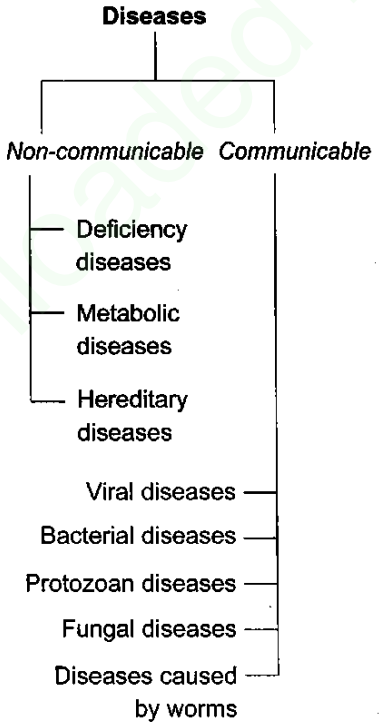
4 Health and Hygiene

LEARNING OUTCOMES

- Non-communicable and communicable diseases
- Transmission of diseases
- Fever and allergies
- Bites, stings, and burns
- First aid
- Prevention of diseases
- Unhealthy habits

(a) (b) (c)

Observe pictures (a) to (c) carefully. Why do you think the boy fell ill? An illness or *disease* is a state in which an organ or a function of the body is no longer in a healthy condition. In this chapter you will learn about different types of diseases and their causes. You will also learn how most diseases can be prevented. Let us start by learning about the types of diseases.



TYPES OF DISEASES

Diseases are mainly of two types: non-communicable and communicable.

Non-communicable Diseases

Non-communicable diseases or non-infectious diseases are those that cannot be transmitted or passed from one person to another. Deficiency diseases, metabolic diseases, and hereditary diseases are examples of non-communicable diseases.

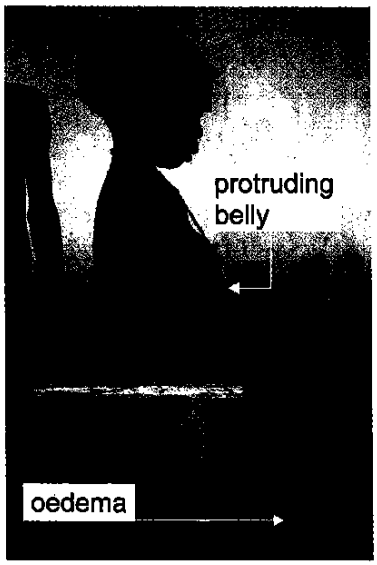


Fig. 4.1 A child suffering from kwashiorkor

Deficiency diseases

You must have learnt about different classes of food and their importance in class 7. Different classes of food (such as proteins, carbohydrates, vitamins, and minerals) are essential for normal functioning of the body.

Lack of proteins, carbohydrates, vitamins, and minerals in the diet can lead to *deficiency diseases.*

Deficiency of proteins A severe deficiency of *proteins* in children may lead to a disease called *kwashiorkor* (Fig. 4.1).

Most victims of this disease are children aged less than one year who are deprived of the mother's milk too early because of the arrival of a new baby ('kwashiorkor' means 'the rejected one'). While the newborn is breast-fed, the older child, who still requires a protein-rich diet (in the form of mother's milk), receives a diet that doesn't supply enough proteins.

Symptoms

1. Stunted growth
2. Discoloured hair and skin
3. Large belly that sticks out (protrudes)
4. Oedema (swelling caused by accumulation of fluid in the tissues under the skin)

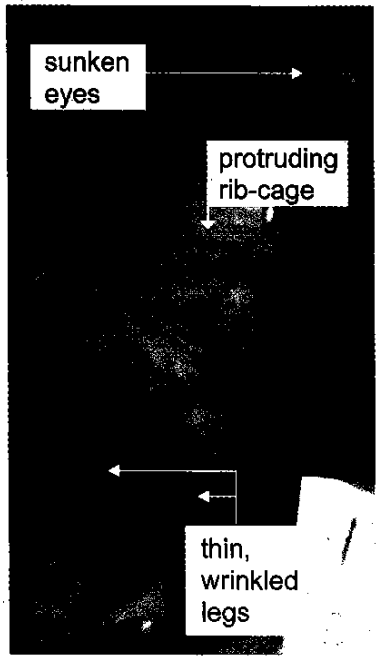


Fig. 4.2 A child suffering from marasmus

Deficiency of proteins and carbohydrates A deficiency of both proteins and carbohydrates in infants results in a disease known as *marasmus* (Fig. 4.2).

