

Diseases and Hygiene

Infectious and Non-Infectious Diseases

Health and Diseases

We often describe 'health' as a state of a person who is free from any kind of disease. However, it is an incomplete definition of health. A person need not only to be free from any physical disease, but he must also have a sound mind to be called a healthy individual. So we can define health as a state of complete physical, mental and social well-being.

The word disease is derived from two words 'disturbed ease'. It may be defined as any condition that can lead to discomfort, distress, health problems, and even death of the affected person. In this condition, a part of body is no longer healthy or it is malfunctioning.

Acquired and Congenital Diseases

Acquired diseases

Diseases acquired by individuals during their lifetime are called acquired diseases. Such diseases are mostly non-inheritable. They can be classified as follows:

1. Infectious diseases
2. Non-infectious diseases

Non-infectious diseases are of the following types.

- **Degenerative diseases:** These are caused by the malfunctioning of vital organs. Examples include diabetes and cancer.
- **Deficiency diseases:** These are caused by the deficiency of one or more nutrients. Examples include night blindness, marasmus and anaemia.
- **Allergy:** These are caused due to hypersensitivity towards certain substances, e.g. dust, pollen, etc. Asthma and hay fever are two such diseases.

Congenital diseases

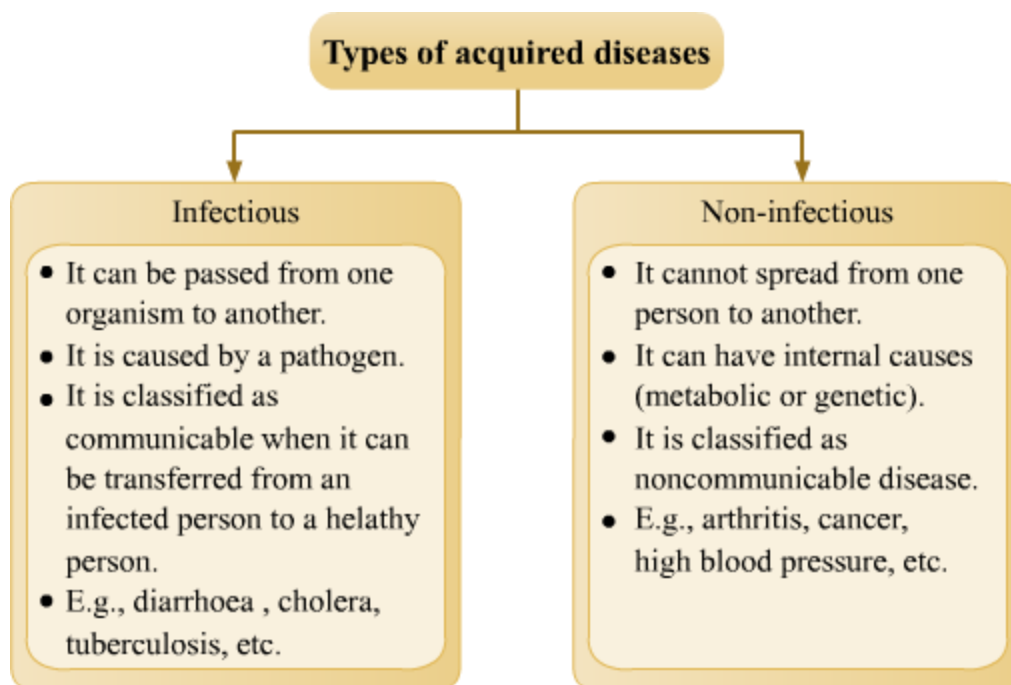
Diseases that are present in individuals from birth are called congenital diseases. They may be caused due to some mutations or metabolic disorders. They are often inheritable. Examples of such diseases include various genetic diseases such as **haemophilia**, autism, sickle-cell anaemia, Klinefelter's syndrome and Turner's syndrome.

Know More

On the basis of spread of disease, diseases are classified in the following manner.

