Why Do We Fall Ill ?

In this Chapter...

- Health
- Personal and Community Health Issues
- Disease
- Infectious Diseases
- Immunisation
- Pulse Polio Programme

Proper functioning of body and mind is essential for our health. Any malfunctioning at the level of cells, organs or organ systems can be caused by various agents/factors. These could be infections by microorganisms, stress or any other agent leading to the state of illness and health failure. This condition is known as **disease**.

Health

It is a state of complete physical, mental and social well-being. It is not merely the absence of disease or infirmity as defined by the WHO (World Health Organisation; 1948). Thus, being healthy means that one should feel good physically, mentally and socially.

Good health has following advantages

- It increases our working efficiency. It helps us to perform various activities at our best.
- It helps us to cope up with the social and mental pressures without much difficulty.
- It makes our life joyful.

Personal and Community Health Issues

- The health of every individual depends on his personal habits, economic status and physical environment.
- Personal health refers to the overall well-being of an individual.
- Human beings live in communities therefore, the health of the community is also an important factor for an individual's health.
- **Community health** refers to the maintenance, protection and improvement (overall well-being) of the whole community in which an individual lives.

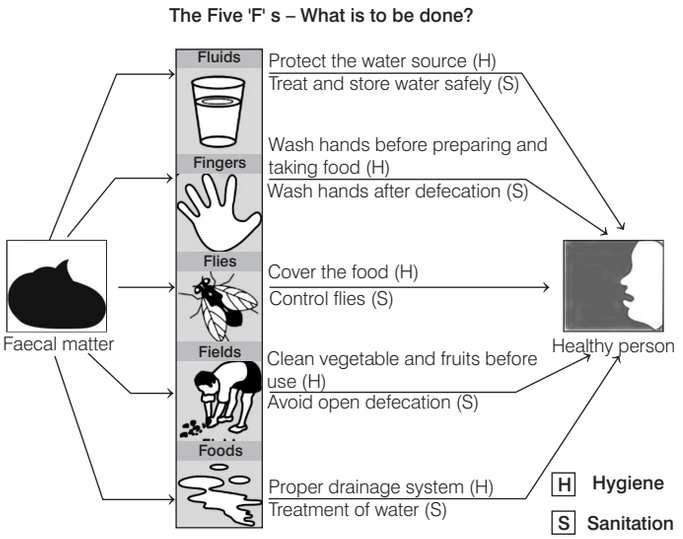
Factors Affecting an Individual's Health

(i) **Social environment** The place where we live (i.e. villages, towns or cities) is an important factor in our individual health.

(ii) **Public cleanliness** Open drain-water lying stagnant around us also causes health issues. Therefore, public cleanliness is important for individual health.

(iii) **Good economic conditions and jobs** Hygienic food can be earned by doing work. For this, work oppurtunities should be available. This ensures good individual health.

(iv) **Social equality and harmony** In order to keep ourselves healthy, we need to be happy. For this, we should maintain good relations with our society. We should not mistreat each other.



Prevention of transmission of diseases by maintaning sanitation and hygiene

Difference between Healthy and Disease-free

Healthy	Disease-free
It is a state of complete physical, mental and social well-being.	It is a state of absence of discomfort or dearrangement of body parts and their functions.
It depends upon the individual as well as on the physical and social environmental factors (societies and communities).	It is related to the individual only.
A healthy person will be disease-free.	A disease-free person can be healthy or unhealthy.
Healthy person is energetic and able to perform as per requirement.	Performance of a disease-free person depends upon environment and personal attitude.

Disease

It refers to any condition that disturbs or modifies the normal functioning of the living organisms. In the presence of a disease, functioning or the appearance of one or more systems of the body may change. These changes give rise to symptoms and signs of disease which are known as **manifestation of disease**.

Manifestation of Disease

Symptoms of diseases are the indications that we feel as being wrong or unusual, such as cold, headache, cough, loose motions, etc. These indicate that there may be a disease but, they do not exactly indicate what the disease.

Signs of a disease give more definite indications of the presence of a particular disease. They help the doctors (physicians) to diagnose the disease.

The manifestation of diseases is different depending upon various factors.

Depending on the duration of infection, diseases may be of following two types

(i) **Acute diseases** are the diseases that last only for very short period of time.
- They do not cause long-term harmful effects on human health.
- In these diseases, patients recover completely after the cure, e.g. common cold, cough, etc.

(ii) **Chronic diseases** are the diseases, which last for a long time, even as much as a lifetime.

They cause drastic long-term effects on human health, e.g. elephantiasis (an infection caused by filarial worm), cancer, tuberculosis (TB), etc.

Causes of Disease

Most of the diseases will have many causes, rather than one single cause.

These causes of diseases are classified into two types

(i) **Immediate causes** These are the real or primary causes, also called **first level of cause**. Various microorganisms like bacteria, virus, fungi, protozoans, etc., that can cause infectious diseases are included in this category.

(ii) **Contributory causes** These are also called **intrinsic** or **internal factors**. They do not lead to a disease themselves.

These can be of following types

- **Poor health due to inadequate diet** It occurs due to deficiency of one or more nutrients, e.g. Kwashiorkor, a nutritional deficiency disease occurring due to low protein diet. So, lack of good nourishment becomes **second level of cause of disease**.
- **Genetic disorders** These are present since birth and pass down from parents to offspring.
- **Lack of public services or poor economic conditions** Poverty also contributes to the cause of disease. These causes become the **third level causes of disease**.

On the basis of cause and communicability, diseases are broadly categorised into two types, infectious and non-infectious diseases.

Infectious and Non-infectious Diseases

Diseases that are caused by infectious agents like microorganisms are known as **infectious disease**. Diseases that are not caused by infectious agents and are restricted only to the persons, who are suffering from them are called non-infectious diesease or non-communicable disease.

Non-infectious diseases do not spread from infected person. These are also known as **non-communicable diseases.** They are generally caused by genetic or environmental factor other than pathogen, such as toxic environmental exposures or unhealthy lifestyle.

e.g. Some cancers are caused by genetic abnormalities or by exposure to certain carcinogenic chemicals and radiations. High blood pressure can be caused by excessive weight and lack of exercise, etc.

Infectious Diseases

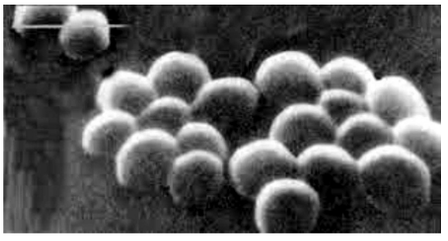
They are caused by some biological agents (pathogens) such as viruses, bacteria, fungi and single- celled animals, i.e. protozoans, etc. These can rapidly spread from one person to another by various means such as water, air, food, insects (vectors) or by physical contact. Hence, are also known as **communicable diseases**.

Infectious Agents

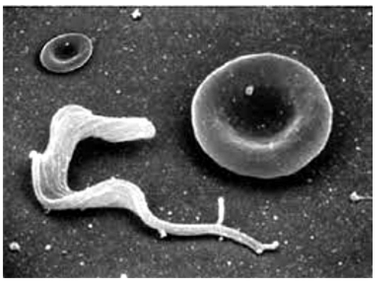
The unicellular or multicellular organisms that cause infection are called infectious agents.

- These diseases causing organisms are also called **pathogens.**
- They are classified into a wide range of categories such as viruses, bacteria, fungi, protozoans, nematodes, etc., to decide the kind of treatment to use because the same drug will not work against a microbe belonging to a different group.

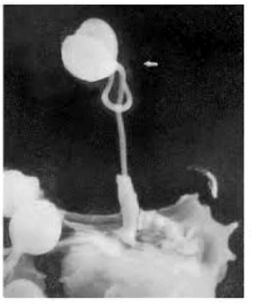
  Some infectious agents of various diseases are shown below



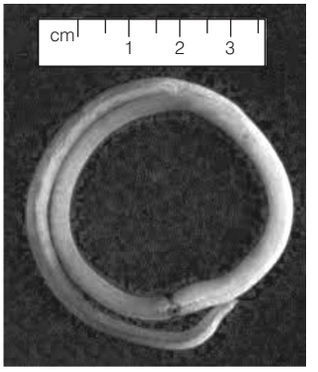
Picture of Staphylococci, the bacteria which can cause acne



Picture of *Trypanosoma*, the protozoan organism responsible for sleeping sickness



Picture of *Leishmania*, the protozoan organism that causes kala-azar



Picture of an adult roundworm (*Ascaris lumbricoides* is the technical name), causes infection of small intestine.

Peptic Ulcers and the Nobel Prize

Two Australians, **Robin Warren** and **Barry Marshall** discovered that a bacterium *Helicobacter pylori* was responsible for peptic ulcers disease. Previously, it was thought that peptic ulcers were caused due to stressful lifestyle.

Due to this discovery, peptic ulcer no longer remained a chronic disease as it can be treated by a short period of treatment with antibiotics. For this discovery, both of them received the Nobel Prize in physiology and medicine in the year 2005.

