

Training Manual for Local Governance and Women Group Representatives



Module X

Water, Hygiene,
Sanitation and
Community
Mobilization

1. INTRODUCTION

Around the world, the health status of people in rural areas is generally worse than in urban areas. In Sub-Saharan Africa, for instance, infant mortality rates in rural areas are 1.6 times that of urban areas. Rural children are 77 per cent more likely to be underweight or under height for age; 56 per cent of rural people in this region live more than 15 km from a health facility.

Population and environmental health issues are critical factors in the relationship between poverty and health. Eighty per cent of the poor in Latin America, 60 per cent in Asia and 50 per cent in Sub-Saharan Africa live on marginal lands of low productivity and high susceptibility to degradation. This tends to encourage migration from rural areas to the cities. In the world's rural areas, more than two billion people live without facilities for garbage disposal or water drainage. They drink contaminated water.

A significant proportion of overall poor health and disease burden of rural people can be attributed to relatively few key areas of risk. These include: poor water quality, poor water availability, inappropriate sanitation, vector-borne diseases (such as malaria), and poor surrounding (ambient) and indoor air quality; toxic substances; and global environmental change.

In many cases, simple preventive measures exist to reduce the burden of disease from such risk. However, a comprehensive knowledge and understanding of such measures among rural people has been more of a challenge. Below are estimates of deaths globally from the most significant environmentally related causes or conditions, and from certain diseases (WHO):



Unsafe water and poor sanitation and hygiene kill an estimated 1.7 million people annually, particularly as a result of diarrhoeal disease.

Indoor smoke – primarily from the use of solid fuels in domestic cooking and heating – kills an estimated 1.6 million people annually due to respiratory diseases.

Malaria kills over 1.2 million people annually, mostly African children under the age of five. Poorly designed irrigation and water systems, inadequate housing, poor waste disposal and water storage, deforestation and loss of biodiversity, all may be contributing factors to the most common vector-borne diseases, including malaria, dengue and kala-azar (a parasitic disease that is spread by the bite of sand flies).

Lead exposure kills more than 230,000 people per year and causes cognitive effects in one third of all children globally; more than 97 per cent of those affected live in the developing world.

Climate change impacts – including more extreme weather events, changed patterns of disease and effects on agricultural production – are estimated to cause over 150,000 deaths annually.

Consumption of unsafe drinking water, improper disposal of human excreta, improper environmental sanitation and lack of personal and food hygiene have been major causes of many diseases among rural people in developing countries.

In the context of rural development, a shift is needed, however, in the emphasis from the traditional irrigation to other means that focus on the needs of the poor and their food insecurity. The challenges are to develop water-saving technologies.

Lands that have been damaged by waterlogging and salinization must be reclaimed through drainage programmes. New irrigation development needs to be carried out with proper environmental impact assessment. Policies must be encouraged that develop sustainable irrigation and harness the wider potential of rain-fed farming, incorporating water management for gardens and foods from common property resources.

This training module explains the various aspects of water, hygiene and sanitation so that rural people can come to know the relevance of these factors. This is an area which is highly overlooked in developing countries.

The aim of the module is not to prescribe, but to suggest ways and means, stimulate change and provide ideas and guidance to all those who want to make rural area a better place for sanitation and hygiene. So that all users interpret the module in the same manner, it is important to clarify the major concepts used, i.e. water, environmental sanitation facilities and rural hygiene literacy and community mobilization.

After completion of this module, you would be able to:

- Describe the importance of health, hygiene and sanitation.
- Bring about an improvement in the general quality of life in rural areas.
- Accelerate sanitation coverage.
- Generate demand through awareness and health education.
- Cover LSG's (local self group) in rural areas with sanitation facilities and promote hygiene values to common people.
- Encourage cost effective and appropriate technology development and application.
- Endeavour to reduce water and sanitation related diseases.
- Understand the knowledge, attitudes and practices towards water and sanitation.

The module contains seven sections with a detailed description on each sub-theme.

- Contents
- Role and Importance of Health, Hygiene and Sanitation.
- Water is life – importance of water.
- Hygiene and sanitation.
- Community support and mobilization for health education.
- Sanitary surveys

The important gaps discussed in this module are skill gaps, limited knowledge of practices used in improving the health, hygiene and sanitation conditions of rural people, limited implementation capacities, and complex and low operating capacities and result-orientation of rural people. Finally, the module describes a selected number of useful practices and successful stories.

2.

KNOWING THE ROLE AND IMPORTANCE OF HEALTH, HYGIENE AND SANITATION



Sanitation literally means measures necessary for improving and protecting health and well being of the people. Sanitation is any system that promotes proper disposal of human and animal wastes, proper use of toilet and avoiding open space defecation.

The World Health Organization states that:

“Sanitation generally refers to the provision of facilities and services for the safe disposal of human urine and faeces. Inadequate sanitation is a major cause of disease worldwide and improving sanitation is known to have a significant beneficial impact on health both in house holds and across communities. The word ‘sanitation’ also refers to the maintenance of hygienic conditions, through services such as garbage collection and wastewater disposal.”

Types of sanitation

There are different types of sanitation relating to particular situations, such as:

- Basic sanitation: refers to the management of human faeces at the household level. It means access to a toilet or latrine.
- Onsite sanitation: the collection and treatment of waste at the place where it is deposited.
- Food sanitation: refers to the hygienic measures for ensuring food safety. Food hygiene is similar to food sanitation.
- Housing sanitation: refers to safeguarding the home environment (the dwelling and its immediate environment).

- Environmental sanitation: the control of environmental factors that form links in disease transmission. This category includes solid waste management, water and wastewater treatment, industrial waste treatment and noise and pollution control.
- Ecological sanitation: the concept of recycling the nutrients from human and animal wastes to the environment.

Hygiene is the practice of keeping yourself and your surroundings clean, especially to avoid illness or the spread of preventable diseases.

Table 10.1: Components of hygiene and environmental health

Description	Concerns
Personal hygiene	Hygiene of body and clothing
Water supply	Adequacy, safety (chemical, bacteriological, physical) of water for domestic, drinking and recreational use
Human waste disposal	Proper excreta disposal and liquid waste management
Solid waste management	Proper application of storage, collection, disposal of waste. Waste production and recycling
Vector control	Control of mammals (such as rats) and arthropods (insects such as flies and other creatures such as mites) that transmit disease
Food hygiene	Food safety and wholesomeness in its production, storage, preparation, distribution and sale, until consumption
Healthful housing	Physiological needs, protection against disease and accidents, psychological and social comforts in residential and recreational areas
Institutional hygiene	Communal hygiene in schools, prisons, health facilities, refugee camps, detention homes and settlement areas
Water pollution	Sources, characteristics, impact and mitigation
Occupational hygiene	Hygiene and safety in the workplace

And after two above one important question come into mind what is “health”? In simple terms, it is a state of being free from illness or injury. Now we will brief you about all the aspects and role of health, hygiene and sanitation.

2.1 Difference between sanitation and hygiene

Both sanitation and hygiene are crucial to prevent dangerous diseases and maintain a good health. Both aim cleanliness. When people are talking about hygiene “personal hygiene” is the most used phrase.

- Hygiene is mainly related to the human body. Maintaining a good personal hygiene is a precaution in preventing the spread of pathogenic microorganisms among people.
- Sanitation is mainly related to safe disposal of waste around human beings. So there are many kinds of sanitation.
 - ▶ *First one is safe disposal of human urine and faeces.*
 - ▶ *Food sanitation is also more important because food is an easier way for the pathogens to come into the community.*
 - ▶ *Industrial sanitation highly affects the ecosystem and the bio-diversity.*
 - ▶ *Many countries of the world have considered recycling and reusing of disposed wastes. It is very important to not only prevent diseases but also to improve economic development in the world.*

For instance, a school sanitation, water and hygiene management programme tells us that:

- A child is the key resource.
- A school is the knowledge centre.
- A teacher is the sensitive leader.
- Community is an equal partner.
- Government is committed facilitator.

A multitude of different social, economic and cultural factors determine a person's health. This means that people living in the same community, or people of the same age, can have vastly different chances of good health.

Health and illness are affected by many factors, which may be explained using a model of determinants of health. This module provides a brief overview and discussion of determinants of health and suggests how this module may assist the rural communities with communicating and applying best practices in public health.

Box 10.1**Global Hand-washing Day: China**

On Global Hand-washing Day, there were education activities on proper hand-washing methods, involving 8 million students in 10 provinces in school campuses nationwide. Government officials from the Ministry of Education and other Public and Private sector partners announced the 'Healthy Great Wall' Foundation with the aim of reaching 100 million Chinese kids by 2015. Also, a mass billboard campaign and TV spots were reminders to participate in the celebration.

The event, which featured games and educational activities for children, promoted correct hand-washing technique and attracted an estimated 2,000 local residents and students. The event was organized by the National Patriotic Health Campaign Committee and Health Education Institute of China CDC with support from UNICEF.

Source: UNICEF

3

KNOWING THE ROLE AND IMPORTANCE OF HEALTH, HYGIENE AND SANITATION



Rural people in developing countries cannot achieve real development if they continue to live in an unclean surroundings due to lack of access to safe water and sanitation. Poor water and sanitation facilities have many serious repercussions. A direct

link exists between water, sanitation, health, nutrition and human wellbeing.

Individual health and hygiene is largely dependent on adequate availability of drinking water and proper sanitation. Consumption of unsafe drinking water has been one of the major causes of many diseases among rural people.

Unsafe drinking water and poor environmental sanitation causes major health problems to the community. Safe drinking water must be free from bacteriological and chemical contamination. The bacteriological contamination in drinking water may cause diarrhoea (loose motions), dysentery, typhoid fever, cholera, jaundice etc.

Dental, skeletal and non-skeletal fluorosis may be caused due to presence of excess fluoride in drinking water. Arsenic contamination in drinking water causes dermatitis. Blue baby syndrome among newly born babies may be caused due to presence of excess nitrate in drinking water.

Water is one of the most important substances on earth. People, plants and animals cannot survive without water. If there were no water there would not be any life on earth (Figure 10.1).

Figure 10.1: Plants and animal need water



Apart from drinking it to survive, people have many other uses for water. These include:

- Cooking.
- Washing their bodies.
- Washing clothes.
- Washing cooking and eating utensils, such as saucepans, crockery and cutlery.
- Keeping houses and communities clean.
- Recreation, such as swimming pools.
- Keeping plants alive in gardens and parks.
- Water is also essential for the healthy growth of farm crops and farm stock and is used in the manufacture of many products.

Today we use water in many ways (Figure 10.2). In our homes, we use water for drinking, cleaning, cooking, and flushing. Irrigating farms, golf courses, and our lawns requires a tremendous amount of water. Industries use water to manufacture metal, glass, and wood products. They use water in canned foods, soft drinks, and many other products. Water is used to produce electric power. We enjoy the beauty of nature's rivers, lakes, and oceans. We use the bodies of water for swimming, boating, and fishing. Water is also used by fire extinguishers to save lives and property.

A community based management system would be appropriate to achieve the objective. Accordingly community need to be made aware and motivated on the use of safe drinking water. A capacity and infrastructure should be built at village level with participation of community leaders, primary teachers, health workers.

Figure 10.2: Uses of water



About 70% of the earth's surface is covered with water. The fresh water available for human use is just 0.629% (ground water, fresh water, rivers). And by polluting this small amount of water available for human use we are not only threatening our own survival but also the lives of other organisms.

Do you know that?

- Of all the water on earth, only 2.5% is fresh water.
- Fresh water is either groundwater (0.5%) or readily accessible water in lakes, streams, rivers, etc. (0.01%).
- 80% of the earth's water is surface water.
- The other 20% is either ground water or atmospheric water vapour.
- Approximately 66% of the human body consists of water.
- The total amount of water in the body of an average adult is 37 litres.
- Human brains are 75% water, bones are 25% water and blood is 83% water.

- A person can live about a month without food, but only about a week without water.
- A person must consume 2 litres of water daily to live healthily.
- Humans drink an average of 75,000 litres of water throughout their life.
- Groundwater supplies serve about 80% of the population, whereas up to 4% of usable groundwater is already polluted.
- Each day almost 10,000 children under the age of 5 in Third World countries die as a result of illnesses contracted by use of impure water.
- About 25,700 litres (6,800 gallons) of water is required to grow a day's food for a family of four.
- Over 70,000 different water contaminants have been identified.
- Water is one of developing countries' most pressing problems — 80 per cent of infectious diseases are water borne.
- Projections for 2025 indicate that the number of people living in water-stressed countries will increase to 3 billion — a six folds increase.

3.1 Sources of water

There are many ways in which we can collect water. The main sources of water are:



“Water, water everywhere, nor any drop to drink.” The Rime of the Ancient Mariner

Surface water

The principal sources of surface water are streams, rivers and lakes (Figure 10.3). This is water that falls to the ground as rain or hail. This water is col-

lected from a special area called a catchment. The catchment feeds water into a holding area via rivers, streams and lakes. The water is then stored in a natural or artificial (man-made) barrier called a dam or reservoir (Figure 10.4). Dams are usually placed at the lower end of a valley.

Community water supplies in rural areas are drawn directly from nearby rivers, streams or lakes.

Figure 10.3: Major surface water sources



River



Stream



Lake

Figure 10.4: Surface water Dams



These are the most abundant, common and most useful sources of water in rural areas. However it is unfortunate that most of these sources have been polluted and should be used only after adequate treatment. Sometimes, you may notice that rivers and lakes are polluted so much that even fish cannot live in them. In such cases, very extensive and expensive methods are needed to clean these sources of water.

These are the most abundant, common and most useful sources of water in some communities.

Rainwater

The rainwater that falls on the roofs of your houses is often collected using roof guttering leading through a pipe to a storage tank. This can be the purest form

of water, if it is collected properly and the air in the area is not heavily polluted.

You can collect rainwater draining from the roof of your buildings by using roof gutters as shown in Figure 10.5.

- Storage containers near the house (A).
- Underground storage tanks (B)

Figure 10.5: Rainwater storage tanks



Many times people collect water by using these two devices. But you should know that if this water is not treated properly it gets contaminated (dirty) easily with germs and insects. It gets dirty by:

Springs

These are found where underground water flows out of the ground naturally without the use of bores, wells or pumps (Figure 10.6). Springs often occur towards the bottom of a hill or on sloping ground.

Figure 10.6: Spring water



A spring is underground water that flows out naturally, usually from the side of a hill. For this reason, spring water can be of very high quality, and used without treatment if some measures are taken to protect the outflow properly. Unprotected outflows could be contaminated by human and animal activities.

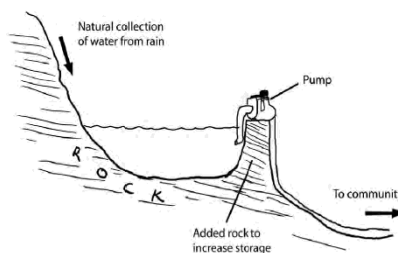
You can use the following measures to protect and keep spring water safe for drinking.

- Build a covered concrete structure (a spring box) around the edge so that the water flows directly into a pipe without ever being open to pollution from outside. (See Figure 3).
- The box should be easy to clean.
- The cover must be securely locked to stop unauthorized personnel from contaminating the water.
- The box should have an overflow vent and an air vent.
- A fence should be constructed around it in order to prevent animals from getting too close to the source.
- A surface drainage ditch should be dug uphill to the source to direct surface water run-off away from the source.
- If the spring is not protected, then the water should be treated before drinking.

Rock catchment areas and rock holes

Sometimes large rocky outcrops contain low areas in which water is trapped. These low areas make good natural dams (Figure 10.7). Often a wall can be built to increase the amount of trapped water.

Figure 10.7: Rock catchment areas and rock holes



Excavated dams

Excavated dams are made by digging a large shallow hole (Figure 10.8). These dams are sometimes placed at the bottom of a slope to aid water collection. However, this can only be done in areas where the soil will not allow the water to drain away very easily through the ground, for example, in clay soils.

If a community wants a dam in an area where the soil is not impervious digging the hole and lining it with clay or an impervious liner, such as concrete or heavy plastic, can still do this. Farmers to supply water to animals often use excavated dams.

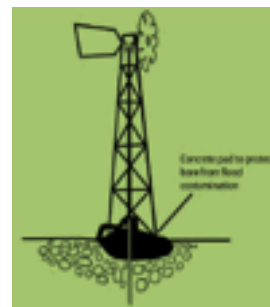
Figure 10.8: Excavated dams



Bores and wells

These are holes drilled into the ground deep enough to find a permanent (long-lasting) body of water (Figure 10.9). A pipe runs down the hole into the water and a pump is used to get the water up to ground level. The water is then pumped to the community.

Figure 10.9: Bore and well



Artesian bores

Sometimes when a bore is sunk into a low lying area the water gushes out of the hole under its own pressure (Figure 10.10). This kind of bore is called an artesian bore.