- **Endemic diseases:** An endemic disease is one that is constantly present in a particular region and affects some people in that region. Goitre, for example, is endemic to the north-eastern hills of India, mainly because the water present there lacks iodine.
- **Epidemic diseases:** An epidemic disease infects a large proportion of a country's population, irrespective of the regions. Plague, for example, affected a large proportion of India's population in 1994.
- **Sporadic diseases:** Such diseases occur occasionally. Malaria is a sporadic disease.
- **Pandemic diseases:** Such diseases occur worldwide. AIDS is a pandemic disease.

Types of Acquired Diseases



All communicable diseases are infectious, but all infectious diseases are not communicable.

Types of Diseases

Non-infectious Diseases

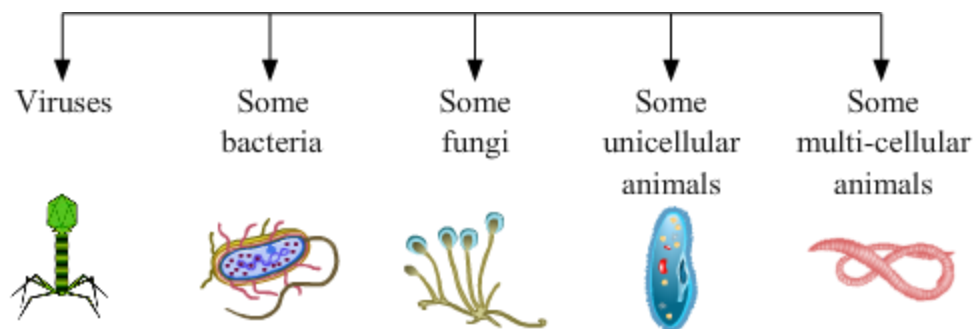
Non-infectious or non-communicable diseases can occur due to a number of reasons.

- Genetic disorders: Diseases that are caused by changes in the genetic makeup, or DNA of an individual. These diseases may get passed on from parents to their children. Examples include haemophilia and thalassaemia.
- Dietary deficiency diseases: These diseases are caused due to deficiency of some important dietary components in our body. These nutrients are highly important for normal growth and development of our body, and thus their lack can result in diseases.
- Allergy: Allergy refers to a sudden, unpredictable reaction of body to any particular substance, or **allergen**. Some common allergens include dust, pollens, spores, certain medicines, cosmetics, etc. These allergens most commonly affect the skin, respiratory system, digestive tract, eyes, etc.
- Diseases caused by physical and chemical agents: Heat stroke or sunburn can be caused by the physical agents. Some diseases may also be caused by chemical agents, such as mercury, lead, potassium cyanide, etc.

Infectious Agents

Infection: It may be defined as the entry and multiplication of disease-causing microorganisms inside the body. It may or may not lead to a disease. Diseases caused due to such disease-causing microorganisms are known as infectious diseases.

Infectious agents/ Pathogens: They are the disease-causing microorganisms which show **virulence**. They belong to different categories.



Infectious Agents: Viruses

Viruses: They are very tiny organisms and are visible only with the help of an **electron microscope**. They cannot grow, multiply or reproduce on their own. They need to infect a host cell to get the required machinery to perform these functions. The genetic component of a virus may be made of **DNA** or **RNA**. RNA-containing viruses are called retroviruses.

- Examples of RNA viruses include SARS virus (Severe Acute Respiratory Syndrome-causing virus), polio virus, influenza virus, hepatitis C virus, retrovirus (example, HIV).
- Examples of DNA viruses include bacteriophage (virus that infects bacteria) and herpes virus.

Viron: A virion is a single viral particle consisting of an outer protein shell (called capsid) and an inner core of genetic material (either DNA or RNA).

The smallest known virus is *Circovirus* and the biggest known virus is *Megavirus*.

Infectious Agents: Bacteria and Fungi

Bacteria: Bacteria are unicellular **prokaryotic** organisms. They reproduce very quickly. They are larger than viruses. Only some bacteria cause diseases; others are useful in nature.

- Examples of diseases caused by bacteria include whooping cough, typhoid, cholera, anthrax, tuberculosis, diarrhoea, diphtheria, tetanus, syphilis, **gonorrhoea**, dysentery, plague and acne.

Fungi: They are **eukaryotic** organisms and are **heterotrophic** in nature, i.e., they lack chlorophyll. They are mostly multicellular and have thread-like bodies.

