been established although many are fearing pollution from poisoning from a nearby flower farm.

#### Questions

1. Is this case reported by the Chairperson a signal? Why or why not?
  - a. **Yes, this is a signal - the above report is considered a fish kill or fish die-off and fits with one or more of the signals listed in Annex 8 (e.g., signals AC2 and E8)**
2. Once the signal is verified as an event, describe how the initial risk assessment should be conducted?

- a. **Intermediate EBS FP/Surveillance Officer or any other relevant person from the intermediate or higher level should conduct risk assessment.**
  - b. **Given that this is an animal event, the animal risk assessment algorithm should be used.**
3. Based on available information, what should be the decision of the risk assessment team?
- a. **Based on the Africa CDC Risk Assessment Algorithm the result is: Very High**
    - i. **Q1: Yes**
    - ii. **Q2: Unknown**
    - iii. **Q3: No**
4. Outline all stakeholders that should be engaged and what actions they should take.
- a. **Engage the government ministries covering waterways as well as fish/wildlife to investigate any contaminants in the waterway and the cause of death in the fish populations**
  - b. **Engage the ministries covering human health to ensure an initial investigation is conducted to understand the possible harm this event could have on human health. May need to sensitise population on the risks including not swimming in or drinking from affected waterways; not eating any affected fish or other animals from the affected waterways; preventing affected fish from entering the food chain; etc. A temporary closure of the waterway may need to issue based on investigation finding.**
  - c. **Engage the ministries covering animal health to ensure an initial investigation is conducted to understand the possible harm this event could have on livestock or other animal health that have access to or drink this water.**

After the scenario - share information about harmful algal blooms (HABS) and the harms they play to the environment, animal, and human health. (See the One Health slide set)

### **Cross-border**

**Objective:** To enable the participants understand how the cross-border EBS signals are processed

**Method:** Small group exercise and presentations

**Activity time:** 50 minutes

Set the stage of group activity by asking the participants to get back to their groups.

#### Step 1: Set up the small group exercise

- Introduce the small group exercise by referring to the prepared flipchart small group exercise – case scenario 2 (appendix of the guide) and ask participants to locate the corresponding handout section of their participant guide.



- Ask participants to get into groups of at least five participants.
- Give each group the prepared flipchart, instructions, and a marker. Each team should select a group member to take notes (recorder) and another to present the group's responses to the audience (presenter).

Step 2: Get participants to read the inject 1 of case scenario 2 (5 minutes).

***Inject 1: “A community health worker (CHW) in West Pokot county, Kenya heard from a colleague from Kaptum CU in the neighbouring Uganda (a region known for Marburg virus disease outbreaks) that a 35-year-old hunter was admitted to a hospital on 20 September 2017 with symptoms of high fever, unusual bleeding, severe headache, and muscle pain and died five days later. The sister who was taking care of him developed similar symptoms two days after his death and died three days after. A brother who was staying with them in the same house also became sick with the same symptoms.”***

Ask participants the following. Discuss and record answers to these questions on a flipchart (10 minutes).

- Q1. Does this information received by the CHW in West Pokot constitute an EBS signal? Give reasons.
- Q2. If you consider this information a signal, describe systematically how it should be processed?

Step 3: Facilitate group presentations and feedback

Monitor the timing of the exercise. After 10 minutes, ask the groups to direct their attention to the larger group for the group presentations. Inform the groups that they will have 5 minutes to present. Ask if there is a group that wants to present first. If no group volunteers, randomly select a group to present first.

Ask participants to be mindful of the time and show respect towards each reporter by not engaging in a side conversation. Summarize common points from the presentations by including input from each group.

Step 4: Wrap up session with key message

Prior to moving to the next session, reinforce the key takeaway message below:

- Q1. Does this information received by the CHW in West Pokot constitute an EBS signal? Give reasons.
  - a. **Yes, this information constitutes an EBS signal. There is clustering of severe disease indicating a possible infectious threat. Also, it is happening across an international border with a potential of importation.**
- Q2. If you consider this information a signal, describe systematically how it should be processed?
  - a. **This is a signal happening outside the jurisdiction of the CHW that has detected it. It is in fact across an international border. The EBS FP at the**

**intermediate level immediately notifies the responsible counterparts across the border through the Border Management Committee (BMC) or the national MOH.**

Step 5: Ask participants to get back into their groups of at least five participants. Get them to read the inject 2 of case scenario 2 (*5 minutes*).

**Inject 2: “Fearing witchcraft to the family, the sick brother visited his relatives in West Pokot County, Kenya who took him to a traditional healer in Trans Nzoia County, Kenya where he died on 26 October 2017 while undergoing treatment. The healer notified their area CHW”.**

Ask participants the following. Discuss and record answers to these questions on a flipchart (*25 minutes*).

- Q3. Does this additional information constitute a new EBS signal? Give reasons?
- Q4. How should the information be processed?

Step 6: Facilitate the second group presentations and feedback

Monitor the timing of the exercise. After 25 minutes, ask the groups to direct their attention to the larger group for the group presentations. Inform the groups that they will have 10 minutes to present. Allow the group that hadn't presented or presented last to now present first. Ask participants to be mindful of the time and show respect towards each reporter by not engaging in a side conversation. Summarize common points from the presentations by including input from each group.

Step 7: Wrap up session with key message. Prior to moving to the next session, reinforce the key takeaway message below:

- Q3. Does this additional information constitute a new EBS signal? Give reasons?
  - a. **This is a report of unusual severe sickness, history of clustering, and community death that constitutes a signal. It has been reported in a new county making it a new signal.**
- Q4. How should the information be processed?
  - a. **This is a signal detected by a CHW in their area of jurisdiction hence should be processed as follows:**
    - i. Signal triage – Assess relevance for early warning and response
    - ii. Signal verification – Reaching out to the healer, local administration, health authorities to ascertain the validity of the report
    - iii. Event risk assessment – Collect information on confirmation, spread, severity, and establish the level of risk the event poses to public health
    - iv. Event alert and response – Notify the national county and levels. The neighbouring country should be alerted as well through the BMC and MOH

# Module 4: Hotlines

## Objectives of this Module

Hotline refers to a specialised data capture service through telephone, SMS, or other direct messaging platforms (WhatsApp, Facebook, Twitter, etc.) that provides an effective way to obtain or provide information - in this case, information about health-related events. This module correlates with Chapter 3 of the EBS framework and addresses how a country can approach implementing hotline EBS.

The time allocated for this module is 1.5 hours, which includes 20 minutes for presentation, 10 minutes for questions and answers and at least 1 hour to enact one of the case studies listed at the end of the module.

The methodology for instruction is PowerPoint presentation, interactive discussions, and case study.

**Equipment needed:** The facilitator will require a laptop, LCD projector, screen, and a pointer; PowerPoint presentations; one copy of the EBS training module facilitator guide; flip charts, and marker pens. The participants will each require a copy of the EBS training module participant manual, and associated case study materials.

### Module objectives:

- To describe the sources and steps of hotline EBS.
- To understand the various stakeholders' roles and responsibilities
- To describe the flow of information for hotline EBS.
- To describe the requirements for establishing a Hotline.

## Sources

Channels such as voice call lines, short message service (SMS), and social media messaging platforms (WhatsApp, Facebook, or Twitter) may be leveraged for the implementation of hotline EBS. If multiple systems are in use, where possible, use the same number to avoid confusion.

Dedicated number(s) and/or social media accounts should be shared with the entire public and should be available all the time (24 hours a day, seven days a week) for the public to report signals.

### Hotline sources include:

- Calls from the general public, health facilities or community health workers.
- SMS from the general public, community health workers or health facilities
- Concise messages through social media platforms such as WhatsApp, Facebook, Twitter

### **Voice Call Line**

A voice call line is a direct phone line to a toll-free phone line that the general public can use to contact an institution/organisation about a particular health concern. Voice call lines should preferably be short, and memorable, customised codes or numbers (e.g., 311). These hotlines enable callers to swiftly report signals that indicate the possibility of a public health event occurring.

For high risk events, automated messages could also be set up to include pertinent public health messaging to pass back to the members of the public.

Wherever possible, it is advisable to establish collaborations with telecommunication companies to provide a “service” in every new telephone to readily dial the hotline number. The cost of reporting signals to health authorities should be zero.

### ***Short Message Service and Unstructured Supplementary Service Data***

Some hotline systems are set up to allow for the sending of an SMS, or “text message”. Correspondents send queries to an institutional SMS contact number, which can also be used to respond to queries about signals or ongoing public health events.

Unstructured supplementary service data (USSD) is very similar to SMS but uses a Global System for Mobile Communications (GSM) protocol that creates a real-time connection and allows for a two-way exchange of information between users. USSD is more responsive than services that use SMS.

Chatbots can also be used to automatically guide users through the initial steps of the triage and can be leveraged to speed up and facilitate the recording and triage process before directing the user to a human being.

### ***Social Media Messaging Platform***

Social media messaging are online platforms that enable the general public to report and share information and engage them in social networks, like Facebook, Twitter, blogs, and WhatsApp, among others. Most of the platforms are free and available on the internet as downloadable applications to devices, including smartphones. A special dedicated contact number or account can be set up and used to capture signals from these platforms. Chatbots can also be used on these platforms to facilitate the triage process.

## **Steps for conducting hotline EBS**

Information is initially captured as a signal through calls, SMS, or direct messaging, which represents a potential acute health risk, such as an outbreak. Not all signals may necessarily become real events, as such, they all need to be triaged, verified and risk assessed before a response is initiated. Figure 6 illustrates key steps in Hotline EBS.



Figure 6 illustrates key steps in Hotline EBS

Effective communication is a key component to establishing a successful hotline. This includes that hotlines and hotline operators establish trust with callers; are service oriented, community led; exhibit emotional intelligence; and communication and recommendations are evidence-based<sup>1</sup>.

- **Trust:** Hotlines require trust from both the community and public health institution. It is an important part of hotlines to build and maintain trust among responders and affected callers or reporters.
- **Response oriented, community-led:** The hotline should be community-led and response oriented. To ensure that the hotline meets the needs of the community, engage the community on a regular basis to circulate and share feedback on the service's usefulness.
- **Emotional intelligence:** Hotline operators are expected to respond to calls from the community who are feeling strong emotions like fear, anger, or stress. They should have the expertise and emotional intelligence needed to effectively manage these situations by modelling empathy, active listening, and a non-judgemental attitude.
- **Evidence-based:** Hotline operators should be knowledgeable about the various disease-related and other public health events that they may be asked about in order to accurately address the public's concerns. This includes being familiar with case definitions, transmission routes, prevention measures and other relevant recommendations.

<sup>1</sup> WHO: [Setup and management of COVID-19 hotlines](#)

## Step 1: Detection

Signals that are captured from hotlines and correspond to the predefined list of signals, should be registered in a signal logbook, or registered.

Signal information for the hotline can be received through telephone calls, text messaging and in-person reports. Here we describe the key sources for signal detection based on means of collection i.e. (a) Calls (b) Messaging and (c) In person reports

### A. Calls

1. Start by greeting and thanking the caller for being proactive to report to the hotline, concerning potential public health events.

*E.g., Welcome to the Public Health Emergency Call Centre/National emergency Call Centre. My name is [INSERT NAME]. How can I help you?"*

2. Obtain the name of the caller, and where they are calling from
3. Allow the caller to introduce the report (the call may be recorded where possible)
4. Engage the caller and follow a prepared set of questions that directly reflect the questions posed in the signal logbook. A signal registration should include enquiries for the following data set for tracking the signals:
  - Source of the report - name and contact information of informant (in case follow-up is needed)
  - Date and time of the call/detection
  - Date and time when signal/event occurred
  - Place of occurrence (geographical area) – where it started and spread
  - Description of event - what happened, who was affected
  - Magnitude of the event – how many have been affected (e.g., number of cases and/or deaths)
  - Date of reporting the event to the next level
5. Briefly summarise what has been accomplished on the call (The set of people involved (children, adults, males, or females) or animals must be documented. Place of event and time noticed must be clearly documented)
6. Let the caller know what happens next (and include a timescale)<sup>1</sup>.
7. Ask the caller if there is anything else they wish to report or add to the report
8. End by thanking the caller for their time, patience and proactiveness.
9. Return the call as soon as possible in situations where a call is interrupted or disconnected or if calls are received while the responder is busy; this will ensure that all signals are collected

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<sup>1</sup> Some hotlines can be equipped with a push-button menu to direct callers to the appropriate topic or contact



10. There may be an automated response (Chatbot or IVR) if calls are received while the responder is busy. The automated message should tell the caller to leave the message, or that the responder is busy, and the call will be returned immediately. In addition to an automated response, some hotlines can be equipped with a push-button menu (serving as a triage mechanism) to direct callers to the appropriate topic or contact.
11. Record the message for future reference (where possible)

## B. Messaging

1. Once an SMS or a social media message (direct message) is received, an instant automated message is sent to greet the sender, thanking them, and stating that an operator will contact them. **Note:** *Automated questions (IVR) or responders can collect information from the sender.*
2. Hotline operator registers in the signal logbook according to the pre-defined list of signals for the country.
3. Collect information about the sender for further communication and details about the signals reported. A direct call to the sender may be needed if more information is required.

## C. In Person Reports

In certain instances, local inhabitants aware of the physical location of the call centre may opt to walk in and make in-person reports of public health threats. However, it is not advisable to come in contact with these persons, they might be carriers of an infectious disease. Such a practice shouldn't be encouraged.

**Note:** Signals that are captured from hotlines are to be registered in a signal logbook/register ([Annex 1](#)). Signal registration should include the minimum data set for tracking the signals.

### Step 2: Triage

Typically, both detection and triage occur at the same time with hotlines. This is facilitated by the hotline desk operators, or responders, via a list of priority signals that they refer to during the call or while reviewing the messages sent. The hotline team should be trained on how to respond to and collect information from the public in a professional manner. The public should feel respected while reporting information. This ensures sustainability of participation in reporting signals. The responder to the call should start by greeting the caller and thanking them for their proactivity in reporting the concerning potential health events. Then, the responder should follow a prepared

script that includes the list of signals and standardised set of responses. Calls can be recorded to help with recording signal information and also be used to help monitor and evaluate the team's responses to the calls. The hotline desk team should record the category of the caller (e.g., teacher, health professional, opinion leader) and triage any received notifications to determine which signals are of importance (i.e., exists in the lists of signals). All signals, as well as a minimum set of data for each signal, should be registered in a signal logbook (see Annex 1 for example signal logbook) or through the use of digital tools like a customer relationship management (CRM) or interactive voice response (IVR) system. When an IVR or other automated service is used, the responder will be the one to directly register the signals that meet the predefined list of signals electronically or in a register. In situations where a call is interrupted or disconnected, or if calls are received while the responder is busy, calls should be returned as soon as possible. This will ensure that all signals are collected. The call should be ended by thanking the caller again for their time, patience, and proactivity.

All of the above applies to SMS and social media messages received, except that the use of automated messaging could be used to help facilitate communication, triage, and data collection. Information about the sender should be collected to permit further communication and gather additional details about the signal reported. A direct call by the EBS unit to the sender may be the timeliest approach to gathering additional information.

Confidentiality for all callers should be maintained as per the country's laws. Calls or messages received by the hotline but later deemed to be malicious or without merit should be noted and action should be evaluated for response (or to legal teams as appropriate).

### **Step 3: Verification**

Verification should be done at the local level nearest to the location of the signal. The following are the steps for verification:

1. Hotline operator contacts the EBS FP at the intermediate level for verification and notifies the national EBS FP for this information.
2. The EBS FP at the intermediate level reports signal to the health facility FP, CHW/CAHW's supervisor (with adequate capacity) or responsible person in the animal health or environment sector (depending on the origin of signal) who verifies the signal at the site of occurrence using the verification tool (Annex 5).
3. If the signal is true, it becomes an event and if not, it is discarded, and recorded accordingly in the event register (Annexes 1 and 4).
4. Once the signal becomes an event, the intermediate team is notified to conduct a risk assessment.
5. Feedback is also provided to the national team (hotline desk, EBS FP and other relevant offices)

### Step 4: Risk Assessment

Once verified, depending upon the capacity available, the risk assessment could be performed at either the intermediate level or national level. Refer to Module 2 (Page 17) for more information.

### Step 5: Alert

Once the risk level is determined, the EBS unit would then send an alert to the team designated to respond. Refer to Module 2 for more information.

## Stakeholders' roles and responsibilities

The success of the hotline is based on the early detection and immediate notification of signals. The key stakeholders and respective roles within the hotline workflow are shown in Table 6 Roles and Responsibilities for Hotline workforce

**Table 6: Roles and responsibilities of the hotline event-based surveillance workforce**

Workforce	Primary roles	Supportive roles
Hotline operators (may be located at the intermediate or national levels)	Use signals to identify possible public health threats Records signal Conducts triage Report the signal to EBS FP at the intermediate level	Provide information needed Support risk assessment, investigation, and response Participate in the sensitization meetings Participate in the review meetings
EBS FP at Intermediate level	Records signal received from the Data Analyst Triage and verifies the signal Records and reports the event to a higher level (e.g., intermediate, national). Convene a multi-disciplinary team for risk assessment Provide feedback to the reporting party	Provide additional information for verification Provide additional information to the Risk Assessment team Mobilise community members to action Referral of community members and sick animals Supports intermediate/national team during Risk Assessment Supports intermediate/national team during response
Community, CHW/CAHW supervisors, facility surveillance FP, intermediate surveillance FP, call centre operators	Support verification and provide feedback	Work with intermediate team to assist risk assessment

## Flow of Information in Hotline EBS

This refers to the movement of EBS data between the different levels. Timely, efficient, and secure information flows are a central factor in the performance of the decision-making process to respond to events. In Hotlines information most often initiates from the community level direct to the national or intermediate level (depending on where the call centre is located) and flows down to lower levels with a feedback loop in the reverse directions. Figure 7 illustrates information flow through the different levels in Hotline EBS.

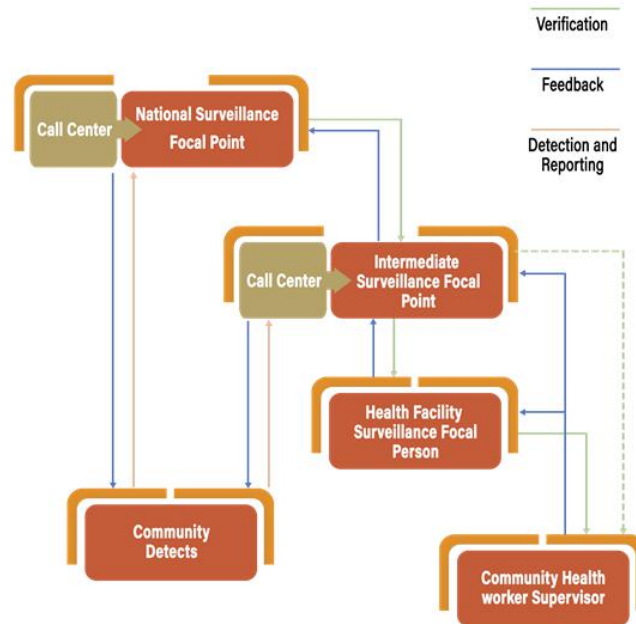


Figure 7 illustrates information Flow through levels in Hotline EBS

## Requirements for Establishing a Hotline

Setting up a call centre is a daunting task, there are a myriad of options for call centre technology. Whether a Member State wants to build or reassess its call centre requirements, technology considerations should include the core platform and workforce optimization software.

