

ASSESSMENT OF WATER SUPPLY FACILITIES FOR URBAN POOR IN CHITTAGONG CITY

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ABSTRACT

Water is one of the most important elements in human life and also recognizes as a social as well as economic commodity. So Water supply is a critical and important factor for public health and economic development of a country. Rapid and unplanned urbanization hamper the water supply systems and creates great challenges to the availability and quality of water in the urban centers of Bangladesh. Chittagong is the second largest city of Bangladesh and commercial capital of the country. Urban poor settlements are also an integral part of Chittagong city, 53.6 % of its total population are poor. They are suffering from various problems; water supply is one of them. Chittagong Water Supply & Sewerage Authority is responsible for providing water, sewerage and storm water drainage services in Chittagong city area. But CWASA can provide its service only 50% of its total population. This research provides a sort of knowledge about how poor people have to manage their daily water demand from alternative sources and tried to indicate and analyze the ongoing multi-faceted problems, with slight concentration on formal and informal water supply and distribution in poor areas. The general conclusion of this research is urban poor people have certain level of capacity and willingness to pay for water but for that there should be an intergraded and pro poor policy for water supply and monitoring system. Therefore, proper monitoring system as well as honesty and responsibility of public representative in service providing agencies is very much essential.

Keywords: *Urban poor, Water supply system, Vendor's water, Pro-poor strategy*

1. INTRODUCTION

Water recognizes as a social as well as economic commodity. (WATSAN, 1998). Water is central to the way of life in Bangladesh and the single-most important resource for the well-being of its people. It sustains an extremely fragile natural environment and provides livelihood for millions of people. (WARPO, 1999). As Water is an important element in human life, the Water supply is a critical and important factor in public health and economic development in all part of the world mostly needed in the developing countries like Bangladesh. Water pollution and scarcity of fresh water are the burning issues in the world. The increasing scarcity of water with rapid population growth give reason for more concern and the need of proper management system of water. Due to rapid population growth, unplanned urbanization, surface water pollution and continuous ground water extraction hamper the sustainability of ecosystem and the cause of destruction in environment. However, it is quite difficult to fulfill the demand of urban poor, if there is a shortage in water availability from the existing sources imposed by water quantity and quality issues. The urban poor are people who cannot afford to meet the basic needs requirements in urban areas with their own income (Islam, 1996). They suffer from getting the basic needs such as water, sanitation, health, education, etc. The settlement may be defined as the residential location or space that lacks from the basic need. The lack of adequate space made of temporary materials and not strong enough to sustain during strong weather elements are characterized by a poor settlement which have been further characterized by high population density, poor environmental infrastructure and services and with income below poverty level. The slums are recognized as the poor settlements. This research provides a sort of knowledge about how poor people have to manage their daily water demand from alternative sources and tried to indicate and analyze the ongoing multi-faceted problems, with slight concentration on formal and informal water supply and distribution in poor areas.

The purpose of this report is to indicate the key constraints that must be addressed for significant reform in the urban poor sector in water supply provisions. It will be meant to be an informational tool that will help to understand and confront the problems that beset projects striving to bring water to the urban poor.

The following objectives are selected for the study:

- ✓ To study the existing condition of water supply system for the urban poor at Chittagong City Area.
- ✓ To develop some recommendation for better water supply system for the urban poor.

2. METHODOLOGY

As methodology provides the general guidelines or system of approach for achieving the objectives of an endeavor, this study is only a hypothetical work that starts with selecting some comprehensible aims. This study is also based on open ended interview of the residences of the study area as well as the people's representatives. Then there were some analysis and synthesis of the information and data to find as apparent depiction of the problems regarding to the utilities of the study area and the underlying causes. Finally the study attempts to suggest some policy guideline that could contribute to make available better utilities provision to the study area as well as others urban center of Bangladesh. Chittagong city Corporation area has been selected as the study area for studying problems of water supply provision for the urban poor. In Chittagong City Corporation, there are 5,778 poor settlements in 41 wards. These settlements are contained 301,527 households where as total households in Chittagong have been estimated at 562,500. (UPPR, 2011). On the basis of the sampling issue, the study has found 14 wards from 41 wards in where there are more than 500 households in a single settlement. The study has taken 30 urban poor settlements from these settlements which are distributed in 14 wards. The settlements are selected from all most all part of the CCC jurisdiction which settlements satisfy above issues.