Symptoms

1. Thin, wrinkled arms and legs
2. Sunken eyes
3. Protruding rib-cage
4. Mental retardation

Deficiency of vitamins and minerals You must have learnt about vitamins and minerals in class 7. Names of common vitamins and minerals, their functions, and deficiency diseases are summarized in Table 4.1.

Table 4.1 *Vitamins and minerals: functions and deficiency diseases*

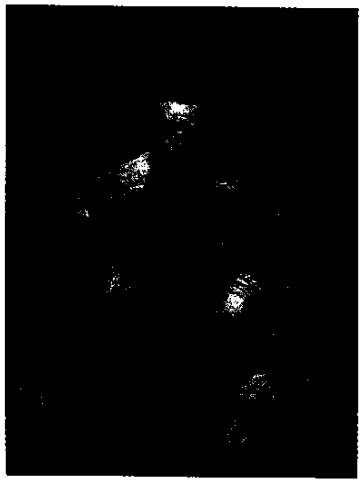
	Functions	*Deficiency diseases*
Vitamins		
Vitamin A	Keeps the epithelium of eyes and skin healthy	Xerophthalmia (dry cornea); night blindness.
Vitamin B1	Keeps nerves healthy	Beriberi (nerve degeneration and paralysis)
Vitamin B2	Regulates protein metabolism and growth	Tongue sores, mouth fissures, and skin inflammation
Vitamin B3	Keeps skin healthy	Pellagra (affects skin and digestive and nervous systems)
Vitamin B12	Forms red blood cells	Fatal anaemia
Vitamin C	Keeps tissues, blood vessels, and gums healthy; boosts immune system	Scurvy (swollen and bleeding gums)
Vitamin D	Gives healthy bones and teeth	Rickets (bone distortion)
Vitamin E	Retards aging; keeps reproductive organs healthy	Sterility and aging
Vitamin K	Normal blood clotting	Excessive bleeding due to delayed clotting of blood
Minerals		
Iron	Hemoglobin formation	Anaemia
Calcium	Skeleton formation; muscle contraction	Rickets; brittle bones (osteoporosis)
Phosphorus	Strong bones and teeth	Rickets; weak gums
Sodium	Muscle contraction; fluid balance; nerve impulses	Muscle fatigue; neuralgia (nerve pain)
Potassium	Osmotic pressure; nerve and muscle function	Swelling of body tissues; low blood sugar
Iodine	Thyroxine formation	Goitre
Fluorine	Teeth enamel formation	Tooth decay
Sulphur	Protein formation	Fragile nails and hair

Metabolic diseases

Metabolic diseases are caused by the malfunctioning of an organ or organ system or by an imbalance of certain control mechanisms of the body. For example, asthma is caused by

Fig. 4.3 *Diabetics need regular injections of insulin*

(a)



(b)

Fig. 4.4 *Conditions resulting from (a) excess and (b) inadequate secretion of the growth hormone*

the hypersensitivity of the epithelium lining the lungs; diabetes is the result of an imbalance of the control mechanisms that regulate carbohydrate metabolism; and cancer is the result of uncontrolled cell division.

Let us consider diabetes. A healthy body maintains a constant blood sugar level which is normally 80 mg per 100 ml of blood. When large quantities of glucose enter the blood stream, as happens after a meal, the excess glucose is converted into an insoluble product called glycogen which is stored in the liver and muscles of the body for future use. As and when required, glycogen is reconverted into glucose and reintroduced into the blood stream. All these processes are controlled by a hormone called *insulin*, produced in the pancreas by special cells called the islets of Langerhans. If this hormone is not produced in sufficient quantities, excess sugar cannot be stored and utilized. As a result, sugar continues to accumulate in the blood, till it is lost through urine. This leads to hunger, thirst, and gradual loss of weight—a condition referred to as diabetes. Although this condition cannot be cured, it may be kept under control by regular doses of insulin (Fig. 4.3).

