

Airborne diseases

- What are they?
- Common airborne diseases
- Prevention
- Symptoms and treatment
- Summary

Airborne diseases pass from one person to another when microorganisms — such as bacteria, fungi, or viruses — travel through the air in aerosolized particles. Chickenpox, the common cold, and COVID-19 can all be transmitted in this way.

Airborne diseases [can transmit](#)^{Trusted Source} through coughs or sneezes, spraying liquid, or dust. The microorganisms may come from a person or animal who has a disease or from soil, garbage, or other sources.

There are many types of airborne diseases, and the symptoms, treatment, and outlook will vary according to the disease.

Ways of preventing transmission include the use of personal protective equipment and effective ventilation systems. Depending on the disease, an individual can help prevent transmission by avoiding close contact with others or wearing a face covering.

In this article, learn more about airborne diseases and how to prevent them.

What are airborne diseases?

According to the [Centers for Disease Control and Prevention \(CDC\)](#)^{Trusted Source}, airborne diseases can spread through a direct or an indirect form of transmission, depending on the germ involved.

The pathogens may enter the air in wet droplets, for example, when someone breathes or sneezes. There, they will be suspended in the air, and some droplets dry out, leaving microscopic particles. While suspended in the air, these particles can attach to or enter the body systems of people nearby.

Some particles, such as the fungus *Aspergillus*, are [widely present](#)^{Trusted Source} in the environment. It occurs in soil, plants, including decomposing plant matter, household dust, and building materials, as well as food and water. During building

renovations, breathing in dust that contains the fungus may cause disease in some people.

[Anthrax](#), too, [is present](#) [Trusted Source](#) in the soil in many places around the world. When dust forms from that soil, a person can become sick if they breathe in anthrax spores.

Here are some characteristics that droplet residuals may have, according to the CDC:

- They contain microorganisms that could be active.
- They may have a protective coat of dry secretions, such as mucus or saliva.
- They may stay in the air indefinitely.
- They may carry over long distances.

Air currents can disperse the microorganisms, but how far they travel depends partly on the environment. The further the droplets travel from the source, the lower the risk of infection, due to environmental factors.

Depending on the pathogens, factors that affect how long they remain active [include](#):

- air temperature
- humidity
- exposure to sunlight or other forms of radiation
- the weight of the particles, which can affect how long they take to settle
- the structure and stability of the pathogen

It is not always possible to prevent the spread of airborne diseases, but individuals and authorities can take measures to reduce the risk by recommending or ensuring adequate ventilation and the use of protective equipment.

Common airborne diseases

Depending on the type of organism, the degree of exposure, and individual factors, airborne particles may cause illness to develop if exposure occurs.

Many diseases can arise after exposure to airborne particles, including:

- the [common cold](#), which can develop from a rhinovirus
- [chickenpox](#), caused by the Varicella zoster virus
- [mumps](#), caused by a paramyxovirus
- [measles](#), caused by another paramyxovirus
- [whooping cough](#), a bacterial infection caused by *Bordetella pertussis*
- [COVID-19](#), caused by the SARS-CoV-2 virus
- aspergillosis, caused by the *Aspergillus* fungus
- [tuberculosis \(TB\)](#), caused by the bacterium *Mycobacterium tuberculosis*
- [anthrax](#), a bacterial infection resulting from contact with *Bacillus anthracis* spores
- [diphtheria](#), a bacterial infection caused by *Corynebacterium diphtheriae*
- [meningitis](#), which can result from exposure to certain bacterial, viral, or fungal particles

Some [experts](#) believe [influenza](#) transmits through the air, but not all scientists agree.

Prevention

Measures taken by hospitals and individuals can help prevent the spread of airborne infectious diseases.

