CHAPTER 9

Towards Better Health

Control of Micro-organisms

A large number of diseases are caused by micro-organisms called **pathogens**. Most bacterial and viral diseases can be controlled by good health habits, sterilization of food and water, proper sanitary conditions, maintenance of body health and artificial immunity produced by vaccination or inoculation. Pathogens can be controlled in several ways. These include:

1. Use of high temperature
2. Use of antibiotics.
3. Use of antiseptics.
4. Use of High salinity (salting).
5. Dehydration.

1. *Use of high temperature*

Heating to high temperature is one of the ways by which micro-organisms can be controlled. Bacteria and their spores are destroyed at very high temperatures. Food can be boiled, baked or fried. This technique of food preservation destroys disease-causing micro-organisms e.g. typhoid, which could be transmitted by food. Surgical instruments and dressings are sterilized by boiling and autoclaving (i.e. passing steam under pressure through the materials) in hospitals. This ensures that pathogens are not transmitted through the instruments to patients. Autoclaving is necessary to kill bacterial endospores. Boiling of drinking water also destroys pathogens that are present in the water. Ultraviolet rays also kill bacteria. Its main use is in modern operation theatres, and in the sterilization of prepacked surgical dressings and syringes.

2. *Antibiotics*

Antibiotics are chemicals extracted from bacteria or fungi. They destroy many forms of harmful micro-organisms without harming the cells of the body.

Today, a number of available antibiotics are useful against all types of bacteria. To prescribe an effective antibiotic, doctors must identify the bacteria causing an infection.

Also, bacteria undergo constant mutation. Therefore, bacteria can develop resistance to certain antibiotics. For example, some kinds of bacteria that were once killed by Penicillin are now resistant to it. Examples of antibiotics are penicillin, tetracyclin, streptomycin, aureomycin, neomycin, nystatin and chloramphenicol. Antibiotics are not effective against viral infections. Remember that viruses reproduce by using the same chemical machinery as your own cells. Any substance that interferes with this chemistry would kill your own cells along with the virus, hence, prevention is still the best way to deal with viral diseases.

3. *Antiseptics*

Antiseptics are chemicals which act against bacteria. Some antiseptics kill the bacteria and their spores. Others kill the bacteria but not the spores, and some merely prevent the bacteria from multiplying. Examples of antiseptics are tincture of iodine, hydrogen peroxide (H_2O_2), potassium tetraoxo manganate VII or potassium permanganate, $KMnO_4$.

Disinfectants contain antiseptic chemicals. They also kill bacteria, but are stronger than antiseptics and are not suitable for use on human skin. They can be used on floors, walls and equipment in buildings such as hospitals and homes. Examples include solutions of chlorine, formaldehyde, milton and lysol.

4. High Salinity (Salting)

This is the application of salt to destroy micro-organisms. Common salt in sufficient quantity will prevent any bacterial activity. The high salt content plasmolyses any bacteria around. It does this by drawing all the water from the bacteria to itself by the process of osmosis.

5. Dehydration.

Micro-organisms cannot grow or multiply if there is insufficient water. Therefore, the drying of foodstuffs helps to control the growth of bacteria.

Experiment 9.1 To demonstrate the effect of heat on micro-organisms.

Method

1. Your teacher will prepare two petri dishes containing culture medium.
2. Label the two petri dishes, A and B.
3. Put petri dish A in a hot oven (about 160Â°C) and leave petri dish B in a safe place.
4. Observe the two petri dishes after 48 hours.

Observation:

It will be observed that a colony of micro-organisms developed in petri dish B but not in petri dish A.

Conclusion:
This shows that heat has destroyed the micro-organisms in petri dish A.

Vectors

A vector is an animal which transmits a disease-causing organism (pathogen) from an infected person to an uninfected person. Most vectors are insects. *Table 9.1*. summarizes the common vectors and the diseases they transmit.

Table 9.1 *Common vectors and the diseases they transmit.*

Vector	Disease transmitted
Anopheles mosquito	Malaria
Aedes mosquito	Yellow fever
Culex mosquito	Filariasis (elephantiasis)
Simulium (blackfly)	River blindness (onchocerciasis)
Glossina (tsetse fly)	Sleeping sickness
Housefly	Dysentery, cholera, typhoid, etc.
Fleas and lice	Plague, typhus
Ticks and mite	Typhus

Ways of controlling vectors

When a disease is passed on by a vector, it is simpler and more effective to attack the vector, rather than the pathogen. This can be done in several ways.

1. Spraying infected areas with insecticides to kill vectors (e.g. mosquitoes and houseflies).
2. Spreading oil over the surface of water containing pupae and larvae of vectors to suffocate them.
3. Thorough draining of swamps.
4. Stocking ponds with fish to eat up larvae and pupae of mosquitoes.
5. Sleeping under nets to avoid mosquito bites.

