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**ENSURING AVAILABILITY AND SUSTAINABLE MANAGEMENT  
OF WATER AND SANITATION FOR ALL**

**Trialling innovative sanitation solutions for low-income  
communities in Dhaka, Bangladesh**

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*The residents of low-income communities (LICs) in Dhaka struggle to gain access to sustainable, communal sanitation services, due to a wide variety of factors including technological challenges, lack of social cohesion and poor governance. This paper details a number of innovative approaches to improving communal sanitation services for LICs in Dhaka, recently trialled by WSUP in partnership with Dhaka Water and Sewerage Authority (DWASA) and International Centre for Diarrhoeal Disease Research, Bangladesh (ICDDR,B) with funding from UNICEF and DFID.*

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**Background**

Of the nearly 14 million people living in Dhaka, approximately 6 million reside in LICs and 4.3 million use communal toilets which are shared by multiple households as their primary means of sanitation. Despite the challenges involved, many experts argue that shared sanitation is the only technically and financially viable solution for densely populated areas. There is therefore a great need in Dhaka for the development of sustainable and effective communal toilet management systems, including A) innovative designs for sanitation facilities, responsive to the unique characteristics of these settlements (densely populated, scarcity of land, low lying, and low permeability of soils); B) behaviour change messaging to promote better user maintenance of existing communal sanitation facilities; and C) safe and affordable faecal sludge management (FSM) services.

**Addressing barriers to safe sanitation: innovative models**

To address some of the needs mentioned above, WSUP worked with multiple stakeholders to introduce the following approaches:

**Small Bore Sewer System with Settler and Anaerobic Baffled Reactor (ABR)**

Residents of low-income communities struggle to obtain land for the construction of septic tanks attached to communal toilets. Vacutug (Vacuum Tanker) access to these areas – to empty the sludge from the septic tank – is also difficult due to narrow access paths inside the LIC. As a solution, WSUP developed a replicable and financially viable Small Bore Sewer System with Settler and Anaerobic Baffle Reactor (ABR). The system consists of a small bore pipe network, settler and ABR: the settler is constructed next to a road where vacutug access is possible – facilitating the sludge emptying service – and the ABR is provided to ensure the quality of effluent meets national standards. A total of 10 Small Bore Sewer System have been implemented under the WSUP-UNICEF partnership with 11,261 people benefitting from improved access to FSM services.



**Figure 1. Model of SBS and Settler with ABR**

Source: WSUP

Figure 1 above depicts five individual toilet compounds connected to the settler by a small bore sewer network. The settler is constructed next to the road (on the left hand side of the image) for ease of access by vacuum tanker. The settler is connected with Anaerobic Baffle Reactor (ABR) to improve quality of the effluent.

#### **Improved community latrine designs**

WSUP has introduced innovative community sanitation models for LICs, including latrines with a pre-fabricated structure suitable to the local context and responsive to the needs of people with disabilities. The use of a soak pit is not suitable for these areas due to the low permeability of soil; as an alternative, a bristle filter is installed in the septic tank to ensure the quality of effluent meets national standards. A total of 1,675 communal latrines of various models have been constructed under the programme, with a total of 41,875 people benefitting from improved access to hygienic facilities.

Sustainability of the latrines is promoted through the establishment of Community Management Committees (CMCs) for each facility comprising 5-7 members. The CMCs generate a small fund for regular operation and future maintenance purposes. The user charge is collected on a monthly basis and deposited in the Bank Account. A paid caretaker is appointed with responsibility for keeping the system functional and collecting the tariff.



**Photograph 1. Improved community latrine**

Source: WSUP

### Using behaviour change messaging to improve existing communal toilets

A census of our intervention areas revealed substantial numbers of community latrines – installed by various NGO organisations – that were in poor condition due to inadequate Operation and Maintenance (O&M) arrangements. To change this situation, WSUP supported latrine management committees to improve community sanitation services. Behaviour change messages were developed through a formative research process with intensive consultation from end-users. Messages were kept simple to ensure they could be easily understood by communities with little or no formal education. Signage formed an important part of the intervention, with signs designed to provide cues at point-of-use and to impact behaviour at a practical level. WSUP provided technical support to the development of the behaviour change materials and also provided hardware, notably the provision of buckets for flushing and bins for the disposal of menstrual waste. Hygiene messages were disseminated through group sessions in addition to signage, latrine use demonstration and counselling to improve patterns of use. As of January 2016, a total of 94,442 people – including 49,508 women – have benefitted from the campaign (the number of women beneficiaries is based on gender ratios in the project target areas as measured in WSUP baseline surveys). Physical observations of target latrines indicate positive results and reductions in the amount of faeces present in the latrine pan. Figures 2 and 3 present signage used in the intervention, reminding the user to dispose of waste in the bin and not the latrine.