- Examples of diseases caused by fungi include athlete's foot, **candidiasis** and ringworm.

Not all bacteria are harmful for humans. In fact, the disease causing bacteria are less than 1%. Some bacteria that live in our body are actually good for us.

For example, *Lactobacillus acidophilus* is a harmless bacterium that resides in our intestines. It helps us digest food, destroys some disease-causing organisms and provides nutrients to our body.

Infectious Agents: Other Unicellular and Multicellular Organisms

Protozoa: They are simple, eukaryotic, unicellular organisms. *Amoeba*, *Trypanosoma* and *Leishmania* are examples of protozoa. They often spend part of their life cycle outside of humans or other hosts.

Most of them are found in water as they require moisture for survival. Some live in other sources like food and soil.

- Examples of diseases caused by protozoa include amoebiasis, kala azar, malaria and African sleeping sickness.

Multicellular animals (e.g., worms): Worms are parasites that infect the intestines of human beings and animals. Roundworms, pinworms, hookworms and tapeworms are some examples of disease-causing worms.

- Examples of diseases caused by worms include diarrhoea, taeniasis (by tapeworms) ascariasis (by roundworms), elephantiasis (end stage of filariasis), anaemia and liver rot.

Know More

Why do we have to identify the causal agent of a particular disease? Is there any advantage in having information about the disease-causing organism?

The type of causal agent of a disease determines the type of treatment that can be used for curing the disease.

Since all microorganisms are different in structure, a medicine or drug manufactured to disrupt the structure/function of one microorganism may not have any effect on another microorganism.

For example, the common **antibiotic** penicillin blocks the synthesis of the cell wall in bacteria.

Therefore, this antibiotic can be used effectively against a large number of bacteria. However, it cannot be used on other microorganisms like viruses.

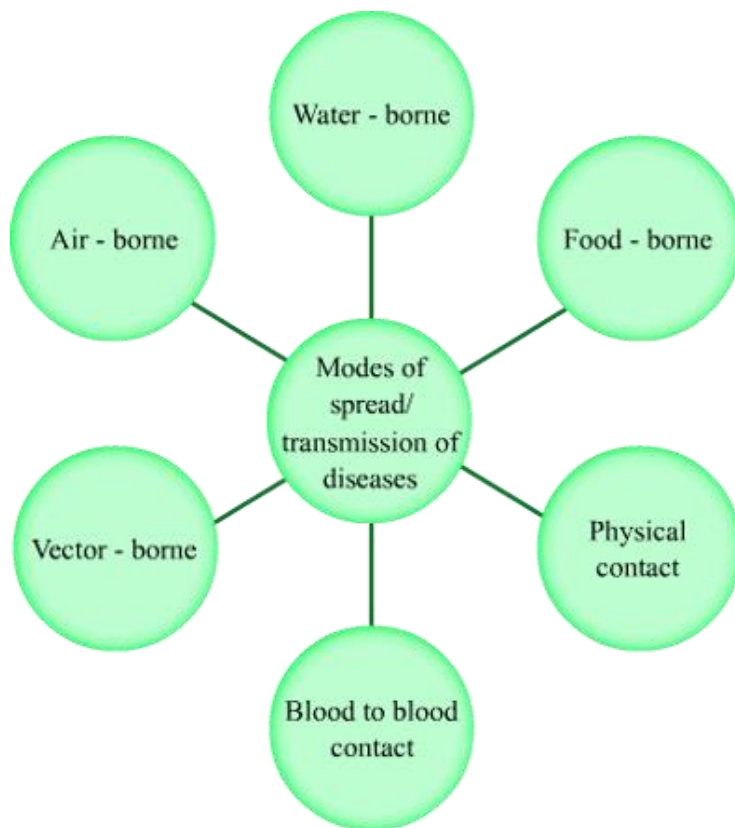
Modes of Transmission of Diseases

Transmission of Diseases

We use various means of transport to travel from one place to another. In the same way, pathogens causing infectious diseases also use certain means of transport (or to be more specific, modes of transmission) such as air, food and water to enter the bodies of living organisms.

