Water, Sanitation, and Hygiene (WASH) practices among residents of different slum settlements in a ward of Kolkata: A mixed-methods study

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Abstract:

BACKGROUND: Access to safe water, sanitation, and hygiene (WASH) is the most basic need for mankind. Poor WASH practices are associated with various waterborne diseases, especially in developing countries such as India. The aim of the study was to assess WASH practices among residents of different slum settlements in a ward of Kolkata, identify the factors associated with WASH practice, and explore the barriers faced by the families and municipal staff in providing adequate WASH services to the community.

MATERIALS AND METHODS: An observational study, cross-sectional in design with a convergent parallel mixed–methods approach, was conducted in different slum settlements in a ward of Kolkata. Quantitative data were collected by face-to-face interview, spot observation, and measuring the living area, door, and window spaces. Key informant interviews were conducted with the medical officer, ward vector-control coordinator, and municipal waste handlers, in addition to in-depth interviews with respondents who had unsatisfactory WASH practices. SPSS version 25.0 was used to analyze the quantitative data. Qualitative data were analyzed thematically using Atlas.ti 22.

RESULTS: The overall WASH practices were considered satisfactory in 58.8% of the households. Education of the respondents up to the secondary level, presence of overcrowding, and inadequate ventilation in the house had statistically significantly higher odds of unsatisfactory practice. Poor living conditions, difficulty in collecting and storing water, waterlogging, blocked sewage drains, common toilets for men and women, and lack of motivation were the primary obstacles identified by the residents.

CONCLUSION: Unsatisfactory WASH practices were observed among a high proportion of the slum population. Community engagement and education regarding WASH in communities is strongly recommended along with improvement of infrastructure and capacity building.

Keywords:

Drinking water, hygiene, sanitation, urban population

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Introduction

The World Health Organization (WHO) prioritizes water, sanitation, and hygiene (WASH) practices to be one of the most basic needs for universal development. One of the 2030 agendas called the WASH initiative and Goal 6 of the sustainable developmental goals (SDGs) was framed up with the aim "to ensure availability and sustainable management of water and sanitation for all" by 2030.

Goal 1 also includes a target for universal access to basic services.[1]

Looking closely at global figures, about 780 million people lack access to an improved water source, and nearly 2.5 billion people lack access to an improved sanitation facility.[2] It is also striking that less than 50% of the Indian population have access to safe drinking water.[3]

The literature on WASH reveals disturbing scenarios from the slums of India. Comprising almost 17% of India's urban population and 29.6% of the population in Kolkata Metropolitan city, the slum dwellers have little or no access to universal, equitable, and safe WASH services. Most urban poor households depend on communal or shared sanitation facilities.[4] The gap in access to safe WASH services in Indian slums is expected to linger on as the rate of growth in urban population is 2–3% per year, whereas the slum populations are increasing at an alarming rate (6–8% per year). Women are especially vulnerable as the lack of adequate and safe WASH affects their overall livelihood.[5]

India has taken a significant step in improving access to WASH by achieving the total elimination of open defecation. The Swachh Bharat Mission, the Jal Jeevan Mission, and WASH in Schools are some of the government's ongoing programs supported by the United Nations Children's Fund (UNICEF).

Since time immemorial, inadequate access to safe WASH practices has been associated with an increased risk of water-borne diseases. In low- and middle-income countries, such as India, diarrhea is attributed to 54–65% of all deaths due to inadequate access to safe drinking water (35%), poor sanitation (31%), and poor hygiene (12%). These deaths account for 829,000 fatalities annually and 49.8 million disability-adjusted life years.[6]

Kolkata is one of the most populous cities in India and has substantial slum settlements. These slums are characterized by overcrowding, unhygienic living conditions, shared water supply and community latrines, and inadequate sewerage. Although WASH has been assessed in many parts of India, there is a paucity of studies from Eastern India, especially Kolkata. Studies previously conducted in West Bengal mainly focused on hand hygiene. With this background, a mixed–methods study was conducted in different slum settlements of a ward in Kolkata with objectives to assess WASH practices among its residents, describe their housing conditions, identify the factors associated with WASH practice, and explore the barriers faced by the families and municipal staff in providing adequate WASH services to the community.

