



14th WEDC Conference
Water and urban services
In Asia and the Pacific
Kuala Lumpur 1988

Technologies for women's low-income housing needs

Dr J C Srivastava

Urbanisation has several components in terms of development viz., increasing trend of existing population growth rates nationwide, influx of rural migrants or from other states in search of employment and transformation of settlements from rural to urban. Due to subcritical and meagre income, such migrants were forced to take shelter with their families in shanty clusters, slum dwellings or squatters settlements.

Ramachandran notes that by the year 2000, almost half the world's population will be living in urban areas. This has encouraged identification of cities in developing countries with poverty, inequality, environmental degradation and antisocial behaviour. While large cities in some developing countries have been growing at the rate of 10 per cent per annum, slums and squatter settlements in some of them have been growing twice as quickly (1). In 12 metropolitan cities in India, it has been estimated that 12.25 million people living in slums (1981 census) will swell to about 20 million by 1990 (see Table) where proportion of women would touch to about 50-60 per cent (2). Shelter conditions, infrastructure and services are the areas in which most settlements are visibly losing ground. Although urban life offers some good job opportunities and income; for the women of low-income groups, it entailed quite a lot of hardship and drudgery too. These strategies in terms of women's needs must seek to redress imbalances brought about by inputs of science and technology (S&T).

NEEDS OF WOMEN

As women are intimately linked and are more directly affected by housing and settlements environmental conditions, a survey was undertaken to assess their needs, preferences and actual uses. The needs requiring specific attention in terms of dwelling related to (i) space determination and utilization inside the house which may help improve the efficiency in performing the daily domestic chores and reduce drudgery; (ii) provision of a well-laid cooking place with a smokeless and fuel efficient cookstove; (iii) a sanitary latrine which would help in the hygienic disposal of human excreta; (iv) provision of essential services and facilities like waste water disposal, drainage, ventilation and lighting; (v) safe drinking water near the house, and upkeep and maintenance of drinking water resources and water quality improvement; and (vi) methods for prevention of damage to houses and their belonging due to fire and stagnating water during rains and floods.

TECHNOLOGIES

The input/output indicators for application of technologies to meet the above needs were determined as under:

INPUT	OUTPUT
Acceptability, Availability, Affordability, Maintainability, Replicability	Distinct advantage felt by women for a healthful living and elimination of related hardship and drudgery

Estimated Urban Population and Slum Population in 1990 in Metropolitan Cities (Persons in lakhs)