Level of call centre placement should be determined by:

1. Population size and volume of calls expected
2. Proximity to the event location to ensure rapid verification, feedback, and response time
3. Country capacity to operationalize, including available human resources, technology, equipment, and finances

### Minimum requirements needed

- a) Trained personnel inclusive of risk communication techniques. Note: the number depends on the level the hotline has been established and the catchment population.
- b) Dedicated contact number and social media handle
- c) Office space
- d) Data collection tools: Each agent should be equipped with tools (e.g., forms, hardware, software, etc) for management of operations, data storage and customer references – even if everything is stored on the cloud
- e) Telephone with landline
- f) FAQ or reference book for operators to consult when communicating with callers
- g) Event management system (EMS): will be used to capture, track, analyse, and retrieve all signals and events detected
- h) Trained RRT available for deployment

### Additional (Recommended) requirements

- a) Headsets with in-built microphone component
- b) Call recording software/device
- c) Customer relationship management (CRM) or IVR system: technology automatically routes calls to phone agents based upon organisational rules

## Case Study

**Objective:** this exercise is aimed at giving the participants an understanding of the process of hotline EBS

**Methodology:** Set the stage of group activity by asking the participants to get back to their groups.

- Introduce the small group exercise by referring to the prepared case scenario and ask participants to locate the corresponding handout section of their participant guide.
- Ask participants to get into groups of at least five participants.
- Give each group the prepared flipchart, instructions, and a marker. Each team should select a group member to take notes (recorder) and another to present the group's responses to the audience (presenter).

**Time:** 60 minutes

**Scenario (30 minutes):** Residents in Mtakwenda village were alarmed and started to panic after rumours broke out that two young adults died in their village two days apart with similar symptoms of vomiting blood. The villagers, through a radio advert, got a toll-free number and called the National centre.

### Questions

#### 1. Please outline questions that you will ask the villagers.

- Start by greeting and thanking the caller for being proactive to report to the hotline, concerning potential public health events.  
*E.g., Welcome to the Public Health Emergency Call Centre/National emergency Call Centre. My name is [INSERT NAME]. How can I help you?"*
- Obtain the name of the caller, and where they are calling from
- Allow the caller to introduce the report (the call may be recorded where possible)
- Engage the caller and follow a prepared set of questions that directly reflect the questions posed in the signal logbook. A signal registration should include enquiries for the following data set for tracking the signals:
  - Source of the report - name and contact information of informant (in case follow-up is needed)
  - Date and time of the call/detection
  - Date and time when signal/event occurred
  - Place of occurrence (geographical area) – where it started and spread



- Description of event - what happened, who was affected
  - Magnitude of the event – how many have been affected (e.g., number of cases and/or deaths)
  - Date of reporting the event to the next level
- 2. Outline the final conversation over the phone.**
- *Thank the caller for calling the National call centre.*
  - *Give the caller a summary of what has been accomplished on the call.*
  - *Let the caller know what happens next (and include a timeline).*
  - *Ask the caller if there is anything else they wish to report or add to the report and end by thanking the caller for their time, patience, and pro-activity.*
- 3. Describe actions that will be taken at National level.**
- *Register the signal in a signal register. When signals are detected, they must be registered in a signal register.*
  - *Reach out to the intermediate level who would in turn reach out to the FP for verification.*
- 4. List the tools that will be used at this stage**
- *The signal register (see the annex).*

**Inject 1 (10 minutes):** The National team reached out to the intermediate level who reached out to the FP in Mtakwenda village for verification and the information was validated.

### Questions

1. Given the information found during verification; what is your conclusion?
  - *This is an event.*
2. Based on the information, within your group outline all steps that would be taken at all levels.
  - *Verification teams:*
    - i. *They are expected to provide feedback through reports. Reports are preparation of comprehensive documentation of the processes, and the reporting can be in the form of Situation Report (SITREP), Spot Report (SPOTREP), etc. However, it is important to note that each of the EBS processes constitutes a brief report that should be shared immediately with the relevant level.*
    - ii. *The verification team would give feedback to the intermediate level team who would then conduct a risk assessment.*
  - *Intermediate level: They will conduct a preliminary risk assessment and classify the event as a high risk event based on the risk assessment algorithm (Page XX of the manual).*

**Inject 2 (20 minutes):** On further investigation it was determined that one of the young adults was not a resident of the village but was being nursed at his uncle's place after a terminal diagnosis of oesophageal cancer. The other person was suspected to have peptic ulcer, which was confirmed after inspection of the medications that the patient used.

### Questions

1. Do these findings affect your conclusion? If yes, how?
  - *Yes, they do. These findings show that these events do not constitute a risk to public health, as the young adults did not experience any infectious or communicable disease. The intermediate team would then re-evaluate the level of risk and close the event.*

2. Briefly draft a short but concise message of feedback to villagers at Mtakwenda (not more than 500 words).
  - Key parts of the message
    - i. Thank the villagers for alerting the relevant authorities on the event that took place in Mtakwenda.
    - ii. Explain the investigation process and what has been done.
    - iii. Give a summary of the findings of the risk assessment, and why this is not a cause for concern.
    - iv. Allay the fears of the villagers and also encourage them to continue to reach out to the public health officials through the hotlines if any signals are picked up.

## Module 5: Media Scanning

Media scanning refers to the regular perusal (e.g., reading, listening) of different sources of media, extracting relevant information pertaining to health-related events that fall within the guidelines of an identified signal. It is an active process and utilises unstructured data from diverse sources (e.g., web-based, radio, television, newspapers, etc.) to provide early warning and situational awareness of impacting the health of humans, animals, plants, and the environment.

This module correlates with Chapter 4 of the EBS framework and is aimed at providing learners with an overview of the considerations that should be made when implementing internet-based media scanning EBS at the national or regional level.

The time allocated for this module is 1.5 hours, which includes 20-30 minutes for presentation, 10 minutes for questions and answers and at least 1 hour to enact one of the case studies listed at the end of the module.

The methodology for instruction is PowerPoint presentation, interactive discussions, and case study.

**Equipment needed:** The facilitator will require a laptop, LCD projector, screen, and a pointer; PowerPoint presentations; one copy of the EBS training module facilitator guide; flip charts, and marker pens. The participants will each require a copy of the EBS training module participant manual, and associated case study materials.

### Module objectives:

- To describe the sources and steps of media scanning EBS
- To understand the various stakeholders' roles and responsibilities
- To describe the flow of information for media scanning EBS
- To describe the different types of internet biosurveillance systems

## Sources

A source list should be maintained as a resource for EBS analysts to keep track of the location of media sources, as well as of login IDs and passwords, when conducting surveillance for all health-related events. This source list should be shared among all analysts.

To ensure a multisectoral, One Health approach, the source list should also be inclusive of information beyond traditional health system sources. This can include data provided by the animal or environmental health sector, local communities, media, and international sources. The main sources for media scanning EBS include:

### Official Sources

Signals detected through official sources are reliable and do not need further verification.

#### Examples of official sources:

- a) Official websites and social media accounts of governmental sectors including, but not limited to Ministries of Health, Agriculture, Environment, and Foreign Affairs

- b) Official public health agencies' (e.g., Africa CDC, US CDC, ECDC, China CDC, UKHA) websites
- c) Websites for official organisations such as universities and internationally recognized centres of research
- d) Official pages/accounts on social media for governmental and official organisations: most organisations have official accounts on social media which can be considered a reliable source of information
- e) WHO official websites for Early Warning (e.g., WHO's IHR Event Information Site for national FPs) which is a secured platform accessible only to national FPs
- f) WHO Disease Outbreak News (DONs)
- g) Websites for WHO regional offices (e.g., AFRO, EMRO, EURO, SEARO, WPRO, PAHO)
- h) Disease-specific sources (e.g., Global Influenza Surveillance and Response, OFFLU)
- i) World Organisation for Animal Health (WOAH); World Animal Health Information System (WAHIS)
- j) Food and Agriculture Organization (FAO) of the United Nations; EMPRES-i
- k) International Food Safety Authorities Network (INFOSAN), European Food Safety Agency (EFSA)
- l) The International Atomic Energy Agency (IAEA) for environmental events (radiological and chemical)
- m) Network of WOAH reference laboratories

### **Un-official Sources**

Signals detected through unofficial sources are not reliable and need to be verified, though they may be a good source for acute public health events.

#### **Examples of unofficial sources:**

- a) Newspapers and magazines
- b) Online content of TV and radio channels
- c) Social media (e.g., Facebook, Twitter)
- d) Blogs
- e) Local and international media
- f) Internet bio-surveillance sources/mechanisms include ProMED, the Global Public Health Information Network (GPHIN), HealthMap, and MEDISYS, among others

## Steps of conducting Media Scanning EBS

Not all signals may necessarily become real events, as such, they all need to be triaged, verified and risk assessed before a response is initiated.

### Step 1: Detection

Signal detection involves information scanning that can be done manually and automatically:

#### A. Manual Scanning

This refers to the physical monitoring of media sources for health-related events.

##### Manual scanning requires the following steps:

1. Develop a checklist of online sources for scheduled review
2. Develop a list of prioritised signals regarding hazards, strategies, capacities, and resources of the country
3. Develop a list of keywords related to the list of priority diseases, syndromes, or conditions; if needed, translate the list of keywords into the local language
4. Develop a review schedule of the prioritised sources
5. Visit all predetermined websites in the checklist of online sources to scan for keywords
6. Designated Media Analysts capture the signals (according to the pre-defined list of signals) and register in a signal logbook/ register (see a sample of signal logbook for in Annex 1 and 4)
7. Audit the source checklist continuously to ensure that newly available sources are added to the predefined source list and that non-working / non useful sources are removed

#### B. Automated Scanning

Multiple automated technological tools can be used for scanning online information from pre-defined sources. These tools can save time and effort and support the early detection of public health threats. Examples of automated scanning are:

- a) Rich site summary or really simple syndication (RSS) is a web standard that allows users and providers to share updates to websites in a standardised and computer readable format.
- b) Data aggregators are client software or web applications that monitor and aggregate designated websites and inform the user with updates.
- c) Contributor-based sources are based on sharing information among health professionals, in which individuals collect information that can be accessed through shared feeds. ProMED mail is the most relevant example.
- d) Automated information feeds or services developed by governments or international organisations that collect health information from several sources - decreasing the time spent in scanning for individual sources. These are also called media aggregators, and many are currently undergoing development. EIOS (<https://www.who.int/initiatives/eios>) and GPHIN ([https://gphin.canada.ca/cepr/aboutgphin-rmispenbref.jsp?language=en\\_CA](https://gphin.canada.ca/cepr/aboutgphin-rmispenbref.jsp?language=en_CA)) are the most relevant examples.

### **Automated scanning requires taking the following steps:**

1. Develop a list of keywords related to the list of prioritised signals including diseases, syndromes, or events
2. Develop a list of prioritised automated scanning tools (sources of signal information, e.g., ProMED, HealthMap, EIOS etc.)
3. Subscribe/ download and install the automated scanning tool
4. Operationalize the tool using keywords developed in step 1 (may follow instructions provided by various tools)
5. Review the signal information to determine whether it matches any of the pre-determined list of signals.
6. Register the signal and proceed to triage (see registration tool Annex 4)

The difference between an RSS feed and a data/media aggregator is that RSS feed is a standard for sharing updates from websites sharing content updates while aggregators are software tools that can use RSS to retrieve updates from multiple websites or sources.

Technology tools for scanning online sources of information may be developed by each country for optimum customization, while free applications for scanning the online content are available. For example, Google Trends can track keyword queries in time and by location. Additionally, Google Alert is a free service that sends emails to the user when it finds new results matching the user's keyword queries.

Note: At signal registration a minimum data set should be captured and updated throughout the process for tracking the signals/events

### **Suggested minimum data set**

- Source/informant: the website where media scanning signal was obtained
- Signal: when it happened, who/what was affected (cases, deaths) and where it originated and spread
- Date of signal/event start date
- Follow up of the signal: verification, risk assessment and response
- Date of reporting the signal to the next level
- EBS analyst tasked to follow up

## **Step 2: Triageing**

Most of the internet biosurveillance tools have in-built triage functionalities. The system enables the users to set filters that help in sorting out articles according to relevance to EWAR while also eliminating duplicates to a certain degree. However, the analyst still has to perform a second level screening to sort out relevant articles given that automation may still fail to be as accurate as required.



### **Key steps for triaging involve:**

1. Establish that the signal registered is pertinent to EWAR (use pre-defined signal list as reference).
2. Confirm that the same signal has not been reported from the same or different sources (duplicate reports)
3. If the signal is from an official source, register as an event (see signal registration form in Annex 1 and 4), notify relevant authorities for risk assessment.
4. If the signal is from an unofficial source, notify relevant authorities for verification.

### **Step 3: Verification**

Verification should be done at the local level nearest to the location of the signal:

#### **Steps for verification include:**

1. Media Analyst contacts the EBS FP at the intermediate level for verification and notifies the national EBS FP for his information
2. The EBS FP at the intermediate level reports to the FP closest to the signal source who then proceeds to verification using the verification tool (see Annex 5).
3. If the signal is true, it becomes an event and if not, true it is discarded, and recorded accordingly in the relevant tool (Annex 1 and 4).
4. Once it is confirmed an event it is immediately reported to a higher level (e.g., intermediate, national) who then proceed to conduct a risk assessment
5. Feedback is again provided to the reporting party (Media Analyst)

### **Step 4: Risk Assessment**

At this stage, the FP at the intermediate level convenes a multi-disciplinary team to determine the extent and magnitude of the event. See Module 2 for more information.

### **Step 5: Alert**

The unit at the national level should assign at least one person to follow up on signals sent for verification until verification is obtained. According to the country's capacity, the country can decide the number of responsible personnel for follow up. However, at least one person from the media scanning team should be responsible for the follow up of the signals that were sent for verification until it is confirmed that the verification process is completed. If the EBS unit is operating 24/7, the same person who captures signals should follow up those signals waiting to be verified, during the same working shift. For proper handover between shifts, the ending shift should update the starting shift with the verification status of the signals. For more details refer to Module 2.

## Flow of Information for Media Scanning

In Media Scanning EBS signals are initially captured by media analysts from pre-determined media sources, the signal is then registered at the national/intermediate level (depending on the level where the media scanning centre is located) and flows down to lower levels with a feedback loop in the reverse directions (Figure 8).

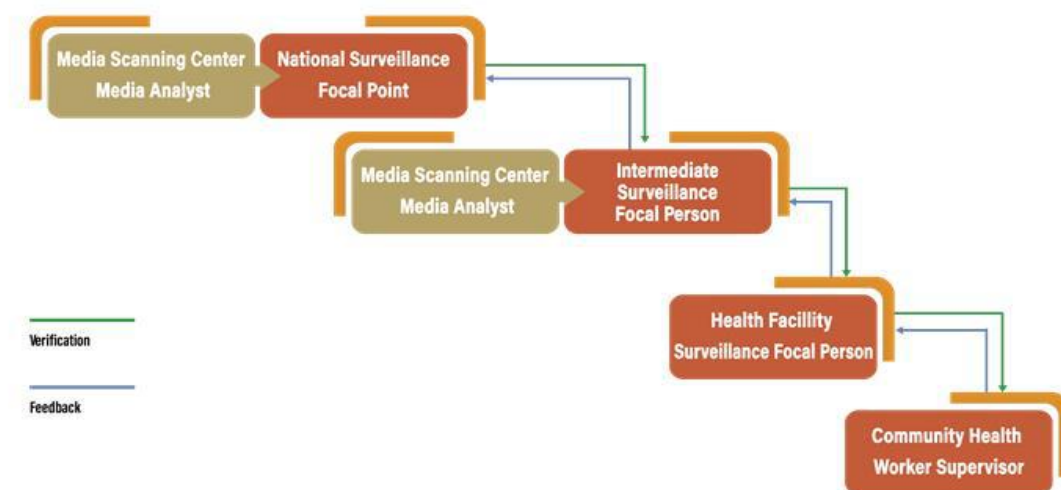


Figure 8 Information flow in Media Scanning EBS

## Requirements to Establishing a Media Scanning Centre

There are a myriad of options for media scanning centre technology. Whether a MS wants to build or reassess its media scanning centre requirements, technology considerations should include the core platform and workforce optimization software.

Level of media scanning centre placement should be determined by:

1. Volume of media reports expected and geographic range covered (global, region, national, subnational, etc.)
2. Country capacity to operationalize (e.g. human resources, technology, equipment, and financial)

Here we outline the minimum requirements for establishing a functional centre.

### Infrastructure

- a) Radio, TV
- b) Data capture tools (e.g. hard or soft copies)
- c) Internet access
- d) Identified list of sources

### Setup Options

- a) Perform a complete inventory of all print, radio, and television media available: Encouraged to visit multiple media kiosks to ensure all print sources are documented

- From this, select sources (rank) that feel most important and relevant to EBS in your country.
- Selected resources should be reviewed to ensure they are not currently feeding into main news aggregation sites, including Google news, health maps etc.
- Train data collection team to screen local media for stories that may be related to a relevant health event and/or signal as described.

## Examples of Internet Bio Surveillance Systems

Internet bio-surveillance utilises unstructured data from diverse web-based sources to provide early warning and situational awareness of public health threats. The scope of source coverage ranges from local media in the vernacular to international media in widely read languages. Internet bio-surveillance is a timely modality that is available to government and public health officials, HCWs, and the public and private sector, serving as a real-time complementary approach to traditional indicator-based surveillance methods<sup>1</sup>. In this section we describe a few popular internet-based tools that may be used for bio-surveillance.

### Tweet Deck

Tweet Deck is an interface that allows you to view multiple Twitter timelines and/or lists in one interface (Figure 9), while managing multiple Twitter accounts. This tool may assist in media scanning as it allows you to keep tabs on the latest and relevant keywords (hashtags). It is free and available to anyone who has a Twitter account. More can be found here <https://tweetdeck.twitter.com>

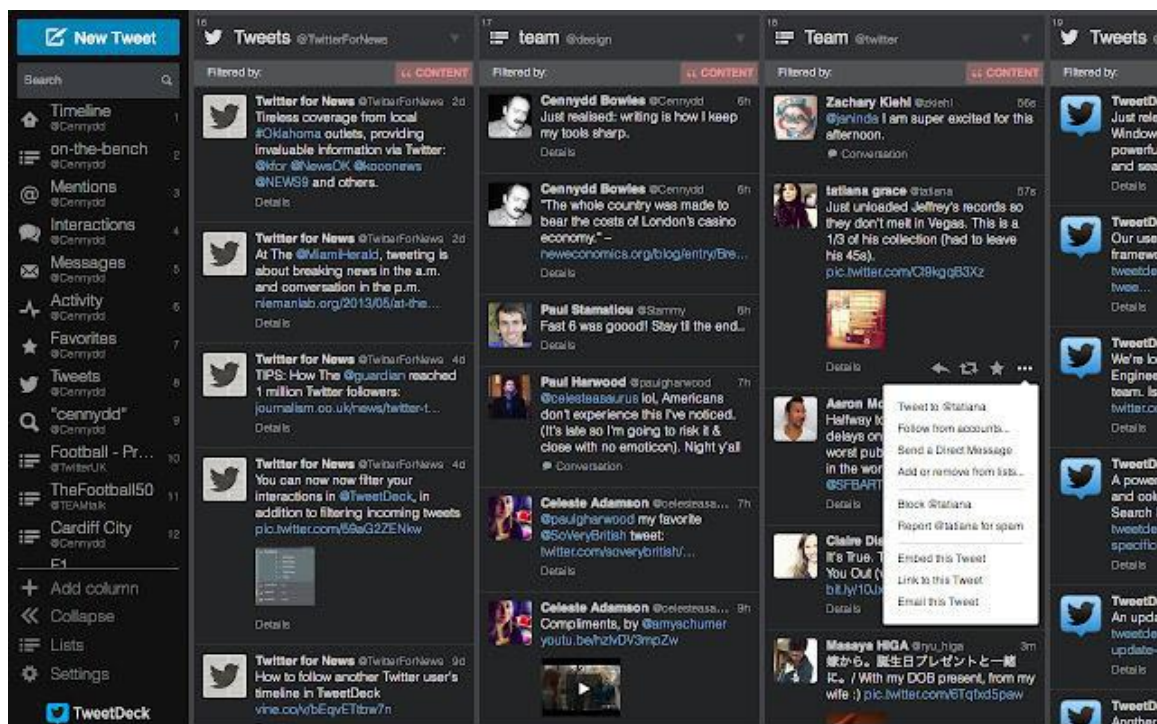


Figure 9: Example Tweet deck interface

<sup>1</sup> Hartley, David M., et al. "An overview of internet biosurveillance." *Clinical Microbiology and Infection* 19.11 (2013): 1006-1013.

