Chapter 8

INTRODUCTION TO ENVIRONMENTAL SANITATION

Background/Sanitation and health/Objecttive and definition of sanitation/Classification of wastes/Sanitation systems/Appropriateness of sanitation systems/ Sanitation practices in Bangladesh/Important factors for sanitation in Bangladesh.

8.1 BACKGROUND

With increasing urbanization and industrial development it is only natural to expect an increase in the production of wastes. These wastes, if not properly managed, can have detrimental effects on the environmental quality. Although the awareness of environmental degradation is not yet very prevalent in developing countries, the problem is very real and is envisaged to worsen with increased urbanization and population densities.

A major challenge faced by the developing countries is that of human waste management and disposal. The primary concern is the amount of money that is required for proper management and disposal of human wastes. Human wastes or excreta are the terms used to mean human faeces and urine, excluding other types of domestic waste such as household solid waste or garbage. The potential dangers of human wastes have been realized for many years in industrialized countries through experiences from the spreading of infectious diseases at uncontrollable rates. Human faeces are dangerous to health and detrimental to the environment if they are untreated before being disposed of into the environment.

In developing countries nearly half the urban population lack adequate waste disposal facilities and a very insignificant portion of rural population have proper waste disposal facilities. According to World Health Organization (1996), in 1994, only 18% of the rural population had adequate waste disposal facilities. This is 2% lower than what it

was in the year 1990, simply because it was not possible to keep pace with the increasing population growth. Urban sanitation coverage stands at 63% in 1994, again 4% lower than the coverage in 1990. It was also estimated that if the present trend of coverage continues, some 3.3 billion people will be without access to appropriate sanitation by the year 2000, of which 74% in rural areas. People in rural areas typically defecate near their houses or in the fields. The increasing numbers of high-density, low-income urban communities have little choice but to resort to unsanitary means of waste disposal, thus risking severe health consequences.

Sanitation is rarely seen as an attractive option to policy makers of developing countries or even to the aid donors, and accordingly receives a low priority in the national development programmes. The provision of sanitary latrines can not compete with the appeal of improved roads, bridges, electricity and even water supply for political reasons. Primarily because of the high cost of providing sanitation, emphasis has consequently been given to supplying water without providing for adequate disposal of human wastes.

Serious water pollution has sometimes occurred and public health has often not shown much improvement despite water supply programmes. Rather, these programmes have resulted in a shift in dominance from one set of diseases associated with inadequate water supply to another associated with inadequate sanitation and disposal of wastewater. However, the sanitary disposal of human wastes is arguably of greater importance than safe water supply because it essentially removes the risk of contamination of water by pathogens contained in human faeces. In addition to public health improvement, investments in sanitation have other benefits in the form of environmental conservation, employment generation, increase in productivity and a great potential in utilizing the wastes as resources, e.g., energy in the form of biogas, nutrients for food production, and water for agriculture.

8.2 SANITATION AND HEALTH

Providing appropriate sanitation has several important reasons, such as privacy, convenience and health. Usually the service providers, e.g., governments and international development agencies, consider health and for that matter reduction of diseases as most important, while in most cases the people themselves like to have latrines for privacy and convenience. Some people may want to have latrines for keeping the environment clean, yet some may want to have them as a matter of prestige and status in the community.

It is important to understand that the improvement of health is not possible without sanitary disposal of human excreta. However, neither sanitation nor water supply alone is good enough for health improvement. It is now well established that health education or hygiene promotion must accompany sufficient quantities of safe water

and sanitary disposal of excreta to ensure the control of water and sanitation-related diseases.

