Research Article

A study on water supply and sanitation at a slum in Kolkata

Arkaprabha Sau

Department of Community Medicine, R. G. Kar Medical College and Hospital, Kolkata, West Bengal, India

Correspondence to: Arkaprabha Sau, E-mail: arka.doctor@gmail.com

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ABSTRACT

Background: Rapid urbanization in India leads to development of slums in urban area. These increasing number of slum dwellers are the key concerns for the urban planner. This study will help us to know the present scenario of accesses to safe drinking water and availability of adequate sanitation at a slum in Kolkata. **Objectives:** (1) To estimate the accessibility of safe drinking water to the households at that slum and (2) to estimate the availability of sanitary latrine to the households. **Materials and Methods:** An observational descriptive study with cross-sectional design was conducted at Bagbazar Slum, Kolkata, West Bengal. The study period was from 1st April 2016 to 30th April 2016. During the study period, there were total 450 households living at that area. 200 households were selected by simple random sampling. Each household was selected using Random Number table. One adult member from each household was interviewed at their home using predesigned and pretested. Statistical analysis was performed using Microsoft Excel 2016 software. **Results:** About 94% of the selected households were using piped water supplied by Kolkata Municipal Corporation and 6% were using bottled water for drinking purpose. 78% households had to use shared sanitary latrine into their household premises, but 8 (4%) households did not have any latrine facility. **Conclusions:** All the household had access to safe drinking water. There is a need for improvement in sanitation facility at that slum.

KEY WORDS: Sanitation; Slum; Safe Drinking Water; Sanitary Latrine

INTRODUCTION

Due to rapid urbanization, especially in the developing country, more and more people are trying to live in urban areas than rural areas, and this trend is expected to continue in future.[1] Share of urban population in India rises from 27.81% in 2001 to 31.16% in 2011 census.[2] Data from 2011 census also show that 17.4% of urban households in India live in slum area.[3] In Kolkata, one-third of the urban population lives in slums.[4] Slums are densely populated informal urban residential areas where ventilation, drinking water supply, and sanitation facility are supposed to be inadequate. Accesses to safe drinking water and availability to adequate sanitation are basic to the health of every individual. Although worldwide many do not have access to such fundamental needs. These increasing number of slum dwellers are the key concerns for the urban planner in respect to accessibility of safe drinking water and availability of adequate sanitation facility. 2011 census data also show that the water, sanitation, and hygiene situation in slums in India needs to shift focus from mere water availability to emphasis a set of service level benchmarks (SLB) in water supply and sanitation.[2] Moreover, safe drinking water supply and hygienic sanitation facility is the single most cost-effective major public health intervention to reduce childhood morbidity and mortality.[5] An important step toward resolving this global issue is to understand its magnitude that how many people are lacking access to drinking-water and sanitation. To answer this question, household survey with a harmonized survey question is essential to assess drinking water, sanitation, and hygiene-related practices at the household level.[6] Keeping that background in mind, the study was conducted with following objectives:

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1. To estimate the accessibility of safe drinking water to the households at that slum.
2. To estimate the availability of sanitary latrine to the households.

MATERIALS AND METHODS

Study Design

It was an observational descriptive study with cross-sectional design.

Study Setting

The study was conducted in a slum at Bagbazar, Kolkata which is the service area of Bagbazar Urban Health and Training Center (UHTC) and it is also the urban field practice area of the Department of Community Medicine, R. G. Kar Medical College and Hospital, Kolkata.

Study Period

The study was conducted from 1st April 2016 to 30th April 2016.

Study Population

All the households under the service area of Bagbazar UHTC. As per records available at Bagbazar UHTC, during the study period, there were total 450 households living at that area.

Sampling Technique

Simple random sampling without replacement.

Sample Size

Determination of sample size for estimating proportion with finite population correction, the formula was $n = Nz^2pq/\{d^2(N-1)+z^2pq\}$,[7] here n = sample size, N = total no of households living under the service area of Bagbazar UHTC, i.e., 450, z = 1.96 at 95% confidence level, $P = 76.7\%$ of slum households have access to improved/suitable quality source of drinking water and sanitation facility.[2] q = (1-p), and considering d = absolute precision/margin of error (5%). Using the formula and above values calculated sample size was 181. Considering non-response rate as 10%, the final sample size was 200 households. Each household was selected using random number table.

Study Technique

One adult member from each household was interviewed at their home using predesigned and pretested schedule after taking informed written consent.

Study Tool

A schedule was used for this study based on "Core questions on drinking-water and sanitation for Household surveys" developed jointly by World Health Organization and United Nations Children's Fund.[6]

Some Important Definition[6]

Improved/suitable quality/safe source of drinking water included - Piped water into dwelling, also called a household connection, is defined as a water service pipe connected with in-house plumbing to one or more taps (e.g., in the kitchen and bathroom), piped water to yard/plot, also called a yard connection, is defined as a piped water connection to a tap placed in the yard or plot outside the house, Public tap or standpipe is a public water point from which people can collect water, also known as a public fountain or public tap. Public standpipes can have one or more taps and are typically made of brickwork, masonry or concrete. Moreover, bottled water is considered an improved source of drinking-water only when there is a secondary source of improved water for other uses such as personal hygiene and cooking. Criteria for Sanitary Latrine:[8] A sanitary latrine is one which does not - pollute or contaminate soil, pollute or contaminate ground water, pollute or contaminate surface water, act as medium to fly breeding or access to flies and animals, require handling, produce odour and give ugly sight, Require huge amount of money and high technology.

