10 Things You Need to Know About Sanitation

1. What do we mean by "sanitation"?

The first challenge for countries seeking to solve the problem of access to sanitation is to define what “sanitation" really means. The second challenge is to decide what aspects are the most important. In other words, what aspect of the problem is going to be dealt with as a priority. This problem is not a simple one and many professionals confuse the two steps. With respect to defining sanitation most professionals would agree that "sanitation" as a whole is a “big idea” that covers inter alia:

- safe collection, storage, treatment, and disposal/re-use/recycling of human excreta (feces and urine);
- management/re-use/recycling of solid wastes (trash or rubbish);
- drainage and disposal/re-use/recycling of household wastewater (often referred to as sullage or gray water);
- drainage of storm water;
- treatment and disposal/re-use/recycling of sewage effluents;
- collection and management of industrial waste products; and
- management of hazardous wastes (including hospital wastes and chemical/radioactive and other dangerous substances).

For countries with very low access to basic sanitation, increasing the effectiveness of management of excreta at the household level may have the biggest health implications and it may be the biggest challenge. For this reason, some countries may legitimately decide to focus their efforts at this level in the short term. In other cases, specific inter-linkages between elements of sanitation mean that a more complete solution may be better – for example, in a particularly congested urban community, some form of off-site (sewered) sanitation may be the only viable technical choice – in which case there will probably need to be some interventions to improve management of solid wastes and stormwater drainage – otherwise the sewers won’t work. Yet other countries or communities may try for a more complete solution that includes a focus on protecting the environment from contamination (as is the case in countries that already have universal access). In some cases, it will be possible to start with an “ecological” approach to sanitation that seeks to contain, treat, and reuse excreta where possible – thus minimizing contamination and making optimum use of resources.

The key issue here is that each community, region, or country needs to work out what is the most sensible and cost effective way of thinking about sanitation in the short and long term and then act accordingly. Flexibility and pragmatism should be the key words – and both professionals and politicians need to try and see past “experience” and ideas that are developed elsewhere – a pragmatic local approach with an eye to wider environmental issues is likely to result in more progress than blind adherence to a rigid global definition.

2. Why focus on sanitation?

Wherever humans gather, their waste also accumulates. Progress in sanitation and improved hygiene has greatly improved health, but many people still have no adequate means of disposing of their waste. This is a growing nuisance for heavily populated areas, carrying the risk of infectious disease, particularly to vulnerable groups such as the very young, the elderly, and people suffering from diseases that lower their resistance. Poorly controlled waste also means daily exposure to an unpleasant environment. The buildup of fecal contamination in rivers and other waters is not just a human risk: Other species are affected, threatening the ecological balance of the environment.

The discharge of untreated wastewater and excreta into the environment affects human health by several routes:

- polluting drinking water;
- entry into the food chain, for example, via fruits, vegetables, or fish and shellfish;
- bathing, recreational and other contact with contaminated waters; and
- providing breeding sites for flies and insects that spread diseases.

3. What is the size of the problem?

In 2004, only 59 percent of the world population had access to any type of improved sanitation facility. In other words, 4 out of 10 people around the world have no access to improved sanitation. They are obliged to defecate in the open or use unsanitary facilities, with a serious risk of exposure to sanitation-related diseases. While sanitation coverage has increased from 49 percent in 1990, a huge effort needs to be made quickly to expand coverage to the Millennium Development Goal (MDG) target level of 75 percent. Investing in sanitation infrastructure involves a long project cycle.

If the MDG sanitation target is to be achieved, innovative approaches need to be developed to reduce the time span from policymaking to services delivery. The global statistics on sanitation hide the dire situation in some developing regions. With an average coverage in developing regions of 50 percent, only one out of two people has access to some sort of improved sanitation facility.

The regions presenting the lowest coverage are sub-Saharan Africa (37 percent), Southern Asia (38 percent), and Eastern Asia (45 percent). Western Asia (84 percent) has the highest coverage among developing regions. Out of every three persons unserved, two live in Southern Asia or Eastern Asia.

4. What diseases are associated with poor sanitation?

Human excreta have been implicated in the transmission of many infectious diseases, including cholera, typhoid, infectious hepatitis, polio, cryptosporidiosis, and ascariasis. The World Health Organization (WHO) (2004) estimates that about 1.8 million people die annually from diarrheal diseases where 90 percent are children under 5, mostly in developing countries.

Poor sanitation gives many infections the ideal opportunity to spread: plenty of waste and excreta for the flies to breed on and unsafe water to drink, wash with or swim in. Among human parasitic diseases, schistosomiasis (sometimes called bilharziasis) ranks second behind malaria in terms of socioeconomic and public health importance in tropical and subtropical areas. The disease is endemic in 74 developing countries, infecting more than 200 million people. Of these, 20 million suffer severe consequences from the disease.