Materials and Methods

An observational study, cross-sectional in design with quantitative dominant convergent parallel type of mixed–methods approach (QUAN+qual), was conducted in different slum settlements in urban field practice area of a medical college in Kolkata over a period of 6 months (July to December 2022).

Study population and selection criteria
Quantitative strand: The sampling unit for the study was the households. To avoid repetition of responses, only one adult member from each household was taken as the respondent (usually the head of the family or any other available senior-most member). Individuals who refused to give informed written consent were excluded.

Qualitative strand: Households having unsatisfactory WASH scores, the medical officer of the ward urban primary health center, vector control coordinator, and municipal waste handlers were included.

Sample size
Quantitative strand: Taking the proportion (p) of poor WASH scores from a study by Chu *et al*.[7] in slums in Vellore, Tamil Nadu, as 65%, q = 1-p and relative error L as 10% sample size was calculated using Cochran's formula:

$$n = Z_{1-\alpha/2}{}^2 pq/(L)^2 = [(1.96)^2 \times 0.65 \times 0.35]/[(0.1 \times 0.65)^2] = 207$$

The final sample size was 228 households after adding a non-response of 10%.

Qualitative strand: Eight households, one medical officer, one vector control coordinator, and four waste handlers were interviewed until data saturation.

Sampling technique
Quantitative strand: A line list of 3,983 households, maintained at the Urban Primary Health Centre (UPHC), was obtained after permission from the medical officer. Then, the required number of households for the study were selected using simple random sampling technique without replacement with the help of health workers.

Qualitative strand: Criterion type of purposive sampling technique was adopted.

Study tools
Quantitative strand:
i. A pre-designed, pre-tested, and structured schedule consisting of
   a. Sociodemographic profile
   b. Housing conditions
   c. Questions on WASH practice (adopted from the core WHO/UNICEF Joint Monitoring Program

for Water Supply and Sanitation household survey questionnaire) included 12 questions on water, 11 questions on sanitation, and 9 questions on hygiene including menstrual hygiene.[8]

ii. Non-stretchable measuring tape.

The schedule was translated into the local regional languages (Bengali and Hindi) by one language expert and re-translated into English by another expert. It was then matched by another independent reviewer to assess consistency. The schedule was later pretested among 20 slum dwellers who were not included in the final sample.

Qualitative strand: Initially, semi-structured interview guides were prepared under the supervision of two professors from the subject of community medicine and one medical officer working in the State Public Health Cell, Swasthya Bhawan, Kolkata. After preparation, all questions were read out in front of the experts for face validity and for inputs regarding the addition or modification of questions. After a few suggested modifications, the guides for finalized for use.

Study technique
Quantitative strand: Door-to-door visit of the selected households was performed. At first, the head of the family was approached. If unavailable, then a senior member giving consent was interviewed. Data were collected using face-to-face interviews, observing the housing and environmental conditions, and measuring the living area, door, and window spaces.

Quantitative strand: In-depth interviews were conducted with the residents who had poor WASH scores at their respective homes, whereas the key informant interviews were held at the Urban Health and Training Center (UHTC). Each interview lasted for about 20–25 min.

Study variables
Quantitative strand:

Dependent variable: WASH practices
Independent variables:
i. Sociodemographic characteristics: age, gender, religion, caste, level of education, occupation, socio-economic status as per the Modified BG Prasad Scale updated 2022[9] and substance addiction.
ii. Housing conditions: Type of house, overcrowding, ventilation, cross-ventilation, natural lighting, location of kitchen and type of cooking fuel used.

Qualitative strand: Barriers and enablers pertinent to WASH services in the area.

Operational definition:
Unsatisfactory WASH practice: Households scoring less than the median of the total WASH score.

Data analysis
Quantitative data were analyzed using Statistical Package for the Social Sciences (SPSS for Windows, version 25.0, SPSS Inc., Chicago, USA). Descriptive statistical measures were used to summarize the data. Responses on WASH practices were scored with the total score ranging from 0 to 40. The overall WASH practices were categorized as satisfactory or unsatisfactory, taking the median as the cut-off. Bivariate analysis was performed to ascertain the relationship between the unsatisfactory WASH practices and the independent variables. All independent variables having $P < 0.20$ in the univariate regression analysis were considered biologically plausible to be included in the multivariable logistic regression model. Data were checked for multicollinearity (variance inflation factor <10), and variables with $P < 0.05$ were considered statistically significant predictors in the final model.