Figure 10.10: Artesian bore



Underground water or groundwater

A water supply taken directly from a bore or well is often called groundwater.

The water that comes from any of these sources may be salty, cloudy, smell unpleasant or have germs in it. Water of this kind would require special treatment to make it potable.

Groundwater is a valuable resource of water. Where surface water, such as lakes and rivers, are scarce or inaccessible, groundwater supplies many of the water needs of people everywhere. In developing countries, it is the source of drinking water for about half the total population and nearly all of the rural population.

This water is mostly rainwater. It collects at different depths below the surface of earth over many years. The underground area where the water collects is called an aquifer. Groundwater, under normal circumstances, does not contain any disease germs, because as rainwater seeps through the earth, the soil serves as a filter and removes the germs.

Like other sources of water, you can collect groundwater from several sources: a well dug by the community people, a borehole drilled or when water comes out naturally as a spring.

You should know that ground water gets depleted over a short period of time. Groundwater depletion is defined as long-term water level declines caused by sustained groundwater pumping. It is a key issue associated with groundwater use. Many rural areas in the developing countries are experiencing groundwater depletion (Figure 10.11).

The main cause of groundwater depletion is the sustained groundwater pumping. Some of the negative effects of groundwater depletion are:

- Drying up of wells.
- Reduction of water in streams and lakes.
- Deterioration of water quality.
- Increased pumping costs.
- Land subsidence (The gradual caving in or sinking of an area of land).

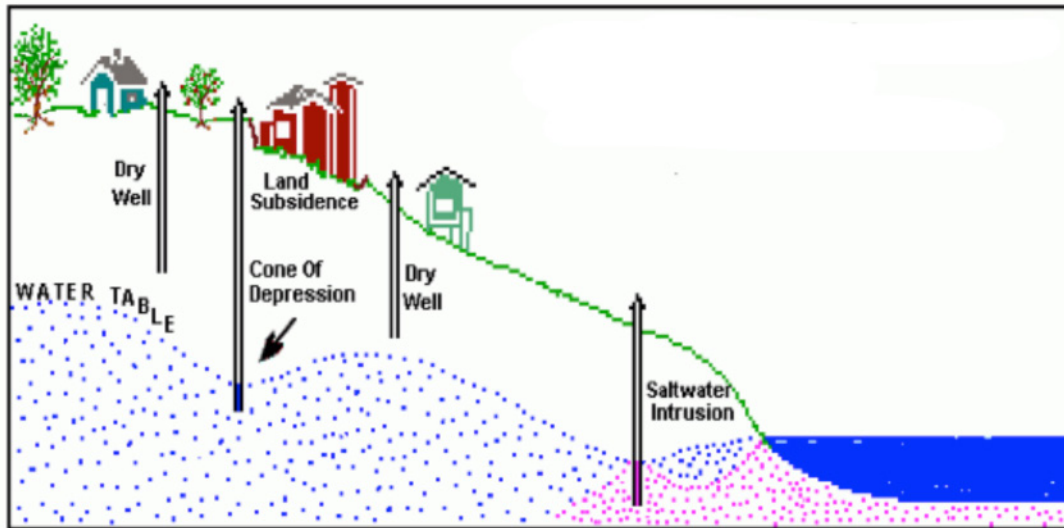
Factors responsible for the depletion of water are:

Increasing population: As a result of increasing population, all the facilities such as houses, shops, roads, offices, pavements, etc. occupy more and more land surface. This, in turn, decreases the open area for seepage of water into the ground.

Increasing industries: Most of the stages of manufacturing processes in industries require water. If the number of industries increases, then the water required by them will also increase. Therefore, increase of industries contributes to the depletion of water table.

Agricultural activities: In predominantly agricultural countries, water for agriculture is mainly utilised from ground water, rainwater and canal water. As there is no rainfall in many places, agriculture cannot be entirely depended on rainwater. Also, canal water is available in a few places only. Therefore, groundwater is the main source of water for agricultural activities and this causes depletion of water table.

Figure 10.11: Impact of over-pumping of groundwater and groundwater depletion



Source: College of Alameda Physical Geography

Water contamination and prevention

Our water sources are constantly at risk of contamination from events that occur naturally and from human pollution. Local and national government committees and organizations formulate policies to reduce water contamination, and there are many water treatment programmes in place. We, as individuals, can take many steps in our private lives to protect our water resources. Look for opportunities to get involved with water protection activities in your area, and implement recycling programs in your personal life.

The water that we drink and use for other purposes should be clean water. This means that the water must be free of germs and chemicals and be clear (not cloudy). Water that is safe for drinking is called potable water. All the action taken to make sure that drinking water is potable is called water treatment.

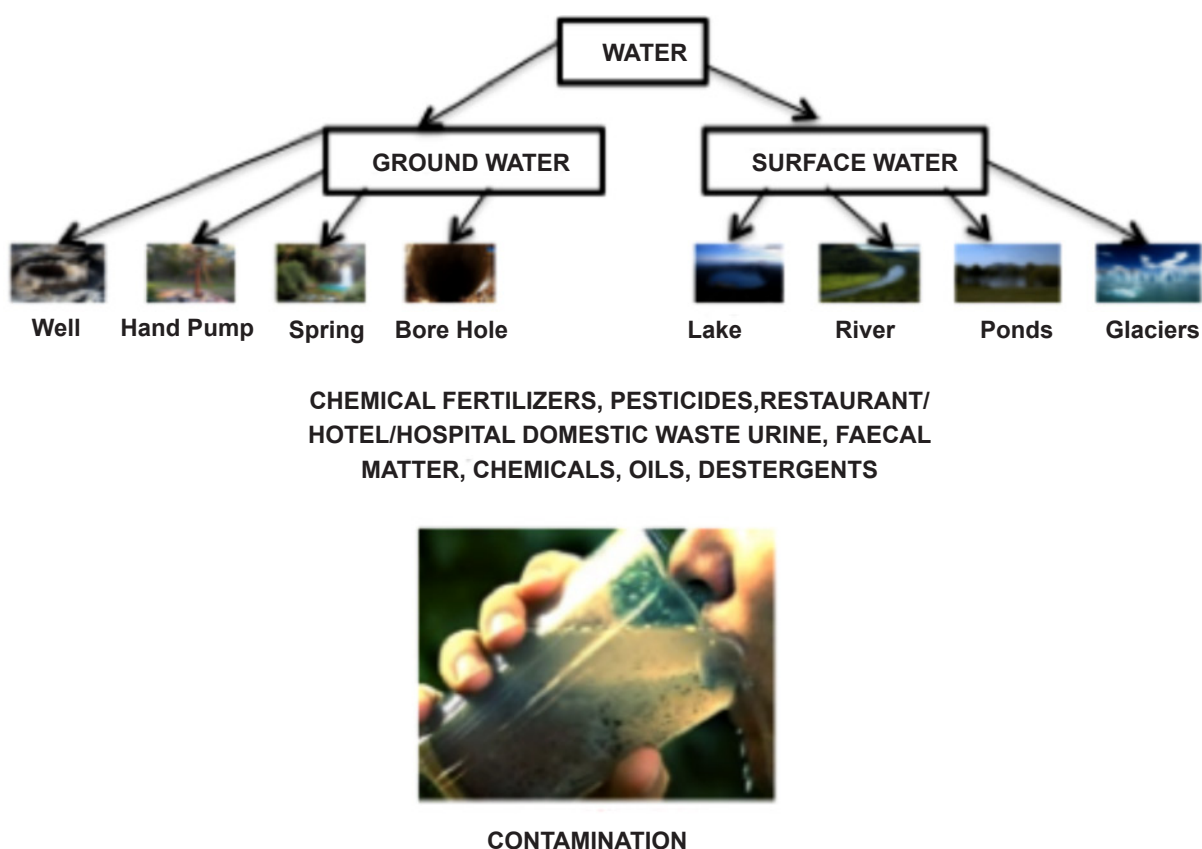
Disease-causing germs and chemicals can find their way into water supplies. When this happens the water becomes polluted or contaminated and when people drink it or come in contact with it in other ways they can become very sick. Figure 10.12 shows the several ways in which water is contaminated.

Water that is not safe to drink is said to be non-potable. Throughout history there have been many occasions when hundreds of thousands of people have died because disease-causing germs have been spread through a community by a polluted water supply.

We have seen above that drinking water is derived from two basic sources: surface waters, such as rivers and reservoirs, and groundwater. All water contains natural contaminants, particularly inorganic contaminants. In general, groundwater is less vulnerable to pollution than surface waters.

There are a number of possible sources of man-made contaminants, some of which are more important than others. These fall into the categories of point and diffuse sources.

Figure 10.12: General ways of water contamination



Thus there are several contaminants (or pollutants) of water. Water can be contaminated or polluted by:

Organic materials such as:

- Animal carcasses (the dead body of an animal).
- Animal and human faeces (waste matter remaining after food has been digested, discharged from the bowels) and sewage.

- Food waste.
- Plant matter (grass, leaves, wood).
- Oil, petrol and grease.

Inorganic materials such as:

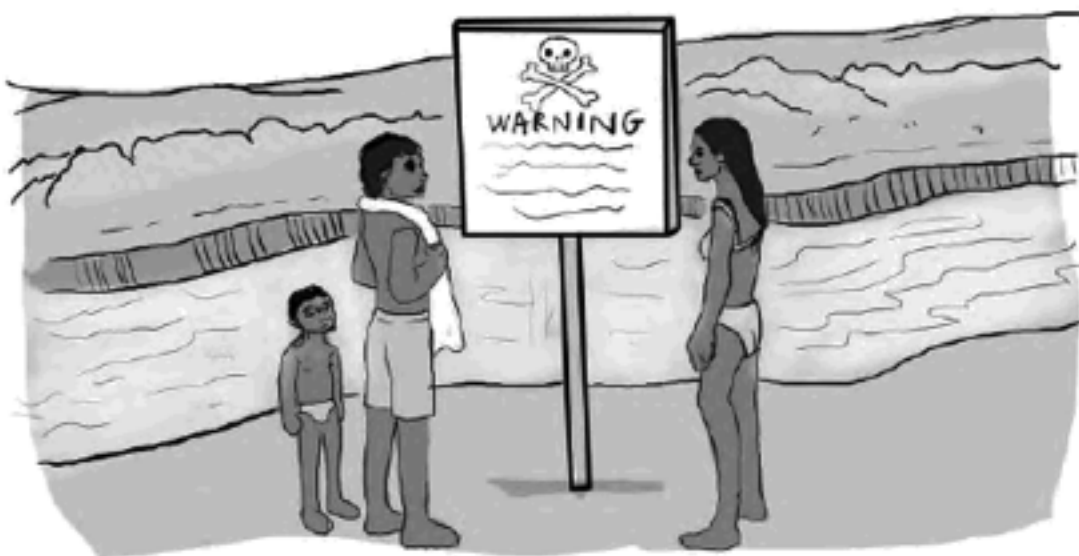
- Scrap metal and junk.
- Sand.
- Chemicals.

Many of these materials can carry disease-causing germs into water supplies. Chemicals in the water supply can poison people and other animals.

Water can be contaminated at:

- The source, such as the river or bore.
- In storage, such as in elevated tanks.
- In the pipe system which delivers water to the user.

Figure 10.13: Drinking or swimming in contaminated water can be dangerous to health.



Different types of water supplies can become contaminated (Figure 10.13) in a number of ways. Some of these, and their methods of prevention are described below.

Unfortunately, most of these sources have been polluted and should be used only after adequate treatment.

3.2 Sources of contamination and methods of prevention

Rainwater and domestic rainwater tanks

Contamination

- Dust and animal droppings (faeces) especially birds droppings, that collect on the roofs of buildings.
- Pollutants in the air, for example carbon dioxide, that dissolves in the water to cause acid rain.

Prevention

- Wash the storage container properly and regularly if possible.
- Let the first rain wash away the dirt, like dust and bird droppings off the roof before you start to collect the rainwater.
- Put a wire mesh or screen over the top of the down-pipe for the roof gutter to prevent it from becoming clogged with leaves.
- Boil the water before drinking, as an extra precaution.

If a house has a rainwater tank as its water supply, the following should be done to keep the water clean:

- Install a first flush diverter. This prevents the first flush of water which may have contaminants from the roof, from entering the tank.
- Keep the roof and gutters clean.
- Keep a lid on the water tank.
- Check for and repair any leaks.
- Regularly look into the tank. If the water or walls or floor are dirty the tank will need to be cleaned.

Surface Water (Rivers, Streams and Lakes)

Rivers provide some of our most beautiful and most endangered natural habitats. Whether you enjoy white water rafting down a wild, clear mountain river or drifting serenely on a slow, gentler river, rivers give us places to enjoy nature. Sadly, rivers face pollution from many sources: farming, industry and even tourism. It is important to protect rivers from pollution in order to save them for us and for future generations (Figure 10.14).

Figure 10.14: Different ways in which river water gets contaminated



How do these sources of water get dirty or contaminated by disease germs? They are contaminated in the following ways:

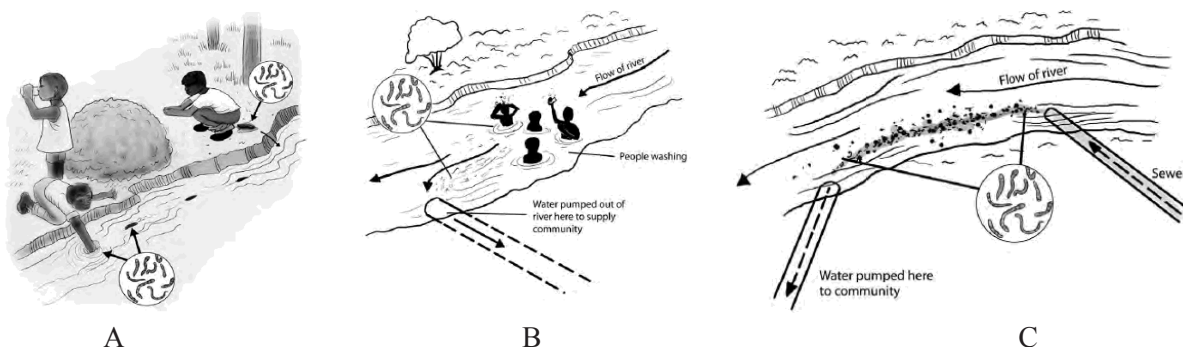
- Rubbish may fall into or be washed into the river, for example, from a nearby dump.
- Sewage may seep into the river from nearby septic tanks and leach drains.
- Faeces may be deposited directly into the river by people or other animals (Figure 10.15 - A).
- Human, animal faeces and urine deposited near the river may be washed into it by rain.
- Chemicals or poisons sprayed onto land near the river may be washed into the water.

- People or animals may wash themselves in the river.
- Fertilisers and other farm wastes are discharged or washed into them.
- Pesticides that are used to spray crops on farms are washed into them.
- Industrial and mining wastes (chemicals) are discharged into them.

How we can protect the quality of surface water? In fact, it is very difficult to protect surface water from contamination because a river travels through a long distance. However, the extent of pollution can be reduced if people living along it practised good personal hygiene and environmental sanitation.

What is the best way to collect water from a stream or river? Water should always be collected upstream of any known point where any form of pollution is taking place (Figure 10.15 B and C). For example, if wastewater is being discharged into a river, water should be collected at a point upstream to that point of discharge.

Figure 10.15: Contamination of river water



You can take the following steps at the community level.

- Visit a nearby river: You cannot begin to fight pollution until you see the problem for yourself. Spend some time on the closest river to you, so that you can begin to understand the beauty and the variety of life it supports.
- Educate yourself: You cannot begin to protect rivers until you know what their problems are. Contact local environmental groups for information about rivers in your neighbourhood.
- Join an environmental group: Often group efforts are more effective than individual efforts. Working together with others who are committed

to protecting your river can get your voice heard by legislators and the public.

- **Have the water tested:** Take a water sample to your local public health unit for testing. You will need facts about river pollution to enlist the support of public officials and individuals.
- **Speak out:** Take advantage of opportunities to speak about pollution in your river at local commission and state meetings. This is a perfect opportunity to educate others about the need to protect your river.
- **Practice what you preach:** Organize or help with efforts to clean up the river. Volunteers can pick up garbage from riverbanks to promote a cleaner, healthier environment.

