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PRA: A Tool to Address WatSan Issues and Achieve the Standard In Low Income Settlements An empirical study on a Dhaka slum

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Abstract

Most of the slums in Dhaka lack in safe water supply and sanitation facilities. This study was performed in a slum situated near Mohammadpur embankment known as Shopon's slum. Participatory rural appraisal method was used to collect information and analyze the WatSan problems of the slum. It is built on low lying marsh land and stagnant water. Water supply is illegally obtained from municipal connection and insanitary hanging latrines are used. According to the analysis lack of property rights, financing, lack of space and low elevation are the main reasons for water-sanitation problem of the slum. Resulting effects are inconvenience, long waiting time, disease outbreak, water logging etc. After considering standards set by DPHE and slum dwellers demand, a submerged septic tank system based sanitation plan and a legal water supply with storage tank and collection points for the community is proposed. PRA tools were proved to be helpful for this purpose.

Background of the Study

Dhaka city has emerged as a fast growing mega city in recent times. It is now populated with around 12.04 million people (BBS, 2011). As rapid population growth of Dhaka city is not proportionate with planned development, approximately 3.4 million people live in slum. Because of the mass rapid urbanization, haphazard development and rural to urban migration, slums are growing rapidly in Dhaka city. The slum population of Dhaka city faces extreme poverty because of their involvement in low paid informal jobs. As a result, condition of water supply and sanitation condition slum dwellers is deplorable. So it is necessary to explore water supply and sanitation problem in slums to improve their living condition. In this respect Participatory Rural Appraisal (PRA) method can be used to explore the water supply and sanitation problem of slum dwellers.

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Objectives of study

1. To explore the water supply, drainage and sanitation problem of a selected slum by using different PRA tools.
2. To explore several strategic solutions that aim to improve their water supply, drainage and sanitation problem.

Methodology

To conduct the study firstly objectives were formulated to guide it in a structured manner. Study area has been selected after formulation of objectives. The existing condition of the study area has been analyzed using participatory tools like social and resource map. Problems related to water and sanitation condition have been identified and reasons behind them have been identified using daily and seasonal activity schedule, pair wise ranking, cause effect diagram etc. Slum dwellers proposal for deriving solutions to existing problems and proposal for a better condition of the slum have been consulted through dream maps drawn by them.

So, according to the methodology to collect data regarding water and sanitation facilities of the study following PRA tools were employed. PRA method is distinguished from other traditional planning method by its local graphic representations created by the community. Participatory Rural Appraisal Method is a process of involving the local people in planning for them. In this process, in all the stages of planning are followed accordingly but involving the local people from the very beginning till the end. Being facilitated by the planners, preparation of inventory , identification of problems and their causes, recognition of their effects and proposal for probable solution and their dream map is gathered from the population for whom plan will be prepared. For this study the following participatory rural appraisal tools are being followed

a) Social map
b) Resource map
c) Daily activity schedule
d) Seasonal diagram
e) Cause and effect analysis
f) Dream map

To apply these tool methodologies were followed from the handbook titled “Methods for Community Participation: A Complete Guide for Practitioners” by Somesh Kumar. Finally, several strategic solutions have identified with commensurate their needs and planning aspects.

Selection of study area

In this study water supply and drainage and sanitation problem of Shoponer Basti of Rayerbazar have been explored by using different PRA tools. This slum was selected because it is built over low lying area and majority part is built on stagnant water. There are no legal water supply connection and sanitation facilities in this slum. In fact there is also question of legality over the land ownership. Thus this slum reflects worst possible situation in terms of water supply and sanitation facilities.

Data collection and analysis

Through the use of PRA tools diversified information regarding water supply and sanitation is collected. First of all some basic information regarding ownership, rent, payment method, social hierarchy etc are collected. Then characteristics of water and sanitation facilities, causes behind poor water sanitation condition are identified.

