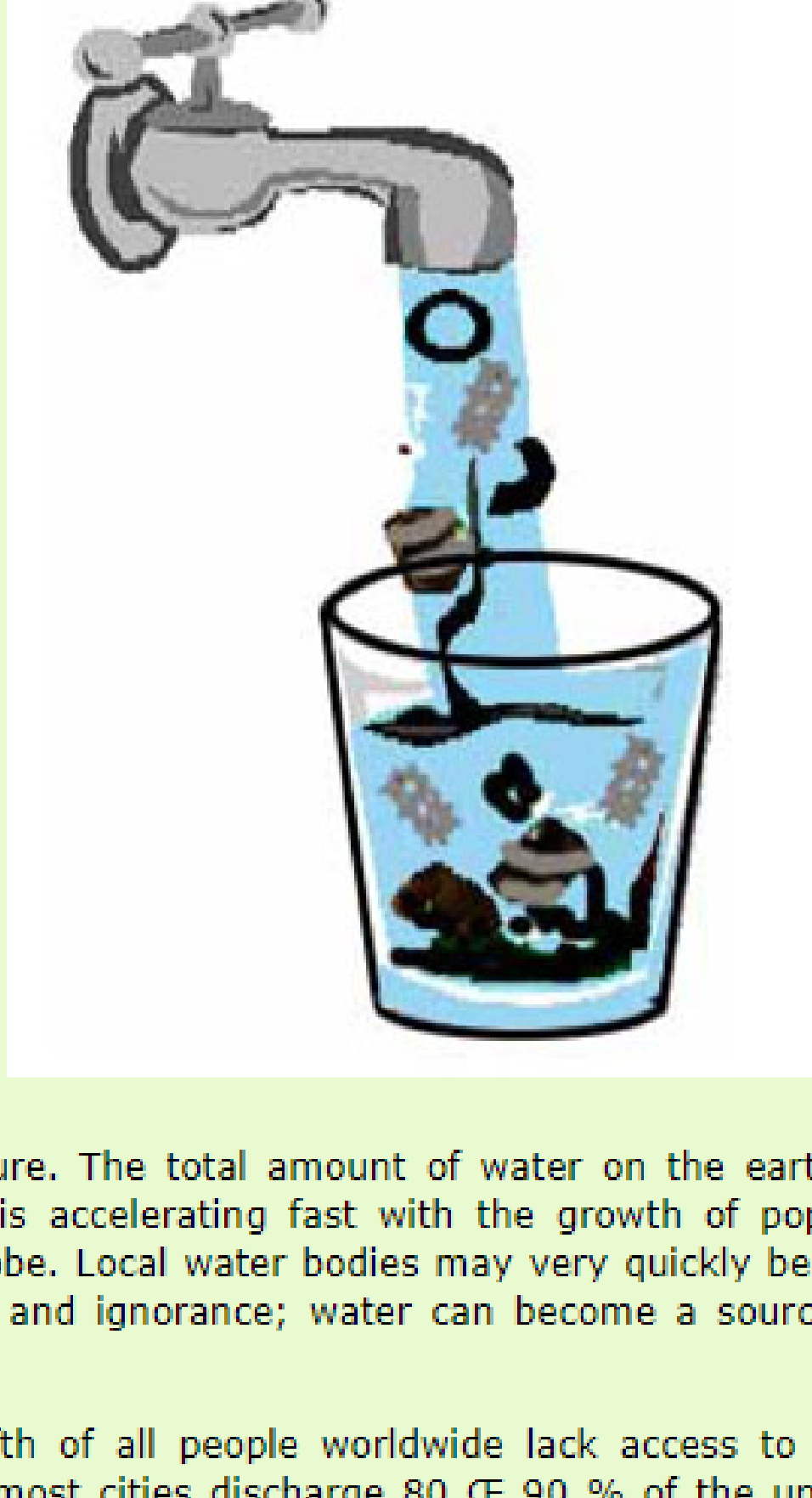


WATER AND DISEASE



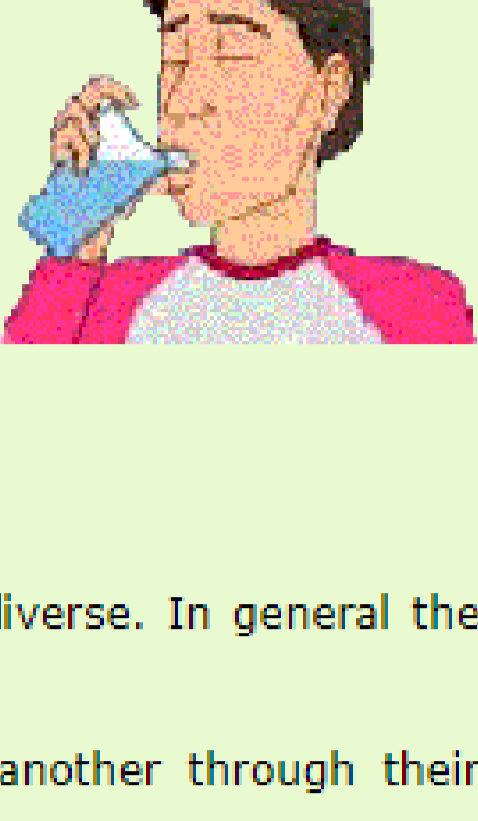
Water is a gift of nature. The total amount of water on the earth is finite, while man's capacity for pollution is accelerating fast with the growth of population, agriculture and industry across the globe. Local water bodies may very quickly be exhausted and become polluted due to greed and ignorance; water can become a source of death and disease rather than life.

Today, at least one-fifth of all people worldwide lack access to safe drinking water. In developing countries, most cities discharge 80-90% of the untreated sewage directly into rivers and streams, which are used for drinking, bathing and washing. This lack of sewage treatment has allowed dangerous microorganisms to spread water borne diseases; particularly diseases transmitted by vectors which live in the water environment account for about a third of all deaths in the world.

The growing pollution of our rivers constitutes the biggest threat to public health. Polluted waters lead to various gastrointestinal problems, liver infections, cancer, etc. Children are often the worst affected, dying in large numbers because of diarrhoea. Even in the 1990s more than 1 million children died due to diarrhoea and other gastrointestinal disorders. Since independence, our neglect of water sources has killed more than 50 million children.