A malfunctioning heart could be a disaster. Improper blood supply to the cardiac muscles, may eventually result in heart failure as these muscles do not receive enough food and oxygen.

Malfunctioning of kidney, another important organ, could also spell disaster, if it fails to remove the toxic substances that are produced within the body during metabolism. Accumulation of toxic substances above a certain level in the blood is fatal. It may be recalled that the main function of the kidney is to filter out the toxic metabolic wastes and to eliminate them from the body through the urine.

Diseases resulting from hormonal imbalance can make a person abnormally tall [Fig. 4.4(a)] or short [Fig. 4.4(b)].

Hereditary diseases

Hereditary diseases (inherited from parents, e.g., hemophilia—a condition in which the blood flowing from a wound fails to clot), mental illnesses, and certain allergies are also non-communicable diseases.

Communicable Diseases

Communicable diseases are infectious diseases that can spread from one person to another. These diseases are caused by a variety of disease-causing germs called *pathogens*, which may be viruses, bacteria, protozoa, or fungi. You must have read about these organisms in class 7. Some common communicable diseases, their mode of transmission, organs affected, and symptoms are listed in Table 4.2.

Table 4.2 *Communicable diseases: mode of transmission, organs affected, and symptoms*

Diseases	*Mode of transmission*	*Organs affected*	*Symptoms*
Viral			
Common cold	Droplets	Nasal cavitiy	Headache, fever, mucous discharge
Influenza	Droplets	Nasal cavity	Fever, body-ache
Chickenpox	Fomites*, droplets	Skin	Pearly blisters on abdomen and back
Rabies	Animal bites	Brain and spinal cord	Fear of water (hydrophobia)
Poliomyelitis	Food and water	Spinal cord	Paralysis
Bacterial			
Tuberculosis	Air/milk	Lungs and bones	Wasting disease resulting in weakness
Cholera	Contaminated food (flies)	Digestive tract	Diarrhoea and vomiting
Diptheria	Droplets	Trachea	Obstruction of throat, leading to suffocation and death
Typhoid	Contaminated food	Digestive tract	Fever, headache, rose spots (rashes) on body
Protozoan			
Malaria	Causative organism (*Plasmodium*) transmitted through the bite of the female *Anopheles* mosquito	Liver and kidneys	Severe fever alternating with chills
Amoebic dysentery	Causative organism (*Entamoeba histolytica*) spreads through contaminated food and water	Liver, spleen, lungs, etc.	Abdominal pain, discharge of blood-stained mucous, and diarrhoea
Fungal			
Ringworm	Direct contact with the infected person; formites	Skin (groin, area between the toes, etc.)	Red, ring-shaped rash
Worm-caused			
Ascariasis	Contaminated food	Intestine	Abdominal pain, dizziness, vomiting
Filariasis	Bite of the *Culex* mosquito	Lymphatic system	Enlargement of body parts (elephantiasis)

** Formites are objects or substances that are capable of absorbing pathogens and, thus, transferring them from one person to another. Dirty towels and utensils are examples of formites.*

TECH FILE

Hay fever or allergic rhinitis is triggered by exposure to pollen or house dust. It causes the nasal membrane to release a chemical called *histamine*, which irritates and inflames the nose, sinuses, and eyes, causing them to swell, itch, and become runny. The word 'hay fever' is, in fact, a misnomer. This problem is not usually caused by hay and does not cause fever.

FEVER AND ALLERGIES

Fever is not a disease, but a condition that indicates an infection. Fever in caused by substances called *pyrogens* released into the blood by parasitic microorganisms such as bacteria. *It is a state of abnormally high body temperature, often accompanied by a quickened pulse.* Fever results from a disturbance of the temperature-regulating centre in the brain, which results in increased heat production and a decrease in heat loss.

Allergy is hypersensitivity to a specific substance (which in similar amounts is harmless to most people). People who are allergic to a particular substance may experience reactions such as sneezing, skin rashes, and, in more serious cases, asthma. The substances that trigger such reactions are known as *allergens.* Pollen grains, household dust, dust mites, and fur shed by cats and other domestic animals are examples of allergens.