Ascariasis is found worldwide. Infection occurs with greatest frequency in tropical and subtropical regions, and in any areas with inadequate sanitation. Ascariasis is one of the most common human parasitic infections. Up to 10 percent of the population of the developing world is infected with intestinal worms – a large percentage of which is caused by ascaris. Worldwide, severe ascaris infections cause approximately 60,000 deaths per year, mainly in children.

Trematode infections are caused by parasitic flatworms (also known as flukes) that infect humans and animals. Infected individuals transmit trematode larvae in their feces. In many areas of Asia where trematode infections are endemic, untreated or partially treated excreta and nightsoil are directly added to ponds, rivers, or lakes. The trematodes complete their lifecycles in intermediate hosts and subsequently infect fish, shellfish, or encyst on aquatic plants. Humans become

infected when they consume the fish, shellfish, or plants raw or partially cooked. WHO estimates that more than 40 million people throughout the world are infected with trematodes and that more than 10 percent of the global population is at risk of trematode infection.

Infection with trachoma is the leading global cause of preventable blindness; trachoma is closely linked to poor sanitation and is one of the best examples of an infection readily preventable through basic hygiene. Six million people worldwide are permanently blind due to trachoma. Trachoma is spread by a combination of:

- poor sanitation, allowing the flies that spread the infection to breed;
- poor hygiene associated with water scarcity and poor water quality; and
- lack of education and understanding of how easily the infection can spread in the home and between people.

Infectious agents are not the only health concerns associated with wastewater and excreta. Heavy metals, toxic organic and inorganic substances also can pose serious threats to human health and the environment - particularly when industrial wastes are added to the waste stream. For example, in some parts of China, irrigation for many years with wastewater heavily contaminated with industrial waste is reported to have produced health damage, including enlargement of the liver, cancers, and raised rates of congenital malformation rates, compared to areas where wastewater was not used for irrigation.

Nitrates from wastewater can build up to high concentrations in water sources underground. This is associated with methaemoglobinaemia (blue baby syndrome) when contaminated water is used to prepare infant feeds. Nutrients may also cause eutrophication - undesirable excess in nutrients - in water sources. This can result in overgrowth of algae and harmful cyanobacteria. The toxins produced by some toxic cyanobacteria cause a range of health effects, from skin irritation to liver damage.

5. How does sanitation prevent disease?

For a sanitation system to provide the greatest health protection to the individual, the community, and society at large it must:

- isolate the user from his or her own excreta;
- prevent nuisance organisms (e.g. flies) from contacting the excreta and subsequently transmitting disease to humans; and
- inactivate the pathogens before they enter the environment or prevent the excreta from entering the environment.

It is important to understand that sanitation can act at different levels, protecting the household, the community, and society. In the case of latrines, it is easy to see that this sanitation system acts at a household level. However, poor design or inappropriate location may lead to migration of waste matter and contamination of local water supplies, putting the community at risk. In terms of waterborne sewage, the containment may be effective for the individual and possibly also the community, but health effects and environmental damage may be seen far downstream of the original source, hence affecting society.

6. What are the options for controlling excreta?

For practical purposes, sanitation can be divided into on-site and off-site technologies. On-site systems (e.g. latrines), store and/or treat excreta at the point of generation. In off-site systems (e.g. sewerage) excreta is transported to another location for treatment, disposal, or use. Some

on-site systems, particularly in densely populated regions or with permanent structures, will have off-site treatment components as well.

On-site disposal. In many places, particularly in areas with low population densities, it is common to store and treat wastes where they are produced on-site. There are a number of technical options for onsite waste management that if designed, constructed, operated, and maintained correctly will provide adequate service and health benefits when combined with good hygiene. On-site systems include ventilated improved pit (VIP) latrines, double vault composting latrines, pour-flush toilets, and septic tanks. Dry sanitation or eco-sanitation is an on-site disposal method that requires the separation of urine and feces. Building and operating these systems are often much less expensive than off-site alternatives. Some on-site systems (e.g. septic tanks or latrines in densely packed urban areas) require sludge to be pumped out and treated off-site. Composting latrines allow waste to be used as a fertilizer after it has been stored under suitable conditions to kill worm eggs and other pathogens.

Off-site disposal. In more densely packed areas, sewerage systems are frequently used to transport wastes off-site where they can be treated and disposed. Conventional centralized sewerage systems require an elaborate infrastructure and large amounts of water to carry the wastes away. This type of approach may work well in some circumstances but is impractical for many other locations. The cost of a sewerage system (which can be as much as 70 times more expensive than on-site alternatives and its requirement of a piped water supply preclude its adoption in many communities in less industrialized countries that lack adequate sanitation. In specific circumstances, cost-effective alternatives to conventional sewerage systems have been developed, including small diameter gravity sewers, and vacuum and pressure sewers. Simplified sewer systems have been successfully used in Brazil, Ghana, and other countries.

