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Mobile Toilet and Fecal Sludge Management in Dhaka City: User Perspectives and People's Perception

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Abstract

The study on mobile toilet explores user's perspectives, attitude, and issues of fecal sludge management. Several data collection tools (participatory rural appraisal) were applied for this study. Individual interview, key informant's interview, focus group discussion, and case study were conducted in collecting primary information on above-mentioned issues. The concept of the mobile toilet is very new in Bangladesh. Only few mobile toilets are available in Dhaka city. Two types of mobile toilets exist in Bangladesh. Fixed types on location basis and another one is mobile and event-based. Floating and working peoples are using it on the basis of emergency. Eventually, travelers are used it during unusual period (urgency). Several facilities provided by mobile toilet operators including water, soap, toilet tissue, and bathroom sleeper. At night they provided light for safe use. Several problems were mentioned by the female users. These include shyness; peoples look at them, lack of cleanliness, warm condition inside the toilet, and few extents lacks of enough water. Women are very shaky in using the mobile toilet in open locations. The male respondents were also reported that bad smell, lack of toilet tissue, soap and water is the common problems. Operators have drawn several points on benefits of mobile toilet likely people can use it during urgency (diarrhea, dysentery, and emergency evacuation), low cost per use, friendly environment, and user-friendly. This opportunity reduces open evacuation in Dhaka city and minimizes environmental pollution. On the other hand, they opined that drug users used the mobile toilet for longer time taking drugs, few people steal toilet tissue, soap, and light too. Usually several bottles, cans passed away into the pan. Women also disposed their napkins inside the toilet during menstrual periods as opined by the operators. This leads to the congestion of sewerage connections, and it is too difficult to clean. Local extortionist (Racketeer) creates pressure to the operators for money. It was reported that there were three options for fecal sludge disposal. They usually connect the toilet to the existing sewerage line. If there are no sewage connections, they go tank disposal. They used separate containers and disposed in the canal or rivers. The third option is the pit options, but it is limited due to lack of enough space in the context of a city like mega Dhaka city. Thus, mobile toilet is providing multifaceted benefits by addressing emergency and reducing environmental (air and water) pollutions. Fecal sludge could be used for generation of renewable energy and organic fertilizers through biogas technology. Connections of electricity, water, and sewerage could be the solutions of the smooth operation of the mobile toilet and fecal sludge management.

Keywords: Attitude; Fecal Sludge; Floating People; Mobile Toilet; Urgency

1. Introduction

Bangladesh is a country having a huge population and facing severe problem regarding fecal sludge management, especially in city areas. Nowadays, peoples are using the mobile toilet in Dhaka city during an emergency. The urban area like mega Dhaka city has sanitation problem (Cotton et al., 2013). In rural areas, sanitary latrines are often considered as a luxury item. As they have a lack of awareness about health and environment, they did not get safe sanitation (UNICEF, 2010). The public toilets are very much