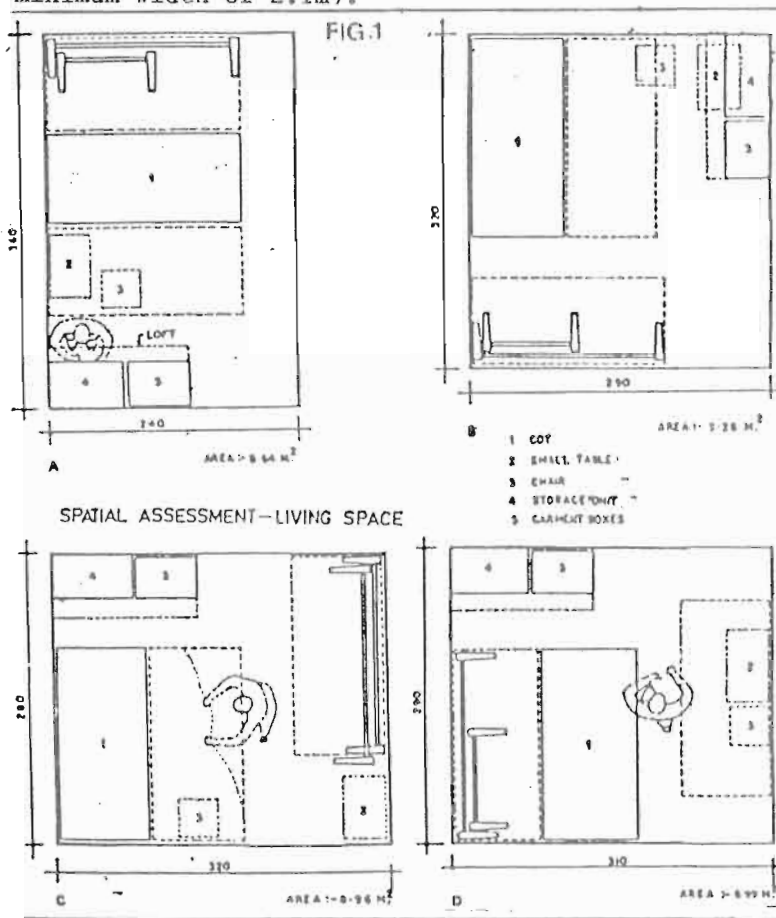
Name of the City/Town	Total Pop. 1981	Identified Slum Population		Growth Rate 1971-81	Estimated Population 1990	Estimated Slum Population 1990
		Number	Percent to Col.(3)			
2	3	4	5	6	7	8
Calcutta	91.94	30.280	32.9	30.35	125.33	43.86
Greater Bombay	82.43	28.314	34.3	37.80	117.89	41.26
Delhi	57.29	18.000	31.4	56.66	97.67	32.08
Madras	42.89	13.630	32.1	34.91	60.22	21.08
Bangalore	29.21	3.050	10.4	76.17	51.86	10.37
Hyderabad	25.45	5.000	19.6	40.74	37.07	11.12
Ahmedabad	25.48	5.363	20.3	43.53	37.76	11.33
Kanpur	16.39	6.140	37.5	32.39	22.84	8.00
Pune	16.86	2.743	16.3	48.48	25.73	5.15
Nagpur	13.02	4.161	31.9	39.50	18.82	5.64
Lucknow	10.07	2.850	28.3	23.66	13.12	3.94
Jaipur	10.15	2.960	29.1	57.78	16.34	4.90
Total:	421.18	122.491	29.1		618.65	198.73

The Central Building Research Institute (CBRI), Structural Engineering Research Centre (SERC), National Environmental Engineering Research Institute (NEERI) and Mechanical Engineering R&D Organisation (MERADO), constituent research laboratories of the Council of Scientific & Industrial Research (CSIR) India have developed a number of technologies having scope of adoption by women. The selected technologies which have reasonably met their expectations are briefly presented here.

Space determination

Space determination is related to posture of working, habits, income levels and capabilities of the women. It is also

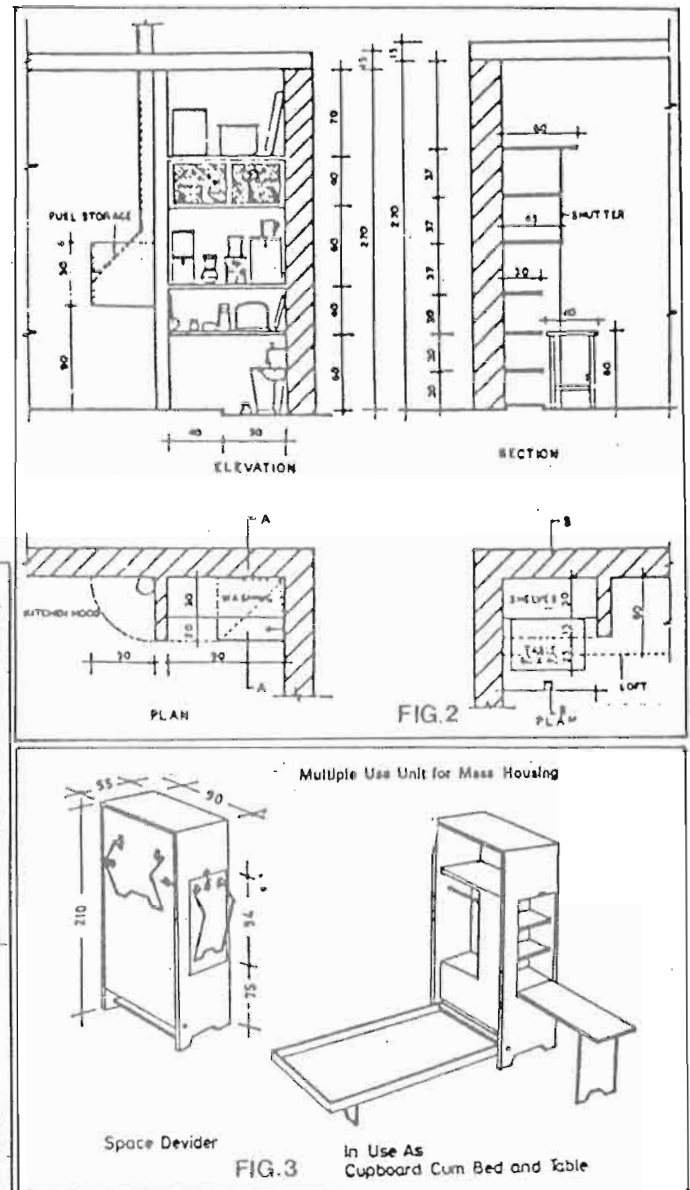
influenced by space, structure and design of furniture and fixtures in the house. Minimum floor space for various requirements in a household has been determined as under (3) Living space has been considered to cater needs of sleeping, leisure-time, sitting and storage of household items. Since sleeping during night has been found to be the critical requirement, shifting and rearranging of furniture for day-time and night-time activities were considered. Floor area of these requirements could conveniently be made as 10 m^2 with a minimum width of 2.4m and 2.6m for one and two door arrangements respectively. Figure 1 shows a few such arrangements (minimum floor space for one cot enclosure is 5 m^2 with minimum width of 2.1m).