Wastewater and excreta treatment. Waste needs to be treated to remove or inactivate pathogens before it can be safely reused or disposed of safely. Many on-site waste disposal methods treat excreta by storing it for enough time to kill the pathogens. Most off-site strategies (and some on-site systems) require wastes to be treated at a facility before it can be safely used or released into the environment. In industrialized countries, one approach has been to use mechanical and biological processes (primary and secondary treatment) to remove suspended solids, biological oxygen-demanding substances (BOD) and other pollutants. Pathogens and nutrients are typically only minimally removed in these processes. The problem is that these conventional or mechanical processes are expensive to operate: They require energy, skilled labor, infrastructure, and maintenance. To further reduce the pathogens and nutrients requires additional processes, which pushes up the cost still further. In efforts to reduce the cost and complexity of waste treatment, experiments have been conducted with smaller decentralized treatment units. For example, in Durban, South Africa, local sewerage networks have been connected to small treatment plants (baffled aerobic reactors) to cost-effectively treat more waste. In other areas where off-site treatment is required, and land is available at low cost, waste stabilization ponds have proven to be cost-effective methods for treating wastewater.

7. What are the economic costs of sanitation?

The health impact of inadequate sanitation leads to a number of financial and economic costs, including direct medical costs associated with treating sanitation-related illnesses and lost income through reduced or lost productivity and the government costs of providing health services. Additionally, sanitation also leads to time and effort losses due to distant or inadequate sanitation facilities, lower product quality resulting from poor water quality, reduced income from tourism (due to high risk of contamination and disease), and clean-up costs. Increases in female literacy (due to increased school attendance where proper sanitation facilities exist) contribute to economic growth.

Every dollar spent on improving sanitation generates economic benefits (about nine times) that far exceed the required sanitation investments. The cost of inaction is enormous. Achieving the MDG for sanitation would result in $66 billion gained through time, productivity, averted illness and death. It is estimated that a 10 year increase in average life expectancy at birth translates into a rise of 0.3-0.4% in economic growth per year.

8. How does sanitation affect the environment?
In regions where a large proportion of the population is not served with adequate water supply and sanitation, sewage flows directly into streams, rivers, lakes, and wetlands, affecting coastal and marine ecosystems, fouling the environment and exposing millions of children to disease. Particularly in the context of urbanization, domestic wastewater, sewage and solid waste improperly discharged present a variety of concerns, from providing breeding grounds for communicable disease vectors to contributing to air, water, and soil pollution.

The results of poor waste management also contribute to a loss of valuable biodiversity. In the case of coral reefs, urban and industrial waste and sewage dumped directly into the ocean or carried by river systems from sources upstream, increase the level of nitrogen in seawater. Increased nitrogen cause overgrowths of algae, which in turn smother reefs by cutting off their sunlight. Improved sanitation reduces environmental burdens, increases sustainability of environmental resources, and allows for a healthier, more secure future for the population.

9. What are the reasons for slow progress on sanitation?
Many people do not realize the health and economic benefits to the individual, the community, and society from improved sanitation. The high cost of improving sanitation is often cited as a barrier to implementing sanitation projects. Improving sanitation is often low on the list of priorities. There are so many other pressing needs for the attention of governments: food supply, education, medical treatment and dealing with war and conflict. Most people are aware that poor sanitation has a health impact, but there is a lack of awareness of the extent of ill health that it causes.

On the other hand, human society has developed very different sociocultural responses to the use of untreated excreta. This ranges from deep disgust to practical preference. While determined partly by survival economics, these cultural differences apply to many water-poor countries as well as to water-rich areas of the north. For example, in Africa, the Americas, and Europe, excreta use is generally regarded as culturally unacceptable, or at best viewed with indifference. This results from the strongly held view that human excreta, especially feces, are repugnant substances best kept away from the senses of sight and smell. Products fertilized with raw excreta are regarded as tainted or defiled in some way. These views are less rigid in the case of using excreta in compost and sludge for agriculture, but still pose a barrier to use of waste.

10. How can we achieve sanitation targets?
To achieve the MDG targets, action must start NOW. Now is the time to act. Households, communities, local and national governments, civil society, and private companies all need to work together. Media and public opinion around the world can influence political leaders to act now. For the principal target audience of politicians and government officials (particularly aid administrators), the strategy for this year's World Water Day is designed to increase substantive awareness, ideally leading to decisive actions in support of improved sanitation. Related communication also includes the media, in developed but especially in developing regions, since the media have excellent capacities to inform the population and guide its opinions.

Key areas of action that could create impact are as follows:

- making political commitments;

- creating legislation and regulations to support improvement in access and quality of sanitation and hygiene services;
- bringing together more resources, having stronger institutions and better trained people;
- providing culturally sensitive and appropriate hygiene education;
- choosing technology that is cost-effective and environment-friendly;
- giving attention to gender and equity;
- supporting small-scale entrepreneurs;
- monitoring progress; and
- making information flow.