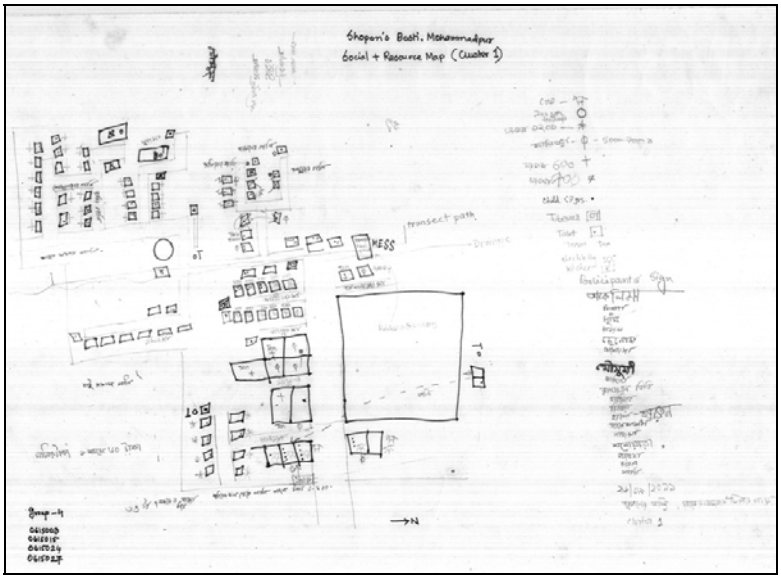

Figure 1a: Map of Shoponer Bosti prepared by participants (Eastern Cluster), Source: Field Survey, 2011

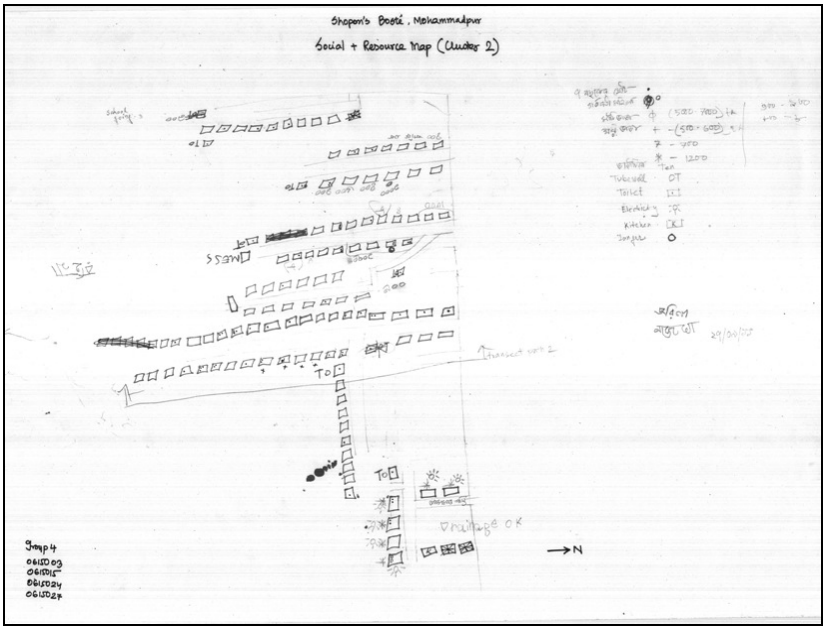

Figure 1b: Map of Shoponer Bosti prepared by participants (Western Cluster), Source: Field Survey, 2011

Basic information of the slum

Ownership pattern: Three basic types of ownership have been identified in the social map. Firstly the owner of the slum who has provided both land and rooms for rent. Again people paying rents for land in eastern cluster has constructed some rooms and letting those for rent to some other people. So a diagram representing ownership pattern can be shown as follows.

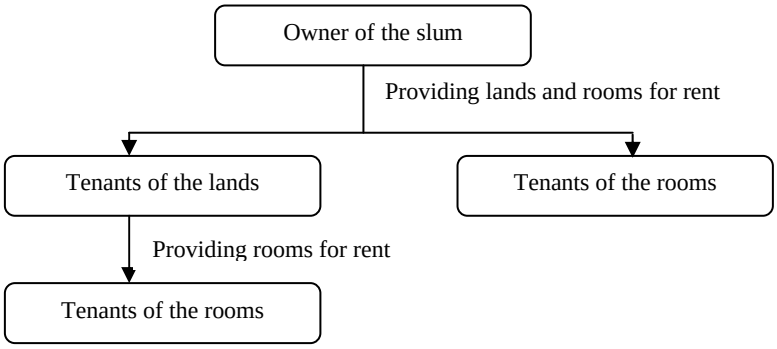

Figure 2: Ownership and tenancy pattern of the slum, Source: Field Survey, 2011

Land ownership is a crucial matter while providing services, as “Without land rights to the plots they occupy, people are mostly unwilling to invest in improving them” according to Stockholm Environment Institute. According to them, this is the reason why the slum dwellers put up temporary, unimproved structures those can be easily dismantled (Stockholm Environment Institute, 2010).