TRANSMISSION OF DISEASES

There are various mechanisms by which infectious diseases spread from person to person.

Droplets When a person sneezes, the mucous-laden air, containing thousands of droplets, exits through the mouth with great force. If the person sneezing is suffering from any disease that affects the respiratory system, each droplet will be loaded with germs. If a healthy person standing nearby happens to inhale the air loaded with these germs he/she may also contract the same disease. Droplets may even be discharged while talking and coughing. Common cold, influenza, and tuberculosis are examples of diseases that spread through droplet infection.

Contaminated food and water The food and water we consume sometimes get contaminated by disease-causing organisms. Diarrhoea, typhoid, and cholera are examples of diseases that spread through contaminated food or water.

Carrier organisms (vectors) Vectors are animals, mostly blood-sucking insects, which transmit a disease-causing organism from one organism to another (Fig. 4.5). Malaria, dengue, filariasis, yellow fever, typhus fever, and plague are examples of vector-borne diseases.

THINK QUEST

Why should the mouth be covered while sneezing? (*Hint: What exits the mouth when a person sneezes?*)

Fig. 4.5 *Mosquito is a vector*

Direct or indirect contact: These are diseases that spread by direct (which involves touching the infected person) or indirect (which involves touching the objects that have been used by the infected person) contact between two persons (Fig 4.6). Skin diseases such as ringworm, scabies, lice, conjunctivitis, and chickenpox are examples of diseases that spread through contact.

Animal bites: Certain pathogens spread through animal bites. A bite from an infected dog can spread rabies. Bites from non-poisonous snakes and wild animals such as squirrels and bats can transmit bacteria or viruses that these animals may have in their saliva.

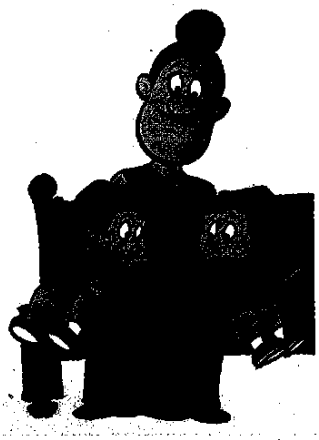


***Fig. 4.6** Infectious diseases often spread by sharing articles used by an infected person*

BITES, STINGS, AND BURNS

Accidents such as bites, stings, and burns may not always lead to diseases, but can still cause varying degrees of discomfort. In some cases, such accidents can even be fatal.

Bites from poisonous snakes are often fatal unless medical aid is sought in time. Bites from centipedes and spiders are not so serious, although swelling and pain may persist for a few days.

Stings from insects like bees and wasps result in the injection of poison into the victim's skin. Honeybees leave their stings behind in the wounds *and once stung, the bee itself dies.* The deadliest stingers are scorpions, which can inject sufficient poison to kill even humans.

Burns cause varying degrees of damage to the skin and underlying tissues. In addition, burns are constantly exposed to the risk of secondary infection by bacteria. There are three types of burns, depending on the extent of damage. A *first-degree burn* damages only the outer layer of epidermis. A *second-degree burn* damages the dermis, including the capillaries and nerve endings, causing blistering and pain. A *third-degree burn* extends to deeper parts and even damages the tissues lying underneath the skin. Second- and third-degree burns need immediate medical attention.

FIRST AID

First aid is the immediate care that can be given to an accident

FACT FILE

King cobra is the largest poisonous snake. Its venom is strong enough to kill a fully grown Asian Elephant in three hours!

TECH FILE

Antivenom, used in the treatment of poisonous bites or stings, is obtained by injecting a small amount of venom into an animal such as horse, sheep, or rabbit. The bodies of these animals produce antibodies in response to the venom, which can be extracted and used in the production of the antivenom.

THINK QUEST

A little boy in your school suffers a minor cut while trying to sharpen a pencil. What first aid would you give to help him?

victim to prevent the injury or illness from worsening, before medical help can be provided.

First aid for cuts Cuts and bruises are a part of active childhood and, at times, an occasional occurrence even in adults. Minor cuts and bruises can almost always be dealt with effectively at home by providing first aid in time.