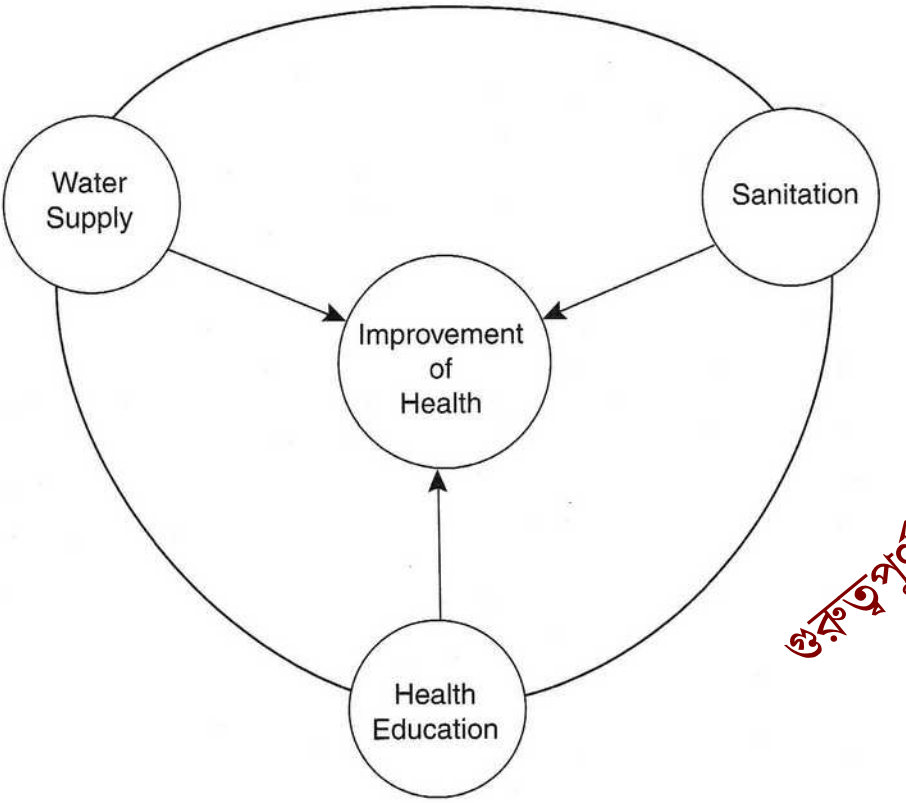

Figure 8.1 Interrelationship between water, sanitation and health education (Veenstra S., 1994)

Figure 8.1 depicts the interrelationship between water, sanitation and health education. The importance of health education in improving health has been clearly demonstrated in water supply and sanitation situation of Bangladesh. Despite tremendous success in improving access to safe water (over 90% coverage of rural population) during the International Drinking Water Supply and Sanitation, IDWSS decade (1981-'90), water and excreta related diseases remained the major cause of mortality and morbidity in Bangladesh (Rashid and Rahman, 1994). From 122 deaths for every 1000 live births in 1981, the infant mortality rate came down by only 12 to 110 in 1990. The reasons identified were low sanitation coverage (only 6% of rural population by the end of the IDWSS decade) and absence of health education and hygiene promotion, a factor that greatly influence the use of water and sanitation facilities. The health situation in Bangladesh however, is gradually improving with the infant mortality rate declining to 77 per 1000 live births in 1996, with the gradual improvement of the

sanitation coverage (33% of rural population and 42% of urban popualtion in 1993) and more importantly, with the introduction of an intergrated approach of water, sanitation and hygiene education.

Proper sanitation can control many excreta-related diseases. However, to improve health conditions through improved sanitation, it is necessary to have a clear understanding of the diseases that are prevalent in absence of proper sanitation, and their transmission routes. These diseases are excreta-related and are caused by micro-organisms such as viruses, bacteria, protozoa and helminthes or worms.

Micro-organisms are excreted by humans and are too small to be seen with naked eye, but can be observed through a microscope. Not all micro-organisms excreted are harmful. People who are already infected with diseases excrete harmful micro-organisms, called pathogens, which are then transmitted to other healthy persons through various environmental transmission routes. It is useful to classify excreta-related diseases according to these environmental transmission routes so that effective control measures can be taken by obstructing these routes.