1. Rent: Rent for lands vary from 4000-6000 BDT per year according to the size of the land. Again rents for rooms vary from 500-1200 BDT per month according to the services provided. "Service" here stands for electricity supply, water supply or tube wells etc. Especially rooms with electricity supply are the main reason of high rent. Power supply in this slum is illegally obtained.

2. Community structures: No community structure like health facility or education facility or community gathering place exists within the slum. But sometimes different volunteer groups come to provide assistance or in the purpose of raising awareness.

Based on tenancy a social stratification could be identified in the area. Four very influential tenants of the land were identified who have provided 10 to 40 rooms on rent. They have also provided their tenants with supply of water and charge them accordingly.

Condition of water supply and latrine facility

In the study area 12 tube wells and latrines have been identified for 182 households. In some sub clusters only four or five households can access one single tube well whereas in another cluster 43 households are using one. In all cases latrines are provided adjacent to the tube wells.

Major characteristics for water supply are given below -

a) Source: All of the water supplies are illegally obtained from WASA supply.

b) Technique: They have developed an ingenious technique. Instead of using plumbing techniques they are using rubber pipes to carry the water from main source and obtaining that with hand tube well (Figure2). There is no home to home water supply connection and people of a cluster collect water from their tube well. There are 7 collection points in

Shopon's slum. If the size of cluster is big then people of that cluster needs more time to collect water.

Figure 3: Water supply , hand tubewells, Source: Field Survey, 2011

Figure 4: latrine facility; Source: Field Survey, 2011

c) Pricing and pattern: As discussed in the social stratification part of social mapping, the most influential tenant of eastern cluster is providing his residents continuous supply charging 500-600 on monthly basis and others are paying 50-60 BDT per month for supply. Payment for water moves from land tenant to slum owner then local influential people who

managed illegal water supply for the slum. Water supply is mostly continuous in nature, but sometimes there is interruption due to power failure. Some room owners could not provide their tenants with a separate water supply. Therefore they are sharing a common water supply and latrine provided by the slum owner.

Major characteristics for latrine facility are described below-

a) Type of latrine: All of the latrines are unhygienic and insanitary. Hanging latrine and Open defecation is the common phenomenon (Figure 3).

b) Structural quality and construction material: Latrines walls are made off bamboo fences, those hardly provide any privacy. Squatting hole is prepared by bamboo piles, identified very risky.

c) Water supply: No water supply is available in these latrines. People have to carry water from tube wells for latrine purposes.

Daily and seasonal variation in condition of water supply and sanitation facilities

a) Usage: There are three peak periods for usage of tubewell and toilets. Those are 5am to 7 am, 12 pm to 2 pm, 6pm to 9pm. This is in line with working hours of slum dwellers and their daily activities like cooking, washing and bathing etc. As a result waiting time is high at peak periods. During these hours waiting time for toilet usage is around half an hour. Waiting time also increases during summer.

b) Quality of water: Quality of water falls in rainy season. Where odor problem is a common problem along the year, in rainy season filth and debris also found in water. Since tube wells are submerged in this season due to water logging, water quality is bound to fall. In such times slum dwellers need to connect a pipe at the point of flow and bring that to some higher part of the area and collect water.

c) Continuity of supply: Supply of electricity is the influencing factor in case of water supply. As the supply line for this slum is an illegal connection of nearby WASA pump. Whenever power failure occurs, water supply becomes unavailable. So water supply is not continuous but regular. As power failure is a general problem in Summer, problem in water supply is also evident in this season

d) Condition of toilet: Due to open defecation and unhygienic condition inhabitants are always unsatisfied with the toilet condition. During rainy season toilets often goes under water. There is no option of preparing a substitute toilet in this season.