1. To avoid infection, hands should be washed with soap and water and an antiseptic solution before touching the wound.
2. The wound should be rinsed under running cold water to remove any dirt and grit. (The wound can also be cleaned using some cotton wool dipped in an antiseptic solution.)
3. Finally, the wound should be dried with sterile gauze and, keeping the edges of a gaping cut together, covered with surgical tape.

***Fig. 4.7** Bite from an infected dog can cause rabies*

First aid for bites For animal bites, the wound should be cleaned with soap and water and an antiseptic cream applied over it. The victim should also be provided medical care as some animals transmit rabies through their bite (Fig. 4.7). A person bitten by a poisonous snake should receive immediate medical attention. In the meantime, the victim should be kept as still and motionless as possible, as activity tends to increase the spread of poison. The bitten part should be kept below the level of the heart. Most insect bites can be treated using ice/soothing ointments. Scratching should be avoided as it tends to damage the tissue.

FACT FILE

The three main aims of first aid, also referred to as the three P's, are

Preserve life
Prevent further injury
Promote recovery

First aid for stings Bee stings have backwardly pointed spines, which make them difficult to remove from a victim's body. The sting left by the bee should be gently scraped off and the stung area washed with soap and water to neutralize the acidity of the sting. Ant stings are also acidic. Wasp sting is alkaline and the sting is not left behind like the bee. They can be neutralized by applying vinegar (weak acetic acid). Scorpion stings can be deadly. The victim should receive immediate medical help.

First aid for burns For minor burns, the affected part should be kept under running cold water. This should take care of mild burns over a small area. If the burn is severe, medical help should be sought immediately.

First aid for fever Fever is generally a sign that the body's immune system is doing its best to fight an infection. If the fever causes the body temperature to rise too much, a towel or sponge soaked in cold water could be placed on the forehead, wrists, and calves of the affected person, keeping the rest of the body covered. Giving plenty of fluids with a high content of vitamin C is also considered beneficial.

Carl Wunderlich
1815–1877
German physician Carl Wunderlich conducted extensive studies on human body temperature. He was the first to discover that fever is not a disease, but a symptom.

PREVENTION OF DISEASES

Diseases can be prevented by taking certain precautions.

1. Deficiency diseases can be prevented by consuming a balanced diet (Fig. 4.8).
2. Consumption of exposed fruits should be avoided. Flies, which often sit on exposed foodstuffs, can carry disease-causing germs, which get transferred to these foodstuffs. These germs enter the body of the person consuming these foodstuffs.
3. Water sold at roadside stalls often carries germs and should be avoided. Water can be boiled to make it safe for drinking. Chemical agents such as chlorine and iodine are also used to kill the germs present in water.
4. Hands should be washed with soap and water before handling food. Germs can pass from dirty hands to foodstuffs and ultimately reach inside the body when such foodstuffs are consumed.
5. Mouth should be covered while sneezing.
6. Articles such as towel and handkerchief used by an infected person should not be used by anyone else.
7. There should be no stagnant water/open garbage dumps in the locality. These often serve as breeding grounds of disease-carriers such as flies and mosquitoes.

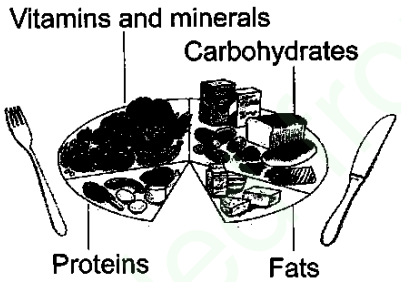


Fig. 4.8 *Deficiency diseases can be prevented by consuming a balanced diet containing food from all major food groups*

Natural defense mechanism of the human body

Our body has three lines of defense against infections. The *first line of defense* is the skin (which provides an outer protective covering to the body) and the mucous membrane. These barriers are sometimes destroyed by the invading germs, which manage to enter our bodies. The entry of germs alerts the body's *second line of defense*, which comprises white blood cells. These cells attack and destroy the disease-causing germs. The body's *third line of defense* involves the body's *immune system*, which releases chemicals called *antibodies* into the blood. These antibodies act against foreign substances (antigens) such as pathogens.

