

A Guide to Establishing Event-based Surveillance



World Health
Organization

Western Pacific Region

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A guide to establishing event-based surveillance.

1. Epidemiological factors. 2. Communicable diseases — epidemiology.

ISBN 978 92 9061 321 3 (NLM Classification: WA 110)

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Purpose of the guide

In line with the recommendations of the Asia Pacific Technical Advisory Group (TAG) on Emerging Infectious Diseases and in response to requests from Member States, the WHO Western Pacific Regional Office has developed the following guide for the design of event-based surveillance systems.

What is Event-based Surveillance?

Event-based surveillance is the organized and rapid capture of information about events that are a potential risk to public health.¹ This information can be rumours and other ad-hoc reports transmitted through formal channels (i.e. established routine reporting systems) and informal channels (i.e. media, health workers and nongovernmental organizations reports), including:

- **Events related to the occurrence of disease in humans**, such as clustered cases of a disease or syndromes, unusual disease patterns or unexpected deaths as recognized by health workers and other key informants in the country; and
- **Events related to potential exposure for humans**, such as events related to diseases and deaths in animals, contaminated food products or water, and environmental hazards including chemical and radio-nuclear events.

Information received through event-based surveillance should be rapidly assessed for the risk the event poses to public health and responded to appropriately.

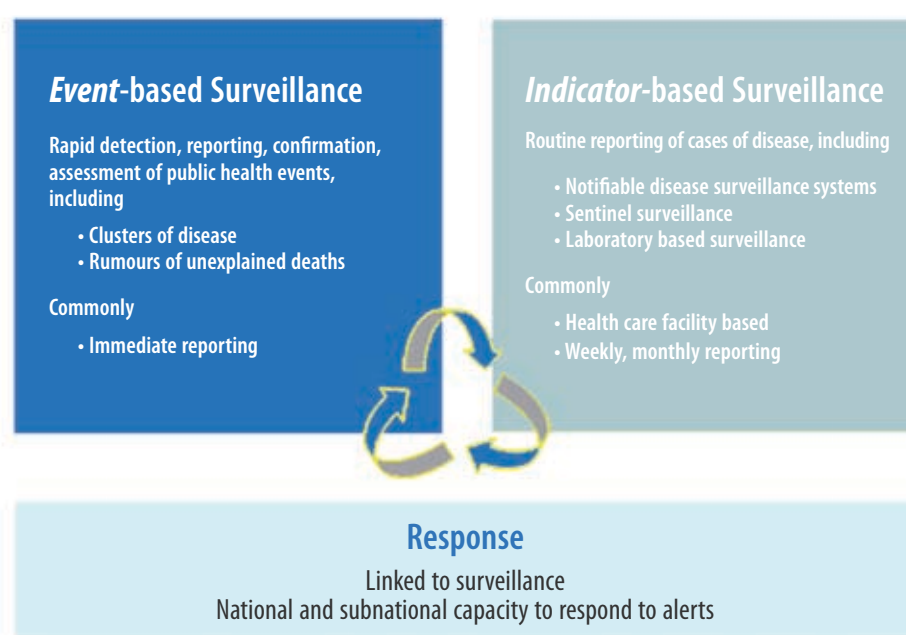
Unlike classic surveillance, event-based surveillance is not based on the routine collection of data and automated thresholds for action but rather on unstructured descriptions and reports.

¹ The definition of event-based surveillance has been adapted from the unpublished WHO EWARN guideline.

Rationale for Event-based Surveillance

Event-based surveillance complements indicator-based surveillance. Both systems should be seen as essential components of a single national surveillance system (Fig. 1).

Fig. 1. Surveillance and response system



When it comes to the timely detection of outbreaks and important public health events, indicator-based surveillance systems often fail. Furthermore, the systems are not suited to the detection of rare but high-impact outbreaks (Severe Acute Respiratory Syndrome, Avian Influenza) or emerging and unknown diseases.

Event-based surveillance systems rely on the immediate reporting of events (Table 1) and are designed to detect:

- Rare and new events that are not specifically included in indicator-based surveillance.
- Events that occur in populations which do not access health care through formal channels.

