Diseases: Causes and Control

Diseases and their Causes

Solved Examples

Medium

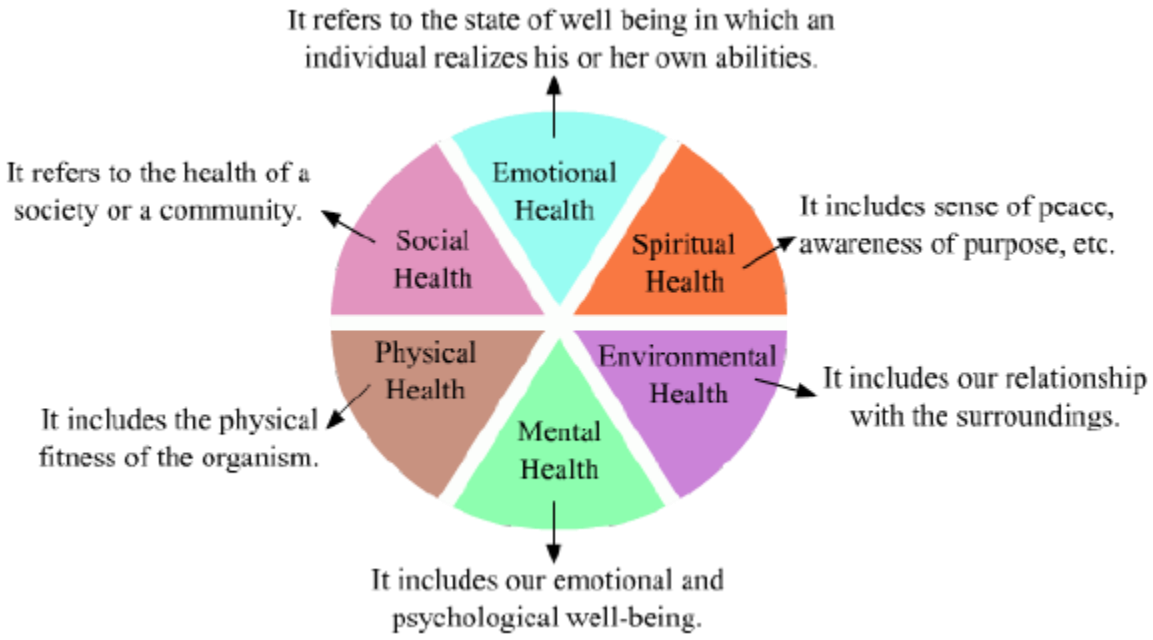
Example 1:

Can you explain the difference between a healthy and a disease-free state of the human body?

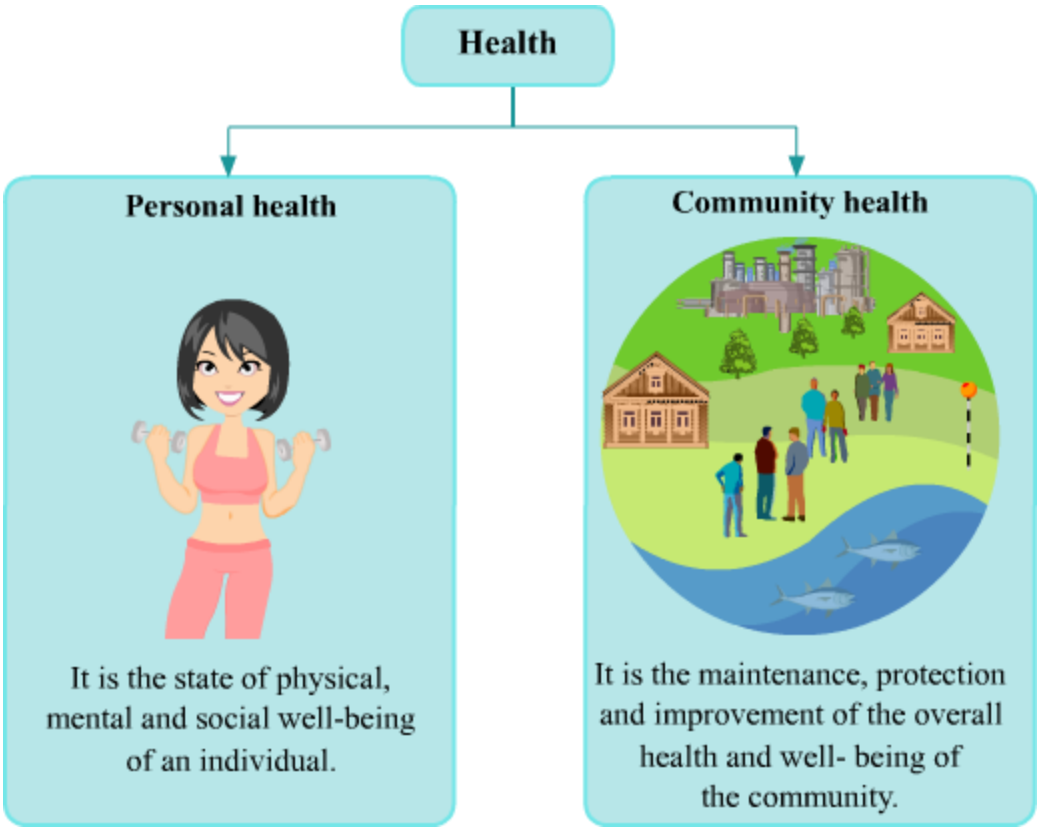
Solution:

The state of not having any **disease** is not the same as being healthy. Good **health** is the ability of an individual to realize his or her full potential. Consider, for example, an athlete who is tired after running about hundred metres. The athlete cannot be called a diseased person. However, he is not healthy either. Therefore, one can have poor health without having any identifiable disease.

Types of Health



Personal Health and Community Health



Did You Know?

- The word ‘hygiene’ is derived from the Greek word ‘Hygieia’. In Greek mythology, Hygieia is the goddess of health, cleanliness and sanitation.

Concept Builder

Personal hygiene

Here are certain healthy habits that we all must follow to maintain personal hygiene.

- Bathing regularly to remove sweat and dirt
- Washing hands before eating
- Keeping our nails clean
- Brushing teeth after every meal

Community or social hygiene

Here are some of the steps that need to be taken to ensure effective social hygiene.

- Making provisions for clean drinking water
- Making provisions for family welfare education
- Establishing healthcare services

- Making provisions for proper waste disposal and sanitation facilities
- Controlling diseases by providing vaccination, medical aid and medicines

Solved Examples

Medium

Example 2:

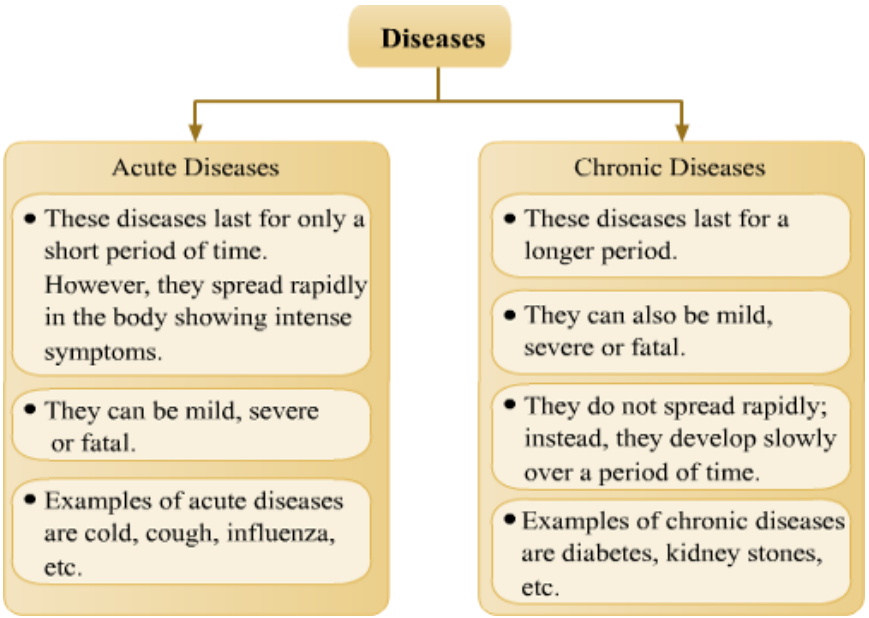
Why are social equality and harmony necessary for good personal health?

Solution:

Social equality and harmony are important for good personal health. Social equality means equal access to education, hygienic environment, health facilities, etc. Social harmony refers to the peaceful interactions between the various individuals and groups constituting the society. Individual health prospers when conditions for social equality and harmony are present. This in turn adds to the overall health and well-being of the community.

