



20th WEDC Conference

Colombo, Sri Lanka, 1994

AFFORDABLE WATER SUPPLY AND SANITATION



Willingness to pay/use for water supply and sanitation

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THIS PAPER IS a sociocultural case study of Dhaka, the capital city of Bangladesh, on the willingness to pay/use for water supply and sanitation. "Willingness to use" is a relatively new concept which can be defined as the maximum amount of desire one can willingly express for a certain commodity or service. Many technical, institutional, financial and legal factors determine the willingness to use. Affordability combined with willingness to use leads to willingness to pay. The low "willingness to pay/use" is one of the reasons behind the unproportional success rate of much of the national and international efforts undertaken for safe water supply and sanitation. However safe water supply and sanitation is an urgent need in Bangladesh where the number of water borne diseases cases per 100,000 persons is 51,000, much higher than other developing countries (WHO, 1992). One of the causes behind this alarming situation is low willingness to pay/use. Along with a brief description of the present situation in Dhaka city, efforts are taken to identify the problems behind the low willingness to pay/use for water supply and sanitation in light of the sociocultural aspects. This may provide useful information for other developing countries. Some improvement strategies are also proposed.

Present situation

Dhaka is the capital of Bangladesh. It is a mega city with a population of 6.54 million living in an area of 1345 sq. km. Per Capita GRP at current factor cost is TK. 7434 (Taka 40 = 1 US\$), which is slightly higher than the national

GNP/capita which is TK. 7094 (Statistical yearbook, 1992). Like all other developing nations, variations in income of the people are quite high. The extremely poor people usually live in slum areas. About 40% of the total city population are slum dwellers (Rahman & Islam, 1992). According to a report (Planning commission, 1991), the health conditions of urban slum settlements are extremely bad, and at any given time, 30% to 46% of this population suffer from diseases, most of which are related to environmental conditions — arising from pollution of water and air. Crude death rate for the urban slum area is 43.62 per thousand per year, which is four times the national average and six times the urban non-slum average. The 'under five' mortality rate is 150 to 180 per thousand, over 50% higher than the national norm and almost double the urban non-slum rates.

The sole responsibility of providing potable water supply and waste water disposal service to Dhaka city lies on DWASA, Dhaka Water And Sewerage Authority. Apart from supplying the billed water, DWASA operates 1209 public stand posts for free water supply (DWASA, 1991). Most of these stand posts are located in areas that constitute a large portion of slum dwellers. It is calculated that each public stand post serves an average of 250 people. According to another study (CUS, 1988), about 50% of the city's slum dwellers use water from DWASA service, 14% of them get water from community shallow tube wells set up locally. The remaining 36% do not have any access to safe water facilities. They obtain water from ponds or rivers. Therefore, this specific 36% of the slum dwellers

Figure 1. Water supply pattern of Dhaka city

Figure 2. Sewerage system of Dhaka city

are the most susceptible group for health hazard. Another report shows (Islam, 1992) that about 25% of the total city population are not served by DWASA. Most of this group use surface water for drinking purpose (fig. 1).

The situation in the sanitation sector is rather worse. Only 20% of the city population have DWASA sewage service, and 35% of Dhaka residents have no sanitation service at all (fig. 2). Those with no service use borehole latrines and must resort to open defecation, which deposits excreta directly into the local living environment. Dhaka City Corporation (DCC) now operates 20 public toilets that are extremely insufficient. Most slum areas have little or no sanitation services.

Causes behind the low willingness to pay/use

The city water supply and sanitation system suffers from various problems including those of technological, policy and planning and coordination and managerial aspects. Some of these can be explained by low willingness to pay/use, again which has its roots in the sociocultural background. Many cities of the developing world suffer from similar situations. To overcome these problems, some are discussed and identified herein.

Low service beneficiary

The DWASA sewerage system currently serves only 20% of the Dhaka city population. This situation is not expected to improve over the next five years (Islam, 1992). As a result, people within the densely inhabited districts have been advised to build their own septic tanks to obtain safe sanitation. However, as there presently exists no design regulation, costs vary over a wide range. A typical 2000 litre septic tank required for a family of six persons may cost 200 to 300 US\$, which is beyond the affordability of lower income people. Moreover, lack of construction land for the septic tanks also plays a key role. On the other hand, open defecation pollutes the surface, and sometimes, ground water. Most slum dwellers use surface water for washing, bathing, etc. and thereby become infected.

