

Sanitation in rural communities in Bangladesh

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Household sanitation in developing countries, especially in the rural areas, is poor. An evaluation of what was achieved in this regard during the 1980–90 decade of safe water supply for all was carried out in the present study. It was observed that even where a safe water supply and sanitary latrines were provided, people did not always use them. While 23% of the studied households had sanitary latrines, children in about 11.5% of these households did not use them and women in about 6% of households did not use them for micturition at night. Not a single house in the study area could fulfil all the criteria of sanitary housing in a strict sense; for example, although 34.5% of the households had tubewells, only 11.5% of them had a satisfactory level of water usage. Since socioeconomic conditions and education influence the level of sanitation, improvements in both are required.

Introduction

A WHO report (1) has shown that three quarters of the urban population in developing countries have more or less adequate excreta disposal facilities compared with only 15% in the rural sector. The data also indicated that sanitary conditions in WHO's South-East Asia region were the worst in the world.

The list of housing-related diseases is long (2); the three main areas are diseases related to:

- over crowding, e.g., respiratory diseases;
- materials used in the building, e.g., allergic and parasitic diseases;
- deficiencies in water supply and sanitation, e.g., faeco-oral diseases.

These diseases are not only responsible for sickness, low life expectancy, and death but also prevent social and economic progress.

Domestic sanitation, an important determinant of health or disease in human populations has been neglected in the developing countries. In Bangladesh, one of the least developed countries in the world, communicable diseases and parasitic infestations are widespread and improvements in sanitation are possible only if adequate information is available, on the basis of which planning and evaluations may be undertaken. The principal aim of this study was to collect data on sanitary conditions in the rural areas of Bangladesh where 85% of the population live.*

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* Bangladesh Bureau of Statistics. *Statistical pocketbook, 1989*. Dhaka, Ministry of Planning, 1989.

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Materials and methods

The *upazilla* (administrative unit with about 250 000 population) of Dhamrai in the Dhaka district, 30 km from Dhaka city and well connected by a trunk road, was chosen as the study area. Two out of the 16 unions (the lowest administrative unit with a population of about 25 000 each), Dhamrai and Kulla, were selected. Four villages (out of an average of 26) from each union were selected by a random process and all the households in these villages were listed; 25 households from 175 (on average) were selected, again by a simple random process, from each of the 8 villages. The total sample size was therefore 200 households.

The estimation of sampling error was not undertaken for several reasons. The selected unions were nearest to the *upazilla* headquarters and their inhabitants, who were the most educated in the *upazilla*, represented the best situation among the variables. Since the selected areas were homogeneous, there was minimum variability and no stratification was attempted during, before or after the sampling.

The interview questions and check-lists for observation, which were developed, pretested and finalized, were aimed at the following: cleanliness of the living quarters and courtyards, provision of safe water supply, sanitary latrines, separate kitchen, proper setting of the house, amount of floor space per person, refuse and garbage disposal, and the method of sheltering domestic pets and animals. Data were collected by interviewing the head of each household and by observing the sanitary conditions in the homes and their surroundings. Spontaneous response was advocated and no surrogate respondent was accepted. Operational definitions of the variables were worked out and are given in the Annex.

The same person (a physician) interviewed all the respondents to avoid bias.

Results

Income and education. Based on the monthly income/person, the 200 families were classed as low, middle, and upper, having incomes of <400, 400–1100, and >1100 taka, respectively (taka 32=US\$ 1); 65.5% of the study population belonged to the low income group, while 29.5% belonged to the middle and only 5% to the upper class. Investigation of the level of education showed that 82% of the study population was illiterate, while 13% had primary education, 4% up to secondary level, and only 1% to college level.

Sanitary conditions. The majority of houses (60–85%) were unsatisfactory in their setting, in their window areas and in the amount of floor space/person (Table 1). While nearly half the studied households had a separate kitchen, the majority were unsatisfactory regarding cleanliness (>98%) or were found to have insanitary latrines (>75%) (Table 1). Children in only 50% of the households with sanitary latrines were using them, in comparison to all the adults. However, about 26% of women in these households did not use the latrines at night for micturition.

