

# Understanding water, sanitation, and hygiene situation through participatory appraisal in urban slum of Dhaka City

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## ABSTRACT

Water, sanitation, and hygiene (WASH) is an imperative issue for infection prevention, and disease control. To understand the existing resources, and WASH situation, a participatory appraisal was conducted at Bauniabdh slum, Mirpur, Dhaka, Bangladesh from February-March 2022, and June-July 2023. *Social mapping, transect walk, and informal discussion* were conducted to identify available resources in the community for maintaining WASH, and also understand the challenges related to these; explore the surrounding cleanliness, waste disposal, and drainage system. Most of the households (HHs) fetched water from the nearest supply stations. Few families did not treat drinking water for purification; the gas flow was not sufficient to boil drinking water most of the time. A number of HHs did not clean their water reservoirs regularly, resulting in odor in supplied water. Regular garbage removal system was absent. WASH being a communal issue in slum setting, community engagement for WASH management is strongly recommended.

**Keywords:** participatory appraisal, Bangladesh, water, sanitation, hygiene

## INTRODUCTION

Safe drinking water, sanitation, and hygiene (WASH) are vital for health and well-being of human [1]. However, poor WASH condition accounts for more than one million diarrheal deaths every year and constrain effective prevention and management of other diseases including malnutrition [1]. Evidence shows that integration of nutrition-sensitive interventions as WASH with nutrition-specific intervention is required for optimal nutrition [2]. The World Health Organization has also stated the substantial impact of WASH on nutrition, and its influential impact on better health outcomes of individuals [3].

WASH is considered an imperative issue for infection prevention, and control of diseases, particularly in a slum setting [4]. Secure WASH is needed to promote human development; on the other hand, poor WASH has detrimental effect on children's health, maternal and reproductive health outcomes, including nutrition [5-7]. While most of the population in slum areas in Bangladesh has access to basic drinking water, the quality of water is compromised with bacteriological contamination resulting from poor WASH practices. There is a lack of platform to implement sustainable WASH services in slums, particularly for children and mothers.

Poor WASH practices and unhygienic home environments are primarily responsible for environmental enteric dysfunction (EED) in slums. It is, therefore, imperative to put emphasis on environmental conditions as well as WASH behaviors in order to avert the adverse consequences of EED and improve nutritional status among slum-dwelling children, adolescents and adults [8, 9].

Participatory appraisal (PA) has been documented as a powerful means of involving community in identification and analysis of problems, planning, and implementation of programs. icddr,b, an international public health research organization based in Dhaka, Bangladesh, has initiated a research project, at Bauniabdh, Mirpur, Dhaka with the objective to establish an evidence based sustainable model for optimizing pregnancy weight gain, increasing dietary diversity of adolescent girls, and ensuring proper physical growth of under 2 children, and improve the overall WASH situation of the community. To understand the existing resource, and situation related to WASH in a slum setting, a PA was conducted with the community people residing at Bauniabdh slum, Mirpur, Dhaka, Bangladesh. Findings from PA is expected to generate information in understanding the context and reasons to various issues regarding WASH situation, and to guide in planning interventions or strategies for further improvement.

**Table 1.** The objectives of applying different methods under the PA

Method	Objective
<i>Social mapping</i>	The aim of <i>social mapping</i> was to understand existing resources and conditions of WASH at the community level. <i>Social mapping</i> was done by the research team along with slum community people who knew well about the different resource of their locality and existing WASH situation, and maps were drawn based on this.
<i>Transect walk</i>	The aim of <i>transect walk</i> was to observe the WASH situations at the community level. During data collection, the research team walked around the slum area and found some issues which indicated unhealthy surroundings; various problems were found while the team came across the unclean surroundings, open drainage, and open waste disposal system.
<i>Informal discussion</i>	The aim of <i>informal discussion</i> was to get clarity of the findings collected from different sources (i.e., observation during <i>transect walk</i> ). It was held at the community level to understand their thoughts and current situation regarding WASH. Three <i>informal discussion</i> sessions with 40 people were arranged in three different blocks of the community; each session lasted around 45 minutes; they expressed their views on challenges they face to get pure drinking water and to proper sanitation.

## MATERIALS AND METHODS

### Design and Duration

PA was conducted as part of a larger study which was a quasi-experimental study. PA was carried out in two phases: February 2022 to March 2022 and June 2023 to July 2023.

### Study Setting

PA was done at Baunibadh slum in the Mirpur area belonging to Dhaka North City Corporation. This slum area is located in the greater Mirpur area, one of the 21 administrative units of the nation's capital, Dhaka. This slum is inhabited by poor and lower middle-class families, and their residential and sanitary conditions are typical of any congested urban settlement. Bauniabadh slum has five blocks, each block has around 22 lines or small alleys and each line has an average of 2000 households (HHs) accommodating a total number of 11000 HHs and more than 100 thousand people. The population attributes of this slum are typical of any slum with poverty. Five blocks were selected from this area for PA to collect data regarding WASH situations and community environment. Three blocks from this area belonged to the intervention area of the main quasi-experimental study, which were randomly selected beforehand and the other two served as control.