2.1 Salient Feature of the Study area

Chittagong is the second largest city of Bangladesh and commercial capital of the country is located in the southeast of Bangladesh. It is situated on the bank of Karnaphully River which is surrounded by the green Hilly Terrain and the Bay of Bengal on the west. The city is located in between 22°13' and 22°27' north latitudes and in between 91°40' and 91°53' east longitudes. Under the jurisdiction of Chittagong City Corporation, the City has an area of 168 sq. km. which divided into 41 wards.

In the Chittagong City, there are 5,778 poor settlements where 27.24 percent were found to be extremely poor, 23.54 percent very poor, 27 percent moderately poor and the remaining 22.2 percent were marginally poor settlements. There are 301527 households in these poor settlements. As the total households in Chittagong have been estimated at 562,500, the proportion of poor households in Chittagong can be calculated at 53.6 percent. Thus, more than half of households in Chittagong are poor. Each ward has 140 poor settlements on average. The average size of poor settlements in Chittagong was 52.2. The size of settlement means the number of households live in each settlement. It is shown that over 55 % of the settlements where poor households live were small in Chittagong. On average the poor settlements of Chittagong were 32 years old. However, the actual age of these settlements varies from less than 5 years to over 50 years. The total area of poor settlements has been calculated as 2516.1 acres in 41 wards. It is observed that about 5.7 percent of the total area of Chittagong City, has been covered by the poor settlements. On that basis the average density of settlements in Chittagong was 2.3 settlements per acre of settlements area and the average household density in Chittagong is 120 per acre of settlements area. (UPPR, 2011)

3. ANALYSIS OF THE STUDY FINDINGS

According to the Water Supply & Sewerage Authority (WASA) Act - 1996, Chittagong WASA is responsible for providing water supply, sewerage facilities and storm water drainage services in Chittagong city area. The WASA Act-1996 provides high degree of autonomy to CWASA for performing its duties. But the present CWASA's water production capacity is inadequate (equivalent to 35% of the total estimated demand) and the pipe network is dilapidated. Currently, about 45,000 households are directly connected with treated piped water by CWASA (out of about 600,000 households in the Chittagong City Corporation area). Even then, within the current network water supply is not guaranteed on a regular basis. Other agencies (CCC and the Bangladesh Railway Authority) have attempted to provide some services as a partial stop-gap measure. A large portion of the remaining city population accesses water through shallow tube wells. The quality of this underground water is questionable, with high salt and iron levels (and possibly with arsenic contamination in some wells), posing health risks to the public. (World Bank, 2010)

Table 1: Source of Water in Poor Settlements of The Study Area

Location Name	No. of poor settlements in respect of water connection system				Total
	CWASA	Shallow Tubewell	Shallow Tubewell & Vendors Water	Railway Authority	
02	0	1	1	0	2
03	0	1	0	0	1
05	0	1	0	0	1
07	0	2	2	0	4
08	0	3	0	0	3
09	0	1	0	1	2
11	0	1	0	0	1
12	3	1	0	2	6
13	0	0	2	2	4
14	1	0	0	0	1
17	0	1	0	0	1
30	1	0	0	0	1
35	0	1	1	0	2
40	0	0	1	0	1
Total	5	13	7	5	30

(Source: Field Survey, 2014)

From the Table 1, it is revealed that there are four water sources available in Chittagong City Corporation areas. CWASA water supply coverage is available in only three wards in surveyed areas. Shallow Tubewell is present in almost all poor settlements. When people cannot enable to get water from CWASA or Shallow Tubewell, they proceed to collect water from vendors. In CWASA jurisdiction areas, the water supply is not provided timely, so people have to collect water from alternative sources or vendor's water. The vendor supply water through monthly basis payment or daily basis payment but they provide water for short time. Bangladesh Railway Authority supplies water in its jurisdiction areas. In this study, there are five study areas which are covered by Railway Authority.

