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Sanitation and health education in Rajasthan

The International Conference on Primary Health Care, held at Alma-Ata Kazakhstan in 1978, described the essential elements of primary health care and cited foremost among these activities an adequate supply of safe water and basic sanitation. The urgency and importance of these needs led the United Nations to arrange an International Water Conference in Mar del Plata, Argentina, in March 1977, to discuss community water supply and hygienic excreta disposal systems. The Mar del Plata Plan of Action called for the designation of 1981-90 as the International Drinking Water Supply and Sanitation Decade. The Decade has been launched at the special session of the United Nations General Assembly on 10th November,1980 and in India the Decade has started from Ist April,1981 being the first day in the financial year of the Decade. Government of India as well as the Government of Rajasthan are fully committed to the International Drinking Water Supply and Sanitation Decade and intend to provide safe and adequate water supply to all. In Rajasthan 100% population will be covered with safe drinking water supply arrangements and 80% of the Urban and 25% of Rural population will be covered with sanitation schemes. Upto the Vth Five Year Plan we have concentrated our efforts to provide water supply to 100% urban population. Now the rural water supply is given the highest priority and more and more funds are allocated by the Government of Rajasthan(under RMNP) as well as by the Government of India (under accelerated rural programme). The implementation of increased number of water supply schemes in rural communities will also call for the need of effective and economical waste water disposal systems. If the arrangements of disposal of waste water are not done, insanitary conditions and pollution will prevail, resulting in health hazards. The sanitation of rural communities have been assigned low priority to cover only 25% of rural population because a huge capital investment is required for providing facilities. In order to tackle the problem of rural sanitation on a large scale so as to provide sanitation facilities to the maximum rural communities in coming Decade,Low Cost Technology seems to be the only workable solution. The other major control measures are to provide improved housing, to identify and eliminate the breeding sites and to deliver health education to the rural people.

2. LOW COST SANITATION TECHNOLOGIES

(A) Household sanitation technologies

(i) Pit Latrines : It consists of large hand-dug pit, covered with a squatting slab made of timber. When it is full, another pit is dug nearby and a new shelter built on top. The shelter consists of screen wall only. Usually there is no roof. Where the soil and ground water conditions are right, the pit latrine is an excellent solution to problems of excreta disposal. A vertical vent-pipe of 15 cm dia, covered by a fly screen, will greately reduce the amount of fly breeding and escape of any flies that do breed.

(ii) Pour flush latrines: Pour Flush (P.F.) latrines have water seals beneath the squatting plate or pedestal seat and are available in many different designs. The two basic types are : the direct discharge and the offset pit design. In both these designs, approximately 1 to 2 litres of water (or sullage) are poured in by hand to flush the excreta into the pit. Since this type of PF latrine is free from both odour and fly and mosquito nuisance, it may be constructed inside the house. Wherever space permits, two pits should be constructed. When the first pit is full, the PF unit can be connected to the second pit. The design capacity 0.40 m^3 per person, per year can be used.

(iii) Compositing Latrines : There are two basic types of compositing toilets toilets : continuous and batch. In continuous composting toilets, the humus has to be removed at the correct rate and only a minimum liquid can be added. Even if these conditions are met, fresh excreta may occasionally slide into humus pile and limit the potential reuse. For this reason, continuous compositing toilets are not suitable for developing countries. Double vault compositing (DVC) toilets are most common type of batch compositing toilt. There are two adjacent vaults, one of which is used until it is about three quarters full, then it is filled with earth and sealed and the other vault is then used. Ash and biodegradable organic matter are added to the vault to absorb odour and moisture. The composting process takes place anaerobically and requires approximately one year to make the compost microbiologically safe for use as a soil fertilizer. A small quantity of water is required to clean the squatting plate, only the absolute minimum of water should be added to DVC toilets.