Summary of Some Infectious Diseases

Diseases Caused by Protozoans

Diseases	Causal organisms	Means of spread	Symptoms	Preventions and controls
Malaria	*Plasmodium*	Female *Anopheles* mosquito	Headache, nausea and muscular pain. High fever with specific pattern of cold, hot and sweating stage.	Use mosquito nets and insect repellents to prevent mosquito bite. Do not allow collection of water anywhere. Sprinkle kerosene oil in open drainage or any place where uncovered water is collected. Wire-gauze should be used on doors and windows. Doses of quinine are prescribed to control malaria.
Sleeping sickness	*Trypanosoma brucei*	Bite of tse-tse fly	Anxiety, fever, headache, itching, insomnia, mood changes, sleep pattern changes, etc.	Using insect repellents, wearing long-sleeved clothing, avoiding tse-tse fly dense areas. Doses of drug Eflornithine.
Kala-azar or **Leishmaniasis**	*Leishmania donovani*	Bite of infected sand flies	Difficulty in breathing. Skin sores, which may become skin ulcers. Ulcers in mouth, tongue, gum, lips and nose. Abdominal discomfort.	Use insect repellent. Stay in well-screened areas. Antibodies containing compound is the main drug for treating this disease.

Diseases Caused by Bacteria

Diseases	Causal organisms	Means of spread	Symptoms	Preventions and controls
Tuberculosis (TB)	*Mycobacterium tuberculosis*	Inhaling infected droplets released by coughing, sneezing or talking to infected person.	Loss of appetite and weight. **Lung TB** It includes continuous fever, persistent cough and blood stained sputum, chest pain, breathlessness. **Lymph gland TB** It includes swelling, secretion through skin. Prolonged low grade fever arises in afternoon.	Avoid overcrowded areas, isolation of patient, covering mouth while coughing, maintain good hygiene and sanitary conditions. Immunisation with BCG for prevention, ATT(Anti-Tubercular Therapy) for control.
Cholera	*Vibrio cholerae*	Flies, contaminated water and food.	Watery diarrhoea, vomiting without nausea and shrunken eyes. Great loss of mineral salts leads to kidney failure.	Boiled water and cooked food should be consumed, maintenance of personal hygiene and good sanitation. Immunisation by cholera vaccine, ORS (Oral Rehydration Solution) controls dehydration, antibiotic tetracycline kills bacteria.
Typhoid	*Salmonella typhi*	By ingestion of water, food contaminated with faecal matter, by houseflies, etc.	Headache, fever that rises in afternoon and keeps increasing for 7-8 days. High fever in second week, gradually decline during 3rd-4th week.	Proper sanitation and disposal of faecal matter. TAB vaccination, typhoral oral vaccine, chloromycetin drug cures typhoid.
Diarrhoea	Mainly bacteria, such as *Escherichia coli*, *Shigella*, *Salmonella*, etc., and some also caused by **viruses** (rotavirus, enterovirus), **protozoans** (*Entamoeba histolytica*) and **nematodes** (*Ascaris*).	Contaminated food , water, hands, clothes, etc.	Frequent loose motions, vomiting, weight loss, abdominal cramps and dehydration.	Proper personal hygiene and sanitary conditions. Stale food should be avoided. Give ORS to control dehydration. ORS can be prepared by adding sugar and small amount of salt in water. Dose of antibiotics and anti-diarrhoeal drug.

Diseases Caused by Virus

Diseases	Causal organisms	Means of spread	Symptoms	Preventions and controls
Influenza	*Myxovirus influenzae*	Through contact and by droplet infection *via* sneezing, coughing or talking to infected person.	Sudden chills, discharge from nose, sneezing, fever, headache, coughing, inflammation of respiratory mucosa and weakness.	Try to keep away from the patient. Anti-viral drugs are taken for cure.
Jaundice or **Hepatitis-A** and **B**	Hepatitis virus or hepatitis-A and B virus	Food and water contaminated with hepatitis virus.	Dark yellow urine and light yellow stool. High fever, nausea, vomiting, headache, loss of appetite and joint pain.	Use chlorinated boiled water. Avoid stale food. Hepatitis-A and B vaccination and interferon injection. Intake of high calorie diet such as juice of sugarcanes, radish with jaggery.
AIDS (Acquired Immuno Deficiency Syndrome)	Retrovirus HIV (Human Immuno-deficiency Virus)	Through blood transfusion, sexual contact, use of contaminated needles from infected person to healthy person, from mother to child through placenta.	Swollen lymph node, regular fever and sweating at night, weight loss, loss of memory and ability to speak and think. Frequent occurrence of viral, bacterial and fungal infection.	Keeping knowledge about AIDS transmission. Avoid sexual contact with unknown person. Avoid use of common needles and razors. No effective treatment is known so far. Some anti-viral drugs are given to the patient to keep HIV infection under control.
Rabies (Hydrophobia)	Rabies virus	By bite of rabid cat, dog and monkey.	Severe headache and high fever. Painful contraction of muscles of throat and chest. Fear of water (hydrophobia) is developed. Excessive salivation, difficulty in taking food and damage of central nervous system. Mental depression for a short period.	Cleaning of wound with medicated soap. Course of anti-rabies vaccine. Compulsory immunisation of stray cats and dogs. No treatment if disease occurs.
Dengue	Dengue virus	*Aedes* mosquito (it lands with the head and tip of abdomen pointing towards the surface)	High fever with headache, nausea, vomiting, weakness and joint pains.	Maintenance of hygienic conditions in community, preventing the mosquito breeding sites and public awareness programmes should be conducted.
Polio or Poliomyelitis	Polio virus	Contaminated food, water and milk.	Sore throat and headache. Fever, vomiting, muscular pain, stiffness in neck and tingling sensation in limbs. Ultimately paralysis of lower body (paraplegia).	Complete rest and physiotherapy (helpful in beginning). Maintenance of hygiene by proper sanitary disposal. OPV (Oral Polio Vaccine) is given orally. Following pulse polio programme controls polio.

Means of Spread of Infectious Disease

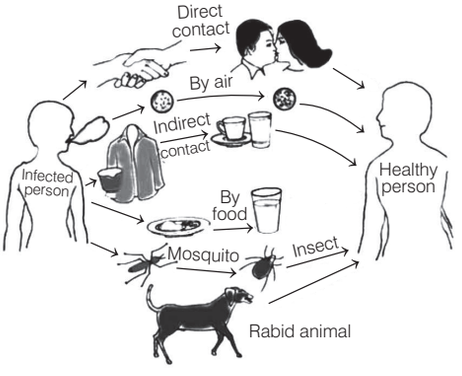
Infectious diseases can spread from an infected person to a healthy person by various ways and therefore, are also called communicable diseases. These diseases spread through various modes like air, water, sexual contact, vectors, etc. These are discussed below.

(i) **Airborne diseases** Causative microbes of such diseases spread through air. Little droplets are thrown out by an infected person on sneezing or coughing. These droplets can be breathed in by someone standing close and the microbes get a chance to start new infection.
For example, common cold, cough, pneumonia and tuberculosis.
Overcrowded and poorly ventilated housing is a major factor in spreading airborne diseases.

(ii) **Waterborne diseases** In such diseases, microbes spread through water. If the excreta from someone suffering from an infectious disease, such as **cholera**, gets mixed with the drinking water used by people living nearby, it results in waterborne disease. Such diseases are much more likely to spread in the absence of safe supply of drinking water.
For example, cholera causing microbes enter new hosts through the water they drink and can cause disease in them.

(iii) **Sexually Transmitted Diseases** (STDs) These are microbial diseases that can be transmitted by sexual contact from one partner to the other.
However, STDs do not spread by casual physical contacts. They include hugs, hand shakes, sports such as wrestling or by any other way in which we touch each other socially.
Syphilis and **AIDS** are the common examples of sexually transmitted diseases. AIDS virus can also spread through blood transfusion, from an infected mother to her baby during pregnancy and through breastfeeding.

(iv) **Spread of diseases through vectors** Many animals which live around us in the environment can transmit diseases (germs) from sick person to a healthy person (another potential host). These animals act as an intermediate and are known as **vectors** (carrier of the disease or infection).
e.g. **Mosquitoes** such as *Anopheles* (female)–malaria, *Culex*–filariasis, *Aedes*–yellow fever, dengue.
Flies such as housefly–typhoid, cholera, etc., tse-tse fly–sleeping sickness, sand fly–kala-azar.



Common methods of transmission of diseases

General Effects of Infectious Diseases

Immune system is the defence system that protects body against various types of microbes.

- It also keeps the body safe by killing infectious microbes.
- When infectious microbes enter the body, the immune system gets activated in response to infection.
- An active immune system recruits many cells to the affected area and kill off the disease causing microbes. This recruitment process is called **inflammation.**
- Due to this process, there may be local effects like swelling, pain and general effects like fever.
- Sometimes, **allergy** may also occur in response to allergens.
- The **severity** of disease manifestations indirectly depends on the number of microbes (pathogens) in the body.
- If the number of microbes is very small, the disease manifestations may be minor or unnoticed.
- If the number of microbes is large, the disease can be severe enough to be life threatening.
- The immune system is a major factor that determines the number of microbes surviving in the body.

Organ-Specific and Tissue- Specific Manifestations

The selection for the site of microbe's home is related to their point of entry, e.g.