Table 2: Sources of Water Supply According To the Connection Systems

Connected Water System	No. of Settlements in respect of water source					Total
	Hand Pump Tubewell	Community Well	Household water supply (piped)	Street Hydrant	Community well & Household Piped line	
CWASA	0	1	0	3	1	5
Shallow Tubewell	1	9	2	1	0	13
Shallow Tubewell & Vendors Water	2	3	1	1	0	7
Railway Authority	0	1	2	2	0	5
Total	3	14	5	7	1	30

(Source: Field Survey, 2014)

From the Table 2 it's revealed that people in poor settlements collect water from community well and street hydrant in most cases. People collect water from street hydrant and community well respectively in 7 & 14 surveyed areas. In some cases, people get household pipe line water but it is seen in few capable areas which are served by either railway authority or vendors or water point committee managed by own people. CWASA provide their water supply by street hydrant or community well in poor settlements. To collect water from shallow Tubewell, they make different provisions on the basis of their capacity. When shallow Tubewell water doesn't meet their demand they collect water from vendors by the above ways. Railway authority also provides their water supply as the same manner.

Table 3: Sources of Water According To The Consumption Purpose

Criteria of water use	Sources of Water in Selected Poor Settlements					
	Deep Tube well	Shallow Tubewell	Hand Pump Tubewell	CWASA	Vendors Water	Provided by Railway Authority
Drinking	7	9	6	4	0	4
Cooking	7	7	2	7	2	5
Bathing	7	7	2	7	2	5
Washing	7	7	2	7	2	5

(Source: Field Survey, 2014)

From the Table 3, it is seen that people prefer Deep Tubewell or shallow Tubewell for drinking water. In other cases such as cooking, bathing & washing, they prefer water which is available in his area. When they cannot enable to manage water, they use vendor's water.

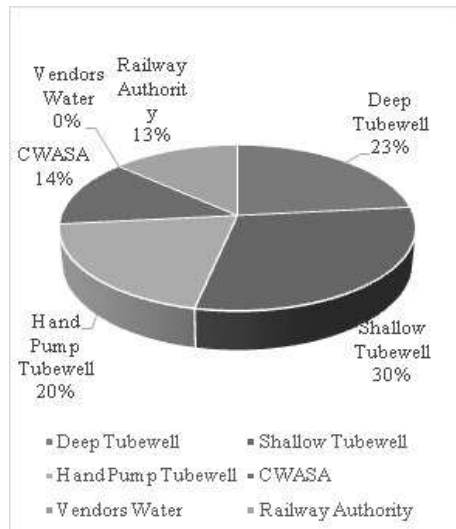


Figure 01: Source of Drinking Water

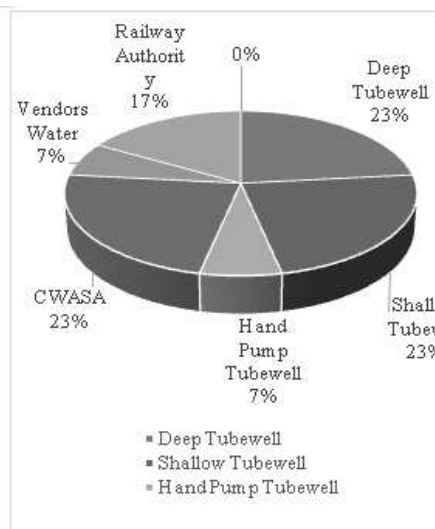


Figure 02: Source of water for others purpose

From the above Figure 1 & Figure 2, it is shown that over more than 50% people collect their drinking water from deep and Shallow Tubewell from available sources or collect it from the vendors. So, the poor people spent huge amount of money is for drinking water purpose. Few people collect their drinking water from other sources. For the others purpose except drinking water the poor people tries to use the available sources whatever they get in their area.

Table 4: Frequency of Availability of Water Supply

Frequency of Water Supply (No. / Day)	No. of Settlement	Percentage (%)
1	2	6.7
2	11	36.7
3	3	10.0
All times	14	46.7
Total	30	100.0

(Source: Field Survey, 2014)

Another important issue is frequency of supplying water per day in the poor settlements. From the Table 4 it indicated that in the study areas, there are 14 areas where people get water all the time in a day. But this provision is made by the water point committee or settlement owner. In the CWASA jurisdiction areas, people get water on the basis of location and time period. In some areas, people get water twice or only single time in a day, some cases there are some poor settlements which get water day after day. This water availability depends upon the payment of water. . Poor people have to pay for the water. The payment system varies place to place and modes of payment have different ways.

