



Ebola virus disease (EVD)

Last update: 2022-10-05

Key facts

To better understand public health terms included in this Disease Tool (e.g. What is a case definition? or What is an infectious agent?), consult our page on [Key concepts on epidemiology](#).

Importance

Ebola virus disease (EVD) was first recognized by the scientific community in 1976, in two simultaneous outbreaks in what are now South Sudan and the Democratic Republic of Congo. The latter occurred in a village near the Ebola River, from which the disease takes its name. The 2014–2016 outbreak in West Africa spread between countries, starting in Guinea then moving across land borders to Sierra Leone and Liberia. Sporadic cases have been exported to Mali, Nigeria, United States and Spain.

The average case fatality rate for EVD depends both on the strain of virus causing the infection, and the patient's access to early supportive care and specific treatment. It has varied from 25 per cent to 90 per cent in past outbreaks. People can get EVD through direct contact with an infected animal (zoonotic disease) or a sick or dead person infected by Ebola virus.

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Case definition

A **case definition** is a set of uniform criteria used to define a disease for public health surveillance. It enables public health officials to classify and count cases consistently.

*The following are standard case definitions to allow national health authorities to interpret data in an international context. However, during an outbreak case definitions may be adapted to the local context and the Red Cross Red Crescent should use those agreed/established by national health authorities. NB: Consider that during community-based surveillance, **volunteers** should use broad (simplified) case definitions (referred to as community case definitions) to recognize most or all possible cases, provide relevant risk communication and appropriate actions and encourage them to seek care. Other actors such as **healthcare workers or investigators** studying the cause of a disease, on the other hand, can use more specific case definitions that may require laboratory confirmation.*

Routine surveillance

Suspected case: Illness with onset of fever and no response to treatment for usual causes of fever in the area, and at least one of the following signs: bloody diarrhoea, bleeding from gums, bleeding into skin (purpura), bleeding into eyes and urine. *During an outbreak, the case definitions are likely to be modified to be adapted to new clinical presentation(s) or different modes of transmission related to the local event.*

Probable case: Any deceased suspected case (where it has not been possible to collect specimens for laboratory confirmation) having an epidemiological link with a confirmed case.

Confirmed case: A suspected case with laboratory confirmation (positive IgM antibody, positive Polymerase chain reaction (PCR) or viral isolation).

Community-based surveillance

Alert case: Illness with onset of fever and no response to treatment of usual causes of fever in the area OR at least one of the following signs: bleeding, bloody diarrhoea, bleeding into urine OR any sudden death. If the National Society is doing community-based surveillance, a community case definition should be agreed upon with the relevant health authority.

WHO case definition source of information:

<https://www.who.int/csr/resources/publications/ebola/ebola-case-definition-contact-en.pdf>

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Alert / epidemic threshold

An **alert threshold** is the pre-defined number of alerts that suggest the beginning of a possible disease outbreak and therefore warrant immediate notification.

Epidemic thresholds are the minimum number of cases indicating the beginning of a particular disease's outbreak.

Single case.

Risk factors

- Infection when caring for those suffering from the disease may occur through contact with the body fluids of patients, or contact with fomites (e.g. clothes, bedding, needles, medical equipment contaminated with body fluids from a person who has EVD) when infection prevention precautions are not strictly practised.
- Burial ceremonies that involve direct contact with the body of the deceased are a significant driver of transmission. Mourners are at increased risk.
- People in contact with wild animals like fruit bats, apes, antelopes and monkeys, in areas where Ebola virus (EBOV) may be present.
- Health workers who do not have access to/do not use proper IPC measures while caring for Ebola patients (detected or undetected) are at highest risk of getting sick. Other patients who share a bed, room or medical equipment with Ebola patients are at very high risk.

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Attack rate (AR)

The **attack rate** is the risk of getting a disease during a specific time period (such as during an outbreak).

Attack rates will vary from one outbreak to another. In case of an outbreak, consult the latest information provided by health authorities.

Household attack rates are between 12 and 48 per cent.

