

AUDIT COURSE - DISASTER MANAGEMENT

SANITATION AND HYGIENE

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INTRODUCTION

Emergencies and disasters can occur anywhere in the world, affecting human health, people's lives and the infrastructure built to support them. Environmental health problems arising from emergencies and disasters are connected to their effects on the physical, biological and social environment that pose a threat to human health, well-being and survival: shelter, water, sanitation, disease vectors, pollution, etc.

The first goal of emergency response is to prevent outbreaks of waterborne diseases, caused by malfunctioning water supply, various point pollution of water resources, and lack of sanitation facilities. Top priorities for immediate response are provision of sufficient quantities of safe water, arrangement of basic sanitation, and promotion of good hygiene behavior.

Sanitation refers to all conditions that create unhealthy conditions, especially with regard to dirt and infection and specifically to the drainage and disposal for sewage and refuse from houses. The World Health Organisation (WHO) defines sanitation as the means of collecting and disposing of excreta and community liquid wastes in a hygienic way so as not to endanger the health of individuals and the community as a whole. Thus the basic objective of all the sanitation programmes should be disposal of human excreta and community wastages without endangering the public life.

Disasters worsen the already inadequate sanitation situation. Certain special measures must be adopted to improve the sanitation condition and to check any spread of epidemic in the aftermath of the disasters like flood, cyclone, earthquake etc. This unit deals with the available sanitation means and how to improve the hygienic and sanitary conditions in the emergency situations.

WATER, SANITATION AND HYGIENE (WASH)

Water, sanitation and hygiene (WASH) principles are of tremendous concern in everyday life, but can be heightened during an emergency or disaster. With systems potentially damaged, access to water can be quite limited. Sanitation often comes to the forefront when displaced persons live in camps, especially overcrowded ones.

The main objective of WASH programs in disasters is to reduce faeco-oral transmission of disease and exposure to disease-bearing vectors.

Provision of WASH in health care facilities in emergencies is essential to protect human health and prevent outbreaks.

IMPORTANCE OF PROPER SANITATION

During the planning of sanitation measures for any community, safe disposal of excreta is of great importance for health and welfare of the concerned population. Sanitation is the highest priority for



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the local governments over the years now to ensure basic health of the communities. There is a direct relation between better provision of sanitation facilities, safe drinking water supply and health care at the local level. Thus improved sanitation and safe drinking water supply should be the highest priority areas to achieve the target of improved health in the urban and rural areas of the country. Keeping all these factors in mind sanitation must be given the highest importance by according it the status of basic human need like food, housing, health etc.

FACTORS AFFECTING SELECTION OF SUITABLE SANITATION

A large number of sanitation technologies are available. The selection of most suitable option must be done after careful analysis of all factors including cost, acceptability, operation and maintenance and locally available resources. Various factors can affect the selection of the most suitable sanitation option are

1. Water Supply Levels

The amount of water supply available to an individual holds the key in proper selection of sanitation option.

Options like the Ventilated Improved Pit (VIP) Latrines are available where no water is required except for toilet hygiene. This type of options must be utilised when water supply is insufficient (say 20-25 litres per capita/daily). If the water supply is up to 50 litres per capita daily the options like pour flush and vault toilets are the better options. Similarly, if there are no constraints on water supply, cistern flush toilets with conventional sewerage or septic tank options are more suitable.

2. Soil Conditions

Local soil conditions play a very important role in determining the sanitation option except for those options, which are completely contained over the ground like vault toilets and bucket latrines. Soil stability and permeability are the two soil characteristics, which determine the technology selection. The impermeable soil conditions are least appropriate for a majority of the options available. In case of unstable soil, the bases of pits must be lined as in case of Ventilated Improved Pit and Pour Flush toilet options. Rocky soils are the most unwanted soil type for any type of sanitation option. In case the ground water table is within 1 metre below the ground surface, various toilet options, which require pits, are not possible at all.

3. Population Density

The population density is also a very important factor in determining the sanitation option. In highly dense areas, VIP latrines are not possible and pour flush toilets and septic tanks with soak ways are feasible only under favourable conditions. Conventional sewerage pour flush systems and vault toilets are feasible for these areas.



