



Typhoid 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

There are approximately 11—20 million cases of typhoid fever every year (WHO report from 2018), resulting in approximately 128,000 to 161,000 deaths annually. Typhoid fever outbreaks are common worldwide. Primary causes include insufficient access to safe drinking water and inadequate sanitation and hygiene. Countries facing complex emergencies and large population movements (of internally displaced people or refugees) to overcrowded settings are particularly vulnerable to typhoid fever outbreaks.

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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.*

Outbreak case definitions (similar to routine surveillance case definitions but may have added features):

Suspect case: At least three out of seven consecutive days of fever OR a physician's suspicion of enteric fever.

Probable case: In line with the suspect case definition plus an epidemiological link to the outbreak.

Confirmed case: Laboratory confirmation by culture or molecular methods of *S. Typhi* organisms or detection of *S. Typhi* DNA from a normally sterile site.

WHO case definition source of information:

Risk factors

- Overcrowded areas where person-to-person spread is easily possible. For instance, peri-urban slums where minimum standards of clean drinking water and sanitation are not met.
- The consequences of a humanitarian crisis – such as disruption of water and sanitation systems, or the displacement of populations to inadequate and overcrowded camps – can increase the risk of typhoid fever transmission, should the bacteria be present or introduced.
- Water contaminated with human faeces, for example from sewage, septic tanks and latrines, is a source of infection. Animal faeces also contain microorganisms that can cause typhoid fever.
- Inadequate access to clean water and sanitation facilities. Water can also be contaminated during transport, storage and handling.
- Food and water when prepared or stored in unhygienic conditions. Raw fruits and vegetables that are not appropriately washed. Seafood taken from contaminated water and eaten raw or not sufficiently cooked.
- Household members and close neighbours of typhoid patients are at increased risk in the days immediately following the person's illness.
- In developing countries school-age children (aged 5–15 years) are disproportionately affected, but in some endemic areas, children aged under five years of age show incidence rates similar to, or exceeding those of, school-age children.

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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.

Groups at increased risk of severe illness (most vulnerable)

- Serious complications occur in up to 10 per cent of typhoid fever patients, especially in those who have been ill longer than two weeks and who have not received proper treatment.
- Special caution is needed for those experiencing typhoid fever caused by multidrug-resistance (MDR) strains of *S. Typhi* – that is, resistance to all three of the first-line antibiotics. It is associated with more severe illness and higher rates of complications and death, especially in children aged under two years of age.

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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.

Salmonella Typhi (*S. Typhi*) (bacterium).

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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.

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.

Faecal oral transmission: Ingestion of contaminated food and water that have been handled by a person who is shedding *Salmonella Typhi* through the faeces, or if sewage contaminated with *Salmonella Typhi* bacteria gets into the water used for drinking or washing food. Flies and other insects can mechanically transfer the organism to food, where the bacteria then multiply to achieve an infective dose.

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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.

5—60 days, usually 1—3 weeks.

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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.

The disease is communicable for as long as the infected person excretes *S. Typhi*, usually after the first week of illness through convalescence. Approximately 10 per cent of untreated cases will excrete *S. Typhi* for three months and between two to five per cent of all cases become chronic carriers.

Clinical signs and symptoms

- The disease starts with fatigue, headache, abdominal pain and slow stepwise fever onset. Constipation usually occurs in older children and adults at the beginning of the disease, whereas younger children may suffer from diarrhoea.
- Complications can include continuous fever (temperature always greater than 38°C), rash (called roseola) at the body trunk, relatively slow heart rate.
- Severe forms of typhoid fever may entail cerebral dysfunction, delirium and shock, and occasionally also intestinal perforation and haemorrhages.
- Symptoms are often non-specific and clinically non-distinguishable from other febrile illnesses.
- Clinical severity varies and severe cases may lead to serious complications or even death. Without therapy, the illness may last for three to four weeks and death rates range between 12 and 30 per cent.

Other diseases with similar clinical signs and symptoms

Malaria, dengue fever, influenza or other febrile illnesses.

Diagnosis

Confirmed diagnosis requires isolating *S. Typhi* in the laboratory through blood cultures or occasionally through bone marrow culture. After two to three weeks stool cultures can be used as well for diagnosis.

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.

- Typhoid fever is treated with antibiotics.
- The World Health Organization (WHO) recommends the programmatic use of typhoid vaccines for the control of the disease. As of 2021, three types of typhoid vaccines are licensed for use:
 1. an injectable polysaccharide vaccine for persons aged two years and above.
 2. a live attenuated oral vaccine in capsule formulation for those over five years of age.
 3. a typhoid conjugate vaccine (TCV). TCV is the preferred vaccine at all ages due to its improved immunological properties, suitability for use in younger children and expected longer duration of protection.