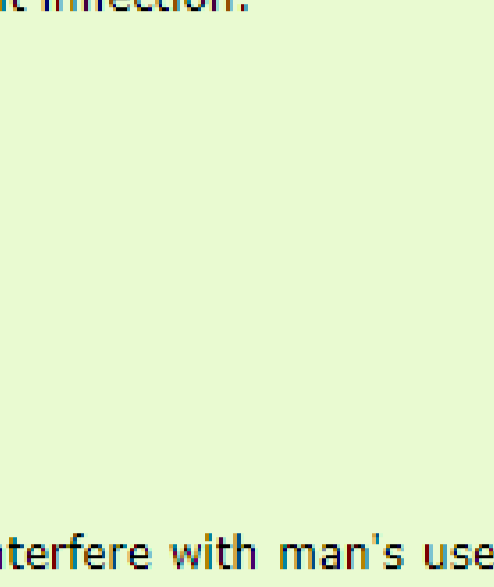
Distribution of the earth's water

- Oceans and seas 97.29%
- Ice caps and glaciers 2.09%
- Underground aquifers 0.61%
- Lakes and rivers 0.01%
- Atmosphere 0.01%



The need is great in the Developing World!

- 1 billion people do not have access to safe drinking water
- 2.9 billion people do not have adequate sanitation facilities
- 11,000 children die each day of water-related diseases



Water-related diseases

The water-related infections of man are extremely numerous and diverse. In general the following are the ways in which diseases may be carried by water.

- Pathogenic organisms are transmitted from one person to another through their domestic water supply. (e.g.) *cholera, typhoid and hepatitis.*
- Inadequate water supply, lack of personal cleanliness (e.g.) *trachoma and skin infection*
- Infection transmitted by organisms which live in water. (e.g.) *helminths (parasitic flukes) that spend part of their life cycle in water.*
- Insect vectors which are related in some way to water transmit infection. (e.g.) *yellow fever, malaria etc.,*