Storage Unit

A minimum floor space of 0.6 m^2 to 0.8 m^2 was determined in the living space. A depth of 45 cm and minimum length of 75 cm with provision of shallow shelves of 30cm depth at lower level was worked out for use of children items. Space for storage of cereals, prepared food and milk and fuel storage (in fuel hood) has also been worked out; for which a minimum floor space of 0.21 m^2 was worked out (see Fig.2).

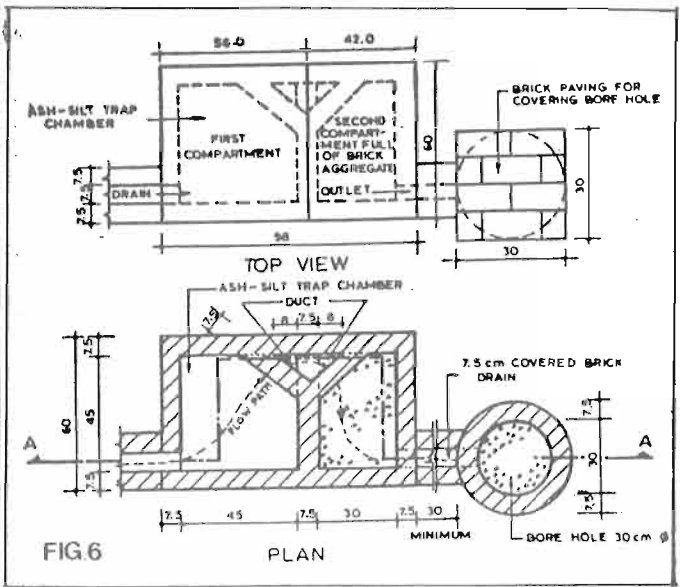
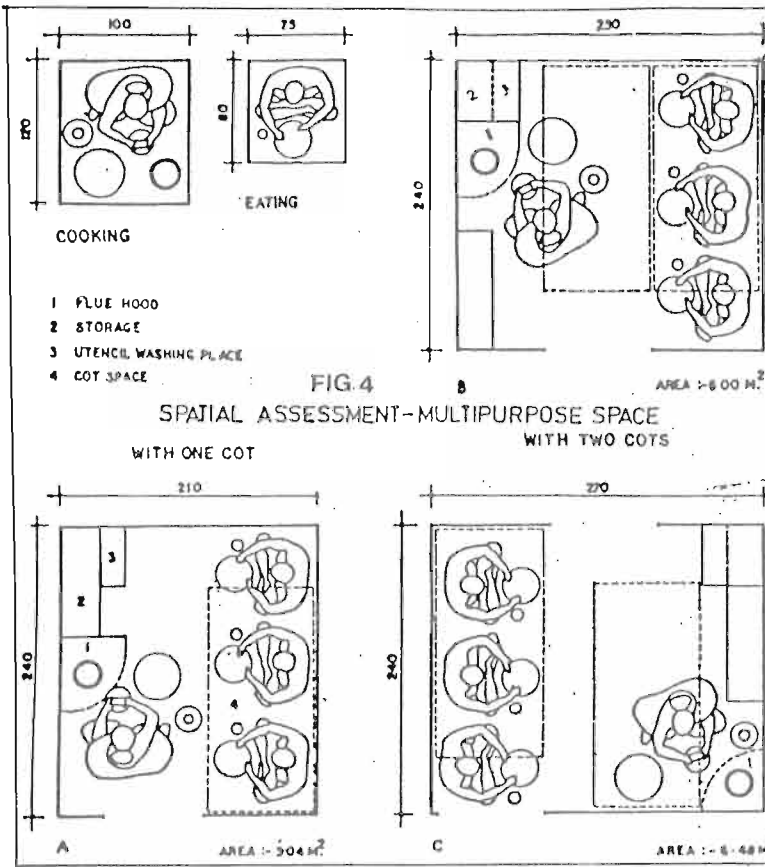
Storing, sleeping and day-time working-tops are main activities for which majority of women demanded compact, cost-effective and ready to use type of furniture. A number of designs have been worked out by CBRI to this effect (4) (see Fig.3)



