



# Meningococcal meningitis

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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

Meningococcal meningitis remains a major global public health challenge with high case fatality rate and leading to serious long-term complications. It occurs in small clusters throughout the world with seasonal variations. It accounts for a variable proportion of epidemic bacterial meningitis. Meningitis is an infection that affects the meninges—the membranes covering the brain and spinal cord.

The largest burden of meningococcal disease occurs in an area of sub-Saharan Africa known as the “meningitis belt”, which stretches from Senegal in the west to Ethiopia in the east.

Although meningitis outbreaks are decreasing in size and frequency with the increase in vaccinations, they still pose a significant risk. Fatality rate is 10–15 per cent and up to 40 per cent in meningococcal meningitis with septicaemia. Without any treatment the fatality rate is close to 100 per cent. The most effective way to deliver long-lasting protection is vaccination.

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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 surveillance, **volunteers** should use broad (simplified) case definitions to recognize most or all possible cases 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 of acute meningitis:** sudden onset of fever (over 38.5 °C rectal or 38.0 °C axillary) and stiff neck, altered consciousness or other meningeal signs.

**Probable case of meningococcal meningitis:** suspect case WITH microscopic confirmation of *N. meningitidis* (in cerebrospinal fluid (CSF) or blood) OR with a CSF leukocyte count greater than 10 cells/mm<sup>3</sup>; or with bacteria identified by Gram stain in CSF; or antigen detected by

immunochromatographic dipstick or latex agglutination.

Confirmed case: suspected or probable case as defined above that is laboratory confirmed.

WHO case definition source of information:

[https://www.who.int/immunization/monitoring\\_surveillance/burden/vpd/WHO\\_SurveillanceVaccinePreventable\\_12\\_Meningococcus\\_BW\\_R1.pdf?ua=1](https://www.who.int/immunization/monitoring_surveillance/burden/vpd/WHO_SurveillanceVaccinePreventable_12_Meningococcus_BW_R1.pdf?ua=1)

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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.

**Endemic areas:** For areas of population between 30,000 and 100,000: an alert threshold of three cases per 100,000 inhabitants per week; and an epidemic threshold of 10 per 100,000 in one week.

**For small populations:** alert threshold is either two cases in one week or a higher incidence than in a non-epidemic year; and an epidemic threshold of five cases in one week or a doubling of incidence in a three-week period.

**Special situations** (mass gatherings, displaced persons camp settings, or closed institutions such as schools or barracks): one case of meningococcal disease is confirmed in one week.

**Non-endemic areas:** Increased incidence of clustered meningitis cases and causal *N. meningitidis* pathogen (*N. meningitidis* A, C, Y, W135) has been confirmed.

## Risk factors

- Living in an area of sub-Saharan Africa known as the "meningitis belt": During the dry season dust winds, cold nights and an increase in upper respiratory tract infections damage the nasopharyngeal mucosa, increasing the risk of meningococcal disease.
- Transmission may be facilitated by overcrowded housing and by large population displacements, e.g. pilgrimages, mass gatherings, refugee camps, student, military and other occupational settings and traditional markets.
- Inadequate sanitation and hygiene measures (including hand hygiene and coughing etiquette).
- Infants, adolescents and young adults are most at risk because the nasopharyngeal carriage of meningococci is higher in this age and close gatherings are generally more common.

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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).

- Endemic disease occurs primarily in children and adolescents, with highest attack rate in infants aged 3—12 months, whereas in epidemics older children and young adults may be more involved.
- In the “meningitis belt”, major epidemics occur every 5 to 12 years with attack rates reaching 1,000 cases per 100,000 population. Other regions of the world experience lower overall rates of disease and occasional outbreaks. Annual attack rates in these regions average around 0.3 to 3 per 100,000 population.

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

- Infants and the elderly.
- 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.

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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.

There are different types of bacteria causing meningitis, including: *Streptococcus pneumoniae*, *Haemophilus influenzae*, and *Neisseria meningitidis*. *Neisseria meningitidis* (Nm) is the bacteria that causes meningococcal meningitis, which has the highest potential to produce large epidemics.