Table 5: Mode of Payment

Category of Pricing	No. of Settlement	Percentage (%)
Within House rent	11	36.7
Less 100 tk	6	20
100-500 tk	2	6.7
500-1000 tk	3	10.0
More than 1000 tk	3	10.0
Meter Unit basis	5	16.7
Total	30	100.0

(Source: Field Survey, 2014)

In the study areas, there are 11 settlements (36.7%) where the water bill is included in housing rent. 5 community (16.7 %) pay as per CWASA rate. People who collect water from Deep or shallow Tubewell which installed by the NGOs or Community itself they have to pay 100 to 500 Tk/month as for maintenance cost. The poor communities who have to collect water from the vendors, they have to spent height money for collecting water. Sometimes they paid more than Tk. 1000/month. In this study there are 30 % of the settlements who paid around or more than Tk. 1000/ month for water consumption.

Table 6: Water Pricing In Different Surveyed Areas

Settlement Name	Water Consumption (litter/household/day)	Cost (Tk/month)	Average cost (Tk/1000 litter)	Water Rate of CWASA (Tk./1000 litre)	Price Comparison	
					Actual Rate / CWASA Rate	Average higher price than CWASA
Alamgir colony	250	200	26.67	6.57	4.06	
Beltola Nalar par	500	1000	66.67		10.15	
Amin colony	800	1000	41.67		6.34	
Shingnal colony	500	100	6.67		1.01	
Wireless						
Railway colony	250	700	93.33		14.21	
Taher colony	300	500	55.56		8.46	8.23
Chairman colony	20	150	250.00		38.05	
Boshor colony	200	500	83.33		12.68	
Barma Colony	250	750	100.00		15.22	

(Source: Field Survey, 2014)

CWASA fix up the water rate for its consumer. The water consumption rate for the residential a is Tk. 6.57 / 1000 Litter. But the Table 6 revealed that the poor community have to pay more price than CWASA rate. Sometimes these rates vary from slightly higher than the CWASA rate to 38 times higher than CWASA rate. In the study it found that the poor communities averagely pay 8.23 times higher than the CWASA rate. But unfortunately this higher rate cannot insure the availability of water for the urban poor.

Table 7: Level of Satisfaction on Water Quality

Water Service Parameter	Satisfaction Level (%)				
	Very Good	Good	Moderate	Poor	Very Poor
Quality of Water	3.3	33.3	13.3	46.7	3.4
Color of Water	3.3	36.7	20	36.7	3.3
Taste of Water	3.3	36.7	26.7	30	3.3
Pressure of Water	10	23.3	20	23.3	23.4

(Source: Field Survey, 2014)

From the above Table 7, it is shown that above 46% poor people have said that water quality is poor in the study area. The water color is varied from areas to areas and taste of water is considerably good across the City. The pressure of water in some areas is good and in some areas bad.

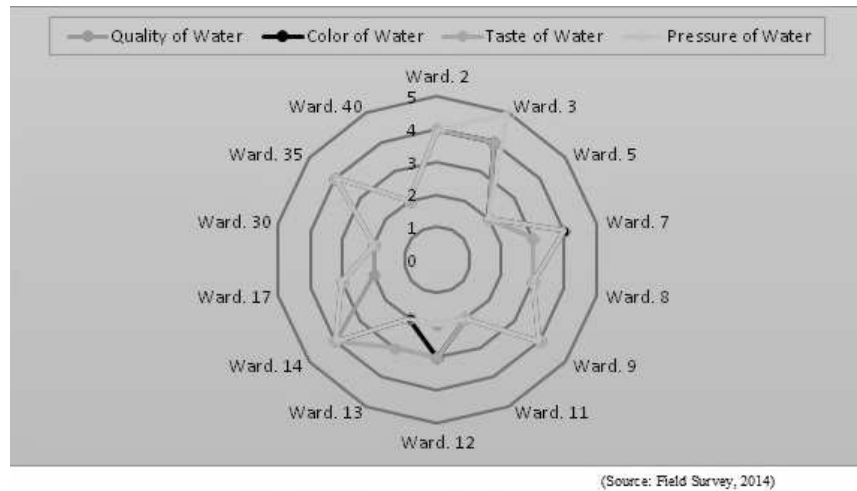


Figure 3: Ward wise Satisfaction Level of Water Service

From the above Figure 3, it is acknowledged that the above four parameters are varied from ward to ward. The numeric values correspond according to the following table.