## Program for Monitoring Emerging Diseases (ProMED)

ProMED was launched in 1994 as an internet service to identify unusual health events related to emerging and re-emerging infectious diseases and toxins affecting humans, animals, and plants. (<https://promedmail.org/about-promed/>). Open to all sources, free of political constraints, and available to users free of charge, ProMED-mail exploits the speed and ubiquity of the Internet to serve as an early warning system for the detection of emerging disease outbreaks.

### ProMED-mail facts

- Reports are screened and placed in an appropriate context by commentary and references from a panel of expert moderators
- Reports are posted to the Web and sent by e-mail to subscribers
- Reports are selected and interpreted by a panel of specialist moderators who provide expert commentary, supply references to previous reports and the scientific literature, and put the report in perspective
- Supported by donations and foundation grants

### ProMED's focus

- Newly described or unknown diseases, epidemics, and outbreaks
- Emergence of diseases in new areas or populations
- Emphasis on diseases of plants and animals that might affect human populations
- Upholds One Health and recognizes the importance of diseases that affect plants and animals of agricultural importance, as well as zoonoses

### Getting Started with ProMed

- A. Access ProMED by entering the URL: <https://promedmail.org> in any browser. You will be directed to the ProMED page (see below)



- B. Click on the subscribe button on top right corner as circled below



- c. You will be directed to a page that requires your contact information and allows you to select language, categories of diseases and events and their geographical locations. This is filtering and allows you to predetermine what information you wish to receive.

**Change ProMED Subscription Settings**

Subscribe to All  
 Unsubscribe All

**ProMED (English-language posts focusing on worldwide disease outbreaks in people, animals, and plants)**

Subscribe  Unsubscribe  No change

**ProMED-digest (A consolidations of ProMED posts, usually one or two per day)**

Subscribe  Unsubscribe  No change

**ProMED-ahead (Only animal zoonotic, vector-borne disease posts)**

Subscribe  Unsubscribe  No change

**ProMED-ahead-digest (A consolidation of ProMED-ahead posts)**

Subscribe  Unsubscribe  No change

**ProMED-edr (Emerging disease reports)**

Subscribe  Unsubscribe  No change

**ProMED-plant (Only plant disease outbreaks)**

Subscribe  Unsubscribe  No change

**ProMED-plant-digest (A consolidation of promed-plant posts)**

Subscribe  Unsubscribe  No change

- d. Click the subscription button on completion of the subscription settings

**ProMED-AMR (English language posts focusing on world-wide Antimicrobial Resistance events of significance)**

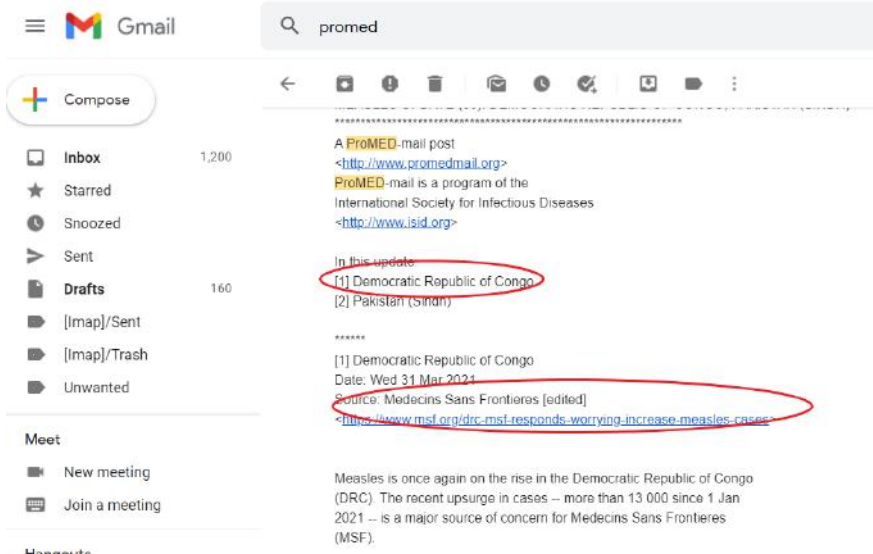
**Subscribe**  Unsubscribe  No Change

I give the ISID permission to send me communications by email. You can change your contact preferences at any time.

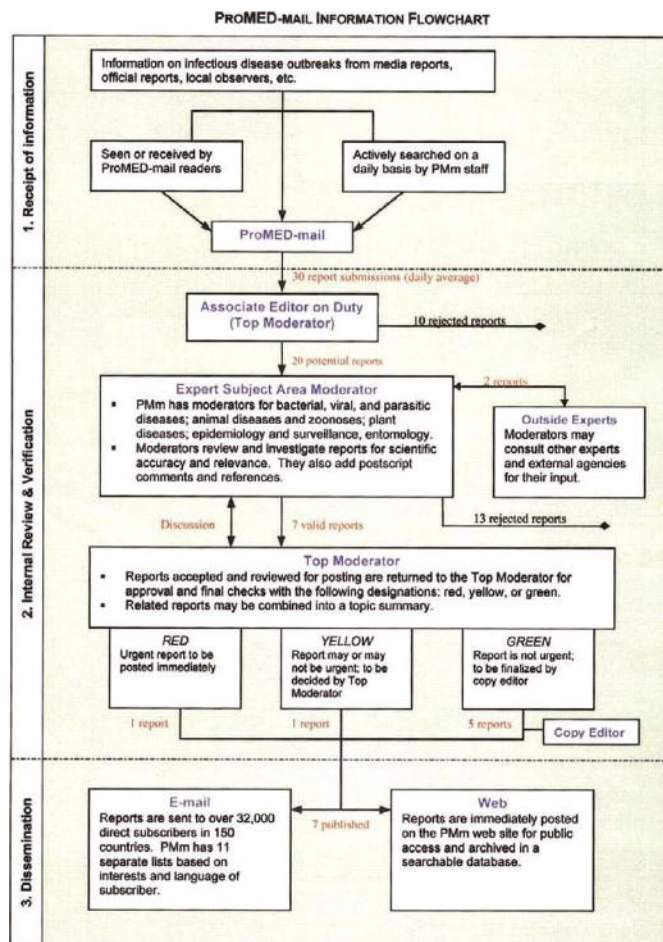
Join the ISID (redirect to join form after submission)

- e. A mail notification will be sent to you. You are now subscribed to ProMED. ProMED will send to you mail updates on new signals on a daily or every other day based on your predetermined filtering preferences/settings. Open the articles sent to your mailbox. Take note of the locations and sources of the reported signals as below.





## Information Flow at ProMED



## HealthMap

Health Map is a multi-lingual, real-time disease outbreak detection, tracking and visualisation system. The website collects over 300 reports per day in English, Spanish, French, Russian, Portuguese, Arabic and Chinese, from both general news media and public health sources around the world.



- a) Sources include Google News (in all seven languages) as well as other online news aggregators and informal sources, along with ProMED and WHO.
- b) The system also allows for user driven reporting through submission of URLs.
- c) Updated hourly, the system filters reports to determine relevance, disease, location, and duplication clustering by means of a series of automated text processing algorithms. Relevant reports are then aggregated and displayed in a freely available dashboard where users can tailor the view according to date, disease, location, and source.
- d) Though the system is fully automated, a dedicated human analyst along with collaborators examine reports each day to verify the accuracy of the system output

## Getting started with HealthMap

- A. Enter the URL <https://healthmap.org> into your browser. You should view the HealthMap home page below



- B. Click on the login icon in the right lower corner as shown below.



- C. This will lead you to the login section if you already have an account or to register for a HealthMap account in the event you don't have an account. Click on the register option and provide a username and password and other identifier information.

### Login

username

password

**Login**

[Register](#) | [Forgot password](#)

### Register for a HealthMap Account

**Minimum Password Requirement**  
8 characters or more  
a combination of at least 2 letters, 2 special characters or 2 numbers

name

email

affiliation

username

password

confirm password

Sign up for our low-volume mailing list

This includes quarterly newsletters and occasional alerts of potential international significance, as determined by the WHO Guidance for the use of Annex 2 of the International Health Regulations (2005).

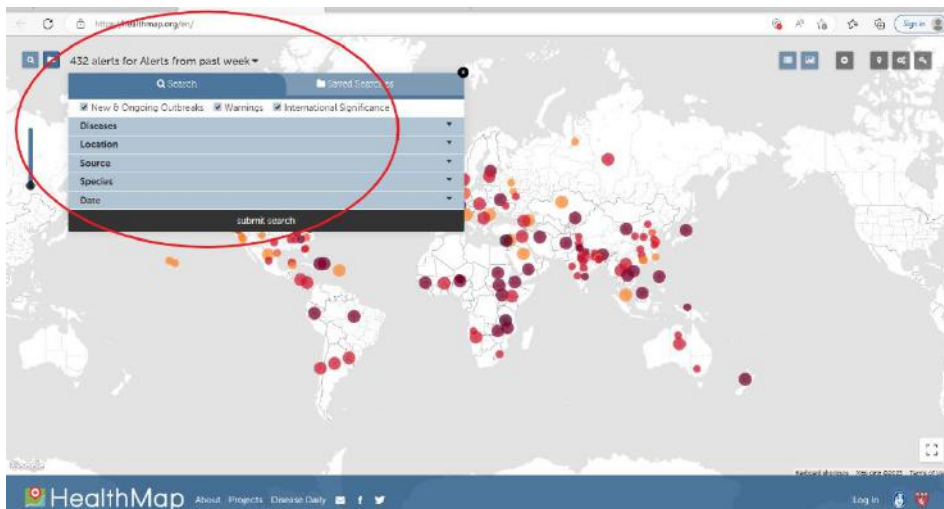
**Register**

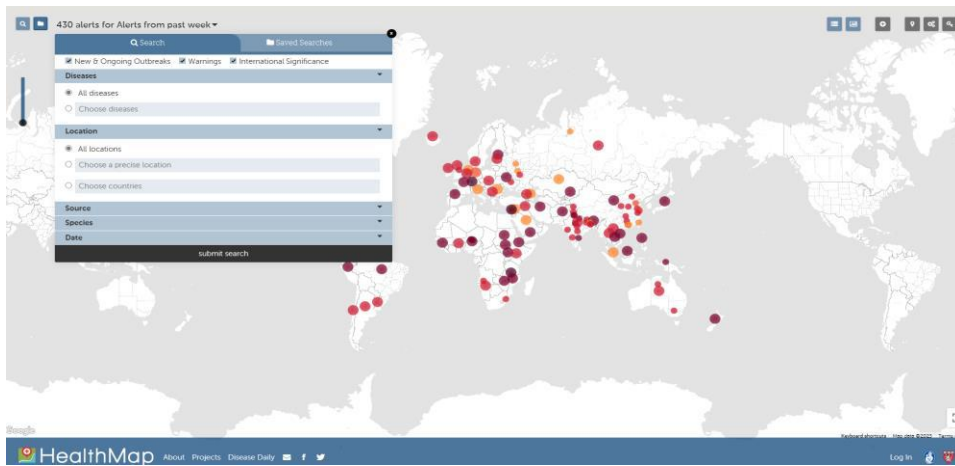
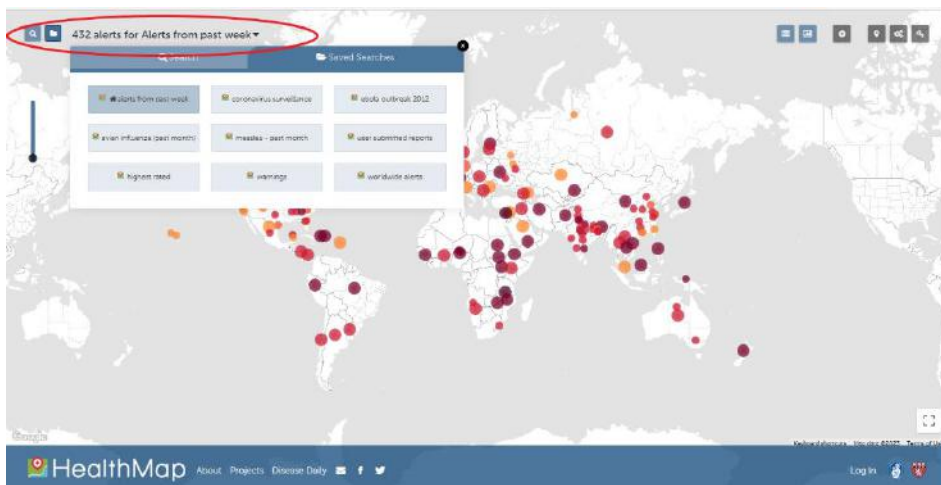
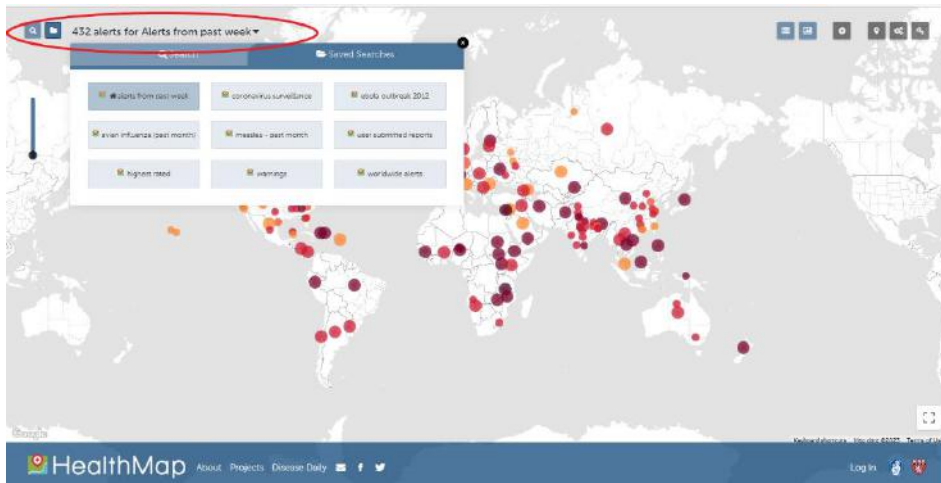
[Log In](#) | [Forgot password](#)

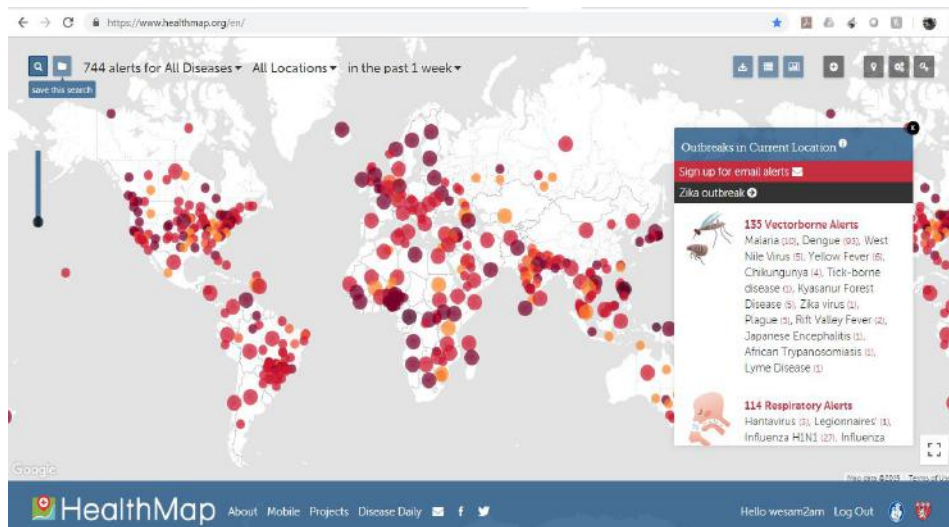
- D. Once you have completed this a mail notification will be sent to you with a link. Click/follow the link to confirm your registration. HealthMap will send you a confirmation email. You are now ready to log-in and search for diseases and events. Check the language setting by clicking the icon below.



### E. Filtering for diseases and events



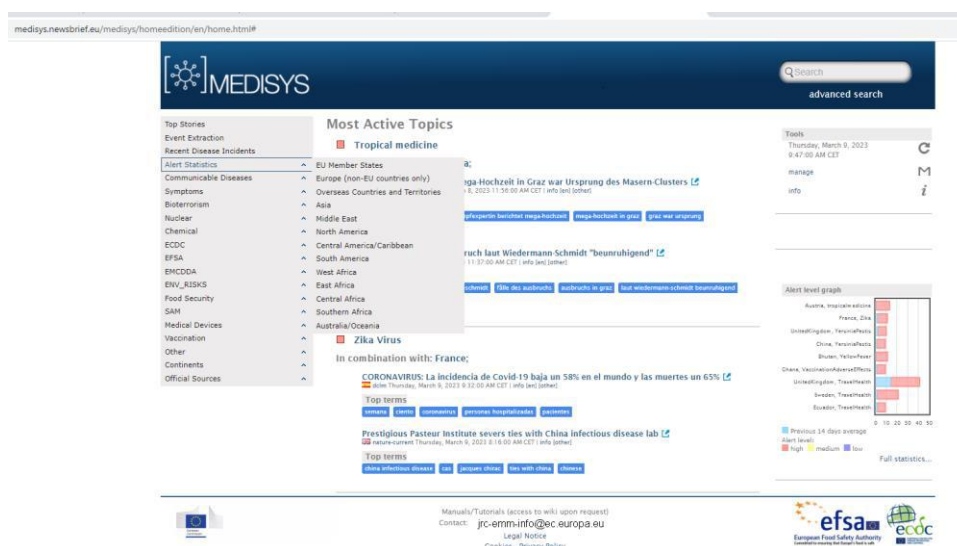




## MedISys (Medical Information System)

MEDISYS ([MEDISys link](#)) is a media monitoring system providing EBS to rapidly identify potential public health threats using information from media reports. It displays the articles with interest to public health (e. g. diseases, plant pests, psychoactive substances), analyses news reports and warns users with automatically generated alerts.

- MedISys is a fully automatic 24/7 public health surveillance system, run and maintained by the Joint Research Centre (JRC) of the European Commission.
- MedISys covers infectious human and animal diseases, bioterrorism and CBRN threats reported in open-source news media and provides daily automated e-mail alerts to Subscribers.



MedISys users can access world maps in which event locations are highlighted and graphs showing



- Aggregate disease counts by geographical location
- filtering of news according to language, disease or location, and filtering by orthogonal categories such as “outbreaks”, “treatment”, “legislation”, and displaying of specific entities within the news article such as persons, organizations, and search words

## Global Public Health Intelligence Network (GPHIN)

This is an electronic public health early warning system developed by Canada's Public Health Agency, and is part of the WHO Global Outbreak Alert and Response Network (GOARN). This system monitors internet media, such as news wires and websites, in nine languages in order to help detect and report potential disease or other health threats around the world

- The online sources of GPHIN are drawn from sources available from Factiva and Al Bawaba, supplemented by automated and manual web crawling done by GPHIN analysts.
- Machine selection of articles is based on keywords corresponding to the IHR.
- Outputs are presented to GPHIN’s user community (WHO, public health, intelligence, and law enforcement officials) as raw, machine-selected and translated articles.

The screenshot shows the GPHIN website interface. At the top, there is a navigation bar with 'All languages' and 'All articles' buttons, and links for 'Log out', 'wnankoula', 'Health ministries', 'Contact us', 'Help', and 'Français'. Below the navigation bar, there are 'Filter Results' and 'Show Map and Graph' buttons. The main content area displays a list of search results. The table below represents the data shown in the screenshot.