- If they enter from the air through nose, they are likely to reach the lungs. This is how tuberculosis causing bacterium enters the body.
- If they enter through mouth, they can stay in the gut lining, e.g. typhoid causing bacteria. They can also go to the liver like jaundice causing virus.
- If they enter through sexual contact, they spread to lymph node all over the body like HIV.
- If they enter through mosquito bites, they may enter the liver and then to Red Blood Cells (RBCs) like malaria causing microbes. They may reach to brain like Japanese encephalitis virus that causes brain fever.

Thus, the signs and symptoms of a disease will depend upon the tissue or organ targeted by microbes, e.g.

- If the target is the lungs, the symptoms will be cough and breathlessness.
- If the target is liver, then jaundice may occur.
- If the target is brain, then headache, vomiting, fits or unconsciousness may occur. So, it is important to reduce the symptoms and effect of disease by getting a proper treatment of disease by a doctor.

Principles of Treatment

Treatment is the attempted cure of a health problem following a diagnosis. It can involve reducing the effects of disease and / or eliminating the cause of the disease.

Following are the two ways to treat infectious diseases

(i) **Symptom-directed treatment** By providing a particular treatment, so that symptoms can be reduced. The symptoms are usually because of inflammation. This kind of treatment will not kill the disease causing microorganisms.

(ii) **Microbe-specific treatment** It is essential that medicine specific to disease causing microbe is taken. For example, For the treatment of bacterial disease, antibiotics can be taken by the patient that block essential biochemical pathways of bacteria without affecting our own.

Similarly, there are drugs that can kill protozoans, such as malarial parasite.It is harder to make anti-viral medicines because viruses have very few biochemical mechanisms of their own.

They enter our cells and use our machinery for completing their life processes. This means that there are relatively few virus-specific targets to aim at. However, effective anti-viral drugs like the drug that keeps HIV infection under control are now available.

Antibiotics

These are the chemical substances produced mainly by microorganisms (bacteria and fungi). At low concentration, they have the ability to inhibit the growth of other microorganisms. They commonly block the **biochemical pathways** important for bacteria, e.g. penicillin.

The antibiotic **penicillin** blocks the formation of cell wall in bacteria. This cell wall helps in the protection of bacteria. Due to penicillin, bacteria become unable to make the cell wall and die easily. Many antibiotics can work against many species of bacteria rather than simply working against one.

Antibiotics do not work against viral infections because viruses do not use the same pathway as that of bacteria. Therefore, prevention of diseases is also important.

Principles of Prevention

There are two general ways to prevent diseases. These are described below

(i) **General ways of preventing infectious diseases** These ways are mostly related to prevent exposure to infectious microbes. Public hygiene is also necessary for the prevention of infectious diseases.

Some other general principles for prevention are:

(a) **Strong immune system** The immune system of our body fights against the microbes that enter into our body and kills them. The cells of the immune system kill off the microbes before it can take on major proportions.

(b) **Balanced diet** Immune system will not function properly if sufficient amount of food and nourishment is not available. Therefore, availability of proper and sufficient food for everyone is the second basic principle of prevention.

(ii) **Specific ways of preventing infectious diseases** They include adopting the practice of immunisation.

Immunisation

The process of development of immunity in our body to fight against diseases by introducing dead and weakened antigens is called immunisation. When the immune system first sees an infectious microbe, it responds against it and then remembers it specifically.

So, the next time when that particular microbe or its close relatives enter the body, the immune system responds with greater vigour. It eliminates the infection more quickly than the first time around. This is the basic principle of immunisation.

Vaccine is a preparation of weakened or killed infectious agents or their products. It stimulates the immune system to produce antibodies against particular disease. The first vaccine was discovered by **Edward Jenner** against **smallpox disease**.

Many vaccines are available for preventing infectious diseases and provide disease-specific means of prevention.

The diseases against which vaccines are available, are given below:

- Diphtheria, Pertussis, Tetanus — DPT (Hib vaccine)
- Poliomyelitis — OPV (Oral Polio Vaccine)
- Hepatitis-B — Hepatitis vaccine
- Tuberculosis — BCG (Bacillus Calmette Guerin)

These vaccines are available under child immunisation programme for preventing infectious diseases.

Pulse Polio Programme

- India launched the Pulse Polio Immunisation (PPI) programme in 1995 as a result of World Health Organisation (WHO) Global Polio Eradication Initiative.
- Under this programme, all children under 5 years are given 2 drops of Oral Polio Vaccine (OPV) in December and January every year until polio is eradicated.
- PPI was initiated with the objective of achieving hundred per cent coverage.
- India has been declared polio-free by WHO.
- Pulse polio programme is continuing to eliminate any chance of its comeback.

Chapter Practice

PART 1
Objective Questions

1. Which of the following is dangerous for individual health?
(a) Open drainage
(b) Garbage throw in streets
(c) Stagnant water in our surroundings
(d) All of the above

2. Which of the following would lead to malnutrition?
I. Overnutrition
II. Undernutrition
III. Imbalanced nutrition
Codes
(a) Only II (b) II and III
(c) I and III (d) I, II and III

3. Identify the incorrect match.
(a) Acute disease — Cold and cough
(b) Infectious disease — Goitre
(c) Non-infectious disease — Diabetes
(d) Chronic disease — Tuberculosis

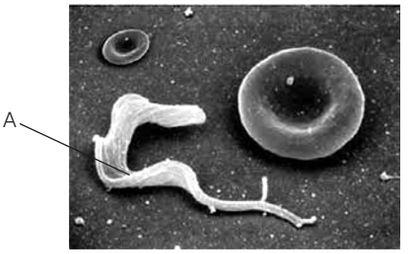
4. Complete the analogy given below and choose the correct option.
Typhoid: Bacterial disease:: Polio: .....
(a) Protozoan (b) Bacterial disease
(c) Viral disease (d) Worm disease

5. Making anti-viral drug is more difficult than making anti-bacterial medicine because **(NCERT Exemplar)**
(a) viruses do not use same pathway as that of bacteria
(b) viruses are on the border line of living and non-living
(c) viruses have very few biochemical mechanisms of their own
(d) viruses have a protein coat

6. Select the contagious, viral disease from the following.
I. Dengue II. Leprosy
III. Common cold IV. Chickenpox
Codes
(a) I and III
(b) II and IV
(c) III and IV
(d) II and III

7. What is common between diarrhoea, cholera and typhoid diseases?
(a) All of them are caused by bacteria
(b) All of them is transmitted by contaminated food and water
(c) All of them are cured by antibiotics
(d) All of the above

8. The figure given below shows a diseases-causing microbe. Choose the correct option for microbe **A**.



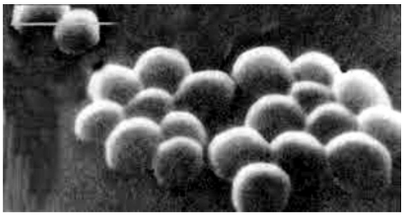
(a) Staphylococci : Bacteria which can cause acne
(b) *Leishmania* : Protozoan that causes kala-azar
(c) *Ascaris lumbricoides* : Also known as round worm
(d) *Trypanosoma* : protozoan responsible for sleeping sickness

9. Refer to the given flowchart.

Choose the correct option for *P*, *Q*, *R*, *S* and *T*.

	P	*Q*	*R*	*S*	*T*
(a)	Tuberculosis	Cancer	Chickenpox	Influenza	Diabetes
(b)	Chickenpox	Influenza	Tuberculosis	Cancer	Diabetes
(c)	Diabetes	Influenza	Cancer	Chickenpox	Tuberculosis
(d)	Chickenpox	Cancer	Diabetes	Tuberculosis	Influenza

10. Identify the microorganisms shown in the picture below. Select the option which gives correct identification of the type of microbe and disease caused by it.

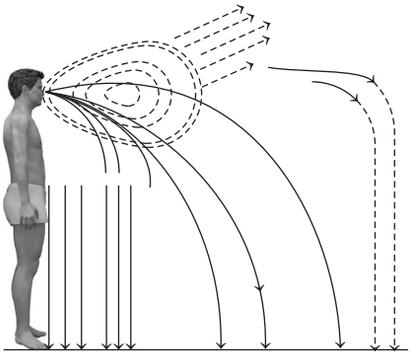


(a) *Leishmania*; Protozoan—Kala-azar
(b) Round worm; Worms—Intestinal infection
(c) *Trypanosoma*; Protozoan—Sleeping sickness
(d) Staphylococci; Bacteria—Acne

11. If you live in an overcrowded and poorly ventilated house, it is possible that you may suffer from which of the following diseases? **(NCERT Exemplar)**

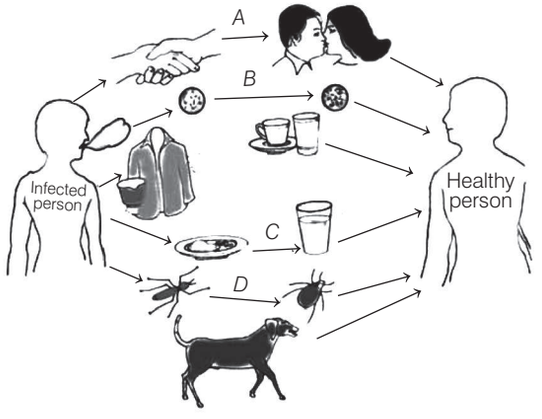
(a) Cancer (b) AIDS
(c) Airborne diseases (d) Cholera

12. Identify the disease and its causative agent which spread through the given mode of transmission.



(a) Tuberculosis—*Mycobacterium*
(b) Cholera—*Vibro cholerae*
(c) Influenza—*Trypanosoma*
(d) Peptic ulcer—*Helicobacter pylori*

13. The diagram given shows some common methods of transmission of diseases as *A* to *D*.



Match the labelling referred in Column I and correlate with the diseases given in Column II.