Improper sewage and water billing system

For residential metered connections, the water charge is TK. 3.49 per 1000 litres, however for non-meter connections, it is 22.62% of the annual valuation of the holding (DWASA circulation, 1993). Currently, the cost for sewerage service is the same as the water bill charge. As the lower middle class people usually have a yard connection for their water supply, they are reluctant to receive the DWASA sanitation service because they would have to pay an additional service charge equal to that of their water bill. Ironically, most low income people have the more expensive non-metered connections since users must purchase meters. For lower middle income people, the water and sewage bill may amount to 10% of their

monthly income, which is more than the World Bank recommendation of 3% (World Bank, 1983). This reduces the willingness to use as well as pay. Moreover, the water charges are, at present, flat, regardless of water consumption and high water cost reduces willingness to use the water supply by lower income people.

Complicated and costly system for new connections

For a new connection, a potential sanitation service subscriber must spend a considerable amount of money to construct a pit. Then one faces many complicated procedures that require visiting and registering at various agencies such as DCC, DWASA (zonal office and service office), land taxation office and municipal taxation office. As middle or poor income people often live on limited land space, sometimes they need to construct their pit under a road, and for that purpose, they must obtain permission from the police and DCC. Furthermore, road reconstruction is the individual's responsibility. Experience has shown that incidental expenses are about 10 times higher than the official connection fee. These may be some of the factors behind low willingness to pay/use.

Low reliability of sewer system

In the city sewerage system, many manholes are damaged and sewers are blocked. Due to the flat terrain, 15 sewage lifting stations have been installed. However as pump station failure (mechanical or electrical), system overloading and sewage overflow remain common during the monsoon season, connection to the DWASA sewer system, which incurs a substantial expense, doesn't improve one's hygienic situation. Hence, people do not want to connect their toilet to sewer system.

Charge for public toilet

People must pay a certain amount to use public toilets. Although this rather low charge seems quite logical, it has become a factor for low willingness to use this service. A day labourer, for example, whose daily income may be as low as 50 Taka, will certainly be very reluctant to pay 0.50 Taka each time he or his family members use this service. For a family of six that uses the toilet a total of 10 times, one-tenth of the day's income will be incurred.

Location and number of public toilets and public stand posts

Since 30.31% of the slums are illegal (CUS, 1988), the government can not technically support them by providing public stand posts or public toilets. The illegal slum dwellers are indirectly provided with these support since slum removal is not a short term priority. However, facilities are constructed a certain distance away from such slums, and dwellers must walk a long distance to reach these services that are available outside the illegal slums. Regrettably, this inaccessibility reduces their will-

ingness to use. Moreover, the number of public toilets and public stand posts is quite insufficient. This is another important cause behind deficient beneficiaries in safe water supply and safe sanitation service. All these reasons reduce the willingness to use.

Operation period of public toilets and public stand posts

Although DCC has no time restriction on the operation period of public toilets, the operation contractors usually provide service from 6 a.m. to 10 p.m. only. As a result, people without private toilets are forced to defecate outside at night.

Water supply service is also not continuous. The supply period varies between 8 and 18 hours a day depending on location and season. Such inconvenience and drinking water pollution caused by low pressure during off service time is a cause for low willingness to pay/use.

Unapproved connection and under-reporting of bill

It is reported that 26% of DWASA water is lost due to illegal connections and under reporting of water consumption (DWASA, 1984). The reason behind this "unaccountable loss" lies in the users' rather high willingness to use and low willingness to pay.

Insufficient water pressure

The water supply network often suffers from low pressure; sometimes there exists no pressure. This occurs due to an intermittent water supply. The water production (0.680 Million Cubic Meter per Day, MCMD) is much less than the estimated demand (1.260 MCMD) (DWASA, 1993). Moreover, 30% line loss (DWASA, 1984) reduces the actual supplied quantity to 0.476 MCMD. As a result, 2nd floor water access is denied. Hence, people have to install private underground storage tanks, overhead tanks and pumps. Despite having a willingness to use, this extra cost involvement reduces affordability.

