

ASSESSMENT OF WATER SUPPLY, SANITATION AND DRAINAGE FACILITIES OF SOUTH BEGUNBARI SLUM, DHAKA, BANGLADESH THROUGH PARTICIPATORY RURAL APPRAISAL (PRA) METHOD AND PROPOSING UPGRADING SCHEMES

Shahadat Hossain Shakil¹
E-mail: shshakil.buet@gmail.com
and

Tazrina Habib Ananya, Dr. Ishrat Islam, Naila Sharmin
Department of Urban and Regional Planning
Bangladesh University of Engineering and Technology, Dhaka – 1000, Bangladesh

ABSTRACT

This paper presents techniques of assessing the present state of water supply situation, sanitation condition and drainage system of an area by using Participatory Rural Appraisal (PRA) method. South Begunbari Slum, Dhaka has been selected as the study area for this study. Several participatory planning tools have been adopted in course of the study for determining the present scenario of the previously mentioned utility facilities in the selected study area. Finally some recommendations have been specified to develop the overall condition. Local people's participation has been ensured to the maximum limit during the study. Bottom-up approach of planning through PRA method has been demonstrated here. Existing scenario, local peoples vision and assessment of the prescribed needs with regards to the country standard has been also performed.

Key words: PRA Method, Water Supply, Sanitation, Drainage, Begunbari Slum

I. INTRODUCTION

Dhaka had a population of over 15 million in 2010 making it the 9th largest city in the world. The situation is getting more complicated by consistent burden of the new migrants, around 2,100 people every day [1]. Along with existing population these migrating population need potable water, sanitation services, and a wastewater system that keeps the city free of disease and ensures sustainable development [2].

In this study the tools of participatory planning has applied on the local people of South Begunbari slum to identify their problems as well as to find a better solution. The objectives of this study are:

- (1) To explore the present condition of Water, Sanitation and Drainage facilities.
- (2) To identify the problems related to Water, Sanitation and Drainage and their corresponding causes and effects.
- (3) To provide some proposals for the improved water, sanitation and drainage provision

¹Corresponding Author

II. METHODOLOGY

Some sequential tasks have been performed for this study. The steps followed to achieve the objectives have been discussed below. Only the name and purpose of the PRA tools are mentioned here shortly. Detail methodologies and finding from every tool will be described in the upcoming sections.

Formulation of Objectives

At the beginning of this study the specific objectives has been established.

Selection of Study Area and Secondary Data Collection

South Begunbari Slum has been designated as the study area considering the criteria - at least 100 HH (household) within the study slum. Then relevant secondary data about the slum has been collected.

Reconnaissance Survey

Reconnaissance survey has been conducted to get an overview about the study area regarding the three issues – Water Supply, Sanitation and Drainage. Contact persons and tentative participants groups have been formulated for future consultations.

Social and Resource Map Drawing

Social Map and Resource Map has been drawn by the participants from the slum. Social and Resource maps help to identify the physical arrangement of the area.

Daily Activity Schedule Preparation

Daily activity schedule of the inhabitants of the study area has been made in consultation with the participants from the slum. The main outcome of this schedule is to identify the peak and off-peak hour of demand in case of water and sanitation.

Seasonal Diagram Formulation

Seasonal diagram has been formulated to depict the seasonal variation related to water supply, sanitation and drainage facilities.

Pair Wise Ranking of the Causes behind the Problems

Pair wise ranking has been carried out to sort the out main causes behind the main problems of the facilities.

Formulation of Cause-Effect Diagram

Cause-Effect diagram has been devised to get a rapid consensus about the issues, problems, causes, effects and their interrelationships under one roof.

Need Assessment

Participants have been asked about their need and a table has been constructed to depict their desire about the utility facilities.

Analysis

Present situation, need assessment, standard guidance, and scope of renovation have been analyzed to suggest the potential improvement proposals.

Proposals for Upgrading

Virtually possible solutions, their implementation strategy and spatial location (map) has been finally prepared.