At the level of home, you can take the following measures:

- Buy phosphate-free detergents and fertilizers. The phosphorus in these products is one of the major pollutants of rivers.
- Purchase cleaning products without having toxic, hazardous chemicals, oily and greasy substances, etc. When these chemicals pollute local rivers, they disrupt fish living in the river and can cause birth defects and deformities.
- Take old and unwanted household chemicals to hazardous waste collection centres. Pouring them down the drain eventually introduces them into your local rivers and watersheds. Discard them safely to protect your river.
- Conserve water. Limiting the amount of water your household pours into the local wastewater treatment centre will limit the amount of pollution you introduce to your local rivers.
- If the community water supply comes from a river make sure that:
 - ▶ *It is obtained upstream from any possible contamination sources, for example, swimming holes or effluent runoff points.*
 - ▶ *It is taken from the deepest possible point in the body of water.*
 - ▶ *Make sure that there is little or no building development near the water supply source. There are laws which control where people can put septic tanks/leach drains, effluent ponds, and rubbish tips in relation to water supplies.*
 - ▶ *Make sure people do not use the area around the water supply source for recreational purposes, such as playing sport and having*

picnics.

► *In the case of a billabong, it may be possible to fence the water source to prevent contamination by people and other animals.*

Water collected from rivers, streams and lakes should always be treated before drinking. There are many methods by which these sources of water can be treated to make them safe for drinking.

Underground or groundwater

Underground or groundwater is not free from contamination. Chemical substances contaminate most of it. These are the naturally occurring chemicals in rocks or soil, which get washed along as water sinks towards the groundwater storage or aquifer. When dangerous chemicals, such as lead and arsenic, are found in groundwater, you are advised not to drink water from that source.

Groundwater, under normal circumstances, should not contain any disease germs, because as rainwater seeps through the earth, the soil serves as a filter and removes the germs.

Groundwater becomes available to man when a well is dug, a borehole is drilled or when it comes out naturally as a spring.

The main source of contamination of underground or groundwater is chemicals found in them. These are the naturally occurring chemicals in rocks or soil that get washed along as water sinks towards the groundwater storage or aquifer.

When dangerous chemicals, such as lead and arsenic, are found in groundwater, normally people are advised not to drink water from that source.

Sometimes human activities also expose groundwater to contamination. They include:

- Mining.
- Latrines; pit latrines and septic tanks.
- Disposal of wastes underground.
- When wells are not maintained properly.

Sources of such contamination, such as pit latrines, should be as far away as possible (minimum safe distance) from groundwater points - wells and boreholes. The minimum safe distance recommended between a water point and a potential source of pollution as by World Health Organisation (WHO) is 30 metres. These potential sources of pollution should not be on ground higher than the water points.

Springs

We have seen above that an important source of underground water is springs. A spring flows out naturally, usually from the side of a hill. For this reason, spring water can be of very high quality, and used without treatment if some measures are taken to protect the outflow properly. Unprotected outflows could be contaminated by human and animal activities.

How to protect and keep spring water safe for drinking? You can do this by:

- Building a covered concrete structure (a spring box) around the edge so that the water flows directly into a pipe without ever being open to pollution from outside.
- The box should be easy to clean.
- The cover must be securely locked to stop unauthorized personnel from contaminating the water. The box should have an overflow vent and an air vent.
- A fence should be constructed around it in order to prevent animals from getting too close to the source.
- A surface drainage ditch should be dug uphill to the source to direct surface water run-off away from the source.
- If the spring is not protected, then the water should be treated before drinking.

Shallow and deep wells and boreholes

Wells and boreholes give access to underground water and are very common sources of water in many communities, especially rural communities (Figure 10.16).

The following factors affect the quality of well water:

- The Water table determines the depth of the well. Normally, the deeper the well the better the bacteriological quality of the water, all other things being equal since the water is filtered through a longer column of soil.
- Location, for countries along the sea, distance from the sea determines whether the water will be salty or not. This does not apply to Zambia.
- Distance from potential sources of pollution. For example, pit latrines, tombs and refuse dumps etc.
- Such pollution may affect the bacteriological quality of the well water. The type of rock formation in the area affects the chemical quality.

You can protect the quality of well water by:

- Situating the well at least 30 metres from possible pollution source, e.g. refuse dumps, latrines, tombs, animal pens, stagnant water etc.
- Situating on higher ground than possible pollution sources.
- Lining the well with either brick or stone, or masonry for several reasons:
 - ▶ *It protects the well during construction against caving and collapse.*
 - ▶ *It prolongs the life of the well by retaining the walls after completion.*
 - ▶ *It prevents polluted surface water from entering the well.*
 - ▶ *It acts as foundation and support for the well top or headwall and any pump or other mechanism, that may be fitted on completion.*
- A raised parapet should be constructed around its outer rim to protect the well from the inflow of outside or surface dirty water. The wall should be high enough (50-75 cm) to prevent small children and animals from falling into the well.
- A concrete apron of 2 metres diameter or 2 metres square should be constructed around the well, and it should slope so that water flows away from the well instead of collecting around it.
- A concrete drainage channel at least 3 metres long should be constructed to carry spilled water away from the well apron.
- All wells should have a secure cover, which should also slope, so that water is able to drain off it.
- Dug wells should have either a windlass or a hand pump for drawing water.

Figure 10.16: Unprotected and protected wells



- For dug wells, the rope and bucket used for drawing water should not be left on the ground where they could become contaminated.
- Instead it should be hung on a pole erected close to the well. Only one container should be used to draw water.
- A fence should be constructed around the water point to keep animals away from it.
- There should be good drainage around the well to prevent stagnant water collecting around the immediate surroundings.

This is not the end of story. You have to maintain all the water points. The steps are as follows:

- After the wells have been built with all the facilities mentioned above, it is important to monitor them by periodically doing sanitary surveys.
- As soon as any risk factors are identified, they must be fixed immediately.
- Persons in the community should be trained and be responsible for routine maintenance and repairs to the water point facilities.
- Tighten nuts and bolts of hand pump body once a month.
- Periodically (once a week) oil all movable parts like the hand pump, handle and Chain.
- Clean your apron and drainage channel once a day.
- Keep the water point surroundings (30 metres radius) clean. Protect it from animal and human faeces, refuse, and pools of stagnant water.

In addition to the measures suggested above, you have to do the following as well to protect water pollution in your community.

- Educate yourself about water resource protection. Learn about threats to your local water sources. Familiarize yourself with the national Water Act(s) of our country and find out the standards for the water quality of your drinking water source.
- Get involved with water protection activities where you live. Go to public meetings. Ask questions about how the issues discussed above affect your water sources, specifically about plans to prevent water contamination. Participate in local activities that monitor water contaminants.
- Avoid contaminating water sources in your own personal life. Do not use pesticides or fertilizer on your lawn and garden. Travel on public transportation whenever possible, since the carbon dioxide emissions eventually end up in our water sources. Recycle and reuse plastic, aluminium, glass and motor oil to keep the toxic spill-off from these items out of the water supply.
- Avoid waste by buying products made with long-lasting, durable materials. Purchase products with the least or no packaging. Conserve water in your own life by closing the faucet whenever it is not needed.

3.3 Water-borne diseases

A water-borne disease is any disease that can spread through contaminated water. Some examples of waterborne diseases include cholera, dysentery, bad bugs and their bites, hepatitis A and diarrhoea. Infection can result not only from drinking the water but also from swimming in the water where it can enter the body in other ways such as through broken skin. Many poorer countries have limited uncontaminated water supplies so water-borne disease is a huge health issue worldwide.

Water-borne diseases and their mode of transmission

- What these diseases are?
- How these diseases are spread?
- The part water plays in spreading them.

In order to prevent community water supply from causing or spreading disease, it is important to know:

You will be surprised to know that water we drink is one of the major sources of death of human beings. Table 10.1 shows the classification of water-borne diseases based on the role water plays in the spread of diseases.

Figure 10.1: An overview of water-borne diseases

Group name	Mode of spread of disease	Examples
Water-borne	By drinking or ingesting water containing disease germs.	Cholera, typhoid fever.
Water-washed: Insufficient water quantity	Insufficient amount of water so basic hygiene practices such as washing hands, cloths and bathing are often neglected.	Skin and eye infections: scabies, conjunctivitis, round worm infestation e.g. Ascaris (any parasitic roundworm found in the human small intestine and causing diarrhoea).
Water-based	The disease parasite (worm) spends part of its life cycle in an aquatic intermediate host. It infects a person when the worm penetrates the skin.	Bilharzia or snail fever. This parasitic worm disease is transmitted by snails that live in fresh water. Guinea worm - A painful and energy loosing in human body infestation contracted by drinking stagnant water contaminated with Guinea worm larvae that can mature inside a human's abdomen.
Insect vector	By insects that breed in water.	Malaria.

Where do the germs that cause these diseases come from?

- The germs are found in the intestines of the sick person. This is why most of these diseases are also called gastrointestinal diseases.
- The germs are mixed with the faeces, or stools and vomit of the sick person.
- Millions of the germs come out in the faeces of the sick person, when he or she defecates.

The water-born diseases spread from person to person, if:

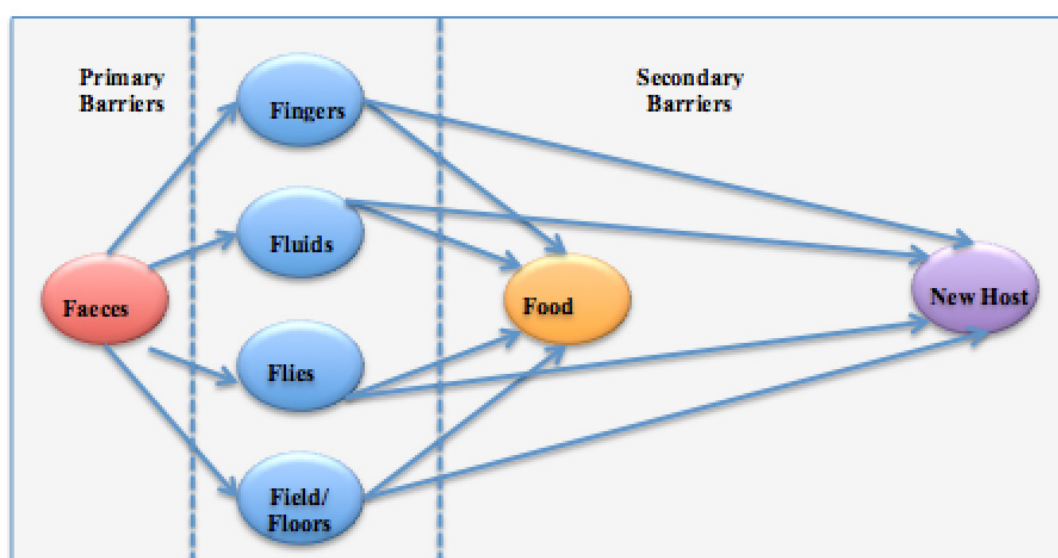
- A person sick with cholera, for example, defecates near water or directly into a water source (well, river, lake).
- The faeces of the sick person, containing the disease (cholera) germs, get or are washed into the water.
- Another person drinks water from the source containing the disease (cholera) germs and gets the same disease, cholera.

Figures 10.17 and 10.18 show the transmission of these diseases from person to person.

Figure 10.17: Human and Animal Faeces



Figure 10.18: Faecal-oral transmission of diseases via different routes.



Fluids (Water): Drinking water and other fluids that are contaminated with faeces.

Fingers: Faeces get on fingers when we use the latrine or clean children after they have defecated.

Food: Faeces left in the open field get on our fruits and vegetables.

Fingers contaminated with faeces used for eating.

Preparing food with hands that have been contaminated with faeces.

Using contaminated water to prepare food.

Flies: Flies land on exposed faeces, and contaminate their feet then they land on food, and transfer the faeces onto the food.

Fields (Animals): Domestic animals walk in exposed faeces and bring them to our living quarters. Children playing on the floor contaminate their fingers, which they then lick or eat with.

3.4 General signs and symptoms of water-borne diseases

- Many watery stools per day, which is normally called diarrhoea. This is why these diseases are also called diarrhoeal diseases.
- The stools may or may not contain blood and mucus.
- Vomiting.
- Stomach cramps.
- General body weakness.
- Fever.
- Headache.

The sick person may show many of these signs together.

Diarrhoea

Diarrhoea is the passage of three or more loose or liquid stools per day, or more frequently than is normal for the individual. It is usually a symptom of gastrointestinal infection, which can be caused by a variety of bacterial, viral and parasitic organisms. Infection is spread through contaminated food or drinking water, or from person to person as a result of poor hygiene.

Severe diarrhoea leads to fluid loss, and may be life threatening, particularly in young children and people who are malnourished or have impaired immunity.

A person gets diarrhoeal diseases like cholera by the faecal-oral routes. There are several effects of diarrhoea on the human body. Diarrhoea results in the body losing a lot of fluids, leaving the body dry or dehydrated. If the lost fluids are not replaced very quickly, this dehydration could result in death.

Signs of dehydration include:

- Eyes are sunken (but no tears).
- Sunken soft spot in skull of children.
- Dry lips, mouth and tongue.
- Feeling very thirsty all the time.
- If skin is pinched, it will take longer than usual to return to its position.
- Very little urine or no urine at all.

Diarrhoea remains the most prevalent water related disease in majority of developing countries. It mostly affects children under the age of 5 years old and often leads to death. Diarrhoeal infection is spread through food and drinking water that has been contaminated.

A diarrhoeal attack can last up to 2 weeks and leave the person completely dehydrated.

Symptoms of diarrhoea include, severe dizziness, loss of consciousness, dehydration and pale skin, little or no urination and in some case bloody stool.

Treatment for dehydration

- Drink a lot of fluids or liquids to replace what the body is losing as soon as diarrhoea begins, and continue until the diarrhoea stops.
- Continue breast-feeding babies. (Note! This may not be advisable if mother is HIV positive. Please check at the health centre). Patients must be encouraged to eat food they can tolerate.
- Oral Rehydration Solution (ORS) - a sugar and salt solution, which can either be bought from the pharmacy shop, or obtained from clinics, health workers or prepared at home.

How to prepare Oral Rehydration Solution (ORS) at home

- Step 1: Boil and then cool one litre of water.
- Step 2: Add 10 tablespoons of granulated sugar (white spoon sugar).
- Step 3: Add one tablespoon of salt.
- Step 4: Mix well with a very clean spoon.
- Step 5: Give this to the sick person as often as he/she can tolerate.

If the diarrhoea is very severe and does not stop, it is important to go to the nearest Rural Health Centre immediately for help.

Cholera

Cholera is an infectious disease that causes severe watery diarrhoea, which can lead to dehydration and even death if untreated. Eating food or drinking contaminated water causes cholera.

The disease is most common in places with poor sanitation, crowding, war, and famine.

- Cholera disease causes a lot of watery diarrhoea and vomiting.
- Cholera diarrhoea can look like cloudy rice water.
- Cholera can cause death from dehydration (the loss of water and salts from the body) within hours if not treated.

How is cholera spread?

- Cholera germs are found in the faeces of infected people.
- Cholera is spread when faeces from an infected person get into the water people drink or the food people eat.
- Municipal water supplies.
- Ice made from municipal water.
- Foods and drinks sold by street vendors.
- Vegetables grown with water containing human wastes.
- Raw or undercooked fish and seafood caught in waters polluted with sewage.
- Cholera is not likely to spread directly from one person to another.

Protect yourself and your family from cholera and other diarrheal diseases:

- Drink and use safe water. Safe water is water that is bottled with an unbroken seal, has been boiled, or has been treated with a chlorine product.
- Wash hands often with soap and safe water. If no soap is available, scrub hands often with ash or sand and rinse with safe water.
- Use latrines or bury your faeces, do not defecate in any body of water.

- Cook food well (especially seafood), eat it hot, keep it covered, and peel fruits and vegetables.
- Clean up safely— in the kitchen and in places where your family bathes and washes clothes.

What to do if you or your family are ill with diarrhoea?

- If you have oral rehydration solution (ORS), start taking it now. It can save your life.
- Go immediately to the nearest health facility, cholera treatment centre, or community health worker, if you can.
- Continue to drink ORS at home and while you travel to get treatment.
- Continue to breastfeed your baby if they have watery diarrhoea, even when traveling to get treatment.

Piped water sources, drinks sold in cups or bags, or ice may not be safe and should be boiled or treated with chlorine.

Symptoms of cholera can begin as soon as a few hours or as long as five days after infection. Often, symptoms are mild. But sometimes they are very serious. About one in 20 people infected have severe watery diarrhoea accompanied by vomiting, which can quickly lead to dehydration.

Signs and symptoms of dehydration include:

- Rapid heart rate.
- Loss of skin elasticity (the ability to return to original position quickly if pinched).
- Dry mucous membranes, including the inside of the mouth, throat, nose, and eyelids.
- Low blood pressure.
- Thirst.
- Muscle cramps

If not treated, dehydration can lead to shock and death in a matter of hours.

Malaria

Malaria or malarial fever is spread by the female anopheles mosquito that breeds in water bodies like lakes and paddy fields. Stagnant water is another favourite breeding ground for these deadly parasites. The mosquito bites mainly between dusk and dawn.

Malaria mostly kills children, as adults slowly form some sort of immunity against the parasite, over the years.