Date	Title	Publication Name	Source Language	Relevance	Source
2019-03-12 02:42 UTC	African swine fever: Global pork 'black swan' event	National Hog Farmer	EN	0.83	AP
2019-03-12 02:42 UTC	New Zealand calls for vaccination against measles following outbreak	Xinhua News Agency	EN	0.96	HBA
2019-03-12 02:42 UTC	Luence Diagnostics to Develop AI Tools for Liver Cancer Treatment	PR Newswire	EN	0.91	O
2019-03-12 02:40 UTC	Gov't to strengthen inspections of places vulnerable to bird flu outbreaks	Yonhap English News	EN	0.78	HAP
2019-03-12 02:24 UTC	SOIL TESTS FOR TOXIC CHEMICAL	Westside Weekly	EN	0.42	NCP
2019-03-12 02:21 UTC	Psychosis in Maduro secondary school due to influenza cases	CE NoticiasFinancieras	EN	0.77	HAO
2019-03-12 02:02 UTC	New Zealand's measles outbreak set to spread in South Island	opa International Service in English	EN	0.89	HA

## Epidemic Intelligence from Open Sources (EIOS)

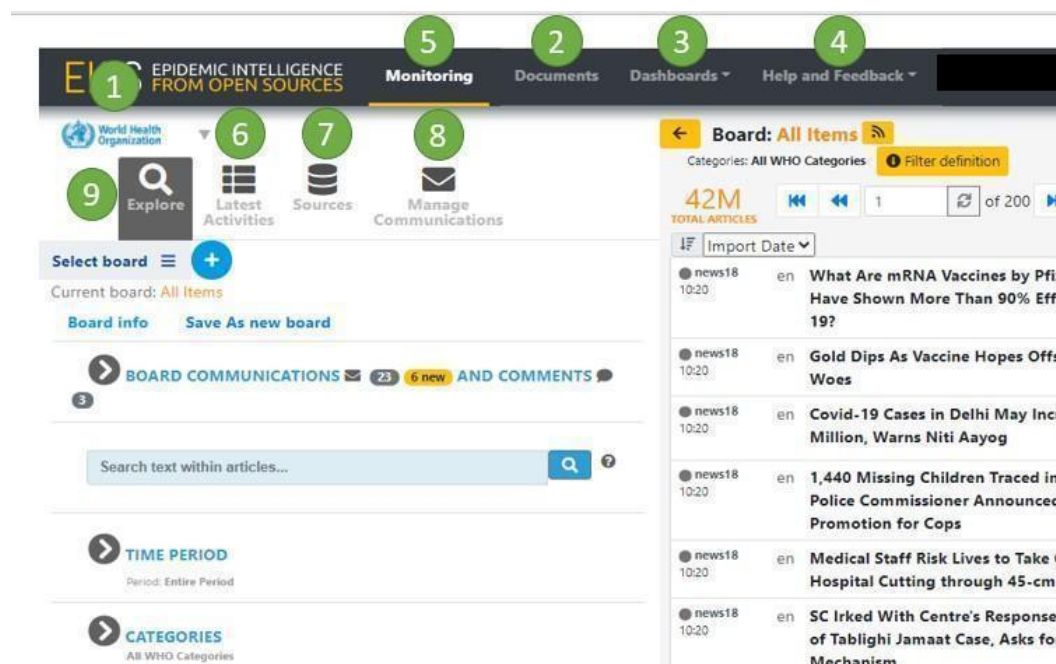
The EIOS initiative is a unique collaboration between WHO and various stakeholders that brings together new and existing initiatives, networks, and systems to create a unified all-hazards One Health approach to early detection using the EIOS system. This document introduces the EIOS system interface to familiarize yourself with the system. (However, comprehensive training is provided to countries upon request submission to WHO)



## Getting started with EIOS

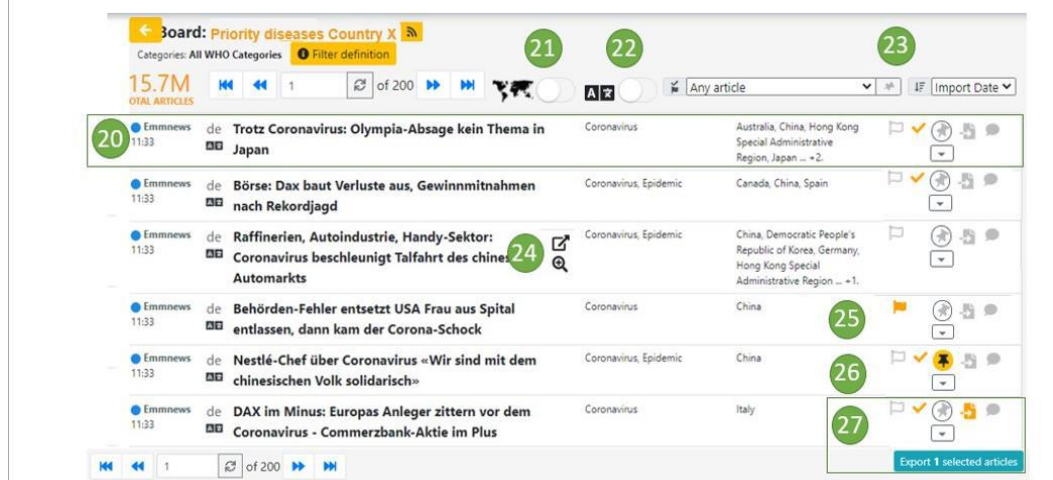
On your first login, you will be brought to the monitoring page as shown below. If you have any issue logging in, please contact your Community Manager, your WHO Regional EIOS Coordinator or FP. If you don't know who they are, please contact [eios@who.int](mailto:eios@who.int).



Note that in the next pages, you can “press CTRL” and “click” on the hyperlinks to be redirected to the relevant section of the Reference manual and get additional information



1	You can find here which <a href="#">Community</a> you are in. If you are a member of multiple communities, this box will contain a dropdown menu that allows you to switch between your communities.
2	The <a href="#">Documents page</a> is where you can share documents with others in your community. You can also find there the User guide, which explains how to use the EIOS system, and the FAQ which provides answers to many of the questions you may have about the EIOS initiative and system.
3	The <a href="#">Dashboards</a> dropdown menu gives you access to the Big Screen Map and other available dashboards. The <a href="#">Big Screen Map</a> page is a visualisation of some of the most recent articles about selected events.
4	The Help and feedback dropdown menu gives access to the <a href="#">Reference Manual</a> , which provides in-depth instructions for all the buttons and functions as well as information on revisions and additions to the EIOS system. Under this menu, you also have access to the <a href="#">Feedback</a> page, which allows you to share comments, report a technical issue or ask a question.
5	The <a href="#">Monitoring page</a> is the page you will mainly use. You can view a list of articles in the system (based on selection criteria), navigate through article pages, and then apply additional search and filter criteria as desired. The yellow line under its name shows that this is the page you are currently viewing.
6	You can use the <a href="#">Latest Activities tab</a> to see how many articles were read, flagged, pinned by people in your community or team or to see which user has opened, modified or closed a board.
7	You can use the <a href="#">Sources tab</a> to check whether the sources you want to make sure are included in your community are there and how many articles are coming through from each source.

<b>8</b>	The <a href="#">Manage Communication tab</a> allows you to search for a specific communication across all the boards to which you have access, read the message, see the attached articles and reply.
<b>9</b>	The <a href="#">Explore tab</a> is the main tab used for media monitoring activities. From the Monitoring page you can view and filter articles, comment on articles and create communications. The grey box around the name shows that this is the tab you are currently viewing.



<b>20</b>	Once a board is selected, the articles matching the applied filters will be displayed on the <a href="#">article panel</a> on the right side of your screen. Each <a href="#">article row</a> shows selected information and allows you to interact with the specific article. Article titles will appear in their original language of publication.
<b>21</b>	A map is visible above the Article rows when the <a href="#">Map switch</a> is turned on. The map displays locations mentioned in the articles found below the map. The map can be useful to select a subset of articles based on a <a href="#">location</a> , to apply a <a href="#">Spatial filter</a> by drawing an area of interest on the map, or to produce a map to include in a <a href="#">report</a> .
<b>22</b>	The current <a href="#">built-in translation tool</a> translates a few languages to English. One main advantage of the current translation functionality is with the text search. However, to translate the whole content on the article page, we recommend that you use an external translation tool, such as the Google Translate extension. You can find more information on how to install some options in the <a href="#">translation</a> section of the Reference manual.
<b>23</b>	You can <a href="#">filter</a> and <a href="#">sort</a> the articles displayed on the article panel according to the options listed in the Reference manual.
<b>24</b>	When you hover anywhere over an article row, two icons will appear. Clicking on this icon  will open the full article on the original publication website (external to EIOS). Clicking on this icon  will open the <a href="#">Detail view</a> in EIOS, which allows you to read the article, obtain additional <a href="#">information</a> (language, mentioned countries, locations, associated categories, etc.) and interact with the selected article in EIOS ( <a href="#">pinning to any board</a> , <a href="#">commenting</a> , highlighting key words which triggered the category label, etc.).

25	On the article row, you can flag articles of interest for future reference by clicking on the <a href="#">flag icon</a> . Flags are visible across the community – your flags will be yellow, and everyone else’s flag will be grey. Flags belong to individual users, and an article can be flagged by multiple users at the same time.
26	You can also pin an article of interest to any board for future reference by clicking on the <a href="#">pin icon</a> . Pinning is shared across all members of the community. This means that if an article has been pinned to a board by someone else in your community and you unpin it, it will be unpinned for everyone.
27	To create a report, first mark the desired article(s) by clicking the <a href="#">export icon</a> . Then click on <a href="#">Export articles</a> at the bottom of the article panel, select the template, and generate a Microsoft Word document.

## Case Study

**Objective:** This exercise is aimed at enabling learners to develop, practise and improve their skills of using PROMED (as an internet biosurveillance tool) for detecting events in their countries as well as neighbouring countries.

Participants are expected to have a laptop or a tablet with access to the internet.

This session is expected to last for 15 minutes

**Methodology:** participants are expected to work in groups of five. Each group should nominate a chair, note taker and presenter.

### Instructions for group work

1. Ask participants to go to [ProMED](#),
2. Depending on where their country is located, ask them to click on “Anglophone Africa”, “Afrique Francophone” or “Middle East/Northern Africa”
3. Use the zoom button (+/-) to bring the map to required scale
4. Scroll to your country or any other Member State reporting an outbreak.
5. Using the provided webpage scan through the outbreak report and capture the critical information needed for next steps.
6. Each group records and presents their findings.

### Expected response

Each participant is expected to access the PROMED page.

They should be able to identify their countries or other countries of interest on the map

### Critical information should include:

- Source/informant: the website where media scanning signal was obtained
- Signal: when it happened, who/what was affected (cases, deaths) and where it originated and spread
- Date of signal/event start date
- Follow up of the signal: verification, risk assessment and response
- Date of reporting the signal to the next level
- EBS analyst tasked to follow up

## Module 6: Facility EBS

Event-based surveillance in facilities (FEBS) aims to improve early detection and reporting of signals within a facility that may represent a health risk, (such as a cluster of illnesses in a human or veterinary clinic, unexpected change in water quality at a water treatment facility). Facilities for event-based surveillance (FEBS) include human health, animal health facilities (e.g., veterinary clinics, zoos, farms), laboratories, environment (e.g., wastewater facilities) and others.

This module correlates with Chapter 5 of the EBS framework and is aimed at providing learners with an overview of the considerations that should be made when implementing FEBS.

The time allocated for this module is 1.5 hours, which includes 20-30 minutes for presentation, 10 minutes for questions and answers and at least 1 hour to enact one of the two case studies listed at the end of the module.

The methodology for instruction is PowerPoint presentation, interactive discussions, and case study.

**Equipment needed:** The facilitator will require a laptop, LCD projector, screen, and a pointer; PowerPoint presentations; one copy of the EBS training module facilitator guide; flip charts, and marker pens. The participants will each require a copy of the EBS training module participant manual, and associated case study materials.

### Module objectives:

- To describe the sources and steps of facility EBS.
- To understand the various stakeholders' roles and responsibilities
- To describe the flow of information for facility EBS.

FEBS is not disease specific and doesn't make use of standard case definitions that are typically used in IBS in health facilities. Clinicians, nurses, CHW, veterinarians, para-veterinarians, CAHW, field extension workers and other relevant professionals can be trained within the facilities to detect and report on signals. Depending on the type of facility, the signal may take a variety of forms such as: cluster of deaths (health facility), antimicrobial resistance AMR (laboratory), animal abortions (animal health facility), etc. A detailed list of signals by sector and facility type is listed in Annex 8.

### Examples of signals at the health facility level include:

- a) Occurrence of one or more cases or deaths of a severe, unusual, or unexplained disease, based on clinician's professional judgement and failure to respond to standard treatment
- b) One or more healthcare worker(s) with severe illness after attending to patients with similar symptoms
- c) Cluster of animal deaths in an animal clinic, farm, game reserve/park, zoo

- d) Unusual change in physical water quality parameters of drinking water sources (e.g., colour, taste, odour, suspended solids, turbidity)

## Sources

### General examples of signal sources at facility level include:

- a) Health facilities: Healthcare workers should participate in both IBS and EBS since signals can come from both surveillance systems.
- b) Historical data gathered over time during routine sentinel surveillance (IBS) can provide alerts or benchmarks against which to compare the early course of an event
- c) Healthcare workers from the following health facility departments such as wards, pharmacy, laboratory, Outpatient Department (OPD), public health and others.
- d) Veterinary clinics, laboratories, water treatment facilities

## Steps for conducting Facility EBS (FEBS)

Information is initially captured as a signal at a healthcare (or other) facility as reported by healthcare workers or through trends in data collected at the healthcare facility. Not all signals may necessarily become real events, as such, they all need to be triaged, verified and risk assessed before a response is initiated.

### Step 1: Detection

At health facilities, signals are most likely to be detected by HCWs. Key steps for detection are as follows:

1. The EBS FP at the facility sensitises HCWs and other facility staff on FEBS signals and how to report them. In facilities without an EBS FP, the facility officer in charge or any other assigned staff could play this role.
2. HCWs and facility staff detect signals according to the pre-determined list of signals. This may be done by taking note of the number of cases, prescriptions, lab requests, data summaries, reports from caretakers and/or patients. When the signals are detected, the facility staff records in a notebook detailing important pieces of information concerning the signal such as time, location, and source.
3. Once recorded, the facility staff reports the signals immediately to the facility EBS FP or facility in-charge. The reporting mechanisms are diverse and include phone calls, SMS, in-person (verbal), electronic platforms, mobile applications, paper-based forms, social media, and others.

4. The EBS FP records the signal received and reports to the facility officer in-charge and EBS FP at the intermediate level for their information. The EBS FP at the facility level then proceeds to triage.

### **Step 2: Triageing**

Once a signal is reported, the EBS FP or facility in-charge takes further steps to triage the signal. Throughout this process, other facility staff may be engaged providing relevant information. Key steps for triaging involve:

1. Establish that the information being reported is pertinent to EWAR.
2. Confirm that the signal conforms to the pre-determined signals.
3. Confirm that the same signal has not been reported from the same or different sources (duplicate reports)
4. Register signals that are not duplicates and correspond to one of the pre-defined signals and proceed to verification.
5. Triage can be done by the EBS FP or the person in charge of the facility.

### **Step 3: Verification**

The facility's EBS FP or the facility in-charge will verify all triaged signals that meet the signal definition of the pre-defined signal list. Verification can be conducted by:

- Asking other people about the reported signal and visiting the person or facility from where the signal has been reported.
- In case of inability to access location or event site, a phone call could be made to the officer in charge or FEBS Focal person who then verifies the signal to establish validity. The result of the verification is the confirmation that a signal is true or false.
- Once a signal is verified and confirmed as true, it becomes an event and must be recorded in the register (Annex 2) and reported to the EBS FP at the intermediate level/ relevant authorities for risk assessment. Feedback should also be provided to the HCWs or facility staff who reported the signal.

**Note: the process of verification and reporting should be completed within 24 hours.**



## Step 4: Risk Assessment

Risk Assessment for FEBS most typically happens at the administrative unit within its jurisdiction whether this is at the local, intermediate, or national level. See Module 2 for more detail on risk assessment methods. **Risk assessment should take place within 48 hours of signal/event detection.**

## Step 5: Alert

Based on the risk assessment and characterization, the signal becomes an event and appropriate response should be conducted by the intermediate or national level.

## Stakeholders' roles and responsibilities

The success of FEBS is based on the early detection and immediate notification of signals; the key stakeholders and their respective roles within this FEBS workflow as shown in Table 7.

**Table 7: Roles and responsibilities of the facility event-based surveillance (FEBS) workforce**

Workforce	Primary roles	Supportive roles
Facility Staff	<ul style="list-style-type: none"> <li>- Detect signals</li> <li>- Share information on signals with FEBS FP</li> <li>- Receive feedback about signals from FEBS FP</li> <li>- Participate in training on FEBS, facilitated by health authorities</li> </ul>	<ul style="list-style-type: none"> <li>Provide information needed</li> <li>Participate in the sensitization meetings</li> <li>Participate in the review meetings</li> </ul>
FEBS FP	<ul style="list-style-type: none"> <li>- Participate in training on FEBS, facilitated by health authorities</li> <li>- Sensitise facility staff and key informants on FEBS</li> <li>- Detect signals</li> <li>- Record signals in notebook or applicable e-platform</li> <li>- Lead signal triage and verification for signals detected at facility</li> <li>- Report signals and events immediately to designated health authorities (e.g., local/intermediate-level FPs)</li> <li>- Support risk assessments as needed</li> <li>- Receive feedback about reported signals/events from health authorities</li> <li>- Provides feedback to the reporting party</li> <li>- Adopt and mobilise HCW and other facility staff to positive behaviour change for health</li> </ul>	<ul style="list-style-type: none"> <li>Provide additional information for triage and verification</li> <li>Provide additional information to the Risk Assessment team</li> <li>Mobilise community members to action</li> <li>Referral of community members and sick animals</li> <li>Supports intermediate/national team during Risk Assessment</li> <li>Supports intermediate/national team during response</li> </ul>
Local-level supervisor/FP	<ul style="list-style-type: none"> <li>Participate in FEBS training, facilitated by health authorities at national/intermediate level</li> <li>- Assist in sensitising community stakeholders involved in FEBS</li> </ul>	

	<ul style="list-style-type: none"> <li>- Receive reports of signals from local level facilities</li> <li>- Record signals in register/logbook or an electronic register</li> <li>- Support local-level facility FP with signal triage and verification</li> <li>- Report signals/events immediately to intermediate-level FPs</li> <li>- Participate/conduct risk assessment and response activities</li> <li>- Provide feedback to local-level facilities reporting signals/events</li> </ul>	
<b>Intermediate level EBS FP</b>	<ul style="list-style-type: none"> <li>Facilitate FEBS training for facility staff and FPs with national level</li> <li>- Assist in sensitising community stakeholders involved in FEBS</li> <li>- Receive reports of signals/events from FEBS FPs (and local-level FPs, where applicable)</li> <li>- Record signals/events in register/logbook or an electronic register</li> <li>- Support FEBS FPs with signal triage and verification</li> <li>- Report events immediately to national level FPs</li> <li>- Conduct risk assessment and response activities, where applicable</li> <li>- Escalate FEBS activities to the national level for support</li> <li>- Provide feedback to immediate lower level (e.g., local-level and facility FPs)</li> <li>- Data analysis and use</li> <li>- Monitoring FEBS activities</li> </ul>	<ul style="list-style-type: none"> <li><b>Support FEBS Focal person in verification</b></li> <li><b>Mobilisation of resources for FEBS</b></li> <li><b>Support evaluation of FEBS</b></li> <li><b>Coordinate stakeholders</b></li> </ul>
<b>National level EBS FP</b>	<ul style="list-style-type: none"> <li>Support training of the intermediate workforce</li> <li>- Supervision the intermediate activities</li> <li>- Monitoring and evaluation</li> <li>- Mobilisation of resources for FEBS</li> <li>- Provide feedback</li> <li>- Coordinate stakeholders</li> <li>- Develop policy and guidelines for FEBS</li> </ul>	<ul style="list-style-type: none"> <li><b>Support risk assessment and response process</b></li> <li><b>Supervision of lower levels</b></li> </ul>

## Flow of information for FEBS

The flow of information for notification and feedback on FEBS is illustrated in Figure 10 Flow of information in FEBS. Signals are detected by HCWs or other facility staff in facilities then notified immediately to FEBS FP. The reporting follows the existing surveillance reporting structure.