unhygienic and provide the unhealthy environment. In this condition, the invention of mobile toilet changes the situation a lot (Bartlett, 2003; Stanton and Clemens, 1987). Mobile toilets are extremely clean and have most of the basic services such as light, water supply, soaps, and toilet tissues (Amreen, 2015). Peoples are using mobile toilets during immediate needs. The people affect by many diseases due lack of improved sanitation system in the city. Spears (2013) reported that poor sanitation system is highly correlated with open defecation and population density. Lack of proper sanitation system can create many problems. Human excreta and fecal sludge are found in the street and common public places. This is also very much harmful to the environment and society (Lalander et al., 2013). In many rural areas, sanitary latrines are often considered as a luxury item. As they have a lack of awareness about health and environment, also the hygiene expenditure get low priority among them like soap. So they do not get safe sanitation (UNICEF, 2010). On the other hand, in urban areas are industrialized and are much more modern with vast opportunities, but the safe and hygienic sanitation is a major concern (Bartlett, 2003). In Dhaka city, there are 69 public toilets under the Dhaka City Corporation of which 47 are usable. However, these toilets are not well operated, unhealthy and not friendly for women and disable. In this connection, the invention of mobile toilet changes the situation. Open defecation pollutes the environment and causes diseases to the urban population. The under privilege people and working-class people barely get good sanitation system. Every day many people move and rum around Dhaka city for different tasks. These pedestrian people are unable to get proper sanitation; as the situations of most of the public toilets are terrible. Peoples are using mobile toilets at the immediate needs. These toilets are providing few immediate services including light, water supply, soaps, toilet tissue, and clean environment to the users. These toilets are very clean and have extra facilities. The floors are clean, and also these toilets have a secure hook (Amreen, 2015). Fecal sludge is a raw or partially digested either semi-solid or slurry comes from onsite sanitation technologies and results of excreta and water, with or without graywater. The sludge management systems of mobile toilets are very poor. Most of the septic tanks, dry latrines, bucket latrines, communal toilets, or other types are used to accumulate fecal sludge. Effective and sustainable fecal sludge management is a global need. This fecal sludge must be disposed safely. If these wastages are dumped into undefined places, this may cause environmental pollution and health risks. The poor sanitation system introduces diverse diseases which are very harmful to human health. Mobile toilets are portable in nature with basic facilities. Everyday huge number of people moves from one place to another. The sanitary system for these floating people is very poor, and the public toilets are not available everywhere. The main purpose of mobile toilets is to stop open defecation and reduce the environmental pollution. Mobile toilets are getting more popularity than public toilets due clean environment and facilities. Sludge management is not a new issue in Bangladesh. There is a gap in the management of fecal sludge. It is evident that fecal sludge management is crucial that must be addressed in the city. The common framework of fecal sludge management has been developed by Parkinson et al. (2013) mentioning collection, transportation, treatment, disposal, and use. Households and masons are involved in this stage, manual or mechanical transport engaged in transportation, local government is responsible for the treatment plant, and finally, local government and local farmers are responsible for end use or disposal. The environment is polluting in developing countries especially the center and peripheral area which causes many diseases. Lack of toilets and inadequate sanitation services causes high health risks, malnutrition, and death (Winblad and Simpson-Hebert, 2004). The population of cities is increasing which makes the situation worst. At this point, sustainable and affordable sanitation system is a big challenge (Langergraber and Muellegger, 2005). The sewerage system is very important, and it is affecting total sanitation system (UNICEF, 2010). There is two broad type sanitation practices: Flush and discharge and drop and store. Flush and discharge are regarded as the ideal technology over the periods. It is suitable for urban areas. Drop-and-store device is usually a pit toilet, which indefinite storage of human excreta. Drop and store is often regarded as an inferior, temporary solution compared with flush and discharge. In third world, sewage is nearly always discharges into the environment without treatment (Stenström, 2004). Flush and discharge system huge amount of urine and feces need to washed away, which need a large amount of pure water. All the wasted waters from bathroom, kitchen, streets, and industries are polluted which finally discharges without any treatment. This is very harmful for the environment. On the other hand, drop and store requires access to the ground, a reasonable amount of open space, soil that can be dug, a low groundwater level, and a site

that is never flooded. No water is required for flushing, the technology is simple and any material (paper, solid objects, or water) can be used for anal cleaning. The disadvantages are soil and groundwater contamination, bad odors, fly breeding, pit collapse, destabilization of nearby buildings, and risk for overflow during heavy rains (Esrey et al., 2001). Fixed place for defecation created a new challenge for fecal sludge management. Most of the cities have dumping sites or treatment plants for fecal sludge. As a result, sludge dump down in nearby open drains or water bodies. This practice ultimately regenerates the risks of fecal matter re-entering the domestic environment. Poorer groups who dwell in unsafe environments suffer the most from this but the risk remains also high for those who practice safe sanitation (Opel et al., 2012). There is a bias between sewerage and fecal sludge management system. It has become a major problem in both urban and rural areas. If the management system is not systematic then it will cause harm to the environment and as well as in human body (Ingallinella et al., 2002). Ecological sanitation is a role model for Bangladesh. The concept is to treat various type of waste including human waste. All the waste will be safely collected, treated, and reused to prevent pollution of water bodies and environment. Currently, various type of promotions are going on for Ecological sanitation (Langergraber and Muellegger, 2005). The pollution causes any type of disease which creates a miserable situation for the people to live a healthy life and also to raise their children. Most of the pollutions are caused because of lack of toilets and inadequate sanitation services. Ecological sanitation is also known as ecosan. It is a sustainable closed-loop system. In this system, the human waste is used. The waste is collected and processed until it is free from disease organisms. After processing, the excreta are used in agriculture (Esrey et al., 2001; Winblad and Simpson-Hebert, 2004). ARBAN is an NGO working with mobile toilet project in Dhaka city. ARBAN mentioned that 0.5 million floating people, 10 million rickshaw pullers, 10 million different occupational people, and 30 million different types of pedestrian people need public toilet every day in Dhaka city. However, the public toilets are inadequate in number. Public toilets do not have minimum facilities for proper sanitation facilities. The demands of mobile toilets are increasing as it provides better and hygienic sanitation. Mobile toilets or portable toilets are not just only famous in Bangladesh it is famous world widely. In India, there is a total industry of portable toilet which is well known as mobile toilet in Bangladesh. Event-based mobile toilets are very much useful in religion or non-religion festivals, campaign, party, political seminar, and gathering. Portable toilets are used in the place where many people meet together (Singh and Bisht, 2014). These toilets are very much useful for women and disable people. Portable toilets are small but they offer every basic need. The main objective of this study is to find out user's perception on the use of mobile toilet. The other associate objectives of this study were to:

- Find out the process of fecal sludge management derived from mobile toilet.
- Elicit neighbor's attitude toward the mobile toilet.
- Identify problems related to the mobile toilet and fecal sludge management.
- Recommend sustainable solutions for fecal sludge management.