Although the majority of households (89%) were found to use tubewell water for drinking purposes (the rest used dug-well water), only 34.5% had tubewells in their household and 65.5% had a tubewell within 400 m of their household; 40% of the households, however, had tubewells sunk within 15 metres of a source of pollution. No household used any boiled, filtered or chemically purified water since the members of these households thought it unnecessary except during an outbreak of diarrhoea or during

Table 1: Sanitary condition of the 200 households in the survey

| Variables* | Satisfactory | | Unsatisfactory | |
|--|--------------|------|----------------|-------|
| | No. | % | No. | % |
| Site or setting of the house | 39 | 19.5 | 161 | 80.5 |
| Window area | 29 | 14.5 | 171 | 85.5 |
| Adequate floor space/person | 76 | 38.0 | 124 | 62.0 |
| Separate kitchen | 95 | 47.5 | 105 | 52.5 |
| Clean living quarters and courtyards | 34 | 17.0 | 166 | 83.0 |
| Sanitary latrine (water seal + pit latrines) | 46 | 23.0 | 154 | 77.0 |
| Safe water supply and usage | 23 | 11.5 | 177 | 88.5 |
| Refuse and garbage disposal | 3 | 1.5 | 197 | 98.5 |
| Shelter for domestic pets and animals | 0 | 0 | 200 | 100.0 |

* Analysed individually.

floods. Few households (11.5%) had a satisfactory level of safe water usage and only 1.5% had satisfactory refuse and garbage disposal. Not a single household could be found with a satisfactory place for sheltering domestic pets and animals (Table 1).

An analysis of the variables, in combinations of two or more, showed that few households (3–12%) were satisfactory in the following: provision of safe water supply and sanitary latrine; safe water supply, sanitary latrine and a separate kitchen; these three and a proper setting of the house; all these plus adequate floor space/person; and all these plus general cleanliness of the house (Table 2). While no household was found to be satisfactory in more than seven of the variables, about 10% were satisfactory as regards a safe water supply, presence of sanitary latrine (irrespective of its usage), a separate kitchen, and proper setting of the houses.

Table 2: Sanitary condition, in combinations of two or more variables, of the 200 households surveyed

| Variables | Satisfactory | | Unsatisfactory | |
|--|--------------|------|----------------|-------|
| | No. | % | No. | % |
| Safe water supply and sanitary latrine | 23 | 11.5 | 177 | 88.5 |
| Safe water supply, sanitary latrine, and separate kitchen | 23 | 11.5 | 177 | 88.5 |
| Safe water supply, sanitary latrine, separate kitchen, and proper setting of the house | 19 | 9.5 | 181 | 90.5 |
| Safe water supply, sanitary latrine, separate kitchen, proper setting of the house, and adequate floor space/person | 12 | 6 | 188 | 94 |
| Safe water supply, sanitary latrine, separate kitchen, proper setting of the house, adequate floor space/person, and cleanliness | 7 | 3.5 | 193 | 96.5 |
| Safe water supply, sanitary latrine, separate kitchen, proper setting of the house, adequate floor space/person, cleanliness, and refuse and garbage disposal | 2 | 1.0 | 198 | 99.0 |
| Safe water supply, sanitary latrine, separate kitchen, proper setting of the house, adequate floor space/person, cleanliness, refuse and garbage disposal, and shelter for domestic pets and animals | 0 | 0.0 | 200 | 100.0 |