Sources of water pollutants

Direct additions

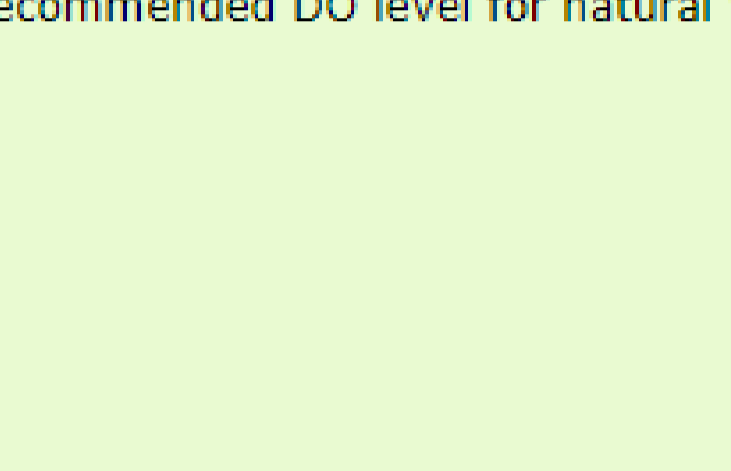
- Discharge of domestic, industrial or agricultural effluents.
- Direct application of herbicides to control water plants that interfere with man's use of freshwaters.
- Direct application of insecticides to fresh waters to destroy larvae of mosquitoes, the vector of malaria.
- Molluscicides widely used in the tropics to control the snail vectors of schistosomiasis

Indirect additions

- Run-off of insecticides and herbicides applied to the land.
- Carelessly dumped waste pesticides and their empty containers in pools or streams
- Land fill sites and toxic waste dumps contaminate ground water.

Types of pollutants found in water

- Organic pollutants
- Inorganic pollutants
- Thermal pollutants
- Radioactive materials



Organic pollutants

Origin

- Domestic sewage (major source)
- Urban run-off (from houses, factories and roads)
- Industrial effluents

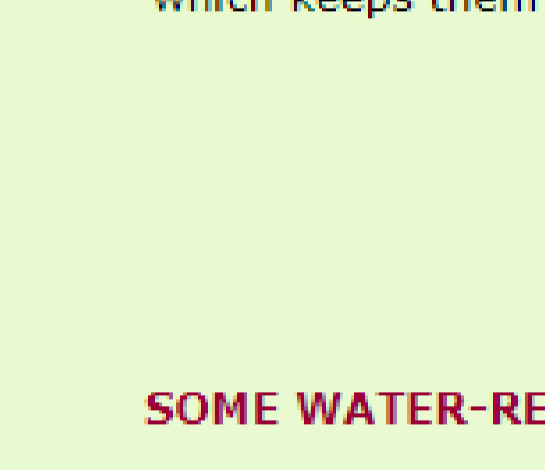
Effects

- Depletion of dissolved oxygen (the recommended DO level for natural water is 4 to 6 ppm)

Pathogens

Origin

Faecal contamination of water can introduce a variety of pathogens into waterways, including

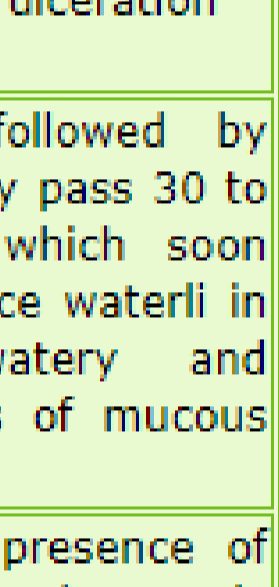


- Bacteria
- Virus
- Protozoans
- Parasitic worms
- Vectors

Water for life

Life originated in water and it is water that makes life possible. Water makes up 60 percent of body weight, blood plasma contains more than 90 percent of water, cell cytoplasm contains about 70 percent of the water. Even bone is 20 percent water. Water is needed for

- Transporting nutrients and oxygen to all parts of the body via blood
- Maintaining blood volume
- Removing body waste materials
- Helping maintain body temperature
- Plants which use water to convert the nutrients in the soil into food, which keeps them alive and helps them to grow