Tips for individuals include:

- staying away from other people when symptoms are present or after receiving a diagnosis of an infectious disease
- wearing a face mask in public places
- keeping rooms properly ventilated
- regularly cleaning and servicing ventilation systems
- covering the mouth and nose when coughing or sneezing

Hospitals and other healthcare centers follow strict [guidelines](#)^{Trusted Source} regarding ventilation methods and other measures to protect people from particles that cause airborne diseases and other health problems.

[Experts](#)^{Trusted Source} believe that some diseases can spread through more than one route. For example, if microorganisms enter the environment when a person

coughs, they may stay in the air or land on surfaces. These surfaces become fomites, which is a term for an object likely to carry an infection. If another person touches a fomite and then touches their mouth, they may then develop symptoms of the disease. Influenza is one example where this might happen, [research](#) suggests.

During the COVID-19 pandemic, people should follow local guidelines about testing, isolation, and wearing face coverings. [Here](#), learn more about how to help stop the spread of COVID-19.

Symptoms and treatment

The symptoms of an airborne disease will vary widely, depending on the type of disease. Here are some examples of the main symptoms and treatment approaches for some of these diseases:

Disease	Type of pathogen	Symptoms	Treatment
COVID-19	virus	fever, a cough, loss of the sense of taste and smell, breathing difficulties, body aches, headache, and moreTrusted Source	symptom relief; antivirals may help
Measles	virus	rash, fever, nasal congestion, cough, pink eye, and moreTrusted Source	symptom relief
Aspergillosis	fungus	difficulty breathing, increased sputum production, chills, headache, joint pain, and moreTrusted Source	antifungal medication
TB	bacterium	persistent cough, weight loss, fever and chills, blood in sputum, and moreTrusted Source	a combination of antibiotics

The outlook will vary widely depending on a person's diagnosis. Some airborne diseases, such as the common cold, produce minor symptoms in most people and usually resolve within a few days. Others, such as COVID-19, can be life-threatening or involve long-term complications.

[Antibiotics](#) can help manage a bacterial infection, and antifungal medications may help resolve infections due to [fungi](#). [Antivirals](#) can help slow the activity of a virus in

some cases, but there is currently no cure for a virus. However, vaccines can prevent many viruses from causing severe illness.

While antibiotics have improved the outlook for many bacterial infections, some diseases, such as TB, are becoming resistant to antibiotic treatment, making them harder to treat.

The best approach is to take measures to prevent and avoid infection.

Summary

Airborne diseases can pass from one person to another when particles that contain pathogens enter into the air, and some then remain suspended there. A range of fungi, viruses, and bacteria can all transmit in this way.

To avoid infection or passing a disease on to another person, people should take care to cover their mouth and nose when sneezing and stay away from other people if they are unwell. Hospitals should follow guidelines to ensure adequate ventilation.

During the COVID-19 pandemic, people can help prevent the spread of disease by using face coverings in public places and isolating according to their current local guidelines.

INTRODUCTION

Infectious diseases spread from infected person to another person through various routes. Water borne diseases spread through water contaminated with human or animal faeces (including food and utensils, which have been washed with the contaminated water and dirty hands). These diseases are also known as faeco-orally transmitted diseases. There are other diseases, which could be water related but not transmitted by the faeco-oral route e.g. malaria, leptospirosis etc.

Water gets contaminated under poor hygienic and in-sanitary conditions. Contamination can occur at the source of water supply, while passing through water pipes, which are broken, or in the homes when water is not stored properly. The number of people affected will depend on the place of contamination.

The risk of water-borne diseases is higher in areas with:

- Inadequate water supply
- Poor quality of water and sewage pipelines
- Poor sanitary conditions
- Step wells and uncovered wells used as sources of drinking water
- Defecation in the open especially near sources of drinking water
- Poor system for the disposal of human waste

The water-borne diseases can also occur if contaminated water is used for washing utensils, fruits and vegetables, especially if these are eaten raw. Water borne diseases can be transmitted through ice prepared with water from unreliable sources.

