

Why Do We Fall Ill

- **Health and Disease**

- **Health** - A state of physical, mental, and social well-being that includes a unity and harmony within the mind, body, and soul of an organism
- **Disease** - Any condition that can lead to discomfort, distress, health problems, and even death of the affected person
- **Symptoms** - Indications of disease, such as headache, stomach pain, nausea, etc that can only be felt by the patient
- **Signs** of a disease include fever, vomiting, diarrhoea, etc that can be observed by a physician
- **Incubation period** - The time interval between infection and appearance of symptoms

Causes of diseases

1. Contributory causes

- Unhealthy condition
- Improper public service
- Poverty

2. Immediate causes:

- These are external causes like micro-organisms.
- Organisms like virus, bacteria, and other micro-organisms can cause diseases in a person.

On the basis of its duration , diseases are of two types- Acute and Chronic

- **Acute** - Lasts for a short period of time, eg. Cold, cough, influenza, etc.
- **Chronic** - Lasts for long periods of time, eg. Diabetes, kidney stones, etc.

The disease-causing microorganisms that transmit communicable diseases belong to different categories such as:

- **Viruses** - These are tiny organisms that grow, multiply, or reproduce only inside the host cells.

Diseases caused by viruses - Influenza, cold (Rhinovirus), dengue, AIDS, etc.

- **Bacteria** - These are unicellular organisms; larger than viruses
Diseases caused by bacteria - Whooping cough, typhoid, cholera, anthrax, etc.
- **Fungi** - These are plant-like organisms; heterotrophic
Diseases caused by Fungi - Athlete's foot, candidiasis, ringworms, etc.
- **Protozoa** - These are simple, primitive unicellular organisms which are often found in water.

Diseases caused by Protozoa - Amoebiasis, kala azar, malaria, African sleeping sickness, etc.

- **Multicellular animals like worms** - These are parasites that infect the intestines of human beings and other animals.

Diseases caused by worms- Diarrhoea, anaemia, liver rot, etc.

- **Disease** is characterised by various signs and symptoms.
- Infectious diseases. For example: Common cold
- Noninfectious For example: Cancer
- **Infectious diseases.**

It spreads through infectious agents that include bacteria, viruses, protozoans and fungi.

- **Bacterial diseases**

1. Typhoid fever: *Salmonella typhi*; Widal test is used for confirmation of typhoid
2. Pneumonia: *Streptococcus pneumoniae* and *Haemophilus influenzae*; it infects the alveoli of lungs
3. Other examples include dysentery, plague, diphtheria

- **Viral diseases**

1. Common cold: Spreads through Rhino viruses

- **Protozoan diseases**

1. Malaria: Pathogen is *Plasmodium*; malarial parasite requires two hosts: humans and female anopheles mosquito; malarial parasite reproduces asexually in the human host while in the mosquito host it reproduces sexually

2. Amoebiasis (amoebic dysentery): *Entamoeba histolytica*

- **Helminthes diseases**

1. Ascariasis: Pathogen is *Ascaris*
2. Elephantiasis or filariasis: Pathogen is *Wuchereria bancrofti*
3. Taeniasis : pathogen is *Taenia solium* or *Taenia saginata*

- **Fungi**

1. Ringworms: Caused by fungi which belong to genera *Microsporum*, *Trichophyton* and *Epidermophyton*

On the basis of causative agents - **Infectious and Non-infectious**

- **Infectious** - Diseases such as influenza, cold, etc., which are caused due to infectious agents . An infectious disease is classified as **communicable** because it can be transferred from an infected person to a healthy person.
 - **Non-infectious** - Diseases such as high blood pressure, cancer, etc., which are caused by some internal causes such as excessive weight, genetic defects, etc. These are **non communicable** because it cannot be transmitted from a diseased person to a healthy person.
1. **Communicable Diseases** - Diseases which spread from one person to another, such as influenza, cold, etc. They are caused by the disease-causing microorganisms.
 2. **Non-communicable Diseases** - Diseases which cannot spread from one person to another such as high blood pressure, cancer, etc. These diseases are caused by some internal causes such as excessive weight, genetic defects, etc.

Communicable diseases

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- **Viruses** - These are tiny organisms that grow, multiply, or reproduce only inside the host cells.

Diseases caused by viruses - Influenza, cold (*Rhinovirus*), dengue, AIDS, etc.

- **Bacteria** - These are unicellular organisms; larger than viruses

Diseases caused by bacteria - Whooping cough, typhoid, cholera, anthrax, etc.

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Diseases caused by Fungi - Athlete's foot, candidiasis, ringworms, etc.

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Diseases caused by Protozoa - Amoebiasis, kala azar, malaria, African sleeping sickness, etc.

- **Multicellular animals like worms** - These are parasites that infect the intestines of human beings and other animals.

Diseases caused by worms- Diarrhoea, anaemia, liver rot, etc.

- **Means of spread of communicable diseases**

Based on the mode of transmission, communicable diseases are of following types

- **Air-borne diseases** - Transmitted when disease-causing microorganisms are expelled into the air by coughing, sneezing, talking, etc.

Eg. Common cold, chicken pox, small pox, pneumonia, influenza, tuberculosis, etc.

- **Water-borne diseases** - Spread when the excretions, from an infected person, containing causal microorganisms get mixed with drinking water and this contaminated water is consumed

Eg. Cholera, typhoid, hepatitis A, etc.

- **Food borne diseases** – Caused by consuming food infected by disease causing microbes.
Eg. Botulism, stomach infections, etc.