SOME WATER-RELATED DISEASES AND THEIR CAUSATIVE ORGANISMS

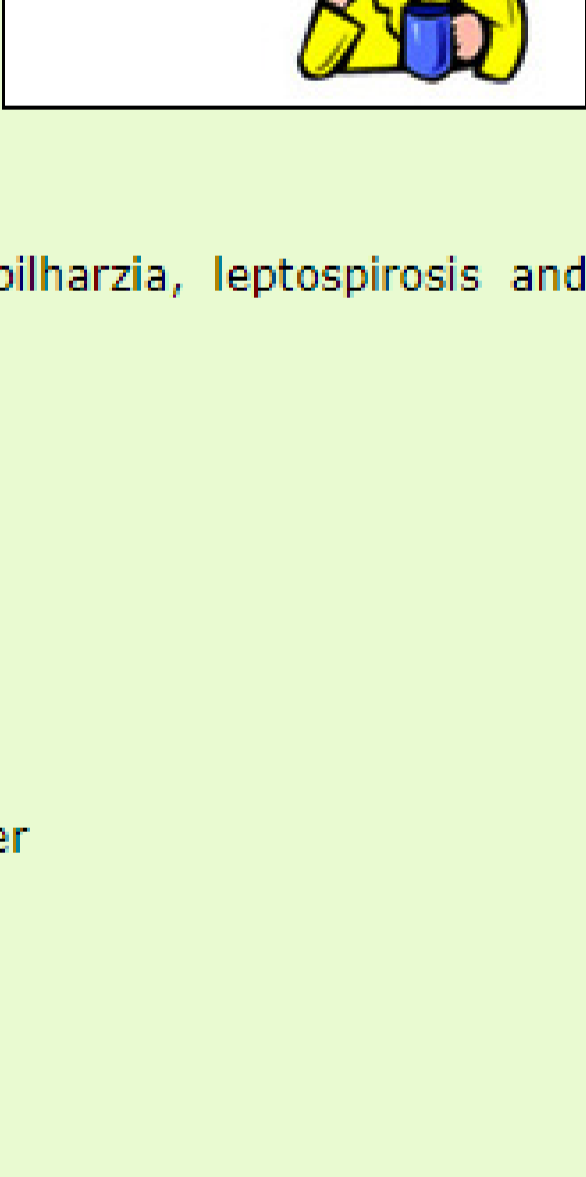
Disease	Causative organisms	Mode of Spread	Symptoms
BACTERIA			
Typhoid	Salmonella typhi	Ingestion of contaminated food, water, milk, unwashed raw vegetables and flies	Continuous fever which progressively increases day by day, the temperature being higher in the evening than in the morning accompanied by body aches, headache and constipation, Haemorrhage from an ulceration in the small intestine
Cholera	Vibrio cholerae	Ingestion of water or food contaminated by the bacteria from the stool of a cholera patient	Painless diarrhoea followed by vomiting; patient may pass 30 to 40 stools per day which soon becomes typically irrice waterli in appearance i.e. watery and colourless with flakes of mucous floating in them
Bacterial dysentery	Shigella spp.	Through contaminated food, water and by direct personal contact	Diarrhoea, with the presence of blood and mucous in the stools accompanied by severe griping pain in the abdomen. Stools are not too frequent (4-10 per day) and the faecal matter is scanty. Patient looks ill.
Leptospirosis	Leptospira	Primary hosts are rodents, which carry the organisms in their kidneys and the patient may become infected by wading or swimming in water contaminated with the rodent's urine	Fever, pain in legs, nausea, vomiting are common, congestion of the conjunctival blood vessels around the corneas of the eyes
VIRUSES			
Infective hepatitis	Hepatitis virus	Stools that contain virus contaminating the water and food	Loss of appetite, nausea, vomiting and diarrhoea accompanied by fever. The urine is dark coloured. Eye and skin have yellow colouration
PROTOZOA			
Amoebic dysentery	Entamoeba histolytica	Ingestion of cysts in food and water	Abdominal discomfort to diarrhoea, with or without the presence of blood or mucus in the stools, accompanied by fever, chills and griping pain in the abdomen
Diarrhoea	Giardia(=Lamblia) intestinalis	Cysts which are voided with the faeces and enter the new hosts in food or water	Intestinal disorders leading to epigastric pain, abdominal discomfort, loss of appetite, headache and loose bowels
HELMINTHS			
Bilharzia	Schistosoma spp.	Eggs of the flukes pass out with human faeces or urine and if they reach fresh water, develop into miracidia larvae which infect snails. The cercaria stage develops in the snails and on leaving the host, cercaria penetrate the skin of humans wading in the water.	Allergy-like itch, rash, aches, fever, eosinophilia, etc. When infection is heavy, the eggs may be deposited in the arterioles of the lungs causing cardio-pulmonary schistosomiasis or corpulmonale or ayerza disease, which may lead to congestive heart failure
Guinea worm	Dracunculus medinensis	Unfiltered water containing the infected copepods	Blisters near the ankle, burns around the blister, allergy and aches

Protection against water-borne diseases

It is necessary to be careful about the water you drink and the water you bathe in, since water is a carrier for a number of diseases.