Column I		Column II
A	1.	Tuberculosis
B	2.	Syphilis
C	3.	Filariasis
D	4.	Diarrhoea

Codes

	A	B	C	D		A	B	C	D
(a)	2	1	4	3	(b)	3	4	1	2
(c)	1	3	4	2	(d)	4	2	1	3

14. Consider the following statements and select the incorrect one regarding penicillin.

I. Penicillin works against viruses.
II. Penicillin blocks the processes that build the cell wall.
III. Penicillin is an antibiotic.

Codes

(a) I and II (b) II and III (c) Only II (d) Only I

15. Match the following columns.

	Diseases		Target Organs
A.	Hepatitis	1.	Brain
B.	Fits	2.	Lungs
C.	Pneumonia	3.	Skin
D.	Fungal disease	4.	Liver

Codes

	A	B	C	D		A	B	C	D
(a)	4	1	2	3	(b)	2	1	4	3
(c)	1	4	2	3	(d)	3	2	1	4

16. A person is suffering from **X** disease. He wants to get vaccine against that disease, but he has not found any vaccine against the **X** disease. Choose the appropriate option for disease **X**.

(a) Tetanus (b) Whooping cough
(c) Measles (d) Common cold

17. Refer to the given picture and choose the correct statement regarding it.

(a) Edward Jenner is known as Father of Vaccination
(b) Cowpox is a very dangerous disease
(c) Smallpox virus is not related to the cowpox virus
(d) There are vaccines for all infectious diseases

18. Choose the correct statement from the following.

I. There are anti-rabies vaccines for both humans and animals.

II. Some hepatitis viruses, which cause jaundice are transmitted through air.

III. Swelling, pain are local effects of inflammation.

IV. Under Pulse Polio Programme, 2 drops of OPV are given to all children under 5 years of age.

Codes

(a) I and III (b) I, II and IV

(c) I, II and III (d) I, III and IV

• Assertion-Reasoning MCQs

Direction (Q. Nos. 19-26) In each of the following questions, a statement of Assertion is given by the corresponding statement of Reason. Of the statements, mark the correct answer as

(a) Both Assertion and Reason are true and Reason is the correct explanation of Assertion

(b) Both Assertion and Reason are true, but Reason is not the correct explanation of Assertion

(c) Assertion is true, but Reason is false

(d) Assertion is false, but Reason is true

19. **Assertion** Some children fall ill more frequently than others.

Reason Weak immune system makes children more susceptible to diseases.

20. **Assertion** Arthritis is a chronic disease.

Reason It lasts for longer time.

21. **Assertion** Swelling, pain and fever are symptoms of inflammation.

Reason Inflammation is the result of an active immune system to a viral pathogen only.

22. **Assertion** Antibiotics are biochemical compounds which kill or block growth of other microbes.

Reason They are effective against bacterial pathogens.

23. **Assertion** DPT is called a triple antigen.

Reason It works against three specific diseases causing microbes.

24. **Assertion** Fever is a symptom for an infection.

Reason Pathogen cannot tolerate high temperature.

25. **Assertion** Congential diseases are not communicable.

Reason These are caused by microbes.

26. **Assertion** Artificial chemicals are injected through vaccination.

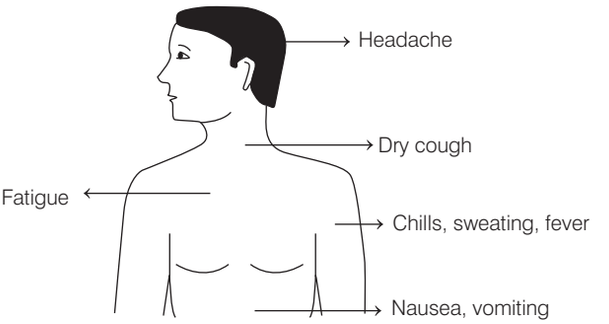
Reason Vaccination is a process of immunisation.

• Case Based MCQs

27. Read the following and answer the questions from (i) to (v) given below

Disease refers to any condition that disturbs or modifies the normal functioning of the living organisms. In the presence of disease, functioning or the appearance of body may change. These changes given rise to symptoms and sign of disease.

A person is suffering from the given symptoms.



(i) The person is suffering from which of the following disease?

(a) AIDS (b) Common cold

(c) TB (d) Malaria

(ii) Choose the correct option for the causal organism of the disease, the person is suffering from?

(a) Myxovirus (b) AIDS

(c) *Vibrio cholerae* (d) *Plasmodium*

(iii) Choose the correct statement from the following.

I. Signs of a disease give definite indications of the presence of a particular disease.

II. Headache and vomiting are examples of symptoms.

III. Being disease-free means being healthy.

IV. Antibiotics do not work against viral infections.

Codes

(a) I, III and IV

(b) I, II and IV

(c) II and III

(d) III and IV

(iv) Which part of the body does malaria target?

(a) Lungs (b) Liver

(c) Brain (d) Kidneys

(v) What is the vector of the disease?

(a) *Aedes*

(b) *Culex*

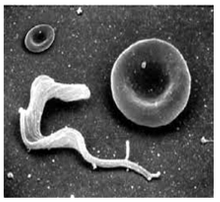
(c) Female *Anopheles*

(d) tse-tse fly

28. Read the following and answer the questions from (i) to (v) given below

A teacher asked students to observe three slides of different disease, causing microbes under the microscope. She marked the slides as I, II and III.

I


II


III

(i) Identify the correct pathogens of their respective slides.
(a) I—*Trypanosoma* (b) II—Staphylococci
(c) III—*Leishmania* (d) II—SARS

(ii) Anti-viral drugs can prevent the disease caused by which of the following microbe?
(a) I and II (b) II and III
(c) Only I (d) Only III

(iii) Which of the following is the target organ of microbe II?
(a) Liver (b) Small intestine
(c) Brain (d) Kidneys

(iv) Which of the following is an infectious disease?
(a) Sleeping sickness (b) Kala-azar
(c) SARS (d) All of these

(v) Which of the following groups of microorganisms can be used to extract antibiotics?
(i) Virus (ii) Bacteria
(iii) Protozoa (iv) Fungi
Codes
(a) (i) and (ii) (b) (ii) and (iii)
(c) (ii) and (iv) (d) (iii) and (iv)

29. Read the following and answer the questions from (i) to (v) given below

Infectious diseases can spread from an infected person to a healthy person by various ways. These diseases spread through various modes like air, water, sexual contact, vectors, etc.

The practices adopted for prevention of diseases that are related to environment are given in table below

Microbes	**Practices**
Airborne microbes	By providing living conditions that are not overcrowded.
Waterborne microbes	By providing safe drinking water. This is done by treating the water to kill any microbial contamination.
Vector-borne microbes	By providing clean environment which would prevent breeding of mosquitoes, etc.

(i) Which of the following is an airborne disease?
(a) Pneumonia (b) Cholera
(c) Malaria (d) Jaundice

(ii) Identify the vector from the following.
(a) Virus (b) Protozoan
(c) Bacteria (d) Flies

(iii) Which of the following statement is incorrect?
I. Diseases that can spread from sick person to healthy person is called as communicable diseases.
II. Malaria is both airborne and waterborne diseases.
III. Tuberculosis is a waterborne disease.
IV. Peptic ulcers are caused due to stressful lifestyle.
Codes
(a) I and II (b) II, III and IV
(c) I, III and IV (d) II and III

(iv) ORS is commonly given in case of
(a) airborne disease
(b) waterborne disease
(c) vector-borne disease
(d) sexually transmitted disease

(v) Which of the following disease can spread through breastfeeding?
(a) TB (b) Kala-azar
(c) Sleeping sickness (d) AIDS

PART 2
Subjective Questions

• Short Answer Type Questions

1. State any two conditions essential for good health.

2. Write Five 'F's of prevention of transmission of diseases by maintaining sanitation and hygiene.

3. Public cleanliness is considered more important for individual's health. Do you agree? Give reason.

4. How is personal health and community health connected?

5. Are the conditions essential for maintaining good health and being free of diseases same or different? Why?

6. Why are we normally advised to take bland and nourishing food when we are sick?

7. Give two examples for each of the following:
(i) acute diseases (ii) chronic diseases
(iii) infectious diseases (iv) non-infectious diseases
(NCERT Exemplar)

8. List three disadavantages of infectious diseases.

9. It was diagnosed that a patient has lost the power of fighting against any infection.
(i) Name the disease from which the patient is suffering from.
(ii) Name the pathogen responsible for the disease.

10. Name two non-infectious diseases and their cause.

11. Name and give an example of each
(i) The disease causing factors within the body.
(ii) The non-cellular disease causing microorganism.
(iii) The substance introduced in body to confer immunity against subsequent infection.