Excreta from infected persons can cause infection in other persons in two different ways. Firstly, the pathogens in the excreta of an infected person reach another person and initiate infection. These are the excreted infections. Secondly, infections in other persons are caused by the transmission of excreted pathogens via insects such as flies and mosquitoes and rodents such as rats, which act as vectors.

Successful transmission of excreted pathogens depends primarily on how many pathogens are excreted by an infected person and how these numbers change in the environment during transmission. The number of pathogens excreted is termed the excreted load. The changes in this number during environmental transmission are governed by three key properties of pathogens: *latency*, i.e., how long it takes for an excreted pathogen to become infective; *persistence*, i.e., how long the excreted pathogen can survive in the environment; and *multiplication*, i.e., the ability of the excreted pathogen to multiply in the environment. The environmental classification of various excreta-related diseases (Mara, 1996) is shown in table 8.1, in which the first five categories are the excreted infections and the last two are the insect-vector and rodent-vector excreta-related diseases.

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Table 8.1 showing environmental classification of excreta-related diseases, is self-informative and also provides the framework for the control of these diseases through improved sanitation practices. As indicated in the table, sanitation is extremely important, as are improved personal and domestic hygiene, through improved water supplies for the control of excreta related diseases.

Table 8.1 Environmental classification of excreta-related diseases

Category	Environmental transmission features	Examples of infection	Environmental transmission focus
1. Non-bacterial faecal-oral diseases	Non-latent; Low to medium persistence; Unable to multiply; High infectivity; No intermediate host	Viral: Hepatitis A & E Rotavirus diarrhoea Protozoan: Amoebiasis Crystosporidiasis Giardiasis Helminthic: Enterobiasis Hymenolepiasis	Personal Domestic
2. Bacterial faecal-oral diseases	Non-latent; Medium to high persistence; Able to multiply; Medium to low infectivity; No intermediate host	Campylobacte- riosis Cholera Pathogenic E.Coli infection Salmonellosis Shigellosis Typhoid Yersiniosis	Personal Domestic Water Crops
3. Geohelminthiases	latent; Very persistent; Unable to multiply; Very high infectivity; Intermediate host	Ascariasis Hookworm Strongyloidiasis Trichuriasis	Peri-domestic Field Crops
4. Taeniases	Latent Persistent; Able to multiply; Very high infectivity; Intermediate host-cow or pig	Taeniasis	Peri-domestic Field Fodder crops
5. Water-based helminthiases	Latent Persistent; Able to multiply; High infectivity; Intermediate aquatic host	Schistosomiasis Clonorchiasis Fasciolopsiasis	Water Fish Aquatic species, Aquatic vegetables
6. Excreta-related insect-vector diseases		Infections 1-3 transmitted mechanically by flies and cockroaches Bancroftian filariasis transmitted by Culex quinquefasciatus	Peri-domestic Water Peri-domestic
7. Excreta-related rodent-vector diseases		Infections 1-3 transmitted mechanically by rodents Leptospirosis	Water

(Source: Mara, 1996)

8.3 OBJECTIVES AND DEFINITION OF SANITATION

Sanitation may be defined as the science and practice of effecting healthful and hygienic conditions, and involves the study and use of hygienic measures such as:

- safe, reliable water supply;
- proper drainage of wastewater;
- proper disposal of all human wastes;
- prompt removal of all refuse.

The word sanitation actually refers to all conditions that affect health, and according to the World Health Organization may include such things as food sanitation, rainwater drainage, solid waste disposal and atmospheric pollution. However, in this book the word sanitation will refer to only human waste, wastewater and solid waste disposal. The principal objectives of providing sanitation facilities are:

- to have improved public health;
- to minimize environmental pollution.

Sanitation can contribute greatly to preventing the spread of infectious diseases through transmission of disease causing agents, as is the case when pathogenic organisms from the excreta of an infected person are transmitted to a healthy person. As indicated in table 8.1, these infections may occur in different forms through different transmission media such as:

- ingestion of food or drinking water contaminated with faeces;
- ingestion of beef infected with tapeworms;
- contact with contaminated water;
- contact with contaminated soil;
- insect vectors.