COMMON SOURCES OF INFECTION	
Drinking Water <ul style="list-style-type: none">• Contaminated at its source.• Contaminated during supply & storage.• Ice made from contaminated water.	Food <ul style="list-style-type: none">• Contaminated during or after preparation.• Fruits and vegetables, washed with contaminated water and eaten raw.• Fruits and vegetables, grown at or near ground level and fertilized with night soil or irrigated with water contaminated with human waste, and eaten raw.



While cases of water borne diseases may occur throughout the year, a seasonal increase is noted in the summer, monsoon and post-monsoon period. The risk of large outbreaks of water-borne and water related diseases increases following heavy rains.

1. WATER BORNE DISEASES OF PUBLIC HEALTH IMPORTANCE

Water borne diseases are considered to be of public health importance for the following reasons:

- Potential for causing large outbreaks.
- High disease burden due to the large number of cases and deaths, especially in young children.
- In many states and districts, water borne diseases are major causes of pediatric indoor admissions and outpatient visits to the hospitals and health facilities.
- No specific treatment is available for some viral diseases such as hepatitis E. Increasing anti-microbial drug resistance is being recorded for some bacterial diseases.
- Potential for causing panic in the community and negative media coverage.

WATER BORNE DISEASES OF PUBLIC HEALTH IMPORTANCE

1. THOSE CAUSED BY THE PRESENCE OF AN INFECTIVE AGENT

- (a) Viral : Viral hepatitis A
Hepatitis E
Poliomyelitis
Rotavirus diarrhea in infants
- (b) Bacterial : Typhoid fever
Paratyphoid fever
Bacillary dysentery,
E. Coli. Diarrhea
Cholera
- (c) Protozoal : Amoebiasis,
Giardiasis
- (d) Helminthic : Roundworm
Threadworm
Hydatid disease.
- (e) Leptospiral : Weil's disease

2. THOSE CAUSED BY THE PRESENCE OF AN AQUATIC HOST

- (a) Snail : Schistosomiasis
- (b) Cyclops : Guineaworm
Fish tape worm

1. ACUTE DIARRHOEAL DISEASES IN YOUNG CHILDREN

Diarrhoea is the passage of loose or watery stools more than three times a day. However, it is the recent change in the consistency and character of stools that is more important than the number. Passage of frequent formed stools, passage of pasty stools in a breast-fed in fact during or immediately after feeding should not be considered as diarrhoea.

Diarrhoea is classified by clinical syndromes as acute watery diarrhoea (majority of the cases), dysentery (blood in the stools) and persistent diarrhoea. Such classification is important for the management of cases. Although cholera is a form of acute watery diarrhoea, it is discussed separately.

CLASSIFICATION OF DIARRHOEA

(by clinical syndrome)

- Acute watery diarrhoea
- Dysentery (blood in the stools)
- Persistent diarrhoea

Acute diarrhoea starts suddenly and is characterized by the passage of loose watery motions. Patients of diarrhoea recover within three to seven days. If diarrhoea persists for more than 14 days and is associated with weight loss it is classified as persistent diarrhoea. Persistent diarrhoea, which is recurrent or long lasting, due to non-infectious causes such as sensitivity to gluten or inherited metabolic disorders.

More than three-fourths of all diarrhoeal episodes are acute watery diarrhoea. Diarrhoeal diseases are common in children under five years of age and are among the major causes of deaths in children in this age group. It is presumed that one in four (or five) deaths in children under five years of age are due to diarrhoea. In districts where appropriate case management of diarrhoea is not widely practiced, up to a third of pediatric hospital admissions and 20% of the deaths of inpatients are diarrhoea related. Estimates based on the current child mortality rates indicate that more than 6,00,000 children die annually due to these diseases in India.