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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.

Typhoid fever reinfections are rare but have been described; this means that immune responses are only partially protective after the initial episode(s) of infection.

The vaccines do not provide long-lasting immunity. The TCV vaccine does provide longer lasting immunity compared to the other ones.

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).
- Community education and engagement activities to encourage the adoption of protective behaviours:
 - Promote handwashing with soap at critical times (before breastfeeding, after changing napkins, before cooking, before eating, after using toilets). This includes not only communication and community mobilization activities to promote handwashing with soap practices, but also when possible providing handwashing stations in public spaces (e.g. markets, schools).
 - Promote food hygiene:
 - Consume properly cooked food and eat it while still hot.
 - Raw milk and products made from raw milk should be avoided. Encourage people to drink only pasteurized or boiled milk.

- Wash fruits and vegetables carefully. If possible it is best that vegetables and fruits are peeled.
- Plates and utensils must be kept off the ground.
- Food must be covered and protected from flies at all times.
- All food preparation surfaces must be cleaned.
- Access to safe drinking water (chlorination; filtration; solar disinfection; boiling). Water storage containers should be protected from contamination and kept clean.
- Safe disposal of faeces (promote the use of improved sanitation facilities). Latrines/toilets should be maintained clean and a handwashing device (with soap and water) must be present near the latrines.
- Distribution of essential non-food items (NFIs), including soap and water chlorination tablets (if context-appropriate).
- Social mobilization for typhoid vaccination for outbreak control (in conjunction with other interventions).

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 |
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| Suspected, probable and confirmed cases (disaggregate by age, sex) |
| Case fatality rate |
| Attack rate |
| 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 |

Red Cross Red Crescent activities

Suspect cases among children under five years 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: Children under five years who are 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 children under five years who are 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 the disease transmission

Numerator: Total number of people who cited at least one transmission route and at least one measure for preventing the disease transmission during the survey

Denominator: Total number of people surveyed

Source of information: Survey

Number of community members who received epidemic prevention and control material (e.g. soap, chlorination tablets, IEC material)

Numerator: Number of community members who received materials

Source of information: Distribution lists

Percentage of households where soap (or ash) is available for handwashing

Numerator: Total households where soap or ash was available during the survey

Denominator: Total households surveyed

Source of information: Survey

If supporting vaccination campaigns:

Number of households covered during the Supplementary Immunization Activity (SIA)

Number of volunteers participating in the SIA

Number of vaccinations realized during the SIA

Source of information: Vaccination activity records

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>
- For vaccination activities, see: IFRC (2020) *Social Mobilization Guide for Vaccination Campaign and Routine Immunization*. Available at: https://oldmedia.ifrc.org/ifrc/wp-content/uploads/2020/01/1_SM-Guide-RC_version-1.pdf

Impact on other sectors

| Sector | Link to the disease |
|--|---|
| WASH | Primary cause of typhoid fever includes insufficient access to safe water, proper sanitation and hygiene. |
| Food security | Ingestion of contaminated food and water with human waste can transmit <i>Salmonella Typhi</i> . |
| Nutrition | Malnutrition increases the risk of severe typhoid fever. |
| Shelter and settlements (including household items) | Functional sanitation facilities and good waste management are important to decrease transmission risk. Often basic infrastructure with safe water and proper hygiene is disrupted when there is a need for shelters and settlements. A typhoid fever outbreak often happens in overcrowded areas or in emergency shelters with poor hygiene. |
| Psychosocial support and mental health | Typhoid fever can have several negative impacts on psychological, social and emotional aspects of a person's life, apart from its physical effects only. Psychological reactions may include fear of social stigma, anxiety and worry about the outcome, social withdrawal, among others. |
| Education | When schools do not have clean running water or basic toilets, 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 out on education if staying at home due to illness. 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 | Illness leads to reduction in productivity as people may not be able to work due to disease. 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. |
| Gender and sex | In many societies, women have primary responsibility for sanitation, health and water supply in the household. Women do not only ensure that there is water for drinking, but also for cooking, cleaning, caring for domestic animals, personal hygiene and caring for the sick. It is therefore key that epidemic response activities take into consideration the central role women have in water management. |

Resources:

- WHO (2018) *Typhoid. Fact sheet*. Available at: <https://www.who.int/news-room/fact-sheets/detail/typhoid>