FACT FILE

Immunization has eliminated smallpox from the world and the practice of vaccination against smallpox has now been discontinued.

Immunization

Immunization is the process of protecting our bodies against infectious diseases. Through immunization, we acquire new powers of resistance which we do not possess at the time of our birth. Since *natural immunity* (with which we are born) does not protect our bodies from certain diseases, immunization against these diseases is essential. The immunity acquired after birth, through immunization, is known as *acquired immunity.*

An immunizing preparation containing a suspension of killed or weakened germs is called a ***vaccine.*** The vaccine used against typhoid consists of killed typhoid germs, while the vaccine used against smallpox is a preparation of weakened smallpox germs. The germs in the immunizing preparations act as antigens, stimulating the body to produce antibodies and antitoxins against them. These antibodies and antitoxins protect the body from future infections. *The introduction of a vaccine by scarification (cutting the skin) is known as* ***vaccination,*** *while the introduction of a vaccine by injection is called* ***inoculation.*** Some vaccines, such as that for polio, are also given orally (Fig. 4.9).

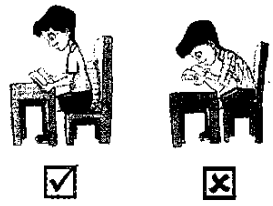
Fig. 4.9 *An oral vaccine*

UNHEALTHY HABITS

'A healthy mind in a healthy body' is an age old saying. It must be emphasized that a healthy body results from the interplay of several factors, and good health can only be sustained by maintaining healthy habits. Personal hygiene, timely immunization, good food in right quantities, and regular exercise are important in promoting good health. A few habits that can adversely affect one's health are listed below.

1. *Lack of personal hygiene* If one is careless in the daily maintenance of personal cleanliness of skin, hair, teeth, sense organs, etc., it may adversely affect one's health.
2. *Lack of exercise and rest* In the absence of adequate exercise and rest, good health cannot be sustained. These will have to be built into one's daily routine.
3. *Lack of clean surroundings* Safe disposal of sewage, waste water, and household wastes is important as these serve as breeding grounds of disease-causing organisms.
4. *Lack of balanced diet* Our food needs to be well-balanced and it should be taken in the right quantities—not more, not less.

FACT FILE



Posture refers to the way in which we walk, sit, or stand. A straight, upright posture also helps us stay healthy.

5. *Addiction to drugs* Addiction to drugs such as morphine and marijuana can have disastrous consequences—physical or physiological dependence, illness, accidents, or even death.
7. *Addiction to tobacco* Chewing or smoking tobacco is injurious to health (Fig. 4.10). It can cause lung cancer and heart diseases.
8. *Addiction to alcohol* Excessive intake of alcohol can damage the brain and the liver. Cirrhosis, a condition characterized by the death of liver cells, is prevalent among alcoholics. As the disease progresses, the patient's skin may develop the yellowish hue of jaundice and fluid accumulates in the legs and in the abdomen. The liver subsequently shrivels and can no longer function effectively. This damage is irreversible.

Fig. 4.10 *Cross-section of a smoker's lung. The black patches are carbon deposits formed as a result of smoking*

KEYWORDS

Disease A state in which an organ or a function of the body is no longer in a healthy state
Non-communicable diseases Diseases that cannot be transmitted or passed from one person to another
Communicable diseases Diseases that can spread from one person to another
Pathogens Disease-causing germs
Fever A state of abnormally high body temperature, often accompanied by a quickened pulse
Allergy Hypersensitivity to a specific substance
First aid Immediate care that can be given to an accident victim to prevent the injury or illness from worsening, before medical help can be provided
Vaccine Immunizing preparation containing a suspension of killed or weakened germs

SUMMARY

- Diseases can be non-communicable or communicable.
- Lack of proteins, carbohydrates, vitamins, and minerals in the diet can lead to deficiency diseases.
- Deficiency of proteins in the diet of children can cause kwashiorkor.
- A combined deficiency of carbohydrates and proteins in the diet of infants can cause marasmus.
- Metabolic diseases such as cancer and diabetes are caused by malfunctioning of an organ or organ system or by an imbalance in certain control mechanisms of the body.
- Communicable diseases can spread through droplets, contaminated food and water, carrier organisms, direct or indirect contact with the infected person, and animal bites.
- First aid can prevent an injury from worsening before the victim can receive medical assistance.
- Immunization, through vaccination, protects the body against infectious diseases.
- Unhealthy habits such as lack of personal hygiene, exercise, rest, clean surroundings, and balanced diet as well as addiction to drugs, tobacco, or alcohol should be avoided.