Qualitative data were analyzed thematically using Atlas. ti 22. Codes and themes generated were represented in a tabular form and with the help of a mind map.

Ethical considerations
Institutional Ethics Committee permission was obtained before starting the study (letter no: Institute name/IEC/2022/516 dated 14.11.2022). Informed written consent was obtained before each interview, and all ethical principles were strictly adhered to throughout the course of the study.

Results

Out of the 228 study population from selected households, 109 (47.8%) of the study population belonged to the age group of 38 to 57 years, 140 (61.4%) were females and 223 (97.8%) belonged to the Hindu community. A little more than three-fourths, 180 (78.9%) were from the general caste, and 23.7% were educated up to middle school. About 46.1% were homemakers and 59 (25.9%) were involved in some kind of business as far as the occupation was concerned. Also, 97 (42.5%) of the study population belonged to the middle class as per the Modified BG Prasad Scale 2022.

On assessment of housing conditions, nearly half of the study population were residing in mixed-type houses (112, 49.1%) with only one room per family (143, 62.7%). Overcrowding was present in 144 (63.2%) of the households, 129 (56.6%) were well-ventilated, and cross-ventilation was present only in 87 (38.2%) households. A little over one-fourth of the households (61,26.8%) had adequate natural lighting.

Also, 141 (68.1%) of the study population had their kitchen in the verandah.

Most households obtained their drinking water and water for other purposes from corporation water supply (226, 99.1%) which was intermittent in timings and was located within 10 m from their dwelling (116, 50.9%). No pre-treatment was given to drinking water to make it safer to consume in 161 (70.6%) families. Water storage containers were cleaned at least once weekly in 162 (71.1%) households. Also, 191 (83.8%) respondents reported that the water supplied was acceptable to them [Table 1].

A little more than three-fourths used community latrines (178, 78.1%), shared by other households (193, 84.6%) with manual flushing facilities (214, 93.9%). A water source was present in only 38 (16.7%) toilets.

Table 1: Distribution of households according to information on practice related to water (*n*=228)

Information on practice related to water	*n* (%)
Main source of water for drinking and other purposes	
Piped water/corporation tap water	226 (99.1)
Tube well	2 (0.9)
Location of the water source	
Within dwelling	69 (30.3)
<10 m	116 (50.9)
10–20 m	30 (13.2)
>20 m	13 (5.7)
Drinking water stored in	
Drinking bottles/covered containers	226 (99.1)
Uncovered containers	2 (0.9)
Drinking water made safer	
Boil	40 (17.5)
Strain through cloth	14 (6.1)
Water filter	13 (5.7)
Nothing done	161 (70.6)
Method of drawing drinking water	
Safe	202 (88.6)
Unsafe	26 (11.4)
Water for other purposes stored in	
Covered containers	165 (72.4)
Uncovered containers	63 (27.6)
Method of drawing water for cooking	
Safe	205 (89.9)
Unsafe	23 (10.1)
Frequency of cleaning storage container	
At least once a week	162 (71.1)
Once in 2 weeks	49 (21.5)
Once in 3–4 weeks	17 (7.5)
Mode of water supply (main source)	
Continuous	2 (0.9)
Intermittent	226 (99.1)
Water acceptability	
Yes, acceptable	191 (83.8)
No, unpleasant taste/color/smell	37 (16.2)

A mere 24 (10.5%) respondents reported that the toilets were cleaned daily. The majority of the households disposed of their solid wastes in designated waste disposal areas and 156 (68.4%) disposed of their household wastewater in open drains. Out of 55 households that had children under 5 years of age, excreta disposal into latrines was practiced by 8 (14.5%) families, and in 23 (41.8%) dwellings, the children used community latrines. The excreta was thrown indiscriminately into the drain in 12 (21.8%) households, whereas 11 (20.0%) disposed of it along with other solid waste [Table 2].