Malaria is an acute illness. In a non-immune individual, symptoms appear seven days or more (usually 10–15 days) after the infective mosquito bite. The first symptoms – fever, headache, chills and vomiting – may be mild and difficult to recognize as malaria. If not treated within 24 hours, malaria can progress to severe illness often leading to death. Children with severe malaria frequently develop one or more of the following symptoms: severe anaemia, respiratory distress, or cerebral malaria.

How to prevent and control malaria?

- Do not create breeding grounds for the mosquito.
 - ▶ *Do not leave empty cans, bottles, and old car tyres around to collect water.*
 - ▶ *Do not allow the environment to be overgrown with weeds.*
 - ▶ *Ensure good drainage around the home in order to avoid the formation of pools of stagnant water.*
- Destroy all existing breeding grounds.
 - ▶ *Drain stagnant water from ponds, empty cans, bottles etc.*
 - ▶ *Clear weeds from around the home.*
- Kill adult mosquito by using insecticides.
- Prevent the adult mosquito from biting you:
 - ▶ *Sleep in impregnated mosquito nets.*
 - ▶ *Cover windows in the home with mosquito screens.*

Other diseases that can be spread through water

Eating under-cooked fish - Fish and shellfish may contain disease parasites. These parasites get into the water bodies, and later into the fish, when faeces that contain them are discharged or washed into the water. An example is the

fish tapeworm. If the fish is not cooked well (under-cooked) to kill the parasite before it is eaten, one could get sick.

Accumulation of (toxic) dangerous chemicals in fish - Sometimes industrial wastes containing poisonous chemicals (toxins) are discharged into water bodies. These toxins may find their way into fish so that when a person eats this fish, the toxic substances may get into the body and make him/her sick.

3.5 Simple water purification methods

Safe, clean drinking water is essential to human life and health. Millions of people die each year from consuming contaminated water. Fortunately, several simple and inexpensive methods for water purification are available. Note, however, that many of these purification methods will kill microbes that cause disease, but will not remove heavy metals, pesticides, hydrocarbons and other dangerous chemical contaminants. For best results, use a combination of purification methods to produce safe drinking water.

Boiling

Boiling water is the safest way to kill microbes.



Boiling is a safe and easy method of killing bacteria and other pathogens in water. Simply boil the water for 10 minutes, and let it cool before drinking. When energy to boil the water is available, and chemical contamination is not a concern, boiling is the most reliable water-purification method. Pouring the water back and forth between two vessels will add oxygen to the water, making it taste better. Allow any sediment to settle to the bottom before drinking or pouring.

Bleach

Adding regular bleach (with no scent or other additives) to water will prevent the growth of microorganisms and kill any pathogens that are present. Simply add two to four drops of bleach per quart of water --- two drops if the water is clear, or four drops if the water is cloudy --- and wait 30 minutes before

drinking. Pouring the water back and forth between two containers will help to spread the bleach throughout the water.

Iodine



Iodine is another effective chemical treatment for microbes in water. However, some people are allergic to iodine. Also, this method is inappropriate for pregnant women, people with thyroid problems and people who are taking lithium. To purify water, use a 2-percent tincture of iodine, which is avail-

able in drugstores. Add five drops per quart of water, or 10 drops if the water is cloudy. Again, pouring the water back and forth will mix the iodine thoroughly, and make the water taste better. Adding a little vitamin C after bleach or iodine treatment will also improve the taste of the water.

Solar Disinfection

The sun's ultraviolet rays can disinfect water in plastic bottles.

The sun's ultraviolet rays and heat will kill pathogens in water. Fill clean, clear plastic bottles with water and set them out in the hot sun (preferably atop a black cloth, which helps to absorb the sun's heat) for at least six hours. If the sky is overcast, disinfection may take up to two days. This purification method is common in certain in many villages in developing countries.



Filtration

If the water is cloudy, it is a good idea to filter it through a clean cotton cloth before attempting the preceding purification methods. Alternatively, you can make a slow sand filter using a five-gallon bucket, cloth, gravel and sand. Punch holes in the bottom of the bucket, and fill it partially with gravel. Put a cloth on top of the gravel and add a few inches of fine sand. Put another cloth on top of the sand. Pour water into the bucket; the water that comes out will be free of

most biological contaminants and suspended particles.

Distillation

Distillation involves boiling water and collecting the resulting water vapor as it condenses. Distilling water will remove microbes, chemicals, salts, dirt and radioactive dust (if present). The New Jersey Office of Emergency Management recommends distilling water by filling a clean pot halfway with water, and tying a cup to the pot lid's handle so that the cup will hang upright when the lid is upside-down over the pot. Boil the water for 20 minutes; the water vapour will condense on the lid and fill the cup.

4. HYGIENE AND SANITATION

Proper sanitation is important not only from the general health point of view but it has a vital role to play in our individual and social life too. Sanitation is one of the basic determinants of quality of life and human development index. Good sanitary practices prevent contamination of water and soil and thereby prevent diseases (Box 10.1). The concept of sanitation includes personal hygiene, home sanitation, safe water, garbage disposal, excreta disposal and waste water disposal (Table 10.2).

Table 10.2: Preventive or control measures for the faecal-oral transmission of diseases

Transmission to be blocked	Preventive or control measures
Hand Wash	<ul style="list-style-type: none"> •Hands are washed properly with water and soap/ash after using the latrine or after cleaning the anal area of a child. •Hands are washed properly before eating, cooking or handling food. •Hands are washed properly after handling animals. •Dirty fingers are not sucked by children.

Latrines	<ul style="list-style-type: none"> •Constructing latrines and using them properly and at all times. •Faeces, including that of children are disposed of properly in latrines in order that flies do not get to them. •Faeces are disposed of properly, in order that domestic animals are not exposed to them. •Faeces are disposed of properly in latrines in they are not washed into water sources.
Storage of drinking water	<ul style="list-style-type: none"> •Drinking water and food should be stored properly by covering them; drinking water is stored in clean containers and covered. •Drinking water is kept in storage containers reserved for that purpose only. •Drinking water is removed from its storage container with the same cup or ladle without the hand touching the water. •Do not drink from the cup or ladle directly -it should be kept clean and only used for transferring water to another cup. •Food, cooking utensils, plates and cups are covered at all times so that flies do not land on them. •Food is prepared with water, which is not from a source contaminated with faecal matter. •Raw fruits and vegetables are washed properly and/or peeled before eating. •Food is cooked well to kill any germs that may be in them.
Domestic animals	<ul style="list-style-type: none"> •Domestic animals are kept away from living area or kept in dens.
Refuse disposal	<ul style="list-style-type: none"> •Refuse is disposed of properly in order that flies do not breed in them.

In this part of the module, you will learn the basic principles of:

- Hand-washing.
- Latrine usage and maintenance.
- Refuse and waste water disposal.
- Cleanliness in carrying water, storing water and in cooking food.

Box 10.1

The importance of hygiene and sanitation practices in healthy communities – Solomon Islands

Diarrhoea, malaria, chest infections and skin diseases are rife in many of these villages. These high levels of illnesses predominantly result from the

communities' use of open water sources, often contaminated by animals or by the villagers themselves, and a lack of understanding around basic hygiene practices and health. The Solomon Islands also has one of the highest incidences of malaria outside Africa.

These problems are compounded by 'the tensions' – a period of civil war that stretched between 1998 and 2003, which severely affected infrastructure and, as a result, the population's health. Reaching basic health facilities often requires days of travel, and limited medical supplies often run out due to high demand.

To help tackle these problems, Solomon Islands Red Cross developed a community-based health programme, with support from Australian Red Cross and funding from the Australian Government's overseas aid program, AusAID. Known as Tugeda lumi Waka fo Helti Komuniti (Together You and Me Work for Healthy Communities), the programme provides communities with the knowledge, skills and long-term support to improve health and hygiene practices, and builds on people's abilities to address and resolve their own problems.

Volunteers trained by Red Cross educate their own communities, using participatory learning techniques and a series of visual aids to overcome literacy issues.

Training is also provided on efficient management of water resources and the construction of improved toilets. When this 'software' is in place, Red Cross provides necessary 'hardware', such as tanks and construction materials, which families and communities then use to build basic infrastructure.

The first three-year programme was recently completed in 22 remote communities on the island of Malaita and the Weather Coast of Guadalcanal. Success is evident in local clinics. Where once basic medicines would only last a couple of weeks, now the supplies last for months, as healthy communities no longer turn to them for treatment of basic illnesses.

There have also been unexpected benefits. After years of conflict between the islands of Malaita and Guadalcanal, strong relationships are building between the Red Cross health team members, who come from the different regions, and the once warring communities are starting to work together.

The programme has also resulted in a change in the gender relationships. Where traditionally women have been marginalised in many of these communities, the programme has actively worked to include them as equals, involving them as staff and volunteers. This has helped to develop a new-found respect for the women's skills and knowledge.

For Mirriam, one of the community health volunteers, the most important success is reflected in the lives of her children and the people of Marumbo. "Now our children are healthy," she says. "Now our community is healthy."

Source: Joe Cropp, Australian Red Cross

4.1 Personal hygiene

Personal hygiene is a concept that is commonly used in medical and public health practices. It is also widely practised at the individual level and at home. It involves maintaining the cleanliness of our body and clothes. Personal hygiene is personal, as its name implies. In this regard, personal hygiene is defined as a condition promoting sanitary practices to the self. Everybody has his/her own habits and standards that they have been taught or that they have learned from others. Generally, the practice of personal hygiene is employed to prevent or minimise the incidence and spread of communicable diseases.

The term cleanliness should not be used in place of hygiene. Cleaning in many cases is removing dirt, wastes or unwanted things from the surface of objects using detergents and necessary equipment.

Hygiene practice focuses on the prevention of diseases through the use of cleaning as one of several inputs. For example, a janitor cleans the floor of a health centre using detergent, mop and broom. They might also use chlorine solution to disinfect the floor. The cleaning process in this example is the removal of

visible dirt, while the use of chlorine solution removes the invisible microorganisms.

Hygienic practice encompasses both cleaning for the removal of physically observable matters and the use of chlorine for the removal of micro-organisms. The hygiene practice in this example aims at preventing the spread of disease-causing organisms. Cleaning is a means to achieve this task.

Body hygiene (skin care)

The body has nearly two million sweat glands. Moistened and dried sweat and dead skin cells all together make dirt that sticks on to the skin and the surface of underclothes. The action of bacteria decomposes the sweat, thereby generating bad odour and irritating the skin. This is especially observed in the groin, underarms and feet, and in clothing that has absorbed sweat. Skin infections such as scabies, pimples and ringworm are results of poor body hygiene.

Scalp ringworm



The first task in body hygiene is to find water, soap and other cleansing materials. Taking a bath or a shower using body soap at least weekly is very important to ensuring our body stays clean. Bathing can be every day or after periods of sweating or getting dirty. The genitals and the anal region need to be cleaned well because of the natural secretions of these areas. Dry the body with a clean

towel after thorough rinsing. Change into clean underwear after a bath. Changing sweat-soaked clothes after each bath is advised. Cleaning the ears after every bath is also necessary. Avoid sharing soaps and towels because of the danger of cross-infection.



Oral hygiene (teeth care)

Taking good care of the teeth is important because:

- Strong, healthy teeth are needed to chew and digest food well.
- Painful cavities (holes in the teeth caused by decay) and sore gums can be prevented by good tooth care.
- Decayed or rotten teeth caused by lack of cleanliness can lead to serious infections that may affect other parts of the body.
- People who do not care for their teeth are more likely to lose them when they get old.

Teeth should be cleaned carefully twice a day. This removes the germs that cause decay and tooth loss. Clean the surface of all front and back teeth then clean between the teeth and under the gums. Use a soft brush, tooth stick, or finger wrapped with a piece of rough cloth. Toothpaste is good but not necessary. Salt, baking soda, or even plain, clean water will also work.



- Rinse the mouth after each meal.
- Brush your teeth with a fluoride-containing toothpaste twice a day – before breakfast and before you go to bed. Cleaning the mouth with twigs is possible if done carefully.
- During the day, fill your mouth with water and swish it around to get rid of anything sticking to your teeth.
- In addition to regular brushing, it is advisable to floss your teeth at least once a day, usually before you go to bed.

Hand washing

Frequent hand washing is one of the best ways to avoid getting sick and spreading illness. Hand washing requires only soap and water or an alcohol-based hand sanitizer—a cleanser that doesn't require water.

Why should we wash our hands? We wash our hands because our hands become contaminated with the germs that cause diseases while:

- Working in the field or farm.
- Cleaning our anal area or the anal area of a child after defecating.
- Blowing our noses when we have a cold.
- Playing in dirt on the ground.
- Handling or playing with animals.

When to wash your hands?

As you touch people, surfaces and objects throughout the day, you accumulate germs on your hands. In turn, you can infect yourself with these germs by touching your eyes, nose or mouth. Although it's impossible to keep your hands germ-free, washing your hands frequently can help limit the transfer of bacteria, viruses and other microbes.

Always wash your hands before:

- Preparing food or eating.
- Feeding a child.
- Treating wounds, giving medicine, or caring for a sick or injured person.
- Inserting or removing contact lenses.

Always wash your hands after:

- Working in the field or farm or other places of work.
- Returning from school.
- Defecating – using the toilet or changing a diaper or handling a child's faeces or cleaning up a child.
- Preparing food, especially raw meat or poultry.
- Touching an animal or animal toys, leashes (a chain, rope, or strap attached to the collar or harness of an animal, especially a dog or waste).
- Blowing your nose, coughing or sneezing into your hands.
- Treating wounds or caring for a sick or injured person.
- Handling garbage, household or garden chemicals, or anything that could be contaminated — such as a cleaning cloth or soiled shoes.
- Shaking hands with others.

In addition, wash your hands whenever they look dirty.

How to wash your hands?

It is generally best to wash your hands with soap and water (Figure 10.19). Follow these simple steps:

- Wet your hands with running water — either warm or cold.
- Apply liquid, bar or powder soap or wood ash.
- Lather (foam) well.
- Rub your hands vigorously for at least 20 seconds. Remember to scrub all surfaces, including the backs of your hands, wrists, between your fingers and under your fingernails.
- Rinse well.
- Dry your hands in the air with a clean or disposable towel.

Figure 10.19: Good Washing

:



Keep in mind that anti-bacterial soap is no more effective at killing germs than is regular soap.

Kids need clean hands too

Help children stay healthy by encouraging them to wash their hands properly and frequently. Wash your hands with your child to show him or her how it is done. To prevent rushing, suggest washing hands for as long as it takes to sing the “Happy Birthday” song twice. If your child can’t reach the sink on his or her own, keep a step stool handy (Figure 10.20).

Hand hygiene is especially important for children in child care settings. Young children cared for in groups outside the home are at greater risk of respiratory and gastrointestinal diseases, which can easily spread to family members and other contacts.

Practice Preparing water saving device

- Use any vessel or bottle.
- Make a hole three finger up the bottom.
- Insert a short stem of bamboo.
- Seal the space between the bamboo and the hole in the vessel with gum.
- Make a plug for the bamboo.
- Prepare a container for ash or hang soap nearby the hand-washing stand.
- Wash hands and feel the difference in water saving and convenience.

Installing a hand washing station makes it easier to wash hands and reminds people of the critical moments. If you set one outside the latrine and near where people cook and eat, they will be more likely to remember hand washing and more likely to do it because there are fewer barriers.

If water is scarce and or running water is not available, the tippy tap addresses these problems. Thus, It is the best kind of hand washing station to set up.

Figure 10.20: A Tippy Tap with soap: An outdoor hand-washing device



Be sure your childcare provider promotes frequent hand washing. Ask him/her whether the children are required to wash their hands several times a day — not just before meals. Note, too, whether the child defecating areas are cleaned after each use.

Hand washing doesn't take much time or effort, but it offers great rewards in terms of preventing illness. Adopting this simple habit can play a major role in protecting your health.

Face hygiene

Our face reveals our daily practice of personal hygiene. Face hygiene includes all parts of the face. The most important area to keep clean is the eyes. The eye discharges protective fluids that could dry and accumulate around the eye. They are visible when a person gets up in the morning. The organic substance of the eye discharge can attract flies and this is dangerous because the fly is a carrier (vector) of trachoma and conjunctivitis.

A person should wash their face every morning in order to remove all dirt that they have come in contact with during the course of the day. This will keep your face clean all day. Children are advised to wash their face frequently. Never share your face towel with others.

Fingernail and toenail hygiene (nail care)

A nail is hard tissue that constantly grows. Long fingernails tend to accumulate or trap dirt on the underside. The dirt could be as a result of defecation or touching infected and contaminated surfaces. Keeping nails trimmed and in good shape weekly is important in maintaining good health. Clip nails short along their shape but do not cut them so close that it damages the skin. Razor blades and fingernail cutters or scissors are used to cut nails. Nail cutters should not be shared with others.