2. Methodology

2.1. Research framework

The study was conducted over a period of 1 year. Both qualitative and quantitative method used in this research. Several tools were applied for primary data collection using participatory rural appraisal tools. Focus group discussion (FGD), key informant's interview, and semi-structured interviews were carried out. Three case studies were carried out with the selective participants.

2.2. Selection of area

Three sites (one from Banani Railway area, one from Katabon signal area, and one from Mirpur Technical area) were selected for this study. These sites were selected considering the number of users.

These three toilets are mostly used by many users everyday as these toilets are situated in most busy areas of Dhaka city. At first, location wise list of mobile toilets was collected from ARBAN office. Then, the information of the number of daily users was collected from ARBAN and Wateraid office. Depending on the percentage of users these three sites were selected.

2.3. Selection of respondents

A total of 60 people from mobile toilet users (50% male and 50% female) were selected and interviewed using semi-structured questionnaire covering several issues related to perception, mobile toilet facilities, environmental pollution, cost per use, bad smell, and fecal sludge management from three sites. The respondent was selected randomly from three sites of the study areas. The people who use the mobile toilet were the main respondent. Among them, 20 respondents were selected randomly where 50% were male and 50% were female.

2.4. Key informants interview

Five key informant's interviews (one person from water aid, one from ARBAN, and three operators from three sites) were interviewed for this study.

2.5. FGD

A total of six FGD (one male and one female group from each site) were carried out to ascertain this study. Two FGD (one with the male group and one with the female group) from each site were carried out using a guided checklist. Each FGD formed by six participants. In this case, the operator helps to find the FGD participants.

2.6. Secondary data

To support the research work, many secondary data were used. Books, articles, journals, leaflets, and magazines from ARBAN office; information from Wateraid Bangladesh, etc., were collected. Many internet sources were used to support the literature.

3. Results

This section broadly outlines demography and socioeconomic status of the respondents, user's perspectives and attitude toward mobile toilets, people's perception, and fecal sludge management system for mobile toilets.

3.1. Demography and socioeconomic background of the respondent

3.1.1. Age and gender of the respondent

It was mentioned that 50% respondents were male and 50% female among the respondents. In each site, there were 20 respondents (10 male and 10 female). From Table 1, it was observed that the lowest age group of the respondents is below 20 years and maximum age group is >35 years. The lowest frequency of the respondents is below the age group 20 years (3.33%), and the highest frequency is in between 25 and <30 age group (40%). It means that the maximum number of respondents is from working people (40%). The working people usually move to several places for their work. This group people, traveler, and floating people are using mobile toilets more.

3.1.2. Occupation of the respondents

The respondents were from the different type of occupational group. Most common occupation among the respondent was business. 26.67% respondents were from the different business background

(Table 2). The type of business includes grocery, nursery, fruit selling, garments product selling, hotel, and restaurant in the footpath and tea stall. Among the respondents, 16.6% were student, as students travel a lot and use the mobile toilet. In this case, mobile toilet plays a key role in their everyday lives. From the FGD, it was reported that the most mobile toilets users are Rickshaw/Van Puller, Day laborer, Beggars, and another occupational group. They were mentioned several reasons of mobile toilet use. As they mentioned that it is secure, clean, and located near to the working place, on the way to move and anywhere in common and suitable places. Apart from mobile toilet, there is no toilet for defecation during emergency near to their working place. They found that the mobile toilet is easily accessible to them and comfortable place with all facilities.

3.1.3. Income of the respondents

It is found that among the three sites; the minimum incomes of the respondents are below 5000 and maximum income is 30000. The maximum respondents (46.67%, n=28) were mentioned that their income range between more than BDT 5,000 and less or equal to BDT 10, 000. It was found that 30% respondents have had their income less than BDT 5,000 (Table 3). The income status represented the user's profile. They are floating people, working people, and traveler including Rickshaw/Van Puller, Day laborer, and Beggar. 46.67% respondents' income is between BDT 5000 and BDT10000 that is the highest frequency among the 60 respondents.