2. CHOLERA

Cholera is a form of acute watery diarrhoea. More than 90% of sporadic cases in endemic areas are mild and difficult to distinguish clinically from other types of acute diarrhoea. In epidemic situations, however, there is rapid onset of severe watery diarrhoea and vomiting, resulting in loss of large amounts of fluids and electrolytes from the body. The condition of the patient can deteriorate rapidly in the absence of medical care. If treatment is delayed or inadequate, death may occur rapidly from dehydration and circulatory collapse. Cholera should be suspected if patients older than 5 years of age develop severe dehydration from acute watery diarrhoea (usually accompanied with vomiting).

Cholera is endemic in India and several outbreaks of the disease have been reported. Because cholera has the potential of rapid spread leading to an acute public health problem, special attention is required to be given to the surveillance and prompt follow up action on reported cases of cholera. If appropriate measures are taken, cholera remains restricted to a limited habitation. Therefore, reporting of village, taluka and district helps in identifying the affected area. The first suspect case of cholera in a non-endemic area must be notified immediately to the local health officer. Laboratory confirmation should be obtained at the earliest opportunity and the results intimated to local health office as soon as these become available.

There are many serogroups of *Vibrio cholerae*, but only serogroup O1 and O139-cause cholera. *V.cholerae* O1 occurs as two biotypes – classical and E1 Tor. Each biotype also occurs as two serotypes- Ogawa and inaba. Almost all the recent cholera outbreak has been caused by the E1 Tor biotype. Cases caused by the classical biotype have not been reported in India since 1980. The E1 Tor biotype also causes a higher proportion of symptomatic infections than the classical biotype and survives longer in the environment. In late 1992, large-scale epidemics occurred in India and Bangladesh caused by a new serogroup-*V.cholerae* O139.

Man is the only host. Patients remain infectious usually for a few days after recovery from clinical symptoms. Occasionally, the carrier stage may persist for several months. The chronic carriers however do not play important role in the spread of disease. Anti biotics, to which the strain is susceptible, shorten the period of communicability. *V.Cholerae* can survive for long periods in the environment and can live in association with certain aquatic plants and animals, making water an important reservoir for infection.

Incubation period varies from a few hours to 5 days, usually 2-3 days.

3. BACILLARY DYSENTERY/SHIGELLOSIS

Dysentery is diarrhoea with visible blood in the stools. The patients may complain of abdominal cramps, fever, and anorexia and weight loss. 10 to 15% of all episodes of acute diarrhoea in young children are due to dysentery. *Shigella* is the most common cause of dysentery. *Entamoeba histolytica* presents with similar clinical symptoms but is relatively rare in young children. Outbreaks of dysentery have the potential of causing a large number of deaths, especially in young children, unless specific antimicrobial treatment is started in manner. It is important that the community and the peripheral health personnel are aware of the danger sign of blood in the stools (bloody diarrhoea) so that medical help is sought immediately.

The incubation period is usually 1-3 days. The severity of the illness and the cause fatality rate is the functions of the host (age and pre-existing nutritional status) and the sero-type. *Shigella dysenteriae* 1 is often associated with severe disease and complications. Infections with *S.Sonnei* and *S.Flexneri* result in short clinical course and negligible mortality.

The patients may transmit the infection in the acute stage and up to one month after illness. Since only a few bacilli are sufficient to transmit the infection, *shigella* is

usually transmitted through person to person. Asymptomatic carriers may transmit infection. The carrier state rarely persists for long periods. Treatment with appropriate antibiotics cuts short the duration of transmission.

4. TYPHOID FEVER/ENTERIC FEVER/SALMONELLOSIS

Gradual onset of fever, malaise, lethargy, myalgia and loss of appetite usually characterize typhoid fever. Fever increases in stepwise fashion to 39 to 41 C over a 5 to 7 day period. A highly characteristic feature is the pulse, which is relatively slow (bradycardia). Mental apathy and dullness is common and delirium may develop. At this stage the patient may present to a health facility as fever with altered sensorium. Since typhoid fever is very common in our country, it should be excluded by careful medical history, physical examination and blood culture for *Salmonella typhi*.