Table 3. Sanitary condition of the 200 households according to their socioeconomic condition (class) and level of education

| Class and education | No. of households with satisfactory sanitation for the following variables: ^a | | | | | | | |
|------------------------------|--|--------------|--------------|--------------|--------------|--------------|-------------|----------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| <i>Socioeconomic status:</i> | | | | | | | | |
| Upper class (n=10) | 4 (40) ^b | 5 (50) | 6 (60) | 6 (60) | 9 (90) | 6 (60) | 1 (10) | 0 (0) |
| Middle class (n=59) | 7 (11.9) | 32 (54.2) | 32 (54.2) | 19 (32.2) | 31 (52.5) | 20 (33.9) | 2 (3.4) | 0 (0) |
| Lower class (n=131) | 12 (9.2) | 9 (6.9) | 57 (43.5) | 14 (10.7) | 36 (27.5) | 8 (6.1) | 0 (0) | 0 (0) |
| <i>Educational level:</i> | | | | | | | | |
| Illiterate (n=164) | 11 (6.7) | 32 (19.5) | 72 (43.9) | 28 (17.1) | 63 (38.4) | 17 (10.4) | 0 (0) | 0 (0) |
| Primary (n=26) | 7 (26.9) | 6 (23.1) | 16 (61.5) | 7 (26.8) | 8 (30.8) | 12 (46.2) | 1 (3.9) | 0 (0) |
| Secondary (n=8) | 3 (37.5) | 6 (75) | 4 (50) | 2 (25) | 3 (37.5) | 4 (50) | 1 (12.5) | 0 (0) |
| Higher secondary (n=2) | 2 (100) | 2 (100) | 1 (50) | 2 (100) | 2 (100) | 1 (50) | 1 (50) | 0 (0) |

^a Key to variables: 1. Safe water supply; 2. Sanitary latrine; 3. Separate kitchen; 4. Proper setting of the house; 5. Adequate floor space/person; 6. Cleanliness of the house; 7. Refuse and garbage disposal; and 8. Shelter for domestic pets and animals.

^b Figures in parentheses are percentages.

Table 3 presents the number of households with satisfactory sanitation for the eight variables in relation to socioeconomic status and educational level of the occupants.

Discussion

In developing the questionnaire for this study special care was taken not to put sensitive questions at the start. Some conversation always preceded the interview.

To avoid between-interviewer bias the same person (a physician) interviewed all the respondents. Although he was from a different socioeconomic background and from another area of Bangladesh, this should not have biased the collected data because of the homogeneous cultural and religious background. All the data collected through interviews were verified by observation, wherever possible, to preclude under- or over-reporting. The possibility of recall bias did not arise because the information collected was cross-sectional in nature. There was no non-response or drop-out bias because of the 100% response rate. Since no surrogate responder was necessary or included, a proxy bias did not arise. Studies or interviews that involve identification, classification or categorization of diseases or reference to certain time periods are fraught with biases, which were avoided in the present study.

A WHO/UNICEF study in 1975 showed that only 1.7% of houses in Bangladesh had sanitary lat-

rines and only 1.1% of children used them.^b This study also showed that latrine sanitation in rural Bangladesh was low but had increased to 23% in 13 years. More and faster improvements are very essential. This study also indicated that, despite the presence of a sanitary latrine in a house, children and sometimes women refrained from using them. This indicates a need for health education.

Most households (89%) were found to use tubewell water for drinking and the rest used dug-well water. The above-mentioned WHO/UNICEF study in 1975 showed that 52% of households used tubewell water and 27% used dug-well water for drinking; the remainder used surface water (ponds, rivers, etc.) for this purpose. Mujibur Rahman et al. (3) in 1977 obtained similar estimates as that of the WHO/UNICEF study. In the present study no one was found to use surface water for drinking. This may be due to the health education efforts of the government as well as some nongovernmental organizations in the rural areas and also to the supply of tubewells by the public health engineering department at subsidized prices. However, only 11.5% of households used tubewell and dug-well water for cooking and washing of utensils; the rest (88.5%) were using

^b Skoda, J.D. et al. A survey in rural Bangladesh on diarrhoeal morbidity, water usage and related factors. Unpublished report of UNICEF/WHO, 1977.

surface water for these purposes. Thus, the provision of a safe water supply does not necessarily ensure water sanitation. For example, only 7.5% of the household members were found to bathe in tubewell water and 4.0% in dug-well water. All the domestic pets and animals were washed in surface waters which were also used by most household members for bathing, i.e., there was no separate source of water for washing the animals.