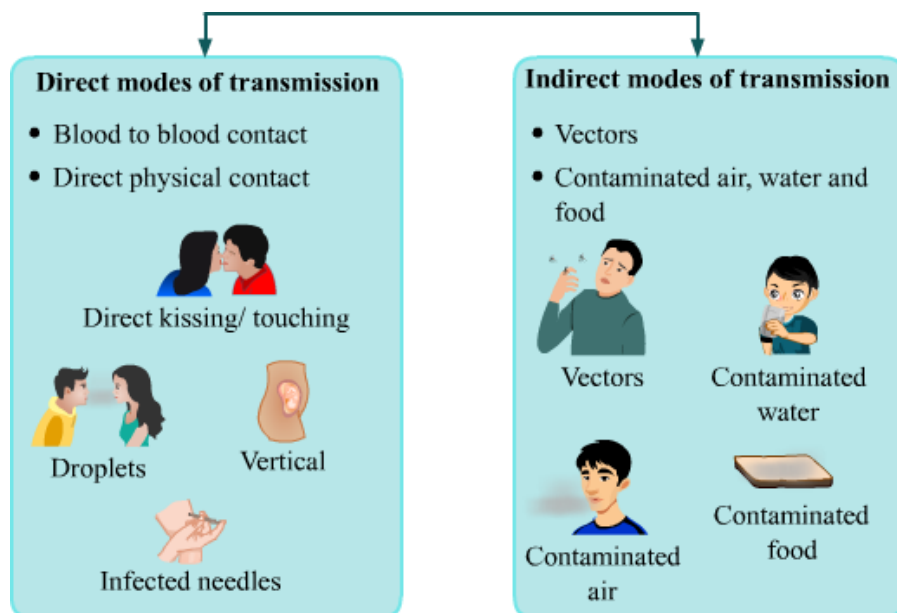
Infectious diseases are caused by microorganisms such as bacteria, viruses, etc.

That get into the body and cause problems. Some — but not all — infectious diseases spread directly from one person to another. Such diseases are called communicable diseases.



Diseases: Modes of Transmission

The modes of transmission of diseases are categorized as:



Pathways to Pathogens: Direct ways

Blood to blood contact: This type of contact is established –

- through blood transfusion
- by the use of contaminated needles
- during pregnancy (between the mother and the foetus)

Note: AIDS is a disease that spreads through sexual contact and also via blood to blood contact.

Sexual contact: The sexual act involves close contact between two people. This may lead to the transfer of diseases such as syphilis, gonorrhoea and AIDS. These diseases are known as *sexually transmitted diseases*. Note that casual physical contact such as handshaking, hugging and kissing do not lead to the transfer of these diseases.

Direct contact: Certain diseases spread when one comes in contact with the diseased person or on using the articles used by him. Swine flu, athlete's foot, ringworm, conjunctivitis and German measles are diseases that spread in this manner.

Whiz Kid

Do you know why most newborn babies suffer from jaundice?

While in the womb, the foetus relies on RBCs for oxygen supply. After birth, these extra RBCs get broken down and the liver changes the wastes into water-soluble products. However, when this does not happen, the waste products (yellow in colour) attach to the fatty tissues of the skin and brain of the baby. This is one of the reasons why most newborn babies suffer from jaundice.

Pathways to Pathogens: Indirect ways

- **Air:** Disease-causing microorganisms can be expelled into air when a diseased individual coughs, sneezes, talks, etc. The dust particles or water droplets present in air carry these microorganisms to other people. Diseases caused in this way are called *airborne diseases*. Common cold, chicken pox, small pox, pneumonia, influenza and tuberculosis are examples of such diseases.
- **Water and food:** When the excretions from an infected person get mixed with drinking water, the water becomes contaminated with disease-causing microorganisms. Diseases are caused when this contaminated water is consumed by other individuals. Such diseases are called *waterborne diseases*. Any food prepared using this same water can also cause diseases when consumed. These diseases are known as *food-borne diseases*. Food and water can also be

contaminated by various insects like mosquitoes, houseflies, cockroaches, etc. Examples of such diseases include cholera, typhoid and hepatitis A.

- **Vectors:** These are organisms that carry disease-causing microorganisms from an infected person to others. Though a vector carries pathogens, it itself is not infected by them. Diseases spread through vectors are known as *vector-borne diseases*. Examples of such diseases include malaria, filariasis, dengue, rabies and plague.