The incubation period is 2 weeks with a range of 7 to 21 days.

The bacilli are excreted in the urine and faeces in the acute stage of the disease and some patients may continue to excrete *S. Typhi* in the convalescent stage as well. A small percentage of the patients may become chronic carriers and excrete the bacilli for years. The carrier is a danger to the community, the degree depending on personal hygiene and also the sanitary conditions in the locality.

5. VIRAL HEPATITIS

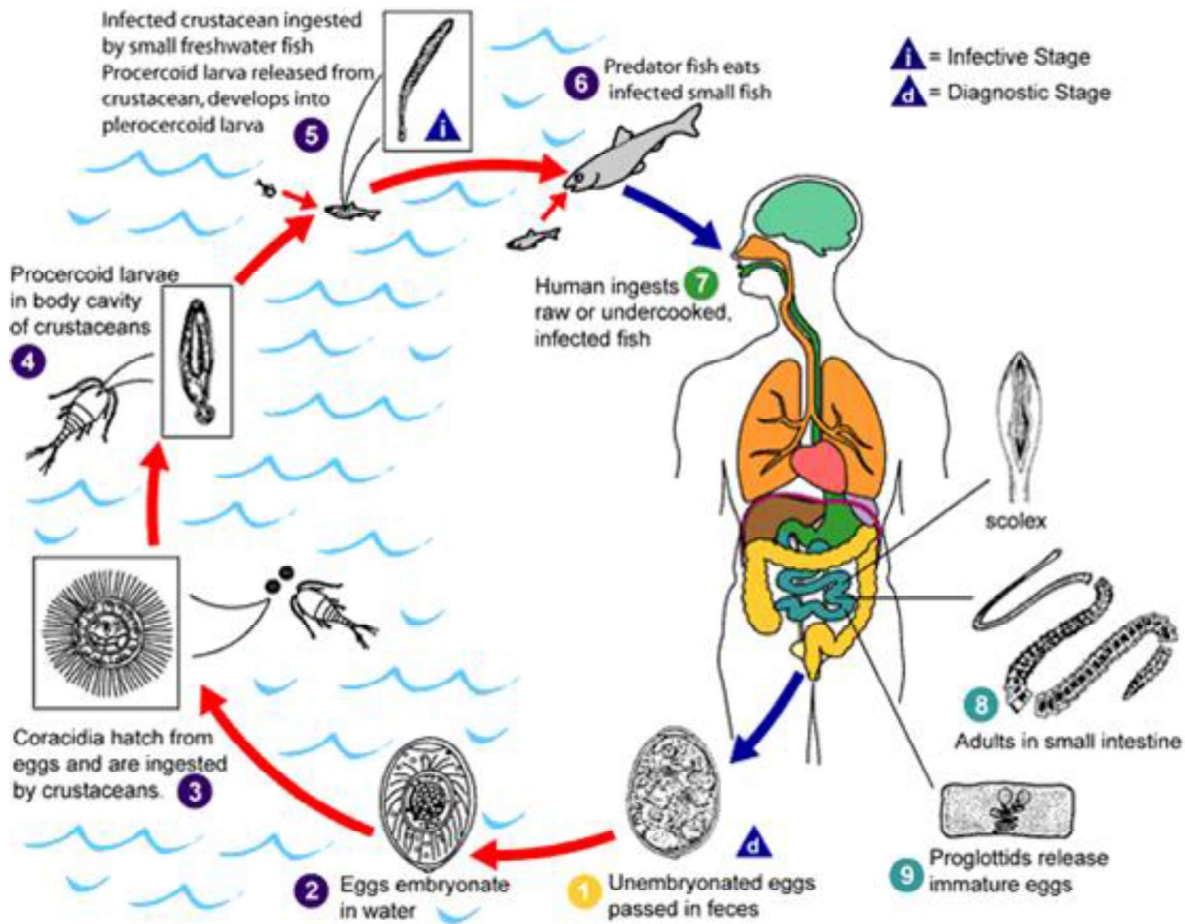
Viral hepatitis A and E are water borne; Hepatitis viruses B, C, D and possibly G are transmitted by the parental route and are not transmitted through contaminated water.