Cause and effect analysis of water, sanitation and drainage related problems

Causes and effects according to the problems have been identified from a discussion with the inhabitants. Identification and analysis of water, sanitation and drainage issues are set as the main focus of this process. From that point of view there are three major areas of problem- water, sanitation and drainage.

a) **Problems related with water supply:**

Two major problems of water supply are poor quality of water and low quantity of supply. Both of the problems can be originated from three reasons. As the water is collected through a pipe from the roadside collection points of DWASA, problem in these points or leakage in the pipes can create these supply problems. Seasonal occurrence of load shedding is also a reason behind this problem. Load shedding hampers pumping of water hence may cause low water supply problem.

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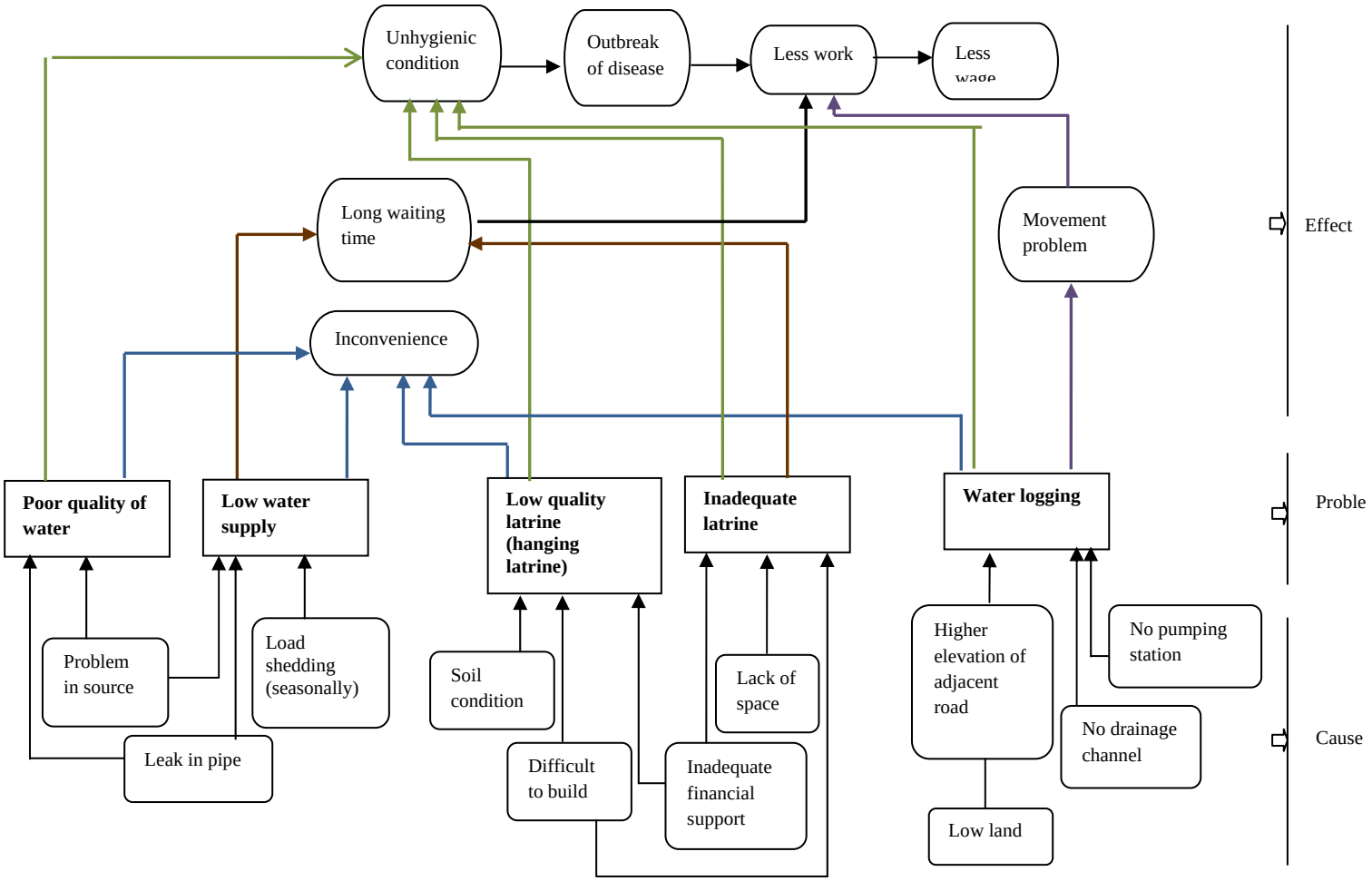

