Government and NGO Provided Water Interventions and Its Effectiveness on Urban Poor: A Study in Gazipur Sadar Area

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Notes

Interventions: The action or process of intervening to improve water situation in the community (Hoque et al. 1996)

Effectiveness: Efficacy of establishing a viable source to fulfill the long-term basic water needs of the urban water insecure community

Secure Water: The capacity of a population to safeguard sustainable access to adequate quantities of and acceptable quality water for sustaining livelihoods, human well-being, and socio-economic development, for ensuring protection against water-borne pollution and water-related disasters, and for preserving ecosystems in a climate of peace and political stability (UN-Water 2013).

Urban Poor: A group of ten or more adjacent households whose housing structures are of visibly poor quality, and/or whose homes have been laid out in a non-conventional fashion without adherence to a ground plan (Mckinney 2016).

Safe Water: Safe water means water that will not harm you if you come in contact with it. The most common use of this term applies to drinking water, but it could also apply to water for swimming or other uses (USGS 2008).

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1 Introduction

Southern Asia is one of the more swiftly urbanizing regions of the world. More than 2 billion people live in urban areas; with regional urban population's 30% living in slums. In the Asian economy, estimated $10–12 billion (US) dollar is contributed by the irrigation of groundwater. Conferring to United Nations World Water Development Report (2015) nearly half of world's use of groundwater is done by China, Pakistan, Nepal, India and Bangladesh. Around 4 million people lack access to safe water and 85 million people lack the chance for improved sanitation facilities worldwide (Water Org 2018). Bangladesh's main lifeline is considered to be about 700 rivers and its tributaries, which comprise approximately 15,000 miles of total waterway (Banglapedia 2012). Millions of people in Bangladesh are directly reliant on rivers for their regular livelihoods as it provides various sources of revenue options such as agricultural, fishing and fisheries as well as transportation practices; which are unswervingly reliant on the existence of rivers. Buriganga, Turag, Dhaleshwari, Shitalakhya and Balu are the major rivers that are surrounding the Dhaka metropolitan. Rivers near the capital have been polluted due to unplanned and rapid industrialization and urbanization. Habited by huge amount of people with substandard housing Turag has long been considered as one of the highly polluted rivers in Bangladesh (Tania 2014). Industries have been up-surging over the last decade around Dhaka city (Ahmad et al. 2010). Though it uses small amounts of water compared to public usage, quality of water is affected immensely (Munnaf et al. 2015). Additionally, solid wastes from both industrial as well as municipal areas are being dumped on the open space of the Turag river bank contributing factors combine to create a huge threat for people to secure fresh water from the river with toxic odor (Halder and Islam 2015). The population of soon to be megacity Gazipur is increasing, thus the consumption of water will also immensely escalate. As a result, dearth of safe water access is going to affect most people; from city-dwellers to the poorest people. Around 88% slum dwellers in Dhaka have no access to drinking water. Subsequently, people in the Gazipur region are using contaminated water from Turag river; causing various diseases including those of the colon. There are differences in terms of characteristics, capacity and resources between rural poor and urban poor, so their needs will also not be the same. Thus, implementation of the water policy or strategy for the urban poor needs to be tailored to their specific needs. Since a poor person is less able to afford individual interventions to secure safe water, government and NGOs are more likely to intervene for them. The identified group, prior to outside interventions, had no permanent sources of water to meet their daily water need, sometimes they collect unsafe contaminated water for drinking and to ensure their daily water need from household consumption they need permanent solution.

Regarding the comparative advantages of multiple intervention types, methods and dynamics which could contribute to impact the community as a whole – very limited knowledge is available. There has been little information regarding what has been irrefutably proved concerning different intervention approaches (Campos 2008). There have been so many literatures discussing the improved situation after implementation of interventions in the community to deal with diarrhea (Clasen et al. 2004). Studies addressing the situational analysis of endemic water-borne diseases in the

global level as well (Colford et al. 2006). Water security for urban poor is a relatively new concept however if the implementation level was as robust as the policy level, for any country, water securing for urban poor ought not to be a concern (Singh and Desouza 1980; Meissner 2016; Pahl-Wostl 2016; Yang et al. 2016). So far there are not many studies completed regarding the Government and NGO interventions that in working on water security securing water for the urban poor from the context of Bangladesh. With the aforementioned arguments, specific objective of the present study is to assess the efficiency of Government and NGO provided water interventions for establishing a viable source to fulfill the long-term basic water needs of the urban water insecure in Gazipur Sadar areas, specifically Baimail Nadir Parr, Koroitola and Machimpur. This study would make a transparent depiction of the existing mechanism and their efficiency for securing water for the poor by the proper authorities.