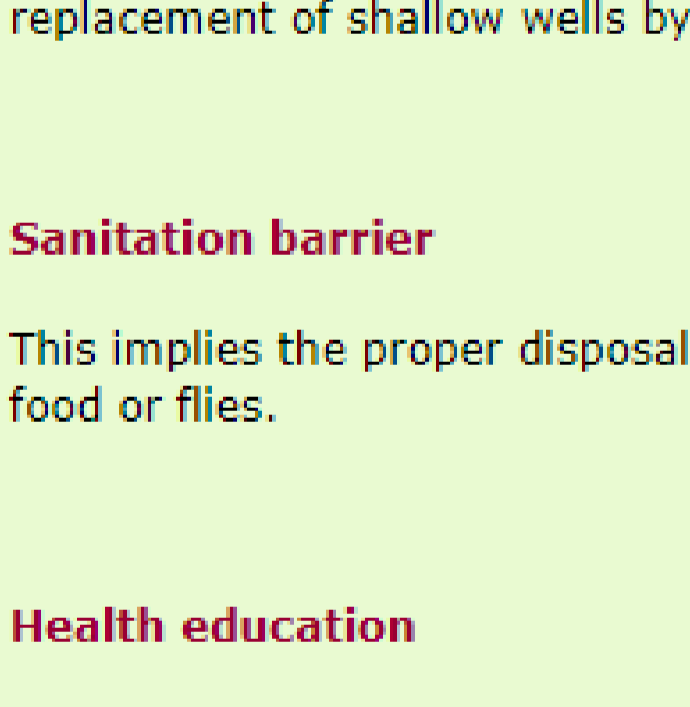
Drinking water

- Filter water with a cloth or mud pot or candle filter
- Boil water to 100°C for 10 to 15 minutes
- All fruit and vegetables that will not be cooked must be peeled after soaking them in treated water
- Do not eat ice-creams, drinks, etc., sold by street vendors
- Clean your teeth preferably with treated water



Bathing Water

Bathing can expose the body to several diseases, notably bilharzia, leptospirosis and diarrheic diseases. Mud and sand can contain parasite larvae.



Avoid

- Walking with bare feet
- Bathing in untreated water

Safe water supply

This is very essential. In rural areas this can be achieved by chlorination of water and replacement of shallow wells by sanitary wells.

Sanitation barrier

This implies the proper disposal of excreta so that infection does not reach water, soil, milk, food or flies.

Health education

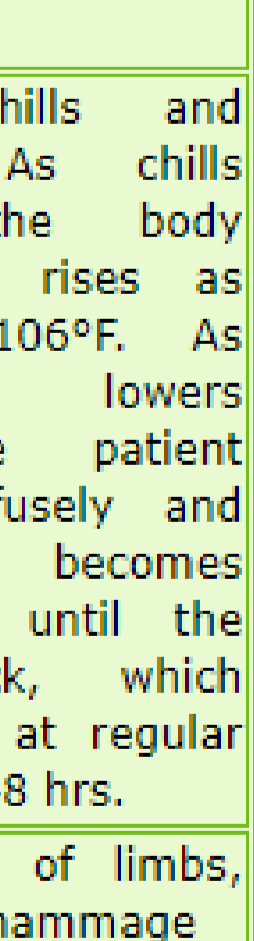
It is essential to educate people for improvement in sanitation and personal hygiene.

Bottled water- is it your choice?

Recent studies show that many brands of bottled water contain high levels of contaminants. Surveys reveal that most of what is promoted as pure is just municipal water that has been refiltered and repackaged with slick labeling.