Figure 5: Cause Effect Diagram (Water supply, Sanitation and Drainage problems); Source: Field Survey, 2011

Both of these problems cause inconvenience in day to day life. Odor and filth in water causes discomfort in using. While low quantity of water supply is responsible for increasing the waiting time. This may result in less work less wage situation. This situation can also be attained if the disease outbreak becomes severe due to unhygienic condition created by poor quality of water. Due to illness poor people cannot go to work and hence cannot earn money

b) **Problems related with sanitation:**

Major problems related with sanitation are inadequate number and poor quality of latrines. Lack of space is a major reason behind this fewer number of latrines. Soil condition is the major reason behind poor quality latrine. Land being swampy in nature is not suitable for installation of sanitary latrine with dug pit. Besides this, it is also difficult to build and is found costly in most of the cases. Due to this difficulty in installation and cost behind this, the area has few numbers of latrines and existing ones are established in a haphazard manner.

These problems create discomfort while using latrines. Fewer numbers of latrines cause longer waiting time which may cause less work less wage situation. Poor quality latrine causes disease outbreak which may also end up with this particular situation.

c) **Problems related with drainage:**

The most identifiable drainage problem is water logging. Slum existing within a low land is bound to experience this problem where no pumping or drainage canals exist to support them. All three of these have been found as the major causes behind the problem.

Movement problem is caused due to this water logging which directly affects the work schedule of people creating a no wage situation.

People's demand to improve water and sanitation facilities in Shopon's slum

The inhabitants of Shopon’s slum were asked to draw a dream map showing their anticipation for improved water and sanitation facilities. In the dream map they have identified the location of new tube wells. At the same time they have told about their estimation of total number of tube wells required. According to the dream map only two new tube wells are required and they should be placed just beside two present locations of tube wells. This is because at present situation there is no space available for establishing new tube wells. Although they wish to have legal water supply system as currently they have illegal water supply. They believe that legal water supply system will reduce their problem of interruption in water supply despite paying money for it. In terms of toilets, according to the slum dwellers quantity is satisfactory. Though they are not satisfied with the quality as all the toilets are insanitary hanging latrines. But they also do not want sanitary latrines, as the whole slum is built on a low lying area and building sanitary latrines will require huge amount of earth work.

Identification of solutions

Need Assessment according to DPHE standard

According to the standard of Department of Public Health Engineering, need for water and sanitation related facilities are assessed for all 178 households of Shopon’s slum. The process of need assessment is as following:

Number of facility = (Total no. of households / no. of households required for per unit facility)

For example – Total no. of households =178

Number of households per tube well = 10

So, Total number of tube wells required = (178/10) = 17.8

= 18 (Approximately)

In this way need for tube wells, communal toilets, water supply systems etc. are calculated. (Table 1)

Table 1: Existing condition and need assessment for Shopon's slum (water and sanitation)

Item	Standard (No. of Households/ unit of item)	Total no. required, X	Present situation, Y	Additional need according to standard, X-Y	No. of items proposed by slum dwellers in the dream map	Remarks
Tube well	10	18	11	7	2	
Communal toilet and bath	10-20	18	16 (unsanitary hanging latrines with bathing facilities)	2	0	Improved quality of latrines demanded
Small piped water system with communal collection point	30-40	5	0	5	0	Scarcity of space but locals are interested for managing space

Source: (DPHE, n.d.) and field survey, 2011

From the table it can be observed that total number of 18 tube wells and 18 latrines are needed according to DPHE standard. From analysis of the Dream map it is found that slum dwellers only want two more tube wells. So it can be said that there is a huge difference in their dreams and actual standard. As a matter of fact these slum dwellers live in such sub-standard condition, they cannot expect more than what they have right now. However there are some technical obstacles in the way of planning according to DPHE standard. Those are as following:

a) lack of space to provide new facility

b) Unwillingness of people to relocate the facility beside their rooms to a central place.

c) unwillingness of people to change any of the existing facility which actually arises from their insecurity

Improving Water Supply Condition

Possible solutions are as follows-

i) **According to need assessed**:

According to the DPHE standard (DPHE, n.d.), water supply need is assessed for the population of this slum. Seven more tube wells will be needed according to the standard and those would be legal.