A dedicated handwashing facility was observed in only 33 (14.5%) dwellings, whereas more than half of the study population washed their hands in the open outside their houses (112, 52.2%). A bar or liquid soap was available in 192 (84.2%) handwashing facilities. Also, 171 (75%) of the study population responded that they always washed their hands with soap before eating and 200 (87.7%) always washed their hands with soap after using the toilet [Table 3].

Out of 140 women respondents, 44 had attained menopause. Amongst the others, 79 (82.3%) used sanitary pads during menstruation while the remaining preferred cloth. Also, 41 (42.7%) of the women disposed of their menstrual material along with other solid waste in wrapped condition.

The overall WASH practices were considered satisfactory in 134 (58.8%) households taking the median WASH score of 26.0 as the cut-off. Multivariable binary logistic regression was performed to find factors associated with unsatisfactory WASH practices. Male gender (AOR 2.57 [1.29–5.15]), education of the respondent up to the secondary level (AOR 4.42 [1.75–11.16]), the presence of overcrowding (AOR 3.81 [1.86–7.84]), and inadequate ventilation (AOR 6.69 [3.42–13.08]) had statistically significant higher odds of unsatisfactory practice. About 41.2% variability of the dependent variable (unsatisfactory WASH practices) was explained by Nagelkerke R^2 [Table 4].

Thematic analysis from in-depth interviews with the respondents is presented in Table 5.

The key informant interviews gave insight into the barriers and needs of the service providers. K1 shared that *"the remuneration paid to the ground staff is very less, they do not have adequate logistics...still they work to the best of their capabilities. But sometimes they are absent."* He added, *"No activities are stressed upon to improve WASH here. There are other programs to look into."*

Table 2: Distribution of households according to information on practice related to sanitation (*n*=228)

Information on practice related to sanitation	n (%)
Type of toilet	
Sanitary latrine	178 (78.1)
Non sanitary latrine	50 (21.9)
Toilet located	
In own yard/plot/community premises	209 (91.7)
In own dwelling	19 (8.3)
Sharing of toilet	
Shared with other households	193 (84.6)
Used by the general public	18 (7.9)
Not shared	17 (7.5)
Flushing facility	
Manual	214 (93.9)
Cistern	14 (6.1)
Frequency of toilet cleaning	
Daily	24 (10.5)
Weekly	116 (50.9)
Once or twice a month/infrequent	88 (38.6)
Water source in the toilet	
Present	38 (16.7)
Not present	190 (83.3)
Privacy in the toilet	
Maintained	207 (90.8)
Not maintained	21 (9.2)
Rubbish disposal	
In the designated waste disposal area	224 (98.2)
Within the household yard or plot	4 (1.8)
Garbage disposal	
In the designated waste disposal area	223 (97.8)
Within the household yard or plot	5 (2.2)
Household water disposal	
Sink/drain connected to sewer	60 (26.3)
Sink/drain connected to an open drain or open ground	156 (68.4)
Disposed directly to open ground or a water body	12 (5.3)

Table 3: Distribution of the households according to information on practice related to Hygiene (*n*=228)

Information on practice related to hygiene	n (%)
Handwashing area	
Sink or tap in dwelling	33 (14.5)
Sink or tap in yard/plot or community	76 (33.3)
Open (No sink)	119 (52.2)
Water at hand washing pace	
Available	97 (42.5)
Not available	131 (57.5)
Availability of soap	
Not available	30 (13.2)
Bar or liquid soap	192 (84.2)
Detergent	6 (2.6)
Handwashing with soap before eating	
Always	171 (75.0)
Sometimes	52 (22.8)
Never	5 (2.2)
Handwashing with soap after using a toilet	
Always	200 (87.7)
Sometimes	23 (10.1)
Never	5 (2.2)
Bathing	
Daily	226 (99.1)
3-5 times a week	1 (0.4)
<3 times a week	1 (0.4)
Trim nails	
At least once in 2 weeks	137 (60.1)
Once a month	82 (36.0)
Once in 2 or 3 months	9 (3.9)

"…. handwashing facilities preferably WASH blocks to be established in this area" [Figure 1].