In each of these media, shown diagrammatically in Figure 8.2, the organisms from sick persons are transmitted to healthy persons. As indicated in the figure, sanitation facilities can prevent transmission by breaking the chain of transmission at the source of the infection process.

8.4 CLASSIFICATION OF WASTES

A thorough understanding of the different types of wastes and their composition is essential for determining the most suitable option or options for their efficient management and disposal. There could be many different types of wastes, which can be classified in many different ways, and again such classification may vary from country to country. In general, wastes can be classified as follows:

Human waste or human excreta: refers to only human faeces and urine and usually are not combined with other liquid or solid wastes. They are also widely known as night soil when collected without dilution in large volumes of water.

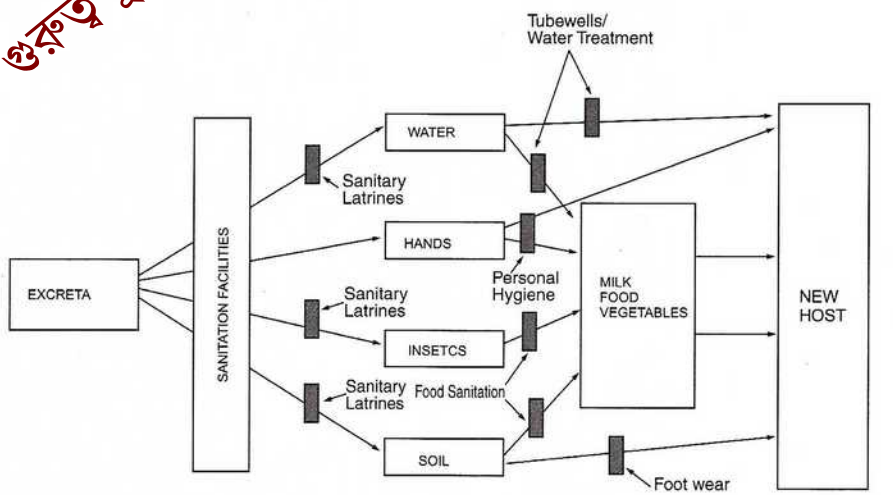

Figure 8.2 Disease Transmission and Sanitation

Municipal sewage/ Wastewater: is the liquid waste conveyed by a sewer and may include domestic and industrial discharges as well as storm water, groundwater infiltration and inflow.

Domestic sewage: is the liquid waste which originates in the sanitary conveniences, e.g., water closets (wc), urinals, baths, sinks etc. of dwellings, commercial facilities and institutions in a community. Sometimes it is also referred to as sanitary sewage.

Sullage: it is the liquid discharges from kitchens, wash basins etc. and excludes human excreta. Sullage is less foul than domestic sewage and can be discharged through open surface drains in unsewered areas.

Industrial wastes: it include the liquid discharges from spent water in different industrial processes such as manufacturing and food processing.

Storm water: It is the surface runoff during and immediately after the rainfall, which enters sewers through inlets. Storm water is not as foul as sanitary or industrial sewage and hence can be carried through open drains or channels and disposed of in natural rivers or streams without any treatment.

Solid wastes: include all materials which are normally solid and are discarded as useless or unwanted during human activities. Domestic solid waste is a composition of organic food wastes, paper and paper products, wood, plastics, leather and rubber materials, rags and textile products, glass, metals, inert stone and other bulky wastes. Solid wastes from factories and industries vary as their raw material and products and often consist of packaging, offcuts and spoiled material, and unwanted by-products.

8.5 SANITATION SYSTEMS

A sanitation system involves all arrangements necessary to store, collect, process and deliver human wastes or other forms of wastes back to nature in a safe manner. Sanitation systems with respect to human waste management may be considered to have the following functions:

- excretion and storage;
- collection and transportation;
- process/ treatment;
- disposal/ recycle.