Table 1. Comparison of key attributes and components of event-based and indicator-based surveillance

	EVENT-BASED	INDICATOR-BASED
Definitions	<p>Definitions can be used to help guide reporting.</p> <p>Definitions are broad, such as a cluster of deaths in the same village during the same time period.</p> <p>Definitions are more sensitive than those used in indicator-based surveillance.</p>	<p>Diseases and syndromes have a corresponding case definition which may include one or all of the following:</p> <ul style="list-style-type: none"> • Clinical presentation • Characteristics of people affected • Laboratory criteria <p>Definitions are more specific than those used in event-based surveillance.</p>
Timeliness	<p>All events should be reported to the system immediately.</p>	<p>Data are usually reported each week or month.</p> <p>Some diseases and syndromes may be immediately notifiable.</p> <p>Even where electronic reporting exists, a delay often remains between case identification and when aggregated data are reported to the system by a health facility.</p> <p>Where laboratory criteria are included in the case definition, a further delay in reporting may occur.</p>
Data/ Information	<p>The data format is not pre-defined.</p> <p>For each event as much information as possible is collected and recorded.</p> <p>Designated staff collecting the information attempt to obtain key pieces of information (i.e. time, place, person) to assist with event confirmation and assessment.</p>	<p>Data are aggregated for each disease/syndrome.</p> <p>The data format is pre-defined and may include a breakdown by demographic and other variables (i.e. number of cases 0-4 and >5 years of age).</p>
Reporting structure	<p>Loose structure.</p> <p>Reports are unstructured and can enter the system at any time.</p> <p>Forms are used to capture the event information, but the format is sufficiently flexible to collect qualitative and quantitative data.</p> <p>A unit/team is designated to triage, confirm and assess each reported event and trigger a response, as appropriate.</p>	<p>Clearly defined.</p> <p>Reporting forms are used by reporting units to pass information through the system often on pre-defined days of the week or month.</p> <p>Zero reporting is often used.</p> <p>A unit/team is designated to analyse the surveillance data at regular intervals.</p>
Reporting units	<p>Open, sometimes undefined (i.e. the general public can report directly to the system).</p>	<p>Facility-based, closed.</p>
Trigger for initial action	<p>A report that is confirmed and assessed as a potential risk to public health.</p>	<p>Pre-defined thresholds.</p>
Analysis	<p>Rapid risk assessment.</p>	<p>Pre-defined intervals (weekly, monthly).</p>
Response	<p>Immediate.</p> <p>The response to an event is built into the surveillance system.</p>	<p>May be delayed as a result of the time taken to collect and analyse data.</p> <p>The response to an outbreak is built into the surveillance system.</p>



Recommended Surveillance System Structure

Reporting Structure

Ideally, an event-based surveillance system includes all potentially relevant reporting sources (Table 2).

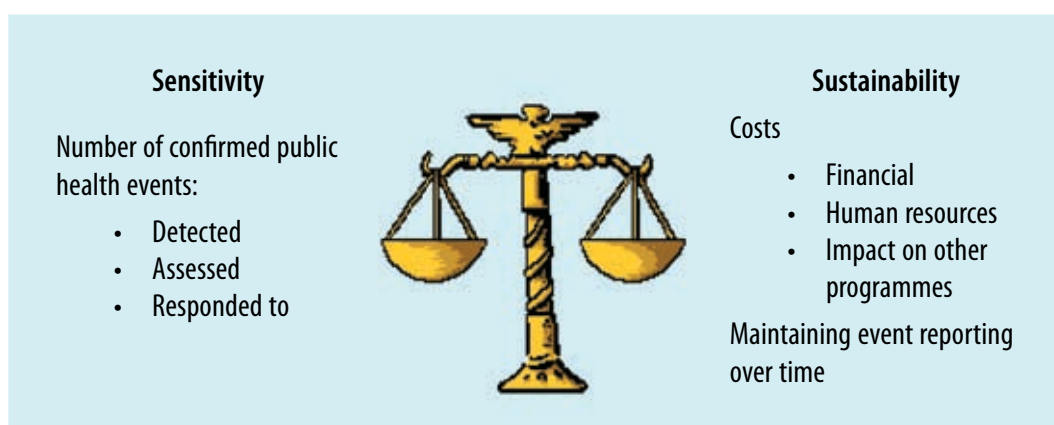
Table 2. Sources of Reports and Rumours for Event-based Surveillance Systems