Regular feedback to information providers regarding the signals and events reported is imperative to sustain motivation for reporting by HCW and other FPs. Feedback is one of the core functions of a surveillance system and can help to trigger important actions against the reported

signals/events at all levels. When practised over time, it will also help to enhance the balancing between sensitivity and specificity of the surveillance system. For instance, feedback can help to revise the signal definition to reduce system overload. Low specificity would result in the surveillance system documenting many "false" outbreaks and spending a lot of resources and time for verification and investigation.

Feedback can be affected through different ways including supervisory visits, meetings, active calls, short message texts and newsletters. It is important to continuously monitor and evaluate the quality and usefulness of feedback provided. It is important to highlight cross reporting at the different administrative levels between the different sectors (animal, environment, and human)

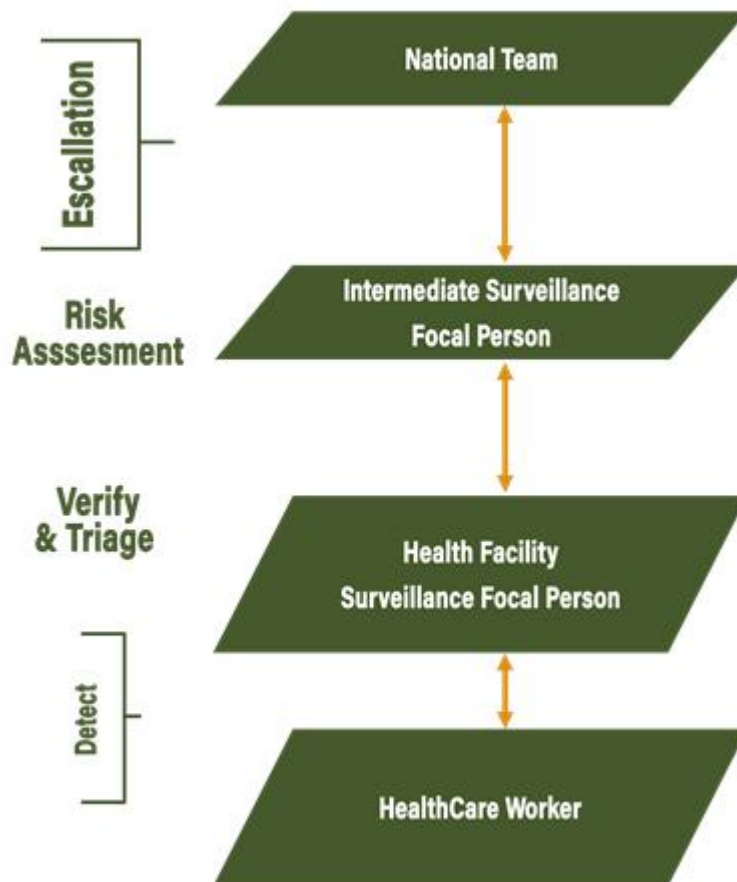
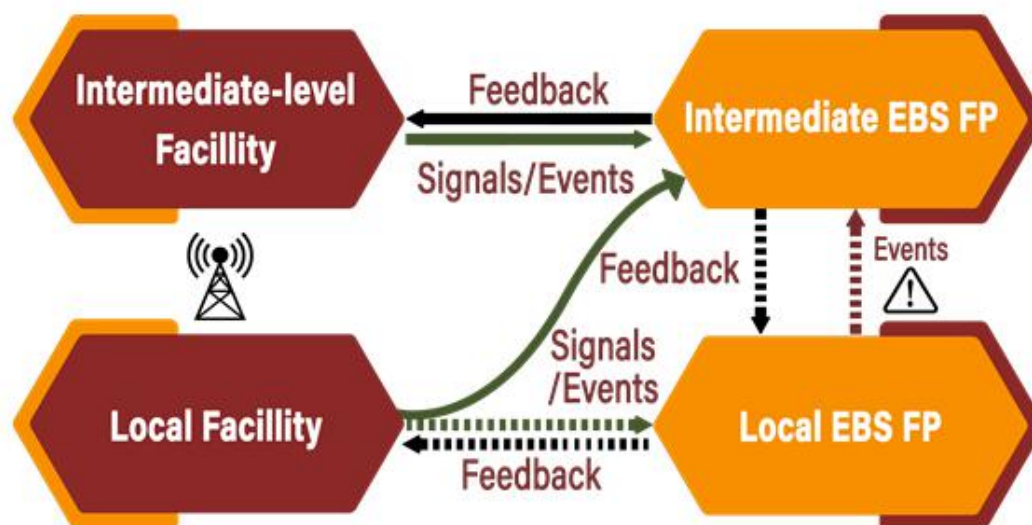


Figure 10 Flow of information in FEBS



## Case Studies

### Health Facility

**Objectives:** This case scenario aims at orienting participants of the EBS steps involved in conducting facility based EBS at a health facility.

**Methodology:** Print out any necessary documents involved in this case scenario. Prepare a training room to support plenary and break out group sessions. Share with the training participants the objectives of the case scenario exercise, approach, and the time it will take to complete. Divide them into groups of at least five members (depending on the overall number of participants). Provide them with print out copies of the case scenario. Encourage them to select a moderator and a recorder of discussions. Ask them to read through and brainstorm on the case scenario for five minutes. Allow them to ask questions, if any, during this period.

**Group work:** Group work should take in overall 25 minutes to complete (5 minutes to read through and brainstorm; 20 minutes to answer the questions. This will be followed by a 10-minute plenary session to present and discuss all group work outputs.

**Tools:** signal list and human risk assessment tool (see Annexes 6-8)

**Scenario:** On June 19th, 2022, Dr. Tetuh, Kosso district surveillance officer received a call from the Facility EBS (FEBS) FP at Bassar Hospital, Dr Warri, who reported that 2 days earlier, a 23-year-old pregnant woman (3rd trimester) had been admitted in the emergency room with fever, general malaise, weakness, headache, vomiting and shortness of breath. A chest x-ray chest revealed lobar pneumonia. A standard pneumonia treatment plan was initiated.

5 hours ago, she started bleeding from her gums and nose and her clinical condition has been getting worse with facial swelling, pain in the chest, back, and abdomen. She was transferred to the ICU. Despite adequate treatment, the patient developed shock and multi-organ failure. The head of the ICU reported the case to the FEBS FP as a signal because he thinks the patient presents with an unusual clinical manifestation and fails standard treatment.

### Questions

1. Is this case reported by the head of ICU a signal? Why?



- a. Yes, because they state that the patient is presenting with unusual symptoms and is failing standard treatment.
- b. This scenario aligns with signal #
2. If this information is a signal, who should conduct the triage and verification, and how?
  - a. The Facility EBS FP (e.g., surveillance officer, in-charge, etc.) should conduct both the triage and the verification of the signal. In this case it would be Dr. Warri at Bassar Hospital.
  - b. The person conducting triaging should have at hand the list of pre-determined/priority signals. They should first confirm if the signal is one of the pre-determined signals and/or if it is relevant to the EWAR. If neither, they should discard this signal. If it meets these criteria, they should determine that this report is not a duplicate of something previously reported. If not a duplicate report, they should immediately report to the Intermediate level Surveillance Officer or other relevant official at the intermediate level and subsequently conduct the verification.
  - c. The person conducting verification should make a physical visit with the source in the facility to establish if the information is true and a representation of what is happening. It is important to remember to record the results in the register and provide feedback to the community health worker. The entire process of signal verification should be completed within 24 hours.
  - d. *Note that triage and verification can often be conducted in the same step within a facility, so there are times when the facility EBS FP will be reporting up an event (not a signal) to the Intermediate level FP.*
3. If the signal has been verified as an event, what is the next step?
  - a. This becomes an event that should be reported to the next higher-level, e.g., intermediate, for risk assessment.
4. Who should conduct the initial risk assessment and what is the outcome?
  - a. Intermediate EBS FP/Surveillance Officer or any other relevant person from the intermediate or higher level should conduct risk assessment.
  - b. Based on the Africa CDC Risk Assessment Algorithm the result is: High
    - i. Q1: Yes
    - ii. Q2: Unknown/No
    - iii. Q3: No

## Wastewater Facility

**Objective:** To enable the participants to understand how EBS can be conducted at alternate facility types like a wastewater treatment facility and the importance of taking a multisectoral approach.

### Methodology:

- Group work: divide participants into groups of 5 and have them work through the scenario. Read the first scenario in plenary then have the groups work through the first set of questions for about 10 minutes. Introduce inject 1 in plenary and then have the groups work through the second set of questions for about 20 minutes. After this each group should be given about 5-10 minutes to present and discuss their responses.
- Time: 45-60 minutes
  - Group work: 30 minutes; 10 minutes for the first scenario and 20 minutes for inject 1
  - Group presentation: 15-30 minutes

**Scenario:** On March 20, tropical storm Leo struck ground in Mozambique causing widespread flooding along the coastline. Staff at a wastewater treatment plant outside of Beira noted that both raw and partially treated sewage from the plant was starting to enter the local waterways, including the Pungwe river, due to the recent storm surges. The Beira metropolitan area receives its water supply from the neighbouring Pungwe river. Farms in the region irrigate their crops with the nearby river water as well. The river serves as a source of drinking water for the nearby livestock and wildlife and supplies fish to the nearby markets.

Upon realisation of the breach and resulting contamination to the local waterways, the facility staff immediately notified the plant manager. The manager confirmed the occurrence of the breach and immediately notified his intermediate-level supervisor within the Ministry of Water.

### Questions:

1. **Is this an event on the existing signal list and/or relevant to EWAR? Why or why not?**
  - a. See signal definition list in Annex 8. This event relates to environmental-related signals 1,2 5. Diseases such as cholera, diarrhoea, dysentery, hepatitis A, typhoid, parasites, and polio are linked to contaminated water ([ref](#)). Additionally, contaminated water can impact the environment, contaminate crops intended for the food supply, and cause illness in animals ([ref 1](#), [ref 2](#)).
2. **If this event is relevant to EWAR, what are the next steps that the district supervisor should take?**
  - a. Ensure event is logged into the data capture form/event management system
  - b. Conduct a risk assessment
  - c. Issue an alert to the team responsible for taking action (e.g., field investigation, mitigation steps)

**Inject 1:** The district sent a team to investigate the breach to determine the approximate amount of sewage that has spilled over into the waterways and also test for contaminants in the local water way to see if the levels could impact human, animal, and environmental health. The team discovers that over 10 million gallons of raw and partly treated sewage have been dumped into the waterways. And the contaminant levels in the river have exceeded those safe for drinking. It is likely that neighbouring districts could have been impacted by this event and that other wastewater treatment facilities in the country could have been impacted by the tropical storm.

3. **What are the immediate next steps for the district supervisor? What stakeholders should be notified? How would you engage the relevant stakeholders, especially any relevant government sectors?** *Note: in this country a multisectoral, One Health data sharing policy exists*
  - a. The intermediate level supervisor needs to immediately alert the national level FP of these findings and develop a communication to alert his counterparts within public health, animal health (e.g., wildlife, fisheries, livestock), and the agriculture/plant health sectors.
  - b. An intermediate level multisectoral team should be convened
  - c. A multisectoral risk assessment should be conducted to understand the risks to all relevant sectors
4. **What are the next steps for the national level Ministry of Water FPs**
  - a. Conduct an assessment to determine if other districts and/or facilities have been impacted



- b. Alert the authorities responsible for convening all relevant ministries at the national level
  - c. Develop multisectoral messaging and issue a national level alert to the general public on the health risks related to this event and how to mitigate any negative outcomes
- 5. What are the immediate next steps that other sectors should take to mitigate risk?**
- a. Ensure the event is logged into the sector-specific (e.g., public, animal, plant health) data logs/event management systems.
  - b. Notify all levels (CHWs/CAHWs, facilities, etc.) of signal definitions that could be used to detect subsequent health-related events that could be linked to this event
  - c. Issue preventive/mitigation measure guidance to general public and other relevant stakeholders
- 6. If this event had not been picked up at the water treatment facility when it was, what are signals that could be used by the environmental and other sectors to pick up this event later on?**
- a. Algal blooms in the neighbouring waterways
  - b. Clusters of dead fish and other aquatic species in the waterways
  - c. Clusters of people with diarrhoea in the community and health facilities

## Module 7: Community EBS

The implementation of surveillance in community settings is essential for early detection, reporting, and response to emerging health events. Community event-based surveillance (CEBS) is the systematic detection and reporting of events of public health significance within a community, by community members.

This module correlates with Chapter 6 of the EBS framework and focuses on the detection of signals, processing of signals and the roles and responsibilities of stakeholders involved in the process. It also highlights the critical role of CEBS as a function of EWAR.

The time allocated for this module is 1.5 hours, which includes 20-30 minutes for presentation, 10 minutes for questions and answers and at least 1 hour to enact one of the case studies listed at the end of the module.

The methodology for instruction is PowerPoint presentation, interactive discussions, and case study.

**Equipment needed:** The facilitator will require a laptop, LCD projector, screen, and a pointer; PowerPoint presentations; one copy of the EBS training module facilitator guide; flip charts, and marker pens. The participants will each require a copy of the EBS training module participant manual, and associated case study materials.

### Module objectives:

- To describe the sources and steps of community EBS.
- To understand the various stakeholders' roles and responsibilities
- To describe the flow of information for community EBS.

Community health workers (CHWs), community-based animal health workers (CAHWs), the public, religious leaders, civil society members, teachers, and similar groups can be engaged and trained to detect and immediately report unusual health events or health risks occurring in their communities that align with pre-determined signals. These signals may be predictive of acute health risks that need early detection, reporting and response. Community signals should be broad (non-disease specific) simplified and free of scientific terminology to facilitate comprehension by community members. These signals should also be limited in number but broad enough to capture all public health risks in the community.

### Example of signals at community level are:

- a) Two or more cases of people presenting with similar severe signs/symptoms from the same community, school, or workplace within one week ('severe' can be elaborated at the community level as needing to seek medical care)
- b) A cluster of unexplained domestic or wild animal deaths
- c) An unexpected change in animal morbidity/mortality

- d) An illness with novel or rare symptoms ('novel or rare' can be explained as signs/symptoms that the community has not seen before)
- e) Abnormal colour or odour of community water source (e.g., river, well, spring)

Note: signals can be generated according to the list of pre-determined priority diseases, burden of diseases and other community factors. To simplify the reporting process, signals may be coded.

## Sources

Sources of EBS signals at the community level include:

- |                              |                       |
|------------------------------|-----------------------|
| a) Community members         | g) Construction sites |
| b) Livestock keepers         | h) Orphanages         |
| c) Traditional healers       | i) Local markets      |
| d) Schools                   | j) Drug shops         |
| e) Prisons                   | k) Social media       |
| f) Faith-based congregations | l) Mass media         |

Internet social media and mass media have become important communication channels to report signals and disseminate disease risks and interventions; at the community level they can be used as additional sources for signal detection. This happens when community members, community leaders or CHWs become aware of the relevant information disseminated/communicated/disclosed through these channels as information sharing platforms, which may be for non-public health purposes.

## Steps for conducting CEBS

Information is initially captured as a signal by CHW/CAHW and is reported by their supervisor to the CEBS FP at the local, facility, or intermediate level depending upon existing reporting lines and capacity (Figure 7). Not all signals may necessarily become real events, as such, they all need to be triaged, verified and risk assessed before a response is initiated.

### Step 1: Detection

At the community-level, signals are most likely to be detected by CHWs/CAHWs, community residents, traditional leaders, and other key informants because of their engagements in community networks. Detected signals should be recorded and reported immediately to the CHW supervisor, or designated FP (e.g. the nearest facility FP or CHW, etc.). Steps for detection include:

1. The CHW/CAHW supervisor sensitise the CHW/CAHW, key informants, community members on community EBS signals and how to report

2. CHW/CAHW or community members **identify** the signals. When the signals are detected, CHW/CAHW **records** in the notebook (Annex 3). **Note:** If the signals are detected by the community members, the best practice would be to report to the CHW/CAHW (who conducts preliminary triage).
3. Once recorded, CHW/CAHW **reports** the signals immediately to their supervisor. Where the supervisor is not available, the CHW reports directly to the associated facility or the community local structure. Means of reporting: telephone, SMS, or in-person
4. Provide feedback to the reporting party

**Note:** The CHW/CAHW Supervisor proceeds to triage. In the absence of the CHW/CAHW Supervisor, the EBS FP or facility in-charge proceeds to triage.

### **Step 2: Triaging**

Because of its high sensitivity, CEBS is likely to generate signals from real events and non-events. Once a signal is reported to the local supervisor, the supervisor triages the information provided to establish that it conforms to one of the pre-defined signals. Key steps for triaging are:

1. Confirm that the signal conforms to the pre-determined signals.
2. Confirm that the same signal has not been reported from the same or different sources (duplicate reports).
3. If any of the above statements are not true, discard the signal. If all of the above are true, report this to the next level (EBS FP at facility or other relevant official) for verification.
4. Provide feedback to the reporting level.

### **Step 3: Verification**

It is recommended that the CHW/CAHW and supervisor within the community or facility is trained to carry out verification. This could be done through a physical visit, telephone call or other means of communication with the source to establish if the information is true. The EBS FP conducting the verification may conduct a second level triage by cross checking if the information reported meets one or more of the pre-defined signals.

Key steps for verification are:

1. If the signal is true, it becomes an event and if not true discard, and record accordingly in the relevant tool (Annexes 2-4).
2. Report events immediately to a higher level for risk assessment (e.g, intermediate, national).

- The line listing of all the events identified during the month should be completed by the CEBS FP (Annex 2) and submitted monthly to the nearest facility/intermediate/local EBS FP every month

Note: Feedback should also be provided to the CHW/CAHW or community member who detected and reported the signal about the outcome of verification

Note: The result of the verification of signals should be recorded in a local register or signal logbook and the entire process **should be completed within 24 hours**.

### Step 4: Risk Assessment

This step should be done at the lowest level with capacity (e.g., intermediate level). It should take place within 48 hours of the signal detection. See module 2 for additional details on how to conduct risk assessment and characterization within the framework of EBS.

### Step 5: Alert

The final report should be prepared by the risk assessment team and then submitted to the relevant authority (e.g., intermediate level, national level, etc.).

## Flow of Information for CEBS

The flow of information for notification and feedback on CEBS is depicted in Figure 11 Flow of Information in CEBS. Signals are detected by a CHW/CAHW who is among the community and then notifies the local-level supervisor immediately. The reporting follows the existing surveillance reporting structure. The roles and responsibilities of the CEBS workforce are summarised in Table 8.