Figure 2. Intervention signage

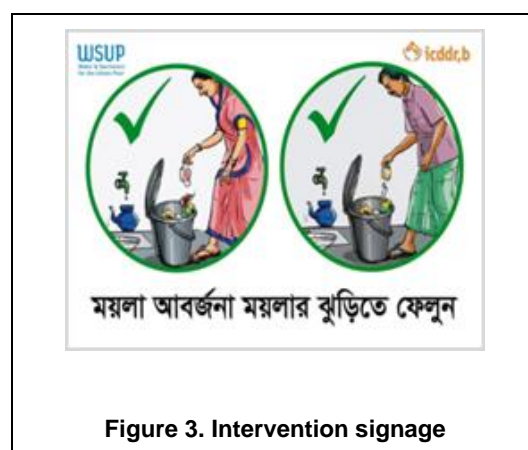


Figure 3. Intervention signage

### Addressing citywide Faecal Sludge Management (FSM) challenges

The need for improved FSM services in Dhaka is well documented: only 20% of households and institutions are connected to DWASA's sewerage network, with 80% of the city's population dependent on on-site sanitation systems. Most pit latrines and septic tanks are manually emptied by informal service providers, posing health risks to both the public and the service providers themselves. The situation in Dhaka is further characterised by the lack of clarity on institutional mandates around sanitation. In collaboration with Unicef and Dhaka Water and Sewerage Authority (DWASA), WSUP has sought to improve the situation by A) engaging small-scale entrepreneurs to provide pit-emptying services in areas where vacuum tanker access is difficult, and B) engaging medium-scale entrepreneurs in areas where vacuum tanker access is possible.

#### FSM services in hard-to-reach LICs

In densely populated LICs with narrow roads, WSUP has supported small-scale entrepreneurs in providing pit or septic tank emptying services using specialised equipment including the gulper, mud pumps and diaphragm pumps. It is not financially viable to transport the sludge directly to the DWASA disposal point or treatment plants as these are far from the intervention areas. WSUP has therefore constructed a transfer station for faecal sludge at Mirpur: the overall function of the transfer station is to aggregate, dewater, partially treat and temporarily hold faecal sludge collected from the pits or septic tanks of residents living within 2-3 kilometres of the facility. The entrepreneurs transport the sludge to the transfer station using a tri-wheeler, after which sludge is either transported from the transfer station to drying beds for reuse, or taken by medium-scale entrepreneurs directly to the DWASA disposal point using a vacutug. A significant challenge is then to ensure the safe disposal of sludge at the disposal point – which feeds directly into the sewer line – using a manually operated small tanker.

Major components of the transfer station are headworks (including screens) to separate out solid substances, solid waste storage, underground holding tanks and a washing space. The partial treatment process which takes place at the transfer station is as follows: collected sludge is poured into the screen with sufficient velocity to separate solids to be disposed directly to the sanitary land fill. The sludge then enters underground holding tanks consisting of three chambers where anaerobic treatment takes place. A bristle filter is provided in each chamber's outlet where biological treatment takes place. Finally, the effluent water is disposed to the drain through a 30-foot gravel media which also improves the effluent quality.



Photograph 2. SSEs emptying a septic tank



Photograph 3. Transfer station



Photograph 4. Drying beds



Photograph 5. MSEs emptying septic tank

#### FSM services in accessible areas

DWASA played a pivotal role in unlocking FSM service delivery in partnership with the private sector through a newly introduced SWEEP brand. Supported by WSUP and UNICEF, DWASA offered a lease agreement for emptying equipment (vacuum tankers) to medium-scale enterprises (MSEs). As well as providing access to equipment, the agreement:

- allowed the MSEs to provide safe and professional FSM services under the SWEEP brand marketed through DWASA;
- required the MSEs to pay a security deposit; and
- required the MSEs to pay a lease fee (after an initial grace period of 3 months) in return for access to the vehicle as well as disposal sites within the DWASA sewerage network.

This model has advantages for both parties: the MSEs benefit from reduced risk to market entry through lower start-up costs, greater flexibility, and a faster return on investment, while DWASA is able to service customers in a scalable manner across the city while staying nimble and maintaining ownership of its assets (provided by UNICEF). Technical and business management training was provided to the MSEs to improve their ability to safely and profitably deliver services. Furthermore, supported by WSUP, a promotion and marketing strategy for the SWEEP brand was developed and implemented by DWASA. MSE's emptied around 1600 m<sup>3</sup> of septic sludge in all serving 50,000 population from which they earned USD 13,500 by providing the pit emptying service.

## Learning

Although the activities documented in this paper are either ongoing or have only recently completed, the project has already produced a number of learning points, particularly with regards to FSM services. While the project has demonstrated that small-scale entrepreneurs can provide an efficient service within a specified catchment area, the emptiers are currently not disposing of sludge at the transfer station in Mirpur: incentives need to be developed to encourage the emptiers to travel to the transfer station after each job, and there is a corresponding need for better monitoring to define the average distance (between households and the transfer station) which the emptiers are willing to travel. More also needs to be done to ensure the small-scale entrepreneurs are aware of the health and safety risks associated with their work.

The higher capacity FSM business (SWEEP) is already operating at a profit and appears to be functioning extremely well, partly as the result of an initial focus on middle- and higher-income customers: WSUP is now assessing what incentives need to be in place for the business to gradually transition to serving low-income consumers. The business has been widely accepted by customers and appears positioned to scale-up if supporting institutional arrangements are put in place. The project has indicated that a combination of individual and institutional customers is helpful in building up a new FSM business, and affirmed experience from elsewhere that the provision of disposal points is essential in promoting greater operational efficiency. The SWEEP experience to date suggests that Public Private Partnerships could be an effective solution for FSM service provision in Dhaka.

The project reflects the need for diverse solutions in order to provide adequate sanitation to low-income communities (LICs). In the area of behaviour change messaging, our research has demonstrated that communal sanitation interventions can be improved by simple signage designed to help users to keep their toilets clean. Signage and behaviour change approaches more broadly need to be based on extensive community consultation to ensure strong understanding of local issues and needs. The research also emphasised A) the vital role that landlords have to play in maintaining latrine cleanliness, B) the effectiveness of providing low-cost hardware such as waste bins and buckets inside latrines, and C) the importance of promoting flushing after each using a small or medium-sized water container to mitigate against excessive water use in water-scarce contexts.

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