



# Zika virus infection (Zika)

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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

From the start of 2017, the vector borne Zika virus infection (Zika) was established in 84 countries and territories in Latin America, Caribbean, the United States of America, Africa, South-eastern Asia and the Pacific. The Zika virus continues to spread geographically to areas where competent vectors are present. Although in general symptoms are mild, during pregnancy Zika virus can lead to complications such as preterm birth and miscarriage and can cause microcephaly or other congenital malformations in newborns.

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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.*

Case definitions can change by region, depending on other diseases present and how many cases have been confirmed in the area. Case definitions are therefore updated as new information becomes available. Check for the definition in your area.

**Suspected case:** A person presenting with rash and/or fever and at least ONE of the following signs or symptoms: joint pain (arthralgia); or joint inflammation (arthritis); or red eyes (conjunctivitis).

**Probable case:** A suspected case with presence of IgM antibody against Zika virus and an epidemiological link.

**Confirmed case:** A person with laboratory confirmation of recent Zika virus infection: presence of Zika

virus RNA or antigen in serum or other samples (e.g. saliva, tissues, urine, whole blood) OR IgM antibody against Zika virus positive and plaque reduction neutralization test (PRNT90) for Zika virus with titre  $\geq 20$  and Zika virus PRNT90 titre ratio  $\geq 4$  compared to other *flaviviruses* AND exclusion of other *flaviviruses*.

WHO case definition source of information:

[https://apps.who.int/iris/bitstream/handle/10665/204381/WHO\\_ZIKV\\_SUR\\_16.1\\_eng.pdf?sequence=1&isAllowed=y](https://apps.who.int/iris/bitstream/handle/10665/204381/WHO_ZIKV_SUR_16.1_eng.pdf?sequence=1&isAllowed=y)

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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.

At the local level a single case of Zika or its complications may trigger action. At state or provincial level, the increase in reported cases above an established baseline for the same week or month in preceding years, or increasing vector density, may indicate impending epidemic activity. At national level, the detection of changes in virus serotype, subtype or genotype distribution, clinical severity or seropositivity rate, or the introduction of a Zika vector into a new ecological niche, are signals that should be investigated without delay.

## Risk factors

- Environments where mosquitoes breed such as humid, and semi-humid environments, as well as around bodies of stagnant water in and close to human habitations in urban settings.
- Increased contact between humans and infected mosquitoes, particularly in urban areas can create epidemics.
- Outbreaks of the disease are of particular concern when they occur in overcrowded settings with inadequate water supply and waste management services that allow the mosquitoes to breed easily.
- Children and elderly who sleep outdoors during daytime in endemic areas are at greater risk.
- Unprotected sex.
- Pregnancy in regions where there are Zika epidemics.

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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.***

- Infection rate: 73 per cent.

- Symptomatic attack rate among infected: 18 per cent.

## Groups at increased risk of severe illness (most vulnerable)

- A pregnant woman can pass Zika virus to her foetus during pregnancy. Zika is a cause of microcephaly and other severe foetal neurological defects known as congenital Zika syndrome.
- Guillain-Barré syndrome is more common in adults and males.

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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.

*Zika virus.*

**Vector:** Mosquitoes (*Aedes aegypti* and *Aedes albopictus*) are carrying the *Zika virus*.

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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.

Non-human and human primates are likely the main reservoirs of the virus.

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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.

- **Vector-borne:** Mosquito bite (*Aedes aegypti* and *Aedes albopictus*). The mosquitoes usually bite during the daytime (peak biting periods are early in the morning and in the evening at dusk).

- **Congenital transmission:** During pregnancy from the pregnant women to her foetus.
- **Sexual transmission:** Unprotected sex.
- **Vehicle-borne transmission:** Unsafe blood transfusion (very likely but not confirmed).

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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.

3—14 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.

*Zika virus* is present in blood from a few days to one week, but the virus remains in semen longer.

## Clinical signs and symptoms

- People with Zika virus infection can have symptoms including mild fever, skin rash, red eyes, muscle and joint pain, malaise or headache. These symptoms normally last for two to seven days.
- Many people infected with Zika virus will not have symptoms or will only have mild symptoms. Estimates suggest only one in five people show symptoms.
- Zika virus infection during pregnancy is a cause of congenital brain abnormalities, including microcephaly (smaller than normal head size). Outcomes in the child depend on the level of brain damage that the congenital Zika syndrome may cause. Other congenital abnormalities may include limb contractures, high muscle tone, hearing loss or eye abnormalities.
- Zika can also cause complications during pregnancy such as preterm birth and miscarriage.
- Zika virus could trigger the Guillain-Barré syndrome, a rare condition in which a person's immune system attacks the peripheral nerves. Severe cases which result in near-total paralysis are even rarer.