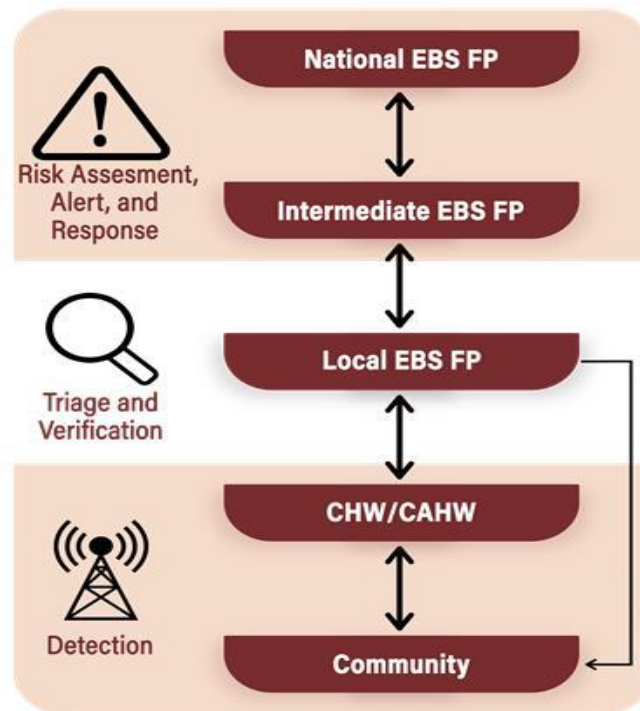


Figure 11 Flow of Information in CEBS

## Stakeholders' roles and responsibilities

Table 8: Roles and responsibilities of the community event-based surveillance (CEBS) workforce

Workforce	Primary roles	Supportive roles
Community residents	<ul style="list-style-type: none"> <li>- Detect signals</li> <li>- Share information on signals with CHWs/CAHWs</li> <li>- Receive feedback about signals from CHW/CAHW</li> </ul>	
Key informants	<ul style="list-style-type: none"> <li>- Detect signals</li> <li>- Share information on signals with CHW/CAHW</li> <li>- Receive feedback about signals from CHW/CAHW</li> <li>- Participate in training on CEBS, facilitated by health authorities</li> <li>- Adopt and mobilise community members to positive behaviour change for health</li> </ul>	<p>Provide information needed</p> <p>Participate in the review meetings</p>
Community Health Workers and Community Animal Health Workers	<ul style="list-style-type: none"> <li>- Sensitise community residents and key informants on CEBS</li> <li>- Detect signals</li> <li>- Record signals in notebook or applicable e-platform</li> <li>- Report signals immediately to designated health authorities (e.g., local-level supervisor)</li> <li>- Participate in triage, verification and risk assessments as needed</li> </ul>	<p>Provide additional information for verification</p> <p>Provide additional information to the Risk Assessment team</p>
	<p>Receive feedback about reported signals from health authorities and give feedback to the community members</p> <ul style="list-style-type: none"> <li>- Build networks, with other community key informants include animal health workers, pharmacies, traditional healers, women groups, alternative medicine outlets, local admin leaders)</li> </ul>	<p>Mobilise community members to action</p> <p>Referral of community members and sick animals</p>
Local-level Supervisors	<ul style="list-style-type: none"> <li>- Participate in CEBS training, facilitated by health authorities at national/intermediate level</li> <li>- Assist in sensitising community stakeholders involved in CEBS</li> <li>- Receive reports of signals from CHWs/CAHWs</li> <li>- Record signals in register/logbook or an electronic register</li> <li>- Triage and verify all signals to determine whether they are events</li> <li>- Participate/conduct risk assessment if applicable</li> <li>- Report events to FP at the next level up (e.g., intermediate or national level) for either risk assessment or response as applicable</li> <li>- Supervise/provide feedback to immediate lower level</li> <li>- Ensure the appropriate use of signal definitions to identify priority health events in the community</li> <li>- Data analysis and use</li> </ul>	<p>Work with intermediate level team to conduct rapid assessment of events</p> <p>Ensure sensitization of the community key informants (networks)</p>
Intermediate level EBS FP	<ul style="list-style-type: none"> <li>- Train and supervise local-level supervisors</li> <li>- Conduct initial risk assessment</li> <li>- Data analysis and use</li> <li>- Provide feedback to local-level supervisors</li> <li>- Submit reports to the national levels</li> <li>- Escalate CEBS activities to the national levels for support</li> <li>- Monitoring CEBS activities</li> </ul>	<p>Support local-level supervisors in verification</p> <p>Mobilisation of resources for CEBS</p> <p>Support evaluation of CEBS</p> <p>Coordinate stakeholders</p>



## Case Study

**Objectives:** This case scenario aims at highlighting the central role of CHW in early detection and response to signals of public health threats including infectious diseases. It helps the participant to improve understanding of key steps underpinning the EBS process and key stakeholders involved.

**Methodology:** Print out necessary documents including case scenario and signal register. Prepare a training room to support plenary and break out group sessions. Share with the training participants the objectives of the case scenario exercise, approach, and the time it will take to complete. Divide them into groups of at least five members (depending on the overall number of participants). Provide them with print out copies of the case scenario. Encourage them to select a moderator and a recorder of discussions. Ask them to read through and brainstorm on the case scenario for five minutes. Allow them to ask questions, if any, during this period.

**Group work:** Group work should take in overall 25 minutes to complete (5 minutes to read through and brainstorm; 20 minutes to answer the questions. This will be followed by a 10-minute plenary session to present and discuss all group work outputs.

**Tools:** signal list and risk assessment tool

**Scenario:** On 6th of June 2019 at Dr. Stephan, the District Surveillance Officer, received a call from Khady Philip, the local-level health supervisor in the village of Butumba. Ms. Philip informed Dr. Stephan that she was informed by a community health worker that five sick persons (2 children and 3 adults) were taken to a traditional healer in the village after they all fell ill with the similar clinical manifestations. All five persons had attended a wedding ceremony at a neighbouring village the day before, ate from the same bowl with their hands, and drank water from the same cup. Around 8 hours later, all became ill with severe vomiting and abdominal pain. All of them attended the local clinic and received fluid therapy due to moderate dehydration. The two children were referred to the nearest hospital because their clinical condition did not improve. The youngest (4 years old) died 2 hours later.

Questions: Answer the following questions using the triage, verification, and risk assessment tools.

1. **Is this information reported by the community health worker health volunteer a signal? Why?**
  - a. Yes, this would be a signal because it represents more than one case of people from the same village presenting with similar severe clinical manifestations within the same period and potentially common source of exposure. The occurrence presents a potential risk to public health, which could turn into an outbreak.
2. **If this information is a signal, who should conduct the triage and how should this be conducted?**
  - a. Local-level health supervisor in the village of Butumba
  - b. The person conducting triaging should have at hand the list of pre-determined/priority signals. She should first confirm if the signal conforms to the pre-determined list of signals and if it is relevant to the EWAR. If not, she should discard it. If yes, she should proceed to establish if there was any duplication in the number of patients reported. After this, she should report to the Disease Surveillance Officer or other relevant official at the local health facility
3. **If the signal is not a duplicate and is relevant to EWAR, what is the next step?**
  - a. The next step is verification

4. **Who should verify this signal and what is the process of verification?**
  - a. The EBS FP at the health facility or other relevant official should conduct the verification
  - b. The person conducting verification should make a physical visit with the source to establish if the information is true and a representation of what is happening. In situations where in-person verification is not possible, telephone calls with the source or other reliable people, including the health care workers in the primary health facilities, local health officers, and community leaders. It is important to remember to record the results in the register and provide feedback to the community health worker. The entire process of signal verification should be completed within 24 hours.
5. **If the signal has been verified as an event, what is the next step?**
  - a. This becomes an event that should be reported to the next higher-level, e.g., intermediate, for risk assessment.
6. **Who should conduct the initial risk assessment and what are the outcomes?**
  - a. District Surveillance Officer or any other relevant person from the intermediate or higher level should conduct risk assessment
  - b. Based on the Africa CDC Risk Assessment Algorithm the result is: Very High
    - i. Q1: Yes
    - ii. Q2: Unknown/Yes
    - iii. Q3: Unknown/No

## Module 8: EBS Monitoring and Evaluation

The primary goal of event-based surveillance is the early detection of outbreaks and other health threats. Those involved in EBS implementation at different levels need to use surveillance information to rapidly address identified health events; accurately report to the next level; and update partners and donors on implementation progress. Thus, there is a need for EBS implementers to review their performance in detecting and responding to events as well as account for EBS program activities and resources needed to stakeholders. This is done by establishing a monitoring and evaluation (M&E) plan for EBS. An M&E plan for EBS systems should provide timely information on whether a system is functioning properly and meeting targets, while providing data to guide continuous performance improvement. The plan should describe why, how, and when changes towards a desired EBS goal are achieved. In brief:

- Monitoring is the process of continuously tracking progress or delay in inputs, activities, outputs, and outcomes. Monitoring helps keep track of implementation processes and provides a basis for re-adjustments based on performance plan metrics.
- Evaluation is the process of periodically assessing the relevance, effectiveness, and impact of a program or system. Evaluation ensures that the EBS system meets the objectives for which it was set by providing evidence-based explanations for achievements and shortcomings and recommending its improvements.

This module correlates with Chapter 7 of the EBS framework and provides guidance for the implementation of an EBS M&E program, including suggested metrics for measuring success and a timeline for measuring results. This module is to provide skills to EBS implementers at all levels of the health system, to track and monitor progress of EBS activities. This module can also serve as a resource for developing training, supervision, monitoring and evaluation of surveillance activities.

The time allocated for this module is 45 minutes, which includes 30 minutes for presentation and 15 minutes for questions and answers.

The methodology for instruction is PowerPoint presentation, interactive discussions, and case study.

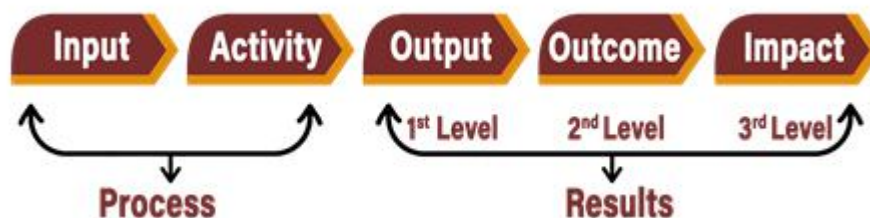
**Equipment needed:** The facilitator will require a laptop, LCD projector, screen, and a pointer; PowerPoint presentations; one copy of the EBS training module facilitator guide; flip charts, and marker pens. The participants will each require a copy of the EBS training module participant manual and a copy of the EBS framework or associated M&E Annexes 7-9 from the framework.

**Module objectives:**

- To describe the logical framework and different types of indicators that can be used to conduct monitoring and evaluation of EBS.
- To describe the different M&E data sources.
- To describe evaluation methodologies and considerations
- To describe the various M&E roles and responsibilities

### Logical Framework

To guide implementation of M&E for EBS, Africa CDC suggests the use of a logical framework termed the results chain, or pipeline, model (figure 12). The logic model represents the relationship between indicators. Indicators are measurable variables that provide information on status of the EBS program and enable managers to track progress, demonstrate results, and take corrective actions where necessary to improve the system.



*There are five types of indicators, which are input, activity, output, outcome, and impact. Input and activity indicators are categorized as process indicators while output, outcome and impact are categorized as result indicators of EBS implementation*

Figure 12: The five basic levels of results chain model

EBS programmes can be assessed routinely on how they are conducted (inputs & activities); their level of performance (outputs); and their achievements (outcomes & impact).

A results chain logic is a diagrammatic framework that hierarchically illustrates how a project or program actions taken at one level will lead to desired results at a higher level, over a defined period of time. It is a diagrammatic framework of the cause-and-effect logic for achieving a project/program objective over a defined period. The logic is that specific resources (inputs) are

required to undertake program tasks (activities) whose accomplishments (outputs) bring about system changes (outcomes) that eventually lead to an overall public health (impact).

It explains the links between what was done and what was achieved by demonstrating which actions will contribute to, or influence which results. The overarching questions are: Will the resources allocated deliver the desired results? Has there been measurable progress in the agreed results?

## Indicators

Indicators are measurable variables that provide information on status of the EBS program and enable managers to track progress, demonstrate results, and take corrective actions where necessary to improve the system. There are different types of indicators based on the steps of the program results chain framework.

- **Input indicators:** refer to the resources needed for the implementation of EBS or an EBS-related activity. Examples include:
  - Number of staff and key stakeholders available to implement EBS at each level
  - Amount of financing available for EBS implementation
  - Event management system in place
  - Technical guidelines, SOPs, and training materials are available for use
- **Process/Activity indicators:** measure whether planned activities took place. Examples include:
  - Number of personnel trained and equipped by sector and type of EBS implemented
  - Equipment and reporting tools for EBS are procured
  - Number of planning meetings held
  - Evaluations conducted
- **Output indicators:** measure the immediate results of EBS-related activities. Examples include:
  - Monitoring indicators reported
  - Number of signals reported, triaged, and verified
  - Number of events assessed for risk and responded to
- **Outcome indicators:** measure the quality of the surveillance system and the extent to which surveillance and early warning and response (EWAR) objectives were achieved. Examples include:
  - Proportion of signals verified within 24 hours of detection
  - Proportion of events which were notified within 24 hours after verification
- **Impact indicators:** measure the improvement of overall health that can be attributed to EBS. Examples include:
  - Reduced morbidity/mortality
  - Reduced outbreak costs

## Data Sources and Data Collection

There are multiple sources of EBS data. Data can come from EBS specific data tools (e.g., signal reporting, verification, risk assessment and response), EOCs or hotline call centre call logs and signal registers, support supervision checklists, and general patient registers and medical records. The collection of EBS monitoring data should be integrated into the routine systems for sustainability and cost effectiveness.

Evaluation of data sources includes routine monitoring in addition to information collected from external sources through interviews, observations, surveys and questionnaires, case studies, and

focus group discussions as well as key informant interviews. Standard evaluation tools are recommended for the formative and process evaluation activities to track progress.

The adaptation of this module will vary from one AU Member State to another. Important things to consider during the adaptation process include:

- Making references to existing baseline data or begin with a baseline evaluation
- Involving all program stakeholders, including implementers and beneficiaries
- Integrating into other surveillance systems for sustainability beyond the life of the program

Considering it as a living document that needs to be reviewed on an annual basis and updated to reflect any changes in referenced technical guidelines or whenever the EBS program is modified

### Sample EBS indicators

Indicator Type	Sample indicators
<b>Input indicators</b> (measures resources needed for the implementation of EBS or an EBS-related activity)	<ul style="list-style-type: none"> <li>- Number of staff and key stakeholders to implement EBS at each level</li> <li>- Amount of financing for event-based surveillance implementation</li> <li>- Number and type of resources provided</li> </ul>
<b>Process/activity indicators:</b> (measure whether planned activities took place)	<ul style="list-style-type: none"> <li>- Event-management system established</li> <li>- Existence of EBS signals for all sources/sites</li> <li>- Technical guidelines, SOPs, and training materials are available for use</li> <li>- Equipment and reporting tools for EBS are procured and available</li> </ul>
<b>Output indicators:</b> (measures the immediate results of EBS-related activities)	<ul style="list-style-type: none"> <li>- Availability of EBS implementation work plan and signal definitions</li> <li>- Personnel trained and equipped</li> <li>- Signals reported, triaged, and verified</li> <li>- Surveillance units, health facilities and communities that establish EBS</li> <li>- Monitoring indicators reported</li> <li>- Evaluation site visits conducted</li> </ul>
<b>Outcome indicators:</b> (measure the quality of the surveillance system and the extent to which surveillance and early warning and response (EWAR) objectives were achieved)	<ul style="list-style-type: none"> <li>- Utility of EBS for surveillance workforce, community, and leadership stakeholders</li> <li>- Events assessed for risk and responded to</li> <li>- Surveillance staff capable of analysing and interpreting EBS data for early warning surveillance</li> <li>- EBS data analysed into timely and accurate summaries</li> <li>- Sensitivity</li> <li>- Positive predictive value (PPV)</li> </ul>
<b>Impact indicators:</b> (measure the improvement of overall health that can be attributed to EBS)	<ul style="list-style-type: none"> <li>- Timely event detection, reporting, and response</li> <li>- EBS data used to initiate and inform outbreak response &amp; control efforts</li> </ul>



## **Sensitivity and specificity as components of evaluation**

A sensitive surveillance system is the one that would detect as many potential public health risks as possible; while the specific one would be able to minimise reporting invalid signals as much as possible<sup>1</sup>. EBS is more sensitive than IBS; because IBS depends on verified data, it is unlikely to report unverified information and therefore it is more specific. For unusual events, in situations of a scarcity of health services and where diagnostic facilities are lacking, EBS is very useful by collecting information before human cases occur or before an event is detected and/or reported through conventional recording and reporting systems. EBS therefore significantly increases the sensitivity of the surveillance system.

The success of EBS implementation is contingent on the early detection and reporting of signals and events through a country's surveillance and reporting structure. Timely and routine feedback can help to encourage reporters and maintain consistent EBS implementation. However, it is important to balance sensitivity and specificity for EBS to minimise the risk of overloading the health system (when sensitivity is too high) or missing important signals (when specificity is too high). Balancing can be achieved through continuous monitoring and evaluation of reported signals and their sources for important modifications. It is also important for verification to be done at the lowest level possible in order to prevent a high load of false signals from being transmitted to the next level.

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<sup>1</sup> Signals that may not eventually become events.



## Evaluation Methodology and Considerations

A number of different methodologies can be used to evaluate an EBS system and program. These can be experimental, observational, or quasi-experimental and will often combine both quantitative and qualitative methodologies to measure EBS system attributes (e.g., timeliness, completeness, accuracy, usefulness, simplicity, acceptability, flexibility, sensitivity, specificity, positive predictive value, and representativeness) from both primary and secondary sources. Several surveillance evaluation protocols<sup>1 2 3</sup>

exist that can be referenced and modified to suit this purpose.

An evaluation should be conducted shortly after implementation (formative evaluation) to obtain baseline data, at regular short-term intervals (e.g., annually) during implementation (longitudinal / process evaluation) to track outcomes, and at the end of implementation or at longer-term intervals (e.g., every 5 years) (summative evaluation) to track impacts. Where possible, evaluations should be integrated in the annual performance reviews, mid-term reviews and implementation completion and results reviews for sustainability and cost reduction.

**Internal evaluations** are conducted by the implementing program staff. The objective of internal EBS evaluation is to assist program managers with gaining a better understanding of their program to improve program processes and outcomes. The internal evaluation process promotes utilisation of evaluation findings, reflective practice, and organisational learning. The focus can be to find out to what extent the EBS program vision is being realised; how fully the implementation is being achieved to realise outcomes; or if there are unforeseen emerging events affecting implementation. Benefits to internal evaluations are that they tend to be not as resource dependent or collaboratively intensive. However, internal evaluations may lack expertise, objectivity, and considerations for a broader perspective.

**External evaluations** are conducted by evaluators from outside of the Member State or through program/activities supported by African Union, WHO, academic/research institutions, or other regional bodies. External evaluation verifies whether the instruments and methods applied in the implementation of the EBS programme are appropriate and viable. The external evaluations are done by experts, objective, and broader in perspectives; however, they are expensive and require collaborations.

Several conditions and external factors may have effects on the implementation and performance of EBS and should be considered when conducting an evaluation. These can include changing health priorities such as those occasioned by major health emergencies (e.g., COVID-19 pandemic) or other competing or better resourced programmes that can take focus away from the EBS program. Additionally, fluctuations in available resources to support other health-related programs, staffing, and infrastructure that EBS depends upon, such as community health services,

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<sup>1</sup> US CDC: Updated guidelines for evaluating public health surveillance systems; recommendations from the Guidelines Working Group

<sup>2</sup> WHO: Protocol for the evaluation of epidemiological surveillance systems / prepared by Liverpool School of Tropical Medicine and Ministry of Health and Child Welfare, Zimbabwe

<sup>3</sup> Clara, A., Dao, A.T.P., Mounts, A.W. et al. Developing monitoring and evaluation tools for event-based surveillance: experience from Vietnam. *Global Health* 16, 38 (2020). <https://doi.org/10.1186/s12992-020-00567-2>

can promote or lower EBS performance. Implementers should consider and map out these contextual factors when conducting and evaluation of the EBS program.

## M&E Roles and Responsibilities

Monitoring staff, inclusive of EBS program officers, should be identified at each level to ensure the M&E plan is implemented. These staff can also play a part in process evaluation, which may be done internally as part of the routine monitoring activities. However, impact evaluation requires the addition of an external team to work alongside the EBS unit. The external evaluation team should include a principal investigator, evaluation coordinator(s), and evaluation field clerks. See the breakdown of the roles and responsibilities in the table below (Table 9).