Sanitation systems may have varying combinations of these functions depending on the local conditions. Sanitation systems can, however, be classified based on various other criteria. For instance, the classification of on-site or off-site sanitation systems depends on whether the waste is stored, treated and disposed of at the point of generation or transported to somewhere else for treatment and/or disposal. Sanitation systems can also be classified as wet or dry systems based on the methods of collection and conveyance of wastes produced in a community. Wet and dry systems can be either on-site or off-site systems.

On-site systems

When the wastes are collected, treated and disposed of at the point of generation it is called an on-site system e.g., pit latrines and septic tank systems. On-site sanitation systems are widely used in rural areas of both developed and developing countries, and in the absence of more costly sewerage system, is also extensively used in urban areas of developing countries. The simplest on-site sanitation system is a pit latrine, which consists of a manually dug pit covered by a concrete, wooden or bamboo slab with a squatting hole. Some form of superstructure is erected over the pit to ensure privacy to the user.

The on-site sanitation system has, over the years, been developed and improved into a lot of different designs (e.g., ventilated improved pit latrine, pour-flush single and double-pit latrines, aqua privies, septic tanks and so on) which will be discussed in detail in the following chapter. The basic principles of on-site systems, however, remain the same: liquids infiltrate into the soil and the solids are retained, anaerobically digested and have to be removed, or a new pit has to be dug at regular intervals. The basic on-site systems are primarily designed to dispose of human excreta. Wastewaters from cooking, clothes washing, and bathing are collected in small drains and disposed of in soakaways for infiltration.

On-site sanitation systems are most suitable for in sparsely settled rural areas with low population density and low water consumption because of the system's dependence on the infiltration capacity of the soil for disposal of the liquid portion of excreta. Infiltrating liquid waste however, is a potential cause of groundwater pollution.

Where on-site sanitation systems are not feasible because of high population density,

high water consumption, low infiltration rate of soil or high groundwater table, wastes have to be collected and transported off-site for treatment and/ or disposal.

Off-site systems

When the waste is collected and transported to somewhere else for treatment and disposal, the system is called off-site, e.g., bucket latrine systems and conventional sewerage system. The basic elements of off-site sanitation systems therefore include collection, transportation, treatment, disposal and/ or reuse. The waste is collected either through house sewers or manually using buckets or vaults, transported either by cart, truck or sewer system to a suitable distant place where it is treated prior to disposal or reuse.

Collection and transportation of the wastes through a sewer reticulation system requires that the waste be diluted by water. Hence it is essential that piped water supply be available in areas where this system is to be applied. This waterborne system is by far the most satisfactory system of waste disposal provided sufficient funds are available for its construction and maintenance.

Since costs of waterborne sanitation systems are prohibitive, it may be preferable to introduce such systems gradually, and where possible existing sanitation systems should be upgraded and reused for improvement. For instance, the so-called small bore sewerage system can be employed by making use of the existing septic tanks or upgraded aqua privies. In this system, the costs can be significantly reduced because of smaller sewer sizes and lower gradients. These systems will be further described in a later chapter.

Dry systems

In dry systems no water is used for the dilution of the waste. They are usually applied in unsewered areas with no piped water supply, e.g., pit latrine systems (on-site) and bucket latrine systems (off-site).

Wet systems

In the wet system the waste is diluted with flushes of water. Wet systems are suitable where piped water supply systems are available, e.g., septic tank systems (on-site) and conventional sewerage systems (off-site).

Sometimes a sanitation system can be classified as either permeable or confined depending on whether the system allows infiltration. Confined systems do not allow infiltration of the liquid portion of the wastes into the ground, e.g., aqua privies, septic tanks etc. In the unconfined or permeable system the liquid part of the wastes is allowed to infiltrate, causing potential pollution of the groundwater, e.g., pit latrines.

Sanitation systems may be considered as a combination of several components of unit

operations and processes. Each component may imply several different alternatives for choice of unit operation and/ or facility. Thus, a sanitation system can be combined in many ways. For instance, effluents from septic tanks can be disposed of into a soakage pit where feasible or can be connected to a small bore sewer system for off-site treatment and disposal.