Table 8: The numeric values correspond to Level of Satisfaction on Water Quality

Highly dissatisfied	1
Dissatisfied	2
Neither satisfied nor Dissatisfied	3
Satisfied	4
Highly satisfied	5

The pressure of water is very good in ward 3 and in other 5 wards it takes good level. The taste of water is same in most of the wards. The quality and color of water takes poor position in almost all wards in the study areas.

3.1 Relation Between Price and Quantity of Water

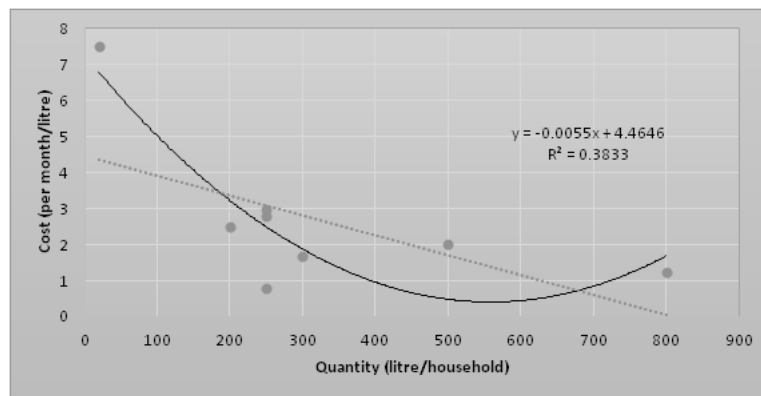


Figure 4: Relation between Consumption Quantity & Cost

From the above Figure 4, it has been seen that R square value is 0.3833. So, the value of correlation coefficient R is 0.619. As the value of R lies between correlation value ranges 0.5 – 0.8, the cost for water is moderately correlated with quantity of water. The downward sloping demand curve indicates the “decreasing marginal value” of water. The first five liters of water per capita per day will be extremely valuable as they are necessary to sustain life. This is illustrated by nonlinear curve in Figure 4. The second five liters will also be valuable, (e.g.

in their use for hygienic purposes). The next five liters are valuable for food preparation, cooking and washing of clothes. All other factors being equal, for each additional increment of water, the marginal value of water tends to decline as the individual is putting the water to less and less valuable uses. Consequently, the individual's willingness to pay for each increment of water will gradually decrease.

From the Table 6, it revealed that people pay more for drinking water purpose in Chairman Colony (Ward No-35), people buy water more than 38 times of usual rate of CWASA. When they buy water for day long, quantity is increased and price is decreased. In Amin Colony, people pay for water more than 6 times. Both sources are expensive, because they are buying from vendors. But water price is varied according to the quantity.

3.2 Preference between Street Hydrant and Household Connection

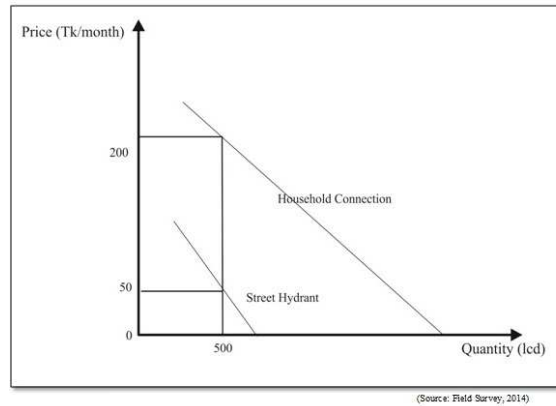
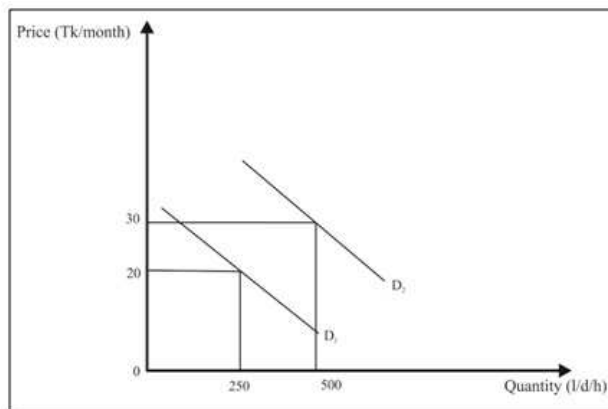