If you do drink bottled water regularly, make sure that the bottle is

- properly sealed
- opened in front of your eyes
- crushed and properly disposed off to avoid reuse and adulteration (bottles are made up of PVC)



Source: - Health and Nutrition, Vol.12, No. 6, September - 2000.

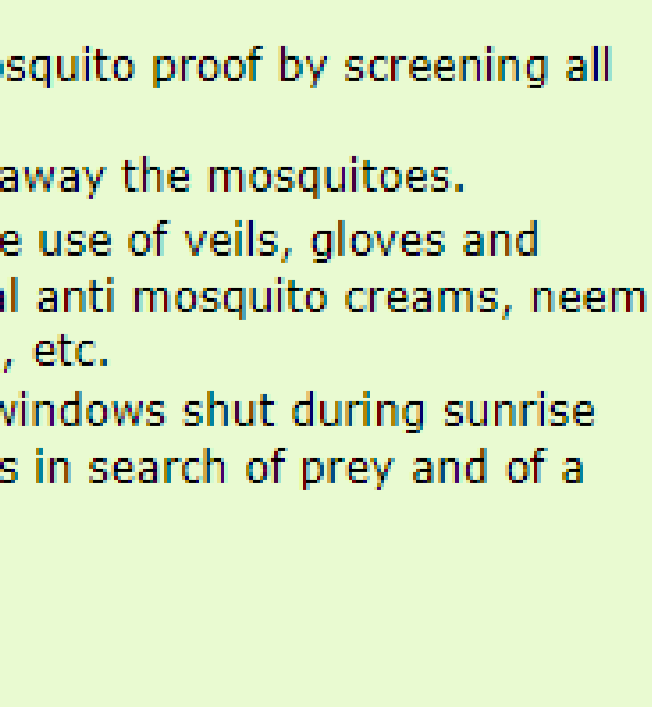
MOSQUITO BORNE DISEASES

Disease	Causative organisms	Vector	Hosts	Symptoms
Malaria	Plasmodium spp	Female Anopheles (primary or final hosts)	Man (Intermediate hosts)	Shaking chills and sweating. As chills subside, the body temperature rises as high as 106°F. As temperature lowers down, the patient sweats profusely and finally becomes comfortable until the next attack, which takes place at regular intervals of 48 hrs.
Filaria (Elephantiasis)	Wuchereria (=filaria) bancrofti	Culex fatigans (Intermediate hosts)	Man (final hosts)	Enlargement of limbs, scrotum or mamage
Dengue	Barbo - virus	Aedes aegypti	Man (reservoir)	Sudden onset of moderately high fever, excruciating joint pain, intense pain behind the eyes, a second rise in temperature following the brief remission and particularly the type of rash and decided reduction in neutrophilic white blood cells.

Mosquito Control

Elimination of breeding places

The mosquito larvae and pupae develop in water; therefore, Swampy areas and stagnant water should be drained out.



- Water should be prevented from stagnating in gutters, drains and depressions.
- The domestic species can be largely controlled by eliminating receptacles that hold water such as tin-cans, buckets, cisterns, barrels, open tanks, etc.
- If possible, the breeding grounds may be filled up.

Destruction of larvae and pupae

- Larvicidal fish like sticklebacks, minnows, trout, etc. should be introduced in the ornamental fountains, ditches, ponds, lakes, canals, tanks, etc.
- Keeping lakes, reservoirs and streams free of aquatic vegetation and other floating material provides the top- feeding minnows (gambusia) better opportunities to search out and feed upon the larvae and pupae.
- Aquatic nymphs and adult insects (dragonflies), which are natural enemies of mosquitoes, should be encouraged.

Protection against mosquito bite

- Houses in mosquito-infested areas should be made mosquito proof by screening all the doors and windows
- While sleeping, mosquito nets should be used to keep away the mosquitoes.
- The exposed parts of the body may be protected by the use of veils, gloves and boots or by the application of repellents, such as herbal anti mosquito creams, neem oil, mustard oil, oil of java citronella and eucalyptus oil, etc.
- If you do not have mosquito proofing keep doors and windows shut during sunrise and sunset. Mosquitoes are on the move at these times in search of prey and of a more pleasant environment.

IN SPITE OF MODERN MEDICINES, ANY OR ALL OF THE ABOVE ILLNESSES COULD BE FATAL

KEEP YOUR WATER CLEAN