8.6 APPROPRIATENESS OF SANITATION SYSTEMS

The purpose of sanitation varies for different people of different regions and even for people within the same community. Some think that the main purpose of sanitation is health, and therefore a sanitation system must be effective in reducing disease transmission. Other people may consider privacy and convenience as important functions of sanitation, and yet others may want a cleaner environment or the prestige and status of having sanitation. A good sanitation system should, therefore, be able to meet all the requirements of the people.

Irrespective of the sanitation system as a whole, the performance of the toilet or the latrine itself is very important, as it is the crucial issue for the users regarding disease transmission, aesthetics and comfort. It is also important that the latrine is connected to a proper collection and disposal system. The primary objective of sanitation would not be achieved with someone using a toilet which is not cleaned regularly, in which the flushing cistern is not working or the waterseal not functioning properly, even if his toilet is connected to waterborne sewerage, the most expensive of all sanitation systems. On the other hand, a clean latrine, if not connected to a proper collection and disposal system, would not bring any benefit to the users. In both the cases the main purpose of sanitation will be defeated.

Suitability of sanitation systems is also very sensitive to the level of water supply. For instance, on-site, dry pit latrine system would not be appropriate with yard tap or 'multiple tap in-house' piped water supply system. On the other hand, waterborne sewerage system is not a feasible option with bucket carried or hand pump water supply. Choice of a sanitation system is also dependent on population density, on-site systems being more appropriate for low density rural settings and off-site systems for high density urban centres. Figure 8.3 provides a guide to the suitability or sanitation systems considering the level of water supply and population density.

It is to be stressed that the sanitation system normally adopted in major cities, e.g., flush toilets and waterborne sewerage with complete wastewater treatment facilities, is not appropriate in most rural areas. Sanitation systems suitable in rural settings, e.g., pit latrines or aqua privies with leach pits may not be suitable or acceptable in the cities. Although both of the systems may be effective to remove excreta, neither system is completely free of detrimental effects to the environment. The treated effluents from the waterborne sewerage system still retain the potential to pollute the receiving surface waters while the liquid part of the pit contents has the potential of contaminating groundwater.

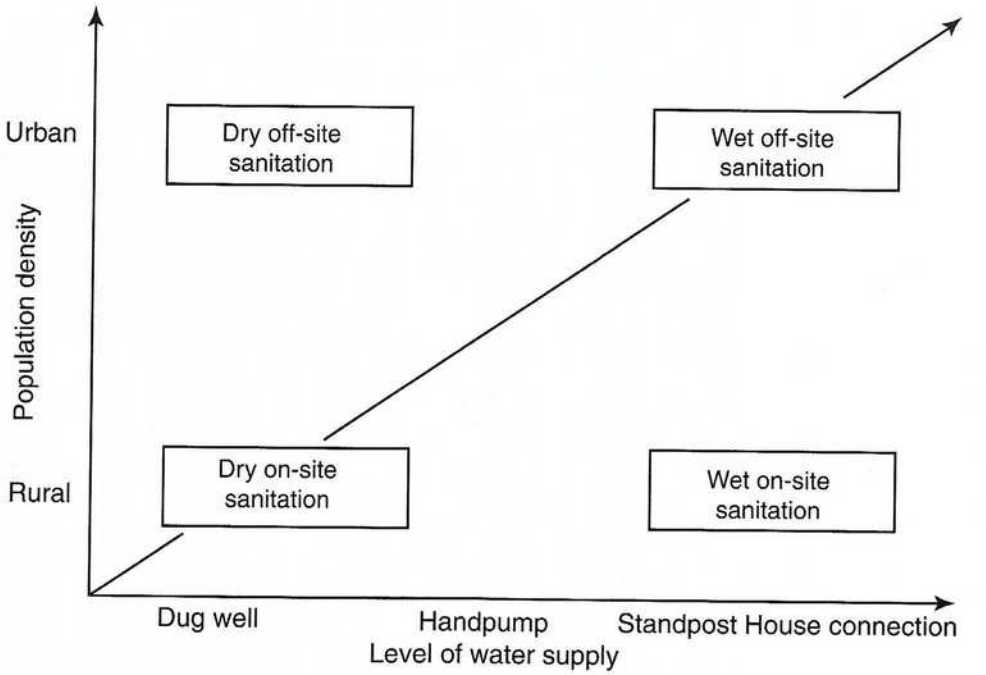

Figure 8.3 Various sanitation systems based on water consumption level and population density (Source: Veenstra et al., 1997)