### Data Collection

A research team consisted of four members who collected data were experienced in qualitative data collection methods and had an academic background in social science. During this PA, *social mapping*, *transect walk*, and *informal discussion* were conducted. Community people was invited to attend the *social mapping* and *informal discussion*. During the invitation, the research team were informed about some of the potential participants who were involved in different non-government organizations (NGO) activity working in their locality. The research team invited them as well at their convenient time. The objectives of applying different methods under the PA as presented in **Table 1**.

### Data Analysis

We performed a content analysis of the textual data. Research staff with an academic background in social science and experience in qualitative research were involved in the data analysis process with the guidance of the investigators. Immediately after data collection, the research team prepared their impression notes on the event once it is done, exchanged

their views on the key findings and methodological issues, and prepared the observational report. After contextualizing the data, they identified condensed meaning units from the textual data; the codes were categorized and interpreted under different themes.

### Ethics Approval and Consent to Participate

The study was approved by the institutional review board of icddr,b. Informed written consent was obtained from the participants. At the beginning of each communication, the enumerator informed the participants about the purpose of the study. The participants were also informed about their voluntary participation and were assured of the maintenance of the confidentiality of the information provided. Names and identifiable information of the participants were not used while dealing with the data.

## RESULTS

### Source of Water

Our *informal discussion* revealed that people of Bauniabadh slum area get Dhaka Water Supply and Sewerage Authority (WASA) supply water from the nearest two supply stations. During the mapping of WASH resources in the community, participants indicated that the WASA supplied them with water from a nearby water pump at a cost of BDT 15 (\$ 0.17) per 1,000 liter, which they stored in their water reservoirs at the HH or compound level (a group of housing units shared a single water reservoir). However, in some areas where there were no water reservoirs, the HH members fetched water from other HHs that had water reservoirs.

### Purification of Water

Most of the participants said that they used boiled water for drinking. We found some of the families drink supply water directly from the tap/tubewell without any type of purification. Gas supply also existed in the area, but the flow of gas was not sufficient most of the time. They suffered to get water boiled and few were reluctant to apply other methods for purification; though some mentioned of applying filtration method to purify drinking water. A few HHs collect drinking water from water supply station (ATM water booth) at a minimum cost, and a few reported to drink water from commercially available jar, and also reported using tablets for chlorinating water.

## Water Reservoir

Many HHs did not clean water reservoir regularly, they got bad smell from supply water. In a discussion with the participants, it was revealed that when the participants cleaned the reservoirs, they found clay and insects that came floating with the water. During our observation, we found cockroaches in the reservoirs. Water, according to some of the participants, can sometimes emit a foul odor. They also stated that the foul odor was not always caused by the directly supplied water but could also be caused by an unclean water reservoir.

## Drainage System

While mapping the drainage system, the participants indicated straight drains in different blocks of the areas. The drains ranged in depth from 1.5 to 2 feet and were about 2 feet wide. The liquid waste of the HHs were disposed off through pipes connected to these drains, which were connected to Dhaka's north city corporation's large drainage system. Due to inappropriate depth, rainwater and wastage get clogged inside the drain. During the *transect walk*, it was found that solid wastes of the HHs were also disposed off in these drains in few blocks by the residents, blocking the usual water flow. There were no lids or broken lids over the drains in a number of places.

Residents cleaned the drains in front of their houses by themselves. There are closed drains and open drains as well. Water and fecal matter kept spilling from the open drains. The city corporation cleaned the drains twice/thrice a year, but the waste remained there for a long time. The drains have been damaged in a few places, but no initiatives were taken for repairing.

## Household Wastes

It was observed that HH liquid waste and fecal wastes from latrines were also disposed off in these drains somewhere in the slums. When a drain became clogged due to solid waste accumulation, the adult members of the HH cleaned the waste but left the dirt piles beside the drain. The city corporation workers who were assigned to collect daily HH wastes did not take the piles of dirt, and as a result, the dirt was washed back into the drain due to rain or pedestrians walking through the area. As a result, they lost interest in cleaning the drain on their own as they mentioned.

## Waste Disposal

The HH waste disposal system also found irregular in the area. More than ten thousand HH living in the area, but daily garbage extraction is scanty. They also disposed off HH waste in the pond, as we observed.

## Sanitation Facilities

Most of the houses/compounds have three families sharing one toilet. A number of users, and poor maintenance made the toilet dirty. Sewerage lines usually opens at the drains (without slab) creating huge waste and bad odor. Some of the residents of the HHs near the pond used latrines provided by an international NGO. They installed a latrine for each of the fifty-one HHs, but due to lack of maintenance, the latrines

were found to be unusable. So, the HHs near the pond used hanging latrines and disposed off the feces in the pond.