3.2. Users perspective

3.2.1. Types of mobile toilet

It was mentioned by the respondents that they have no in-depth knowledge on different types of the mobile toilet and its design. They learn from different people that there are basic two types of mobile toilets. One type is event-based, and another type is fixed on location. In case of event-based mobile toilet, the fecal sludge is collected using container (bucket or tank) and dispose of the sludge through sewerage line or dumped it near to water bodies. In case of fixed location mobile toilet, they make a connection with the sewerage line.

3.2.2. Distance of working place from their living place

Nearly 53.33% respondents were mentioned that their working places are far away from their living places. They need to use mobile toilet frequently. On the other hand, 46.67 respondents were reported that they are from nearby places, but they need to use mobile toilet during an emergency (Table 4). It was reported that there is no toilet in their working places. The floating people and travelers usually face problems due to lack of toilet during their movements. These mobile toilets have been provided the opportunity for emergency defecation with the related facilities. The respondents from FGD also were mentioned that the most of the working people face the problems regarding sanitation at their working places and during travel.

All of the respondent from each site use mobile toilet regularly. As mobile toilets are available in different important section in Dhaka city, they can use these toilets whenever they need. The mobile toilet provides all the basic equipment along with secure and safe sanitation system that is why people from different occupation use mobile toilet regularly. Even some of them also claim that these toilets are more clean then their household toilets.

3.2.3. Reasons for using the mobile toilet

Nearly 50% female and 33.33% male respondents were used the mobile toilet during emergency followed by no toilets in the working places, during traveling, low cost, and clean (Table 5). Actually, the numbers of outside toilets are inadequate, not clean and non-hygienic. The people do not feel comfortable to use it. This makes people discomfort in their workplace and during travel. Mobile

Table 1: Age of the respondents

Age	Katabon n=20		Technical n=20		Banani n=20		Total n=60		
	Male (n=10)	Female (n=10)	Male (n=10)	Female (n=30)	Male (n=30)	Female (n=10)	Male (n=30)	Female (n=30)	Total n=60
<20	1 (10)	0 (0)	0 (0)	0 (0)	0 (0)	1 (10)	1 (3.33)	1 (3.33)	2 (3.33)
20–<25	0 (0)	3 (30)	2 (20)	4 (40)	1 (10)	0 (0)	3 (10)	7 (23.33)	10 (16.67)
25–<30	5 (50)	3 (30)	4 (40)	3 (30)	4 (40)	5 (50)	13 (43.33)	11 (36.67)	24 (40)
30–<35	2 (20)	1 (10)	1 (10)	2 (20)	1 (10)	2 (20)	4 (13.33)	5 (16.67)	9 (15)
>35	2 (20)	3 (30)	3 (30)	1 (10)	4 (40)	2 (20)	9 (30)	6 (20)	15 (25)

Source: Field work 2017

Table 2: Occupation of the respondents

Occupation	Katabon n=20	Technical n=20	Banani n=20	Total n=60
Beggar	1 (5)	1 (5)	0 1 (0)	2 (3.33)
Business	8 (40)	3 (15)	5 (25)	16 (26.67)
Cleaner	0 (0)	0 (0)	1 (5)	1 (1.67)
Day laborer	0 (0)	2 (10)	0 (0)	2 (3.33)
Driver	0 (0)	1 (5)	0 (0)	1 (1.67)
Garments Worker	1 (5)	2 (10)	1 (5)	4 (6.67)
Maid servant	2 (10)	2 (10)	1 (5)	5 (8.33)
Operator	0 (0)	1 (5)	1 (5)	2 (3.33)
Rickshaw/van Puller	3 (15)	2 (10)	0 (0)	5 (8.33)
Student	4 (20)	2 (10)	4 (20)	10 (16.67)
Service	0 (0)	0 (0)	4 (20)	4 (6.67)
Tutor	0 (0)	3 (15)	1 (5)	4 (6.67)
Work in hotel	1 (10)	1 (5)	2 (10)	4 (6.67)

Source: Fieldwork 2017

Table 3: Income status of the respondents

Income	Respondent n=60	Total n=60
≤5000.00	18(30)	18 (30)
>5000 -≤10000.00	28	28(46.67)
≥10,000≤15000.00	12	12(20)
>15000.00	2	2(3.33)

Source: Field work 2017, figure in parenthesis indicates percent value

toilet has changed the situation and met the requirement of working people and travelers. The travelers come from a long distance including Chittagong, Panchagarh, Khulna, and Rajshahi. Here emergency defecation is the major concern of floating people as they move from one place to another place. They need toilet facilities during the working hour or traveling. Sometimes, they faced stomach problem or stuck in traffic during traveling and long working hours. 46.67% female and 23.33% male respondents were mentioned that they have no toilet facilities at their working places. They faced severe problems in the long working hours. Now they are using these mobile toilets to meet their emergency. Most of the street workers, cleaners, hotel stuffs faced defecation problems during their emergencies. As they work in the street, their employers also are incapable in providing them sanitation facilities.