2 Methodology

Based on the nature and set of objectives of the research, primarily qualitative and some required quantitative techniques were applied to measure the efficiency of the government and NGO provided interventions for the urban water insecure. A variable-based technique has been employed in order for the study to be supported by descriptive data obtained from varied primary and secondary sources. Focus Group Discussion (FGD), Case Study, In-depth Interview (IDI) as well as Key Informant Interview (KII) were used for gathering information about the condition and facilities provided by the interventions in Gazipur. FGDs are used for understanding the societal view towards the interventions, whereas the KIIs were developed to understand the position the NGO and the Government has in terms of installing, maintaining and evaluating the interventions. Associated variables and factors are understood through quantitative methods; household survey method has been used for collecting data from the field through purposive sampling. Qualitative data on the other hand has been collected via face-to-face interview method from the beneficiaries of those installed interventions.

Also there had to be criteria for population selection such as; the respondent would need to lack one or more of the followings –

- Permanent and durable housing that protects people from extreme climate conditions;
- Not more than three people sharing the same room or sufficient living space;
- Easy access to water (at an affordable price in sufficient amounts);
- Adequate sanitation access
- Direct user (or beneficiary) of either or both Government and NGO provided water supply interventions

For KIIs, respondents would need to be from a NGO that has worked in those aforementioned communities as well as involved in Government body (City Corporation, WASA); or involved in any leadership capacity in the community. For IDIs and Case Studies, focal person; people who are living in that area for many years or sufferers of any water-borne diseases are selected. For FGDs, participants are not

selected randomly, rather they are chosen based on their involvement in different working sectors, so that various points of views would be shared during the discussion.

2.1 Study Area

This study is to be conducted near the regions of the Turag river. For this purpose, Gazipur district has been chosen as most of the Turag river flow goes through Gazipur sadar area, other factors include industrial and municipal waste being