MEDICAL SETTING	
Health care facilities	General practitioners Health clinics Hospitals Pathology services
Allied health care professionals and organizations	Community health workers Midwives/traditional birth attendants Traditional healers Laboratories Ambulance services Environmental health officers Health quarantine officers
COMMUNITY SETTING	
Community groups	Designated community members: village leaders, village health volunteers, members of the public
Community services	Religious organizations Nurseries Schools Pharmacies Police Public utilities (water and sanitation, environmental health) Nongovernmental organizations Group homes (elderly) Veterinary services
Media and published sources	Media (newspapers, radio, television) Academic press Internet
Other	Military organizations Embassies Universities

In reality, resources are often limited and do not allow surveillance systems to incorporate all of the reporting sources listed above. Therefore reporting sources for event-based surveillance should be prioritized according to their:

- Sensitivity: Are they picking up all important events?
- Sustainability: How easily can they be maintained without undermining other public health programs?

Fig. 2. Finding a balance between sensitivity and sustainability



Prioritizing reporting sources should ensure a balance between the desired sensitivity of the system and the resources available (Fig. 2). Therefore, each country is likely to identify a different set of reporting sources (Fig. 3).

Fig. 3. Sensitivity of different reporting sources and level of resources required to maintain the event-based surveillance system



Minimum Requirements

An **event assessment team/unit** responsible for assessing each reported event and triggering an immediate response must exist **BEFORE** event-based surveillance is implemented.

- At a minimum, the team/unit should exist at the central level.
- Ideally, the central team should establish strong links with designated local staff who can assist with preliminary event confirmation and, where skills and resources exist, preliminary event assessment.

Rapid response capacity must exist **BEFORE** event-based surveillance is implemented.

- National-level response with access to specialist skills (i.e. infection control, laboratory, risk communication).
- Local response with capacity to conduct a preliminary outbreak investigation.

Prioritizing Reporting Sources

STAGE ONE: USING THE MEDIA

In most developed and developing countries the media are the most important informal source of information on public health events. Therefore, all countries should include media sources in event-based surveillance unless there are clear reasons for not doing so.

Examples of media involvement in event-based surveillance

1. Systematic searching of radio, print and electronic media for information about outbreaks.
 - The event assessment team/unit should be responsible for carrying this out at the national level. For large countries with active local press, consider having responsible officers at the subnational level.
 - Responsible officers should screen the media on a daily basis taking full advantage of online media alert services (i.e. global news alert services, customised news alerts provided by internet search engines).
 - Where practical and where adequate funds are available, consider the use of electronic media survey systems. These are commercially available services that are marketed by media and communications companies.
2. Ensuring that calls to health officials from the media about public health events are captured by the event-based surveillance system. Consider:
 - Providing one hotline number so that all calls from the media can be screened and triaged appropriately.
 - Ensuring that all incoming calls are logged and basic information is collected (see page 15; minimum data management requirements).
3. Working with the media as partners, encourage the media to undertake active surveillance of health events through their networks of reporters and journalists. Consider providing :
 - Training on event-based surveillance to the media, highlighting their role in reporting rumours/events.
 - Regular and timely updates on the assessment of the events that are reported through the media.
 - Positive feedback about media involvement and appreciation to those actively involved in the system.

ADVANTAGES

- Credible media usually provide accurate reports of public health events.
- Easily accessible as the alerts are often available in electronic form.
- Few resources required for screening the media.

DISADVANTAGES

- Media reporting criteria is based on newsworthiness of the event and not necessarily on the public health importance.
- In countries with heavily restricted or controlled media, public health events may not be detected and picked up as frequently.

STAGE TWO: INVOLVING HEALTH CARE WORKERS

Health care workers (HCW) can be involved in event-based surveillance as primary reporting sources, such as during patient consultations, or as secondary sources passing on rumours picked up through patient consultations.