III. PRESENT SCENERIO OF THE FACILITIES

A. Present Condition of Water Supply, Sanitation and Drainage Facilities

To explore the existing provision of water supply, sanitation and drainage facilities of Begunbari slum Social and Resource map had been used. Social and Resource map are widely used tools in participatory planning which focuses on the natural and social resources in the locality and illustrate the characteristics of the area. These are drawn by local people and it is not drawn in scale. As the

local people are considered to have an in-depth knowledge of the surroundings where they have survived for a long time, the map drawn by them is considered to be accurate and detailed [3]. The major findings about the facilities have been summarized below:

Water Supply

The water supply system of Begunbari slum is supported by tube-wells. Those tube-wells are connected with legal supply line of WASA. On an average, every 50 households have one tube-well.

Sanitation

Group of houses has a common place for sanitation consists of a number of latrines and washrooms. Those toilets are shared by the dwellers of different households inside any particular group of house.

Drainage

Individual houses have their own piped drainage system. In some houses, the systems are open; in some houses, the systems are covered. The drainage system for the whole Begunbari slum connects with the 'Begunbari Khal' for disposal. Sometimes the last end of the access road gets inundated because of heavy rainfall and the maximum depth of water logging is near about 1.5 feet.

Present scenario of water supply, sanitation and drainage facilities has been shown in Figure 1.

B. Daily and Seasonal Variation in Activities Related to Water Supply, Sanitation and Drainage

a) Daily Variation in Activities Related to Water Supply, Sanitation and Drainage

To explore the daily variation in activities related to the facilities, Daily Activity Schedule has been used. Daily activity schedule is a PRA method which is used to explore the activities of an individual, group or community on a daily basis. In a daily activity schedule different activities taken up along with their duration and are marked against the 24-hour time line [3]. Outcomes from daily activity schedule have been described below:

Water Supply

Availability of Water: Water supply system is quite well and decent in South Begunbari slum. In this slum WASA is the only water supplier. There are common taps and tube wells for a group of people in this slum which are connected with the WASA supply line. People living in this slum suffer less from scarcity of water. They get water almost all day long.

Water Use: In South Begunbari slum a rush occurs at 7:00 AM to get water for freshen up and for using toilets be-

cause most of them have a hurry to go to their works. Women slum dwellers collect water for regular household activities like cooking and washing utensils in between 7:00-8:00 AM. After that, they use a huge amount of water to clean their utensils and clothes. Those, who cannot get scope or time to cook lunches in the morning, cook their lunch at around 1:00 PM. At around 2:00 PM, people of that area normally go to bathroom to take their bath and washes their utensils. So in this time, a queue is made sometimes. At 5:00PM, workers who live there, come back to their house and take their bath. Women made the dinner at 8:00pm, then take their supper and again wash the utensils.



Figure 1: Existing Condition of Water Supply, Sanitation and Drainage

Waiting Time: In South Begunbari Slum, generally rush happens in three times a day. Once is at 7:00-8:00 AM when people need water to freshen up them. It takes 15-30 minutes to collect water at this time. Second rush is at 2:00 PM. In this time, residents need water for taking their bath for which they have to wait for 15-20 minutes. Third and last rush is at 5:00pm when all workers come back from their work and need water for freshen up, and then the waiting time is here around 15 minutes.

Sanitation

Condition of Toilet: Toilet condition of South Begunbari Slum is quite acceptable. All residents have 'pucca' toilet. Almost every night the toilets are being cleaned by the sweepers who are appointed by the managers for particular group of houses. Over flowing of sludge occurs occasionally in this slum.

Daily Demand: Early in the morning, at 7:00 AM, almost all residents go to use toilets and washroom. At around 2:00 and 5:00 PM, a large number of people go to use the washrooms for bathing.

Waiting Time: At 7:00 AM, people living in this slum have to wait in queue for 10-15 minutes to use the toilets. 5-10 minutes is the waiting time at 2:00 PM. Slum dwellers have to wait 10-15 minutes to use the toilet at 5:00 PM as at that time workers come back to their houses at a time and want to use the toilets simultaneously.