Groups at increased risk of severe illness (most vulnerable)

- People with chronic diseases such as renal disease, cancer, chronic liver and lung disease and diabetes.
- Older people with weakened immune systems.
- Infants, young children.
- Immunosuppressed persons such as those receiving chemotherapy, transplant recipients or HIV carriers.

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Infectious agent

Infectious agents are bacteria, viruses, fungi, prions and parasites. A disease caused by an infectious agent or its toxic products is defined as an infectious disease.

Ebola virus (EBOV).

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Reservoir / host

A **reservoir of infection** is a living organism or material in or on which an infectious agent lives and/or usually multiplies. Reservoirs include humans, animals and the environment.

A **susceptible host** is a person at risk of being infected. The level of susceptibility depends on age, sex, ethnicity and genetic factors, specific immunity also depends on other factors that affect an individual's ability to resist infection or to limit its ability to cause infection.

A **zoonotic disease** or **zoonosis** is an infectious disease that has jumped from a non-human animal to humans.

Zoonotic disease: Fruit bats, apes (gorillas, chimpanzees), antelopes and monkeys.

Humans.

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How disease is spread (modes of transmission)

Categorisation of **modes of transmission** varies from one agency to another. In addition, some infectious

agents can be transmitted by more than one mode. A list of modes of transmission can be found in the key concepts to serve as guidance to better understand the diseases included in this website.

Contact transmission:

- Through direct contact (through broken skin or mucous membranes in, for example, the eyes, nose, or mouth) of a person who is sick with or has died from Ebola.
- Through direct contact with infected fruit bats, apes, monkeys and duikers.
- People remain infectious as long as their blood or body fluids contain the virus.
- Transmission after exposure to body fluids of immune-protected sites: the virus can remain in areas of the body that are protected from the immune system, even after the person has recovered. This includes the testes, inside of the eyes, placenta and central nervous system (particularly the fluid around the spinal cord and brain). There have been several “resurgence” outbreaks of EVD up to five years after the primary epidemic. Scientists are now studying how long the virus can stay in these immune-protected areas of the body, and how EVD resurgence may present in patients and/or be prevented.

Sexual transmission:

- Unsafe sex (oral, vaginal or anal) with male survivors presents additional risks for a specific period of time. The World Health Organization (WHO) recommends that male survivors of EVD practise safer sex for 12 months from onset of symptoms or until their semen tests negative twice for Ebola virus. There is no evidence that Ebola can be spread through sex or other contact with vaginal fluids from a woman who has recovered from Ebola.

Vehicle-borne transmission:

- Through contact with objects (like needles, medical equipment, bedding, clothing, dishes) that have been contaminated with blood or other body fluids from a person who is sick with Ebola, or through contact with the body of a person who has died from Ebola.

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Incubation period

This time from when infection occurs to the onset of symptoms is called the **incubation period**. It is a range of days and it can be different for each disease.

On average 8 to 10 days (range 2—21 days).

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Period of infectiousness

Period of infectiousness is the time interval during which an infected person can transmit the infection to other susceptible persons.

People remain infectious as long as their blood contains the virus. Recovering patients are no longer contagious to others and their return home or transfer to a general hospital is safe. Breast milk may still

be contagious for up to one month after recovery and sperm for up to nine months after the patient's recovery.

Clinical signs and symptoms

- Starts with sudden fever, fatigue, muscle pain, headache and sore throat.
- Followed by vomiting, diarrhoea, rash, symptoms of impaired kidney and liver function. There may also be bleeding under the skin, from the nose and from the gums, blood with coughing, and blood in the stools.

Other diseases with similar clinical signs and symptoms

- Other haemorrhagic fevers (Marburg haemorrhagic fever, Rift Valley fever, Crimean-Congo fever, Lassa fever)
- dengue fever
- yellow fever
- malaria
- typhoid fever
- meningitis.

Diagnosis

- Antibody-capture enzyme-linked immunosorbent assay (ELISA).
- Antigen-capture detection tests.
- Serum neutralization test.
- Reverse transcription polymerase chain reaction (RT-PCR) assay.
- Electron microscopy.
- Virus isolation by cell culture.