In this connection, the invention of the mobile toilet has changed the situation and stop open defecation. The cost of mobile toilet per use is very low hence the poor people can get proper sanitation system with all basic facilities (water, soap, toilet tissue, light, secure hook, etc.). Mobile toilet is the best option during traveling for all the floating people. They are getting such facilities during traveling and working. The participants from FGD were mentioned that mobile toilet has created such opportunities for the working people and travelers especially for the women and aged person. They also mentioned that women and aged person drink less water before the start for work and travel to reduce the risk related to defecation in the past. These practice caused different harmful diseases including urinary and kidney diseases. Mobile toilets have reduced these problems from working and floating people. It also reduced pollution by eliminating or reducing open defecation. All respondents agreed that the environment of the mobile toilet is clean and safe that is the main reason for using the mobile toilet.

3.2.4. Perception on mobile toilet

Most of the respondents (56.67%) were mentioned that emergency defecation is possible through the mobile toilet. Mobile toilets provided diverse benefits to us. It reduces open defecation, reduces risks related to air and water pollution, diarrhea, and other air and water-borne diseases. It is easy to reach, and the cost is very minimal. Everyone has the access to mobile toilets. It remains open 24 h and people can use it at any time based on their requirements. It also reduces the mental stress and physical pressure. The user can use mobile toilet based on their needs to reduce pressure on public toilets. It needs an only tiny place and possible to shift from one place to another place. Eventually, the mobile toilet operators are getting benefits from this business. The operator is earning regular income by running mobile toilet business. It is also situated at the central point of the bus stand. All of the common public and crowded places have been brought under mobile toilet services. Mobile toilet is very much environment-friendly. Mobile toilet is the great solution for the floating people to have a good sanitation system outside (Table 6).

3.2.5. Mobile toilet versus public toilet

Nearly 73.33% respondents opined that mobile toilets are better than public toilets (Table 7). The availability of the facilities and the cleanliness of mobile toilets are much better than public toilets. Several opinions were made by the respondents in relation to mobile toilets and public toilets. The majority respondents were mentioned that mobile toilet is better than public toilet followed by same and little extent it is bad. People prefer mobile toilets more than public toilets.

3.2.6. Problems faced in using the mobile toilet

Several problems were identified by the respondents in using mobile toilets. They reported that ventilation is the major problems followed by bad smell, lack of soap, people staring, lack of water, space problem inside mobile toilets, and shyness (Table 8). The common problem is the absence of proper ventilation system in mobile toilets. Sometimes they did not get the soaps. The operators also reported that most of the people steal soap and toilet tissue paper during use. During the summer, MAWTS type toilet becomes so hot which makes it warmer and unusable. They also mentioned that the stairs of the mobile toilets are a huge problem for the handicap/disable and elderly people. Most of the female feel shy because people are starring that they are entering into the toilets. As the space of mobile toilet is narrow, so it is a great problem for the bulky people to use it freely**.**

Few people took drugs inside mobile toilets. After having good supervision; this problem is solved. Sometimes the sewerage line blocked due to the disposal of clothes or sanitary napkin inside the pipe. The operator fixed it by spending his/her own money. Usually, the operators buy water and store it into the container to use it for the mobile toilet. The mobile toilet is lacking from direct water supply connection; the users cannot be able to use more water due to lack of enough water. Bad smell comes during summer due to extreme heat at it emits gas inside the mobile toilets that give bad smell.

Table 4: Distance of living place from working place

Distance	Katabon n=20		Technical n=20		Banani n=20		Total n=60		
	Male (n=10)	Female (n=10)	Male (n=10)	Female (n=10)	Male (n=10)	Female (n=10)	Male (n=30)	Female (n=30)	Total
Near	5 (50)	1 (10)	6 (60)	4 (40)	2 (20)	10 (100)	13 (43.33)	15 (50)	28 (46.67)
Far	5 (50)	9 (90)	4 (40)	6 (60)	8 (80)	0 (0)	17 (56.67)	15 (50)	32 (53.33)
Others	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	60 (100)

Source: Fieldwork 2017 (multiple respondents)