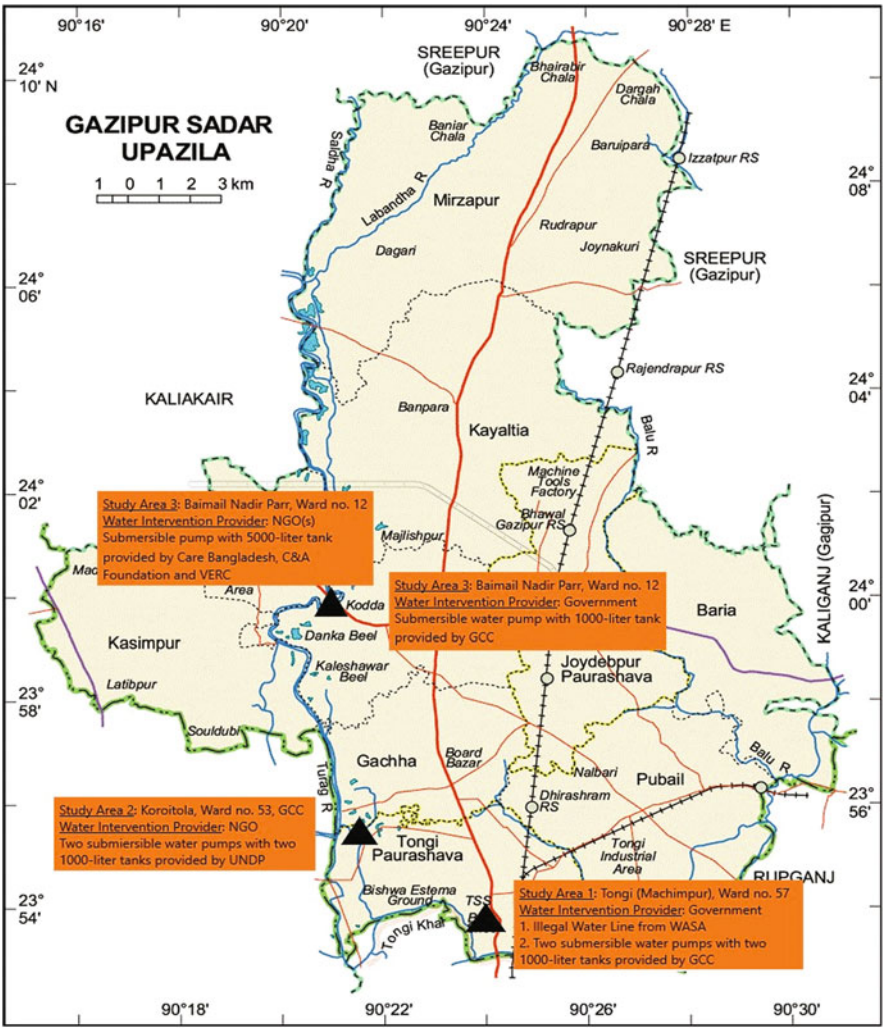


Fig. 1 Map showing study area (1, 2, and 3) in Gazipur

dumped into the river indicating that the urban poor are also dependent on the interventions, rather than on the river for safe water source (Fig. 1).

Data has been collected from three sites of Gazipur Sadar Upazila such as –

(i) Machimpur (Tongi): Ward number 57,
(ii) Koroitola: Ward number 53 and
(iii) Baimail Nadir Parr (Konabari): Ward number 12.

These wards have been selected as Turag river flows through along these areas. Hence water interventions provided by the Government and NGOs for the urban poor living near the Turag river region has been identified and studied.

2.2 *Equation for Determining Sample Size*

To determine sample size Gazipur City Corporation's ward number 12, 53 and 57 were selected based on the availability of the interventions as well as people's dependency on Turag river. Quantitative data collection was completed based on the systematic random sampling method.

To estimate the sample size Fisher's general formula is going to be used as the following:

$$n = \frac{z^2 pq}{d^2}$$

Where,

n = Sample size
z^2 = Value of standard normal variable at 5% level of confidence interval (1.96)
p = Poverty rate in percentage (0.243) (Prodhan et al. 2017)
q = (1 − p) = 1–0.243 = 0.757
d = Degree of accuracy desired, set at 0.05 for this research

Based on Fisher's formula we get a sample size of approximately 283.

However, it was difficult to select 283 houses because the frequency of houses is different in Bangladesh as Bangladesh is a heterogeneous country. Most of the residents of the study area do not fall into the category of desired respondent of the research, and so 283 samplings were not applicable for this study. To avoid that, 210 surveys will be undertaken across the three study areas.

3 Results

3.1 *Profile of the Respondents*

A total of 210 respondents have been identified based on the quantitative random sampling method, where forty-five percent (45%) males and fifty-five percent (55%)

female respondents were interviewed. Highest representation of age group is between 31–40 years, which forty-three percent (43%) respondents belong to. All household surveys were conducted based on their day-to-day reliance on either or both Government and NGO established water interventions. All of the qualitative study participants were also stakeholders of previously mentioned water interventions and were chosen systematically. All of the respondents fulfill the set-out criteria of study population selection.

Average family size of surveys' respondents is 4.27 people, which is close to the national average of 4.4 persons per household according to Bangladesh Bureau of Statistics (Prodhan et al. 2017). Majority (67.1%) of those respondents live in a nuclear family household. Sixty-six percent (66%) respondents' occupancy status is Tenant. Sixteen percent (16%) respondents are found to have never attended school, whereas nineteen percent (19%) are found only to know how to sign their names. In primary education forty-six percent (46%) respondents are found to be educated, while around nineteen (19%) percent respondents are found to be schooled in secondary level. Illiteracy level of women (12.9%) is less than that of men (20.2%); however, dropout level after completion of primary education to secondary education, for women (22.3%) is much higher than men (15.5%). Most of the respondents, thirty-seven percent (37%) are directly involved in trade/business mostly in fish; followed by twenty-nine percent (29%) respondents working in garments factory as a worker/staff. In the study area around fifty-one percent (51%) respondents' income and household expenditure group has been identified between 16,000–20,000 taka. Plus, most of the monthly savings (52%) per household category falls in the category of 1000–2000 taka.