Unauthorized practices

Some subscribers are carrying out unspecified private construction to extract water from the distribution system during periods of very low pressure, or when no pressure exists in the main. During such periods, the water main usually remains full or partially full of water. It is known that, a hand pump is connected to the water main to withdraw water. In another illegal manner, alternation of the service connection to draw water from the lower half of the pipe, instead of upper half, has been observed. These practices, to obtain water even when the main has a free water surface, cause non-availability of water to other subscribers, thus reducing willingness to pay/use.

Poor water quality

Contamination of sewage into the water supply system occurs as a result of low system pressure combined with

pipe leakage. This problem emerges in two circumstances. The first mishap occurs in the narrow lanes where water supply mains are often placed inside sewer manholes due to insufficient road width, location of other service lines or other specific reasons. Constant exposure to corrosive sewer gases reduces pipe thickness. In situations where the water main is submerged in the sewer during periods when water supply pressure is less than external pressure, sewage may leak into the water main. The second contamination route is associated with the service connection. Portions of the lateral connection may lie in contaminated road side water ditches. During periods of low or no pressure, contaminated water may enter through leaks originated from poor materials, poor workmanship or dilapidation. Poor water quality reduces the willingness to pay/use for water supply.

Discussion

Future strategies for hygienic improvement of the developing world's cities like Dhaka must be made with consideration of the overall picture of existing systems. The planned expansion of service should also be based upon future needs and affordability. Appropriate technology should be applied in other developing countries' cities as the strategies proposed here for Dhaka.

Low reliability, poor service, institutional obstacles, managerial problems and lack of awareness are among the compelling causes for low willingness to use. When this is combined with high costs for services, low willingness to pay is inevitable. This, in turn, results in poor service quality. This vicious circle should be cut with an affordable amount of money. For that, efforts should be taken to improve willingness to pay/use by some socio-cultural initiatives. Some measures are proposed as follows.

Public awareness

A public awareness program for the promotion of hygiene should be started by providing up-to-date information on water quality and pollution. This should involve public media, NGOs, health service and women's organizations to reach each person in the community. Electronic media such as TV and radio would play better role in this regard over other media, because about 75% of national population can not read. Although TV is a persuasive media which creates a sharp impact on public opinion, it is not accessible to all people. Radio is currently accessible for almost 100% population. Hence, radio can play a vital role in the public awareness program. On the other hand, with the help of community activity, open defecation should be discouraged. Basic personal hygiene education should be included in primary schools, elderly persons' literacy and women literacy programs, public hospitals and health centres. Field level health workers should provide instruction on a house to house basis. This will increase the willingness to use.

Managerial aspects

A new tariff structure such as a progressive tariff system should be adopted so that people using more water would be charged at a higher rate. This is necessary, because people now use water for gardening and car washing at the same rate that is charged for drinking purposes. The concept of "Some for all rather than more for few" would enable us to raise the willingness to use.

The sanitation billing system should be changed immediately. Instead of the present tariff system based on the holding valuation for non-metered subscribers, meters should be rented to provide equality among all users.

Service reliability

Good maintenance is a key point in maximizing capacity for waste water conveyance, thereby increasing willingness to use. Proper maintenance is also required for the water supply system. Essential facilities such as the pumping and lifting stations operated by DWASA should be protected against the adverse impact of floods. The unaccountable loss of 26% must be eliminated for the betterment of the system. This may include public participation in reporting illegal activities. Identification of leaks and improvement of pressure in the existing system is urgently needed to eliminate the incidence of contamination during transmission and to reduce line losses. An immediate step could be lining the water supply pipes within manholes and through roadside ditches with a protective coating. Steps should be taken for increasing the water pressure along with increasing the production. Since line loss by leakage is proportional to supply pressure, projections to increase pressure through increased production may result in an increase in line loss. Therefore, increasing production alone may not increase deliverable supply pressure. Leak identification and repair is vital.

Institutional aspects

To increase the willingness to use, some institutional measures may be beneficial. These include, among others, simplification of formalities for new connections, provision of soft term loans and/or subsidization of pit latrine, septic tank or shallow well construction

Community septic tanks

Community septic tanks with sewer pipes can be operated by DWASA for areas that can't be readily covered by the sewerage system. This would be a stepwise improvement alternative that could be connected to future sewer lines.

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