Vaccine or treatment

Please refer to the appropriate local or international guidelines for clinical management. All clinical management including the administration of any treatment or vaccine should be conducted by health professionals.

- A prompt isolation of probable and confirmed Ebola cases is required.
- Supportive care-rehydration with oral or intravenous (IV) fluids and treatment of specific symptoms improves survival.
- Specific treatments are available to treat infection with the Zaire strain of Ebola virus.

There are two licenced Ebola vaccines, typically used as follows:

- Ervebo, a single-dose vaccine against Zaire Ebola virus. SAGE currently recommends off-label use of the vaccine in outbreak settings for adults, infants and children from birth to 17 years of age, and for pregnant and lactating women. This vaccine is typically used in a ring vaccination strategy (contacts, contacts of contacts, and frontline workers), for anyone who has not been vaccinated with this vaccine in the preceding six months.
- Zabdeno and Mvabea is a two-dose vaccine for people aged one year and older, prioritized for preparedness areas, and for people who do not fall into the ring vaccination strategy above. As a two-dose regimen, it is not used for outbreak response, where immediate protection is needed.

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Immunity

There are two types of immunity:

- **Active immunity** results when exposure to an agent triggers the immune system to produce antibodies to that disease.
- **Passive immunity** is provided when a person is given antibodies to a disease rather than producing them through his or her own immune system.

People who recover from Ebola infection develop antibodies that last for at least ten years, possibly longer. It is not known if people who recover are immune for life or if they can become infected with a different species of Ebola.

Which interventions are most effective for prevention and control?

The following is a list of activities considered for Red Cross Red Crescent volunteers to take part in. It is not an exhaustive list of all prevention and control activities for the specific disease.

- Communicate risks about the disease or epidemic, not only to share information on prevention and mitigation measures, but also to encourage informed decision-making, positive behaviour change and maintenance of trust in the Red Cross Red Crescent response. This includes the identification of rumours and misinformation around disease—frequent during health emergencies—to manage them appropriately. Volunteers should use the most context-appropriate communication techniques (ranging from social media to face-to-face interactions).
- The population should be well informed about the nature of the disease to avoid further transmission and community stigmatization, and to encourage positive health seeking behaviours (early presentation at treatment centres). e include:
 - Avoiding physical contact with patients who have Ebola virus disease.
 - Frequent handwashing in communities.
 - Quarantine or close follow-up of close contacts.
 - Physical distancing in communities.
 - Post-recovery condom use.
- Use of personal protective equipment by healthcare workers while caring for patients and by those conducting safe and dignified burials.
- Isolating confirmed patients in treatment units. Any suspect case should not be managed at home but

should be transferred to a health facility with isolation capacity immediately. During the transfer, health workers should wear personal protective equipment.

- Contact tracing and follow-up.
- Safe and dignified burials.
- Social mobilization for ring vaccination.
- Interventions to improve infection prevention and control measures in health facilities, including case detection
- Community and health facility-based surveillance
- Psychosocial support (PSS) for patients, survivors, contacts and family members
- In the past Ebola outbreaks engaging with faith leaders was an efficient way of communication (see attached pdf tool: CAFOD [Keeping the Faith. The Role of Faith Leaders in the Ebola Response](#) (2015).

Which interventions have NO evidence and therefore are NOT recommended?

- Spraying of humans and the environment with chlorine is a practice implemented in past Ebola epidemics, but for which there is no evidence as an outbreak control measure. In fact, it is documented that in the West Africa outbreak deliberate exposure of humans to chlorine resulted in detrimental health effects, such as skin, respiratory and eye conditions. Other negative effects may be to create a false sense of security among those sprayed; in some cultures, it may create fear and subsequent resistance not only to spraying but also to other necessary outbreak response activities.

