Lassa haemorrhagic fever

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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

Lassa haemorrhagic fever is a zoonotic disease and known to be endemic in Benin, Ghana, Guinea, Liberia, Mali, Sierra Leone, Togo and Nigeria, but probably exists in other West African countries. 80 per cent of people who become infected with Lassa virus have no symptoms. The overall case fatality rate is one per cent. The observed case fatality rate among patients hospitalized with severe cases of Lassa fever is 15—20 per cent, but can reach 50 per cent of hospitalized patients during epidemics. Because the clinical course of the disease is so variable, detection of the disease in affected patients has been difficult. When presence of the disease is confirmed in a community, prompt isolation of affected patients, good infection prevention and control practices and rigorous contact tracing can stop outbreaks.

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.*

Suspected case: Known exposure to a person suspected to have Lassa haemorrhagic fever AND fever greater than 38°C for less than three weeks PLUS absence of signs of local inflammation AND two major signs or one major and two minor signs.

Major signs: bleeding, swollen neck or face, conjunctiva or subconjunctival haemorrhage, spontaneous abortion, petechial or haemorrhagic rash, new onset of tinnitus or altered hearing, persistent hypotension, absence of clinical response after 48 hrs to antimalarial and/or broad-spectrum antibiotic therapy.

Minor signs: headache, sore throat, vomiting, diffuse abdominal pain /tenderness, chest/retrosternal pain, cough, diarrhoea, generalized muscle or joint pain, profuse weakness.

WHO case definition source of information:

https://www.who.int/news-room/fact-sheets/detail/lassa-fever

Risk factors

- People who live in or visit endemic regions (primarily in West Africa) and have exposure to the Mastomys rat, or food or household items that are contaminated with urine or faeces of these rats.
- Persons living in rural areas where Mastomys rats are usually found, especially in communities with poor sanitation or crowded living conditions.
- Unsafe domestic food storage.
- Unprotected sexual intercourse with infected people during outbreaks.
- Lack of personal protective equipment, infection prevention and control practices (barrier nursing) for healthcare and laboratory workers in endemic areas and during outbreaks.

Attack rate (AR)

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

The secondary attack rate for Lassa fever in healthcare facilities varies depending on the quality of IPC practices.

Groups at increased risk of severe illness (most vulnerable)

- Women in the third trimester of pregnancy (over 80 per cent of all Lassa fever cases are fatal in this period).
- Immunosuppressed persons such as those receiving chemotherapy, transplant recipients or HIV carriers.
- People with chronic diseases such as renal disease, cancer, chronic liver and lung disease and

diabetes.

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.

Lassa virus.

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: Multimammate rat (*Mastomys*). Rats carrying Lassa virus do not become ill, but they can shed the virus in their urine and faeces.

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.

Vehicle-borne transmission:

- Lassa virus is transmitted to humans via contact with food or household items contaminated with rodent urine or faeces.
- People can become infected with the virus by inhaling tiny particles in the air contaminated with infected rodent excretions. This can occur during cleaning activities, such as sweeping.
- Lassa virus may be spread in contaminated medical equipment, such as reused needles.

Contact transmission:

- Person-to-person infections and laboratory transmission can occur, particularly in hospitals lacking

adequate infection prevention and control.

- Lassa virus can spread between humans through direct contact with the tissues, blood, urine, faeces, vaginal and seminal fluids, or other bodily secretions or excretions of a person infected with Lassa fever.

Sexual transmission:

- Unprotected sexual intercourse with a man who has recovered from Lassa fever in the first year after recovery, as the virus may remain in semen for some months.

Casual contact (including skin-to-skin contact without exchange of body fluids) does not spread Lassa virus.

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.

6—21 days.

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. It is believed that sperm may still contain virus for a period of up to a year after the patient's recovery.

Clinical signs and symptoms

- About 80 per cent of people who become infected with Lassa virus have no or mild symptoms (e.g. slight fever, headache) and go undiagnosed.
- One in five infections progresses to severe disease, where the virus affects several organs such as the liver, spleen and kidneys.
- The onset of the disease, when it is symptomatic, is usually gradual, starting with fever, general weakness and malaise.
- After a few days, headache, sore throat, muscle pain, chest pain, nausea, vomiting, diarrhoea, cough, respiratory distress and abdominal pain may follow. In severe cases facial swelling, fluid in the lung cavity, bleeding from the mouth, nose, vagina or gastrointestinal tract and low blood pressure may develop.

- Neurological problems are possible, including hearing loss, tremors and encephalitis
- Shock, seizures, tremor, disorientation and coma may be seen in the later stages.
- Death may occur within two weeks after symptom onset, due to multi-organ failure.
- Deafness occurs in 25 per cent of patients who survive the disease. In half of these cases, hearing returns partially after one to three months. Deafness may develop in mild as well as severe cases.
- Transient hair loss and gait disturbance may occur during recovery.

Other diseases with similar clinical signs and symptoms

Other haemorrhagic fevers (Marburg haemorrhagic fever, Rift Valley fever, Crimean-Congo, dengue fever), malaria, typhoid fever, measles, shigellosis and other infections.