*Table 9. Key stakeholders and their responsibilities in EBS monitoring and evaluation*

<b>Role</b>	<b>Responsibilities</b>	<b>level</b>
	<b>Monitoring</b>	
<b>Program Manager</b>	<ul style="list-style-type: none"> <li>- Develop M&amp;E framework, SOPs, and tools</li> <li>- Train intermediate-level coordinators</li> <li>- Oversee M&amp;E activities and data collection</li> <li>- Maintain the M&amp;E information system</li> <li>- Produce M&amp;E reports</li> </ul>	
<b>Intermediate Surveillance Coordinator(s)</b>	<ul style="list-style-type: none"> <li>- Train community and facility EBS FPs on SOPs and tools</li> <li>- Conduct quality monitoring visits</li> <li>- Support the FPs and data collectors</li> </ul>	
<b>Surveillance FP(s)</b>	<ul style="list-style-type: none"> <li>Coordinate and oversee healthcare workers (HCWs) at the facility and community level</li> <li>- Train HCWs, CHWs, CAHWs, and other EBS staff</li> <li>- Conduct quality monitoring/support visits to facilities and communities</li> </ul>	
<b>Facility and Community Staff</b>	<ul style="list-style-type: none"> <li>Follow SOPs to collect EBS M&amp;E data on designated tools, mainstreamed into the routine surveillance activities</li> <li>- Conduct data quality checks</li> <li>- Share data</li> <li>- Maintain backup data (permanent)</li> </ul>	

<b>Evaluation</b>	
<b>Principal Investigator</b>	Design the evaluation protocol and tools in coordination with the project team and key stakeholders - Assemble, train, and supervise the evaluation team - Perform or coordinate data analysis, writing, and dissemination to key stakeholders
<b>Evaluation Coordinator(s)</b>	- Acts as primary liaison between the evaluation team, the program team, and any other stakeholders - Monitors the evaluation implementation and troubleshoots problems - Assists with developing field instruments - Undertakes fieldwork and oversee data collection - Assists the principal investigator with data cleaning, analysis, and writing of the evaluation report
<b>Evaluation Field Clerks</b>	- Collect evaluation data using the prescribed tools and methods - Deliver datasets to the coordinator and principal investigator

## **M&E Resources**

All EBS implementation programs must take into consideration and provide for its M&E activities. The government should take leadership in securing funding for M&E. However, agencies funding the implementation could support with additional resources for M&E. This may help in documenting the impact to justify further funding or just to assess return on investments. Other agencies that can provide resources for M&E are researchers who are interested in documenting the performance of the programme to answer research questions.

## **Analysis and Dissemination of M&E Information**

Analysis of M&E data can help monitor processes, identify problems, inform strategic planning, and justify a funding request. Sharing this M&E analysis with stakeholders can help engage stakeholders, advance, or consolidate knowledge on the program, and provide donors, policy makers and technical specialists with information on the effective implementation. Preparation of information for dissemination should consider:

- Purpose: Information to provide may include updates of processes monitoring, strategic plans, funding or regulatory compliance, problem identification, further funding needs, impact evaluation and program data for further action, feedback, and advocacy.
- Frequency: Project managers need frequent information to monitor progress and make decisions while donors, stakeholders, and policy makers require less frequent, periodic evaluation reports to ensure accountability and assess impact.
- Users: Different audiences require varying levels of complexity and technical language, formats, and media.
- Accessibility: Different users require varying user-rights and privileges to health information.
- Dissemination methods channels: Determine appropriate outlets necessary for management and policy makers (e.g., SitReps, SpotReps, etc.); and those for external stakeholder reporting (e.g., public fora, news releases, briefings, and web sites, etc).

# Module 9: EBS Data Management and Event Management Systems

This module correlates with Chapter 8 of the EBS framework and aims to increase the understanding of public health officers and health program staff to conduct basic data analysis and interpretation for public health programs. It focuses on ingesting, storing, analysing, and disseminating data created and collected during EBS implementation.

The time allocated for this module is 1.5 hours, which includes 20-30 minutes for presentation, 10 minutes for questions and answers and at least 1 hour to enact one of the case studies listed at the end of the module.

The methodology for instruction is PowerPoint presentation, interactive discussions, and case study.

**Equipment needed:** The facilitator will require a laptop, LCD projector, screen, and a pointer; PowerPoint presentations; one copy of the EBS training module facilitator guide; flip charts, and marker pens. The participants will each require a copy of the EBS training module participant manual, and associated case study materials.

## Module objectives:

- Provide an overview of EBS Data Management
- Describe the process for EBS Data Management
- Describe the key considerations in EBS data management
- To describe the different EBS products and mechanisms of dissemination of EBS

## Introduction to EBS Data Management

Event-based surveillance generates a large amount of data that needs to be collected, analysed, and disseminated in a manner that allows for timely and effective action. Countries must therefore have a system in place to manage this information which may rely on manual systems or automated event management systems.

NPHIs and other sectors implementing EBS might have several ways of collecting, recording, and reporting signals and events. The management and accuracy of reported signals and events can be improved with implementation of an electronic event management system (EMS). EMS is a system that registers signals from hotlines, media scanning, and other sources. EMS tracks the signals and events from when they are detected and until events are closed or signals discarded.

EBS data management involves data collection, analysis, and dissemination of information to inform decision making. EBS data collection should be undertaken with analysis and use in mind. It is important to consider how EBS reporting data (the process of reporting signals and verifying events) links to systems for tracking events and capturing data on outcomes (e.g., number of cases, hospitalizations).

EBS data should be considered of high quality - meaning that it is accurate, complete, and timely.

- Accuracy involves how well the data reflects reality
- Completeness considers if it fulfils the expectations of what's comprehensive
- Timeliness is about availability of information when needed

EBS data accuracy should be ensured through gathering data from credible and reliable sources including vetting of third-party sources. The accuracy should also be improved by making easy data entry through reducing workload, standardizations, and automation. Limiting access to the database maintains accuracy as it minimizes chances of unauthorized alterations and encourages the reporting of restricted or particularly sensitive signals. The program officers must also endeavour to clean data soon after entry to foster accuracy.

Incomplete data sets yield inaccurate results. Data completeness is critical to ensuring that EBS data and analysis conducted with these data are accurate. Data completeness can be improved by making certain fields in data systems mandatory, and by conducting data quality audits to compare source datasets (e.g., signal logs kept at a facility) to a central data repository (e.g., a dataset of signals received from facilities kept at intermediate or national levels). In automated systems, validation checks and skip patterns can also be included to ensure completeness of data.

Data are only useful in decision making if they are collected and shared in a timely manner to support interventions. Timely notifications and sharing of EBS data can be fostered through supporting communications systems and automations. Timeliness metrics can be used to assess how quickly information is shared between local, intermediate, and national levels as specified in national SOPs.

To improve data accuracy, completeness, and timeliness, data quality assurance - which is the process of routinely reviewing, screening, and determining the quality of the data collected in a particular data management system - must be undertaken. This process enables development and implementation of data quality checks to ensure the data serves the EBS needs. A key strategy that underpins data quality assurance is securing dedicated resources especially in the form of personnel and tools for data management.

### **Importance of EBS Data Management**

- Assures accuracy, accessibility, and availability of data
- Helps evaluate sensitivity of sources to guide resource allocation
  - Evaluate performance if the system (e.g., timeliness of verification and risk assessment)
- Helps decision makers understand information that has been gathered
- Helps to generate evidence to demonstrate the relevance of EBS in EWAR

### **Steps in EBS Data Management**

EBS data management involves data collection, analysis, and dissemination of information to inform decision making. EBS data collection should be undertaken with analysis and use in mind. It is important to consider how EBS reporting data (the process of reporting signals and verifying events) links to systems for tracking events and capturing data on outcomes (e.g., number of cases, hospitalizations).

### **Components of EBS Data Management**

- Collection
- Analysis and Presentation
- Dissemination



## EBS Data Collection and Sources

EBS data could be collected from multiple sources and sectors. The type of data collected at the primary data collection site should be standardized and adopted at national level and disseminated to all collection points (Hotline desk, media scanning desk, community EBS FP and FEBS FPs. Data should be captured and transmitted in real time to facilitate prompt processing (i.e., triage, verification, and risk assessment). It is recommended to digitalise data collection tools as this would improve data quality and timeliness of signal reporting. Primary data collectors should be trained on the tools to improve efficiency in data capture. Examples of the different tools used for data collection can be found in Annex 1 – 4.

### COMMON CHALLENGES

Public health officials invest significant money and time in developing and implementing reliable EBS to make timely public health decisions. The quality and availability of EBS data have a direct impact on a public health decision-making approach and the outcome of interventions.

#### Challenges in EBS Data Collection

- Sheer Volume of Data
- Multiple data storages, across multiple sectors
- Data quality
- Duplicate records
- Merging of data files
- De-identification of records (to obscure personal information)
- Data Security

## EBS Data Analysis

Data analysis is core output of EBS data management, informing public health decision making for policy formation and action. Analysis also contributes to EBS program management through routine monitoring and evaluation.

#### Key steps in Data Analysis

- Define questions of public health significance
- Identify and use appropriate ways to summarize data

*A: Define questions of public health significance*

No matter how advanced your EBS data collection methodology is, EBS data will not provide epidemiological insights unless you ask (inquire) specific questions regarding data analysis

### Data is Only as Good as The Questions You Ask

#### Example questions

- What proportion of signals captured were verified in the past six months?
- What sources are reporting the most signals?
- What proportion of zoonotic events have spilled over to human cases compared to previous year?



B: *Identify and use appropriate ways to summarize and/or visualize data*

The presentation of EBS data is crucial to facilitate understanding of decision makers. It is therefore imperative to present the EBS data in a simplified and more understandable format that can make the interpretation of data easier, allowing the decision makers to identify and explore better strategies for improving interventions.

## Appropriate ways to summarise and present data

<b>Tables</b>	Used to show frequency distribution of data e.g., frequency of Event reported by source type
<b>Bar Charts</b>	Used to compare data across categories e.g., comparing the proportion of signals reported by location
<b>Line Graphs</b>	Used to display trends over time e.g., the number of a particular signal reported over a period of six months.
<b>Pie Chart</b>	Used to show percentages (proportional share) of each value to a total e.g., the proportion of signals that become events.

### Data Information and Dissemination

Dissemination refers to the targeted distribution of interpreted EBS data and intervention material to a specific public health stakeholder (audience) with the intent to spread knowledge and the related evidence-based interventions. This may occur through a variety of channels, social contexts, and settings. EBS data dissemination has several broad goals, including the way it is disseminated varies depending on its goal and audience

Product	Method of Distribution	N	I	L	C
<b>SITREPS / SPOTREPS</b>	Web portals, emails, social media	X	X		
<b>Policy Brief</b>	Policy dialogues,	X			
<b>Press release</b>	Web portals, emails, social media, print media media event	X	X		X
<b>Bulletins</b>	Web portals, emails, intranet	X	X		
<b>Scientific Manuscripts</b>	Journals	X			
<b>Periodic Reports</b>	Web portals, emails	X	X		
<b>Presentations</b>	Workshops, Meetings	X	X		
<b>Training Materials</b>			X		X
<b>Posters/Banners</b>	Facility Notice boards, Workshops	X	X		X
<b>Abstract</b>	Conferences	X			

Legend: N - National Level, I - Intermediate level, L - Local level, C - Community level

## Data Quality and Collection Standards

EBS data accuracy should be ensured through verifying signals reported from credible and reliable sources including vetting of third-party sources. The accuracy should also be improved by making easy data entry through reducing workload, standardizations, and automation. Limiting access to the database maintains accuracy as it minimizes chances of unauthorized alterations and encourages the reporting of restricted or particularly sensitive signals. The program officers must also endeavour to clean data soon after entry to foster accuracy.

Incomplete data sets yield inaccurate results. Data completeness is critical to ensuring that EBS data and analysis conducted with these data are accurate. Data completeness can be improved by making certain fields in data systems mandatory, and by conducting data quality audits to compare source datasets (e.g., signal logs kept at a facility) to a central data repository (e.g., a dataset of signals received from facilities kept at intermediate or national levels). In automated systems, validation checks and skip patterns can also be included to ensure completeness of data.

Data are only useful in decision making if they are collected and shared in a timely manner to support interventions. Timely notifications and sharing of EBS data can be fostered through supporting communications systems and automations. Timeliness metrics can be used to assess how quickly information is shared between local, intermediate, and national levels as specified in national SOPs.



## Ethical Considerations

The EBS process involves gathering information from several entities. Collection of individual level data can also occur, for example, in interviews conducted during the M&E process or contact information from community members reporting signals on a hotline. It is therefore necessary to comply with ethical principles during data collection, analysis, report writing and dissemination from all these sources. Confidentiality of EBS information should be always maintained, following existing country-specific procedures. In addition, it is important to restrict unapproved access to information as this could pose risks to originating entities including restrictions to trade and travel, movement of animals and animal products, among others.

Where participants are involved (e.g., surveys related to M&E), the participants should be allowed to exercise autonomy and make their own decisions whether to or not to participate or to withdraw their participation at any time without any consequence. All participants must provide informed consent, preferably in writing if feasible, before data collection.

Where any personal identifiable information (PII) is being collected (e.g., name, contact information, etc.), those sharing this information are entitled to privacy, confidentiality, and anonymity which requires that PII data collected should be delinked from data (responses) intended for analysis or the use of unique identifiers could be considered instead of individual names or geolocation data. Privacy involves taking responsibility for data to be stored securely with access limited to designated, authorised people.

### Key Ethical Principles

<b>Confidentiality</b>	<b>- Confidentiality of EBS information should be always maintained following existing country specific procedures</b>
<b>Privacy</b>	<b>- Securely store data - Restrict Acces</b>
<b>Personal Identifiable Information</b>	<b>- Use unique identifiers to delink PII data from collected data intended for analysis - Access limited to designed authorised personnel</b>

### Data Storage and Security

Data security is critical to protecting confidential data, respecting the privacy of subjects, and complying with applicable protocols and requirements. Storage and security of the EBS data will be based on individual MS data laws and regulations. However, it is generally recommended that where data are collected using paper- based tools, they should be secured in closed, locked cabinets. If data are collected and stored on computers, these should be password protected, securely kept, and backed up. Where data are stored in earth or cloud servers, access credentials should be limited to only authorised individuals. Where EBS data must be shared outside the authorised custodians, the data must be de-identified unless express permission is sought from the participants.

### Using data across multiple sectors

EBS data is usually gathered from official and unofficial reports of potential disease events from a wide variety of sources including media, blogs, community members that cut across multiple sectors. As a result, public health officials face a complicated data situation of unifying data in diverse formats from multiple locations and/or sectors. Key aspects to consider in ensure timely and efficient data collection include

## Data Collection Consideration

<b>Data Standards</b>	<b>Ensures that information can be consistently reported, compared, and analysed across sectors, public health entities need a standardized data format. e.g. setting unique codes for all the signals from the different sectors.</b>
<b>Data Interoperability</b>	<b>The ability of data collection systems to exchange information with and process information from other systems. Through APIs (Application Programmers Interface)</b>
<b>Data Access</b>	<b>Computer software, hardware, networks, and policies that enable public health entities to report and retrieve data and information. This could also be facilitated by establishing data sharing agreements for the different sectors.</b>

## Event Management System

The routine collection of EBS data can be automated to reduce costs while repeated EBS evaluations can utilise the same methods to allow comparisons and trend analysis. One type of tool that can be used to store EBS data is an Event Management System (EMS). An EMS can be a simple Microsoft Excel tool or a dynamic web-based platform. EMS can be used to register signals from EBS sources, track the signals and events through the process of triage, verification, and risk assessment, and monitor the status of events in the associated response until they are closed or resolved.

The Africa CDC has developed an EMS built in DHIS-2, which is an open-source web-based platform. DHIS-2 is a tool that can be used for collection, validation, analysis, and presentation of aggregate and patient based statistical data, tailored (but not limited) to integrated health information management activities. The EMS supports registration, routine data entry and tracking of signals and events, analysing data, generation of reports 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 EIOS, EpiTweetr (<https://www.ecdc.europa.eu/en/publications-data/epitweetr-tool>), etc. which allows for signals detected within these engines to be tagged and imported into the EMS for easy data entry. The system also allows additional data storage e.g., information on Africa CDC's agent or syndromes that can be reported on, surveys and seroprevalence related data. It is a generic tool, with an open meta-data model and a flexible user interface that allows the user to design the contents of a specific information system without the need for programming.



Signals can be generated from the monitoring of IBS data when thresholds are exceeded, therefore, MS may also choose to link IBS data with EBS information on an EMS, creating a centralised repository of signals and events from all sources. This may support a MS to align EBS and IBS reporting SOPs and to track all signals and ongoing events.

One type of tool that can be used to process and store EBS data is an Event Management System (EMS). An EMS can be a simple Microsoft Excel tool or a dynamic web-based platform. EMS can be used to register signals from EBS sources, track the signals and events through the process of triage, verification, and risk assessment, and monitor the status of events in the associated response until they are closed or resolved.

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## Case Study

**Objective:** This exercise is aimed at enabling learners to develop, practise and improve their skills of basic EBS data analysis.

Participants are expected to have a laptop with a spreadsheet program installed. The facilitator should distribute the file titled “*EBS\_Demo\_Data\_for\_Analysis*” to all participants by email or using a flash drive.

This session is expected to last for 40 minutes.

Group work: 30 minutes

Group presentation: 10 minutes

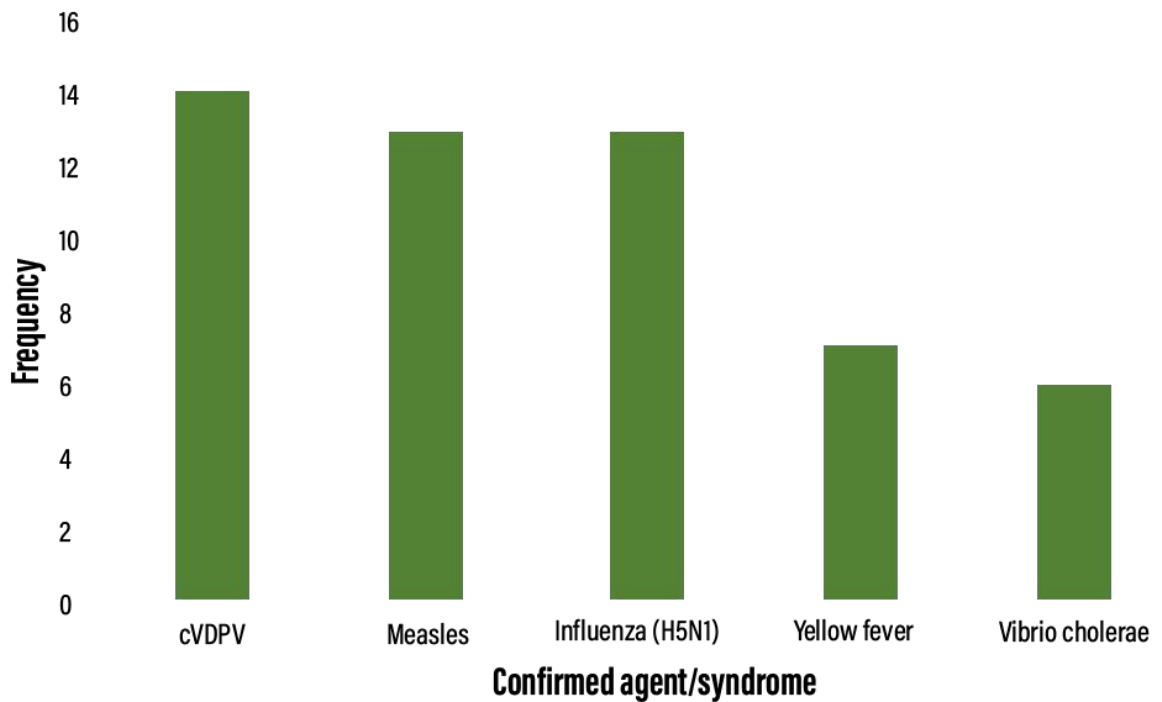
**Methodology:** participants are expected to work individually.

**Training tools:** DEMO EBS data spreadsheet

**Instructions:** Answer the following questions

1. Determine the top 5 confirmed agents/syndromes in 2021.
  - a. Polio virus (vaccine-derived): 14 events
  - b. Measles: 13 events
  - c. Influenza (H5N1): 13 events
  - d. Yellow fever: 7 events
  - e. *Vibrio cholerae*: 6 events
2. Represent your results graphically using a chart.