Table 5: Reason for using the mobile toilet

Reasons	Katabon n=20		Technical n=20		Banani n=20		Total n=60	
	Male (n=10)	Female (n=10)	Male (n=10)	Female (n=10)	Male (n=10)	Female (n=10)	Male (n=30)	Female (n=30)
During emergency	5 (50)	4 (40)	5 (50)	3 (30)	5 (50)	3 (30)	15 (50)	10 (33.33)
No toilet in workplace	3 (30)	3 (30)	2 (20)	6 (60)	2 (20)	5 (50)	7 (23.33)	14 (46.67)
Clean and safe	1 (10)	0 (0)	4 (40)	2 (20)	1 (10)	2 (20)	6 (20)	4 (6.67)
Low cost with more facilities	2 (20)	2 (20)	2 (20)	2 (20)	2 (20)	4 (40)	6 (20)	8 (26.67)
During traveling	2 (20)	3 (30)	2 (20)	3 (30)	3 (30)	2 (20)	7 (23.33)	8 (26.67)

Source: Fieldwork 2017 (multiple respondents)

Table 6: Benefits of mobile toilet

Advantages	Katabon n=20		Technical n=20		Banani n=20		Total n=60	
	Male (n=10)	Female (n=10)	Male (n=10)	Female (n=10)	Male (n=10)	Female (n=10)	Male (n=30)	Female (n=30)
Help during Emergency	4 (40)	5 (50)	6 (60)	7 (70)	5 (50)	7 (70)	15 (50)	19 (63.33)
Use it anytime	2 (20)	3 (30)	2 (20)	3 (30)	2 (20)	1 (10)	6 (20)	7 (23.33)
Easy to use	3 (30)	4 (40)	2 (20)	4 (40)	0 (0)	2 (20)	5 (16.67)	10 (33.33)
Reduce open evacuation	6 (60)	0 (0)	5 (50)	1 (10)	6 (60)	0 (0)	17 (56.67)	1 (3.33)
Everyone can use it	3 (30)	4 (40)	3 (30)	4 (40)	2 (20)	4 (40)	8 (26.67)	12 (40)

Source: Fieldwork 2017 (multiple respondents)

3.2.7. Mobile toilet and facilities

Maximum numbers of respondents (91.67%) agreed that all the basic equipment is available in mobile toilets (Table 9). Few of them disagreed with this statement. They did not get the soap or toilet tissue during use. Many of them made complain regarding water scarcity; as there is no direct water line that creates problem for them to use the mobile toilet with limited water. If the direct water system is available, then the satisfaction level will increase more.

3.2.8. Price per use of mobile toilet

Nearly 90% respondents were reported that the price per use of the mobile toilet is reasonable (Table 10). On the other hand, only 10% respondents opined that price per use of mobile toilet is high. 100% respondents (male and female) from technical were reported that the price per use of mobile toilets is reasonable followed by Banani and Katabon, respectively. They find that in the past, people do open defecation which polluted the environment. The female did not get any facilities for safe defecation outside. The mobile toilets are providing them good services.

3.2.9. Mobile toilet is an enterprise

Mobile toilet is the emerging enterprise in the context of urban and semi-urban areas of Bangladesh. One can run this type of business in selective places of the city with minimum investment. One can earn handsome income through this type of enterprise by engaging family members. Collection of revenue, record keeping, cleaning and supply of water, soap, and toilet tissue are the important tasks for the operator. The operators engage their husband/wife and children to perform the business. According to key informant's interview, the operator from Banani earned more than other places among the study sites.

3.3. Fecal sludge management system

3.3.1. Fecal sludge

Long back ago, human excreta were just thrown on to the streets and collected into pits for reuse in agriculture. The increased excreta with rapid urbanization caused diseases such as cholera and typhoid. Later, solution of the problems was found that human excreta were washed of the cities and mixed in nearby water bodies (river, canal, etc.). The disposed/dumped fecal sludge near to open water bodies in the urban is causing huge environmental problems and health risks to the urban and peri-urban population. The dilution of excreta is known as fecal sludge made them unattractive reuse in agriculture. Fecal sludge is one kind of waste and nasty things as mentioned by the respondents. Most of the respondents (90%) reported that the fecal sludge could be used in agriculture; only 5% respondents mentioned that there is no use of fecal sludge and rest 5% respondents are not sure about the future use of fecal sludge (Table 11). It was mentioned by the focus group participants that fecal sludge could be used for the generation of biogas and biofertilizers using technology. There are many types of methods to dump the wastages along with sewerage line, if there is no direct line then the operator dump the wastage in manhole at late night. The dumping methods are also used for event-based toilets. Another method was pit method. But because of lack of space, they cannot apply this method.