12. What do you mean by disease symptoms? Explain by giving two examples. **(NCERT Exemplar)**

13. A baby is not able to tell her/his caretakers that he/she is sick. What would help us to find out
(i) that the baby is sick?
(ii) the sickness from which bahy is suffering ?

14. Name
(i) A worm which is found in our small intestine.
(ii) Bacteria responsible for causing cholera.

15. A baby from a poor family is suffering from loose motions. Predict the first, second and third level cause of the disease in the given case.

16. Name two diseases caused by contaminated food and water.

17. A patient has been recommended to take Oral Rehydration Solution (ORS) multiple times a day. Which disease is he likely to be suffering from.

18. Mr. Sharma becomes exposed to a disease causing microbe but does not develop any noticeable diseases. Explain.

19. Under which of the following conditions is a person most likely to fall sick?
(i) When she is recovering from malaria.
(ii) When she has recovered from malaria and is taking care of someone suffering from chickenpox.
(iii) When she is on a four-day fast after recovering from malaria and is taking care of someone suffering from chickenpox.
Why?

20. A person is suffering from chest pain, breathlessness, loss of body weight, persistent cough and produces blood stained sputum.
(i) Name the disease and its causative agent.
(ii) Mention any mean of its transmission.
(iii) Name the vaccine used to prevent this disease.

21. A person is suffering from loss of appetite with feeling of nausea and is passing dark yellow urine. Identify the disease and suggest any two methods of preventing it and two methods of controlling it.

22. Under which of the following conditions are you most likely to fall sick?
(i) When you are taking examinations?
(ii) When you have travelled by bus and train for two days?
(iii) When your friend is suffering from measles.
Why?

23. Give one local and one general effect of inflammation process.

24. Name the viral disease which is about to be completely eradicated from the world. What is its preventive measure?

25. Write two ways other than sexual contact by which AIDS can spread.

26. A person suffering from HIV-AIDS cannot fight even minor infections. Why?

27. Why is AIDS considered to be a 'syndrome' and not a disease? **(NCERT Exemplar)**

28. A mother who had suffered from chickenpox in her childhood, is now taking care of her child, who is suffering from the same disease. What are the chances of the mother having chickenpox? Explain.

29. Give cause and remedy of
(i) Hepatitis (ii) AIDS (iii) Malaria

30. List any three ways of preventing the spread of airborne diseases.

31. A person was bitten by a stray dog. After some days his nature gets irritated, he started fearing from water.
(i) Name the disease.
(ii) Is there any vaccine available?
(iii) Is there any plan of your local authority for the control of this disease?

32. Explain, how body reacts after the entry of microbes in the body.

33. Name any two groups of microorganisms from which antibiotics could be extracted? **(NCERT Exemplar)**

34. (i) If penicillin is given to a patient suffering from jaundice, it does not have any effect on the infection. Why?
(ii) Name a disease which has been eradicated from the world.
(iii) State the principle behind its eradication.

35. What are the two barriers, which prevent the entry of microbes in the body?

36. Which female mosquito feed on blood of warm-blooded animals like human beings?

37. Who discovered 'vaccine' for the first time? Name the two diseases which can be prevented by using vaccines. **(NCERT Exemplar)**

38. Why is immune system essential for our health? **(NCERT Exemplar)**

• Long Answer Type Questions

39. Explain by giving reasons. **(NCERT Exemplar)**

(i) Balanced diet is necessary for maintaining healthy body.

(ii) Health of an organism depends upon the surrounding environmental conditions.

(iii) Our surroundings should be free from stagnant water.

(iv) Social harmony and good economic conditions are necessary for good health.

40. What are the different means by which infectious diseases spread? **(NCERT)**

41. Construct a table showing category of agents which cause infection and one disease/ infection caused by each.

(i) Virus (ii) Fungus

(iii) Bacteria (iv) Protozoan

(v) Worm

State the importance of categorisation of infection causing agents.

42. What are the causes and symptoms of malaria? How can it be prevented and controlled?

43. (i) Name two airborne diseases. How does the disease causing microbes spread through air?

(ii) How does HIV virus spread from a patient to a healthy person?

(iii) How does the immune system of our body function?

44. Explain the statement by giving two examples: 'It is not necessary that the pathogen may affect an organ or tissue depending upon the point of entry.'

45. What precautions will you take to justify 'prevention is better than cure'? **NCERT Exemplar**

Or How can you justify the statement prevention of diseases is better than cure?

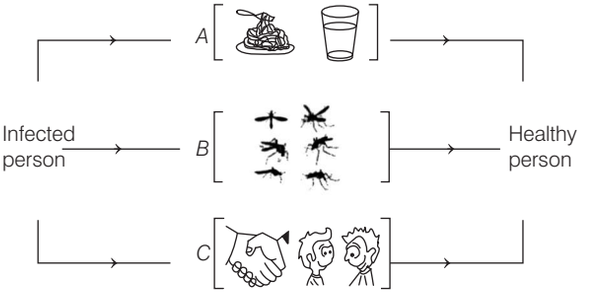
46. 'Educating parents would help a lot in reducing the incidences of diseases in children'. Justify the statement with five reasons.

• Case Based Questions

47. Read the following and answer the questions from (i) to (v) given below

Many animals who live around us in the environment can transmit diseases from sick person to a healthy person.

The diagrammatic representation of common methods of transmission of diseases as *A*, *B* and *C* is shown as follows:



(i) What are vectors?

(ii) Name two diseases that spread through pathway *A*.

(iii) Name any two diseases that are transmitted through mosquitoes vector.

(iv) Write two preventive measures to prevent diseases to spread through pathway *B*.

(v) What is the common symptoms of the diseases that spread through pathway *A*?

48. Read the following and answer the questions from (i) to (v) given below

The principles of prevention consist of general ways that deal with practices to be followed to avoid diseases and specific ways that include immunisation.

The table given shows some important vaccines for infants and children. Study the table carefully and answer the following questions.

Important Vaccines for Infants and Children

Vaccines	Diseases	Age groups	Safety land
Hepatitis-B	Hepatitis	All infant, children, even adult	Not yet confirmed
Polio	Poliomyelitis	All infants up to 5 years of age, minimum of three doses per child at one month interval	Nearly 100%
BCG	Tuberculosis	All children between 10 to 14 years of age	Nearly 70%

(i) How vaccination works?

(ii) Who was the first ever person to produced a vaccine? Name the disease it was developed against.

(iii) What does BCG vaccine stands for?

(iv) What is/are the measure of spread of hepatitis-B?

(v) On the basis of which symptoms a medical practitioner will diagnose a condition as tuberculosis?

49. Read the following and answer the questions from (i) to (v) given below

Simran is a 6 month baby. She lives in a village that lacks basic public services such as clean drinking water, sewage and waste disposal system.

She was suffering from high fever from last few days. Her mother took her to a doctor.

The doctor recorded the following things in his prescription.

Patient's Name Simran Date **:** 20th, Oct, 2021

Age : 6 months

Sex : Female

Prescription

1. CROCIN ORAL SUSP 120 mg/5 mL
   4mL, once every 6 hours for 3 days after food

Lab Test

1. Dengue Profile
2. CBC ESR

General Advice

1. Report to hospital in case of worsening of symptoms
2. Follow the prescription
3. Plenty of oral fluids

Doctor's Notes/Diagnosis

1. Viral fever
2. Unspecified vector-borne viral fever

(i) How can we detect the occurrence of disease ?

(ii) How can we prevent a disease ?

(iii) How can we diagnose a disease ?

(iv) What is a source of infection ?

(v) Why newborn babies are more vulnerable to diseases as compare to adults ?

EXPLANATIONS

Objective Questions

1. (*d*) Proper hygiene and cleanliness is very important for individual health. Open drain's garbage and stagnant water provide breeding places to various disease causing microbes. Hence, they are dangerous for individual as well as community health. Thus, option (d) is correct.

2. (*d*) Malnutrition means bad nutrition. It can be applied to both undernutrition and overnutrition and also for imbalanced nutrition. Some of the diseases caused due to malnutrition are obesity, Kwashiorkor, marasmus, etc.

Thus, option (d) is correct.

3. (*b*) Option (b) is incorrect match and can be corrected as Infectious diseases are caused by pathogens like bacteria, virus, etc., and can pass from one person to another, e.g. chickenpox. Goitre is a non-infectious disease. It is a deficiency disease caused by lack of iodine in diet.

4. (*c*) Typhoid is a bacterial disease, whereas polio is a viral disease.

5. (*c*) Making anti-viral drug is more difficult than making anti-bacterial medicines because viruses have very few biochemical mechanisms of their own. They use host body to reproduce. Therefore, it is difficult to target virus cell or its functioning.

6. (*c*) Chickenpox and common cold, both are caused by viruses and are contagious in the mode of their transmission, i.e. droplets.

7. (*d*) Diarrhoea, cholera and typhoid are bacterial diseases. Hence, can be cured by antibiotics. These diseases are transmitted by contaminated food and water.
Thus, option (d) is correct.

8. (*d*) Option (d) is correct for microbe *A*.

The figure given is of *Trypanosoma*, the protozoan organism responsible for causing sleeping sickness.