(iv) Aquaprivies: The conventional aquaprivy toilet consists essentially of a squatting plate, situated immediately above a small septic tank that discharges its effluent to an adjacent sockpit. The excreta are deposited directly into the tank, connected to squatting plate where they are decomposed anaerobically in the same manner as in a septic tank. There is a gradual accumulation of sludge (Approx. 0.03 to 0.04 m^3/user/year) which should be removed when the tank is two-third full of sludge. The tank volume is usually calculated on the basis of 0.12 m^3 per user. Desludging is normally required every 2 to 3 years, when the tank is two-third full of sludge. The liquid depth in the tank is normally 1.0 to 1.50 meters in household units. The water used for flushing is 4.5 litres/capita/day and the volume of excreta is taken as 1.5 litres per capita per day. Thus, the sockpit is designed for 6 litres per capita/day basis. The sidewall area of the sockpit is calculated assuming an unfilteration rate of 10 litres per sq.metre per day.

(B) Community Sanitation Technologies

(i) Bucket latrines : The traditional bucket latrine consists of a squatting plate and metal bucket located in small compartment immediately below the squatting plate. The excreta are deposited into the bucket which is periodically emptied by through labourer or scavanger into a large collection bucket, which when full, is carried to a night-soil collection depot; from there the night-soil is normally taken by tanker to either trenching ground or burial. The bucket latrine system is not a form of sanitation and should be used as a short term measure and in the long-term they should be replaced by some other sanitation facility.

(ii) Vault and Cartage system : The vault toilets are similar to the P.F. toilets except that the excreta are discharged into the sealed vault that is emptied at regular intervals. Preferably the vault should be emptied by vacuum tanker.

(iii) Sanitary Blocks : The sanitary blocks can be constructed in rural communities. One toilet compartment can be used by 25 to 30 people. The toilet compartments should be arranged in separate blocks for men and women. The ideal type of toilet for rural communities is pour flush toilet. These are preferred in high density areas (over 1000 people per hectare) where a sanitation block can serve 200 to 500 people and they should not walk a distance more than 100 meters.

(iv) Sullage disposal : There are four kinds of sullage disposal systems : (1) disposal by tipping in the street, houseyard or garden,
(2) on-side disposal in soakways,
(3) disposal in open drains
(4) disposal in covered drains or sewers.

* Tipping sullage on the ground in backyards or gardens may create breeding sites for mosquitoes and may also create muddy and unsanitary conditions.
** Sullage disposal in properly designed and constructed ground seepage pits causes only a low risk to ground water pollution, because the risk of microbiological and nitrate

pollution of ground water from sullage is very much lower than the sewage.

*** Sullage disposal in open drains, such as storm water drains, promotes the breeding of mosquitoes. In the areas of seasonal rainfall, the drains are liable to become blocked with garbage.
**** Sullage disposal in closed drains or sewers is expensive, but has no special health problems unless it is eventually discharged without treatment.

Out of all the above facilities pour flush latrines are mot suitable for night soil disposal provided the soil conditions are permissing. The studies conducted in various States (Gujarat) have revealed that the water and soil pollution does not take place if soil conditions are permissible. The arid and semi arid areas of Rajasthan favour adoption of pour flush latrines.

3. Reuse of Excreta : The human excreta in whatever form, should be regarded as natural resource to be conserved and reused rather than digested. The following are the major reuses :
(i) Agricultural reuse : This may be accomplished by the application of sewage, sludge or night soil on the land. The fertilizer from the composting latrines can be used for agriculture. There are health problems associated with the reuse of raw sewage in human food production, as such it is widely used for growing fodder crops for animals. The effluent may also be used to produce crops even not intended for consumption by animals.
(ii) Aquacultural reuse : Three main types of aquaculture are found :
(a) fish farming; (b) algal production; and (c) macrophyte production.

(a) Fish farming : The raising of fish in ponds enriched with human and animal excreta greatly enhances the total fish yield and the fishes are less prone to disease.
(b) Algal culture : Instead of growing fish in waste enriched ponds with large algal populations, it is possible to harvest the algae directly. The advantage is that harvesting at a lower trophic levels ensures for higher yields of biomass and protein.

(c) Macrophyte culture : Many water plants are used as food or animals feed. Some of these are harvested wild, while some are cultivated. Plants include water spinach, water chestnut, water bambook, lotus etc.