Thematic analysis of qualitative data helped in explaining reasons for the unsatisfactory practices to a large extent.

Discussion

The future of public health rests on continuous improvement of WASH practices. Safe WASH practices prevent the transmission of water-borne diseases and impede the incidence of such infections in the community.

The present study findings simulate the National Family Health Survey-5 (NFHS-5), according to which, 99% of families had access to improved sources of drinking water.[10] The source of water in this study was corporation tap water in 99.1% of the households, which also corroborated the findings of Wani *et al.*[11] among slum dwellers in Mumbai and Shukla *et al.*[12] in slums of the Anand district, Gujarat. It was greater than the findings by Chu *et al.* in a Tamil Nadu study, where 92.4% of the study population used municipal water supply.[7] Kanungo *et al.*,[13] in their prospective study on WASH in slums of Kolkata, mentioned that over 90%

K2 mentioned that *"…during rainy season, there is waterlogging and sanitation-related activities become nearly impossible. The focus shifts to vector control."*

K3 and K4 opined that *"…. the responsibility of maintaining good environmental sanitation and hygiene lies mainly with the residents and that they should keep the surroundings clean and not throw waste here and there. They should themselves be interested and motivated."* K5 continued *"…Children should use the toilet only."*

K6 mentioned that they should be provided with *"proper uniform, shoes, and gloves"* as sometimes they even come in contact with biomedical waste.

About menstrual hygiene scheme-related activities, K1 shared that *"…at present, there is no menstrual hygiene scheme going on; women struggle to meet their WASH requirements because they do not have their own separate sanitation facilities."* He also humbly requested for

Table 4: Multivariable binary logistic regression showing predictors of unsatisfactory WASH practices (*n*=228)

Socio-demographic and housing variables	Unsatisfactory WASH practices (*n*)	Crude OR (95% CI)	Adjusted OR (95% CI)	*P*
Education of respondent				
Up to secondary	82	2.71 (1.33-5.52)	3.81 (1.56-9.34)	0.003
Higher secondary and above	12	Ref	Ref	
Socioeconomic status				
Upper (I)	1	0.10 (0.01-1.28)	0.12 (0.01-2.34)	0.162
Upper middle (II)	11	0.18 (0.05-0.68)	0.51 (0.10-2.60)	0.423
Middle (III)	34	0.17 (0.05-0.55)	0.24 (0.06-0.98)	0.047
Lower middle (IV)	35	0.24 (0.07-0.79)	0.27 (0.07-1.12)	0.071
Lower (V)	13	Ref	Ref	
Overcrowding				
Present	77	4.53 (2.42-8.46)	3.94 (1.95-7.98)	*P*<0.001
Absent	17	Ref	Ref	
Ventilation				
Inadequate	65	6.59 (3.67-11.84)	5.99 (3.14-11.43)	*P*<0.001
Adequate	29	Ref	Ref	

Model fit: Coefficient of determination (Nagelkerke R square) = 0.381, Omnibus test of Model coefficients: *P*<0.001 and Hosmer–Lemeshow test: *P*=0.575

Table 5: Thematic analysis from in-depth interviews with the residents (*n*=8)

Themes	Codes	Verbatims
Living conditions	Housing	"Our house is in Bihar, we stay here for work."
		"Houses in basti are like these only."
	Unhygienic	"There are 6 people in my one room house so living conditions are not hygienic."
	Poverty	"Everywhere else is very costly."
		"My son is in loading-unloading work in wholesale …He gets work only few times in a year."
Water-related issues	Collection and storage	"…one tap for over 30 people."
		"…mainly store for drinking and cooking and some water is stored for toilet purpose."
	Drinking water	"We directly consume water as supplied."
		"Boiled water is given only to children."
	Water supply	"In summers it is a problem as usage is more."
		"In the evening water comes for a very short time."
Sanitation-related issues	Latrine	"Drainage outlet gets blocked most of the time."
		"There should be a cistern and tap water connection."
		"Separate toilets for ladies and gents should be there."
	Waste collection	"Everyone should throw waste in one common area only."
		"Staff don't come every day to collect waste. Many times they are absent."
Hygiene-related issues	Handwashing	"…impossible for houses to have sink."
		"…know that it is important to wash hands before eating. We are doing this more often after COVID."
	Menstrual hygiene	"Use sanitary napkins only…some use cloth as it can be reused."
Littering issue	Street animals	"There are many street dogs and cats who litter everywhere."
	Pets	"Some animals are pets and they defecate in the open. They should be fined."

of the households had access to piped water supply. However, this contrasted with Berhampur, Odisha, and Jhansi, Uttar Pradesh, where 62.3% and 42% of the study participants reported public hand pumps as their main water source as reported by Tripathy *et al*.[14] and Agarwal *et al.*,[15] respectively.