Figure 5: Preference between Street Hydrant & Household Connection

Up to a certain point, an individual is prepared to pay a higher price for a product with a higher quality. For the same “quantity” of water, an individual will be willing to pay a higher price for a higher quality product. For example, consumers are normally willing to pay a higher price for water from a house connection than for water from a street hydrant. In this case, there are two different demand curves: one for house connection and one for street hydrant as shown in Figure 5. In the study area, people having in household water connection such as in Beltola Nalar par (Ward No-07), pay more than the other sources. When people get water from street hydrant, they pay little as the cost is distributed over the whole people. But in case of street hydrant people get limited water. When the quantity is increased than the usual demand in household connection, the overall price is also decreased. In the Figure 5, people get same quantity of water but pay different amount depending on the connection system. In the surveyed area, Shignal Colony (Ward-12) get water 500 liters per household for 50 Tk. but water comes one after one day, on the other hand in Abbas Company Bari, Shohedpara (Ward -03) pay for same quantity in monthly BDT 200.

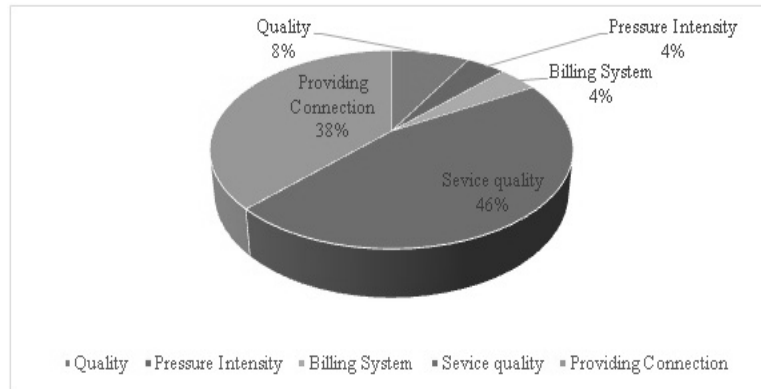


(Source: Field Survey, 2014)

Figure 6: Change in Water Demand

An increase in income will cause the demand curve for water to shift to the right (from D1 to D2), as illustrated in Figure 6. From the surveyed area, Raily Jute Colony (Ward NO-30) has CWASA connection but the water quality is not good and sufficient. So, the community has set up shallow tubewell which has increased their quantity of water demand. In the Figure 7, In Raily Jute Colony (Ward NO-30), people get 250 liter per household per day from CWASA but setting shallow tubewell they have increased their water consumption amount.

3.3 Scope for Water Improvement Provisions



(Source: Field Survey, 2014)

Figure 7: Opportunity for Improvement

The study areas are facing water shortage. This is acutely observed in dry season which is varied from April to July. There are 22 study areas from 30 areas which are facing water scarcity. From the figure, 46% of the surveyed slums want to improve service delivery in their existing water provisions and 38% of the slums want to set up water connection.

3.4 Willingness to Pay

Willingness to pay or contingent valuation is a method of estimating the non-market value of environmental amenities such as the value of safe drinking water. These values are measured based on the willingness to pay of the consumers for improved environment. In this case, the benefit of the project is assumed as the monetary value of WTP derived from the survey. The interesting aspect of the contingent valuation method is that it allows to estimate total value rather than components of that value. The method is appropriate and well known for valuation of environmental amenities. The people buying water from vendors are suffered high water rate. On the basis of their capacity, they want to pay for water between 50-60 BDT.

4. CONCLUSION

Chittagong City is facing water supply problems which is acute in urban poor settlements. Water is scarce in everywhere. The discussions on water supply system in urban poor areas and factors behind the situations give clear hints that the efficient participation of formal and informal organizations or various stakeholders in the management and development of water is necessary. The study has surveyed 30 urban poor settlements in 14 wards and tried to give a scenario of existing water supply provisions in Chittagong City. For having insufficient budget or for CWASA water service limitation, the poor have to buy water from vendors more than 8 times higher than the usual water rate. The expense for water is set higher percentage of their income. As CWASA is not directly involved with the poor, public participation in decision-making is not encouraging and politicians do not care about this urban poor settlements because it is regarded as an informal settlement and thus no efforts for basic services are made. It is the time to work together for the urban poor only for giving their basic needs such as water supply provisions. Chittagong Water Supply and Sewerage Authority (CWASA), City Corporations, Department of Public Health Engineering (DPHE) etc. and private organizations like operational and campaigning NGOs and CBOs can work parallel for the water service delivery in urban poor settlements.