Disease

Disease refers to any disorder of structure or structural function in an organism. Such disorders produce specific signs and symptoms. Diseases are basically characterized by disturbance in normal body functions. On the basis of time duration, diseases can be classified as **acute** disease and **chronic** disease.



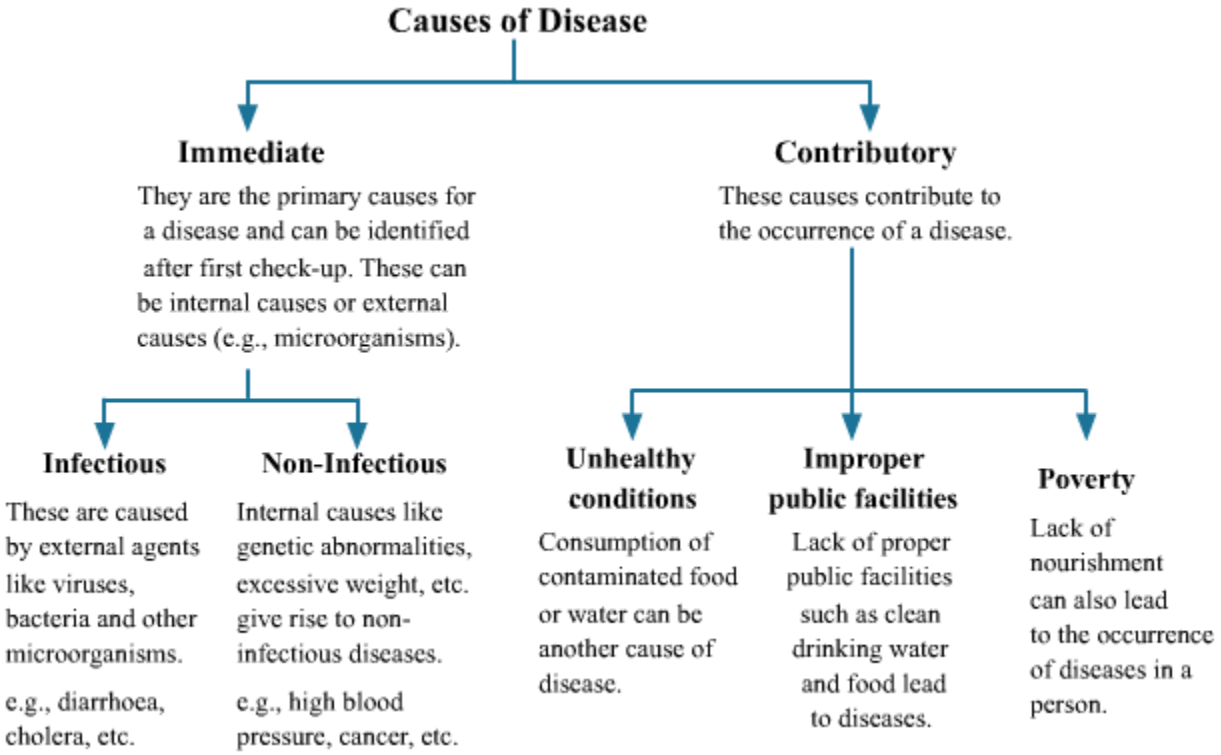
This is the reason why some people get diseases only for a short period and some people suffer from a particular disease throughout their lifetime.

Did You Know?

According to WHO, chronic diseases are responsible for 60% of all deaths worldwide.

Causes of Disease

There can be a number of causes for disease. These are broadly divided into **immediate** causes and **contributory** causes (as is shown in the figure).



Solved Examples

Medium

Example 3:

A number of children consume contaminated food and water. Yet, only some get diarrhoea while the others remain disease-free. Why is this so?