All the studies on household sanitation in Bangladesh have been focused on only water supply and waste disposal. The present study investigated, in addition, other components which are discussed below.

The majority of households without a separate, satisfactory kitchen during the survey claimed to have had one previously, but this was destroyed by the floods and cyclone of 1987; owing to the poor socioeconomic situation the respondents could not repair it or erect a new kitchen. A separate kitchen was considered to be satisfactory only if smoke did not pass from it to the living quarters. Although smoke from separate kitchens was never observed to enter the living quarters, not all the kitchens could be considered as clean since garbage and waste water could be found all around the place of cooking.

Domestic pets and animals were usually kept outside but within 7.5 m (25 feet) of the living quarters. Most respondents had no idea of the possible risks to their health; the main reason for keeping the animals so close was the fear of theft.

Very few households provided for the disposal of garbage and refuse in order to prevent pollution of surface water, insect breeding, etc. Clearly there is a role for health education in situations like this. Although the socioeconomic situation of the household was a powerful determinant of sanitation, further benefits may be obtained by improving the rate of literacy.

In summary, this study has shown that household sanitation, which depends both on education and on socioeconomic situation, is very slowly improving in the rural areas of Bangladesh; that mere provision of resources and logistics may not ensure sanitation to the full extent; and that to improve sanitary practices a more acceptable form of commode for the children's use is needed, in addition to repeated health education on these matters.

Résumé

Les conditions d'hygiène dans les communautés rurales du Bangladesh

L'hygiène domestique comme l'hygiène du milieu

sont des questions qui intéressent l'OMS, le Programme des Nations Unies pour l'Environnement et les gouvernements des pays en développement.

C'est l'absence de données en provenance de pays en développement sur nombre de ces problèmes qui est à l'origine de la présente étude, pour laquelle des renseignements ont été recueillis sur les conditions d'hygiène de l'habitat rural au Bangladesh, qui peuvent être représentatives de la situation dans d'autres pays de la région.

Aucune habitation n'a été jugée complètement satisfaisante du point de vue de l'hygiène. Les éléments suivants ont été examinés: implantation de la maison; éclairage et ventilation (fenêtres); surface utile par personne; évacuation hygiénique des excréta et des ordures; approvisionnement en eau saine; cuisine séparée; abris indépendants pour les animaux domestiques; enfin, propreté des pièces.

Les zones choisies pour l'étude se trouvent dans le district de Dacca, mais chaque unité (ménage) a été choisie de façon aléatoire. La collecte des données a été faite par interrogatoire au moyen de questionnaires et par l'observation des éléments figurant sur une liste de contrôle.

Sur les 200 ménages étudiés, 23% avaient des latrines hygiéniques mais il n'y avait que 11,5% des enfants de ces ménages qui les utilisaient. Alors que 89% des ménages disposaient de puits tubés et en tiraient leur eau de boisson, seuls 6% employaient l'eau de ces puits pour tous les usages. L'eau tirée de puits tubés ou de puits ordinaires était utilisée pour la cuisine et la vaisselle, ainsi que pour la toilette, par 11,5% des ménages. Il n'y avait que 1,5% des ménages qui avaient un endroit réservé aux déchets et ordures, mais la proportion d'habitations jugées satisfaisantes du point de vue de la propreté était tout de même de 17%. La surface utile par personne était suffisante dans 38% des habitations mais moins de 20% avaient une ventilation et un éclairage satisfaisants. Tous les ménages avaient des étables à vaches à moins de 7,5 mètres de leur habitation. Si l'on considère uniquement l'approvisionnement en eau saine, des latrines hygiéniques, une cuisine séparée et une bonne implantation de la maison, on peut qualifier les conditions de satisfaisantes pour environ 10% des ménages. Si l'on tient compte des autres variables, alors les conditions peuvent être qualifiées de partiellement satisfaisantes pour ces mêmes ménages.

Etant donné que ce sont la situation socio-économique et le niveau d'instruction qui conditionnent l'hygiène domestique, le simple fait de fournir les ressources et les installations néces-

saïres risque de ne pas garantir qu'elles soient complètement et correctement utilisées. Une éducation sanitaire soutenue sur ces questions s'impose donc également.