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4. Other Factors

Various factors including costs, reuse potential, environmental factors and institutional constraints must be given due consideration prior to finalizing the sanitation option for a particular locality.

SANITATION OPTIONS

Based on the amount of available water supply, soil conditions and population density, the following are the acceptable sanitary options

- **Simple pit latrines:** This type of latrine consists of a slab over a pit. The lavatory has a squatting hole or a seat so that excreta fall down in the pit directly. The slab is firmly supported on all sides and raised over the ground to prevent the water entry into the pit. This is a low cost technique, which requires no water. This type of latrine gives a bad smell and may create fly and mosquito nuisance, if the tight fitting cover over the squatting hole! is not provided. When the pit is full up to half, a new pit has to be dug
- **Ventilated improved pit latrines:** The ventilated improved pit (VIP) latrines are the improved version of simple pit latrines, where the pit is provided with a vent pipe extending above the latrine roof. The inside of the super structure is kept dark. The vent pipe is provided with a netting to prevent flies and mosquitoes. This type of sanitation system is hygienic, low cost method, which requires no water. The system controls the fly and mosquito nuisance with minimal requirement of user care and involvement. The other advantage is the smell control. However, this type of latrine is highly unsuitable for high-density areas and may pollute ground water. Ventilated improved double pit latrine is another latrine of this type, but with two pits. One pit would be used until full and then sealed while second pit is in use. The first pit is emptied after filling up of the second pit and used again.
- **Pour flush latrines:** Pour flush latrines have a trap providing water seal beneath the squatting plate. The water seal is cleared of faeces by pouring sufficient quantities of water to wash the solids into the pit. The water seal prevents the flies, mosquitoes and smell reaching the latrine from the pit. The pit is usually connected with the latrine through a short length pipe. It is convenient to have two pits instead of one pit. Both of these pits can be utilised alternatively. This type of latrine is a low cost sanitation measure, which also controls the odour, fly and mosquitoes. This type of latrine can be upgraded by connecting it to sewer, when sewerage becomes available. The only drawback is that this system requires large quantity of water.
- **Composting latrines:** In the composting latrines, excreta fall into a watertight tank to which inorganic materials like ash or vegetable waste is added. A careful control over moisture content and chemical balance decomposes the excreta into good manure, which can be utilised as fertilizer. The pathogens get killed during the decomposition process. The composting latrines are of two types. First is the continuous composting while the second one is with two containers used to do the

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composting in batches. The method requires very small quantity of water and produces safe and stable humus. The technique is not for high population density areas and requires good quantities of inorganic biodegradable matter.

- **Septic tank latrine:** A septic tank is a rectangular watertight settling chamber, located below the ground level. The septic tank receives both excreta and flush water from flush latrines and the raw sewerage from the other household activities. The retention time in the tank is usually 1-3 day, during which the solid particles settle down to the bottom, where they get digested and a thick layer of scum is formed over the surface. The effluent from the septic tanks is usually discharged to soak ways or leaching fields. This system works very effectively in the permeable soil conditions and in the areas free from flooding and waterlogging. Now a day the septic tanks with two compartments are commonly used. The septic tanks are usually used for the individual household but can also be used at small community level. The septic tanks require large areas, higher costs and high level of user attention.

- **Sewage system:** The sewerage system is designed to transport a mixture of excreta and waste water from households to the central treatment plant through a network of underground pipes. The system provides highest level of user convenience for all type of waste water disposal, involving no health risks and a very minimal maintenance. The treated water can be utilised for irrigation purposes. The major hurdle is the very high initial cost, skilled labourer, larger amount of water requirements making the system more urbanised and water intensive. If discharged into a water body it requires adequate pre-treatment.

HYGIENE AND SANITATION IN POST-DISASTER SITUATIONS

Communicable diseases or epidemics need not occur in the post-disaster situation unless large number of peoples are evacuated or displaced from their homes and placed in the crowded and insanitary camps. The sanitary deficiencies in these ~amps may expose the habitants of the camps to serious health hazard during their stay over there. Proper disposal of excreta and solid waste and vector control are of primary importance and require immediate attention.