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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.

**Droplet and airborne spread:** Droplets of saliva/mucous and respiratory secretions from one person to another, mainly by kissing, coughing or sneezing or by sharing eating and drinking utensils.

People carrying *N. meningitidis* in their throat can sometimes have overwhelmed body defences, leading the infection to spread through the bloodstream to the brain.

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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.

Three to four days (range two to ten 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.

It is believed that 10—20 per cent of the population carries *N. meningitidis* in their throat at any given time and can infect other people. Nasopharyngeal carriage of meningococci is most common among adolescents and young adults, less so among young children and relatively rare in the adult population. However, the carriage rate may be higher in epidemic situations.

## Clinical signs and symptoms

- High fever, neck stiffness, sensitivity to light, confusion, headaches, rash, joint pains, cold hands and feet and vomiting.
- Common signs and symptoms for infants include a fever, difficulty breathing, neck rigidity, bulging soft spot on top of the head, excessive sleepiness, poor feeding, irritability, rash, convulsions, pale skin, vomiting.

## Other diseases with similar clinical signs and symptoms

Meningitis due to other causes (viral, bacterial, mycotic).

## Diagnosis

- Initial diagnosis of meningococcal meningitis can be made by clinical examination followed by performing a lumbar puncture showing a purulent cerebral spinal fluid.
- The bacteria may sometimes be seen in a microscopic examination and gram staining of the spinal fluid.
- The diagnosis is confirmed by growing the bacteria from specimens of spinal fluid or blood, by agglutination tests or by polymerase chain reaction (PCR).
- The identification of the serogroups and susceptibility testing to antibiotics are important to define control measures.

## 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.**

- Meningococcal disease is potentially fatal and should always be viewed as a medical emergency.
- Admission to a hospital or health centre is necessary without high-grade isolation of the patient (face mask for those coming close to the patient and private room, if possible, is enough).
- Appropriate antibiotic treatment must be started as soon as possible.
- Different vaccines for prevention and outbreak control are available for serotypes A,C,W,Y and B. Protection is usually group-specific and the chosen vaccine depends on the presented serotypes in the region, the age and the aim of the vaccine. Some vaccines also prevent carriage of *N. meningitidis*, thereby reducing transmission and leading to herd 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.

- A previous infection will not offer lifelong protection from future infections.
- Vaccine efficacy is estimated between 63 per cent and 97 per cent, but this decreases in many adolescents within five years.

## 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:
  - Handwashing with soap (hand hygiene).
  - Coughing etiquette (cover mouth when coughing or sneezing; tissues should be disposed of immediately).
  - Avoiding crowds and mass gatherings and spaces that are poorly ventilated.
- Social mobilization for meningococcal vaccination, either during outbreak control campaigns, preventive campaigns or routine immunization activities. This includes extensive Information, Education and Communication (IEC) activities on the benefits of the vaccine, the routine vaccination schedule in country and/or Supplementary Immunization Activity (SIA) campaign dates and locations.
- IEC activities to enhance an understanding of the use of antibiotics for close contacts of those with meningococcal disease to decrease the risk of transmission, according to national guidelines (contact tracing and management). An antibiotic should always be prescribed by a health professional.
- Rapid detection and encouragement of early health-seeking behaviours at health care centres and treatment units.
- If requested by health authorities and in line with national guidelines, support contact tracing activities to identify people who have been in contact with those who are infected and can be used to find a source of infection (this in turn allows for targeted public health measures).

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

Meningococcal meningitis patients do not require a high-grade isolation as the disease is droplet transmitted. They should be placed on droplet precautions (private room and mask for everyone entering the room) until they have completed 24 hours of appropriate antibiotic therapy. Afterwards no isolation is required.