Kitchen

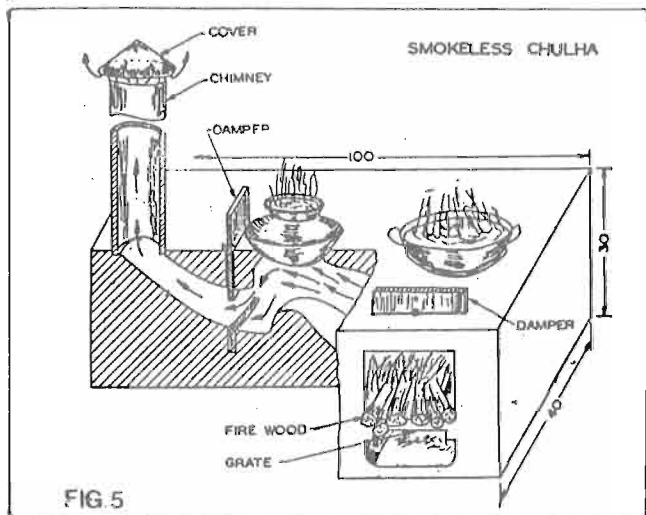
The minimum space requirements for multi-purpose activities related to kitchen were worked out as squatting cooking ($120 \times 100 \text{ cm}$); cleaning of utensils ($50 \times 50 \text{ cm}$); storage of kitchen supplies ($70 \times 30 \text{ cm}$); eating space for 3 persons at the rate of floor space ($80 \times 75 \text{ cm}$) per person; and provision of site for cookstove and flue for the exhaust of smoke and fumes. When all the kitchen activities are over, this space shall be used to accommodate cots for sleeping during night at the rate of 5 m^2 per cot with a minimum width of 2.1m. A few arrangements of these activities are shown in Fig.4.

Improved cookstove These are equipped with internal damper and chimney to control the fire intensity and to eliminate smoke from the room. The inset pot seal prevents accidental fire that are caused by sparks leaping from scalds (see fig.5). Energy crisis is also being felt in such settlements. Solar cookers are being promoted with heavy subsidy.