Solution:

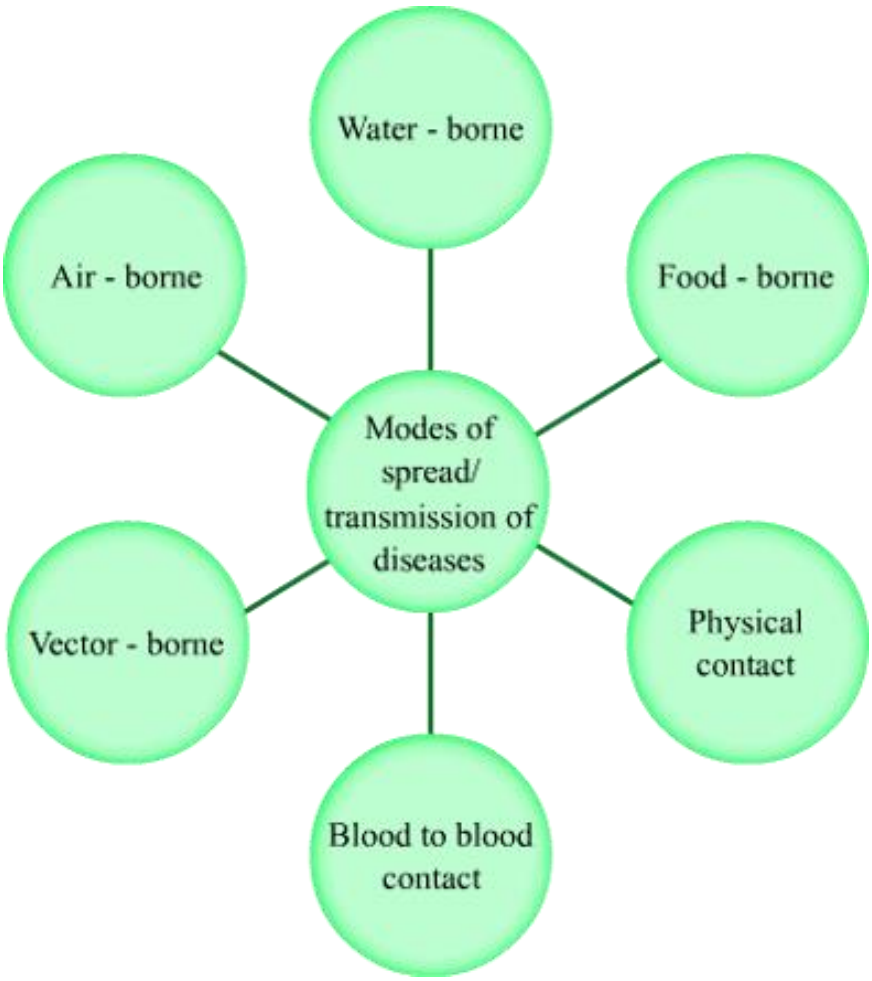
This happens because of the difference in the levels of **immunity**. **A healthy body** or a well-nourished body is less likely to catch a disease when exposed to disease-causing agents. This is because it has a strong **immune system**. On the other hand, a poorly nourished body will easily become diseased due to its weak immune system.

Modes of Transmission of Diseases

Transmission of Diseases

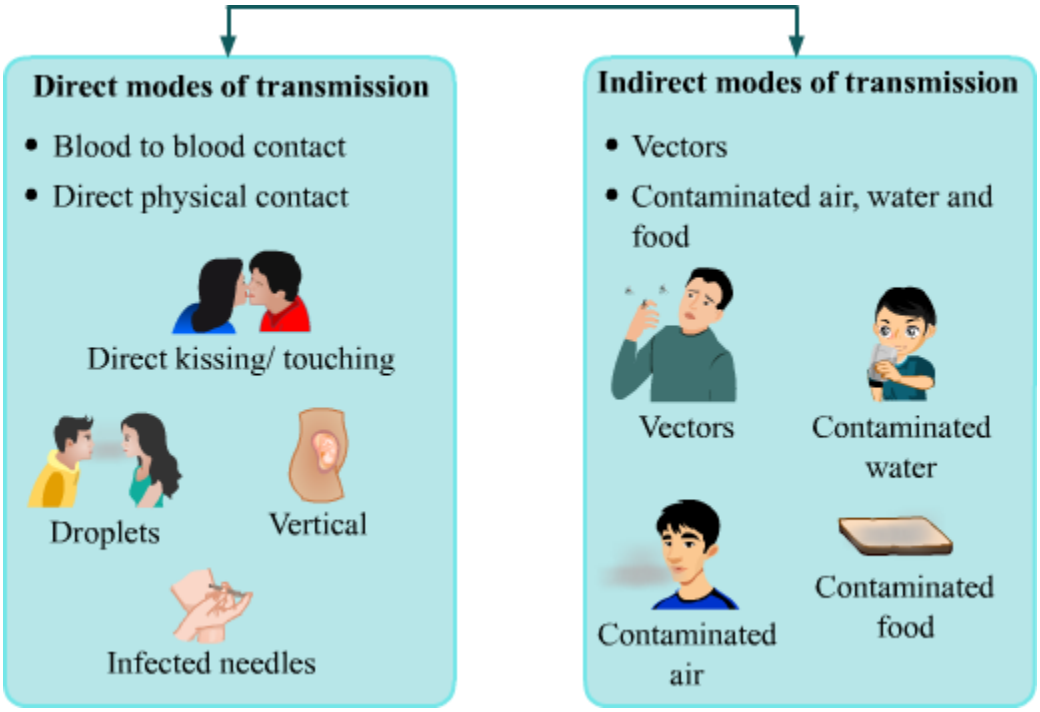
We use various means of transport to travel from one place to another. In the same way, pathogens causing infectious diseases also use certain means of transport (or to be more specific, modes of transmission) such as air, food and water to enter the bodies of living organisms.