Malnutrition and Deficiency Diseases

Malnutrition is defined as the lack of sufficient food or the non availability of proper nutrients in the food we consume or the physical inability to absorb and metabolize the nutrients.

It can be classified into-

Under nutrition: this condition results when there is insufficient amount of food consumed over a period of several days. It is also known as starvation. It affects the physical and mental abilities of the person.

Over nutrition: it is caused by the over consumption of food over extended period of time. It may lead to a condition called obesity.

Deficiency Diseases

Diseases that occur due to the lack of nutrients are called **deficiency diseases**. Deficiency diseases can be of various types:

Vitamin Deficiency

Vitamins are needed by the body in small amounts yet their deficiency leads to various deficiency diseases. Vitamins are of two types – fat soluble (vitamins A, D and K) and water soluble (Vitamin B and C).

If taken in excess, the water soluble vitamins are excreted with the urine but if fat soluble vitamins are taken in excess, they are not excreted easily and harm the body and cause restlessness and nausea.

The sources, uses and associated deficiency diseases for various vitamins are given the following table

	Vitamin	Sources	Essential for	Deficiency disease
1.	Vitamin A	Milk, butter, cheese, tomatoes, carrots, cod liver oil, yellow fruits	Good eyesight	Night-blindness (poor night vision)
2.	Vitamin B complex (mixture of several vitamins)	Milk, eggs, cheese, meat, liver, husk of cereals and pulses	Digestion, growth	Beri-beri (nervousness, loss of appetite, paralysis)
3.	Vitamin C (ascorbic acid)	Citrus fruits (orange, lemon, lime), green vegetables, tomatoes	Muscles and teeth	Scurvy (bleeding of gums and swelling of joints)
4.	Vitamin D (produced by sun in skin)	Milk, yellow of egg, liver, fish liver oil, especially sunlight, cod liver oil.	Strong bones and teeth	Rickets (decaying teeth, weak bones) in children and osteomalacia in adults
5.	Vitamin K (made by bacteria in large intestine)	Leafy green vegetables (spinach, cabbage)	Blood clotting	Haemorrhage (bleeding)

Mineral Deficiency

Some important sources of minerals are vegetables, spices, and fruits. Though they are needed in small quantities, they are indispensable for proper growth of the body and to protect the body from various diseases.

The detail information on various vitamins is given in the following table

	Chemical element	Sources	Functions	Deficiency effect/disease
1.	Calcium	Cheese, milk, green leafy vegetables, pulses, eggs, meat	Bone and teeth formation, blood clotting, Muscle activity	Rickets , Brittle bones, excessive bleeding, bad muscle movement
2.	Phosphorus	Fish, eggs, meat, milk, cheese, potatoes	Bone and teeth formation, nucleic acid formation, energy transfer, ATP	Bad bones and teeth body weakness
3.	Potassium	Beef, eggs, milk, cheese, potatoes	Osmocontrol-blood and tissue fluid, nerve impulse conduction	Muscle weakness and paralysis
4.	Sodium	Salt, cheese, bread, butter	Osmocontrol-blood and tissue fluid, nerve impulse conduction, Gastric juice, HCl acid	Dehydration, extreme weakness
5.	Magnesium	Cheese and green vegetables	Energy transfer, bone and teeth formation	Activity of muscles and nerves, weakness
6.	Iron	meat, liver, eggs, green leafy vegetables	Blood haemoglobin formation, Muscle myoglobin formation, Enzyme activity	Anaemia
7.	Iodine	Sea fish, iodised salt	Thyroid gland function	Goitre (enlarged thyroid), abnormal metabolism
8.	Fluorine	Sea fish, tea, and some drinking water	Bone and teeth formation	Dental cavities

Protein and Carbohydrates/Energy (Calorie) Deficiency

There are certain diseases which are caused due to the deficiency of proteins or

proteins and energy (calories). These are termed as Protein Energy Malnutrition (PEM). Deficiency of proteins leads to Kwashiorkor whereas deficiency of proteins and carbohydrates/calories/energy leads to marasmus.