Maintenance of good health (Public Health)

A person is healthy and lives a full life when, apart from eating good food, he lives in a clean environment, wears clean clothes and is therefore not a victim of diseases.

The maintenance of good health should be the concern of every individual and also the community. Communities help to prevent and control infectious diseases, send inspectors to inspect food product, protect water supply and dispose of waste products like sewage and garbage or refuse. These are parts of the activities of the Local Public Health Authority located in each local government area throughout the country.

Functions of the Local Public Health Authority

Among the main functions of the Local Government Public Health Authority, which has departments and officials in all towns, cities and many villages are the following:

1. Ensuring good water supply.
2. Ensuring proper removal and disposal of refuse and maintenance of a clean environment.
3. Ensuring good systems of sewage disposal.
4. Employing sanitary inspectors to check housing conditions, and sanitary labourers to clean public places.
5. Ensuring that health inspectors inspect abattoirs and ensure that clean and wholesome foods are sold in markets and other public places.
6. Controlling pests and prevention of infectious diseases through immunization.
7. Provision of health care services.
8. Supervision of hospitals, clinics and welfare centres.
9. Issuance of health certificate to travellers.
10. Keeping of records and compilation of statistics on health problems.

Refuse disposal

Refuse is the solid waste from homes and factories. Open refuse dumps around dwellings provide breeding places for insects and rodents and these spread diseases. Also, stench from decomposing refuse becomes a nuisance. Refuse can be disposed of by:

(i) burning it in incinerators;
(ii) burying it in a sanitary land fill; and
(iii) dumping it in isolated areas far from human habitation.

Sewage disposal

Sewage is the liquid waste of a community arising from household sinks, baths, toilets and factories. Sewage can be disposed of in the following ways:

1. *Septic tanks:* Water is used to flush faeces and urine into a tank dug in the ground. This is known as a septic tank. (*See Fig. 9.2).*
2. *Pit latrines:* Faeces and urine are passed into deep pits. This prevents bad odour from escaping and flies from entering *(See Fig. 9.1)*
3. *Municipal treatment processes:* The sewage from various dwellings is collected and treated. In the treatment, harmless aerobic bacteria break down the organic matter in the sewage into simple substances. The solids which settle (i.e. the sludge) are removed and spread on fields to dry out, while the supernatant liquid (the effluent) is chlorinated before it is discharged into the river or onto farmlands.