References

1. **World Health Organization.** Community water supply and excreta disposal in developing countries: review of progress. *World health statistics report*, 29(10): 544-603 (1976).
2. **Feachem, R.M.C. et al.** *Water, wastes and health in hot climates*. London, ELBS, 1979.
3. **Mujibur Rahman, M. et al.** A survey of basic health information of rural Bangladesh. *Bull. Bangladesh Med. Res. Council*, 3(1): 70-76 (1977).

Annex

Operational definitions

Water supply

Sanitation of a household's water supply may be regarded as satisfactory if there is a tubewell within 400 metres of the household and the area within 15 metres of the well is free from any source of pollution, and if all the members of the household use this water for drinking and this or other well water for all domestic purposes (cooking, washing utensils and bathing). Bathing in ponds and rivers cannot be safe since all the studied households washed their animals in these places which were usually polluted.

Sanitary pond

A pond is regarded as satisfactory^a if there is a fence around it, if no one is allowed to go into it, and if cattle are not washed there and the aquatic vegetation is periodically removed. Any deviation from this will be regarded as not satisfactory.

Separate kitchen

Sanitation in this respect is regarded as satisfactory if a dwelling house is provided with a separate kitchen, from which no smoke passes into the living quarters.

Shelters for domestic pets and animals

It is insanitary to keep domestic pets and animals in the living quarters or within 7.5 m (25 feet) of the living quarters.^a

Refuse and garbage disposal

Refuse is the unwanted or discarded solid waste material from houses, or from business and agricultural premises, arising from man's activities.^a Garbage is also waste, arising from the preparation, cooking and consumption of food and containing organic matter which ferments on storage.^a

Sanitation may be regarded as satisfactory if garbage and refuse are removed from the dwelling at least once daily and disposed of in a sanitary manner, e.g., by digging a manure pit and depositing them there.

Setting of houses

There should be an open space all around the house. In rural areas it is recommended that the buildings should not exceed one third of the total area for housing. If this limit is exceeded then it will be regarded as unsatisfactory.^a

Proper light and ventilation

Proper light means that there must be adequate entrance of light so that one can read or write or do normal work in daytime without any difficulty and without any artificial source of light. Proper ventilation means adequate passage of fresh air from the surroundings to the houses, so that one feels comfortable when the outside air is cool. In rural areas the windows of the houses should be at least 10% of the floor area if they are to be considered as satisfactory.^a

Floor space

The accepted standards for floor space are as follows:^a

- ≥ 10.2 m² for 2 units
- 8.4-10.1 m² for 1.5 units
- 6.5-8.4 m² for 1 unit
- 4.6-6.5 m² for 0.5 unit
- < 4.6 m² for 0 unit

A baby less than 12 months of age is not to be counted; children between 1 and 10 years old are counted as half a unit, and above 10 years as a full unit. Each unit represents one person.

Sanitary latrine

An open latrine and no fixed place for defecation are regarded as insanitary. Water-seal and pit latrines are sanitary if they are used by all members; non-usage of

^a Park, J.E. & Park, K. Environment and health. In: *Textbook of preventive and social medicine*, 11th ed. Jabalpur, Banarsidas Banot, 1986, pp. 433-457, 469-472.

such latrines indicates the use of an open or unfixed space for defecation in or around the household which might affect others in the family. In this paper, however, satisfactory sanitation in this regard was based on the presence of a sanitary latrine in the household.

Cleanliness of living quarters

Living quarters and courtyards are regarded as clean and sanitary if refuse is not found in the vicinity and if they are free from too many insects.

Household sanitation

Sanitation is regarded as satisfactory if all the eight criteria used in the study (cleanliness of the living quarters and courtyard, sanitary latrine, safe water supply, floor space/person, separate kitchen, proper setting of the houses, refuse and garbage disposal, and shelters for domestic pets and animals) are concurrently present in the house up to the satisfactory level as defined above.