Epidemic characteristics and RCRC indicators and targets

The first table below includes data that should be gathered from health authorities and relevant non-governmental actors to understand the progress and characteristics of the epidemic in the specific country and area of intervention. The second table includes a link to a list of suggested indicators that can be used for monitoring and evaluating Red Cross Red Crescent activities; wording of indicators may be adapted to specific contexts. Target values for a specific indicator can vary widely from one context to another and therefore managers should define them based on the specific population, area of intervention and programmatic capacity. Exceptionally, some indicators in this website may include target values when these are globally agreed as a standard; e.g. 80 per cent of individuals who slept under an insecticide-treated net (ITN) the previous night—the normative World Health Organization benchmark for universal coverage with ITNs.

Epidemic characteristics and progression
Number of new health areas affected
Number of confirmed and probable EVD cases
Case fatality rate

Red Cross Red Crescent activities

Please refer to:

- The Preparedness and Response Cheat Sheets support rapid DREF or EA development and can guide strategy development. However, detailed planning needs to look at sectoral guidelines and technical standards as the outbreak evolves.
 - This [preparedness activities 'cheat sheet'](#) contains guidance for NS in countries identified as at-risk, when neighbouring a country where there is a known ongoing epidemic.
 - This [response activities 'cheat sheet'](#) contains guidance for start-up of possible activities in the event of an outbreak of Ebola. Each National Society should select its Ebola response activities based on a needs analysis—what are partners covering, what are the gaps—and based on its own capacities.
- [This set of suggested Key Performance Indicators \(KPIs\)](#) for response operations to haemorrhagic fever diseases (Ebola virus disease (EVD); Marburg virus disease (MVD)). Indicators should be selected depending on: the pillar that is supported in a given outbreak response; specific-context needs; and available capacity to conduct the corresponding monitoring activities. The document covers: safe and dignified burials, mental health and psychosocial support, community engagement and accountability, infection prevention and control, and contact tracing activities.

See also:

- For Community Engagement and Accountability (CEA) indicators for activities accompanying ECV actions, please refer to: IFRC *CEA toolkit (Tool 7.1: Template CEA logframe, activities and indicators)*. Available at: <https://www.ifrc.org/document/cea-toolkit>
- IFRC (2020) *Safe and Dignified Burial: An Implementation Guide for Field Managers*. Available at: <https://www.ifrc.org/document/safe-and-dignified-burial-implementation-guide-field-managers>
- IFRC (2017) *Epidemic ready: Community engagement key in fight against Ebola. An IFRC case study documenting best practices and lessons learned on using CEA to prevent the spread of Ebola in the West Africa outbreak*. Available at: https://communityengagementhub.org/wp-content/uploads/sites/2/2020/04/IFRC_CEA-in-Ebola-preparedness_Operational-case-study_FINAL.pdf
- **Ebola ECV/RCCE training** of trainers' package. A collection of resources, including ToT training recordings, PPTs, training materials, guidance notes, social science research, audio visuals and additional resources from the Ebola response in DRC. [EN](#)
- For psychological first aid during Ebola virus disease outbreaks visit: WHO (2014), *Psychological first aid during Ebola virus disease outbreaks*. Available at: [9789241548847_eng.pdf;sequence=1 \(who.int\)](https://www.who.int/publications/m/item/9789241548847_eng.pdf;sequence=1)
- For how to engage with faith leaders during Ebola outbreaks: CAFOD, Christian Aid, Islamic Relief, Tearfund (2015) *Keeping the Faith. The Role of Faith Leaders in the Ebola Response*. Available at: <https://reliefweb.int/report/sierra-leone/keeping-faith-role-faith-leaders-ebola-response>
- For a case study about psychosocial support for the Ebola Virus Disease outbreak in West Africa: Eliza Y.L. Cheung (2015) *An outbreak of fear, rumours and stigma: psychosocial support for the Ebola Virus Disease outbreak in West Africa*. Available at: https://www.interventionjournal.com/sites/default/files/An_outbreak_of_fear%2C_rumours_and_stigma_.10.pdf