Examples of HCW involvement in event-based surveillance

1. Enrol all HCW or designated institutional champions in event-based surveillance and provide the appropriate training on how and when to report events.
2. Include private sector and allied health professionals (i.e. staff at border crossings, ports, airports) where possible. It may be easier to engage the private health care sector in event-based surveillance by:
 - Highlighting that there is no routine reporting requirement.
 - Tapping into clinicians' social responsibility by focusing on the link between reporting and response.
 - Attempting to minimize concerns about negative consequences of reporting unusual events.
 - Arranging for the event assessment team to provide technical support for patient diagnosis or treatment when an event is reported.

ADVANTAGES

- HCW are already involved in national surveillance and public health programmes.
- Identifying institutional champions for event-based surveillance will help to maintain interest and involvement in the system.
- HCW can take advantage of existing systems (i.e. using existing communication methods for immediate reporting of notifiable diseases to also report events) and training programmes (i.e. including training on event-based surveillance while carrying out other surveillance and response training).

DISADVANTAGES

- HCW reporting is biased towards the detection of outbreaks/events among people seeking care in the formal clinical and public health care sectors.

STAGE THREE: INVOLVING THE COMMUNITY

The effective involvement of the community and general public in event-based surveillance relies on striking a balance between their involvement in direct reporting and the resources available to assess, confirm and respond to the potentially large number of reported events.

Examples of community involvement in event-based surveillance

1. Direct community reporting: the general public report directly to national hotlines, websites, or health care facilities.
 - a. Direct reporting must be accompanied by community awareness campaigns to ensure that the general public know what to report and where to report.
 - b. Where community members report events to health care facilities, arrangements need to be made for reporting outside clinic hours. Not all community members who are reporting an event will also seek medical care. It is important that reporting of events does not interfere with the provision of medical services and community members should be able to report events without the need for a clinical appointment.
2. Indirect reporting through community organizations (i.e. religious organizations, schools, long-term care facilities, public utilities and NGOs) and designated community members (i.e. community leaders and community health volunteers).

DIRECT COMMUNITY ACCESS

ADVANTAGES

- High sensitivity.

DISADVANTAGES

- Low specificity as there are likely to be many reports about events of no risk to public health.
- A large number of resources required to assess reports and respond to events.

INDIRECT COMMUNITY ACCESS

ADVANTAGES

- Higher specificity as targeted training for designated community members or groups will help to reduce the number of reported events that can't be confirmed or are not potential risks to public health.

DISADVANTAGES

- Using designated members of community groups (community champions) to report may not be sustainable if:
 - The response results in negative economic consequences for the community.
 - Reporting events is perceived as too much extra work.

Reporting Methods

Minimum Requirements

1. All methods of immediate communication should be made available to those expected to participate in event-based surveillance – hotline (voice, SMS), e-mail, fax.
2. Reporting should be possible 24 hours a day, 7 days a week.

Hotlines

Where hotlines are used they will either be open to the general public or for restricted use (i.e. health care facilities, media or designated members of the community/community groups). The type of hotline will be dependent on the reporting structure and the cultural context. If a decision is taken to establish a hotline:

1. Use only one toll-free telephone number. Where SMS and verbal reports are accepted try to ensure that the telephone number is the same for both methods of communication.
2. Rationalize and harmonize the number of hotlines to avoid confusion.

HF/VHF Radio Communication

In countries where communication infrastructures are limited, radios can be used to report events. Where radio communication is the only reliable option, base station staff and radio operators would need to be trained to triage event information to the event assessment team. Ideally, the event assessment team would be co-located with the base station to ensure that time delays are minimized.

Fax and E-mail

Fax and e-mail can be used as a complementary communication method to a telephone hotline but rarely as primary means of communication. In many countries, hardware malfunctions and intermittent Internet access would further limit immediate reporting.

Event Definitions

As indicator-based surveillance already uses case definitions for immediately notifiable diseases and clusters of disease/death, these definitions can also be used in event-based surveillance:

- As examples of events that should be reported.
- As events that are reported to the event surveillance system for confirmation, assessment and, if appropriate, response.