So, it is rather difficult to evaluate different sanitation systems in general terms. No sanitation system can be considered superior to others in every respect. Any system can be the best system, depending on the characteristics of the design area and of the users of the system. A comparison of the performances of various sanitation systems will be given in the latter part of the next chapter for guidance.

8.7 SANITATION PRACTICES IN BANGLADESH

Current situation

In Bangladesh, about 16% of the 90 million rural population use sanitary latrines. In addition, another 22% use the so-called home-made pit latrines that are constructed by placing a squatting slab made of bamboo over a manually dug pit. Many consider this home-made pit latrine as not fully sanitary. People are now conscious of using latrines and about 61% of the total population have access to some form of latrine. Of about 30 million urban dwellers, sanitation coverage is only about 42%. In urban areas a range of on-site options such as septic tanks, single and double pit pour-flush latrines are used. Conventional sewerage systems are used only in parts of Dhaka and cover only 18% of the city's 8.5 million people.

People in general have a very poor understanding of the relationship between health

and sanitation. Rural sanitation suffers much from the poor understanding of the health benefits of sanitary latrines. In most cases, latrines are used for reasons of convenience and privacy rather than health reasons.

The sanitary condition of urban slums is deplorable. Most of the slum dwellers have literally no latrines, only a few have pit or surface latrines. They often defecate on the drains, in open fields, near the roads, or on the riverbanks. The problem is acute with female residents who have to wait till sunset for defecation or use a neighbour's latrine, if available.

Defecation practices of the 'have-nots'

A study (LGED, 1989) conducted on households having no latrines depicted interesting results of defecation practices by males, females and children in a rural community. The results shown in Table 8.2 indicate variation in defecation practices between males and females and between adults and children.

Table 8.2 Defecation practices by those who do not have a latrine.

Places	Males (%)	Females (%)	Children(%)
Landlord's latrine	2.6	2.6	1.5
Neighbour's latrine	14.4	27.2	2.6
Roadside drain	1.5	0.5	6.1
Open field	46.2	29.7	75.4
River, water bodies	12.3	12.8	8.7
Jungle	12.8	27.7	8.7
Public toilet	10.2	0	1

As indicated in the table, the percentage of children defecating in the open fields is found to be very high because children defecate more frequently than adults. Furthermore, some parents instruct them not to use a latrine either because the pit might be unsafe for the children or because the pit would be filled up too soon. Females more frequently use a neighbour's latrine (27.2%) and are much more accustomed to defecate in the jungle (27.7%) than their male counterparts (14.4% use neighbours' latrine, and 12.8% defecate in the jungle). For children's defecation, public toilets are seldom used. There is a gender variation among the adults in using public toilets. Women do not use public toilets at all, while males do (10.2%), because of the lack of privacy.

Children's defecation practices

Children younger than five years in households either having a latrine or no latrine defecate in the open homestead compound. This is due either to the height of the

latrine door, or because the squatting plate is so designed that it is difficult for children to squat comfortably. It is, however, unrealistic to expect that children should use a fixed place for defecation, while their parents defecate indiscriminately.

Many mothers do not feel the necessity to enforce strict rules on children's defecation practices, because they believe that children's faeces do not produce an offensive smell, and that children's faeces are less harmful than those of adults. There is hardly any difference between households with a latrine and those without a latrine in this respect.