The daily activity schedule has been shown in Figure 2.

b) Seasonal Variation in Activities Related to Water Supply, Sanitation and Drainage

To explore the seasonal variation in activities related to water supply, Sanitation and Drainage, seasonal diagram has been used. Seasonal diagram is also called seasonal calendar or seasonal activity profile or seasonal analysis. Seasonal diagram is one of the popular PRA methods that have been used for temporal analysis across annual cycles, with months or seasons as the basis unit of analysis [3]. The findings from seasonal diagram have been explained below and illustrated at a glance in Figure 2.

Availability of Water: Water is adequately available all over the year except in the summer (April-July). In the days of summer there is scarcity of water due to supply shortage from Dhaka WASA.

Adjacent Water Source: Inhabitants of South Begunbari slum collect water from their adjacent neighborhoods WASA's supply line in case of water shortage (during summer). During the discussion they have mentioned that they collect water from the nearer 'Ansar Camp' also. Using water of adjacent lake is not possible as an alternative source because of its high level of pollution.

Quality of Water: Quality of water in terms of color, taste and odor is satisfactory all over the year except in the rainy season (June-August). Odor problem is obvious in the rainy season because of leakage in the WASA's supply pipelines.

Waterborne Diseases: Different kind of waterborne diseases like Diarrhea, Dysentery, Jaundice, and Typhoid is experienced during the summer and rainy season (April-August) for bad quality of water mentioned earlier. Fever, Influenza, Headache is faced by the inhabitants during winter season (November-February).

Water Demand: Use of water reaches peak during the summer season (April-July) resulting water shortage mentioned earlier. In the rest of the year water demand is moderate to low.

Time	7:00 AM-8:00 AM	9:00 AM-12:00 PM	1:00 PM-2:00 PM	3:00 PM-4:00 PM	5:00 PM-8:00 PM	9:00 PM-10:00 PM
Availability of Water						
Waiting Time for Water 5 min:						
Waiting Time for Toilet 5 min:						
Demand for Water						
Demand for Toilet						

*Participants: Nargis, Nijam Uddin, Rahela, Parveen
Facilitators: Ananya, Shanta, Kuhu, Shakil and Khaled*

Figure 2: Daily Activity Schedule: Water, Sanitation

Condition of Toilet: Toilet condition has been found satisfactory during the discussion about seasonal diagram. Some problems are faced by the people during the summer season (April-July) when ample of water is not available for regular cleaning resulting a filthy condition.

Water Logging: Water logging occurs in some selected narrow roads of this area during the rainy season (June-

October). Sometimes water logging is also experienced due to blockage in the sewerage line. The duration of water logging due to rainfall is 1 to 2 hours. The depth of water logging is 6 inch to 18 inch

C. Problems regarding Water Supply, Sanitation and Drainage and Corresponding Causes and Effects

The problems, causes and their effects of water supply, sanitation and drainage will be discussed in this portion. Two PRA tool has used for this purpose; they are Pair-wise ranking and Cause Effect diagram. Pair wise ranking is a structured method for ranking a small list of items in priority order [3]. At first the problems related to water supply, sanitation and drainage were identified with the help of slum dwellers. Then the causes behind those problems were questioned to the participants. Then the effects created by those problems were examined and all the information's were noted down. A list of problems and causes was made for the three issues followed by development of a matrix with all the causes to rank them. Each box in the matrix represents the intersection (or pairing) of two items. Then each pair has been ranked. Finally the frequency of each cause has been counted by the number of times they appears in the matrix. The pair wise rankings for the three issues have been given in Appendix (Figure A1, A2 and A3).

a) Findings from Pair-wise ranking

Findings from pair wise ranking have been given below:

Months	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
Availability of Water												
Use of Adjacent Water Source												
Quality of Water: Good: Bad (odor problem):												
Water Demand High: Low:												
Condition of Toilet Good: Filthy:												
Water Logging Depth: 6 inch:												
Disease												

*Participants: Nargis, Nijam Uddin, Rahela, Parveen
Facilitators: Ananya, Shanta, Kuhu, Shakil and Khaled*

Figure 3: Seasonal Diagram

Water Supply

According to the number of frequency, main problem of water supply for the people of Begunbari slum is insufficient number of water taps with respect the population of the slum (Appendix: Figure A1). Second problem of water supply is high demand in peak hours. At morning and evening when most of the dwellers go to work and return back from the work respectively, people have to wait for a long time then. Slum dwellers have another problem of insufficient amount of water supply. It occurs only in summer. Last but not the least problem is bad quality of supplied water of WASA but this incident is very occasional.