Where communities, community organizations, and private/allied health care sectors are engaged in the surveillance system, case definitions are not required and open reporting of unusual/unexpected events should be encouraged.

Examples: Event Definitions

The following event definitions are examples of those used in countries with existing event-based surveillance systems.

Symptom-based definitions for diseases in humans

Clusters of deaths in a health care facility, village, community, construction site, mine, school or other institution over a period of two weeks.

Cluster of disease of unknown etiology: three cases or more of a disease of unknown etiology in a health care facility, village, community, construction site, mine, school or other institution over a period of two weeks.

Any unusual event in the community which may affect human health

Any public health event that raises concern, fear and alarm in the community.

An event which may have a known, suspected or possible impact on human health.

Minimum Data Management Requirements

Systematic, structured data collection is a critical component of any surveillance system, including event-based surveillance. For event-based surveillance, data collection has to be rapid and capture enough information to allow for an initial assessment of the event. Information on each event reported should be captured in a database where the outcomes, assessment and subsequent responses are logged.

Step One

Whenever an event is reported, the person responsible for handling the initial contact should collect basic information about the event (Fig. 4) using a reporting form that includes:

- Unique identifier
- Geographical area (i.e. district) name
- Date of reporting and contact details of reporter
- Date and time when event occurred
- Description of event
- Actions taken to date, if any

Fig. 4. An example of an event reporting form

Health Event Report		
Please send this to your Local Health Office or to your Regional Epidemiology and Surveillance Unit (RESU)		
1	Date (Today's date)	
2	What do you want to report? What happened?	
3	When did this happen? (Month, day, year)	
4	Where did this happen? (Municipality or City, Province, Region)	
5	How many have been affected?	
6	Has anyone died? How many?	
7	Other information you have.	
8	What is your name and contact number?	

Step Two

During event confirmation and assessment:

- Further information may be obtained by contacting other sources, i.e. hospitals, laboratories, schools.
- A decision will then need to be taken about further investigation and what actions should be taken.

Capture of additional information and decisions in the database simplifies information sharing and allows for automated reports to be generated and sent to different levels of the health system involved in response activities.

Fig. 5. An example of data recorded during event confirmation and assessment

- 1 Report Date and Time (When was the health event reported?)
- 2 Confirmation Date (When was the health event confirmed?)
- 3 Health Event (What happened?)
- 4 Location (Municipality/City, Province, Region)
- 5 Start Date (Date of onset of first case)
- 6 Number of Cases (How many were affected? Attack Rates?)
- 7 Description of Cases (Who were affected? When? Where?)
- 8 Number of Deaths (Of the cases, how many died?)
- 9 Description of Deaths (Who? When? Where? Why?)
- 10 Actions Taken (Who? What? When?)
- 11 Status of Health Event (Ongoing or controlled?)
- 12 Who has been informed? (Local health departments, etc.)
- 13 Source of information (Name, office number, mobile number)
- 14 Is assistance needed? (If yes, please specify)
- 15 Remarks (Other important information)

Step Three

During a response to an event, details of all decisions, requests for additional support, actions and implementation of control measures should be collected and archived as a reference for future outbreaks/ event investigations.

Step Four

As with all successful surveillance systems, feedback to stakeholders should be routinely provided on any reported event.

Surveillance Bulletin

The following aggregated data could be routinely reported in regular surveillance bulletins traditionally used for feedback by indicator-based surveillance systems to stakeholders and decision-makers.

- Number of events reported
- Number of events assessed
- Number of events confirmed
- Number of events not confirmed (i.e. false rumours)
- Source of reporting (i.e. health care facility, community leader).

When responses to events are undertaken, brief descriptions can be included in the surveillance bulletin to highlight the link between reporting and response.

Feedback should be given to all reporting sources, people and organizations involved in event response.

Confirmation and Assessment

The extent to which event confirmation and assessment can occur at the subnational level will depend on available resources.