Ear hygiene

Earwax accumulates in the ear canal that leads from the outer ear to the ear drum. As the secretion comes out of the ear it collects dust particles from the air. Daily washing with soap and water is enough to keep the outer ear clean. Do not reach farther than you can with your little finger into your ear. Putting in hairpins, safety pins or blunt-edged things for cleaning purposes might harm the

ear. If you feel wax has accumulated and is plugging your ears and interfering with hearing, consult your doctor.

Hair hygiene (hair care)

The hair follicles from which the hair grows produce oil from the sebaceous glands that keeps the hair smooth. The scalp (the skin covering the head) also has numerous sweat glands and is a surface for the accumulation of dead skin cells. The oil, sweat and dead cells all add together and can make the hair greasy and look dirty unless you wash it regularly.

Poor hair hygiene could cause dandruff and skin infections. Dandruff is dead skin on the scalp that comes off in tiny flakes when sebaceous glands produce too much oil and accumulates on the scalp.

Head hair is a good harbour for head lice and nits (eggs of head lice). The head louse is a tiny insect that lives by sucking blood. Children are especially prone to lice infestation. Lice spread from one head to another when there is close contact as in school environments. They make the scalp itchy and are a cause of annoyance, irritation and embarrassment.

Shaving of the head hair is possible in cases of heavy lice infestation. Sharing of blades with others, however, should be discouraged.

Hair cleaning is important to ensure it stays clean, healthy and strong.

The recommended procedures for cleaning the hair are:

- Use clean water to wash your hair regularly (at least twice weekly, preferably once every other day) with body soap or shampoo, whichever is available.
- Massage your scalp well. This will remove dead skin cells, excess oil and dirt.
- Rinse well with clear water.
- Conditioner is helpful if you have longer hair as it makes the hair smoother and easier to comb, but hair doesn't need to have conditioner.
- Use a wide toothed comb for wet hair as it is easier to pull through.
- Dry the hair and the head with a clean towel. Never share a towel with someone else.
- Comb the hair to look beautiful for the day.

Armpit and bottom hygiene

These are body parts that easily get sweaty and where ventilation is very poor. After puberty, our sweat gains a specific and unpleasant odour which may be offensive to others. The armpits and the bottom should be washed daily.

Anal cleaning is the hygienic practice of cleaning the anus after defecation. The anus and buttocks may be cleansed with clean toilet paper or similar paper products. Water may be used. Hands must be washed with soap afterwards. The use of rags, leaves, stones, corn cobs, or sticks must be discouraged as these materials can damage the skin.

Foot hygiene (foot care)

We spend a lot of time on our feet. Our feet sweat as we walk day and night and the sweat accumulates on all foot surfaces and between the toes. The sweat may stain the shoes and can produce an awful odour.

As well as bacteria, sweat also encourages fungal growth between the toes. This is called athlete's foot. The symptoms of athlete's foot are scaly skin and sores or blisters, which start between the toes but can often spread to the soles of the feet. This is a minor irritation and often disappears by itself but sometimes these cracks and sores become the site for other infections. The feet should be washed daily, or at least twice weekly.

Foot hygiene is also important in the treatment of mossy foot. This disease causes swelling in the feet and lower legs. It is a reaction in the body to very small soil particles that have passed through the skin of the feet. This disease can easily be prevented by wearing shoes at all times but, if someone is affected, careful washing and drying of the feet is an important part of the treatment.

Toenails do not have much role in the transmission of diseases. However, they can accumulate dirt and this can increase the potential for bacterial and fungal breeding e.g. athlete's foot.

Clothes hygiene

We usually have two layers of clothing. The internal layer is underwear (or underclothes) such as pants, vest and T-shirt. These are right next to our skin and collect sweat and dead skin cells, which can stain the cloth. Bacteria love to grow

on this dirt and produce a bad smell in addition to the specific odour of the sweat. Underwear must be washed more frequently than the outer layer of clothing.

Clothes hygiene is an important aspect of one's dignity. Changing used clothes for clean ones every day is recommended. Washing dirty clothes requires adequate clean water, detergents (solid or powdered soap) and washing facilities. If possible, the washed clothes should be ironed to help the destruction of body lice and nits. Boiling water or insecticides can be used to destroy clothes infestation.

Frequent changing into clean clothes might not always be possible in poor households. However, the frequency of changing is advised to be twice a week for internal wear and 12 times per week for outerwear. The frequency mainly depends on the intensity of dirt on the clothes, and that depends on the climate and type of activity.

4.2 Personal hygiene: Special needs of women

Rest

Most women work very hard cooking, carrying water, and collecting fuel to help their families survive. If a woman also works outside her home, she has a double burden. She may work all day at a factory, in an office, or in the fields, and then return home to her second job—caring for her family. All this hard work can lead to exhaustion, malnutrition, and sickness, because she does not have enough time to rest or enough food to give her energy for her tasks.

To help reduce a woman's workload, family members can share the burden of work at home. Cooking, cleaning, and gathering fuel and water with other women (together or in turns) can also help make a woman's burden lighter. Whether she works for pay or not, she probably needs help caring for her children. Some women organize child-care cooperatives, where one woman cares for young children so that others can work. Each woman pays something to the woman caring for the children or they each take a turn.

If a woman is pregnant, she needs even more rest. She can explain to her family why she needs rest, and ask them for extra help with her workload.

Exercise

Most women get plenty of exercise doing their daily tasks. But if a woman does not move much while she works—for example, if she sits or stands all day in a factory or office—she should try to walk and stretch every day. This will help keep her heart, lungs, and bones strong.

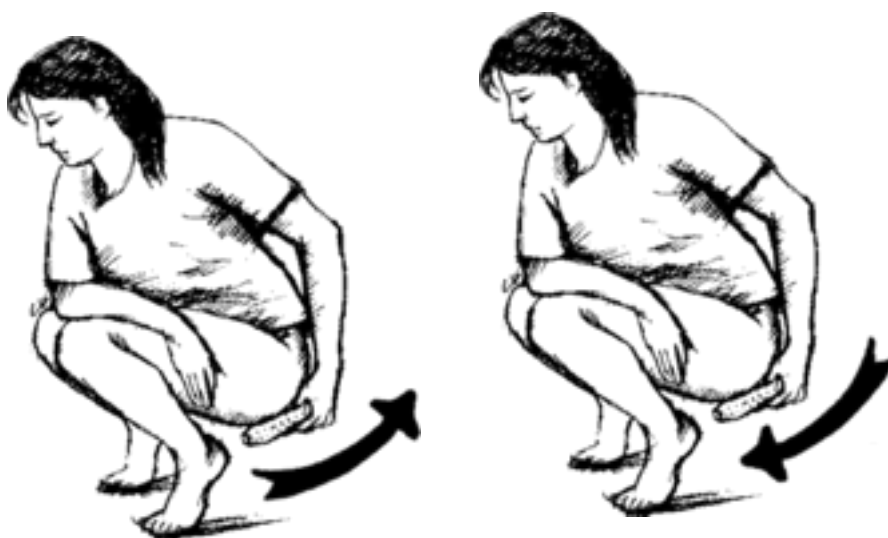


Caring for yourself during monthly bleeding



It is best to wash with soap and clean water every day, if possible. Also:

- Wash your hands before eating or preparing food, after passing urine or stool, and before and after caring for a baby or someone who is sick.
- Wash the genitals every day with mild soap and water. But do not take a shower (douche). The vagina cleans and protects itself by making a small amount of wetness or discharge. Douching washes away this protection and makes a woman more likely to get a vaginal infection.
- Pass urine after having sex. This helps prevent infections of the urine system (but will not prevent pregnancy).
- Wipe carefully after passing stool. Always wipe from front to back. Wiping forward can spread germs and worms into the urinary opening and vagina.



Regular health exams

If possible, a woman should see a trained health worker to check her reproductive system every 3 to 5 years, even if she feels fine. This exam should include a pelvic exam, a breast exam, a test for weak blood (anaemia), and an exam for sexually transmitted infections (STIs) if she is at risk. It may also include a Pap test (explained below) or other test for cervical cancer. This is especially important for women over 35, because women are more likely to get cancer of the cervix (the opening of the womb) as they get older.

Many STIs and cancers do not show signs until the illness is very serious. By then it may be too late to treat the problem.

Safer sex

AIDS has become a major cause of death among women.

Having unprotected sex, or sex with many partners, makes a woman more at risk for getting a sexually transmitted infection (STI), including HIV infection. HIV infection can lead to death from AIDS. Untreated STIs can cause infertility, pregnancies in the tube, and miscarriage. Having many partners also makes a woman more at risk for developing pelvic inflammatory disease (PID) and cancer. Women and men can help prevent all these problems by practicing safer sex.

Family planning

A young woman should use family planning to delay her first pregnancy until her body is fully grown. Then, after her first baby is born, she should wait 2 or more years between each pregnancy. This method, called child spacing, lets her body get strong again between pregnancies, and her baby can finish breastfeeding. When she has the number of children she wants, she can choose not to have any more. (Hesperian Health Guide).

4.3 How to use and maintain latrines

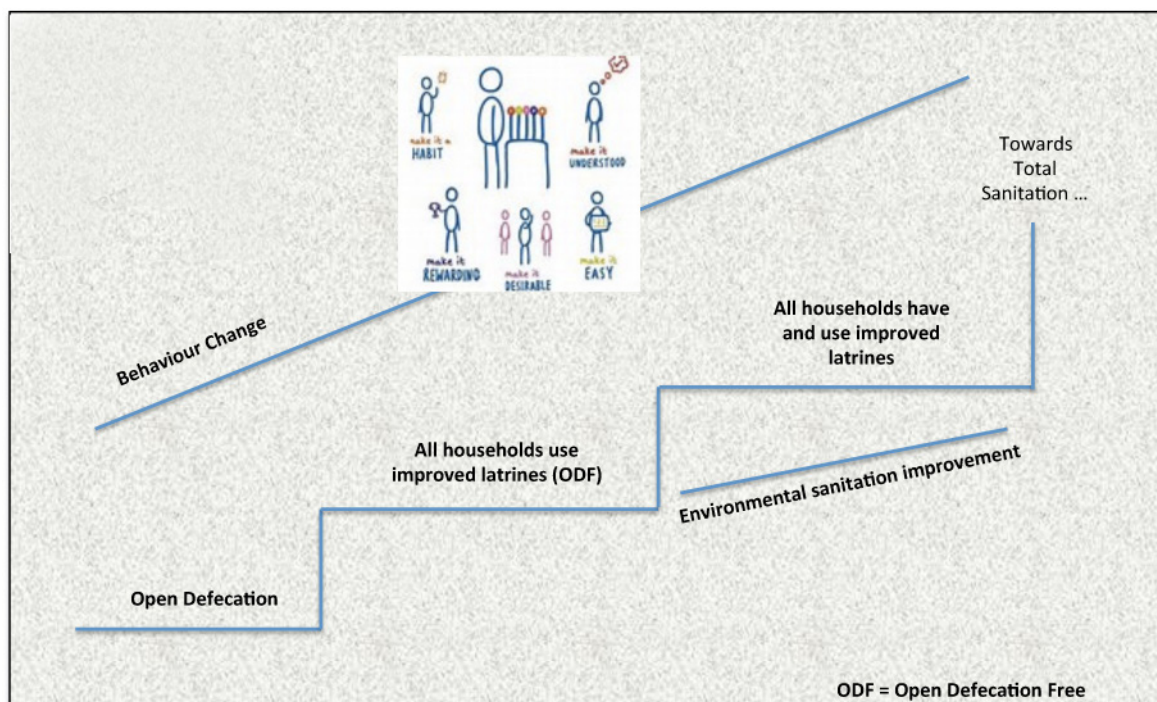
Human excreta (Faeces) are the source of many infectious disease agents. Diseases for which human excreta are the source are known as excreta borne diseases or Faecal Oral Route Infections. Excreta - borne diseases are the most important and wide spread in developing countries. The major reason for this is that majority of the population, especially in rural areas; do not have access to safe and decent latrine system. Thus most of the population in rural areas defecate in open fields or in any available space without any regard to the health risk that result from open field defecation practice.

As result of the open field defecation practices, human excreta contaminate the surface soil/field, food and water sources. The exposed excreta provide breeding places for flies and other insects.

Flies carry from faeces infectious agents to food and finally reach the consumer with the food. During rainy season specially, the disease causing agent are washed or carried by flood to water sources: into rivers, streams, lakes, unprotected wells and springs which are the major source of drinking water in rural areas.

Consequently excreta borne diseases such as Typhoid fever, shigellosis, Amoebiasis, Helminthic infections are very common and serious in these countries. These diseases can easily be controlled if every body uses a properly constructed and maintained latrine system. Figure 10.21 shows the need for changing the behaviour of rural people towards improved personal sanitation.

Figure 10.21: Behaviour Change Model for Personal Sanitation



A latrine is a safe and private place to be used for defecation. A wide range of latrines is used in households, schools, houses of worship, and other agencies.

An Improved latrine is a defecation facility that:

- Prevents contamination of water bodies.
- Breaks contact between humans and faeces.
- Prevents faeces exposure to insects and other vectors.
- Prevents unpleasant odour.
- Well-constructed, safe and easy-to-clean slab.

Advantage of latrine facility

Using properly constructed latrine and burying excreta in proper pit has the following advantages:

- Greater dignity and privacy
- A cleaner environment
- Helps to avoid direct contact with faeces.
- Avoids pollution of soil, water, air, animals and vegetables by human excreta.
- Helps to prevent contact of flies, rodents, and other insects etc. with faeces.

- Avoids foul odour from the environment, hence helps to maintain beautiful surroundings, improved sanitation and hygiene.
- Improved safety (no need to go out into the fields at night).
- Saves time and money, and produces compost and biogas for energy.
- Breaks the transmission cycle of sanitation related diseases.

We can see clearly the advantages of using properly constructed latrine from Table 10.3 showing the chain of excreta /faeces-borne diseases transmission.

Table 10.3: Diseases Transmitted Through Human Excreta: Their Mode of Transmission and Control measures

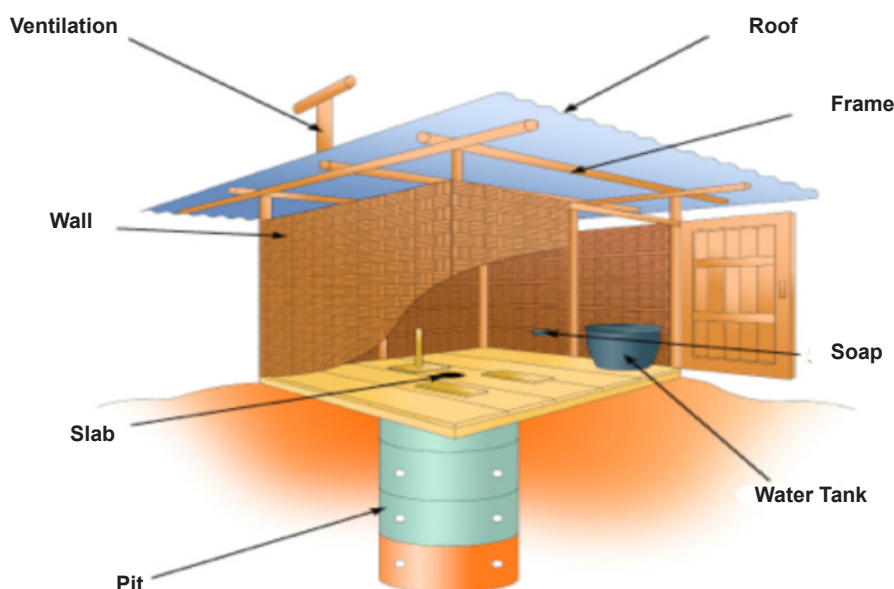
Disease Causing Agents	Type of Disease	Preventive Measures
Virus	<ul style="list-style-type: none"> •Hepatitis (A) popularly called bird's disease •Polio etc. 	<ul style="list-style-type: none"> •Building and using properly latrine. •Washing hands with soap after visiting latrine.
Bacteria	<ul style="list-style-type: none"> •Shigellosis. •Typhoid 	<ul style="list-style-type: none"> •Keeping water safe. •Eating safe food. •Not to use fresh faeces as fertilizer
Protozoa	<ul style="list-style-type: none"> •Entameba histolytica •Giardia etc. 	<ul style="list-style-type: none"> •Washing properly vegetables which are eaten as raw vegetables. •Eat properly cooked meat. •Avoid walking bare foot (wear shoes if possible).
Intestinal Parasites	<ul style="list-style-type: none"> •Ascariasis •Hook worm. •Tape worm. •Bilharzia 	<ul style="list-style-type: none"> •Do not wash in polluted water and do not bathe in polluted water.