In the current study, about 70.6% of the study population did not adopt any method to make water safer for consumption, whereas 17.5% practiced boiling water and 5.7% used water filters. In the slums of Mumbai, 63.3% of the residents boiled their water before drinking, whereas 20% practiced the use of cloth or other straining material.[11] In the longitudinal study by Kanungo *et al*.[13] in Kolkata, about 9.65% in the second round reported using some form of home-based treatment for purifying drinking water, water filters being the commonest (6.81%), followed by boiling (1.66%). According to Agarwal *et al*.[15] about 45% of the study participants in Jhansi consumed the water directly without any pre-treatment.

The method of drawing drinking water was observed to be safe among 88.6% of the study population. This contrasted with Mumbai slums, wherein nearly three-fourths of the households were dipping glass directly into the storage container, which is unsafe (72.7%).[11]
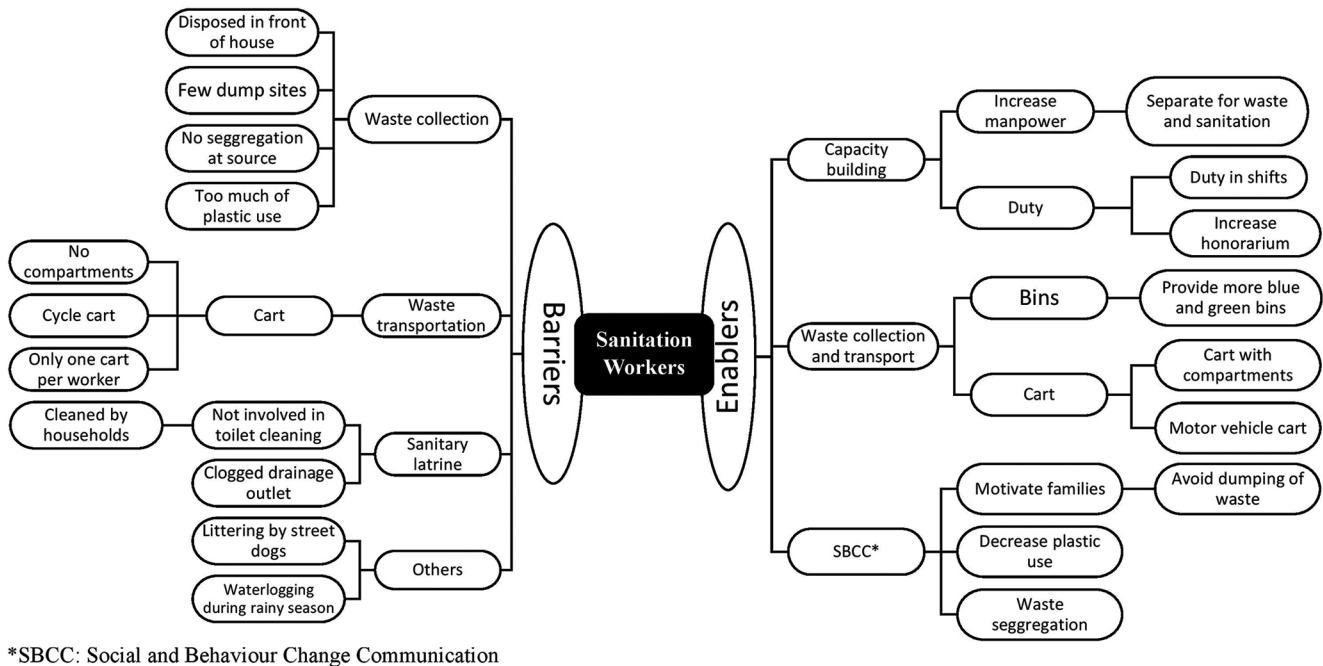
*SBCC: Social and Behaviour Change Communication