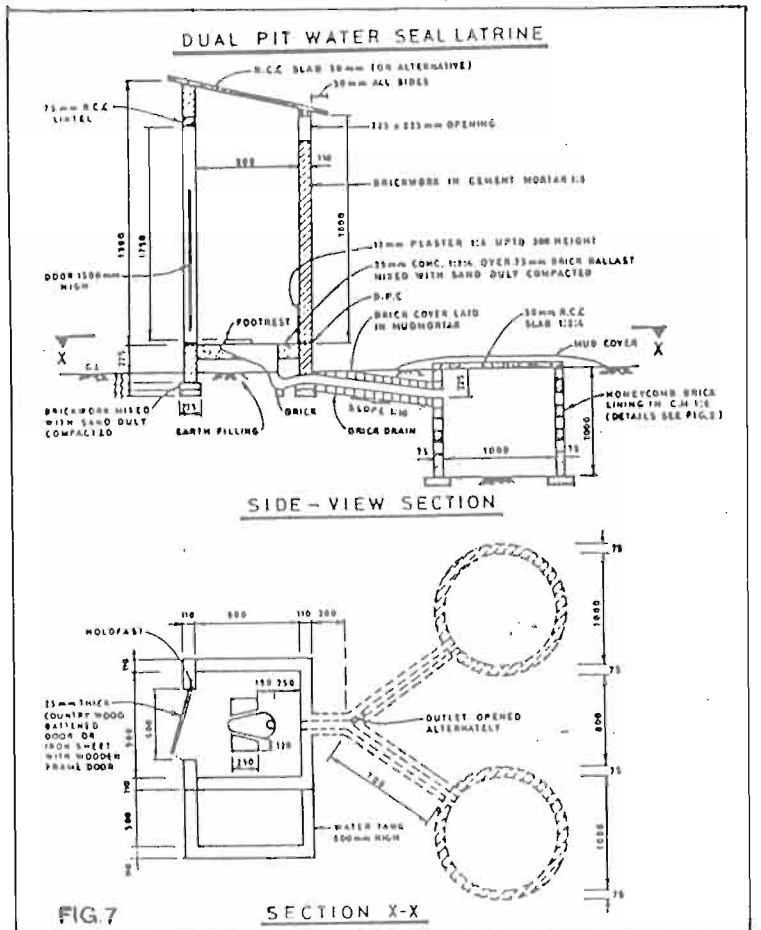
which saves floor space as well as one door, a minimum floor space of 2.2m² with minimum size of 12.1m should be provided. Out of many sanitary latrine designs developed in India, the hand flushed water-seal latrine has been found most acceptable to women in terms of cost, convenience, construction, maintenance, sanitation and privacy (see Fig. 7).

While such latrines should preferably be visually segregated from kitchen, they should be located atleast at 15m distance from handpumps.



Waste water disposal In low-income settlements, there is practically no drainage. For immediate solution, near the source of waste water disposal, the concept of soakage system has been worked out (see Fig. 6). This system consists of two chambers, an ash/silt trap in which silt or ash settles down and the second (filled with brick aggregates) for removal of suspended or colloidal matter in the water. The drain water so filtered flows into a borehole (30 cm depth) for ultimate disposal.

Toilet facilities Minimum floor area for bath and latrine was worked out as 1.4m² with a minimum size of 1.1 m for bath and 1.0 m with a minimum size of 0.85 m for W.C. for separate bath and W.C. facility. For combined bath and W.C.



