Chagas disease

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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

About six to seven million people worldwide, mostly in Latin America, are estimated to be infected with *Trypanosoma cruzi,* the parasite that causes Chagas disease (WHO data from 2021). Chagas disease is found mainly in endemic areas of 21 Latin American countries. Chagas disease was once entirely confined to rural areas but in the last decades, due to population movements, most infected people live in urban settings and the disease has spread to other continents. The burden of disease is due to its chronic progression with people still suffering years later after initial infection.

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.*

Any individual who, as a result of a screening programme or of testing as a possible case, was positive for antibodies against *T. cruzi* in two serological assays.

WHO case definition source of information:
https://www.who.int/news-room/fact-sheets/detail/chagas-disease-(american-trypanosomiasis)

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.

Significant increase above historical averages in endemic countries.

A single case of disease as a result of local transmission in non-endemic countries.

Risk factors

- People living in rural areas, in poor conditions in Latin America.
- Pregnancy in a Chagas disease outbreak area is a risk for congenital transmission to the newborn.
- Consumption of food contaminated with *T. cruzi*.
- Blood transfusion and organ transplantation without correct blood screening.
- Outbreaks of the disease are of particular concern when they occur in overcrowded settings.
- No proper sanitation and hygiene measures.
- Migrants are at increased risk to become infected.

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.

It can be below 10 per cent or up to 100 per cent in some epidemics.

Groups at increased risk of severe illness (most vulnerable)

- People who have suppressed immune systems (for example, due to HIV or chemotherapy).

- People with chronic diseases such as renal disease, cancer, chronic lung or liver 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.

Trypanosoma cruzi (*T. cruzi*). It is a parasite.

Vector: Triatomine bugs carry *T. cruzi*.

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.

Wild animals (e.g. armadillos, raccoons, opossums and rodents), domestic animals, humans.

The large reservoir of *T. cruzi* parasites in wild animals of the Americas means that the parasite cannot be eradicated.

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.

- **Vector-borne:** *T. cruzi* parasites are mainly transmitted by contact with faeces/urine of infected blood-sucking triatomine bugs. They usually bite an exposed area of the skin such as the face, and the bug defecates close to the bite. The parasites enter the body when the person instinctively smears the bug faeces or urine into the bite, the eyes, the mouth, or into any skin break. Normally the bugs hide during the day and become active at night when they feed on animal and human blood.
- **Vehicle-borne transmission:** less often, *T. cruzi* can be transmitted by the consumption of food contaminated with T. cruzi; blood transfusion from infected donors; organ transplants using organs

from infected donors; and laboratory accidents.

- **Congenital transmission:** from an infected mother to child transmission during pregnancy or childbirth.

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.

7—14 days.

Period of infectiousness

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

Reservoirs of *T. cruzi* are infectious for humans as long as the parasite is present in the faeces/urine of infected bugs.

Clinical signs and symptoms

- The initial acute phase lasts for about two months after infection. During this phase, in most cases symptoms are absent, or mild and unspecific. In less than 50 per cent of people bitten by a triatomine bug, characteristic first visible signs can be a skin lesion or a purplish swelling of the lids of one eye. Additionally, they can present with fever, headache, enlarged lymph glands, pallor, muscle pain, difficulty in breathing, swelling, and abdominal or chest pain.
- During the chronic phase, the parasites are hidden mainly in the heart and digestive muscles. Up to 30 per cent of patients suffer from cardiac disorders and up to 10 per cent suffer from digestive (typically enlargement of the oesophagus or colon), neurological or mixed alterations. In later years the infection can lead to sudden death due to cardiac arrhythmias or progressive heart failure caused by the destruction of the heart muscle and its nervous system.

Other diseases with similar clinical signs and symptoms

Non-Chagas cardiomyopathy and diseases of digestive system, typhoid fever, visceral leishmaniasis and some congenital infections.

Diagnosis

- The diagnosis of acute Chagas disease can be made by observation of the parasite in a blood smear by microscopic examination.
- In the chronic phase, the parasite is difficult to detect and antibodies, which are produced by the body to fight the disease, can be tested in the blood.
- Because no test is sufficiently accurate to work as a stand-alone, two or three different tests must be used.

Vaccine or treatment

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

- Chagas disease can be treated with antibiotics. The treatment periods, however, are long (60—90 days) and the treatment has serious side effects. If given soon after infection, antibiotics are almost 100 per cent effective in curing the disease (if given at the onset of the acute phase including the cases of congenital transmission). The efficacy diminishes the longer a person has been infected. Infected adults with no symptoms should be offered treatment as well to prevent or curb disease progression.
- In chronic patients, antiparasitic treatment can potentially prevent disease progression and prevent congenital transmission.
- There is no vaccine for Chagas disease.

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.