9. (*b*) *P, Q* and *R* are represented as chickenpox, influenza and tuberculosis, respectively whereas *S* and *T* represent cancer and diabetes, respectively. Chickenpox and influenza are caused by viruses, while tuberculosis is a bacterial disease, therefore comes under infectious disease, whereas cancer, diabetes are non-infectious disease.

10. (*d*) The microorganism given in the picture is bacteria, Staphylococci. It is responsible for causing acne.

11. (*c*) In closed areas, the droplets nuclei recirculate and pose a risk to everybody. Thus, overcrowded and poorly-ventilated house is a major factor in spread of airborne diseases.

12. (*a*) Tuberculosis (TB) is caused by a bacterium called *Mycobacterium tuberculosis*. It is an airborne disease which can spread through coughing, sneezing and sharing clothing. The bacteria usually attack the lungs, but TB bacteria can attack any part of the body such as the kidney, spine and brain.

13. (*a*) Diseases that are spread through common methods of transmission are

A. Syphilis is sexually transmitted disease which can spread through direct contact of infected person, i.e. sexual intercourse or exchange of blood fluids.

B. Tuberculosis is an airborne disease.

C. Diarrhoea is usually caused by a virus that transmits through contaminated food.

D. Filariasis is a vector-borne disease. It is transmitted through *Culex* mosquito.

14. (*d*) Statement I is incorrect and can be corrected as Penicillin is an antibiotic that works against bacterial cells that cause disease like pneumonia. It blocks the processes that build the bacterium cell wall.

15. (*a*) Target organs for the given diseases are as follows

Hepatitis targets liver, fits or unconsciousness targets brain, Pneumonia targets lungs and fungal disease targets skin.

Thus, option (a) is correct.

16. (*d*) There are vaccines against tetanus, diphtheria, whooping cough, measles, polio, etc., but there is no vaccine for common cold due to involvement of many viruses.

17. (*a*) The picture given shows the vaccination process in which Edward Jenner tried deliberately giving cowpox virus to people so as to provide resistant to smallpox disease.

Option (a) is correct as
Edward Jenner is known as Father of Immunology or Vaccination. The other options are incorrect and can be corrected as

- Cowpox is a mild disease.
- The smallpox virus is closely related to the cowpox virus.
- There are vaccines available for a whole range of infectious diseases, but not for all diseases.

18. (*d*) Statements I, III and IV are correct. Statement II is incorrect and can be corrected as

Some hepatitis viruses, which cause jaundice are transmitted through water.

19. (*b*) Both A and R are true, but R is not the correct explanation of A.

Children fall ill more frequently due to (i) poor personal hygiene; (ii) poor domestic hygiene; (iii) unclean food; (iv) lack of proper nutrition and balanced diet.
All these factors result in the weakening of the immune system. It makes the children more susceptible to disease.

20. (*b*) Both A and R are true, but R is not the correct explanation of A.

Chronic diseases are more harmful because they last for longer time and cause drastic long term effects on patient's health, e.g. arthritis, diabetes, etc.

21. (*b*) Both A and R are true, but R is not the correct explanation of A.

An active immune system recruits many cells to the affected tissue to kill off disease causing microbes, i.e. fungi, bacteria, virus, protozoans, etc. This recruitment process is called inflammation. Due to this process, there may be local effects like swelling, pain and fever.

22. (*b*) Both A and R are true, but R is not the correct explanation of A.
Antibiotics are compounds produced mainly by bacteria or fungi. These are very effective against bacterial diseases because they block essential biochemical pathways of bacterial metabolism, in turn killing them.

23. (*a*) Both A and R are true and R is the correct explanation of A.
DPT is known as triple antigen because it is a vaccine that works against the occurrence of three specific diseases.
(i) Diphtheria (ii) Pertussis
(iii) Tetanus.

24. (*b*) Both A and R are true, but R is not the correct explanation of A.
Fever is a symptom of inflammation or infection. Inflammation is the result of an active immune system to a pathogen which leads to increase in temperature of the body and providing unfavourable condition to pathogen.

25. (*c*) A is true, but R is false because
Congential diseases are not communicable, since these diseases are inherited at the time of birth due to genetic/ chromosomal disorder. These diseases are not caused by microbes.

26. (*d*) A is false, but R is true because
Dead or weak disease causing organisms are injected through vaccination and thus, the antibodies are developed in our body in order to fight against disease. Hence, vaccination is a process of immunisation.

27. (i) (*d*) The symptoms shown by the person is of malaria disease.
(ii) (*d*) Malaria is caused by a protozoan parasite *Plasmodium.*
(iii) (*b*) Statements I, II and IV are correct. Statement III is incorrect and can be corrected as
Being disease-free does not necessarily mean being healthy. Health is a state of complete physical, mental and social well-being, whereas disease-free is a state of absence of discomfort of body and its functioning.
(iv) (*b*) The malarial parasites enter the person's bloodstream and travel to the liver. When the parasites mature, they leave the liver and infect red blood cells.
(v) (*c*) Malaria is transmitted from sick person to a healthy person through female *Anopheles* mosquitoes.

28. (i) (*c*) Microbes show in slide I is SARS virus. Round worm and *Leishmania* are shown in slide II and III, respectively. Hence, option (c) is correct.
(ii) (*c*) Anti-viral drugs are effective in prevention of viral diseases. Microbes shown in slide I is SARS virus that is responsible for causing viral disease which can be prevented by using anti-viral drugs.
(iii) (*b*) In slide II, round worm is shown. It is also known as *Ascaris lumbricoides* which is responsible for causing infection in small intestine.
(iv) (*d*) Infectious diseases are those diseases that are caused by pathogens like bacteria, virus, protozoan, fungi, worms, etc. Sleeping sickness is caused by protozoan *Trypanosoma,* kala-azar is caused by protozoan *Leishmania* and SARS is viral disease. Hence, option (d) is the correct.
(v) (*c*) Antibiotics can be extracted from microorganisms like bacteria and fungi.
Thus, option (c) is correct.

29. (i) (*a*) Causative microbe of pneumonia spreads through air so it is an airborne disease. Whereas cholera and jaundice are waterborne diseases and malaria is transmitted through female *Anopheles* mosquitoes.
(ii) (*d*) Vectors are carrier of the disease or infection, e.g. female *Anopheles* mosquitoes transmit malaria, flies such as housefly transmit cholera and typhoid. Virus, bacteria and protozoan are pathogens or disease-causing microbes.
(iii) (*b*) Statements II, III and IV are incorrect and can be corrected as
- Malaria is a vector-borne disease spread by female *Anopheles* mosquitoes.
- TB is an airborne disease.
- Peptic ulcers are caused by bacterium, *Helicobacter pylori*.

(iv) (*b*) ORS stands for Oral Rehydration Solution. It is used to treat dehydration caused by diarrhoea and vomiting. It is most commonly used in case of waterborne diseases which lead to diarrhoea or dehydration.
(v) (*d*) AIDS virus can spread through blood transfusion from an infected mother to her baby during pregnancy and through breastfeeding.

Subjective Questions

1. Two conditions essential for good health are
(i) availability of sufficient and nutritious food.
(ii) better sanitation or clean surroundings.

2. The five 'F's of prevention of transmission of diseases are fluids, fingers, flies, fields and floods.

3. Yes, public cleanliness is more important for individual's health because open drainage, garbage thrown on street, stagnant water, etc., are the places where disease causing microbes multiply and mosquitoes and flies breed. In this way, diseases may spread in community and hence, affect the individual's health.

4. Personal health refers to the overall well-being of an individual, whereas community health is the maintenance, protection and improvement of the whole community in which an individual lives. Human beings live in communities, interacting and affecting other individuals. Therefore, the health of the community becomes an important factor for maintaining individual's health.

5. Essential conditions for maintaining good health and being free of diseases are different, but interconnected. If the conditions that are essential for good health are maintained, then the chances of getting a disease will be minimised automatically. But, being disease-free does not mean being healthy. The former means not suffering from any disease, while the latter means complete physical, mental and social well-being.

6. In case of illness, the normal functions of the body get disturbed and immune system is weakened. So, a nourishing

food is required, which is easily digestable and contains all the nutrients. Therefore, bland and nourishing food is advised to be taken during sickness.

7. (i) Acute diseases last for short period of time and do not cause long term effects, e.g. cold and cough.

(ii) Chronic diseases last for long period of time even for whole life and also cause long term effects on health, e.g. tuberculosis and arthritis.

(iii) Infectious diseases are caused by the attack of pathogens and can pass from one person to another, e.g. malaria and chickenpox.

(iv) Non-infectious diseases are caused by the factors other than living pathogens and are not transmitted from one person to other, e.g. cancer and goitre.

8. These limitations or disadvantages of infectious diseases are as follows

- Once someone has disease, his body functions are damaged and may never recover completely.
- The treatment will take time. It means that someone suffering from a disease is likely to be bedridden for sometime even if proper treatment is given.
- The person suffering from an infectious disease can serve as the source for further spread of infection to other people.

9. (i) AIDS (ii) HIV virus

10. Diseases that are not caused by infectious agents are called non-infectious diseases. For example, cancers are caused by genetic abnormalities and high blood pressure can be caused by excessive weight and lack of exercise.

11. (i) The disease causing factors within the body is known as intrinsic factors, e.g. excessive weight, hormonal imbalance.