Impact on other sectors

Sector	Link to the disease
WASH	As the virus is spread through direct contact with infected fluids, safe handling of fluids and correct hygiene is needed to decrease transmission rates.
Food security	Sharing food, dishes and kitchen utensils that have been contaminated with body fluids from a person who is sick with Ebola or the body of a person who has died from Ebola can transmit Ebola virus disease.
Nutrition	Malnutrition increases the risk for severe infection.
Shelter and settlements (including household items)	Functional sanitation facilities like handwashing possibilities are important to decrease transmission risk. Indispensable contact tracing is a particular challenge in crowded settings.
Psychosocial support and mental health	Ebola virus disease has several negative impacts on psychological, social and emotional aspects of a person's life, apart from its physical effects. Psychological reactions may include fear of social stigma, anxiety-depression and worry about the outcome, post-traumatic stress disorder (PTSD), among others. Many survivors experience difficulties in reintegrating into their families and the community after recovery and suffer from stigmatization. Isolation, contact tracing and social distancing in communities are highly stressful situations for concerned communities and psychosocial support may be needed for people with Ebola-related experiences. The mental health impact has not only been described among survivors, family members and healthcare workers, but also among the general population. The psychosocial effects persist even months and years after an Ebola outbreak.
Gender and sex	Men, who are more likely than women to go regularly into the forest as a consequence of their gendered roles, may be at greater risk of infection at the onset of an outbreak. However, as an EVD outbreak progresses, female infection rates are often higher than those of males. The reason could be that females do more often care for the sick or prepare bodies for burials and therefore are at increased risk of exposure and being infected with EVD. Young children are often missed in contact tracing, vaccination, and other control measures, leaving them at higher risk of infection. Many of the larger epidemics of EVD were amplified in healthcare settings, leading to a high proportion of nursing staff, predominantly female, being affected. It has been found that EVD has been transmitted in obstetric care settings with low level of suspicion of the epidemic disease, because the women are coming for pregnancy-related reasons. EVD appears to have disastrous consequences for the foetus and causes spontaneous abortions with heavy bleeding.

Sector	Link to the disease
Education	<p>When schools do not have clean running water and handwashing possibilities, these can add transmission risks in places where there are outbreaks ongoing. Children may then be at risk of getting the disease if attending classes, or at risk of losing on education if staying at home. Schools and education centres play a crucial part in educating children and adults about transmission risks and preventive measures.</p> <p>Schools and other facilities dedicated to children and youth can offer an important space for them to engage, mobilize and raise awareness around health education issues. With support, trust and appropriate capacity-building, young people can be effective advocates for the adoption of preventive measures during an epidemic and are those best placed to mobilize their peers.</p>
Livelihoods	<p>Ebola virus disease leads to reduction in productivity as people may not be able to work due to disease or isolation. As close contacts need to be isolated as well, the reduction in productivity is even higher. This can lead to a loss of income due to the reduction in work activity and to the diversion of resources to seek medical treatment.</p> <p>As Ebola is a highly stigmatized disease, some people choose not to use businesses run by Ebola recovered patients, like restaurants and shops, because of an unfounded fear of getting the disease through the prepared food. As a result, many recovered people lose their livelihood.</p>

Resources:

- Jalloh, M. F., Li, W., Bunnell, R. E., Ethier, K. A., O'Leary, A., Hageman, K. M., Sengeh, P., Jalloh, M. B., Morgan, O., Hersey, S., Marston, B. J., Dafaie, F., & Redd, J. T. (2018). Impact of Ebola experiences and risk perceptions on mental health in Sierra Leone, July 2015. *BMJ global health*, 3(2), e000471. <https://doi.org/10.1136/bmjgh-2017-000471>
- WHO (2007) *Addressing sex and gender in epidemic-prone infectious diseases*. Available at: https://apps.who.int/iris/bitstream/handle/10665/43644/9789241595346_eng.pdf
- WHO (2021) *Ebola virus disease*. Fact sheet. Available at: <https://www.who.int/news-room/fact-sheets/detail/ebola-virus-disease>