The diet that is poor in proteins lead to a disease called **kwashiorkor** in which the growth of the infant is retarded. This disease affects the children in age group of 1 to 5 years. The symptoms of this disease are

- Stick like thin legs
- Protruding belly
- Water retention
- Bulging eyes
- Discolouration of hair
- Mental retardation

The deficiency of both proteins and carbohydrates in the diet leads to a condition called **marasmus**. It occurs when the child under the age of one year does not get sufficient food. The symptoms of marasmus are as follows

- Lean and weak body
- Prominent ribs
- Dry, thin, wrinkled skin with folds of loose skin.
- Mental retardation

Do you know that improper cooking methods such as cooking in iron vessels, overcooking, and boiling can lead to the loss of taste and nutrients from vegetables?

This happens because during cooking, some volatile acids and gases are released from the vegetables. These acids and gases spoil the taste and look of the food.

Hence, cooking should be fast to prevent the loss of taste and look of the food.

- Repeated washing of rice, pulses, and some fruits should be avoided as the vitamins and minerals present in them may also get washed away.
- The skins of many fruits and vegetables contain vitamins and minerals. Hence, they should not be peeled before eating.
- Vegetables and fruits should not be washed after they have been cut or peeled.
- Water (in which grains are soaked) should not be thrown away as it contains many useful proteins and minerals.

Therefore, the loss of nutrients while preparing food can be minimized by keeping the above mentioned points in mind.

Methods of Prevention of Diseases

You have learnt that some microorganisms are helpful to animals, while some are not. These microorganisms cause diseases in humans, animals and plants. Disease-causing microorganisms are called **pathogens**.

If you are sitting next to a person who is suffering from cold, then it is likely that you may also catch cold. The virus (pathogen) that causes cold might enter your body through the air and cause the disease. Water, food or a vector are some other means by which diseases can spread.

Let us learn about the various preventive measures that can be taken to prevent the spread of diseases.

Preventive measures for air-borne diseases

1. Stay away from the infected person
2. Cover your mouth or nose while sneezing or coughing
3. Get vaccinated at the right time

Preventive measures for water-borne diseases

1. Ensure proper disposal of sewage
2. Ensure supply of safe drinking water
3. Maintain good sanitary habits
4. Always drink boiled water
5. Get vaccinated at the right time

Preventive measures for vector-borne diseases

1. Use mosquito repellent
2. Do not allow water to stagnate in your surroundings
3. Keep your surroundings neat and clean

The given table lists some common human diseases, their modes of transmission, the pathogens involved, and the preventive measures to be taken to avoid the occurrence of such diseases.

Human disease	Pathogen	Mode of transmission	Preventive measures (general)
Tuberculosis	Bacteria	Air	Patient should be kept in isolation.
Measles	Virus	Air	The personal belongings of the patient should be kept away from others.
Chicken pox	Virus	Air/contact	Vaccination should be given at the proper time.
Polio	Virus	Air/water	
Cholera	Bacteria	Water/food	Water should be boiled and food should be properly cooked before consumption.
Typhoid	Bacteria	Water	One should maintain personal hygiene and good sanitary habits.
Hepatitis B	Virus	Water	Vaccination should be given at the proper time. Water should be boiled before consumption.
Malaria	Protozoa	Mosquito	The breeding of mosquitoes should not be allowed. One should keep one's surroundings clean and dry. Mosquito nets and repellents should be used to avoid contact with mosquitoes.

Some General Preventive Measures

- Eating healthy, hygienic food: We should always take healthy, balanced diet. Fresh, seasonal fruits and vegetables should be eaten to provide proper nutrients to the body. Drinking water must be boiled or purified before consumption.
- Maintaining clean environment: A clean environment helps in controlling a number of diseases. Open garbage and stagnant water are the breeding places for a number of diseases carrying vectors, such as flies, cockroaches, and mosquitoes. So, there should

be a proper disposal of garbage. Also, water should not be allowed to stagnate inside homes or near the residential areas.

- Maintaining personal hygiene: We should always take proper care of personal health and hygiene. Regular bathing is very important to keep the skin free from dust and bad odour. Regular brushing and massaging the gums are effective ways to prevent tooth decay and other dental problems. We should also exercise daily and take proper sleep to keep our body and mind fit.