4.1 Summary & Findings

Table 9 : Summary & Findings of the Study

Responsible Authorities	Existing Conditions	Problems/ Constraints / Satisfactory	Needs
Chittagong Water Supply and Sewerage Authority (CWASA)	<ul style="list-style-type: none"> • People get water from either street hydrant or household pipe line. • Water service availability is different in different wards. • In the same settlements people have to buy water from different sources. 	<ul style="list-style-type: none"> • Fewer areas are connected by CWASA. • The cost of water connection system is hardly possible. • CWASA faces difficulty in deriving water services for land tenure. • The water quality, pressure of water and water availability is not enough good, so they have to look alternative sources. • A bigger portions of poor settlements have to buy vendors water. 	<ul style="list-style-type: none"> • Pro poor pricing. • Establishment of Land Rights. • Willingness to pay by poor people can be improved by maintaining several measures. • Vehicles water can be provided by CWASA. • Water governance should be improved.
Dushtha Shasthya Kendra (DSK)	<ul style="list-style-type: none"> • They worked for poor on the behalf of CWASA. • They mainly set up hand pump tubewell from where water is supplied by CWASA. • They maintain the whole process for few years, then they handover it to the CWASA. 	<ul style="list-style-type: none"> • They have covered little areas but they served well in the connected areas. • The area served by the DSK are performing well on the account of payment. • In some areas there are shortage of water because of limitation of providing water of CWASA. 	<ul style="list-style-type: none"> • The coverage of served areas should be improved. • They can sell water for poor at reasonable price. • They can adopt alternative options for water such as Rainwater harvesting, Installing water banking etc.
Urban Partnerships for Poverty Reduction (UPPR)	<ul style="list-style-type: none"> • They have covered large areas by the help of CCC. • They have provided deep tubewell and water reservoir. 	<ul style="list-style-type: none"> • They have raised better scenarios in the covered areas. • They have derived their water provisions by community well and poor collect the water from a certain point. • On the respect of area, they have provided more deep tubewells and reservoirs. 	<ul style="list-style-type: none"> • CCC can set up water selling mechanism for the poor. • CCC can derive the land rights for providing water services by CWASA. • CCC can engage more NGOs for providing water facilities in poor settlements.

4.2 Recommendation

The poor people face problems in getting water supply connection. For having CWASA limitations, the poor people are the most sufferers for water. They hardly manage everything which is necessary for living. Water supply is one of the basic needs in human life. If the certain authority cannot provide water, they have to look alternative sources. The following procedures can be obtained which are raised from the surveyed areas according to their facing existing problems.

4.3 Water Governance

Water governance is defined by the political, social, economic and administrative systems that are in place, and which directly or indirectly affect the use, development and management of water resources and the delivery of water service delivery at different levels of society. Water governance can be facilitated by the following ways.

- Equity and Efficiency: Principles such as equity and efficiency in water resource and services allocation and distribution, water administration based on catchments, the need for integrated water management approaches and the need to balance water use between socio-economic activities and ecosystems.
- Policies and Regulations: The formulation, establishment and implementation of water policies, legislation and institutions.
- Roles and Responsibilities: Clarification of the roles of government, civil society and the private sector and their responsibilities regarding ownership, management and administration of water resources and services.
- Pro poor Strategy: The bearing cost for water supply is hardly possible for the urban poor. The certain authority or government can take step in this case. If the cost is cross shared between the different class of people which means some level of cross-subsidy from rates charged in middle and upper income areas to cover costs that cannot be recovered from slum areas.