(ii) Virus are non-cellular pathogen, AIDS and influenza are viral diseases.

(iii) Weakened or killed antigens introduced through vaccination confer immunity against specific infections, e.g. polio vaccine.

12. Symptoms are the evidences or physical indications that point the presence of a disease. They are visible in the form of either structural or functional changes in our body or any of its parts.

On the basis of these symptoms, doctors search for definite clues or signs of a particular disease.

For example, symptoms for malaria and typhoid are same like fever, weakness, headache, etc. But, signs for the disease are different as malaria fever manifests through chills and typhoid fever shows rashes, stomach pain, etc.

13. (i) Symptoms which help in finding that the baby is sick are.

- Continuous crying
- Drooping of eyes
- Redness of eyes
- High temperature of body

(ii) Signs which help to indicate the sickness in baby are:

- Loose motions and stomach pain indicate diarrhoea.
- High fever, headache, muscular pain, shivering and feeling very cold indicate malaria.
- Redness and persistent rubbing of eyes indicate eye flu.
- Pale skin, yellow urine and yellowing of eyes indicate jaundice.
- Doctors suggest for laboratory tests if there is fever with no other symptoms, so as to find out the type of sickness.

14. (i) *Ascaris* (ii) *Vibrio cholerae*

15. As the baby suffering from loose motions, the **first** or the **immediate cause** is a virus. The virus could have come from unclean drinking water.
The baby suffered because he was not well-nourished and so the virus from water attacked his body system.
Thus, lack of good nourishment becomes **second level cause**.
The baby was not properly fed because he belongs to a poor family. Thus, poor public services providing unclean drinking water and poverty becomes the **third level cause** of the disease.

16. Jaundice and typhoid are caused by ingestion of contaminated food and water.

17. The patient must be suffering from diarrhoea.

18. An infectious microbe is able to cause a disease only if the immune system of the infected person is unable to put proper defence against it. Many persons have strong immune system or have acquired immunity against the pathogen.

Thus, the immune cells will kill the infectious microbe before it can cause major harm to our body. As a result, despite exposure to infective microbe, the person will not manifest the disease.

19. In condition (iii), a person is most likely to fall sick.
The reasons are

(i) Due to malaria, the body becomes weak and start loosing fluids. In this condition, if she takes four-day fast, she will not recover from the weakness and will become more weak.

(ii) Her immune system is already weak due to malaria. If she will take care of someone suffering from chickenpox, there is high probability that she may also suffer from this disease.

20. (i) The disease is Tuberculosis (TB) and its causative agent is *Mycobacterium tuberculosis*.

(ii) Inhaling infected droplets released by coughing, sneezing or talking to infected person.

(iii) Vaccine used to prevent this disease is BCG (Bacillus Calmette Guerin).

21. The person is suffering from jaundice.

Two methods for prevention are:

(i) Use chlorinated boiled water.

(ii) Hepatitis-A vaccine should be taken to prevent the disease.

Two methods for controlling are:

(i) Application of interferon injection on the advice of doctor will control the disease.

(ii) The patient should take high calorie diet such as juice of sugarcane, radish with jaggery.

22. In condition (iii), chances of falling sick are maximum.
Measles is an infectious viral disease of young children. It spreads through nasal or throat discharge. Being in contact with a friend suffering from measles can cause the transmission of infection.

23. Local effects — Swelling or pain.
General effects — Fever.

24. Polio is the viral disease which is about to be completely eradicated from the world.

It can be prevented through immunisation with oral polio vaccine initiated by Pulse Polio Programme.

25. AIDS is a viral disease that spreads by sexual contact. It can also spread through blood transfusion from infected person or through use of common needles and syringes.

26. In case of AIDS, the virus affects the body's immune system and damages it. So, a person cannot fight even very small infections due to weakend immune system.

27. Syndrome is a group of symptoms, signs, physical and physiological disturbances that are due to a common cause. AIDS is also a complex of diseases and symptoms. It develops due to the failure of body to fight against even minor infections, such as cold.

HIV that causes AIDS damages immune system of the patient. As a result, even small cold leads to the development of pneumonia. A slight gut infection leads to severe diarrhoea and blood loss.

Likewise, skin rashes develop into ulcers. Thus, it leads to a group of symptoms.

28. The chances of mother having chickenpox are nil because she has became immune to this disease. When the immune system first encounters an infectious microbe, it responds against it and then remembers it specifically.

So, when the next time that particular microbe enters into the body, the immune system responds with greater vigour and eliminates infection more quickly. Thus, eliminating any chance of further infection.

29.

Diseases	Causes	Remedies
(i) Hepatitis	Hepatitis virus	Avoid stale food, hepatitis-A and B vaccination.
(ii) AIDS	HIV	Avoid used razors/needles /blades and sexual contact with unknown person.
(iii) Malaria	*Plasmodium*	Hygienic conditions and not letting water stagnate for mosquito breeding, use mosquito repellant.

30. The measures of preventing airborne diseases include
(i) Avoiding direct contact with the infected persons.
(ii) Not sharing articles used by infected persons.
(iii) Use of mask/gloves/handkerchief.

31. (i) Rabies is the disease which spreads by the bite of an infected stray dog.
(ii) Yes, a course of anti-rabies vaccine is available.
(iii) Yes, the local authority makes efforts to immunise all stray dogs.

32. When virus, bacteria or other microbes enter our body, they begin to multiply and cause infection. As a result of infection, the cells of our body get damaged and signs and symptoms of illness appear.

Our immune system comes into action in response to infection. It recruits many cells to affected tissue to kill off the disease causing microbes. This recruitment process is called inflammation. Due to the effect of this process, swelling, pain and fever occur.

33. Two groups of microorganism from which antibiotics could be extracted are
(i) bacteria (ii) fungi

34. (i) Penicillin given to a patient suffering from jaundice will have no effect. Jaundice is caused by a virus. Penicillin blocks the biochemical pathways in bacteria. As, viruses do not use such pathway. So, they remain unaffected by this antibiotic.
(ii) Smallpox has been eradicated from the world.
(iii) The principle behind its eradication is immunisation.

35. Skin and sweat are the barriers that prevent the entry of microbes in the body.

36. In many species of mosquitoes, the female need highly nutritious food in the form of blood inorder to be able to lay mature eggs. Hence, mosquitoes feed on many warm-blooded animals including humans. In this way, they transfer diseases from one person to other person.

37. A 'vaccine' is a biological preparation that improves immunity to a particular disease.

An English physician Edward Jenner (1749-1823), made the first vaccine against smallpox using the microbes of cowpox, a similar, but less severe disease. The modern term 'vaccination' comes from the Latin words *vacca* which means cow and *vaccinia* meaning cowpox.
Diseases which can be prevented by vaccines are diphtheria, pertussis, tetanus and measles.

38. Immune system is body's defence system against various types of pathogens. It includes various components of blood such as phagocytic cells, natural killer cells (NK cells), T-lymphocytes and B-lymphocytes.

B-lymphocytes produce antibodies against antigens of pathogens and their toxins.

Immune system keeps the body healthy by killing infectious microbes and remembers the microbe for better action against any subsequent encounters. It is also important as it decides on the severity of disease manifestations by determining the number of microbes surviving in the body.

39. (i) A balanced diet is the first and foremost condition necessary for good health. A balanced diet provides all the nutrients, e.g. proteins, carbohydrates, fats, vitamins and minerals required by the body in correct proportions. When our diet lacks one or more of these nutrients, we get deficiency diseases or nutritional disorders, e.g. lack of mineral iron causes anaemia.

Excessive or inadequate intake of food and nutrients leads to conditions such as obesity, Kwashiorkor and rickets, A balanced diet prevents deficiency diseases. It also increases our ability to fight against infections in general.

(ii) Our health depends on the cleanliness of our surroundings. Flies and mosquitoes carry germs that cause diseases. Flies breed in rotting garbage and mosquitoes breed in pools of stagnant water.

So, people fall ill quite often if the area in which they live or work has garbage, stagnant water or open drains.

Clean air is also a part of our surrounding and a basic requirement for good health.

(iii) This is so because many waterborne diseases causing insect vectors flourish in stagnant water, which cause diseases such as malaria, dengue, etc., in human beings.

(iv) Social harmony and good economic conditions are necessary for good health. Social harmony involves each other's participation in joys and sorrows, helping others, etc. If we mistreat each other, we cannot be happy or healthy. Proper earning is necessary to provide adequate and nutritious food and clean environment for living.
Thus, good economic condition is also a necessary factor for good health.

40. Infectious diseases spread by the following mean

(i) **Through air** An infected person, when sneezes or coughs releases out droplets containing germs. These droplets infect healthy person standing nearby by entering into his/her body through air. Examples of such diseases are common cold, pneumonia and tuberculosis.

(ii) **Through water** If the water source is polluted by the excreta of infectious individuals having gut diseases and this water is used by other people, they will be infected by the diseases, e.g. cholera, amoebiasis, hepatitis which get spread through water.

(iii) **Through sexual contact** Some diseases like AIDS and syphilis are transmitted by sexual contact.

(iv) **Through vectors** There are some organisms which act as intermediates or vectors for a particular disease. These vectors carry disease from infected person to the healthy person, e.g. mosquito bites spread malaria in humans.