Sanitation

Most important cause behind sanitation problem is insufficient number of toilets which reflects in the pair-wise ranking table (Appendix-A: Figure A2). Number of people is too much in with respect to the number of toilets. As many people use one toilet, it is needed more maintenance which is absent in this slum.

After Pair-wise ranking the major causes were selected for Cause Effect diagram (Figure 4). The main causes derived from the Pair-wise ranking and their corresponding effects are focused in cause effect diagram.

b) Findings from Cause-Effect Diagram

Water supply

In case of water supply there are two major problems such as shortage in water supply and inconvenient quality of water. These two problems are mainly become severe in summer.

Shortage in Water Supply:The main causes behind the shortage of water supply are insufficient water supply from WASA, insufficient number of taps and tube wells and high demand in peak hour. The people of this slum suffer because the seasonal variation of water supply from WASA. This problem becomes severe in summer. In summer water demand gets high but water supply is not sufficient.

The water taps and tube wells are not sufficient for supporting all the slum dwellers. There are one tap or tube well for 50 households consisting of nearly 250 people. In peak hour when a large number of people need water for various purpose this small number of water points cannot fulfill their requirement. Shortage in water supply affects the dwellers in many ways. It disrupts their daily life and they have to wait for a long time for collecting water in peak hour. They cannot reach to their work place in time because of the waiting time which leads to economic loss.

Deterioration of Quality of Water:Sometimes the quality of water is not convenient for use mainly in summer season. In summer the quality of supplied water from WASA deteriorates because of lack of maintenance. A For using this water sometimes people suffer from different waterborne diseases and the water become unable to drink because of bad odor.

Sanitation

The main problems regarding sanitation in south Begunbari slum are insufficient provision of sanitation and filthy condition of toilets.