EXERCISES

I. Review questions

A. Fill in the blanks

1. Marasmus is caused by the deficiency of carbohydrates and ..... (fats/proteins).
2. ..... (Rickets/Scurvy) is a disease caused by the deficiency of vitamin C.
3. Bite from an infected dog can cause ..... (rabies/goitre).
4. Deficiency of vitamin B1 causes ..... (beriberi/pellagra).
5. Deficiency of iron causes ..... (anaemia/rickets).

B. Tick the correct answer

1. Ringworm is caused by a
   (a) virus (b) bacterium (c) protozoan (d) fungus
2. Malaria is caused by
   (a) *Entamoeba* (b) *Plasmodium* (c) *Culex* (d) *Salmonella*
3. Fever is caused by substances called
   (a) dust particles (b) pollen grains (c) pyrogens (d) allergens
4. Deficiency of iodine results in
   (a) tooth decay (b) goitre (c) rickets (d) scurvy
5. Wasp sting is
   (a) acidic (b) alkaline (c) neutral (d) sweet
6. Disease-causing germs
   (a) formites (b) pyrogens (c) pathogens (d) pollen grains

C. Correct the statements that are false

1. Typhoid and cholera spread through contaminated food.
2. Pollen grains can cause allergy.
3. Ringworm and conjunctivitis spread through animal bites.
4. A third-degree burn is the most severe.
5. Fever is a disease.

D. Answer the following

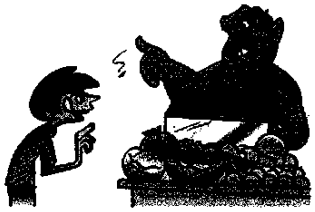
1. Name the two main types of diseases.
2. What causes kwashiorkor? List the symptoms of the disease.
3. What causes marasmus? List the symptoms of the disease.
4. What are metabolic diseases? Name any two.
5. What is an allergy? Name any two substances that can cause allergy.
6. Explain any three mechanisms by which infectious diseases spread from person to person.
7. How are the three types of burns distinguished?
8. What is first aid? How would you provide first aid to a person who has been bitten by a dog?
9. List any five precautions that can help in prevention of diseases.
10. Distinguish between vaccination and inoculation.
11. List any four habits that can adversely affect one's health.

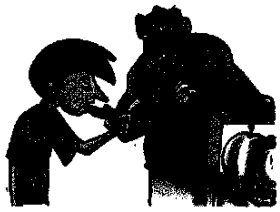
II. Skill-based questions

E. Circle the actions that are likely to cause a communicable disease.

1. Consuming exposed fruits
2. Eating an unbalanced diet
3. Smoking
4. Eating food with dirty hands
5. Lack of exercise

F. Arrange the series of events shown in the following pictures in the correct order.



III. Fun Time

Unscramble the following words. (*Hint: They are all names of diseases.*)

BARIES	DIOYHPT	IMLAARA	UNEDGE	ISKRCET
.....	.....	.....	.....	.....

PROJECT IDEAS

- Students can write a report on one of the following topics: (a) unsanitary conditions and spread of diseases, (b) public awareness and spread of diseases; (c) outbreak of an infectious disease in their city. They can collect information and pictures from books, magazines, newspapers, and the Internet.

TEACHER'S NOTES

- A visit to the local municipal corporation's health department could be helpful in making students understand many problems related to public health.
- A class discussion could be organized on the topic 'How to avoid ill health'.

Website References

http://hes.ucf.k12.pa.us/gclaypo/commdise/commdise.html (accessed 2 June 07)
http://www.kidsheath.org/parent/firstaid_safe/ (accessed 4 June 07)