



# Rubella

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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

Rubella is a contagious viral infection that occurs most often in children and young adults and usually causes mild respiratory infections. Sometimes it can lead to severe complications and death. Epidemics of rubella occur in communities with low immunization coverage. Rubella infection in pregnant women may cause foetal death or congenital defects known as congenital rubella syndrome (CRS). It is the leading vaccine-preventable cause of birth defects.

## 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.*

### Rubella

Suspected rubella case: Any patient of any age in whom a health worker suspects rubella. A health

worker should suspect rubella when a patient presents with: fever, maculopapular rash; and cervical, suboccipital or postauricular swollen lymph nodes (adenopathy) or joint pain (arthralgia/arthritis).

Clinical confirmation: Rubella cannot be confirmed clinically: laboratory confirmation is required.

Laboratory-confirmed rubella case: Because of the difficulty of clinical diagnosis of rubella, laboratory confirmation is required. A laboratory-confirmed case is a suspected case with a positive blood test for rubella-specific IgM antibodies. The blood specimen should be obtained within 28 days after the onset of rash.

Epidemiologically confirmed rubella case: A patient with a febrile rash illness that is linked epidemiologically to a laboratory-confirmed rubella case.

WHO case definition source of information:

[https://www3.paho.org/hq/index.php?option=com\\_content&view=article&id=757:2009-rubella-case-definition&Itemid=843&showall=1&lang=fr](https://www3.paho.org/hq/index.php?option=com_content&view=article&id=757:2009-rubella-case-definition&Itemid=843&showall=1&lang=fr)

### **Congenital rubella syndrome (CRS)**

Suspected CRS case: Any infant less than one year of age in whom a health worker suspects CRS. A health worker should suspect CRS when an infant 0—11 months of age presents with heart disease and/or suspicion of hearing impairment/deafness and/or one or more of the following eye signs: white pupil (cataract), diminished vision, pendular movement of the eyes (nystagmus), squint, smaller eyeball (microphthalmia), or larger eyeball (congenital glaucoma). A health worker should also suspect CRS when an infant's mother has a history of suspected or confirmed rubella during pregnancy, even when the infant shows no signs of CRS.

Clinically confirmed CRS case: An infant in whom a qualified physician detects at least two of the complications listed in (a) below or one in (a) and one in (b):

(a) cataract(s), congenital glaucoma, congenital heart disease, loss of hearing, pigmentary retinopathy.

(b) purple spots on the skin (purpura), enlarged spleen (splenomegaly), small head (microcephaly), mental retardation, meningoencephalitis, forearm bone disease, jaundice that begins within 24 hours after birth.

Laboratory confirmed CRS case: An infant with clinically confirmed CRS who has a positive blood test for rubella-specific IgM antibodies (100 per cent of such infants are positive at the age of 0—5 months of age; 60 per cent are positive at 6—11 months of age). Where special laboratory resources are available the detection of rubella virus in specimens from the throat or urine of an infant with suspected CRS provides laboratory confirmation of CRS (60 per cent of such infants shed rubella virus at the age of 1—4 months of age; 30 per cent at 5—8 months of age; 10 per cent at 9—11 months of age).

**Congenital rubella infection (CRI):** If a mother has suspected or confirmed rubella in pregnancy the infant should have a rubella-specific IgM antibodies blood test. An infant who does not have clinical signs of CRS but who has a positive rubella-specific IgM antibodies test is classified as having congenital rubella infection (CRI).

WHO case definition source of information: <https://www.who.int>

## Risk factors

- Being unvaccinated is the main risk factor for contracting the disease.
- Rubella infection in pregnant women, especially during the first trimester, may cause miscarriage, foetal death, stillbirth or live-born infants with congenital rubella syndrome (CRS).
- Crowded settings in outbreak areas increase the risk of transmission.
- Lack of proper sanitation and hygiene measures.
- Vaccine-preventable disease outbreaks can be particularly deadly in countries experiencing or recovering from a natural disaster or conflict. Damage to health infrastructure and health services interrupts routine immunization and overcrowding in residential camps greatly increases the risk of infection.

## 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 depends on the vaccination rate in an outbreak area. Secondary attack rates among non-immune household contacts are high.

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

- Babies born to women who were pregnant during the infection are at high risk of permanent birth defects and lifelong disability.
- Immunosuppressed persons such as those receiving chemotherapy, transplant recipients or HIV carriers.
- 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.

*Rubella 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.

Humans.

## 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.

- **Droplet spread:** sneezing, coughing, and talking produce droplets that transmit the virus. Sharing eating and drinking utensils can increase droplet spread.
- **Vertical transmission:** rubella virus can be transmitted from the pregnant woman to the foetus, especially in the first trimester.

## 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.

14 days (range 12—23 days).

## Period of infectiousness

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

The most infectious period for rubella is usually one to five days after the appearance of the rash. Infants with CRS may excrete the virus for a year or more.

## Clinical signs and symptoms

- In children and adults, rubella is usually mild, with symptoms including a rash, low fever (under 39 °C), headache, cough, runny nose, nausea and mild pink eye (conjunctivitis). The rash, which occurs in 50–80 per cent of cases, usually starts on the face and neck before progressing down the body and lasts one to three days. Swollen lymph glands behind the ears and in the neck are the most characteristic clinical feature.
- Up to 70 per cent of women who get rubella may develop arthritis and painful joints that usually last from three to ten days. This is rare in children and men.
- When a woman is infected with the rubella virus early in pregnancy, there is a 90 per cent chance of passing the virus on to the foetus. This can cause miscarriage, stillbirth or severe birth defects known as Congenital Rubella Syndrome (CRS). Children with CRS commonly experience deafness, cataracts, heart defects, intellectual disabilities, and liver and spleen damage. Less common birth defects from CRS include glaucoma, brain damage, thyroid and other problems, and inflammation of the lungs.
- 25–50 per cent of people infected with rubella will not experience any symptoms.