## Livestock Issues and Cooking Arrangements

In a number of places, feces of the livestock was scattered, children were playing in close proximity. Poultry/duck were seen to eat the wastage from open drains. The HHs commonly had cooking arrangements in the corridor. Due to gas unavailability, they made additional arrangements for cooking in front of their houses, right above or beside the drain.

## Challenges of Access to Safe Water

As there was scarcity of gas supply, boiling water becomes a bit challenging. Also, unavailability of cards for the ATM water supply booth, a number of families are lagging behind to get water from that source. The local people have mentioned that the line water is of good quality, but it gets polluted as holes are being made to permit illegal lines. When the water line connection near sewerage drain is not connected properly, the polluted sewage water gets mixed with the fresh water.

## Changes Observed

A number of families from Kolabagan area rehabilitated at the slum resettlement; so huge areas of Kolabagan were vacant at the time of data collection. More families were taking the service from ATM water booth (especially in B block).

## DISCUSSION

Evidence suggests that safe drinking-water or sanitation (i.e., regulated piped water or connections to sewers) with waste-water treatment can significantly improve health by reducing deaths due to diarrheal illnesses [1]. In addition to health impacts, access to sustainable WASH facilities is an essential element of quality universal health coverage and is cost-effective [1]. Connecting WASH to programs focusing nutrition reportedly enabled access to resources and demonstrated fundamental role of WASH in increasing sustainable impacts of the program and strengthening their resilience [1].

This PA done in an urban slum setting generated some noteworthy findings on WASH practices of the people residing over that place. Most of the HHs in the community fetched/collected water from the nearest two supply stations maintained by the Dhaka water supply and sewerage authority. They reported that the gas flow was not sufficient in their burners to boil their drinking water most of the time; also, few of the families were reluctant to apply other methods to treat their drinking water. A study done in west Bengal reported public taps as the primary source of drinking water for the majority of the study participants [10]. Another study mentioned filtration becoming progressively popular for purifying dirty water as being more practical and effective [11], which our participating families applied to some extent.

It is backed up by literature, that with the rapid growth of urban population, provision of safe water and basic sanitation has become much challenging especially in slums [10]. Studies reported shared latrine use [12, 13], which was also a common scenario reported in our current study. In our study, a

considerable number of HHs did not clean their water reservoirs regularly, which created an odor in the supplied water. Traditional methods for safe water provision with central treatment and structure have been reported to fall short into keeping pace with rapidly growing demand of expanding urban and peri-urban slums areas [14]. More than ten thousand HHs are living in the area producing a huge amount of garbage every day, but regular garbage removal system was found to be absent at times. Improper and inadequate garbage collection system has been reported by other studies done in urban slum areas [15]. The collected waste is dumped by the residents on the streets, open drains or open water bodies particularly in slum areas where and whenever the collection service is dysfunctional [16].

Few HHs collected drinking water from automated water dispensing machines at a low cost as reported in this current study. A study conducted at different areas of Dhaka city reported that slum residents are willing to contribute a higher share of their income to the development of urban water management [17]. In low- and middle-income countries, a common component of WASH interventions is the goal of empowerment of beneficiaries, particularly poor HHs [4].

Implementing combined WASH interventions has ultimate gain in improving nutritional status of children in particular [6]. The sustainable development goals (SDGs) offer prospects to support and strengthen the participation of local communities in improving water and sanitation management, and to improve health by increasing the availability and use of WASH services [1, 18]. Beyond the WASH oriented goal 6, the SDGs highlight the importance of WASH to the inter-sectoral collaboration required to achieve SDG goals across other SDGs. Achievement of other SDGs, including goals on health, cannot be met without meaningful progress on goal related to WASH [1]. This study applied PA method that assisted in getting an impression of existing WASH situation at community level in the context of an urban slum. However, the study was conducted at a time when the rate of COVID-19 infection was slowing in Bangladesh and so, the findings from this study might have some reflections of the pandemic situations.

## CONCLUSIONS

Findings from this study indicated that WASH was not an individual, rather a communal issue in the sprawling slum setting. Therefore, as part of intervention activities, we suggested incorporating community sensitization meetings for WASH management along with the below recommendations:

- Building social awareness: A large number of population living in this slum area and huge amount of garbage produce every day. Unplanned management and collection of waste creates unbearable situations which is also harmful for public health.
- Community engagement: It is very important to engage community people to improve the situation. Many problems are not solved because of lack of collective effort they said.

- Improve sewage system: In Bauniabadh many of the drains have broken down and most of the drains are open. Many of them throw HH waste into the drain and water flow get interrupted. Daily waste extraction needs to be improved.

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**Data sharing statement:** Data supporting the findings and conclusions are available upon request from corresponding author.

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