None. A person who has had Chagas disease and has been cured can be re-infected through any of the routes of transmission.

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:
  - Use of bednets.
  - Practice good hygiene during food preparation, transportation, storage and consumption.
  - Disposal of rubbish away from the home.
  - Wearing clothes that minimize skin exposure. It is important to assess whether this is culturally accepted, accessible and affordable in the context of intervention.
- Use of insecticide against triatomine bugs (vector control) to reduce population of the *Trypanosoma cruzi* parasite conducted by a professional: check for resistance to insecticides at national level.
- Improvement of housing (inside and outside) to remove areas or favourable conditions for *Trypanosoma cruzi* and triatomine bugs (e.g. repair/replace plastering/walls/roof, cleaning inside dwelling, window and door screenings in homes).
- Rapid detection and encouragement of early health-seeking behaviours at healthcare centres. This includes newborns and other children of infected mothers without previous antiparasitic treatment to access an early diagnosis and treatment.

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
Cases/deaths per week (disaggregate by age, sex)
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
Percentage of individuals with access to insecticide treated mosquito nets (ITN) in the target area ***Numerator**:* Individuals in a given setting that have the opportunity to use an ITN (have access) ***Denominator**:* Total number of individuals surveyed Source of information: Surveys
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:*** 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 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
Number of community members who received epidemic prevention and control material (e.g. soap, bednets, IEC material) ***Numerator*:** Number of community members who received materials Source of information: Distribution lists

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

Impact on other sectors

Sector	Link to the disease
WASH	Inadequate housing, poor hygiene practices and poor waste management allow triatomine bugs to breed easily. *T. cruzi* is also transmitted to humans via consumption of food contaminated with urine or faeces of *T. cruzi* carrier bugs. Good hygiene practices in food preparation, transportation, storage and consumption are relevant to decrease transmission risk.
Nutrition	Malnutrition increases the risk for severe Chagas disease and chronic symptoms.
Shelter and settlements (including household items)	Improvement of housing to remove favourable conditions for *T. cruzi* is important to reduce the vector-borne transmission. This includes repairing walls and roofs and cleaning inside the dwelling, maintaining a clean household, good waste management and using bednets.
Psychosocial support and Mental health	The social consequences of stigma associated with Chagas disease may lead to social rejection. People who suffer from the disease can face work restrictions because it is often associated with poor health, difficulties in performing at work and even sudden death, creating a fear of financial losses by employers. This leads to fear, stigma, worry about the potential outcome, social withdrawal, sleep problems, stress, etc. Affected people might be reluctant to seek medical help, leading to more serious physical and psychological complications and further spread of the disease.
Sex and Gender	Gender roles influence exposure to Chagas disease. Women and girls may be at increased risk due to their domestic roles and caregiving responsibilities – that increase their exposure but potentially delaying their own care and treatment. Men and boys may face occupational exposure, especially in agriculture or construction where contact with infected vectors or blood products may occur. Gender norms can affect health-seeking behavior, with men less likely to pursue testing or treatment in the early stages. Pregnant women are at risk of congenital transmission, highlighting the importance of early detection and access to maternal health services

Sector	Link to the disease
Education	When schools do not have clean running water for regular handwashing, good food and garbage management or are inside inadequate buildings, this can increase the number of bugs and add transmission risks in places where the *T. cruzi* parasite is endemic. Children may then be at risk of getting the disease if attending classes in spaces where environmental sanitation is not appropriate. However, they are at risk of losing out on education if staying at home and educating them on prevention measures and turning them into drivers of change early on in life is an opportunity otherwise lost. Importantly, 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	Chagas disease may lead to a reduction in productivity. The chronic, long-lasting symptoms of the disease are mainly responsible for loss of income due to the reduction in work activity and to the diversion of resources to seek costly and/or long-term medical treatment. The medical care cost of patients with chronic cardiac, digestive, neurological or mixed forms of the disease has been calculated to be more than 80 per cent higher than the cost of spraying residual insecticide to control vectors and prevent infection.

Resources:

- Drugs for Neglected Diseases Initiative (2021) *Chagas disease*. Available at: https://dndi.org/diseases/chagas/facts/
- World Health Organization (2020) *World Chagas Disease Day: bringing a forgotten disease to the fore of global attention*. Available at : https://www.who.int/news/item/14-04-2020-world-chagas-disease-day-bringing-a-forgotten-disease-to-the-fore-of-global-attention#:~:text=The%20social%20consequences%20of%20stigma%20associated%20with%20Chagas,creating%20a%20fear%20of%20financial%20losses%20by%20employers.
- World Health Organization (2021) *Chagas disease (also known as American trypanosomiasis)*. Fact sheets. Available at: https://www.who.int/news-room/fact-sheets/detail/chagas-disease-(american-trypanosomiasis)