41.

Disease causing agents	Diseases/Infections caused
(i) Virus	AIDS
(ii) Fungus	Ringworm
(iii) Bacteria	Tuberculosis
(iv) Protozoa	Malaria
(v) Worm	Elephantiasis

Importance of categorisation of infection causing agents
It helps to decide the kind of treatment to use because the same drug will not work against a microbe belonging to a different group.

42. Malaria is caused by the protozoan parasite *Plasmodium*. This disease spreads through the bite of an insect vector, i.e. the female *Anopheles* mosquito, which feeds on human blood.

Its symptoms are

(i) Fever, headache, nausea and muscular pain.

(ii) Each malarial attack is of 6-10 hours duration and consists of the three stages. These three stages are

(a) **Cold stage** Feeling extreme cold and shivers.

(b) **Hot stage** High fever, fast respiration and heartbeats are increased.

(c) **Sweating stage** It is due to the pressure released by sweating, temperature of the body goes down.

The only way to prevent malaria is to take precaution against mosquito bites. We can protect ourselves from bite of mosquitoes by the following methods

(i) Mosquito repellent should be used to prevent mosquito bite.

(ii) Mosquito larvae can be killed by sprinkling kerosene oil in open drainage, water coolers or any uncovered water bodies. Adult mosquitoes can be killed by spraying insecticides, e.g. BHC, malathion.

(iii) One should sleep under mosquito nets.

(iv) Wire-gauze should be used on doors and windows of houses to prevent entry of mosquitoes.

43. (i) Pneumonia and common cold are two airborne diseases. Spreading of disease causing microbes occurs through the little droplets thrown out by an infected person, when he sneezes or coughs. Someone standing close by can breathe in these droplets and microbes get a chance to start new infection.

(ii) HIV virus can spread from a patient to a healthy person in the following ways

(a) It spreads through sexual contact from an infected person to a healthy person.

(b) It spreads through blood transfusion from infected person or through use of common needles, razors and syringes.

(c) It can also spread through blood transfusion from an infected mother to her baby during pregnancy and through breastfeeding.

(iii) Immune system is body's defence system against various types of pathogens. It keeps the body healthy by killing infectious microbes and remembers the microbe for better action against any subsequent encounter.

44. The pathogen does not necessarily affect an organ or tissue depending on the point of entry. It may invade the body at the easiest accessible route and then makes it is way to the target organ/tissue. The examples of such instances are

(i) **AIDS causing virus** enters through sexual contact, but spreads to lymph nodes all over the body.

(ii) **Japanese encephalitis** Virus enters blood through mosquito bite, but reaches brain.

(iii) **Malaria** Protozoan *Plasmodium* enters blood through mosquito bite, but reaches liver and then passes into the RBC.

45. When someone gets a disease:

(i) His/her body function gets damaged and may never recover completely.

(ii) He/she may become bedridden for sometime.

(iii) He/she can serve as a medium for further spread of disease.

Therefore, prevention is better than cure.

For prevention of diseases, following general practices are adopted

(i) Avoid exposure to airborne microbes.
(ii) Adopt living conditions that are not overcrowded.
(iii) Prevent exposure to waterborne microbes.
(iv) Safe drinking water should be provided.
(v) Avoid vector borne infection. Establish clean environment as it would not allow breeding of disease spreading vectors.

46. (i) Educated parents understand the importance of healthy and balanced diet for their children which will prevent nutritional deficiency disorders and will also help in the proper functioning of immune system.
(ii) They know about modes of spread of diseases so, will maintain hygienic conditions.
(iii) Parents will provide only safe uncontaminated water to avoid water borne diseases.
(iv) Educated parents can provide symptomatic treatment first and then go for further doctor's consultation to kill the cause of the disease.
(v) Educated parents can educate a sense of social and moral responsibility in their children to maintain clean environment to prevent spread of infections.

47. (i) Vectors or intermediates are animals that carry the infecting agents from a sick person to a healthy person.
Anopheles mosquito (for malaria), housefly (for typhoid), rat flea (for plague) are the examples of vectors.
(ii) Typhoid and cholera are diseases that spread through contaminated water and food (pathway *A*).
(iii) Malaria is transmitted through female, *Anopheles* mosquitoes and dengue is transmitted through *Aedes* mosquitoes.
(iv) Pathway *B* shows transmission of diseases through vectors like mosquitoes and flies. To prevent diseases to spread through these vectors
(a) Use mosquitoes repellent and maintain cleanliness and hygiene in your surroundings.
(b) Do not allow water to collect around your surroundings. Put kerosene oil in drains.
(v) The common symptoms of the diseases that are spread through contamination of food and water are diarrhoea and vomiting.

48. (i) Vaccination is the process of injecting dead microbes in the body of a healthy person in order to develop immunity against a particular diseases caused by that microbe.
(ii) Edward Jenner discovered the first vaccine against smallpox disease.
(iii) BCG vaccine stands for Bacillus Calmette Guerin.
(iv) Hepatitis-B is spread through water and food contaminated with hepatitis virus.
(v) A persistent cough that lasts more than 3 weeks and usually bring up phlegm, which may be bloody is a common symptom of tuberculosis.

49. (i) Signs and symptoms help us to detect the disease. Some diseases have specific symptoms and signs.
(ii) Diseases can be prevented by maintaining personal and public hygiene, strong immune system by taking balanced diet and adopting the practice of immunisation.
(iii) A disease can be diagnosed by laboratory tests.
(iv) Person, animal, object or substance from which an infectious agent passes or is disseminated to the host is known as the source of infection.
(v) Newborn babies are more vulnerable to diseases as compare to adults due to weak immunity or immune system and no memory of previous infections.

Chapter Test

Multiple Choice Questions

1. Which of the following group of disease is caused by bacteria?
(a) Anthrax, Typhoid, Dengue
(b) Influenza, AIDS, Common cold
(c) Malaria, Kala-azar, Skin infection
(d) Typhoid, Cholera, Anthrax

2. People drinking water from a shallow hand pump are likely to suffer from which of the following disease?
(a) Cholera (b) AIDS
(c) Tuberculosis (d) Malaria

3. Penicillin kills bacteria, but not our cells because
(a) our cells are immune to penicillin
(b) it blocks formation of cell wall
(c) our cells do not form cell wall
(d) it attacks our nervous system

4. Which of the following is a causative microbe of corona virus disease?
(a) HIV virus
(b) SARS virus
(c) Parasitic protozoan
(d) Staphylococci

5. A microorganism *X* is oval-shaped and has one long whip-like structure. It reproduces through binary fission.

Choose the correct option for *X*.
(a) *Trypanosoma*
(b) *Plasmodium*
(c) Staphylococci
(d) *Leishmania*

Assertion-Reasoning MCQs

Direction (Q. Nos. 6-8) Each of these questions contains two statements, Assertion (A) and Reason (R). Each of these questions also has four alternative choices, any one of which is the correct answer. You have to select one of the codes (a), (b), (c) and (d) given below.

(a) Both A and R are true and R is the correct explanation of A
(b) Both A and R are true, but R is not the correct explanation of A
(c) A is true, but R is false
(d) A is false, but R is true

6. **Assertion** Peptic ulcers can be cured by a short period of treatment with antibiotics.

Reason They cause acidity-related pain and bleeding in the stomach.

7. **Assertion** Japanese encephalitis is also known as brain fever.

Reason Its virus enters through a mosquito bite and goes on to infect the brain.

8. **Assertion** Having the disease once is a mean of preventing subsequent attacks of the same disease.

Reason Immune system responds against the infectious microbe and then remember it specifically.

Short Answer Type Questions

9. High fever, headache, nausea, vomiting and joint pains are some of the symptoms seen in a patient. Which disease he might be suffering from? How does it spread?

10. Roshni visited her friend suffering from malaria. What are the chances of her contracting the disease?

11. Give an account of malaria, its causative agent, symptoms and control measures.

12. Given below are few situations:
(i) Geeta of class IX was having common cold. She sits with Sarika who also develops the disease.
(ii) Animesh of class IX shifted to a new residence, with his family, where water purification system has not been installed yet. He develops cholera and dysentery.

Associate these situations with their mode of transmission and assign appropriate category to them.

13. A lady suffering from AIDS is pregnant.
What is the most likely route for the child to get the disease?

Long Answer Type Questions

14. (i) State two examples of viral diseases.
(ii) After an injury, an injection is given immediately. What is it and why is it given?
(iii) What type of food is advised when we fall sick and why?

15. Fill in the table with appropriate term.

Diseases	Microbes	Target organs	Modes of transmission
Meningitis	Virus	…(*i*)…	Faecal contamination
Hepatitis	…(*ii*)…	…(*iii*)…	Contaminated water
…(*iv*)…	Bacteria	Lungs	…(*v*)…
Ringworm	Fungus	…(*vi*)…	Indirect contact
…(*vii*)…	Virus	Lungs	…(*viii*)…
Dengue fever	…(*ix*)…	Whole body	…(*x*)…

Answers

Multiple Choice Questions

1. *(d)* ***2.*** *(a)* ***3.*** *(c)* ***4.*** *(b)* ***5.*** *(d)*

Assertion-Reasoning MCQs

6. *(b)* ***7.*** *(a)* ***8.*** *(a)*