Data Analysis

Statistical analysis was performed using Microsoft Excel 2016 software.

RESULTS

A total of 200 households were surveyed for this study. All of them had access to intermittent (fixed 4 times a day) piped water supply by Kolkata Municipal Corporation within an average of 20 m (Standard Error 8) from their household. Among the selected households, 188 (94%) were using that supplied piped water for drinking purpose. Packaged drinking water (20 l bottle) purchased from market were used for drinking purpose by 12 (6%) households. Distribution of the source of drinking water revealed that 32 (16%) households had the source of drinking water within their dwellings, 44 (22%) outside yard/plot and 112 (56%) households had the source within their yard/plot (Figure 1).

All households stored the drinking water in small plastic bottle (usually 0.5 l/1 l/2 l). Among the piped water user, 37 (20%) households were filtered and 28 (15%) households were boiled the water before drinking (Figure 2).

All 200 households were using the supplied piped water for cooking, bathing and washing purpose. Water was stored in open plastic or metal container for those purpose.

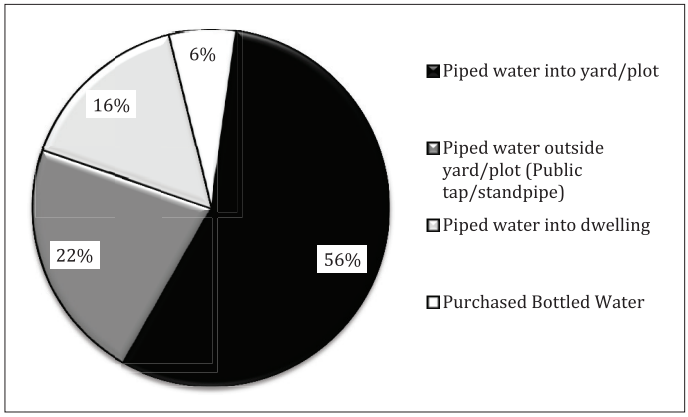

Figure 1: Distribution of households by source and location of drinking water (*n* = 200)

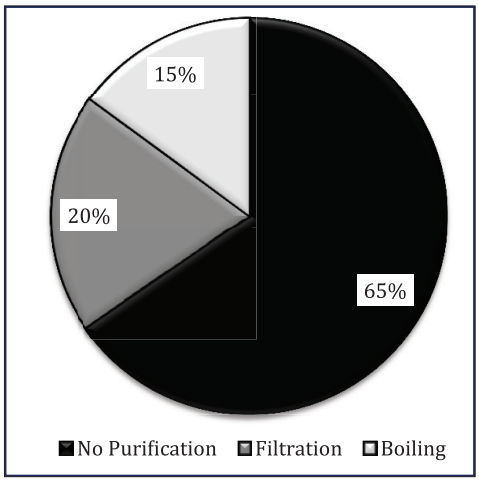

Figure 2: Distribution of households according to method of purification of the piped drinking water (*n* = 188)

All the latrines in that slum were sanitary type. There were two types of sanitary latrines according to mode of use, i.e,. personal latrine for single household and community latrine shared by more than one household. Among the selected 200 households, 176 (88%) households had to use shared sanitary latrine, i.e., community latrine situated at their household premises. Average 5 (Standard error 1.08) household had to share a community latrine. 16 (8%) households had personal sanitary latrine attached with their house. Remaining 8 (4%) households did not have any latrine facility which compelled them to go for open defecation (Table 1).

There were 42 households, those had children not yet able to use latrine. Among them, 16 (38%) households put the children's stool into the sanitary latrine, 14 (33%) households put it in to the drain, 9 (22%) households put it into the garbage cart/open municipal vat and remaining 3 (7%) households left it in the open places in streets or household premises (Table 2).

DISCUSSION

Census 2011 data show that, in India, overall 76.7%[2] of slum dwellers had accessed to piped drinking water, whereas

Table 1: Distribution of households according to sanitation facility (*n*=200)

Type	Number of households (%)
Shared sanitary latrine/Community Latrine	176 (88)
Sanitary latrine within dwelling	16 (8)
No latrine facility (open defecation)	8 (4)
Total	200 (100)

Table 2: Distribution of the households according to child excreta disposal (*n*=42)

Method	Number of households (%)
Put into sanitary latrine	16 (38)
Put into drain	14 (33)
Thrown into garbage cart/open municipal vat	9 (22)
Left in the open place	3 (7)
Total	42 (100)

in this slum 100% households had intermittent piped water supply for all household purpose. However, to achieve a national SLB water supply needs to be continuous 24 × 7 water supply system.[2] In this slum, 32 (16%) households had the source of drinking water within their dwellings, 44 (22%) outside yard/plot, and 112 (56%) households had the source within their yard/plot. Mean (Standard Error) distance between household and source of drinking water was 20 m.[8] Regarding sanitation facility in slum area, NFHS-III data showed that 47.2%[9] slum household had access to sanitary latrine facility in 2005-2006, but this study in 2016 showed a promising improvement in this figure, i.e., currently 96% household in this slum had access to sanitary latrine facility. Census 2011 data also show that open defecation among the slum dwellers in India was 18%,[2] whereas it was found to be 4% in this slum. This study was conducted only in one slum in Kolkata. A large cross-sectional study involving other slums in Kolkata would have been able to draw a generalized picture of safe drinking water supply and sanitation facilities.

CONCLUSION

All the households had access to safe drinking water, but the sanitation facility needs to be improved. Health education about excreta disposal method and its necessity is to be conveyed to them by proper Information Education Communication and Behavioral Change Communication method.

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