4.4 Coordination among Responsible Authorities

CWASA, Railway Authority, CCC are working for water supply in city area. But there lack of coordination among them. Railway authority do not negotiate with the CWASA and CCC provide deep tubewell and reservoir without the accordance of CWASA. But they have liaison with CWASA before. DSK works for poor on the behalf of CWASA. But they have no coordination with the works of UPPR project. The Local governments can bridge the gaps between the disparate authorities in water supply and service delivery, ensure that those services are part of a broader slum upgrading strategy, and document the opportunities necessary to attract additional financing. CBO could play a vital role in water supply provisions provided if coordinated approach involving all parties including the slum dwellers. They can do their works by the following ways:

- Chittagong Water Supply and Sewerage Authority: CWASA should improve the service delivery in connected areas. Where people are buying from vendors, CWASA can provide them vehicle's water, thus way the water payment to vendors will be reduced. The water rate for essential use is higher in vendors.
- Chittagong City Corporation: Chittagong City Corporation can resolve the problems about the boundary of slums for giving water connection. CCC has set up different water supply provisions in poor settlements by the UPPR Project.
- Land Tenure: When CWASA tries to set up water provisions, they face problem about land tenure. The people do not agree with the CWASA for various causes which is seen in providing LIC project by CWASA. So, CCC can provide role for resolving the conflicts. Public awareness, discussion can play a role to motivate the poor people. This is the barrier to CWASA to provide water supply connections in poor settlements without having legal land tenure. The following options can be obtained:

4.5 Willingness to Pay

The city water supply system suffers from various problems including those of technological, policy, planning, coordination and managerial aspects. So, people tend to low willingness to pay. The following provisions can improve the willingness to pay:

- Low Service Beneficiary: People get hardly better service from CWASA, so they want to set up own water supply facilities or have to buy water from vendors. The poor need water for washing, bathing etc. which are relatively lower the residential people. But lacks of mandatory set up, they are overcrowded in a street hydrant which is less than their demand. So, the service of CWASA should be improved.
- Water Billing System: The middle class people pay for water which bears small percentage of their income than the lower people. So, they are interested to take pipelined water supply connection. CWASA is mainly worked with household pipeline system. So, poor people are unable to get water connection. CWASA Water rate is lower than the vendor water, but lacks of proper monitoring system lower class people want to avoid the fees. Water billing system should be provided according to the cross subsidy.
- Costly Water Supply Connection: The initial set up provisions for water supply system is higher if they have no subsidy. The poor people cannot enable to get water supply connections for insufficient money. The poor also suffer from the bureaucratic system for getting water connections and the coordination among poor is rare if they want it together. So, the NGOs, powerful persons can provide the initial set up for people.

- Insufficient water pressure: The water pressure of CWASA should improve in slum areas as they are faced the lower pressure rate. The poor people feel confusion if they cannot enable to get proper water availability after getting high costly connection.
- Water quality: The quality of water can be improved by the maintaining proper ingredients and purification. If the water quality is improved, people will grow willingness to pay for water.

4.6 Responsibilities of NGOs

As CWASA have the limitations of served areas, the NGOs can provide their services in poor settlements for providing water supply facilities. The following measures can be taken:

- Installing Water Banking: A water bank is an institutional mechanism designed to facilitate transfers of water on a temporary, intermittent or permanent basis through voluntary exchange. It creates a more reliable water supply during dry years through voluntary trading and ensures a future water supply for various water needs. Water banks operate to make water available for future use: surface storage in a reservoir, underground storage in an aquifer, facilitating transactions among entitlement holders, and institutional banking. If they can make it, the dependency for water on CWASA will be reduced.
- Rainwater Harvesting: The poor people buy the drinking water with high cost. Rainwater harvesting can be introduced to meet their drinking water demand. The initial set up have to introduce by the NGOs. By discussion and campaigning, poor people can be awarded about Rainwater Harvesting.
- Vendors Water: When CWASA or any other water supply authorities cannot enable to provide water for slum areas, they have to buy water from vendors at the rate of high cost. The following procedures can be taken:

Table 10: Vendor's Water Supply Provisions

Vendor's Types	Water Supply Services
NGOs and small private operators can buy and resell to poor consumers.	It will applicable at the subsidized price (50% costs of the base) rates and be restricted to resell it only to the poor consumers without profit.
Small and medium enterprises who buy raw water from public utilities and reproduce for marketing.	Should be considered as 'commercial and industrial' consumers; Shall be brought under licensing system and within regulatory control.
Small and medium enterprises who run independent systems and undertake commercial marketing.	Licensing should be introduced with a reasonable fees to be determined by CWASA on where the business is operated. For ground water abstraction formal procedure should be maintained but at the subsidized price. Pricing shall be fair and equitable to the users including poor.

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