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Low cost sanitation in India

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1. INTRODUCTION :

Extremely poor level of environmental sanitation, particularly in respect of human excreta disposal, has been a major factor behind the high prevalence of soil and water borne diseases in India. Open defecation in the fields is a common and traditional practice in the rural and urban under-served areas. Even in big municipal towns, thousands of individuals from poorer localities and young children use open fields, passages and road side drains for this purpose. Apart from the most insanitary dry bucket latrines which are still being used by about 40% of the urban population, as much as 50,000 to 100,000 metric tons of human faeces is directly deposited on the soil every day.

The paper reviews the existing status of human excreta disposal in the urban areas in India and examines the feasibility of large scale provision of low cost on-site sanitation facilities (Two pit pour flush latrines) in the urban and peri-urban areas. The paper is based on the feasibility study conducted by TAG (UNDP) in 100 Indian towns in the 1st phase and also on the findings in some of the towns in Eastern India in the 2nd Phase.

2. EXISTING STATUS OF HUMAN EXCRETA DISPOSAL FACILITIES IN URBAN AREAS IN INDIA

As of to-day only about 27% of Urban population and 0.5% of the rural population are having access to minimal sanitation facilities. The household survey of over eight hundred thousand homes in 111 small and medium towns in India covered under the Phase I Feasibility study, revealed that 23% of the population have flush latrines and 29% bucket or dry latrines, while 48% have no latrines whatsoever and resorts to open defecation. Based on this survey and those carried out by the National Sample Survey, the overall situation in the urban communities in India could be that nearly 27% have faci-

lities of sanitary latrines (connected privies, Septic tank etc.) and 40% dry latrines and nearly 33% have no latrines in their premises. In some of the Eastern States the situation is even worst. As for example in the 12 towns in West Bengal, where house-to-house survey conducted, only 18.67% houses are having flush latrines, 20.69% have dry bucket latrines and more than 60% of the houses are without any latrines at all.

2.2 Status of Collection & Disposal of Night Soil from Bucket Latrines.

The maintenance of bucket latrines and facilities of collection, transportation and disposal are extremely poor. In a survey conducted by the All India Institute of Hygiene and Public Health in 34 Municipal towns in the Calcutta Metropolitan district, it was revealed that only 60% of the generated night-soil are collected and transported regularly. As a result, overflowing night-soil from the latrine buckets are largely towards spread of faecally transmitted diseases. The operations at the disposal ground are also very poor. Night-soil is emptied into pits of any size and shape and no coverage with ash or mud is given. In some Municipalities, night-soil buckets are emptied into road-side ditches or water bodies. On the whole the dry bucket latrines remain major health hazards in the municipal towns, apart from being socially degrading for the collectors and handlers.

3. DECADE'S TARGETS AND PROGRAMME FOR URBAN SANITATION IN INDIA.

During the decade on water and Sanitation, Govt. of India would endeavour to provide sanitation facilities to about 80% of the total urban population. Considering the prohibitive capital cost of providing sewerage systems, a higher priority has been accorded to providing low cost on-site sanitation facilities in most of the small and

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medium towns. In order to prepare a replicable model of low cost on-site sanitation system which could be adopted in other similar towns, preliminary engineering and feasibility studies of low cost water-seal latrines were carried out in 110 small and medium towns in seven Indian States, covering a population of nearly 5 millions. Along with techno-economic feasibility of these studies also identified organisational and financing pattern for expeditious implementation of low cost sanitation programme in the small and medium towns. In the 2nd phase, such studies are being carried out, in another 100 towns. In 11 States and 3 Union Territories some of the salient findings of these studies are discussed hereafter.

3. FEASIBILITY OF TWO-PIT POUR FLUSH LATRINES

The twin pit pour flush latrines, which was originally developed in India, through the pioneering studies at the A.I.I.H & P.H and other Institutes, the design of which was subsequently optimised by TAG (Group) (Details shown in Fig.1), was found to be the most suitable means of on-site sanitation in India, both from the point of view of affordability and environmental protection. Such latrines requiring 1½ to 2 litres of flushing waters, could be constructed without much difficulty, for each household by :

- a) converting the existing dry bucket latrines,
- b) constructing new units where they do not exist,
- c) providing community latrine blocks where individual latrines are not practicable and for the floating population.

4. TECHNO-ECONOMIC ASPECTS

The unit cost of conversion and new construction of two pit pour flush latrines would vary from place to place depending on cost of material and labour. Average cost figures, valid for the towns in the Eastern States in India are given below :-

No. of Users	Unit cost for Conversion (Rs)	New Construction (Rs)
5	800	1100
10	1000	1400
15	1300	1600

This means that a family of five would have to bear a financial burden of Rs.6 to 8 per month per household, if the entire amount is advanced as loan to be repaid in monthly instalments in 25 years.

Since a sizeable portion of the urban population has a rather low income, it was felt that even this much of financial burden may be too heavy for some section of the population and an element of subsidy from the Federal or Provincial Government would be necessary to make this type of sanitation affordable to the whole of the urban community. To evolve a rational and optimal combination of grant and loan for people in various income-groups, the maximum monthly repayment rate was fixed at 2% of the monthly income of the family. On this basis, it was recommended that the people in the income group of 0 to 400/- p.m (medium value Rs.200/-), should be provided with as 75% of the construction cost as grants and 25% as loans. Similarly, people in the income group of Rs.400/- to Rs.1000/- should be provided with 50% grants. Socio-economic status of the people could also be assessed on the basis of utility services like, water, electricity, latrine etc. provided in a house. On this basis, households with no utility services should receive the maximum subsidy.