Biogas production : When organic wastes are digested anaerobically, a mixture of methane, carbondioxide, and other gases is given off. This gas has become known as 'Biogas' and can be produced on various scales by various different technologies. The gas is used primarily for domestic cooking and lighting. The biogas plants are fed with diluted animal feces, with or without vegitable refuse. The effluent slurry is reused for agriculture, or it could be used to enrich fish ponds. The dung from one medium sized cow, or similar animal, may produce around 500 litres of gas per day and the calorific value of this gas may be around 4-5 kilo calories per litres. Whereas the human excreta can produce 30 litres of biogas per person daily. The gas plant is more useful for the farmers who own five or six heads of cattle. They can get the necessary quantity of dung required for the preparation of gas. This solves the problem of fuel and lighting for one family. The initial outlay in setting up a Gas plant is high but its cost is recovered in 5 to 6 years in the shape of manure and gas. Thus the fuel problems of village can be solved by gas. The gas burns without smoke and generates much heat. The gas is odorless. Its light is cool and white as moonlight.

In Rajasthan where rural population does not consume fishes, it is advisable to recommend the construction of the community Biogas plants for disposal of wastes of such houses who can not afford to have independent individual units.

5. Sanitation and health protection of the communities :
(i) Health : The human factors contributing to diarrheal diseases are : (1) Indiscriminate elimination, (2) Contamination of food and water supply.

It has now been established that the control of communicable diseases particularly the water-borne ones is more effective by implementing sanitation schemes than water supply schemes. The diseases caused by improper sanitation and lack of health education, have the following consequences on the health :

(a) Lowered health due to diarrheal diseases, lays open the individual to other infections, respiratory gastro-intestinal, etc.

(b) Diarrheal and other infections lower resistance, aggravate the status of the already malnourished populations.

(c) Result in high infant mortality.

(d) Retard mental and physical development.

(ii) Social, psychological and cultural aspects for acceptance of sanitation programme : How people react to excreta disposal schemes or arrangements depends both upon deep rooted cultural values and quite mundane matters of cost, convenience, or comfort. Several health benefits can only be expected to occur if latrines are properly used and maintained. Changes may be required before some systems are acceptable. These are, of course, situations in which effective excreta disposal will not be achieved unless people come to have some new understandings of the health hazards associated with improper excreta disposal and the measures that can be taken to avoid them.

(iii) Health education and community participation : In order that the huge investments that are made on sanitation programme become more effective it is necessary to create awareness, interest and motivate people to adopt, use and maintain the facilities provided for. Often it has been observed that good technical designs and properly executed schemes on sanitation have failed because of inadequate response from the people. The technology recommended should be such that it is acceptable to the people and it encourages use of local material and manpower. The following are the steps to be taken for formulation and implementation of health education programme :

(a) A report on the social, psychological and cultural factors involved in the acceptance, use and maintenance of water and sanitation systems embodying recommended strategies for health education intervention should be prepared.

(b) Guidelines, based on the above should be framed.

(c) A manual should be prepared for the use of workers in health educational methods and procedures as applied at village and community level;

(d) Delivery of health education programme in selected communities on the basis of (a), (b) and (c);

(e) An evaluation report on the impact of water and sanitation and health education interventions on the health status of the community should be prepared.

(iv) Delivery of health education programme : The health education programme should be undertaken to inform, motivate and adopt new understanding, new attitudes and new practices. The conventional methods of informing, motivating and enabling adoption, do not go far enough because of the following limitations:

(a) Limited role of information and mass communication,

(b) Lack of credibility of the media,

(c) Lack of social support and opportunities to evaluate, trial and adopt,

(d) Education is often equated with information. A-V aids and mass media are blamed for not being effective in diffusion of innovation.

(v) Evaluation of health education programme : The following studies are conducted to evaluate the impact of health education programme on (i) the communities willingness to accept, use and maintain the water and sanitation facilities, and (ii) the impact of combined water supply and sanitation facilities and health education inputs on the health of the communities :

(a) Study comprising use of water supply and sanitation facilities before and after the health education interventions, to determine the effects.

(b) Epidemiological studies before and after the water supply and health education to evaluate their impact on the health of community.

(c) Socio-cultural study to evaluate the effect of the health education programme on water use behaviour.