3.3.2. Existing fecal sludge management system

At present, three options exist for fecal sludge management for mobile toilets. Use of containers and free dispose near to water bodies or into the sewerage line is one of option for event-based mobile toilet. Second option is pit method. In this method, both events based mobile toilet and fixed location-based mobile toilet can deposit fecal sludge into the pit. This method requires extra places or land to do it. It is not feasible in the city due to scarcity of land. The third option is to make the connection with the sewerage line directly. This has been done by fixed location-based mobile toilet. Effective fecal sludge management system engages people from the household level user, to collectors, transporters, operators of treatment plant, and end user of treated sludge.

3.3.3. Uses of fecal sludge

In the point of view of the respondent, the possibilities of usage of the wastages are: They can either be used as fertilizers or biogas. Few respondents thought that fecal sludge could be used for the preparation

Table 7: Mobile toilet versus public toilet

Mobile toilets level	Katabon n=20		Technical n=20		Banani n=20		Total n=60	
	Male (n=10)	Female (n=10)	Male (n=10)	Female (n=10)	Male (n=10)	Female (n=10)	Male (n=30)	Female (n=30)
Better	5 (50)	8 (80)	8 (80)	7 (70)	7 (70)	9 (90)	20 (66.67)	24 (80)
Same	2 (20)	2 (20)	2 (20)	3 (30)	3 (30)	1 (10)	7 (23.33)	6 (20)
Bad	3 (30)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	3 (10)	0 (0)

Source: Fieldwork 2017 (multiple respondents)

Table 8: Problems in mobile toilet

Problems	Katabon n=20		Technical n=20		Banani n=20		Total n=60	
	Male (n=10)	Female (n=10)	Male (n=10)	Female (n=10)	Male (n=10)	Female (n=10)	Male (n=30)	Female (n=30)
Shyness	0 (0)	1 (10)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1 (3.33)
People Staring	2 (20)	0 (0)	0 (0)	2 (20)	3 (30)	2 (20)	5 (16.67)	4 (13.33)
Lack of water	2 (20)	2 (20)	2 (20)	0 (0)	1 (10)	1 (10)	5 (16.67)	3 (10)
Lack of soap	2 (20)	2 (20)	2 (20)	0 (0)	2 (20)	2 (20)	6 (20)	4 (13.33)
Ventilation Problem	7 (70)	6 (60)	0 (0)	3 (30)	7 (70)	9 (90)	14 (46.67)	18 (60)
Bad Smell	2 (20)	2 (20)	2 (20)	1 (10)	5 (50)	3 (30)	9 (30)	6 (20)
Space Problem	0 (0)	0 (0)	0 (0)	2 (20)	1 (10)	1 (10)	1 (3.33)	3 (10)
None	0 (0)	0 (0)	7 (70)	2 (0)	0 (0)	0 (0)	7 (23.33)	2 (6.67)

Source: Fieldwork 2017 (multiple respondents)

Table 9: Mobile toilet facilities

Availability	Katabon n=20		Technical n=20		Banani n=20		Total n=60	
	Male (n=10)	Female (n=10)	Male (n=10)	Female (n=10)	Male (n=10)	Female (n=10)	Male (n=30)	Female (n=30)
Yes	8 (80)	7 (70)	10 (100)	10 (100)	10 (100)	10 (100)	28 (93.33)	27 (90)
No	2 (20)	3 (30)	0 (0)	0 (0)	0 (0)	0 (0)	2 (6.67)	3 (10)
Others	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)

Source: Fieldwork 2017 (multiple respondents)

Table 10: Price per use

Price	Katabon n=20		Technical n=20		Banani n=20		Total n=60	
	Male (n=10)	Female (n=10)	Male (n=10)	Female (n=10)	Male (n=10)	Female (n=10)	Male (n=30)	Female (n=30)
Reasonable	8 (80)	9 (90)	10 (100)	10 (100)	8 (80)	9 (90)	26 (86.67)	28 (93.33)
High	2 (20)	1 (10)	0 (0)	0 (0)	2 (20)	1 (10)	4 (13.33)	2 (6.67)

Source: Field work 2017

of fish feed to feed the fishes and other aquatic animals. 21.67% respondents do not have any idea on the use of fecal sludge (Table 12). From KII of operator and FGD is it also found that if there is a system of storing these wastages then only it can be used as fertilizers or biogas. However, as the wastages are dumped in the sewerage line, it is unusable.