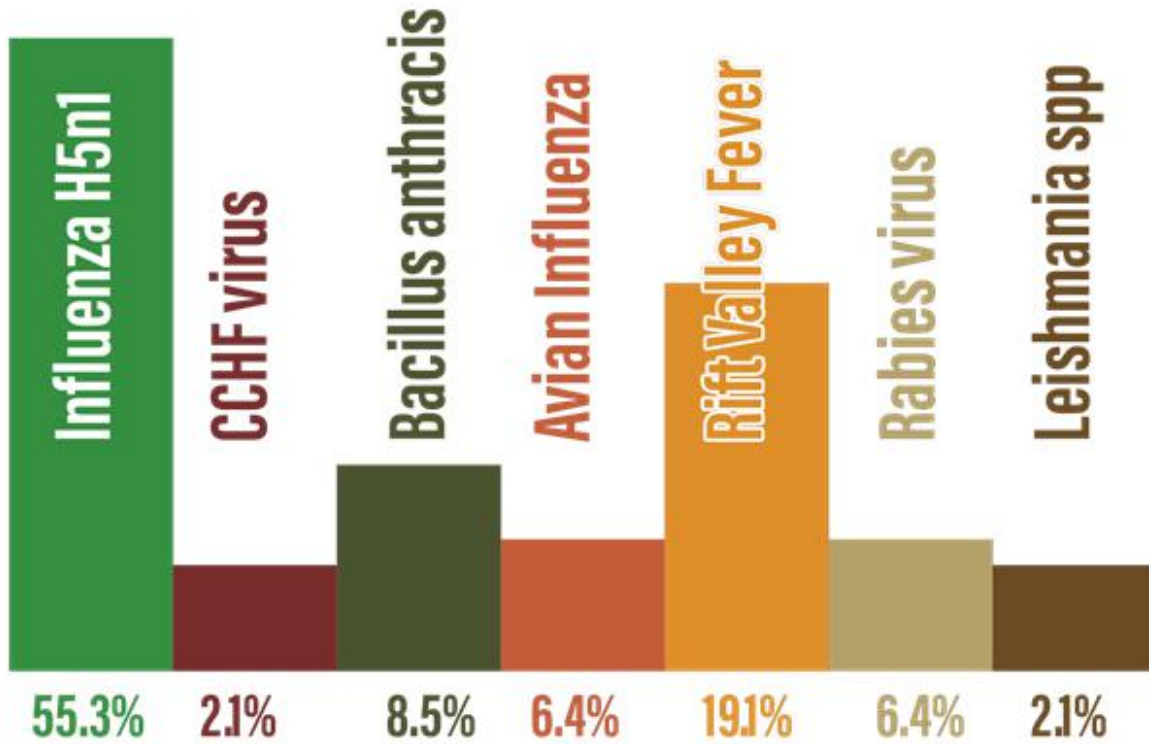
### Top 5 confirmed agent/syndrome in Africa, 2021



Ensure that participants:

- a. Use a bar chart
- b. Clearly label both axes (horizontal and vertical) correctly.
- c. Give the chart a title that contains what, where and when.
3. What source reported the most signals in 2021?
  - a. Ministry of Health: 55 signals/events
4. Using a pie chart, show the reported non-human events between 2020 - 2022.





5. From the pie chart you have created, what are the top three most reported non-human events between 2020 - 2022?
- Influenza (H5N1): 24 (55.3%) events
  - Rift valley fever: 9 (19.1%) events
  - Bacillus anthracis*: 4 (9%) events

# Annexes

## Annex 1: Example Media Scanning/Hotline Form

Variables		Response	
Source of information		<input type="radio"/> CEBS <input type="radio"/> FEBS <input type="radio"/> Media Scanning <input type="radio"/> Hotline <input type="radio"/> Other: _____	
Reporter information (e.g., general public, CHW/CAHW, healthcare worker, etc)			
Date/time of detection/receiving signal			
Reference/contact (e.g., URL, email, phone #)			
Signal type		<input type="radio"/> Human <input type="radio"/> Animal <input type="radio"/> Environment <input type="radio"/> Other: _____	
Location of signal			
Date of event start (e.g., date of symptom onset, date first case seen by health facility, date of lab diagnosis, etc.)			
Number of cases reported			
Number of deaths reported			
Description of signal/event			
Follow-up Activities			
Triage results	<input type="radio"/> Discard <input type="radio"/> Monitor <input type="radio"/> Verify	Date/time:	
Sent for verification	<input type="radio"/> Yes <input type="radio"/> No	Date/time:	
Verified	<input type="radio"/> Yes <input type="radio"/> No	Date/time:	
Risk assessment	<input type="radio"/> Low <input type="radio"/> Moderate <input type="radio"/> High <input type="radio"/> Very High	Date/time:	
Alert sent for response	<input type="radio"/> Yes <input type="radio"/> No	Date/time:	
Response status	<input type="radio"/> Not started <input type="radio"/> Ongoing <input type="radio"/> Completed	Date/time:	

## Annex 2: Example Signal Register for Community and Facility Event-based Surveillance

*This Signal Register may be completed by CEBS supervisors upon receiving reports of signals detected at the community-level. Note: all dates should be recorded in the DD-MM-YYYY format.*

### TABLE INFORMATION KEY

1. 'Date identified' is the date that the person reporting became aware that a person (or persons) showed signs/symptoms of one or more of the signals.
2. 'Date reported' is the date that the reporter informed a local-level supervisor about the signal.
3. 'Source of report' is the individual reporting to the local-level supervisor. A source may be a community health or animal health worker (CHW/CAHW), a veterinarian, schoolteacher, traditional healer, community resident, healthcare professional, etc. Include both the name of the individual and source type.
4. 'Contact of source' asks for the contact information of the reporting party, which may be needed later for any follow-up information regarding verification of the signal.
5. Please state the location of the patient's home, hospital, farm, or place where the incident is occurring, as precisely and exactly as possible. If an address is available, please record it. If an address is not available, please describe the relationship between the patient's location and a landmark. If necessary, please describe the appearance of the setting. For example, a patient's home might be the brown house with a red door that is four buildings away from a specific church.
6. Please refer to the country's pre-defined and coded signal list to populate this field.
7. 'Number affected' is the number of individuals who show signs of the signal being reported. Any deaths should be included in this value, but a case that dies should not be counted twice.
8. 'Reported by multiple sources?' asks the local-level supervisor to state whether the signal has been reported by other individuals at any level of the surveillance or health system.
9. 'Signal verification' asks the local-level supervisor to authenticate the report and record the date of report authentication in the next field (see below). If the information is from a credible/official source and meets one or more predefined signals, it is an event; otherwise, it is false. All events should be reported immediately (within 24 hours) to the sub-national jurisdiction.
10. 'Date verified' is the date that the local-level supervisor verified the signal.
11. 'Date event reported' is the date that the local-level supervisor communicated events (i.e., signals verified as true) to the local or intermediate-level health authority responsible for risk assessment.

**Annex 2 cont.: Signal Register for CEBS/FEBS**

Name of Local-level Supervisor: \_\_\_\_\_

Date (DD-MM-YYYY): \_\_\_\_\_

Health Facility (if applicable): \_\_\_\_\_

Location (e.g., lowest administrative level): \_\_\_\_\_

#	Date identified <sup>1</sup>	Date reported <sup>2</sup>	Source of report <sup>3</sup>	Contact of source <sup>4</sup>	Location of signal <sup>5</sup>	Signal code <sup>6</sup>	Number affected <sup>7</sup>	Reported by multiple sources? <sup>8</sup> (Y/N)	Signal verification <sup>9</sup> (T/F)	Date verified <sup>10</sup>	Date event reported <sup>11</sup>

## Annex 3: Example Community Health Worker Signal Notebook

### General Information

Name: \_\_\_\_\_

Telephone: \_\_\_\_\_

Name of CEBS Supervisor: \_\_\_\_\_

Telephone: \_\_\_\_\_

### Instructions

When you detect one or more signals in your community, please report immediately to your local-level supervisor. Use this notebook to record the following information and communicate it to the local-level supervisor:

Date/time the signal began Date/time the signal detected	
Description of the signal, including the number of people/animals affected	
Location of the signal Contact information of those affected, if applicable:	

List code/description for signals to be reported (examples)	
Other	

*Please refer to the country's pre-defined and coded signal list to populate the signals being reported. Pictures or images of the signals can be included to assist in detection at the community-level.*



## Annex 4: Example Intermediate-level Event Log

*This Event log was adapted from the IDSR District Log of Suspected Outbreaks and Rumours. Signal information should not be entered in this logbook. Note: all dates should be recorded in the DD-MM-YYYY format.*

### TABLE INFORMATION KEY

1. 'Condition, disease, or event' should be completed with a brief description of the event (e.g., suspected measles, cluster of suspected cholera, earthquake).
2. 'No. of cases initially reported' indicates the number of cases reported when the initial signal was reported.
3. 'Location' is where the event is occurring. Please list this as precisely and exactly as possible. If an address is available, please record it.
4. 'Date intermediate level notified' is the date that the intermediate-level health authorities were notified about the event.
5. 'Date event began' is the date that the event began, or the date of symptom onset of the index case. Depending on the event occurring, this may also be the date the threshold was crossed for a seasonal disease, or the date the first cluster of cases was recognized.
6. 'Date first case seen at facility' is the earliest known date that a case sought medical care at a health facility.
7. 'Date and level of risk assessment' is the date the first risk assessment was performed and the level of risk that was characterized (e.g., low, moderate, high, very high).
8. 'Date investigation started' is the date that the intermediate-level health authorities began investigating the event reported.
9. 'Investigation results' asks health authorities to state whether the event was ruled out or confirmed as a suspected outbreak requiring a response, or whether the status is still unknown.
10. 'Date of first intervention' is the date a response was initiated.
11. 'Type of intervention' asks health authorities to describe what was conducted as part of the response.
12. 'Date national level notified' is the date that the intermediate-level health authorities communicated with higher levels about the occurrence of an outbreak.
13. 'Date national response started' is the date that intermediate-level health authorities received response support from the national-level.
14. 'Comments' - Please enter any further comments in this field.

Annex 4 cont.: Example Intermediate-level Event Log

Condition, disease, or event <sup>1</sup>	No. of cases initially reported <sup>2</sup>	Location <sup>3</sup>	Date intermediate level notified <sup>4</sup>	Date event began <sup>5</sup>	Date 1st case seen at facility <sup>6</sup>	Date and level of risk assessment <sup>7</sup>	Date investigation started <sup>8</sup>	Investigation results <sup>9</sup>	Date of 1st intervention <sup>10</sup>	Type of intervention <sup>11</sup>	Date national level notified <sup>12</sup>	Date national response started <sup>13</sup>	Comments <sup>14</sup>

Adapted from the World Health Organization Regional Office for Africa. 2010. Technical guidelines for integrated disease surveillance and response in the African region.

## Annex 5: Verification Tool

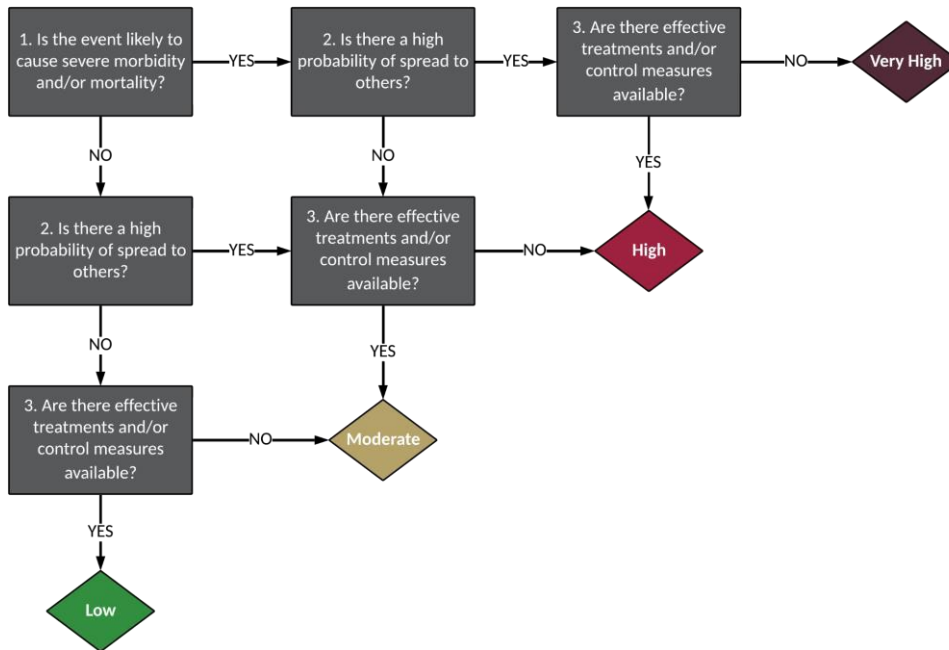
As EBS is highly sensitive, it is essential to verify the authenticity of a reported signal and its characteristics. This process of verification involves actively cross-checking the validity of available information and collecting additional information about the report using reliable sources as needed. The process of signal verification should answer two main questions:

1. Is the report accurate (i.e., true)?
2. Has the information been reported by an official source(s)?

The table below can be used to determine the outcome of signal verification once sufficient information has been collected and validated.

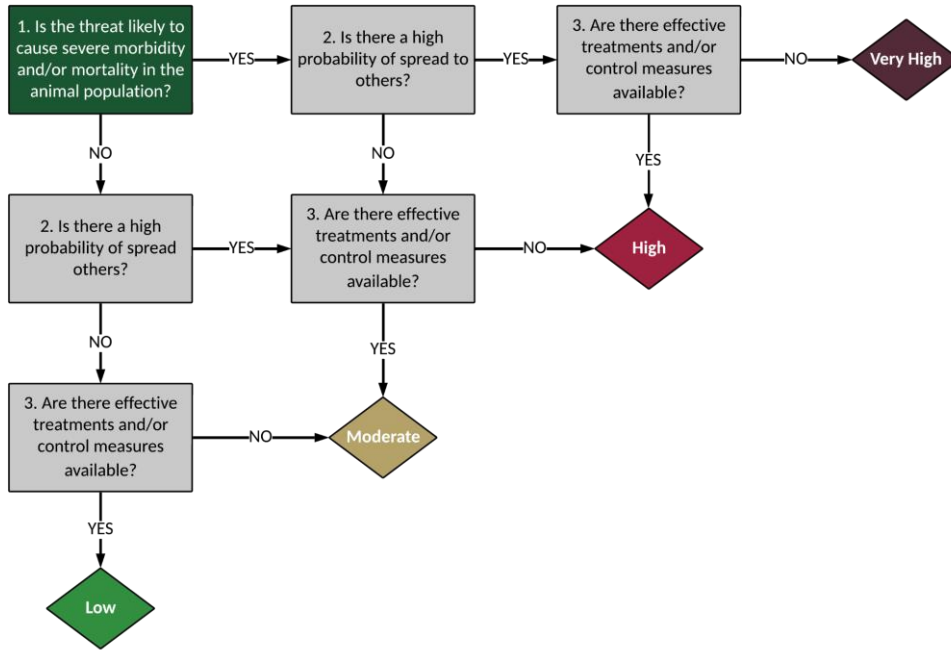
<b>Discard if</b>	<b>Confirm as event if</b>
<b>The information is a hoax or false rumour</b>	<b>The information is accurate and true</b>
	<b>The information has been reported by an official source or sources</b>

## Annex 6: Human Risk Level Algorithm



**NOTE:** If there are specific groups at increased risk of infection, consider performing separate risk assessment for each group. If in doubt for any questions, select higher risk answer.

## Annex 7: Animal Risk Level Algorithm



**NOTE:** If the threat is zoonotic or likely to cause severe morbidity and/or mortality in the human population, also complete the **Human Health Risk Assessment Algorithm**.

## Annex 8: List of Signals

Public Health Community Signals	
PHC1	Cluster of deaths in a village/community construction site, mine, school, prisons, orphanage
PHC2	Cluster of disease of unknown aetiology in a village/community, construction site, mine, school, prison, orphanage, or other institution over a defined period (e.g., two weeks)
PHC3	Any unusual event or occurrence in the community which may affect human health
PHC4	Any public health event that raises concern, fear, and alarm in the community
PHC5	Any event/occurrence which may have a known, suspected, or possible impact on human health
Public Health Facility Signals	
PHF1	Occurrence of one or more cases or deaths of a severe, unusual, or unexplained disease, based on clinician's professional judgement and failure to respond to standard treatment
PHF2	One or more healthcare worker(s) with severe illness after attending to patients with similar symptoms
PHF3	Large, unexpected, sudden increases in admissions for any illness of the same type, including patients in intensive care units
PHF4	Two or more people presenting with similar symptoms with a history of recent travel
PHF5	Cluster of deaths in a healthcare facility
PHF6	Cluster of disease of unknown aetiology in a healthcare facility
PHF7	All immediately notifiable diseases, especially those to be reported immediately (e.g., for IDSR) and any event that poses a public health risk Laboratory Facility Signals (Human and Animal):
LF1	Detection of a pathogen that has not been detected for a long time in that country, a new pathogen, or a new / unreported strain of an already known pathogen (increase in positivity rate, new genetic variation, novel resistance profile, etc)
LF2	Detection of a pathogen in an unusual species (e.g., avian influenza in a mammal)



Code	Signal
LF3	Large/sudden unexpected increase in numbers of specimens with the same testing request, or positive for the same pathogen (including pathogens that are resistant to multiple antibiotics)
LF4	Any pathogen on the immediately notifiable list
LF5	Un-subtypeable or new influenza strain from a patient with severe acute respiratory infection
Animal Community Signals	
AC1	Sudden increase in animal deaths
AC2	Cluster of animal deaths in a wildlife or domestic animal population
AC3	Cluster of disease of unknown aetiology in a wildlife or domestic animal population over a defined period (e.g., two weeks)
AC4	Any unusual event or occurrence in the community which may affect animal health
AC5	Any animal health event that raises concern, fear, and alarm in the community
AC6	Any event/occurrence which may have a known, suspected, or possible impact on animal health
Animal Facility Signals	
AF1	Cluster of animal deaths in an animal clinic, farm, game reserve/park, zoo
AF2	Unexpected change in morbidity and / or mortality in domestic animals and / or wildlife
AF3	Cluster of animals presenting with unusual signs or behaviours (e.g., aggression, bleeding, dizziness, weight loss, isolation from other animals, diarrhoea, body swellings, lameness, loss of hair or limbs, coughing, excessive drooling, blindness)
AF4	Cluster of animals exhibiting production losses (e.g., milk, eggs, abortions) Severe illness in veterinarian, wildlife staff, or community members after contact (e.g., culling, feeding, treating, vaccinating) a sick or dead animal
AF5	All immediately notifiable zoonoses
AF6	Commonly reported lesions during meat inspection from abattoirs
AF7	Sudden increase in vectors population from entomological surveillance
Environment Community and Facility Signals	

<b>Code</b>	<b>Signal</b>
<b>E1</b>	<b>Any unusual event or occurrence in the community which may affect environment health</b>
<b>E2</b>	<b>Any environmental health event that raises concern, fear, and alarm in the community</b>
<b>E3</b>	<b>Any event/occurrence which may have a known, suspected, or possible impact on environmental health</b>
<b>E4</b>	<b>Massive growth of algal bloom (green growth) or water weeds in water bodies (e.g., lakes, rivers, streams)</b>
<b>E5</b>	<b>Improper waste disposal, leakage, or spillage on land, in air or water bodies</b>
<b>E6</b>	<b>Unusual change in physical water quality parameters of drinking water sources (e.g., colour, taste, odour, suspended solids, turbidity)</b>
<b>E7</b>	<b>Occurrence of an environment hazard (e.g., flood, landslide, earthquake, frequent and more intense earth vibrations, release of gases, cracks on the ground)</b>
<b>E8</b>	<b>Unexplained death of aquatic animals (e.g., fish, hippos, etc.) Sudden increase in average atmospheric temperature noticed for two days</b>



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