Insufficient Provision of Sanitation:The causes behind

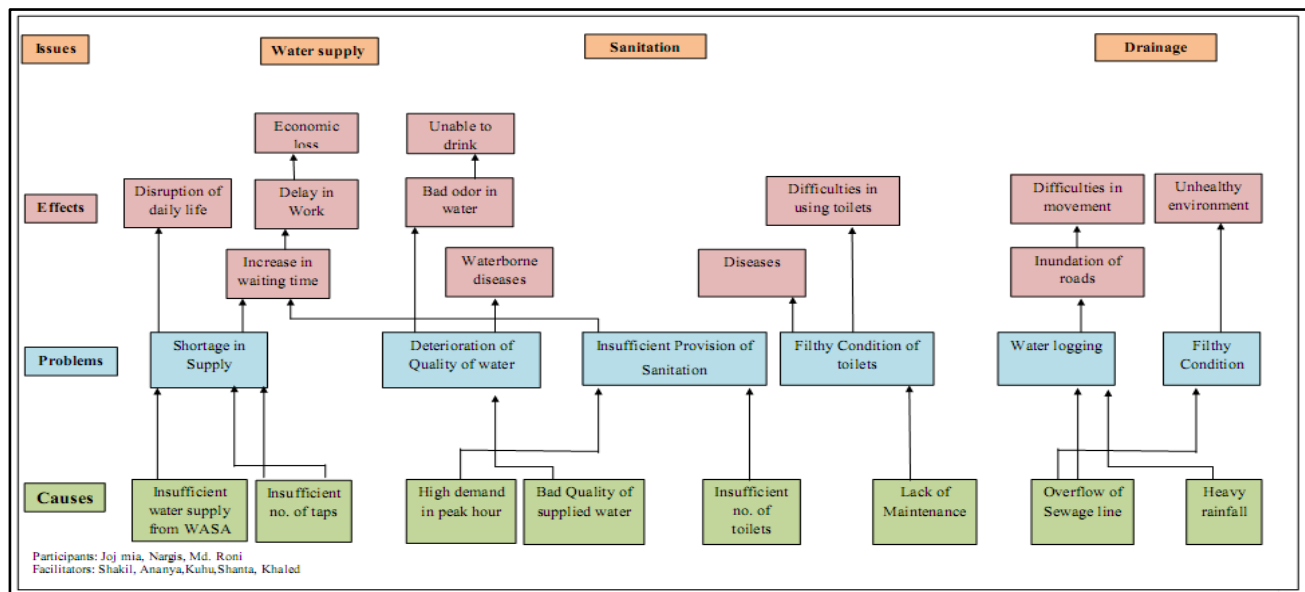


Figure 4: Cause-Effect Diagram

Sanitation problem is insufficient number of toilets and huge demand in peak hour. There is one toilet for 16 families or 80 people which is not sufficient. In peak hour people have to wait for using toilets and they get late to their work which results to economic loss.

Filthy Condition of Toilets: Sometimes the toilets become filthy because of lack of maintenance. It creates difficulties in using toilets and also becomes a cause of diseases.

Drainage

In case of drainage the main two problems are water logging and filthy condition of roads. The main reasons behind these problems are heavy rainfall during rainy season and outflow of sewage line. It creates an unhealthy condition and inundation of roads for which people face difficulties to move from one place to another.

IV. NEED ASSESSMENT AND FINAL PROPOSAL

A. Need Assessment

To assess the need of the slum dwellers they were asked about their need and what they want for a better living. This information was gathered by a focused group discussion (FGD). The information gained from the discussion has been summarized below:

Water Supply

In case of water supply the residents of South Begunbari slum face some problems during summer season like odor problem and insufficient supply from WASA. In that times they have to collect water from some other water sources to have a solution of this problem. According to their opinion in most of the houses residents are satisfied with the provision of water points except having some problems during peak hours. In peak hours they have to wait for collecting water. So in most of the houses residents have given an opinion to establish one or two new tube wells / water points. In case of providing new facilities they are fully dependent on the owner, they don't have any plan to take any initiatives all together.

Sanitation

The existing sanitation facilities of South Begunbari slum are provided commonly for a cluster of houses as well as the water supply facilities. In most of the houses one toilet is provided for 8-10 households. In normal situation most of the dwellers are satisfied with the existing facilities except in the peak hour. In peak hour they have to wait for a long time especially in those houses where density of households is relatively high. To overcome this problem, in most of the houses dwellers want one or two more toilets. In two houses there are 'katcha' toilets and the dwellers wish to have

'pucca' sanitary toilets. In every house the manager appoint a person for the maintenance of the toilets. But the appointed persons don't perform their duty regularly. For this reason sometime the toilet becomes filthy but the slum dwellers don't have any collaborative initiative to solve this problem.

Drainage

There are separate drainage provisions in each of the houses for discharging the waste water, sewerage; and most of them are well constructed and don't causes water logging. In some houses the drainage pipes are open and the dwellers wish to make it covered. They also want proper maintenance of drainage facilities which is done by the appointed person of the manager. There are two sewerage pipes to discharge the waste water and sewerage to 'Hatirjheel Lake'. But the diameters of these two pipes are very narrow which causes water logging on the end of the roads. To get rid of these problems the dwellers think that there should be one more drainage pipe for discharging the waste water, sewerage and the outlet of the pipes should be wider.

The existing provisions, needed provisions, standard provisions as per DPHE (Department of Public Health Engineering, GoB) [4] and the proposed provisions have provided below in Appendix (Figure A4, A5).

B. Proposals for Improved Water Supply, Sanitation and Drainage Facilities

For providing some proposals to improve the scenario of water supply, sanitation and drainage provision of Begunbari slum several factors have been considered. In this regard the needs of the dwellers, standard of DPHE and other relevant factors have been considered carefully. If a comparison is made between the needs of the dwellers and the DPHE standard, then in most of the cases it is noticed that the provision of DPHE standard is higher than the needed provision. But the gap between their needs and the standard provision is not very significant. In this section some measures will be suggested by considering both the need of the dwellers and also the standard of the DPHE.

Water Supply

In most of the houses they need some new water points to overcome the problems. But it is not possible to provide them the facilities as per as the DPHE standard because of space constraint. Considering these issues a convenient number of new water points are suggested for a cluster of houses which will reduce their sufferings as well as feasible to establish.