Consideration for constructing a latrine structure

A latrine consists of 3 main parts (Figure 10.22):

- Above ground called superstructure.*
- On the ground called slab, labeled.*
- Under ground called pit.*

Figure 10.22: A safe latrine



Above-ground part (Superstructure)

This part consists of roof, frame and walls. However, these required parts will depend on the ability of your local community.

- Roof gives privacy and protection to the user from the sun, wind and rain. It can be made of leaves, roof tiles, tin sheets, etc.
- Frame is used to support the roof and walls. It can be made of bamboo, wood, etc.
- Walls are part of the superstructure. They give privacy and protection to the users. They can be made of leaves, mat/woven bamboo, bricks, tin sheets, wood, etc.

On-the-ground part (Slab)

- Slab covers the pit, and provides footrests. It can be made of any material which is strong enough to support the users. Materials used should be long lasting and easily cleaned such as wood, concrete, bamboo with clay, etc.
- Ash or water jar is a jar to store ash or water. Sprinkling some ashes in the pit after use reduces smell, moisture content and makes it unattractive for flies to breed in. Water can be used for hand washing and general cleaning.

Underground part (Pit)

A pit is an underground hole that can be square, round or rectangular, but a round pit is the strongest. Maximum depth depends on the soil conditions and ground water levels in the rainy season. In unstable soils, the pit may have to be fully or partly lined with woven bamboo, bricks, concrete rings, etc.

Any type of improved latrine that breaks the contact between faeces and the environment will be of benefit to its users. So building and using a latrine – any type at all- is the most important step to take.

How should latrines be used?

- Use the latrine always when you need to defecate.
- Show older children how to use the latrine properly, and encourage them to use it all the time.
- Always throw the faeces of infants, and children into the latrine pit.
- Squat on the squat hole properly so that all faeces drop into the pit without soiling the platform around it.
- Make anal cleaning materials readily available for use when needed.
- Have water in a container at the entrance of the door to the latrine and ensure that there is always water in it.
- Assign the responsibility of providing water in the container to some persons in the family or community.
- Make sure that there is always soap or ash next to the container of water.
- Wash your hands always after defecating with clean water and soap or wood ash provided at the entrance to the latrine.

Maintenance of all latrines

- Keep the inside of the latrine, and its immediate surroundings clean at all times. Assign the responsibility to specific persons.
- Scrub the floor, especially the area around the squat-hole and foot rest, regularly even daily with lots of water.
- Do sanitary survey at regular intervals to ensure that good sanitation practices are being followed.

- Make sure that the squat-hole cover fits the hole properly and provide the cover with a handle for easy lifting.
- Cover the squat-hole properly after using the latrine, in order to avoid flies flying in and out. Remember that flies transmit diseases.
- Fit a door that shuts properly, and when you leave the latrine make sure that you close the door to prevent domestic animals from going in.

In summary, a community has defined Open Defecation Free (ODF) if:

- All households defecate only in improved latrines and dispose of babies' faeces only to improved latrines, (including at school).
- No human excreta are seen around community surrounding.
- There are sanctions, rules or other safeguard mechanisms imposed by the community to prevent open defecation practice.
- A monitor system is in place by and for the community.
- There is pathway or strategy for future effort toward total sanitation.

4.4 Refuse and wastewater disposal

The disposal of refuse can have a significant effect on the health of communities. Where refuse is not disposed of properly, it can lead to pollution of surface water, as rain washes refuse into rivers and streams. There may also be a significant risk of groundwater contamination. Refuse disposed of in storm drains may cause blockages and encourage fly and mosquito breeding. It is therefore very important that household waste is disposed of properly.

It is also important that industrial waste is disposed of safely, as it is sometimes toxic and highly dangerous to human health (Figure 10.23).

The type and quantity of refuse produced by a community are extremely variable. The main factors affecting the composition of refuse are:

- Geographical region.
- Socio-cultural, cultural and material levels.
- Seasonal variations.
- Packaging of food ration
- Refuse-generating activities

Refuse containers should gather the refuse to facilitate the collection and avoid dispersion by wind and animals. Often metal drums are used. The bottoms could be pierced so that they do not retain liquids from decomposition, and should be provided with covers and handles for easy lifting.

The collection of the refuse should be well organised; teams, timetables and circuits, with a vehicle or hand carts, established.

Disposal techniques are

- Burying
- Incineration
- Composting

Impact of waste accumulation in day-to-day life

- It makes the environment dirty, untidy and reduces the quality of our environment.
- Decomposition of dead plants and animals give off bad odour that pollutes the air.
- It may cause drains to overflow as the various plastics may clog the drains.
- It can cause death of domestic or stray animals that rummage through the garbage for food, as when these animals eat the waste (like plastics) it can clog their alimentary canal (the food pipe) and cause them to die.
- Also some times due to their eating of waste the various toxins then enter the food chain and then ultimately harm humans.
- Some places where a large amount of waste has accumulated can give out foul odours.
- Some areas where garbage has accumulated acts like a breeding ground for and germs. Mosquitoes, flies, mice, rats and cockroaches, which invade our homes and can eventually lead to large-scale epidemics (lot of diseases) to spread.
- When it rains certain wastes enter the water bodies in the form of run off material and then pollute the water bodies along with its flora and fauna...on entering the soil they have the same effect.
- Domestic animals such as dogs and goats, which are not kept in dens, go there to eat and bring germs to our homes.

Figure 10.23: Unhealthy and Healthy environment



Proper waste disposal

Proper means of waste disposal is crucial to public health and the environment. This helps maintain a cleaner environment and reduces the chances of spreading diseases. Proper waste disposal also reduces the probability of contamination of the soil and groundwater. There are several alternatives available for disposing of waste in a suitable manner.

Composting

It is a natural process in which plant and other organic wastes are broken down biologically to produce a nutrient-rich material. At home, put yard and kitchen waste such as leaves, grass clippings, and fruit and vegetable scraps in a bin. This will eventually decompose and produce a mixture that can be used for soil improvement in individual gardens. You can use plants or vegetable wastes to feed animals like goats, sheep and cows.



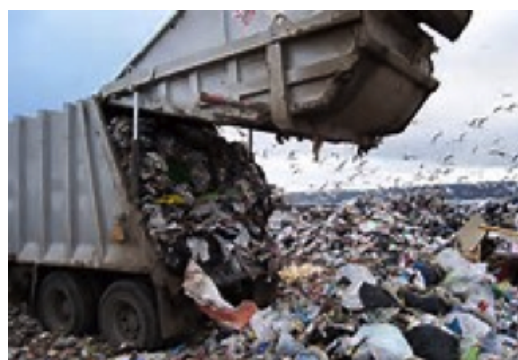
Recycling

Recycling is one of the best ways of waste management. It helps in reducing pollution, saving natural resources and conserving energy. Recycling newspapers, plastics, glass and aluminium also helps in saving money. Recycling other materials such as tires, batteries, asphalt, motor oil, etc. reduces pollution. In order to reduce trash, it is necessary to encourage and implement recycling at all levels of society.



Managing Landfill

Properly designed landfills handle waste in an efficient way. Landfill designs should include proper lining techniques. This helps prevent pollution of adjoining lands. The presence of methane, a greenhouse gas, in landfills can be potentially dangerous to the atmosphere. Therefore, it is important to install proper systems to ensure that the amount of methane present in landfills is under control. Moreover, access to landfills must be restricted for public safety. It is important to select a good site away from the living areas, and just outside the community for refuse disposal.



Burning Waste

In cities that do not have enough land available for landfills, controlled burning of waste at high temperatures to produce steam and ash is a preferred waste disposal technique. Combustion reduces the volume of waste to be disposed significantly. Moreover, solid waste can provide for a continuously available and alternative source for generating energy through combustion. This energy can be channelled into useful purposes.



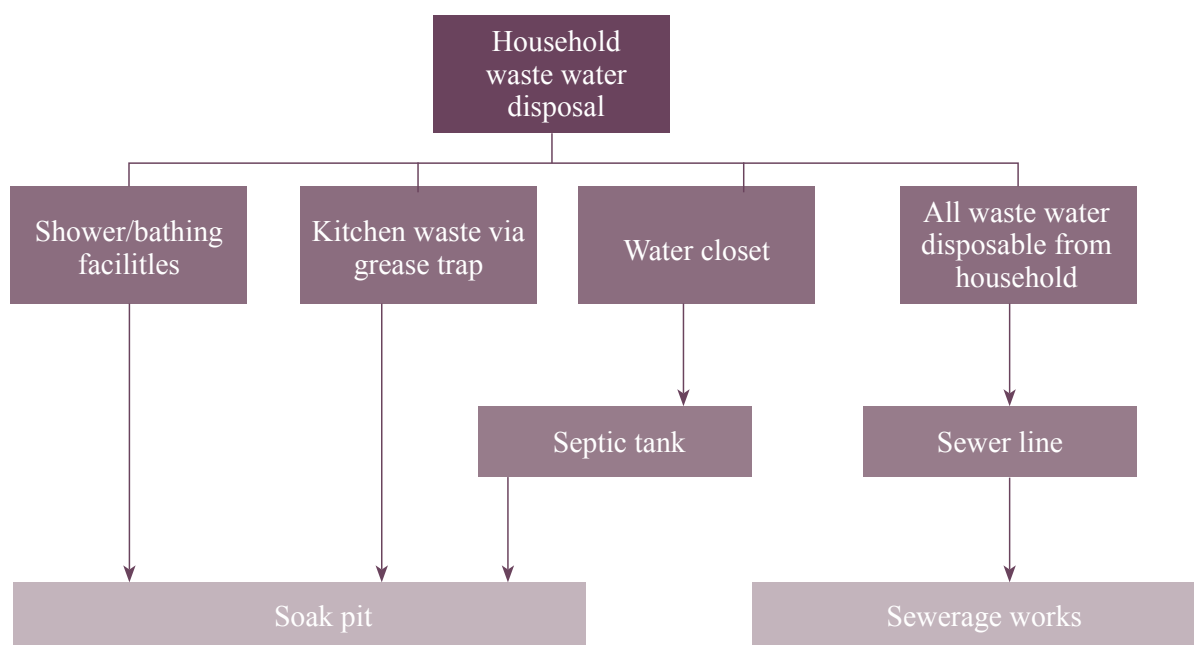
Other Alternatives

Other options for treating waste can also provide positive results. One such alternative is producing methane through anaerobic digestion. This process involves the decomposition of biodegradable waste in the absence of oxygen. The resultant methane can be used as a fuel to generate electricity. Another technique known as mechanical biological treatment yields an organic fraction that can be used to enrich the soil; the other fraction (refuse derived fuel) can be further treated to derive energy.

Wastewater disposal

“Waste Water” is used water (e.g. water used for washing, bathing, cleansing, flushing etc. in households, business premises etc.) which is discharged in the following manner (Figure 10.24).

Figure 10.24: Wastewater discharge system



The best results are obtained when wastewater from baths, sinks and wash hand basins is drained directly to the septic tank used exclusively to cope with sewage from the water closets.

Waste water, if not disposed of properly, leaves ponds and stagnant water, in which mosquitoes can breed and spread malaria. The proper way to dispose of wastewater is to:

- Let it drain into a covered soak-away pit.
- Make sure that the soak-away is not too close to a water source to contaminate it.

To construct a soak-away:

- Dig a large pit, fill it with large stones and cover it.
- Construct a drainage channel to carry the wastewater to the soak-away.
- Ensure that the drainage channel is not blocked so that the wastewater flows freely always.

4.5 Cleanliness in carrying water, storing water and in cooking food

Already treated or purified water has to be stored properly to prevent recontamination. Safe storage means keeping your treated water away from sources of contamination, and using a clean and covered container. It also means that drinking from the container should be done in a way that cross-contamination can be avoided. The container should prevent hands, cups and dippers from touching the water, so that the water does not get re-contaminated. There are several possibilities to store water. They range from very small covered buckets to large tanks or cisterns. Another possibility is to store water in bottles. Furthermore, the hygienic conditions in a household are crucial. Good hygienic measures include the following:

- Careful storage of household water and regular cleaning of all household water-storage facilities.
- Construction, proper use, and maintenance of latrines.
- Regular hand washing, especially after defecation and before eating, preparing food or handling drinking water.
- Careful storage and preparation of water and food.

Treated water should be stored in plastic, ceramic, or metal containers especially when using treatment options that do not leave residual protection (Figure 10.25). The following characteristics of containers serve as physical barriers to re-contamination:

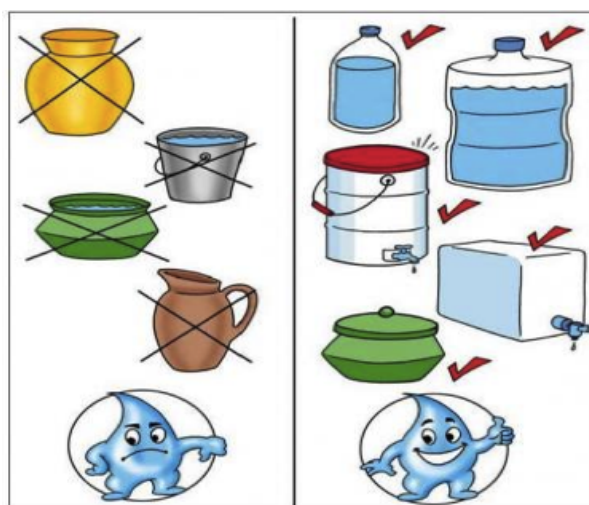
- A small opening with a lid or cover that discourages users from placing potentially contaminated items such as hands, cups, or ladles into the stored water.
- A spigot or small opening to allow easy and safe access to the water without requiring the insertion of hands or objects into the container.
- A size appropriate for the household water treatment method, with permanently attached instructions for using the treatment method and for cleaning the container.

The following aspects should be considered when planning for safe storage and prevention of re-contamination (WHO 1997):

- Location of storage vessel.
- Design of storage vessel.
- Removal of water.

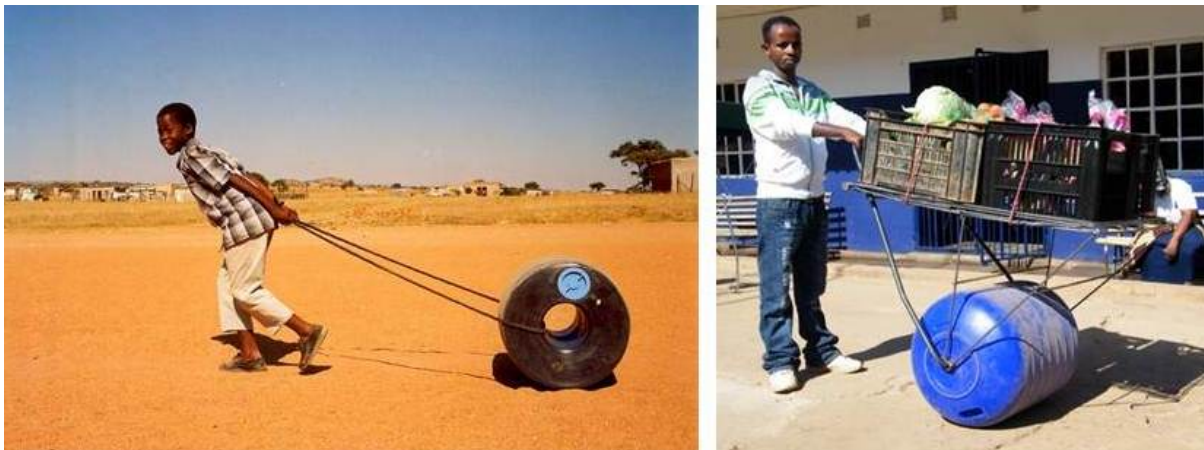
The water storage container must be covered and only used for treated water (Figure 10.25).

Figure 10.25: Water storage containers: Example



Source: CAWST (2009).

Figure 10.26: The Q-Drum



Source: Gunzelmann (2008)

In impoverished rural areas, clean water is often miles away from the people who need it, leaving them susceptible to waterborne diseases. The sturdy Q drum is one of the most suitable devices for rural people to fetch water from distant areas of water resources. The drum holds around 50 litres in a rolling container that eases the burden of transporting safe, potable water (Figure 10.26).

Storage for domestic and animal use and agricultural use must be strictly separated. An outlet such as a tap or a piping system should always be appropriately designed to prevent contact with hands or other sources of contamination, thus pouring treated water from the container rather than scooping the water out of it. Tanks, buckets or other storage types must be cleaned and flushed regularly to prevent health risks and re-contamination. Purified water at household level should be used as soon as possible, preferably the same day, to minimise the risk of re-contamination (CAWST 2009). In general, water from sources such as reservoirs, rainwater tanks, covered buckets or other water sources must be purified before used as drinking water. It is also highly important to wash hands regularly, especially after defecation and before eating, preparing food and handling drinking water (WHO 1997).