Advantages and Disadvantages:

a) Security of supply and improved quality of water.

a) Enough space is not available.

b) New facilities should be legal, along with that existing facilities need to be legalized. Again slum owner may cause unwanted interruptions while realising this.

ii) According to some case studies:

a) A comprehensive water supply system developed for slum dwellers of Mumbai. In this program there are four stage of water supply, those are: source, storage, treatment and distribution. Potable water is collected from municipality source and then stored in tanks. This water is then treated with UV ray and then supplied to slum dwellers either by water taxi or slum dwellers can collect water from SWP pick up point. For non potable water supply water is collected through deep tube well and then stored in tanks. This water is also treated and supplied to customers wither by water taxis or can collect from collection point. There are two types of customers: one is core customer who will sign up for monthly water plan and another is pay per use customer. Core customers will get water supplied by water taxis. Pay per use customers can buy water from street vendors or they can buy it from SWP collection pint. The program uses 10 UV units for treating a total of 77000 litres of water per day. (Bells et al, 2009)

b) DSK is managing community based mini pipe water supply system for slum dwellers without any access to safe water from around 2009. It is named as Community based Mini Pipe water supply system. Four projects are going on in Dhaka and Harirampur union. In all these projects community formed a management committee. A female member from the user families is the head of the Committee. 750 families now have tap water at their house from the projects. Each family pays Tk 50.00 per month to the committee. Community runs the system as a small-scale community business. (DSK, n.d.)

Recommended solution for this problem

This group suggests five tanks to be established in the study area, which according to the standard will be enough to serve the population of area. Local inhabitants were consulted for the idea and they initially approved. Possible locations for the tanks are determined according to the convenience of people and are shown in figure 4. Central collection points are suggested in this idea. Taps will be provided with these tanks 5.

Advantages and Disadvantages:

a) Continuous supply of water and good quality water supply.
b) System of storage which might prove useful in peak period.
c) Large initial establishment cost is associated with the idea and will also need to have legal water supply.
d) Some tanks might require demolition of some existing structures (rooms) which creates problem for the existing inhabitants, but are approved by others.
e) Requires maintenance.

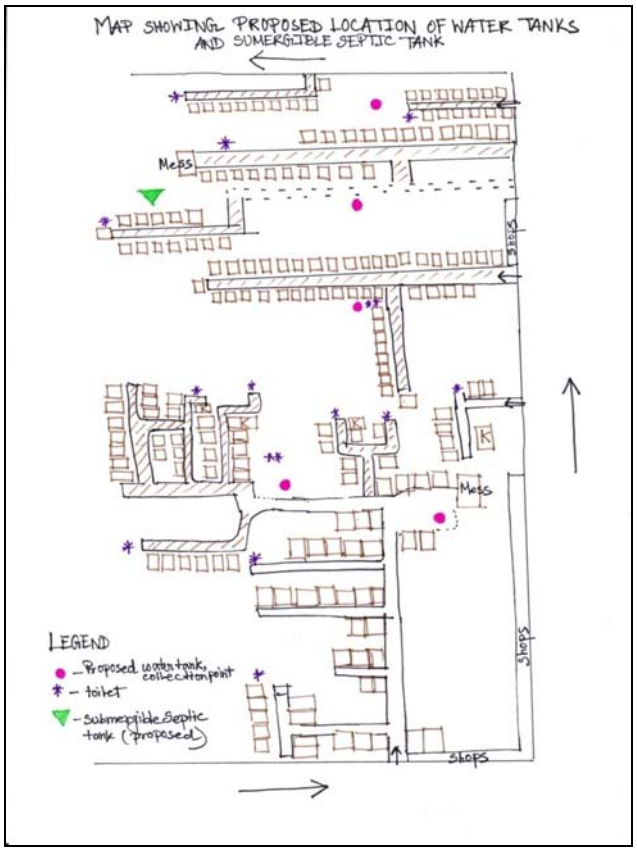

Figure 6: Proposed location for water and sanitation facilities in Shopon's Slum, Source: Field Survey, 2011