8.8 IMPORTANT FACTORS FOR SANITATION IN BANGLADESH

Housing density

Simple single-pit latrines are suitable for use in rural areas and low-density urban areas up to about 300 people per hectare. It is, however, difficult to be more precise in general terms, as local factors such as average household size, housing design, plot layout and area have such a large influence. At higher densities alternating double-pit latrines may be feasible, but other options, such as small bore sewers, community latrine cum biogas plant etc. may even be more appropriate solutions.

Water supply service level

In areas where water use is low (say, less than 30 l/c/d) and where water has to be hand-carried from public standposts, tubewells or communal wells, pit latrines of one type or another are technically feasible sanitation options.

Difficulties associated with pit latrines

Digging pits in loose and unconsolidated soils (e.g., sand or fine-grained alluvium) is difficult and the lining must not prevent the seepage of faecal liquids out of the pit into the surrounding soil. Pit latrines are vulnerable in areas subject to annual flooding or where water tables rise during the monsoon.

Flooding undermines the durability of latrines and contributes to the contamination of the surrounding water bodies. In such circumstances an elevated pit of about one metre high with an impermeable lining extended down at least 0.6 m below ground level may be suggested.

Construction of pit latrines becomes both difficult and expensive in rocky ground. Householders wishing to build pits in rocky areas might need assistance from the local public works department for digging with mechanical devices. In these areas, there is a common tendency to dig shallow pits which fill up rapidly and do not serve the long-term purpose. Tilted placement of waterseal pan may cause losing of criteria for watersealing.

Operation and maintenance

In all latrines cleanliness is of the utmost importance. Squatting slabs easily become fouled and pour-flush bowls may block up. Fouled and unhygienic pit latrines are found all over the country, often because they have been constructed in communities previously accustomed to open defecation. Fouled pit latrines become a focus of disease transmission and may create a health hazard.

The water seal, the essential part of the pour-flush pit latrine, often breaks down. Sometimes other garbage thrown into the pan blocks the latrine. Most of the time, the Y junction of the double pit latrines does not work properly. Often it is observed that necessary action has not been taken by individual households when the pit fills up. Sometimes the pits are very shallow and fill up too soon, inducing them to go back to open defecation to avoid the inconvenience of frequent cleaning or changing of pits.

Soil permeability

Soils with permeability below 2.5 mm per hour (for example, expansive clays) are unsuitable for pit latrines, as the liquid fraction of the excreta is unable to infiltrate into the soil, thereby leading to overflow of the pits. Infiltration capacity of pits is also greatly reduced where the water table is high, e.g., in the coastal region of the country.

Groundwater pollution

The deposition of excreta in pits may pollute water sources, particularly wells, tubewells, pond etc. located nearby. The danger of pollution increases if the pit is dug down to the water table or to fissured or weathered rock. Bacteria will not penetrate more than 1-2 m in most unsaturated soils, but they have been known to travel over 100 m in gravel below the water table and in rock fissures.

In general, the bacterial contamination may spread as far as the distance travelled by the ground water itself in ten days. Where it is necessary to avoid any risk of faecal contamination of groundwater, there should be at least 2 m of soil depth between bottom of the pit and the water table surface. As a general guide, users are required to locate pits at least 10 m from tubewells or other water sources to avoid potential pollution.

Questions

1. What is the global sanitation scenario with respect to population coverage? What is the situation in Bangladesh?

2. Why do you think sanitation is being given low priority compared to other development activities? What consequences do people face due to such low priority on sanitation development?

3. Why the general health condition in Bangladesh did not improve despite very high water supply coverage achieved during the IDWSS decade? Explain the benefits of an integrated approach of water, sanitation and hygiene education in improving the general health condition.

4. List some common infectious diseases that are transmitted due to lack of proper sanitation.

5. Explain the role of sanitation in controlling the transmission of excreta-related diseases.

6. What are the principal objectives of sanitation? Give a general classification of the various sanitation systems.

7. List the important functions of a sanitation system. Compare the suitability of on-site and off-site sanitation systems.

8. Briefly discus the various problems of sanitation faced in Bangladesh.