Small-scale water storage is mainly used where there is neither a distribution network nor motorised distribution. Small buckets can be carried by a single person and it is handy to work with it in the household. Bigger tanks (or cisterns), which are filled by a tank truck or a rainwater harvesting system, are

applied in single households or communities. Water towers are mainly used for communities and to create enough pressure to distribute the water via a piped network.

Advantages

- Small tanks, buckets, cans or clay pots are cheap and available in many countries all around the world and can be carried by a single person.
- Large-scale water tanks are easy to install, durable and mostly locally available.
- Rainwater cisterns are an effective, practical means of storing water in arid regions. They can help meet water demand for domestic and live stock use.
- Cisterns are a reliable, self-replenishing storage of water and are widely used by local communities. They are low-cost, and can be easily built and managed by the communities themselves.
- Cisterns are a good storage of freshwater for supplemental irrigation in orchards (e.g. olive and figs in northwest Egypt).

Disadvantages

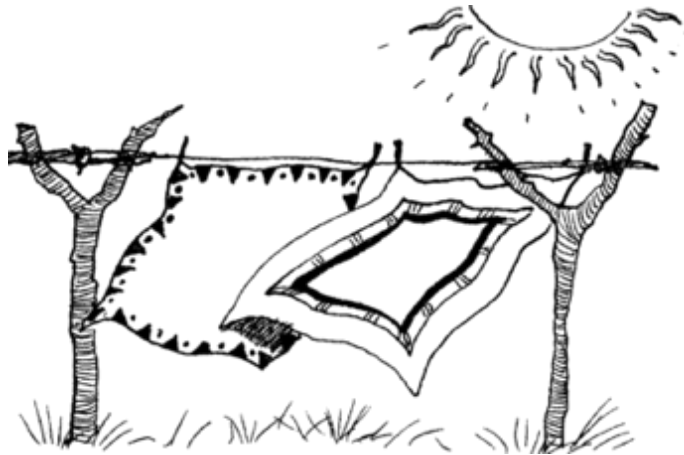
- Water contamination can be a health risk. Sediment traps and grating at the inlet can reduce levels of contamination. However it is recommended that water from cisterns (and also water from tanks) be treated before drinking, to meet health standards.
- Risk of contamination if drinking water tanks are used to store untreated water or other (hazardous) liquids.
- Sediments and other solids (e.g. if there is no first-flush filter) can reduce the storage volume and/or contaminate the water
- It is easy to re-contaminate stored water (e.g. polluted tanks, insects or other animals, no hand washing).

4.6 Cleanliness in the home

Sunlight kills many germs that cause illness.

Since family members are in close contact with each other, it is very easy to spread germs and illness to the whole family. A family will have less illness if they:

- Wash cooking and eating pots and utensils with soap (or clean ash) and clean water after using them. If possible, let them dry in the sun.
- Clean the living space often. Sweep and wash the floors, walls, and beneath furniture. Fill in cracks and holes in the floor or walls where roaches, bedbugs, and scorpions can hide.
- Hang or spread bedding in the sun to kill parasites and bugs.



If children or animals pass stool near the house, clean it up at once.

- Do not spit on the floor.
- When you cough or sneeze, cover your mouth with your arm, or with a cloth or handkerchief.
- Then, if possible, wash your hands.
- Get rid of body wastes in a safe way.
- Teach children to use a latrine or to bury their stools, or at least to go far away from the house or from where people get drinking water.



4.7 Cleanliness and sanitation in the community

We have noticed that clean drinking water can help prevent diarrhoea and parasites.

Many common health problems are best solved in the community. When the community works together to improve sanitation, everybody benefits. For example:



Work together to develop a source of clean water for drinking and cooking

- The source should be close enough to the community for people to get water easily.
- To keep drinking and cooking water clean:
 - ▶ *Do not let animals go near the water source. If necessary, build a fence to keep them out.*
 - ▶ *Do not bathe, or wash clothes, cooking pots, or eating utensils near the water source.*
 - ▶ *Do not pass stool or throw garbage (rubbish) near the water source.*
 - ▶ *Use composted food waste to fertilize your crops: After using the latrine, throw a little lime, dirt, or ash in the hole to reduce the smell and keep flies away.*

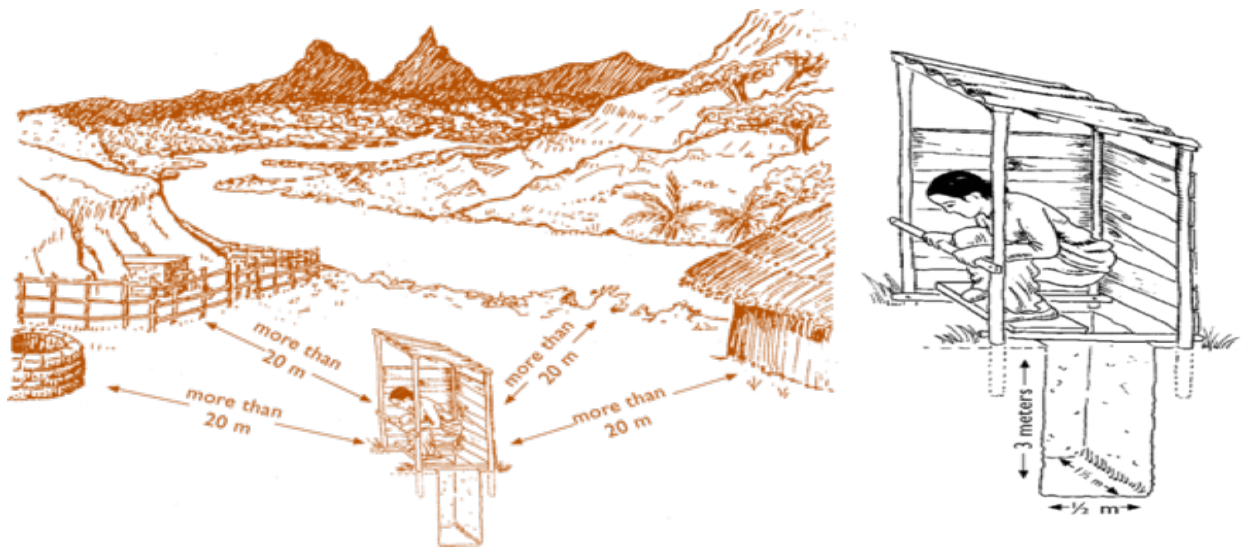
Get rid of garbage in a safe way: If possible, bury, compost, or burn garbage. If you bury it, make sure the pit is deep enough to keep animals and bugs away. If the garbage is above ground, fence off the dump and cover the garbage with dirt to reduce flies. Also, find safe ways to get rid of dangerous and toxic materials. For example, do not burn plastic, because the fumes can be toxic, especially to children, old people, and sick people.

Drain standing water in washing areas, and in puddles, tires, and open containers. Malaria and dengue fevers are spread by mosquitos, which breed in water that is not flowing. If possible, use mosquito nets when sleeping.

4.8 Organizing the community to build latrines

How to build latrines?

- A pit about ½ meter wide, 1 ½ meters long, and meters deep.
- Cover the pit, leaving a hole about 20 by 30 centimetres.
- Build a shelter and roof out of local building materials.



To be safe, a latrine should be at least 20 meters from all houses, wells, springs, rivers, or streams. If it must be anywhere near a place people go for water, be sure to put the latrine downstream.

4.9 Food safety and hygiene

Washing your hands prevents the spread of disease. Keep a special clean rag for drying your hands. Wash it often and dry it in the sun.

Or dry your hands in the air by shaking the water off.



Cooked food

Some communities have traditional ways to prepare raw meat or fish that make them safe to eat.

Cooking food kills germs. All meats, fish, and poultry should be well cooked. Nothing should look raw or have a raw colour.

If the food begins to cool, the germs quickly start to grow again. If the food is not eaten within 2 hours, reheat it until it is very hot. Liquids should be bubbling, and solids (like rice) should be steaming.



Food storage

Women in the community can teach others about which local foods keep well and good ways to store them (Box 10.3).

Whenever possible, eat freshly prepared food. If you store food, keep it covered to protect it from flies and other insects, and dust.

Food keeps best if it stays cool. The methods described below cool food using evaporation (the way that water disappears into the air). Put the food in shallow pans for more complete cooling.

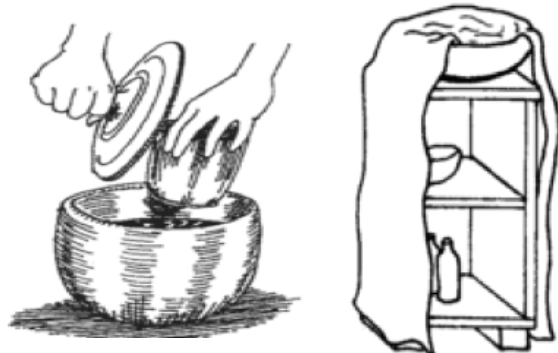
Pottery cooler

This double-pot cooler is made of a small pot inside a large pot. The space between the pots is filled with water. Use a large pot and lid that have not been glazed (coated with a hard, smooth, baked-on covering) so that the water will evaporate through the pot.

The small pot should be glazed on the inside to make it easier to keep clean and to stop water from seeping into the stored foods.

Cupboard cooler

Put a wooden crate or box on its side, and then set it on bricks or stones to raise it off the floor. Put a container of water on top of the crate and drape sackcloth or other coarse cloth over the bowl and around the crate. The cloth should not quite reach the floor. Dip the cloth in the water, so that the wetness spreads throughout the cloth. Place the food inside the crate. As the water in the cloth evaporates, it will cool the food. This



method works best if you can keep the cloth wet all the time. Cover the entire crate when you make a cupboard cooler. The front is open here just so you can see inside.

Box 10.2

Food selection: Sometimes food is bad even before it is cooked or stored. Here are some things to look for when selecting food.

Fresh (raw) foods should be:



- *Fresh and in season.*
- *Whole—not bruised, damaged, or eaten by insects.*
- *Clean (not dirty).*
- *Fresh smelling (especially fish, shellfish, and meat, which should not have a strong smell).*



Processed (cooked or packaged) foods should be stored in:

- *Tins that look new (no rust, bulges, or dents).*
- *Jars that have clean tops.*
- *Bottles that are not chipped.*
- *Packages that are whole, not torn.*

Clean water

Drinking water should be taken from the cleanest possible source. If the water is cloudy, let it settle and pour off the clear water. Then, before drinking, kill the harmful germs as described below. This is called purification (Box 10.4).



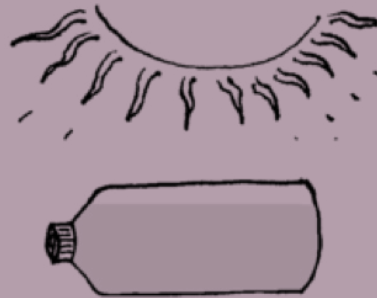
Store water in covered jars and keep your living space clean.

Store the purified water in clean, covered containers. If the container has been used for storing cooking oil, wash it well with soap and hot water before storing clean water in it. Never store water in containers that have been used for chemicals, pesticides, or fuels. Wash water containers with soap and clean water at least once a week.

Box 10.3

Here are some simple and inexpensive ways to purify your water:

Sunlight. Sunlight kills many harmful germs. To purify water, use sunlight, fill clean, clear glass or plastic containers with water, and leave them outside from morning to late afternoon. Be sure to place the containers in an open space where they will be in the sun all day. (If drinking water is needed right away, putting the containers in the sun for 2 hours in the middle of the day should be enough for purification.)



To avoid getting germs in the water, choose a spot away from children, dust, and animals. If you want the water to cool before using, bring the containers inside overnight. Water can be stored for a day or two in the same container. Sunlight purification works best in warm climates.



Lemon juice sometimes kills cholera (and some other germs). Add 2 tablespoons lemon juice to a litre (1 quart) of water and let it sit for 30 minutes.

Boiling water for 1 minute makes it safe from germs. Let it boil for 1 full minute before taking the pot off to cool. Because boiling water uses so much fuel, use this method only if there is no other way to purify your water.



Source: Check the original fexr.

In brief, in order to make sure that we stay healthy, it is important for us to keep both ourselves, and our environment clean. Thus, we have to exercise some good personal hygiene practices.

- Wash your hands with soap or ash and water after defecation and before handling food or eating.
- Always urinate and defecate in the latrine.
- Dispose of children and infants faeces in the latrine.
- Clean latrines regularly.
- Change and wash your clothing regularly in order to avoid unpleasant body odour.
- Wash your hair regularly to avoid head lice.
- Have at least one bath a day, especially after working hard and sweating in order to avoid unpleasant body odour.
- Brush your teeth everyday and after each time you eat sweets to prevent cavities developing in your teeth.
- Cut your fingernails, and especially those of children, regularly because germs that cause diseases can be trapped in them.
- Do not spit on the floor because sputum can also spread diseases like tuberculosis.
- Cover your nose and mouth when you cough or sneeze in order not to spread diseases of the chest.
- Sweep, dust and air your home regularly.
- Air your bedding regularly so that disease vectors like fleas do not hide in them.

5. COMMUNITY SUPPORT AND MOBILIZATION FOR HEALTH EDUCATION

5.1 Why community mobilization is important?

Often, rural people do not understand the ways in which environmental conditions affect their health and therefore, do not know why they should have good environmental health practices. If this happens then your work and the work of the Community Health Workers (CHW) may not be effective.

The right persons to help people understand about the importance of environmental health are you and the CHW.

The information and knowledge of health work will receive a much better response from your community if the people understand why the work is being done and how it is likely to improve their health. For example, by explaining that hand washing is being done because it will result in less diseases and infections.

It is very important to teach people about the germ theory, parasites and the way that diseases spread, so that they understand why they should practise good health.

It is also important to teach people how to practise good health so that they know what to do to keep themselves, their homes and their community healthy.

How to teach about good environmental health

People can learn from:

- Verbal (spoken) explanations.
- Demonstrations (being shown).
- Observing (looking at) what others do.
- Getting information from books, posters, videos, pamphlets and other printed materials.
- Working things out for themselves.

People do not learn well when:

- They do not have the desire to learn.
- They are not physically fit, such as when they are sick or tired.
- They are emotionally upset, such as when they are angry or frustrated.
- When the teacher does not explain things clearly.

People do learn best when:

- They want to learn.
- Things are explained clearly in words they understand.
- They feel happy when they are being taught.
- They are rewarded when they show that they have learnt what they have been taught. People are usually rewarded when they are praised for their efforts.
- Things are explained or shown to them a number of times and in a number of different ways.
- They have the opportunity for actual hands-on practice, for example, plumbing repairs.
- They are not distracted by other things going on around them.
- Pictures and diagrams are used to explain difficult ideas.
- They can use what they have been taught in their communities and homes.
- They can understand the benefits their knowledge will have for them and their community.

CHWs need to understand that people often do not put into practice what they have been taught. This may be because they have not listened properly to the teacher, they have forgotten what has been said or they have not understood.

Even after people know what should be done and why, they often take quite a long time to change their poor environmental health behaviour. This may be because they:

- May not understand that practising good environmental health is important for them;

- Do not want to appear different to other people;
- Think it is too much trouble;
- Do not have the money to buy the necessary equipment;
- Do not have the confidence that they can change their behaviour. This often happens when people do not think much of themselves; and
- Think other things are more important than health.

CHWs must have patience when they are teaching.

Preparing to teach about environmental health

Before the CHW teaches anything about environmental health to people in the community, it is important that the following points are considered:

- It is important that the CHW fully understands what he/she is teaching.
- If the CHW does not fully understand the facts, it is highly unlikely that the learner(s) will be able to understand either.
- The CHW can find out what needs to be taught by talking to the community to find out about their special needs, or by reading books, pamphlets and course notes on the topic.

Regardless of where the lesson is being given, it will need to be planned to make sure that everything that needs to be done will be done.

A lesson plan should have clear objectives. The CHW should work out what it is that needs to be taught, to whom and by what date.

At the end of the demonstration, participants should understand the causes, effects on health and prevention of scabies.

The best teaching aids for the CHW to use are pictures which can help him/her explain what needs to be taught. There are different kinds of teaching aids which have pictures. Examples are flip charts, client one-to-one cards, teaching posters, videos and DVD's, PowerPoint presentations, slides, overhead transparencies and stickers.

Flip charts

These consist of a number of cards with pictures on them bound together in a single file. Each chart is designed to help communicate one or two facts. All the charts together should provide enough information to allow the learner to understand the basic facts about a particular topic.

Flip charts can be used for teaching from one to about ten people and are particularly helpful when teaching people who cannot read. The message is explained verbally as people look at the picture (Figure 10.27).

Figure 10.27: CHW using a flip chart to teach children



Client one-to-one education cards

These are single cards which are designed to provide the basic facts about a particular topic, such as how flies cause disease. Each card has a number of illustrations which together provide the information which needs to be taught. These cards are used for teaching only one or two people and are designed to teach people who cannot read.