Some of the hygienic ways of managing public conveniences in post-disaster situations are:

1. **Excreta Disposal:** Unsatisfactory disposal of excreta is common after natural disasters.

In the absence of proper sanitation measures any of the following may result: • more flies and more breeding places • unpleasant smells • underground and ground water contamination • food contamination by flies • increase in disease incidences

- a. **Existing Sewage System:** The sewage system and treatment plant may be put out of service due to natural disasters. Earthquake may destroy the sewerage network, pumping station or treatment plants. Similarly, floods may block the sewerage system and inundate the treatment

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plant. Immediately after any disaster situation, a detailed survey must be carried out and a damage report must be prepared.

Based on this report various measures can be taken on high priority: • rapid repair of sewers, with temporary arrangements to bypass damaged section, • cleaning blocked sewers, • disinfecting the treatment plant after dewatering format and making it operational; • temporary arrangements for discharging sewage

- b. *Temporary Shelter and Camps*: During the identification and development of the camp, the first priority must be to designate a specific area for people to excrete. The method requires a very careful supervision and management to keep pollution at a minimum. Men, women and children must be encouraged to use it and prevented from defecating in the open. This area must be fenced and must be kept clean by regular removal of excreta from the site and use of disinfections.

Open surface defecation, if it has to be resorted to, can be improved by digging shallow or deep trenches into which people can excrete directly. In this method the faeces can be covered with fresh soil on daily basis to get better sanitation. Other methods recommended for post-disaster sanitation are aqua privy, mobile latrines and separate urinals.

2. **Solid Disposal**: The accumulation of refuse or rubbish in a camp can constitute a health risk. The rubbish either is buried, burnt or removed from the camp site. To expedite the disposal of refuse, separate containers for storing and collection of organic and inorganic wastes must be utilised. The refuse thus collected must be disposed off either through sanitary landfill, incineration or burial. In the rural areas special care must be taken for the collection and disposal of animal dung. The best method of disposal is to bury it into trenches. Another serious problem in post-disaster stage is the disposal of dead animals. Burial is the only solution for big animals while burning is feasible for small animals like cats and dogs. When carcasses are large, it is not possible to bury all of them without heavy excavation equipments. The carcasses awaiting burial should be sprinkled with kerosene to protect them from the predatory animals.
3. **Vector Control**: The post-disaster situations are most favourable for rapid increase in the population of insects and rodents, These can create a health risk and spoil and destroy large quantities of food items, which are already scarce in disaster emergencies. The vector problem generally develops in densely crowded conditions where sanitation conditions are inadequate. Flies, fleas, lice, mites, mosquitoes and bedbugs are disease vectors that develop in uncontrolled environments. Vector control must follow a definite plan and programme. Special teams must be organised to control various types of vectors.

WATER AND SANITATION FOR EMERGENCIES

- Assess immediate population needs and available supply.
- Protect upstream water supplies and wells; treat all surface water as polluted.



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- Pump supplies to storage tanks, to be used as a basis for a more developed distribution system.
- Provide basic collection, storage and treatment facilities for protected sources.
- Prevent indiscriminate defecation through rapid provision of facilities.
- Provide safe disposal of excreta and refuse, controlling rodents and pests.
- Integrate hygiene promotion within community.
- Consider foundations for longer-term infrastructure and ensure their implementation will not be impeded in the future; in particular, ensure continued safety of local water resources which may be scarce.

CONCLUSION

Hygiene and sanitation assume great importance in health management in disaster situations. Sanitation can be described as the means of collecting and disposing of excreta and community wastes in a hygienic way. Keeping in mind the different areas, their water supply levels, soil conditions and population density, a proper planning of sanitary system should be done. Adopting any sanitation option should be guided by these conditions, as this will greatly minimize the problem of likely epidemics during or after disasters. However, when the existing sanitation system gets disrupted, rapid repair should be done and temporary arrangements for discharging sewage should be made. Adequate precaution and sanitary measures should be taken in the temporary shelters and relief camps.

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