4. Discussion

The problem of open defecation in the Dhaka city has been minimized by mobile and public toilets. In fact, the pollution and health risks have been addressed by new sanitation system like mobile toilet. It also reported that floating people, poor working people, and traveler got remedies regarding emergency defecation. In Accra, 30% populations have no adequate toilet and sanitation system in their houses. This is very much dangerous and resulting open defecation and causing health hazards for everybody who moved around in the city. Respondents believed that high cost is required in managing fecal sludge in Dhaka city. Dodane et al. (2012) reported that fecal sludge management cost 5 times less than sewer based solutions. Gaulke (2006) reported that successful fecal sludge management system exists in urban areas of Japan. In Bangladesh, this is lacking from in practice. It was reported by the focus group participants that human excreta usually used in agriculture, but they have no idea on the use of urine or fecal sludge in Bangladesh. There is no concrete finding on the nutrient content of human excreta and urine or fecal sludge in Bangladesh. Respondents believed that both human excreta and urine contain high nutrients. Eventually, they thought that fecal sludge could be used for agricultural production to feed the soil through the appropriate method of processing. Höglund (2001) reported that 2% nutrients are accumulated in the body during adolescent, but it increases when they grown up and eventually excrete the same amount of nutrient as feces and urine as they consumed. The agricultural nutrient demand was covered by recycled human excreta and animal waste before the introduction of mineral fertilizers in Europe. This tradition has been ended at the beginning of urbanization and the invention of flush toilet and sewerage system (Niederste-Hollenberg, 2003). In managing fecal sludge, there is a problem related to coordination. Dhaka city is lacking from coordination from different concerned department including DPHE, WASA, and City Corporation in managing fecal sludge and improved sanitation system. Similar observation was made in ACCRA that uncontrolled sprawling of the city hinders the improved sanitation system in the city for fecal sludge management.

5. Conclusion

The mobile toilet has contributed a lot for the working people, floating people, and travelers. It also reduced open defecation by meeting the emergency. Mobile toilet has reduced waterborne, airborne, and vector-borne diseases in the Dhaka city. People can use it on the way to journey and during works.

Table 11: Fecal sludge management and its use

Comment	Katabon n=20		Technical n=20		Banani n=20		Total n=60	
	Male (n=10)	Female (n=10)	Male (n=10)	Female (n=10)	Male (n=10)	Female (n=10)	Male (n=30)	Female (n=30)
Yes	10 (100)	9 (90)	10 (100)	9 (90)	8 (80)	8 (80)	28 (93.33)	26 (86.67)
No	0 (0)	0 (0)	0 (0)	0 (0)	2 (20)	1 (10)	2 (6.67)	1 (3.33)
May be	0 (0)	0 (0)	0 (0)	1 (10)	0 (0)	2 (20)	0 (0)	3 (10)

Source: Fieldwork 2017 (multiple respondents)

Table 12: Fecal sludge use

Uses	Katabon n=20		Technical n=20		Banani n=20		Total n=60	
	Male (n=10)	Female (n=10)	Male (n=10)	Female (n=10)	Male (n=10)	Female (n=10)	Male (n=30)	Female (n=30)
Fertilizer	7 (70)	3 (30)	6 (60)	7 (70)	5 (50)	4 (40)	18 (60)	14 (46.67)
Biogas	2 (20)	3 (30)	2 (20)	1 (10)	2 (20)	2 (20)	6 (20)	6 (20)
Fish food	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	3 (30)	0 (0)	3 (10)
No use	1 (10)	4 (40)	2 (20)	2 (20)	3 (30)	1 (10)	6 (20)	7 (23.33)

Source: Fieldwork 2017 (multiple respondents)

Respondents showed positive attitudes toward the mobile toilet, and they believed that mobile toilet changes their lives by providing improved sanitation system. They thought that fecal sludge could be a good source of fertilizers for agriculture and great sources of bioenergy.

Several suggestions or recommendations were made by the respondent for the improvement of the mobile toilet and fecal sludge management. In case of a mobile toilet, there is direct water supply connection. The operators buy the water from different places which are costly as well as difficult tasks. Direct water supply connection could be good solution for the continuous supply of water for the mobile toilet. Electric connection could be made easy use of mobile toilet at night by supplying adequate light inside the mobile toilet. According to user's opinion, the mobile toilet should be more spacious to move around it, and separate bathroom could be added extra facilities. The user also has opined that there should direct sewerage connection with the mobile toilet for improved sanitation and fecal sludge management. The design of mobile toilet should be modified by adding stairs and appropriate ventilation system. In the rainy season, the mobile stair becomes risky for old users and handicapped. Among the three sites, there is no direct sewerage line connection in Katabon that is why the operator dumped all the wastages at midnight into the drain or sewerage line. Some of the users claimed that if there is an individual bath chamber that will be better for the floating people. The MAWTS type toilets become very warm during summer that makes people discomfort.

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