The feasibility study also examined whether the local Government Authorities have the capacity to execute the latrine programme and take responsibility of operation and maintenance of sanitation facilities including de-sludging and disposal of humus from the private sanitary latrines. The income and expenditure patterns of all the Municipal towns covered under the 1st Phase and 2nd Phase, were closely examined. It was concluded that though some of the Municipalities were having marginally surplus budgetary provision and there is potentialities of augmenting their revenue by means of fresh taxation

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and improved collection, the municipal authorities could hardly be expected to shoulder the additional responsibility of financing the programme independently. The requirements of funds should be met from external sources. The Central and State Government grants may be matched by loans from financial institutions like the Nationalised Banks, Life Insurance Corporation, Housing Development Corporation etc. Aids from International and Bilateral Agencies may also be sought. Voluntary Agencies may also play a significant role in implementing the latrine programme.

4.1 Soil & Water Pollution Aspects.

One of the very important aspects to be considered for the large-scale implementation programme of the low cost pour flush water-seal latrines with twin leach pits, is the extent of possible soil and water pollution hazards arising from these pits in different hydro geological conditions. During the 1st phase of the feasibility study, pollution travel from latrine pits were studied in six sites in Bihar, Gujrat and Tamilnadu, in collaboration with the concerned State Water Pollution Prevention and Control Boards, National Environmental Engineering Institute and State Public Health Laboratories. In Gujrat, where the soil is very fine with 20% clay, effective size less than 0.002 mm and low permeability of the order of 0.34 to 1.5×10^{-7} Cm/Sec, and water remains well below the bottom of the latrine pit throughout the year, the study findings reveal that :

- i. Bacterial pollution was not present in soil samples as close as 1.5 m from the pit.
- ii. Water samples collected from wells at 8 m from the pit did not show any evidence of faecal pollution.
- iii. There was no significant increase in the nitrate content in well waters at 8 m and 16 m as compared to that collected from wells at 100 m.

The findings from Bihar site, where the soil contains high percentage of silt and clay, with effective size less than 0.05 mm and permeability of the order of 0.032 to 290.5×10^{-5} CM/Sec, the findings were more or less similar to that of Gujrat.

In Tamilnadu, sites were located in rocky region with rock out crops occupying at varying depths. The overlying soil strata is coarse with 75 to 80% gravel and sand and high permeability ranging from 8.5×10^{-3} to 19.5×10^{-3} CM/Sec. The results showed that bacterial pollution within 8 m zone is possible and nitrate pollution upto 16 m from the pit. However the results of this site showed high baseline pollution.

However based on the findings of these studies it could be stated that under favourable hydro-geological conditions, i.e fine soil profile (silt, clay and fine sand) and water table remaining more than 2 m below the bottom of the pit, bacterial travel would not take place beyond 3 m.

A further study has now been taken up, in collaboration with the All India Institute of Hygiene and Public Health and Kerala State Water Pollution Prevention and Control Board, to assess the risk of pollution travel under adverse hydro-geological situations such as :-

- a) Coarser soil profile with effective size more than 0.2 mm.
- b) High ground water table, less than 2 m from the bottom of the pit.
- c) High ground water slope, more than 0.01.

Under this study which is being financed by the I.R.C.W.D, effectiveness of sand envelope having sand thickness of 12" to 24" and E.S 0.2 mm, in preventing travel of pollution from leach pits, under such adverse hydrogeological situations would be evaluated. The study is presently being carried out in two sites at West Bental and Kerala.

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However from the studies which have so far carried out in this field, both in India and abroad, it could be safely concluded that the introduction of pour flush pit latrines does not pose any serious pollution hazards to ground water or water mains, if proper precautions are taken.

4.3 Legal & Institutional Aspects.

The study of the municipal laws and other relevant laws of the seven States covered under the 1st Phase has revealed that there are a few inadequacies in the legal provisions under the respective municipal acts relating latrine programme and hence some amendments are needed to accelerate the implementation of the programme. Given below are some of the suggested amendments :-

- i) Conversion of old bucket latrines and construction of new sanitary latrines, which include Two pit Pour Flush type as well, should be made obligatory for the local bodies.
- ii) Legal provision should be made so that no new building could be constructed or any extension of existing building taken up, unless the owner agrees to provide excreta disposal facilities approved by the Municipal Authorities.
- iii) In case the owner of a house defaults, the municipality should have the power to compel the occupier (tenant) to build necessary sanitation facilities even without the consent of the owner.

- iv) Open air defecation should be legally prohibited not only in public streets and public places, but in any open space public or private.
- v) The municipal authorities be empowered to recover the loan amounts given to the beneficiaries for construction/conversion of latrines through distraintment like taxes.

Several studies of the ongoing low cost sanitation projects in different States, revealed that one of the main reason for slow progress is the non-availability of a proper institution for executing the programme at a reasonable service charge and also for doing the necessary promotional and follow-up measures. Perhaps, a project Management Cell, at the State Government or Local Government level may be set up for co-ordination between Central Government, State Government, Local Authorities, target house-holds, and various other international and voluntary agencies involved in the programme. This Cell should also guide and assist the municipalities in publicity, motivation and health education.

References:-

Reports prepared under UNDP International and India Projects on Low Cost Sanitation.