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.

Bacterial Diseases

Some of the diseases caused by bacteria are:

Disease and incubation period	Causative organism	Symptoms	Diagnosis and transmission	Prevention and control

Tuberculosis (2-10 weeks)	Mycobacterium tuberculosis	Weight loss, cough, fever, chest pain, breathlessness, sputum containing blood	Droplet infection and diagnosed by chest X-ray	BCG vaccine, antibiotics such as streptomycin; patient should be kept under complete isolation
Diphtheria (2-8 days)	Corynebacterium diphtheria	Sore throat, skin ulcers	Droplet infection	DPT vaccine; patient should be kept under isolation
Whooping cough (Pertusis) (8 − 14 days)	Bordetella pertussis	Severe cough with whooping sound; vomiting	Droplet infection	DPT vaccine
Tetanus (4-21 days)	Clostridium tetani	Muscular spasms of mouth and neck region, convulsions and death due to lack of oxygen	Through cuts and open wounds in the skin	Tetanus Toxoid infection; and whenever injured, tend to the wound properly
Cholera (0 − 6 days)	Vibrio cholerae	Inflammation of gut, severe diarrhoea, abdominal pain characterised by ‘rice water stools’	Faecal contaminates of water and food	Antibiotics such as tetracycline and chloramphenicol, clean water supply, proper disposal of waste
Typhoid (1-3 weeks)	Salmonella typhi	Fever, abdominal pain, diarrhoea, vomiting, headache	Faecal contamination of food and water	Antibiotics such as ampicillin and chloramphenicol, DPT vaccine
Syphilis (14 -28 days)	Treponema pallidum	Pinhead or pea-sized sores with red centre	Through sexual contact with infected person	Avoiding sexual contact with infected person,

		around sex organs		penicillin injection
Gonorrhoea (3-10 days)	Neisseria gonorrhoeae	Burning sensation during urination, feeling of ill health, fever, headache	Sexual contact with infected person	Antibiotics such as penicillin and streptomycin; avoiding sexual contact with infected person
Plague	Yersinia pestis	Fever, abdominal pain, diarrhoea, vomiting, headache, skin turning black, seizures, general weakness	Through the bite of fleas that have previously fed on infected animals like mice, rats, etc, through direct contact with an infected person or animal or by eating an infected animal	Antibiotics; keeping the rodent population under control and isoloation of the infected person
Dysentry	Shigella, Campylobacter and Salmonella	Abdominal cramps or pain, nausea, vomiting fever of 100.4°F (38°C) or higher dehydration and severe diarrhoea with blood	Contaminated food and water	Antibiotics and over-the-counter medication which can help relieve cramps; hygenically cooked food and clean water

Viral Diseases

What are Viruses?

Viruses are extremely small infectious agents, made up of nucleic acids and proteins. Some specific characteristics exhibited by viruses are:

- They cannot live freely in nature. They require any living cell as host to carry out their vital functions.
- They take over the cellular machinery of the host cell and use it to produce more viruses. The host cell is usually killed in the process.
- The viruses can be cultured on living tissue in the laboratory. They can also be crystallised and stored.
- Most of the viruses are highly specific for their hosts.