Sanitation

In case of sanitation facilities the dwellers are in need of some new provisions for both male and female. But it is not possible to provide the sanitation facilities as per as the standard of DPHE because of lack of space. So a convenient number of toilets are suggested here by considering the need of the dwellers.

Drainage

The drainage situation of South Begunbari Slum is satisfactory and well-constructed. It should be maintained regularly to ensure a clean environment. There is uncovered drain in some houses which should be covered. A new drainage pipe should be established there with wider outlet for reducing water logging during heavy rain.

Management and Maintenance

In case of maintenance there is some lacking which causes sufferings for the dwellers. The person who is appointed by the manager for maintenance of the facilities is not regular in his/her work. In this case the dwellers should be more conscious about this issue. The dwellers can make a committee and the committee will take the responsibility of maintaining the facilities. The committee members can do the job by altering. In this way they could get a clean and hygienic environment. The dwellers should also be conscious about establishing new facilities. They should inform the owner about their necessity. As most of the dwellers are poor it is very difficult for them to establish new facilities with their own cost. NGOs can play a vital role in this case by providing them with some new facilities. Government should also take some initiatives to solve the problems of the slum dwellers.

Problems in providing New Facilities

Insufficient Space: Major problem to provide new Water, Sanitation and Drainage facilities in South Begunbari Slum is shortage of space. This slum is structured in such a dense way that there is hardly any space for future expansion. Most of the cases boundaries of the adjoining buildings are overlapped. Owners consider only their profit maximization and thus allowing lowest possible space for these utility facilities. In most of the houses there is no space to provide even a single new facility.

Deficiency in Community Bonding: Most of the inhabitants in this slum are bachelor day laborer, garment worker, household maid. They usually live as a group in a single room. They are out of their home for work for a long time. This results in a deficiency of community bonding among the inhabitants of this slum. For weaker community bonding their unified perception about the problems was hardly achieved. They are also reluctant

about participating as a whole in the cost sharing and maintenance process of the facilities which will be supplied in future.

Impermanent Tenure ship: Residents of this slum stay here for a shorter time period because of impermanent nature of their job, evacuation of illegal slum by the authority, hazard (fire, flood) etc. This creates impermanent tenure ship nature among the inhabitants which also leading to deficiency in community bonding.

Absence of NGO Intervention: NGOs are working in most of the slums of Dhaka city but unfortunately at present no NGOs are working here. Some co-operatives running their business here mainly focused on micro-credit.

Lack of Government Intervention: Intervention of the government's relevant organizations such as DPHE, DCC (Dhaka City Corporation) and others is absent in this slum. Present and future guideline has not yet cleared about the betterment of the inhabitants of this slum by these organizations.

V. CONCLUSION

In this study several participatory tools have been used to ensure the active participation of local people. Participatory Rural Appraisal (PRA) allows local people to address their own priorities for development and get them incorporated into development plans. According to the methodology of this study, existing situation of the service facilities could be assessed for the other slums of Dhaka city and improvement schemes can be formulated.

REFERENCES

- [1] Hanchett, S., Akhter, S., Khan, M. H., Mezulianik, S., & Blagbrough, V. (2003). Water, sanitation and hygiene in Bangladeshi slums: an evaluation of the WaterAid-Bangladesh urban programme. *Environment & Urbanization*, 15 (2), 43-56.
- [2] Capacity Building Service Group. (2010). *Ensuring Services to Slum Dwellers: Dhaka WASA Organisation for Low Income and Slum Community Water Service Delivery*. Dhaka: Water and Sanitation by Urban Poor (WSUP).
- [3] Kumar, S. (2002). *Methods for Community Participation: A Complete Guide for Practitioners*. New Delhi: Vistaar Publication.
- [4] Government of the People's Republic of Bangladesh. (1998). National Policy for Safe Water Supply & Sanitation 1998. Dhaka: Local Government Division, Ministry of Local Government, Rural Development and Cooperatives.