While sporadic cases of hepatitis E are reported throughout the year, epidemics occur as a result of contamination of piped water supply. Almost all outbreak of viral hepatitis in India are due to hepatitis E virus. Occasional outbreaks of hepatitis A, which is also water borne, may also occur. However, these are relatively rare, as by age five most individuals develop immunity through natural infection. Infection in young children is generally mild.

The incubation period of hepatitis E is usually one to two months (not less than 15 days). Outbreaks of hepatitis E may therefore be preceded by other water borne disease with shorter incubation periods such as acute diarrhoeal diseases (few days) and typhoid fever (one to three weeks). During outbreaks of hepatitis E, young adults are usually affected. Mortality rate in pregnant women is very high.

6. WATER RELATED DISEASES OF PUBLIC HEALTH IMPORTANCE

a. HELMINTHIC INFECTIONS:-



WHO estimates that more than one billion of the world's population is chronically infected with soil transmitted helminthes which decreases work capacity and fitness and especially in the case of children influences their nutritional status and reduced learning ability.

The major soil-transmitted helminthes include *Ascaris Lumbricoides*, *Trichuris trichuria* and *Ancylostoma duodenal*. The infections are associated with inadequate sanitation and water supplies.

Ascariasis (round worm infection) is generally associated with few or no symptoms. Live worms, passed in stools or occasionally from mouth or nose, are often the first recognized sign of infection. Heavy parasitic burden aggravates nutritional deficiencies, serious complications include bowel obstruction. Transmission is by ingestion of infected eggs in the soil contaminated with faeces of patients. The eggs undergo embryo nation in the soil and become infective after 2-3 weeks and remain infective in the soil for several months or years. The usual span of an adult worm is 12 months. The female worm can produce 2 lakh eggs per day.

Human trichuriasis (whip worm disease) is a nematode infection of the large intestine. Heavy infections may cause bloody, mucoid stools and diarrhea. Hypoproteinaemia, anaemia and growth retardation may occur in young children. Eggs

passed in faeces require a minimum of 10-14 days in warm moist soil to become infective. Transmission is through contaminated vegetables.