## Other diseases with similar clinical signs and symptoms

Dengue fever, chikungunya, West Nile virus infection, yellow fever, malaria, poliomyelitis.

## Diagnosis

- Polymerase chain reaction (PCR).
- Virus isolation from blood samples.

## 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.**

Important therapy principles include the following:

- Zika virus disease is usually mild and requires no specific treatment.
- People sick with Zika virus should get plenty of rest, drink enough fluids, and treat pain and fever with common medicines. If symptoms worsen, they should seek medical care and advice.
  - Zika virus infection and dengue fever have similar clinical presentations and therefore, care should be taken when administering medications such as aspirin or other nonsteroidal anti-inflammatory drugs (e.g. Ibuprofen, Naproxen). These may increase the risk of bleeding if the case is in fact dengue fever and not Zika virus infection.
- Where dengue and Zika occur in the same areas, all suspected cases, especially pregnant women, should be referred to the health facility.
- There is currently no vaccine available.

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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.

Once a person has been infected, they are likely to be protected from future infections.

## 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 preventive behaviours.
  - Actions to prevent mosquito bites during the day and early evening are the most effective preventive measures against Zika virus. These include:
    - Wearing clothes that minimize skin exposure. It is important to assess whether this is culturally accepted, accessible and affordable in the context of intervention.
    - Screening in homes (windows and door screens).
    - Application of “DEET” mosquito repellent to exposed skin or clothing (in accordance with product label instructions). It is important to assess whether this is culturally accepted, accessible and affordable in the context of intervention.
- Eliminate mosquito breeding sites (water bodies where the mosquito *Aedes Aegypti* may lay its eggs). These include:
  - Cover water containers (to prevent them from becoming breeding sites).
  - Empty and clean water containers regularly.
  - Reduce any natural water-filled habitats.
  - Remove standing water in flowerpots.
  - Clean up used tyres.
  - Clean up places where people gather during the day such as markets, schools, and hospitals.
- Targeting males and females separately and being sensitive to their specific gender roles is essential when enlisting their support for vector control.
- Couples where the woman is pregnant should practise safe sex by using condoms to prevent sexual transmission of Zika.
- Indoor residual spraying.
- Outdoor space spraying of flying mosquitoes, on surfaces or around containers where mosquitoes land.
- Larviciding, which is the application of insecticides to water bodies, reducing vector density. Note that it is most effective in areas where aquatic habitats (where larvae lie) are easy to identify and are fixed. Larviciding will be costly and less effective in areas where water habitats are predominant, scattered and where their location may vary.

### **Which interventions have NO evidence and therefore are NOT recommended?**

- Bed nets are an effective way to prevent mosquito bites; but for Zika, these should be used as a preventive measure for those who sleep during the day (e.g. infants or people admitted to hospitals). As the mosquito bites during the day, bed nets during the night will not be an effective preventive measure for this disease.
- Mosquito coils and aerosol bug sprays (containing insecticides) are not effective interventions to protect a person or household from the bite of the *Aedes aegypti* mosquito. Research indicated that where mosquito coils and aerosol insecticides were used, Zika incidence increased. One explanation as to why this occurred was that householders using coils and aerosols relied solely on these anti-mosquito devices and did not adopt other more effective preventive measures. The cost for these items is another prohibitive factor for their use in widespread community programmes.

# 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/confirmed cases per week (disaggregated by sex, age, pregnant women)
Number of new districts with confirmed cases
Attack rate (population)
Indicators for Red Cross Red Crescent activities
Number of volunteers trained on a specific topic (e.g. Epidemic Control for Volunteers (ECV)) <b>Numerator:</b> Number of volunteers trained in ECV Source of information: Training attendance records
Percentage of population detected by volunteers with suspected or confirmed Zika for whom advice or treatment was sought ( <i>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</i> ) <b>Numerator:</b> Number of people for whom advice or treatment was sought from a health facility or provider <b>Denominator:</b> Total number of people surveyed
Percentage of people who know the cause, symptoms, treatment or preventive measures of congenital Zika syndrome (this indicator can be split into three or four separate indicators) <b>Numerator:</b> Number of people who cite the cause, symptoms, treatment or preventive measures of congenital Zika syndrome <b>Denominator:</b> Number of people surveyed Source of information: Survey