# 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 per 100,000 population per week
Case fatality ratio (population, or by district)
Number of districts or provinces that have crossed epidemic threshold
Annual percentage of children who have age-appropriate vaccination coverage for MCV (last dose) in settings with humanitarian crises or emergencies
Indicators for Red Cross Red Crescent activities
<p>Number of volunteers trained on a specific topic (e.g. Epidemic Control for Volunteers (ECV); Community-based surveillance (CBS); WASH training; CBHFA training, etc.)</p> <p><b>Numerator:</b> Number of volunteers trained</p> <p>Source of information: Training attendance sheets</p>
<p>Suspect cases detected by volunteers who were encouraged to seek healthcare and who arrived at a health facility (<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>)</p> <p><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</p> <p><b>Denominator:</b> Total number of suspect cases in the same period preceding the survey</p> <p>Source of information: Survey</p>
<p>Percentage of people recognizing at least one transmission route and at least one measure for preventing it</p> <p><b>Numerator:</b> Total number of people who cited at least one transmission route and at least one measure for preventing it during the survey</p> <p><b>Denominator:</b> Total number of people surveyed</p> <p>Source of information: Survey</p>
<p>If supporting vaccination campaigns:</p> <ul style="list-style-type: none"> <li>Number of households covered during the Supplementary Immunization Activity (SIA)</li> <li>Number of volunteers participating in the SIA</li> <li>Number of vaccinations realized during the SIA among high-risk groups</li> </ul> <p>Source of information: Vaccination activity records</p>

### See also:

- For Community Engagement and Accountability (CEA) indicators for activities accompanying ECV actions, please refer to the IFRC CEA toolkit (Tool 7.1: Template CEA logframe, activities and indicators) at: <https://www.ifrc.org/document/cea-toolkit>

- For vaccination activities, see the IFRC Social Mobilization Guide for Vaccination Campaign and Routine Immunization 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>	Droplet spread can be reduced through appropriate sanitation and hygiene measures like washing hands with soap and following the coughing etiquette. Sharing eating and drinking utensils can transmit <i>N. meningitidis</i> through droplets of saliva or respiratory secretions that remain on the utensils.
<b>Nutrition</b>	Malnutrition increases the risk for severe meningococcal meningitis.
<b>Shelter and settlements (including household items)</b>	Meningococcal meningitis is easily transmitted in overcrowded housing like refugee camps, student, military or occupational settings.
<b>Psychosocial support and mental health</b>	Meningococcal meningitis 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 anxiety and worry about the outcome, especially because of the fast progression of the disease and its long-lasting complications. Such complications may include difficulties with hearing, vision, speech, language, memory and communication.
<b>Education</b>	When schools do not have clean running water for handwashing or are crowded, these can add transmission risks in places where there are outbreaks ongoing. As adolescents and young adults have a higher rate of nasopharyngeal carriage of <i>N. meningitidis</i> they are more at risk to transmit the bacterium to others, even when they are not sick. Students 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 disease. 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.
<b>Livelihoods</b>	Illness and long-term complications 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.



## Resources :

- CDC (2013) *Recommendations and reports. Morbidity and Mortality Weekly Report (MMWR)*. Available at: <https://www.cdc.gov/mmwr/preview/mmwrhtml/rr6202a2.htm>
- Confederation of Meningitis Organizations (2021) *Facts*. Available at: <https://www.comeningitis.org/facts>
- WHO (2018) *Meningococcus*. Available at: [https://www.who.int/immunization/monitoring\\_surveillance/burden/vpd/WHO\\_SurveillanceVaccinePreventable\\_12\\_Meningococcus\\_R2.pdf?ua=1](https://www.who.int/immunization/monitoring_surveillance/burden/vpd/WHO_SurveillanceVaccinePreventable_12_Meningococcus_R2.pdf?ua=1)
- WHO (2021) *Meningitis*. Fact Sheets. Available at: <https://www.who.int/news-room/fact-sheets/detail/meningitis>
- WHO (2021) *Meningococcal Meningitis*. Available at: <https://www.who.int/teams/health-product-policy-and-standards/standards-and-specifications/vaccine-standardization/meningococcal-meningitis>