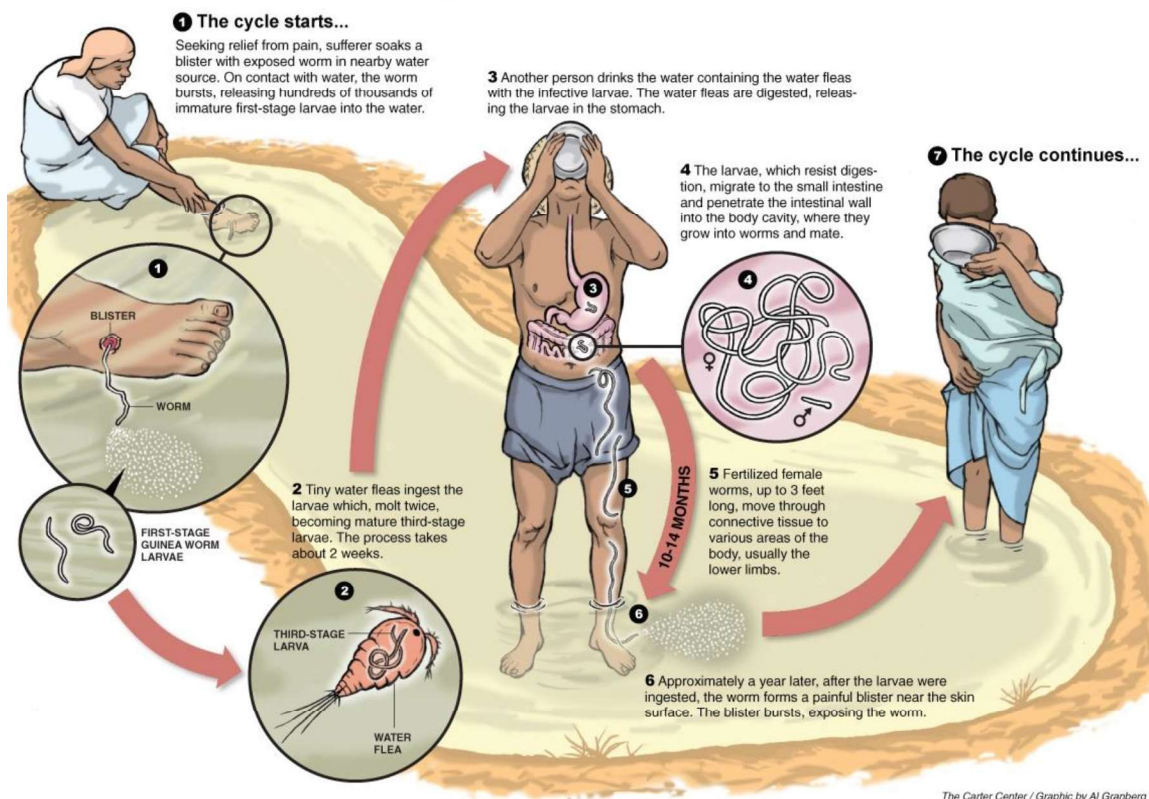
Ankylostomiasis (hook worm disease) is a major cause of iron deficiency anaemia. Children with heavy infection may have anemia, hypoproteinaemia and may be retarded in physical and mental development. Eggs in faeces are deposited on the ground and hatch under favorable conditions. The larvae become infective in 7-10 days. Infection occurs when the infective larvae penetrate the skin, usually of the foot. Infected persons can contaminate the soil for several years in the absence of treatment. Under favorable conditions, larvae remain infective in the soil for several weeks.

Enterobiasis is a common helminthic infection during childhood. Adult worms live in large intestine but migrate to the anus to deposit the eggs, which become infective within a few hours. Transfer of these infective eggs usually transmits the infection by hand from anus to mouth of the same person or another person. The infection is often asymptomatic or results in perianal itching and irritability.

Competition

b. GUINEAWORM DISEASE

The Life Cycle of Guinea Worm Disease



Guinea worm (GW) disease is caused by the parasite *Dracunculus medinensis* and is transmitted through drinking the water from unsafe sources like step well, ponds etc., containing water fleas (Cyclops). The adult worm measuring 60 to 100 cm in length emerges through the skin, usually lower limbs, causing severe swelling, ulceration and

discomfort to the patient. The disease causes incapacitation to the patient who is unable to perform his regular work, resulting in economic loss to the patient. The disease occurs in rural areas with inadequate safe drinking water supply and peaks during the summer season when there is a scarcity of water.

The Government of India launched the National Guineaeworm Eradication Programme in 1983-84. The National Institute of Communicable Diseases is the nodal agency for coordinating the programme, which is implemented by the state health authorities. The ministry of Rural Affairs and Employment, Government of India and the State Public Health Engineering Department (Rural Water Supply) has actively participated in the programme.

Prior to 1984 nearly 40,000 cases were reported annually from 12,840 villages in 89 districts in 7 states. In 1996 only 9 cases were reported from 3 villages in Jodhpur district. The last case was notified in July 1996. All the states except Rajasthan have been free of Guineaeworm disease since the beginning of 1995. No case has been reported in the country since August 1996. Presently cases are reported only from countries in Africa.

The state health authorities including non-endemic states have been alerted to initiate measures for active surveillance of Guineaeworm disease and to maintain appropriate records so that the certification for Guineaeworm eradication could be achieved after maintaining a 3-year period of zero case.