Diagnosis

Laboratory specimens may be hazardous and must be handled with extreme care. Lassa virus infections can only be diagnosed definitively in the laboratory using any of the following tests:

- Antibody enzyme-linked immunosorbent assay (ELISA).
- Reverse transcriptase polymerase chain reaction (RT-PCR) assay (during the early stage of the disease).
- Virus isolation by cell culture (in 7 to 10 days, only in a high containment laboratory).

Vaccine or treatment

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

- Prompt isolation of affected patients.
- Supportive care and treatment of complications. Non-specific antivirals, if recommended by local protocols.
- There is currently no vaccine that protects against Lassa fever.

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.

> Immunity against reinfection does occur after recovery from the illness but it is not known how long this immunity lasts.

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 on. 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).
- Community education and engagement activities to encourage the adoption of protective behaviours:
  - Preventing contact with rodents and their excrement.
  - Good hygiene practices at home and workplaces, e.g. by storing food in rodent-proof containers; disposing of rubbish/garbage away from the home; eliminating food or trash that may attract rodents around the home.
  - Using rat traps for rodent control in and around homes can reduce rodent populations. The wide distribution of this particular rat makes complete control of the rodent impractical.
- Community-based environmental management and clean-up campaigns.
- Barrier nursing and no contact with blood and body fluids when caring for sick persons.
- In healthcare settings, health workers must observe infection prevention and control measures including the use of appropriate personal protective equipment.
- Contact tracing and follow-up.
- Post-recovery condom use.
- There is currently no evidence that there is a high risk of Lassa being transmitted from a dead body. Some Ministries of Health recommend safe and dignified burials.

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 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
Suspected cases
Confirmed cases
Case fatality rate
Indicators for Red Cross Red Crescent activities
Number of volunteers trained on a specific topic (e.g. Epidemic Control for Volunteers (ECV); Community-based surveillance (CBS); WASH training; CBHFA training, etc.) ***Numerator*:** Number of volunteers trained Source of information: Training attendance sheets
Suspect cases detected by volunteers who were encouraged to seek healthcare and who arrived at a health facility *(NB. This indicator requires the implementation of a system in collaboration with the health facility, whereby health workers specifically asked the patient how they heard about the service)* ***Numerator:*** Lassa fever suspect cases detected by volunteers in a determined period preceding this survey (e.g. two weeks) for whom advice or treatment was sought from a health facility ***Denominator:*** Total number of people who are Lassa suspect cases in the same period preceding the survey Source of information: Survey
Percentage of people recognizing at least one transmission route and at least one measure for preventing it ***Numerator*:** Total number of people who recognized at least one transmission route and at least one measure for preventing it during the survey ***Denominator*:** Total number of people surveyed Source of information: Survey

Indicators for Red Cross Red Crescent activities
Percentage of people who know the cause, symptoms, treatment or preventive measures for Lassa transmission ***Numerator***: Number of people who can cite the cause, symptoms, treatment or preventive measures for Lassa transmission ***Denominator***: Number of people surveyed Source of information: Survey

Impact on other sectors

Sector	Link to the disease
WASH	Proper personal and environmental hygiene and sanitation measures to discourage rodents from entering homes decrease transmission of Lassa virus.
Food security	The Lassa virus is transmitted to humans via contact with food contaminated with rodent urine or faeces. Effective prevention measures include storing grains and other food in rodent-proof containers.
Nutrition	Malnutrition increases the risk for severe Lassa fever.
Shelter and settlements (including household items)	Maintaining clean households, good waste management by disposing of garbage far from home and keeping cats are effective measures to prevent infection. Because Multimammate rats are so abundant in endemic areas, it is not possible to eliminate them from the environment.
Psychosocial support and mental health	Lassa haemorrhagic fever can have 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 and worry about the outcome, social withdrawal, among others. Isolation, contact tracing and social distancing in communities are highly stressful situations for people and very challenging on a psychological level. People with low resilience suffer more from anxiety and depression. Sudden deafness in survivors, including in mild cases, dramatically affects people's lives and psychosocial support might be needed.

Sector	Link to the disease
Sex and Gender	Gender roles influence exposure to Lassa fever. Women and girls may be at increased risk due to caregiving responsibilities, food preparation, and domestic tasks that bring them into contact with contaminated surfaces or rodent droppings—potentially delaying their own care and treatment. Men and boys may be exposed through agricultural or occupational activities, especially in rural areas where contact with rodents or contaminated environments is more likely. Gender norms can affect health-seeking behaviour, with men often delaying treatment. Pregnant women face a significantly higher risk of severe disease and mortality, particularly in the third trimester, making early detection, treatment, and access to maternal care critical.
Education	When schools do not have clean running water, good food and garbage management, this can increase the number of Multimammate rats and add transmission risks in places where the Lassa virus is endemic. Children may then be at risk of getting the disease if attending classes, or at risk of losing out on education if staying at home because of isolation measures. 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.
Livelihoods	Lassa fever leads to reduction in productivity as people may not be able to work due to illness. Close contacts may be quarantined or face stigma in carrying out work. 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. Long term symptoms like deafness severely affect people's livelihood.

Resources:

- CDC (2019) *Lassa fever*. Available at: https://www.cdc.gov/vhf/lassa/index.html
- WHO (2017) *Lassa fever*. Fact Sheets. Available at: https://apps.who.int/mediacentre/factsheets/fs179/en/index.html