## 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 a video on a Zika Operation: Impact in the Americas. An educational video overview of the IFRC's Zika Operation to control and prevent Zika in the Americas see: IFRC (2017) *Zika operation: Impact in the Americas*. Available at: <https://www.youtube.com/watch?v=6t951OAlFPk>
- For volunteers teaching and coaching adults about Zika, dengue and chikungunya: IFRC (2016) *Zika, dengue and chikungunya prevention. Community module*. Available at: <https://reliefweb.int/report/world/zika-dengue-and-chikungunya-prevention-community-module>
- IFRC (2016) *Zika, dengue and chikungunya prevention toolkit*. Available at: <https://reliefweb.int/report/world/zika-dengue-and-chikungunya-prevention-prevention-toolkit>
- IFRC (2017) *Zika, dengue and chikungunya prevention school/youth module*. Available at: <https://oldmedia.ifrc.org/ifrc/document/zika-dengue-and-chikungunya-prevention-schoolyouth-module/>
- For a guidance and resource package for coordination, planning, key messages and actions: WHO (2016) *Risk communication and community engagement for Zika virus prevention and control*. Available at: <https://www.who.int/publications-detail-redirect/risk-communication-and-community-engagement-for-zika-virus-prevention-and-control>

## Impact on other sectors

Sector	Link to the disease
<b>WASH</b>	Inadequate water supply and waste management allow mosquitoes to breed easily. Stagnant water in and around the household such as in flowerpots, vehicle tyres or rock pools contribute to an increase in mosquito breeding sites.
<b>Nutrition</b>	Malnutrition increases the risk for severe disease. <a href="#">Studies</a> have shown that protein malnutrition in pregnant women increases the risk of congenital Zika syndrome.
<b>Shelter and settlements (including household items)</b>	People sleeping outdoors during the day are at increased risk of mosquito bites in epidemic regions. Different household actions like screening in homes and covering water containers are a good prevention strategy to decrease the transmission of Zika virus from mosquitoes to humans.
<b>Psychosocial support and mental health</b>	As in the case of a range of other diseases, Zika virus infection 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 and discrimination, anxiety and worry about the outcome or about the transmission to the foetus, social withdrawal, uncertainty regarding upcoming rumours, among others. The potential severe disability for a newborn lasting a whole lifetime is particularly stressful and anxious for parents and surrounding community.



Sector	Link to the disease
<b>Gender and sex</b>	<p>Zika prevention and response projects have raised concerns about gender sensitivity as the burden to be responsible for not having babies with congenital Zika syndrome is unfairly put on women. Beyond thinking only about sexual transmission, the adopted approach to Zika prevention should not unfairly target women and exclude men. The psychological impact might be higher for women than men if pregnant, as pregnant women might constantly worry about becoming infected.</p> <p>In terms of vector control, in many cultures it is women who maintain the primary responsibility for the maintenance of containers for household drinking water and for vessels to do laundry, which are prime breeding sites for the <i>Aedes</i> mosquito. Men on the other hand, may be responsible for the disposal of solid waste or for maintaining larger water vessels stored outside the immediate living area. It is therefore important to understand and consider gendered roles in vector control activities.</p>
<b>Education</b>	<p>Children born with congenital Zika virus infection can present severe development delays. These can include motor impairments such as challenges in the use of hands or an impaired ability to control their limbs. It is <u>documented</u> that alongside other visual and communication impairments, assessments of their cognitive skills are necessary to determine the extent to which children with severe congenital Zika syndrome are able to learn from their environment.</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>
<b>Livelihoods</b>	<p>Specialized care or therapies for children with severe congenital Zika syndrome may represent severe health expenditures and a financial burden on a household's income.</p>

## Resources:

- Wheeler, A. C., Toth, D., Ridenour, T., Lima Nóbrega, L., Borba Firmino, R., Marques da Silva, C., Carvalho, P., Marques, D., Okoniewski, K., Ventura, L. O., Bailey, D. B., Jr, & Ventura, C. V. (2020). Developmental Outcomes Among Young Children With Congenital Zika Syndrome in Brazil. *JAMA network open*, 3(5), e204096. <https://doi.org/10.1001/jamanetworkopen.2020.4096>
- Barbeito-Andrés J, Pezzuto P, Higa LM, Dias AA, Vasconcelos JM, Santos TMP, Ferreira JCCG, Ferreira RO, Dutra FF, Rossi AD, Barbosa RV, Amorim CKN, De Souza MPC, Chimelli L, Aguiar RS, Gonzalez PN, Lara FA, Castro MC, Molnár Z, Lopes RT, Bozza MT, Vianez JLSG, Barbeito CG, Cuervo P, Bellio M, Tanuri A, Garcez PP. (2020) Congenital Zika syndrome is associated with maternal protein malnutrition. *Sci Adv*. Jan 10;6(2):eaaw6284. doi: 10.1126/sciadv.aaw6284. PMID: 31950075; PMCID: PMC6954064.
- World Health Organization (2021) Zika virus. Fact Sheets. Available at: <https://www.who.int/news-room/fact-sheets/detail/zika-virus>