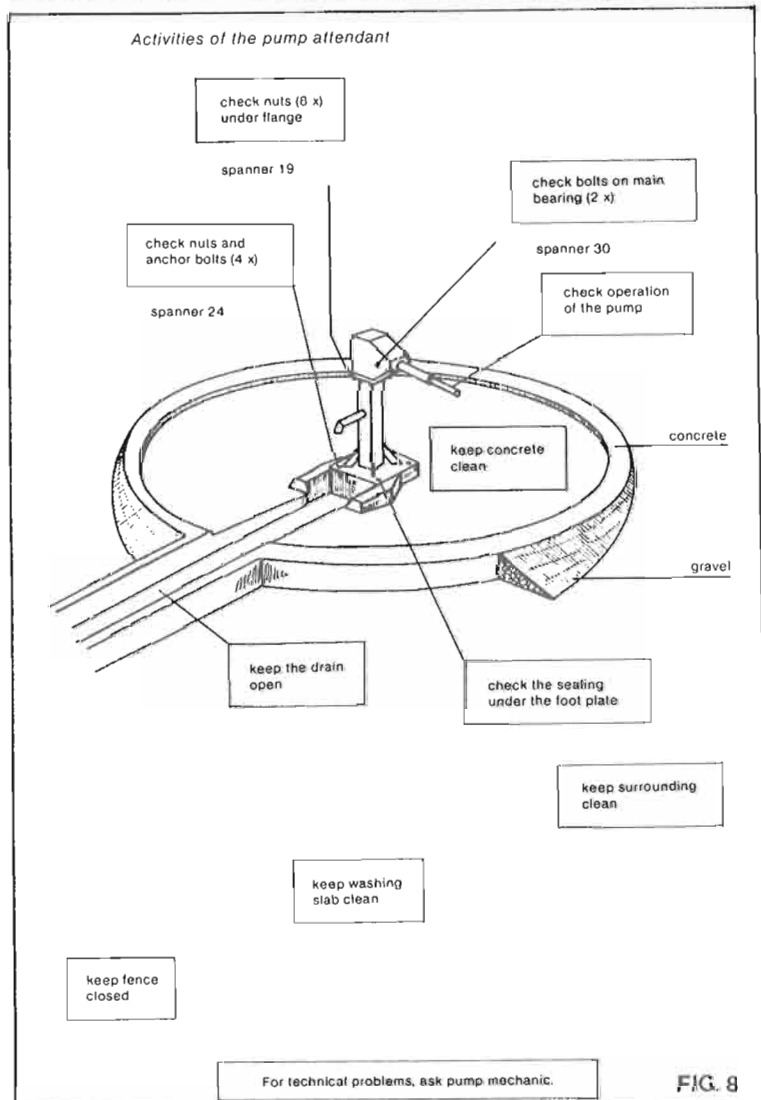
Community latrine and bath The Sulabh International, Patna (India), a voluntary organization has taken a lead in the construction of multipurpose conveniences including bathing facilities near such urban settlements. This has amply demonstrated that such public conveniences can successfully run and maintained on 'pay and use basis' by low income families. Every user has to pay Rs 0.20 (US \$ 0.016 @ Rs 13 = 1\$) per use. This charge includes supply of detergent cake for cleaning hands. The cost of maintenance, one caretaker and two attendants (for keeping the complex neat and tidy) is met by the collection of daily charges from the users.

Drinking water

There are generally no regular drinking water facilities in low-income settlements. Installation of handpumps (India Mark II)) have been found to be most cost-effective and can conveniently be handled even by children.

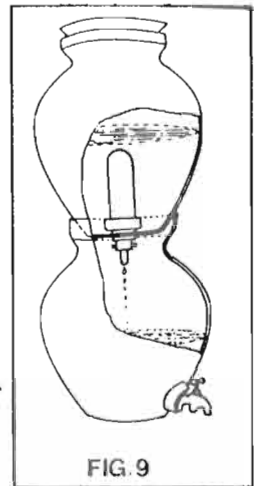
Improving water quality

Many domestic level treatments for improving water quality have been developed



by NEERI, India which have gained popularity in low-income families. Such units like handpump and household water treatment system could easily be handled and managed by women (see Fig.8).

Due to poor environment in such settlements, water should be boiled or filtered through water filter candles fitted in household water containers (Fig. 9).



SUMMING UP

Transformation of development of women in lowincome urban settlements of self-built neighbourhood to a higher environmental standards requires an understanding of socio-cultural system and a balanced compromise between diverse needs and living style and their capacity to adopt the technology. The modern thinking is, therefore, growing for an integrated and multi-dimensional approach with the inputs of S&T, education and women's participation. The concept of 'technology package' presented here though has proved viable in India, it could be put to 'action-research' and trial by other countries. The role of women in planning for development of such settlements should be fully taken into account and this could preferably be done by specialists on women in development, women's organisations, voluntary agencies and female architects.

ACKNOWLEDGMENT

I am grateful to Dr. B.K. Tyagi, Scientist Central Building Research Institute, India for his expert advice in dwelling space requirements and Mr. S.P. Chawla my Secretary for typing and layout assistance.

REFERENCES

1. Ramachandran, Dr. Arcot (HABITAT), How can cities cope, VITA NEWS, 1987, Virginia, USA (periodical)
2. SHELTER, 1986, Statistics column, October-December, HUDCO, New Delhi, India (periodical)
3. Tyagi, B.K., Dwelling space standards, Journal of the Indian Institute of Architects, 1979, January-March, New Delhi, India (journal)
4. CBRI Annual Report(1985-86), Central Building Research Institute, Roorkee, India (annual report).