APPENDIX

Causes	1. Insufficient water supply	2. Insufficient no. of taps	3. Leakage in pipe	4. High demand in peak	5. Bad quality of supplied water	Frequency
1. Insufficient water supply	X	2	1	4	2	3
2. Insufficient no. of taps	2	X	2	2	6	8
3. Leakage in pipe	1	2	X	4	0	0
4. High demand in peak	4	2	4	X	4	6
5. Bad quality of supplied water	1	2	5	4	X	1

Participants: Joj mia, Nargis, Md. Roni Participants: Joj mia, Nargis, Md. Roni
Facilitators: Shakil, Ananya, Kuhu, Shanta, Khaled

Figure A1: Pair-wise Ranking for Water Supply Problem

Causes	1. Overflow of sewage	2. Heavy rainfall	Frequency
1. Overflow of sewage	X	1	2
2. Heavy rainfall	1	X	0

Participants: Joj mia, Nargis, Md. Roni Participants: Joj mia, Nargis, Md. Roni
Facilitators: Shakil, Ananya, Kuhu, Shanta, Khaled

Figure A2: Pair Wise Ranking for Sanitation Problem

Causes	1. High demand in peak	2. Lack of maintenance	3. Insufficient no. of toilets	Frequency
1. High demand in peak	X	2	3	0
2. Lack of maintenance	2	X	3	2
3. Insufficient no. of toilets	3	3	X	4

Participants: Joj mia, Nargis, Md. Roni Participants: Joj mia, Nargis, Md. Roni
Facilitators: Shakil, Ananya, Kuhu, Shanta, Khaled

Figure A3: Pair Wise Ranking for Drainage Problem

SI No.	No. of Storey	No. of Households	Existing No. of Water Point WT/TW	Needed No. of Water Point	Standard No. of Water Point	Proposed No. of New Water Point	Remark
1	1	9	TW-1	1	1	1	ATN
3	3	24	TW-2	2	3	1	ATS,SC
4	2	8	TW-1	1	1	0	SC
5	2	24	TW-2	2	3	2	ATN
7	2	48	TW-2	2	5	2	ATN
8	3	44	TW-2	2	5	2	ATN
9	2	90	TW-4	10	9	2	SC
10	2	36	TW-2	3	4	1	SC
11-16	1	98	TW-2	3	10	3	SC
17	2	20	TW-1	1	2	1	ATN
18	2	23	TW-1	1	3	1	ATN
19	3	40	TW-1	2	4	2	ATN
20	2	22	TW-1	1	3	1	ATN

WT = Water tape, TW= Tube well, K= Katcha toilets, P= Pucca toilets, M= Maintenance needed,
C= Covered drain, O= Open drain, S= Satisfactory, U= Unsatisfactory N= New facility needed
ATN= According To Need ATS= According To Standards SC= Space Constraint

Figure A4: Need Assessment Table for Water Supply

SI No.	No. of Storey	No. of Households	Existing No. of Toilet P/K	Needed No. of Toilet	Standard No. of Toilet	Proposed No. of New Toilets	Remarks	Existing Drainage Facility C/O & S/U	Needed Drainage Facility N/M
1	1	9	P-1	1	3	1	ATN,SC	C & S	-
3	3	24	K-3	2	7	2	ATN,SC	C & S	-
4	2	8	K-1	1	2	1	ATN,SC	O & U	M
5	2	24	P-6	2	6	0	SC	C & S	-
7	2	48	P-9	1	12	1	SC	C & S	-
8	3	44	P-8	1	11	1	ATN,SC	C & S	-
9	2	90	P-9	5	23	2	SC	C & S	M
10	2	36	P-3	2	9	1	SC	O & U	N
11-16	1	98	P-6	4	25	3	SC	O & U	N
17	2	20	P-2	2	5	1	SC	C & S	-
18	2	23	P-2	2	6	2	ATN	C & S	-
19	3	40	P-3	2	10	2	ATN	C & S	-
20	2	22	P-3	2	6	2	ATN	C & S	-

WT = Water tape, TW= Tube well, K= Katcha toilets, P= Pucca toilets, M= Maintenance needed,
C= Covered drain, O= Open drain, S= Satisfactory, U= Unsatisfactory N= New facility needed
ATN= According To Need ATS= According To Standards SC= Space Constraint

Figure A5: Need Assessment Table for Sanitation and Drainage