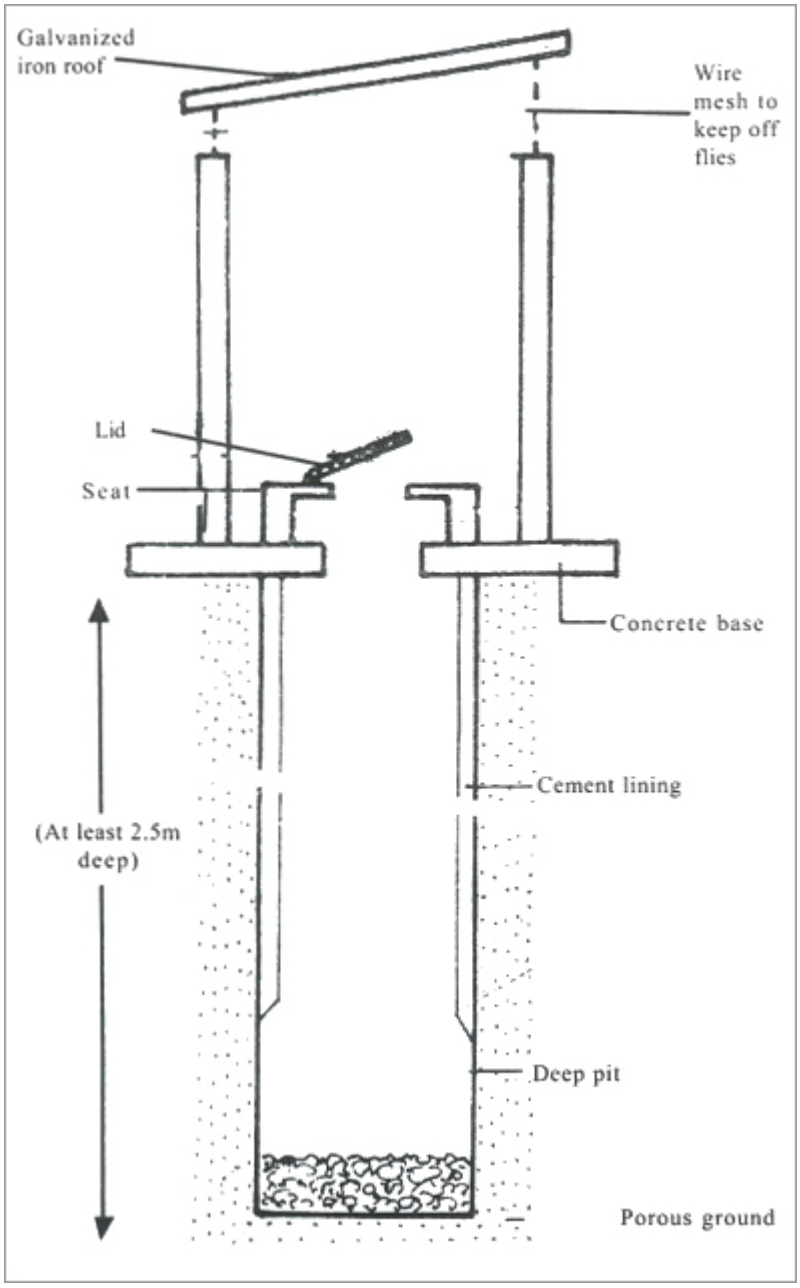

Fig 9.1 A pit latrine

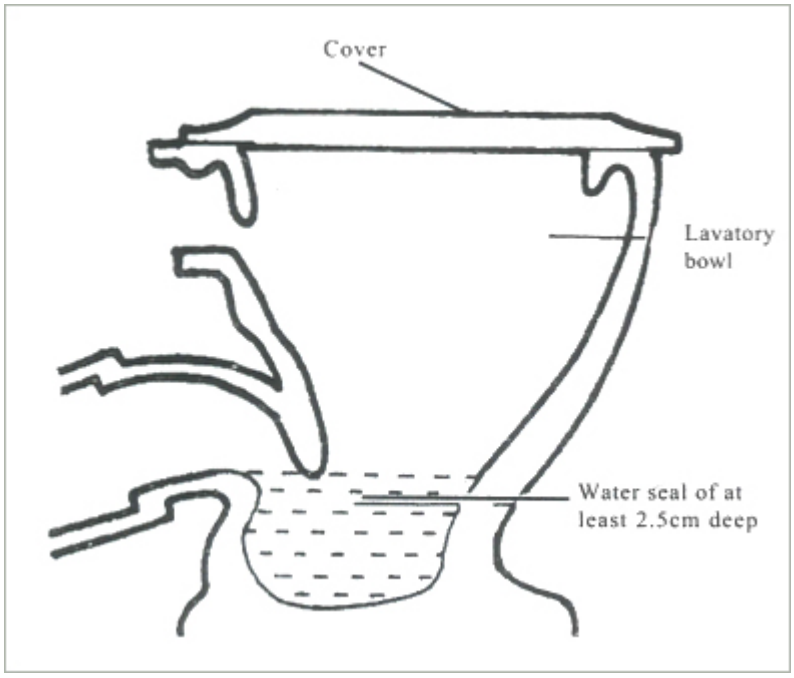

Fig 9.2 A modern water closet

Protection of water

The responsibility for the maintenance of water-supply is delegated to the water board which is an arm of the government. In many developing countries like Nigeria, people in urban centres are provided with pipe-borne water. This is done through the construction of modern water works. It is there that the water is treated, cleaned and chlorinated before it is passed through pipes into houses and other places where it is needed.

Protection of food

All foodstuff, drinks and drugs supplied to the public are required to reach a standard which will make them fit for human consumption. Officials of the Ministry of Health and some health agencies go round to ensure that food, meat, drinks and drugs conform with set standards.

Control of diseases

Diseases can be controlled generally by:

1. Personal hygiene (i.e. regular bathing, care of the teeth, clean hands, clean clothes etc).
2. Living in clean environments; having covered gutters and proper sewage and refuse disposal.
3. Eating good and balanced diet.
4. Using clean, uncontaminated water.
5. Isolation of persons suffering from infectious diseases.
6. Immunization against diseases.
7. Proper first aid.
8. Use of appropriate drugs prescribed by medical experts.
9. Health education and public health information.

Health organizations

There are different national and international organisations that help various governments to improve the health of their people. These organisations include the World Health Organisation (W.H.O), United Nations International Childrenâ€™s Emergency Fund (UNICEF), International Red Cross Society, Nigerian Medical Association (NMA), Food and Agricultural Organization (FAO).

The specific roles played by some selected international health organizations are listed below.

World Health Organization (W.H.O)

1. The World Health Organization sees to the prevention and control of major diseases. They do this by keeping world health statistics which help national health authorities to see if a disease like cholera for example, is spreading or receding.
2. Training of medical personnel and providing experts for member countries to advise health personnel.
3. Producing medical publications.
4. Providing warning systems in the event of an epidemic.
5. Providing drugs and vaccines in case of emergency.
6. Helping in programmes towards better environmental sanitation.
7. Assisting national health organisations in programmes for control of diseases and vectors.
8. Helping in maternal and child health care.
9. Setting and recommending safe standards for drugs.
10. Setting international quarantine regulations.