- **Contact** – spreads through coming in contact with the diseased person or using the articles used by him
Eg. swine flu, ringworm, conjunctivitis

- **Animals** – Animals which transfer disease-causing microorganisms from an infected person to others are called vectors
Eg. female mosquitoes can transfer the malaria-causing Plasmodium

Non-Communicable diseases

A non-communicable disease can be caused by nutrient deficiency, malfunctioning of body organs (degenerative diseases), and bad habits like drug abuse.

- **Nutrition deficiency** – These diseases are caused by deficiency of certain nutrients like carbohydrates, proteins, minerals, vitamins, etc. The person suffering from such diseases is called malnourished

1. Carbohydrate and protein deficiency – Leads to marasmus. In this the body becomes lean and thin, ribs become prominent and child suffers from mental retardation.
2. **Protein deficiency** – Leads to Kwashiorkor. In this, the belly protrudes out, eyes bulge and the legs become stick thin.
3. **Vitamin deficiency** – deficiency of different vitamins lead to different diseases.

Deficiency of	Leads to
Vitamin A	Night blindness
Vitamin B	Beri-beri
Vitamin C	Scurvy
Vitamin D	Rickets
Vitamin K	haemorrhage

4. **Mineral deficiency** – deficiency of different minerals lead to different diseases.

Deficiency of	Leads to
Iron	Anaemia
Calcium	Rickets
Sodium	Muscle cramps
Phosphorus	Bad teeth and bones
iodine	Goitre

- **Infectious agents**

- They are the disease-causing microorganisms which belong to different categories such as:
 - **Viruses** - These are tiny organisms that grow, multiply, or reproduce only inside the host cells. Some diseases caused by viruses - Influenza, cold (Rhinovirus), dengue, AIDS, SARS etc.
 - **Bacteria** - These are unicellular prokaryotes which are harmful as well as beneficial for humans. Some diseases caused by bacteria - Whooping cough, typhoid, cholera, anthrax, etc.
 - **Fungi** - These are eukaryotic heterotrophic organisms. Some diseases caused by Fungi - Athlete's foot, candidiasis, ringworms, etc.
 - **Protozoa** - These are simple, primitive unicellular organisms which are often found in water. Some diseases caused by Protozoans - Amoebiasis, kala azar.
 - **Multicellular animals like worms** - These are parasites that infect the intestine of human beings and other animals Some diseases caused by worms- Diarrhoea, liver rot, etc.

- **Communicable diseases**

- An infectious disease is classified as communicable disease as it can be transferred from an infected person to a healthy person

- **Means of disease spread**

- They are the disease-causing microorganisms which belong to different categories such as:
 - **Air-borne diseases** - Transmitted when disease-causing microorganisms are expelled into the air by coughing, sneezing, talking, etc. **E.g.**, common cold, chicken pox, small pox, pneumonia, influenza, tuberculosis, etc.
 - **Water-borne diseases** - Spreads when the excretions (from an infected person) containing causal microorganisms get mixed with drinking water and this contaminated water is consumed. **E.g.**, cholera, typhoid, hepatitis A, etc.
 - **Physical contact** – Includes sexually-transmitted diseases. **E.g.**, syphilis, gonorrhoea, AIDS, etc.
 - **Blood to blood contact** – Such contact is established during blood transfusion or pregnancy (between the mother and her baby). **E.g.**, AIDS can spread through blood contact
 - **Animals** – Animals that transfer disease-causing microorganisms from an infected person to others are called vectors. **E.g.**, female mosquitoes can transfer the malaria-causing Plasmodium

- **Effects of diseases**

- **Local effects** - Includes swelling, pain, joint stiffness, etc., that occur only at the site of infection
- **General effects** - Includes fever, chills, headaches, fatigue, loss of appetite, etc., that occur all over the body
- **Inflammation**- The process by which the body's immune system shows response to protect the body from infection

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Our body gets infected with various diseases when microbes enter our body. However, our body provides resistance to these microbes through various general and specific mechanisms to protect itself.

Specific Defence Mechanism

The functioning of this mechanism involves the following.

- Engulfing of specific pathogens by the white blood cells
- Production of specific antibodies against specific antigens

Components of specific defence mechanism.

- **White blood cells**
- **Monocytes:** become macrophages on maturation. A macrophage engulfs an invading pathogen.
- **Lymphocytes:** These white blood cells generate antibodies against the antigens.
- **Antibodies:** Specific antibodies are generated for specific antigens. The antibodies either prevent the entry of the pathogen into the cell or kill it.

Sometimes ordinary substances such as pollen-dust, vegetables and fruits may also act as antigens. The body produces antibodies in its defence and this causes allergies.

- **Treatment of Diseases-** Two ways to treat the diseases are-
 - Reducing the effect of a disease
 - Killing the cause of a disease
- **Prevention of diseases**
 - There are some general and specific ways to prevent the diseases
- General ways -
 - Stay away from the diseased person.
 - Ensure safe drinking water supply.
 - Provide a clean environment, which helps in preventing vectors like mosquitoes from breeding.
 - Cover your mouth and nose while coughing or sneezing to prevent the spread of the disease.
 - Availability of proper nutrition. If proper and sufficient nutrition is not available, the immune system of the body will not function properly.
- Specific ways-
 - Vaccination- It is protection of the body from communicable diseases by the administration of some agents that mimic the microbe. Vaccines are available against many diseases like tetanus, polio, measles, hepatitis B, whooping cough, yellow fever etc. These vaccines can be prepared from dead germs, or live, weakened germs, or live virulent germs, or toxoids.
 - Immunization- The immune system develops strength in the body to fight off microbes. It is made up of special cells, proteins, and organs which protect the body against micro-organisms.
- Measures for prevention and control of infectious diseases –
 - Personal hygiene: It includes cleanliness of body, drinking of clean water, etc.
 - Public hygiene: It includes cleaning of water reservoirs, proper disposal of sewage, etc.