Posters

These are large pieces of paper which can be pinned up on a wall and which contain pictures and words about a particular topic, such as malaria. The poster usually does not have many words and it should be possible to understand the message from the pictures.

All the information on a poster should be able to be seen from some distance away and it should be attractive enough to catch people's attention long enough for them to take in the message.

Teaching and message reinforcement posters

Teaching posters are designed to help teachers explain what they want people to understand and learn.

Message reinforcement posters are specially designed to remind people of certain important health messages which have already been explained to them.

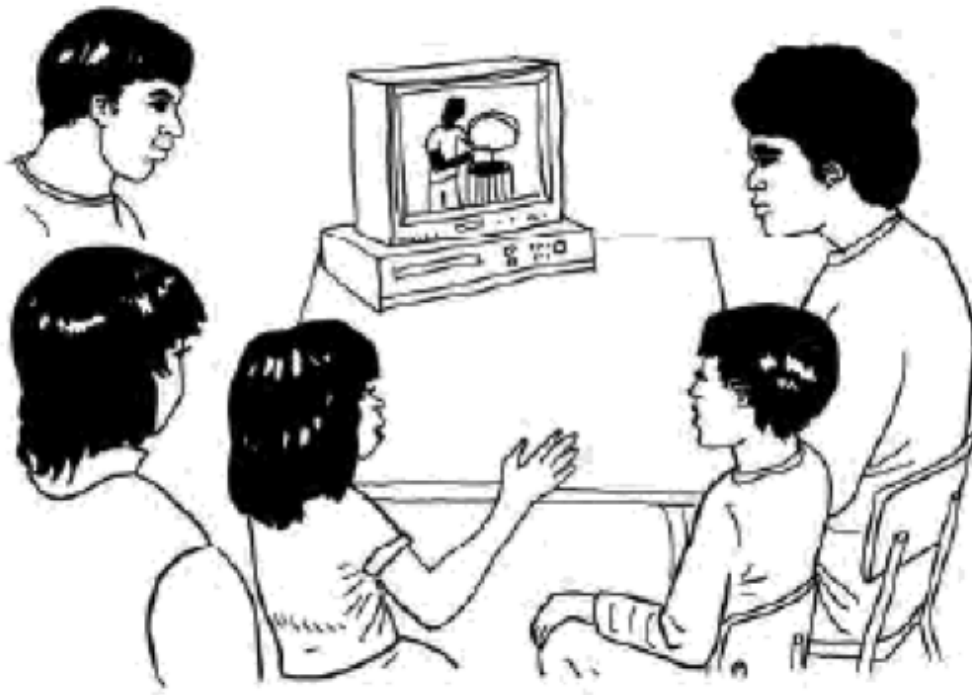
After people have been taught the health messages in a poster, copies should be pinned up in places such as, community clinic, community office, community hall, school, etc. where they are likely to see them over and over again.

Videos and DVD's

Videos and DVDs are used to teach people new information or to remind them about health information that has already been explained to them.

Videos and DVDs are especially useful when you are trying to encourage a group to talk about the subject which is being taught. For example, the CHW or you can ask the people in a group what they think about something which has happened in the video or DVD. You or CHW then ask them what they think the CHW is doing and why in the video or DVD (Figure 10.28).

Figure 10.28: Family watching environmental health video/DVD



Normally, people do not learn facts from just being shown a video or DVD. They need to have things explained by the CHW as well. They also need to talk about and practise what they are taught.

PowerPoint presentations, slides and overhead transparencies

If there is a projector for PowerPoint, slides or transparencies and electric power in the community, these media devices can be used to help get health messages across to large groups of people.

These are expensive education aids and usually can only be borrowed from an education resource centre.

Stickers

Stickers are used to remind people about important health messages. They are often displayed in places where CHWs want people to put into practice something which they have been taught. For example, a sticker reminding people to put rubbish in a bin can be placed on a rubbish bin near where people drop a lot of litter (Figure 10.29).

Figure 10.29: Environmental health stickers remind people what to do



Demonstrations and practice

In addition to using teaching aids, a very good way of teaching people good environmental health practices, such as dog dipping, is by showing them the right way to do things. This kind of teaching is called demonstrating.

This method is particularly effective when the CHW also gives the learner the opportunity to practice what has been demonstrated. People learn better when they do the job themselves. For example, after showing how to wash hands, encourage the learners to actually wash their hands by themselves (Figure 10.30).

It is often a good idea to show people that good environmental health practice improves health. For example, the CHW and the Community Nurse may have run a programme to get rid of malaria in the community. This program may have included screening for malaria, the treatment of affected people, and education about the causes, health affects and prevention of malaria.

To be able to show that this programme has worked, the CHW could ask the local Community Nurse to work out from the clinic records how many people came in for malaria treatment:

If the programme has been done well, there should be a drop in the number of people going to the clinic for treatment connected with malaria. If this has happened, it is important to tell the community about it.

- During the month before the programme started.
- During the month immediately following the finish of the programme.

Figure 10.30: Demonstrating environmental health maintenance



Where teaching can be done

CHWs can teach community members in different places. Here is a list of some of them:

Community meetings: Whenever the CHW thinks that community members need to know about an environmental health problem in the community, he/she should tell them about it at a community meeting. The CHW should tell them about the causes of the problem and what can be done to fix it. When the people know these things they will be in a good position to make decisions which will improve the situation.

People's houses: There are many times when the CHW will need to explain things to individual family members. Some teaching needs to be done with great care so as not to shame people. If there is any chance of this happening, it is best to visit their homes and talk to them on their own.

While working in communal areas: EHPs can often find opportunities to talk to people about environmental health matters when they are just having friendly chats with them outside the store, their homes, around camp fires at night or in the streets.

These times are good for telling them about the work the CHWs do and why they are doing it. This helps them understand better the need for a clean healthy community.

Whenever possible the CHW should correct children who are seen to be behaving in a way which is likely to cause the spread of disease-causing germs and parasites. For example, they should be corrected when they litter, do not wash their hands after going to the toilet, play near leaking sewage pipes, or break water equipment. The more this is done in a friendly way, the better children will learn.

The school: The CHW can make arrangements with the school to teach environmental health topics to children.

It must be remembered that teachers work out their teaching programmes well ahead of time, so it is wise to make these arrangements early in the school year.

At the same time, talk to the class teacher about what needs to be taught and make sure that it fits in with his/her teaching programme.

CHWs can offer to give talks in the classroom or to teach by taking students into the community and showing them how to recognise environmental health problems and the steps they can take to get them fixed.

5.2 Tools and Techniques for Changing Hygiene and Sanitation Behaviour at the community Level

Sanitation Clean-up Campaign

Sanitation Clean-up Campaign is one of the most important tools for changing hygiene and sanitation behaviour at the community level. Thus, the first thing we have to do is to identify “Sanitation – Clean up Campaign” with community members and get them involved in actions to improve hygiene and sanitation in their houses and communities and environment.

The “Sanitation Clean-Up Campaign” is a community action that is programmed for the children, women, men, religious leaders, etc. to clean up their communities periodically (at least once a month).

However, in order to organise such a campaign, you are required to do the following prior to the sanitation campaign:

- Identify focus areas that need to be cleaned.
- Discuss what needs to be done with other key people such as school directors and government team members.
- Set the date on days that people are staying at home (religious holidays, not a market day, etc.).
- Remind schools and the community people about the date, time, and particular place they have to be and what they need to come with—shovels, pick axe, sickles, etc.
- Make certain to involve school children in publicising the event in their loud and enthusiastic voices; as well as involving them in the actual event.

Once done, you should describe and explain the significance and importance to each member of the community that:

- Clean-up days serve to informally monitor (hopefully a reduction in) open defecation in community.
- Clean-up campaigns should be combined with other community events like festivals, drama, music, or parades to call attention to the issues, create social pressure, foment competition, and add an element of creativity and fun.

The Village or Community Pledge

Another tool for mobilising the community for sanitation and hygiene is the “Village or Community Pledge”. This pledge is an agreement of leaders that by a certain date, their village will end open defecation, wash their hands consistently at critical times and protect drinking water. It can be written, for example, as follows:

Example of the Village Community Pledge

VILLAGE PLEDGE (Example)	Village name (insert name) will: •End the practice of open defecation. •Build and use traditional latrines. •Set up “tippy taps” and wash hands at critical times. •Make drinking water safe from source to mouth. We will achieve “sanitary and hygienic” status by (insert date). Signed by:..... (Village Leaders – all sections) Witnessed by:..... (Religious leader)
Support	The Health Education Worker and Community Health Promoter will arrange construction of demonstration latrines and hand washing facilities and visit houses with leadership to overcome difficulties. Signed:.....LeaderHealth Education WorkerCommunity Health Promoter

It is important to ask each participant to read and review the village pledge. It is advised that participants discuss the contents of the pledge and hopefully come up with concrete suggestions to be included in the pledge.

Once the contents of the pledge are finalised, we have to organise a “Village Pledge Ceremony” with all village residents, where the leaders sign their pledge that by a certain date the village will have ended open defecation, be consistently washing their hands at critical times and protect drinking water (always).

Establish Community Organizations

While organizing the campaign, it is worthwhile to organise and assess the potential of using “snack breaks” to discuss hygiene and sanitation behaviours and design an action plan. Once decision on organising snack breaks is taken, we have to ask the participants’ opinion on using “snack breaks” as a tool to discuss health and sanitation with community.

Establishing a “Snacks for Health Club” program for neighbourhoods is another community support mechanism to enable neighbours to discuss their hygiene and sanitation behaviours and design an action plan. The role of social norms in motivating and maintaining change has been emphasized. “Snack for Health Clubs” can maintain peer support and peer pressure, help establish a competitive spirit among neighbourhood, and lastly identify “early adopters,” eager pioneers from among the group to model and motivate new behaviours.

We have to tell the participants that:

- Sustainability of any behaviour change is assured only if households, neighbourhoods and communities at large are empowered to direct their own futures and act to change conditions.
- The role of the volunteer community health promoter or the health education worker should be to motivate and mobilize their communities to take action.
- Effective community mobilization approaches should include: establishing “Snacks for Health Clubs”, planning a “Sanitation Clean up Campaign” and mobilizing the community and leaders to sign the “Village Pledge”.

Community Conversation

Community conversation is another tool that communities can use to develop their own action plan with clear targets and institute a follow-up mechanism. The Community Conversation Program is in principle the same as Snack for Health neighbourhood clubs.

6. SANITARY SURVEYS

In order to protect communities, especially rural communities, from water-borne diseases, emphasis is placed on the promotion of better hygiene and sanitation practices. These include the provision of facilities such as a good water supply and latrines that have hand -washing facilities next to them. However, it is equally important to maintain the infrastructure and keep the surroundings clean. These are achieved by:

- Performing Sanitary Surveys.
- Monitoring the quality of the water supply, mostly the bacteriological quality.

The results obtained from these analyses are combined to ensure that the community is supplied with water of safe quality.

6.1 What is a sanitary survey?

A Sanitary Survey is a tool, in the form of a list of questions, used to inspect facilities such as water points and latrines and their immediate surroundings to identify any potential risk factor(s). Risk factors are poor sanitary conditions that could lead to the contamination of the water supply, which could cause water-borne diseases.

A sanitary survey is used to identify existing or potential contaminants to a water body. Normally the contaminants of concern are pathogenic organisms

known to cause a variety of human diseases. Sanitary surveys may be used by public health officials, beach managers, shell fishing regulators, and any organization requiring detailed information on potential bacterial pollution sources to surface waters.

The sanitary survey provides information on the overall condition of the watershed and makes recommendations for improving water quality. This information can then be used to design site-specific monitoring programs and initiate pollution source remediation efforts.

It is important to note that all the questions of the sanitary survey are equally important and are therefore, given the same weighting.

Main components of sanitary surveys

Sanitary surveys consist of three main components:

- **Point Source Identification:** A lot-by-lot survey surrounding the area of concern. The survey should contain information on land usage, sewage disposal, and identify point sources of potential pollutants.
- **Water Quality Monitoring in the surrounding:** The water quality of the area of concern is monitored by collecting water samples on a regular basis. Water samples are also collected from potential pollution sources to assess their impact on the area.
- **Meteorological and other Studies:** After the pollution sources have been correctly identified, further studies are done to understand how the contaminants affect the surrounding area.

6.2 When should a sanitary survey be conducted?

Sanitary surveys should be conducted when high levels of contamination are present or suspected and the source of contamination is unknown.

- To monitor sanitary conditions as a routine exercise.
- After severe weather changes like heavy rainfall; the sanitary conditions could be affected.

- To identify the likely cause of contamination of a water-point if water quality analysis results indicate so.
- When there are complaints from users of noticeable changes in the water quality, such as colour, odour and taste.
- To identify the likely cause of an outbreak of a water-borne disease.

Sanitary surveys should also be conducted when significant changes in land use, construction, or development of the area is proposed. Possible sources of contamination that would warrant a sanitary survey are:

- Sewage spills from sewer collection systems and pump stations.
- Faulty septic systems.
- Agriculture.
- Non-point source contamination from residential or commercial development.

6.3 How to conduct a sanitary survey

To begin your own sanitary survey, remember to follow these four steps: plan the survey, conduct the survey and site visit, compile the report, review and respond to the reports. To conduct the sanitary survey the following five areas must be evaluated.

- Rainfall and climate: Bacterial contamination is highest after rainfall when runoff carries the faecal material to surface waters. Identifying annual rainfall, rainfall amounts in the 30 days prior to the survey, and the number of events where greater than 1 inch of rain fell in 24 hours is recommended. Identifying terrain and soil permeability that will affect the runoff rate, and identifying temperature patterns during the time of concern will aid in the survey. Pathogens tend to persist longer in warmer temperatures.
- Water flow: Areas with more water movement tend to have less contamination while areas with little or no flow will have higher concentrations. Measuring water flow and movement in the area of concern is important during sanitary surveys.

- Sources of pollution in the watershed: Pollution sources close to the area of concern that occur frequently have a greater impact than those far away occurring less often. Refer to the above list of potential sources of contamination to aid in identifying sources to the area.
- Water treatment level: If a permitted discharge exists in the area, evaluate the level of water treatment as primary, secondary, or tertiary treatment. Identify any other pollution prevention efforts in the surrounding area.
- Sources of pollution in the area of concern: The amount of human and animal faecal pollution should be determined. Examine sanitary facilities at the site as well as failing septic systems, pleasure crafts with toilets, marinas, and animal faecal contamination in the area.

In addition, you should also make sure that:

- The community should have a map of the area showing all the water points and types of water points. The Inspector of Rural Health (IRH) should have knowledge of this in advance.
- The IRH assisting to conduct the survey should try and notify the local community representatives in advance of the visit.
- The sanitary survey questionnaire(s) should be completed on site together with the community representative.
- On completion of the questionnaire, the inspector should clearly encircle each of the risk factors observed on the diagram, detach the diagram from the survey form, and give it to the community representative.
- There should be clear discussions on the interventions necessary and a firm date scheduled for the next visit.

6.4 How to assemble the sanitary survey reports

Sanitary survey reports should be consistent and typically contain the following recommended sections:

- Executive Summary: Identify the area and describe historical water quality.
- Pollution Source Survey: Identify all pollution sources and evaluate their significance.
- Physical Factors: Identify factors that affect distribution and concentration of microorganisms and microbial water quality.
- Meteorological Characteristics: Describe these factors and affects on transport of pollution to the area.
- Water Quality Studies: Include all sampling data and related plans, data explanations, conclusions, and bacterial loading due to meteorological conditions.
- Recommendations: Conclude with recommendations on how to remediate the problem.

Sanitary surveys are only useful and effective if action is taken immediately to repair or eliminate any risk factor(s) identified. Therefore, all interested parties and users' representatives should be given copies of the survey and a copy put on file for future reference. These people in turn should take all the necessary action to undertake prompt and effective repairs of the protective structures of the water-point and clear any unsanitary conditions around it.

7. CONCLUSION

This training module is designed to explore the various aspects of health, hygiene and sanitation so that people in rural areas can come to know relevance of these factors. In today's dynamic era, health is very vital concern to be understood by each and every individual which is highly overlooked in various nations especially in rural areas. The module is not prescriptive, but it gives overviews, stimulate change and provide ideas and guidance to all those who want to make rural area a better place for sanitation and hygiene. So that all users interpret the module in the same manner, it is important to clarify the major concepts used, i.e. water and environmental sanitation facilities and rural hygiene education. Water and environmental sanitation considered in this module include: water supply systems, water storage systems, systems for the improvement and preservation of water quality, waste water drainage, system to manage and dispose of human waste matter, solid waste management, disposal and recycling systems, hand washing facilities, and toilet construction in rural areas.

8. FOLLOW-UP

Please discuss your learning from reading the contents and information of this module with your colleagues and relate it to your experience. Identify activities and make a plan which you can individually or jointly implement.