Figure 1: Mind map showing barriers and enablers to WASH services in the area as reported by the sanitation workers

Concerning sanitation, all study populations in the present study had access to toilet facilities with 78.1% using community sanitary latrines. According to the report published by the Government of India, 66% of households in urban slums had latrines within their premises. Amongst those who do not have toilet facilities at home, 44.3% used public toilets, whereas 55.7% defecated in the open.[16] This was also in contrast to the slums of Vellore, Tamil Nadu, where only 30.9% of the study population had toilets and 83.3% of them used the facility. A notably high proportion of the respondents practiced open defecation (74.2%).[8]

In a Gujarat study, 51.4% had latrines at home, 12.7% used public toilets, and more than one-third defecated in the open (35.9%).[12] Over 95% of the households had access to some form of latrine in a Kolkata study with most of the sanitation facilities being shared between six households on average. About 12.04% of the toilets were accessible for use to the general public in the first round, which was greater than the current study (7.9%).[13] In the Berhampur study, a latrine facility was present in 73.5% of the houses. However, only 66.8% of the study population used them and the remaining 33.2% practiced open defecation.[14] The toilet facility was shared among 30.5% of households and 11.5% of households practiced open defecation according to Undavalli *et al.*[17] in the slums of Gannavaram, Andhra Pradesh.

About 56.3% of the study population in Maharashtra, 49.2% in Gujarat, and 38% in Uttar Pradesh study washed their hands with soap and water before eating, which was higher in the present study (75%).[11,12,15] In Odisha slums,

handwashing was practiced by 86.5% of respondents before and after their meals.[14]

In Mumbai, different methods for excreta disposal of children under 5 years of age were diaper (12.7%), pants (16.4%), paper (40%), on the floor (16.4%), and mixed practices (10.9%). For the final disposal, almost half (54.6%) of households disposed the feces along with household garbage, 21.3% used household drains, and the remaining preferred a combination of both methods. Only one household disposed of the child's excreta in the community latrine, which is the WHO-approved method.[11] Excreta disposal practices of children under 5 years of age were better in the present study as in nearly 42% of the families, the child used a community latrine and 14.5% of the households collected the excreta and disposed it into the latrine.

The hardships faced by slum residents of Bangladesh and their needs reported by Khan in an explorative qualitative study were analogous to the present study. Sustainable drinking water with a special emphasis on separate sanitation facilities for women and men was mentioned by him. Sachdeva also wrote about similar barriers faced by residents in Shimla.[18,19]

Limitation
Though the sampling unit was a household, only one member was interviewed to avoid repetition. However, in doing so, some key findings/practices (good or bad) of the other members might have been missed. Findings from this study showed that the level of education is a

significant factor. As the members of a single household may belong to different "levels of education" groups, their responses to the questions may also vary. This could have been explored in more suitable ways. The inclusion of a component of water quality analysis in the study would have been better. The gap between knowledge and practice of WASH practices among the study population was not assessed. Also, a little more meaningful triangulation of data and meta-inference would have added quality to the study.

Conclusion

A substantial proportion of the slum dwellers did not have satisfactory WASH practices. The main barriers found from the residents were poor living conditions, water collection and storage difficulty, waterlogging, blocked sewage drains, common toilets for both men and women, littering issues, and lack of motivation. Despite the political commitment and introduction of the Swachh Bharat Abhiyan and the efforts toward the achievement of the SDGs, a gap in the implementation and utilization of services persists, which can be reduced by proper infrastructure improvement, economic schemes, and behavior change communication strategies. Community engagement and education regarding WASH practices in communities are strongly recommended for the same.

Ethical approval from authors
All co-authors have seen and approved the final version of the manuscript and it is not currently under active consideration for publication elsewhere, has not been accepted for publication, nor has it been published/reported earlier, in full or in part. All authors have been personally and actively involved in substantive work leading to the report and will hold themselves jointly and individually responsible for its content.

Conflicts of interest
There are no conflicts of interest.

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