Where resources are limited, events should be reported directly to the event assessment team at the central level for confirmation and assessment within 24 hours of the initial event report. The speed with which confirmation and assessment can be undertaken will depend on the links the central team has with local public health staff. Under the supervision of the central team, the involvement of local public health staff in event confirmation, and where possible preliminary assessment, will make the system more responsive.

- Report confirmation is the process by which a report from the community, media or health care worker can be substantiated, i.e. event is considered to be a REAL event. A real or confirmed report does not mean, however, that the event is a potential risk to public health.
- Event assessment is the process by which the available information about a real event is analyzed and a judgement is made as to whether it poses a risk to public health.

Criteria can be used to direct staff that are involved in event confirmation and assessment.

Example event confirmation guidance

Event reports are more likely to be true if they:

- Are confirmed by multiple different sources of information (i.e. not the same source repeated by secondary informants).
- Are reported by trained health care workers.
- Include clear information about TIME, PLACE, PERSON (i.e. 15 people from village X were sick after drinking water from the well three days ago).

Example event assessment guidance

If an event report meets one of the following criteria, a response is triggered.

	ASSESSMENT QUESTION	YES	NO
Human health events	Does the event involve a notifiable disease or syndrome (i.e. diphtheria, watery diarrhoea)?		
	Can the suspected disease cause outbreaks with a high potential for spread (i.e. cholera, measles)?		
	Is there a higher than expected mortality or morbidity from the disease?		
	Is the disease unusual/unexpected in the community?		
	Is there a cluster of cases or deaths with similar symptoms (i.e. bloody diarrhoea, haemorrhagic signs and symptoms)?		
	Could the disease be caused by a contaminated, commercially available product (i.e. food item)?		
	Does the disease have possible consequences for trade or travel (i.e. SARS)?		
	Is there suspected nosocomial spread of the infection (i.e. is the infection being transmitted within a health care setting)?		
Non-human health events	Does the event have a known consequence for human health (i.e. chemical spill, suspected Nipah outbreak in animals, unexplained deaths in animals)?		
	Does the event have a possible consequence for human health (i.e. suspected zoonotic disease outbreak in animals)?		

Responding to an event

Responding to an event is an integral part of event-based surveillance. Once an event is confirmed and is considered to be a potential risk to public health, the response can be organized from either the local or national level.

The level of response and the mix of skills required are determined in the first instance by risk assessment. Not all assessments will result in a full-scale investigation during the initial response.

There should be clear procedures for responding to an event, including definition of roles and responsibilities of key responders and other stakeholders.

Effective, rapid and appropriate response is a fundamental part of event-based surveillance and should not be hindered by an unresponsive system.

Routine Feedback

Routine feedback is essential to maintaining event-based surveillance systems. Without relevant and useful feedback people will stop reporting events.

The format should be simple, adapted to the audience, and include regular updates on confirmation, assessment and response. Consider providing extra data to the media who provide the initial report.

Include data on event-based surveillance in surveillance bulletins and publish regular reviews and evaluations of the system.

External Links

Successful event-based surveillance should identify events that are a potential risk to human health. Therefore, disease events in animals (i.e. unexpected die-offs in poultry) and environmental events (i.e. discoloration of water sources, chemical spills) should also be reported, confirmed, assessed and responded to.

The rapid and effective assessment of, and response to, these events will require close links with other departments, ministries and agencies. The exact mechanisms for information exchange and joint response will vary between countries. However, at a minimum links should be made with the government departments responsible for:

- Surveillance of, and response to, disease in animals.
- Response to environmental hazards (i.e. intentional or unintentional release of chemicals into the environment).

Monitoring and Evaluation

Routine monitoring and evaluation plays a critical role in ensuring that the system is functioning effectively and can adapt over time to changing systems and environments. At a minimum routine monitoring of system performance and regular wider system evaluations should be undertaken. For example:

Routine monitoring

- Number of outbreaks detected compared to the routine reporting systems
- Accuracy and timeliness of information sources for the initial event report
- Positive predictive value of the initial event assessments
- Time from notification to response.

Regular evaluations

- At least two events per year are evaluated from notification to confirmation/assessment and response. At each stage the people involved should be interviewed and the performance of the system assessed and recommendations made.

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