Viruses are responsible for variety of diseases in humans. Some of them are listed below:

Diseases and incubation period	Causative agent	Mode of spread	Symptoms	Control	Prevention
Poliomyelitis (polio) (9-14 days)	Polio virus	Droplet infection through faeces and nasal secretions	Fever, headache, stiffness or paralysis of limbs	Oral polio vaccines	Administration of polio vaccine to children between 18-24 months of age
Mumps (12-26 days)	Mumps virus (Paramyxo virus)	Droplet infection	Swelling of parotid salivary glands, mainly in children	Mumps vaccine	Keep the patient isolated; MMR vaccine in children

Rabies (14 days − several months)	Rabies virus	Bitten by rabid dog	Headache, nervousness, fever, painful spasms, and fear of water	Rabies vaccine	Cleaning of bite wound, checking if animal was rabid, and immunisation of pets with anti-rabies vaccine
Influenza (flu) (48 hrs)	Myxovirus (3 strains)	Droplet infection	Fever, headache, sore throat, muscular aches	Influenza vaccine	Keep mouth and nose covered while sneezing; keep away from infected persons
Measles (10 -12 days)	Paramyxo virus	Droplet infection	Sore throat, cough, fever, rashes in the skin	Measles vaccine (MMR)	MMR vaccine at the age of 9-15 months
Chicken pox (14-20 days)	Varicella zoster	Droplet infection	Fever, headache, rashes, which later form crusts on the skin	Vaccination	Single attack gives life long immunity
Common cold (1-3 days)	Rhinovirus	Droplet infection	Sneezing, coughing, sore throat, infection of the upper respiratory tract, fever, chills, headache, nasal secretions	Antibiotics	Cover mouth and nose while sneezing; adequate rest

Hepatitis B (6 weeks − 6 months)	Hepatitis virus	Blood borne and though sexual contact	Flu-like symptoms, jaundice, nausea, loss of appetite	Hepatitis B vaccine	Avoid fat and protein rich food on infection; 3 doses of vaccines and one booster dosage for children for 1-3 months of age
AIDS (28 months)	HIV (Human Immuno Deficiency virus)	Sexually transmitted through blood	Fatigue, loss of weight, dry cough, oral rashes, headache, occurrence of cancers, and lung infections	No cure	Avoid sexual contact with unknown persons; screening of blood before transfusion; avoid sharing of needles
Dengue	DEN-1,2 virus	Through the bite of Aedes aegyptii mosquito	Fever, headache, sore throat, muscular aches, pains in eye socket and decrease in platelet count	Fluids, pain releivers and anti-inflammatory drugs	Prevent the breeding of mosquiotes; keeping your self covered and protected from mosquito bites.
Swine flu	H1N1 virus	Through contact with infected animals like pigs, bird droplings or the consumption meat of infected animals or birds	Fever, headache, sore throat, muscular aches	Antiviral medicines	Keep mouth and nose covered while sneezing; keep away from infected persons; Keep the patient isolated

Protozoan and Helminthes Diseases

Disease and incubation period	**Causative agent**	**Mode of spread**	**Symptoms**	**Control**	**Prevention**
Malaria (3 Weeks)	*Plasmodium spp.*	*Anopheles spp*. mosquito bite	Fever, chills, vomiting, headache	Drugs such as chloroquine, primaquine, daraprim, and mepacrine	Avoid breeding of mosquitoes in your surroundings. Use mosquito nets and repellents.
Amoebic dysentery (Amoebiasis) (1-4 weeks)	*Entamoeba histolytica*	Contaminated food	Diarrhoea, abdominal pain, stools with blood, nausea, vomiting	Drugs such as metroindazole	Keep food away from flies; hygienic preparation of food
Ascariasis (10 − 40 days)	*Ascaris spp.*	Faecal and soil contamination of food and water	Loss of appetite, insufficiency of nutrients, jaundice	Drugs such as mebendazole, pyrantel, pamoate, and piperazine citrate	Cleaning of vegetables and fruits before consumption
Taeniasis (7 − 12 weeks)	*Taenia solium and Taenia saginata*	Eating raw or undercooked beef and pork	Diarrhoea, abdominal pain, indigestion,	Drugs such as praziquantel	Proper cooking of beef and pork;

			nutritional deficiency	and niclosamide	personal hygiene
Filariasis or elephantiasis (1 year or more)	*Wucheraria bancrofti*	By bite of *Culex* mosquito	Enlargement of lymph nodes, swelling of limbs, pain, odema, fever, and headache	Diethyl carbamazine	Control of vector by using insecticides and maintaining proper hygiene