## Other diseases with similar clinical signs and symptoms

Measles; scarlet fever; monkeypox; hand, foot and mouth disease (HFMD). In humanitarian settings where populations live in crowded conditions it is important to be alert to the similar clinical presentations of measles and rubella and ensure that relevant response actions follow laboratory confirmation of suspect cases.

## Diagnosis

The presence of rubella IgM antibodies or demonstration of a significant rise in rubella IgG antibodies from paired acute and convalescent serum samples provides evidence of ongoing or recent rubella infection. It can also be confirmed by detection of rubella virus by polymerase chain reaction (PCR).

## 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.**

- Patient isolation is necessary.
- There is no specific treatment for rubella. The disease is, however, preventable by vaccination.
- Rubella vaccines are commonly available in combination with other vaccines such as with vaccines against measles, mumps or varicella.

## 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 after rubella infection appears to persist throughout life. However, on rare occasions, serologically documented re-infections have occurred, and re-infection during pregnancy resulting in CRS has been reported.
- Two doses of rubella vaccine provide long-lasting high efficiency.

## 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:
  - Isolation of those who are sick.
  - Coughing etiquette (cover mouth when coughing or sneezing; tissues should be disposed of immediately).
  - Regular handwashing with soap
- Social mobilization for mass vaccination, including extensive Information, Education and Communication (IEC) activities on the benefits of the rubella vaccine, the routine vaccination schedule in-country and/or Supplementary Immunization Activity (SIA) campaign dates and locations, and the importance of the vaccine's two doses.
- Rapid detection and encouragement of early health-seeking behaviours at healthcare centres and treatment units.
- Inclusion of “fever and rash” as a health risk in community-based surveillance activities, particularly in communities where vaccination coverage is low
- Contact tracing and follow-up. All contact tracing activities must be done in close coordination with health authorities.

# 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/deaths per week (disaggregate by age, sex, pregnancy status)
Confirmed cases/deaths per week (disaggregate by age, sex, pregnancy status)
Vaccination coverage (total population, children under 12 months/18 months/5 years/10 years etc. – select most appropriate for disease) <i>Target:</i> greater than 80 per cent for children over 12 months of age <i>Refer to national EPI (Expanded Programme on Immunization) programme</i>
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.) <b>Numerator:</b> Number of volunteers trained <i>Source of information:</i> 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) <b>Numerator:</b> 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 <b>Denominator:</b> Total number of suspect cases in the same period preceding the survey <i>Source of information:</i> Survey

### Indicators for Red Cross Red Crescent activities

Percentage of people recognizing at least one transmission route and at least one measure for preventing it

**Numerator:** Total number of people who cited 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

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 among children aged 6 months–15 years

*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](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
<b>WASH</b>	The spread of droplets is reduced by proper hygiene and sanitation like correct coughing etiquette and regular handwashing. Sharing eating and drinking utensils can increase droplet spread.
<b>Nutrition</b>	Malnutrition increases the risk for severe rubella.
<b>Shelter and settlements (including household items)</b>	Outbreaks are of particular concern in crowded settings when hygiene and sanitation is poor and vaccination rates are low.

Sector	Link to the disease
<b>Psychosocial support and mental health</b>	<p>Rubella can have several negative impacts on psychological, social and emotional aspects of a person’s life, in addition to its physical effects. Psychological reactions may include anxiety and worry about the outcome, social withdrawal, among others. Pregnant women especially can be exposed to severe psychological stress concerning miscarriage or giving birth to infants with congenital rubella syndrome. These long-term complications for the newborn might affect the mental health of the child and the relatives.</p>
<b>Gender and sex</b>	<p>Biologically, rubella can result in severe congenital defects if transmitted from a mother to a foetus. Consequently, women have a higher risk of complications during pregnancy. Socially, there are a number of risk factors that are influenced by gender. Notably, being malnourished, which can primarily affect girls in societies where males are valued more and receive better nutrition; or having more limited access to health care and vaccines among females for the same reasons.</p>
<b>Education</b>	<p>Rubella is an infectious disease which occurs mainly in unvaccinated children. Outbreaks in schools can happen as children stay close to each other. 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 or 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.</p>
<b>Livelihoods</b>	<p>Illness and isolation lead 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. Children born with CRS-related birth defects may face lifelong livelihoods challenges, and may require a higher level of care, removing parents or siblings from the workforce and impacting livelihoods for the whole family.</p>

**Resources:**

- CDC (2019) *Rubella*. Available at: <https://www.cdc.gov/vaccines/pubs/pinkbook/downloads/rubella.pdf>
- Shim E, Kochin B, Galvani A. (2009) Insights from epidemiological game theory into gender-specific vaccination against rubella. *Math Biosci Eng.* Oct; 6 (4):839-54. doi: 10.3934/mbe.2009.6.839. PMID: 19835431.
- WHO (2019) *Rubella*. Fact Sheets. Available at: <https://www.who.int/news-room/fact-sheets/detail/rubella>