United Nations International Childrenâ€™s Emergency Fund (UNICEF)

1. Improving the nutrition of undernourished children.
2. Feeding destitute children.
3. Providing for emergency needs of children in devastated areas.
4. Supplying vaccines or equipment to prevent or control diseases like whooping cough, diphtheria, polio and tuberculosis.
5. Providing childrenâ€™s clothing and other needs.
6. Assisting in the improvement of the health of mothers and their children by providing training programmes and equipment.

The International Red Cross

1. Providing first aid services.
2. Prevention of accidents.
3. Training of nurses.
4. Maintenance of maternal and child welfare clinics and blood banks.
5. Helping in disasters like earthquakes and floods.
6. Preparing information booklets on how to give first aid and on life-saving techniques.

7. Preventing the outbreak of diseases by administering vaccines.
8. In war time, they are concerned with:
   (a) the care of the injured;
   (b) providing emergency aid to those in distress;
   (c) negotiating for the exchange of prisoners of war between countries;
   (d) providing transport for the evacuation of refuges;
   (e) monitoring the welfare of prisoners of war.

Nigerian Medical Association (NMA)

1. To ensure that medical doctors recruited in hospitals are well trained.
2. To assist in the training of medical and paramedical staff.
3. To alert the nation when there is an outbreak of a disease.
4. To carry out researches on ways of curing diseases.

Food and Agricultural Organization (FAO)

1. Provision of technical aids necessary for better production of food.
2. Giving out free samples of plant species which produce high food yield.
3. Educating the public through publications on improved food production.

Suggested Practicals

1. An experiment to demonstrate the effect of antibiotics on micro-organisms.
   (a) Your teacher will prepare two petri dishes containing culture media.
   (b) Label the two petri dishes A and B.
   (c) Put some antibiotics e.g. penicillin into petri dish A.
   (d) Petri dish B serves as the control.
   (e) Put the petri dishes in an incubator at 37Â°C for at least 24 hours.
   (f) After this time, examine each petri dish for the presence of bacteria.
   (g) Record your observations and try to give reasons for them.
2. An experiment to show the effect of oil on the larvae and pupae of mosquito in water.
   (a) Pour water into two beakers.
   (b) Label them A and B.
   (c) Introduce the same larvae and pupae of mosquito into the two beakers.
   (d) Use a dropper to put a drop of kerosene into beaker A, put none in beaker B.
   (e) Allow both beakers to stay for several hours.
   (f) Record your observations and give reasons for your

observations.

Summary

1. Harmful micro-organisms can be controlled by the use of high temperature, antibiotics, antiseptics, high salinity and dehydration.
2. Vectors transmit disease-causing organisms (pathogens) from an infected person to an uninfected person.
3. Vectors can be controlled by killing the adult vectors, preventing them from biting us and by destroying the developmental stages.
4. Maintenance of good health should be the concern of the individual and the community. For example, communities should do this by inspection of foodstuff, refuse disposal, sewage disposal and protection of water through their Local Public Health Authorities.
5. Some International and National Organizations like the WHO, UNICEF, Red Cross Society, FAO and Nigerian Medical Association help the community and the government to carry out their functions with respect to public health.

Objective Questions

1. One of the methods used to prevent milk from fermenting is
   A. disinfection.
   B. sterilization.
   C. pasteurization
   D. irradiation.
   E. use of antibiotics.
2. The prevention and control of major diseases in the world is one of the functions of the
   A. W.H.O.
   B. UNICEF
   C. Red Cross Society Association
   D. F.A.O.
   E. Nigerian Medical
3. In Africa, bacteria have successfully spread diseases because of
   A. the climate.
   B. poorly designed houses.
   C. mosquitoes and houseflies.
   D. ignorance, poor personal hygiene.
   E. poorly designed hospitals.
4. The vector that transmits yellow fever is
   A. *Anopheles* mosquito.
   B. *Aedes* mosquito.
   C. *Culex* mosquito.
   D. *Simulium* (blackfly).

E. Housefly.

5. The best method of sewage disposal is
   A. pit latrine
   B. bucket latrine.
   C. septic tank.
   D. open field.
   E. shallow holes.

Essay Questions

1. (a) What is a vector?
   (b) State five different ways in which a named vector can be controlled.
2. (a) State five different ways in which harmful micro-organisms can be controlled.
   (b) Describe an experiment to demonstrate the effect of heat on micro-organisms.
3. (a) State three functions each of the following:
      (i) World Health Organisation.
      (ii) Red Cross Society.
      (iii) United Nations International Childrenâ€™s Emergency Fund.
   (b) What do you understand by dehydration and high salinity?
4. (a) What is a septic tank?
   (b) Describe three ways in which refuse can be disposed of.