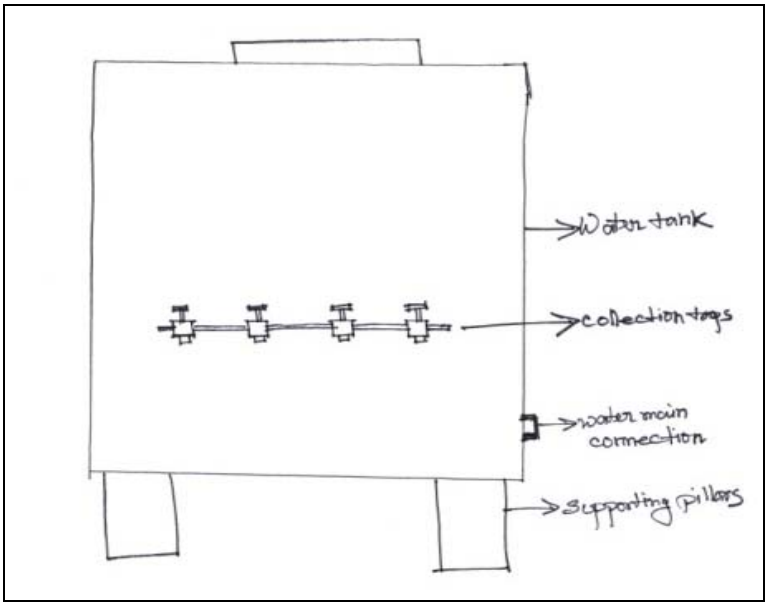

Figure 7: Water tank with collection taps in community water supply system

Improving Sanitation Condition

Possible solutions are as follows-

i) According to need assessed:

According to the DPHE standard, need for latrines are assessed and only two more latrines will be needed to provide.

Advantages and Disadvantages:

a) Sanitary latrines must be provided along with the up-gradation of previous ones.

b) Impossible in present context due to unavailability of space and poor quality soil.

ii) According to some case studies:

a) Dushtha Shasthya Kendra, with the technical help of ITN-BUET has initiated one research work for appropriate sanitation solution in low lying areas. One septic tank connected with 22 hanging latrines has been proposed for usage of 220 families. Water quality parameters of the pond are being monitored in every month. The research is termed as Submergible Septic Tank (SST) project and research work has been carried on for last two years. (DSK, n.d.)

b) An organization in UK named as Practical action, the Schumacher Center for Technology and Development proposes one project of water logged and high water table areas. The concept is termed as compost toilet where small scale septic tank is attached with each toilet. Theory is dry compost toilet will prevent environmental and water pollution. These toilets are built with two chambers to use alternatively decomposition taking place in one where another is being used. (Calvert, 2013)

Recommended solution for this problem

The idea of existing research work of DSK is recommended as solution of this problem. Existing hanging latrines with improvement of their structural condition can be used as in the SST project. One septic tank is suggested for the area, possible location of this tank is shown in the figure 4. This tank will be connected with the existing hanging latrines.

Advantages and Disadvantages:

a) Does not need construction of new sanitary latrines hence saving the cost.

b) Preservation of environment and water bodies. Reduction in disease outbreak.

c) This on site sanitation system may prove convenient by eliminating the necessity of installing sewerage network.

d) Requires initial investment in installation of septic tank and on site pipe network.

e) Requires maintenance.

Conclusion

From the study of water, sanitation and drainage condition of Shopon's slum it has become clear that slum dwellers are living in poor condition yet they are paying high rate of charge. It is also evident that these people are living in so much sub standard condition that their expectation level is also quite low compared to minimum standard of living as decided by the planners. These findings were achievable only because of the special kind of data collection technique used in this study that is the Participatory Rural Appraisal (PRA) method. This method is very useful to reach poor slum dwellers and learn their opinion and views over sanitation and hygiene. Some limitations have been faced while applying the PRA tools in urban setting. Such as slum dwellers

do not want to give time for drawing diagrams as they think of it as wastage of time. Another is these type of exercises raises their expectation of getting some facility or free services. Another is they do not want to draw same kind of map again and again. These limitations can be overcome by explaining the purpose of the exercise clearly and honestly to the slum dwellers. At the same time after the completion of base map the facilitators can prepare several copies of it to use it for further investigation. In this way problem of disappointment and annoyance can be solved. However PRA method is a very powerful tool for planning utilities in low income urban settlement and empowerment of poor people in the planning process.

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