None of the respondents use Turag river's water as a main water source for drinking and cooking, only a minimal percentage (9.5%) people use it as an alternative water source for drinking and cooking, they only do so when it rains. There is a pattern of increase in Turag river use during the wet season, both as main and alternative water source for bathing and hygiene purposes. Bulk (87%) of the respondents believe that Turag river water is not safe, while the remaining thirteen percent (13%) respondents believe that during wet season river water is usable and safer than dry season.

3.2 Government and NGO-Established Water Interventions

Out of 210 respondents 112 (53%) respondents are beneficiaries of Government installed interventions; while 98 (47%) respondents are beneficiaries of NGO installed interventions in selected study areas.

3.2.1 Intervention Providers

A number of Government and non-government organizations have been working in the selected study sites to ensure water for the people. Various initiatives and

activities undertaken by the intervention providers in the study site are discussed below:

I. **Gazipur City Corporation (GCC)**: Providers of multiple intervention facilities for the community, GCC has been undertaking initiatives to address safe water supply requirement of the people in Gazipur. Some of their facilities include:

   (a) Installing two 300 ft deep submersible pump, each having 1000-liter water tanks, that provide water for more than 100 families via public piped into dwelling method in Tongi (Machimpur), ward number 57 of GCC. First submersible was established back in 2011 while the second one was established in 2015. Families need to pay a monthly fee of 50 taka to use this facility (Fig. 2a).
   (b) Providing one 280 ft deep submersible pump with a 1000-liter water tank, that provides water for the people through public piped into yard method for 130 families in Baimail Nadir Parr, ward number 12 of GCC. Installed by Public Health Engineering Department under the project of "Creating supply source on district cities for providing water (submersible pump)", it was completed in 2014–15 fiscal year. Families need to pay a monthly fee of 30 taka to use this facility (Fig. 2b).

II. **Care Bangladesh, C&A Foundation and VERC**: Providing one 300 ft deep submersible pump with 5000-liter tank that supplies water to 85 fisherman households through public piped into dwelling method in Baimail Nadir Parr (Konabari).
   This intervention was funded by C&A Foundation, assisted by Care Bangladesh and completed by the Village. Education Research Center (VERC) under the "Building Resilience of the Urban Poor (BRUP)" project, it was installed in 2016. Households have to pay 80 taka per month to use this facility (Fig. 2c).

III. **UNDP**: United Nations Development Programme (UNDP) with permission from and partnership with GCC, installed a 300 ft submersible pump with two 1000-liter water tanks under the project name "Urban Partnerships for Poverty Reduction (UPPR)". This intervention was established in 2009 and it supplies water for around 200 families of Koroitola, ward number 53 of GCC. Each beneficiary household has to pay a monthly fee of 100 taka to use the facility (Fig. 2d).

3.2.2 Time Spent on Water Collection

Figure 3 pinpoints that NGO provided interventions take a lot less time for water collection when compared to government provided interventions. Forty-four percent (44%) respondents who are beneficiaries of NGO interventions answered that it takes them less than 5 min to collect water. While forty percent (40%) Government intervention beneficiaries responded that it takes them less than 5 min to collect water from the intervention source.

Fig. 2 Some phorograpg of Cazipur City Corporation area. (**a**) Water Intervention provided by GCC in Tongi (Machimpur). (**b**) GCC provided intervention in Baimail Nadir Parr. (**c**) NGO provided intervention in Baimail Nadir Parr. (**d**) NGO provided intervention in Koroitola

Sixteen percent (16%) respondents stated that it takes more than 60 min to collect water from government installed water sources. None of the NGO-intervention-beneficiary respondents have stated that it takes them more than 11–15 min to collect water from the source.

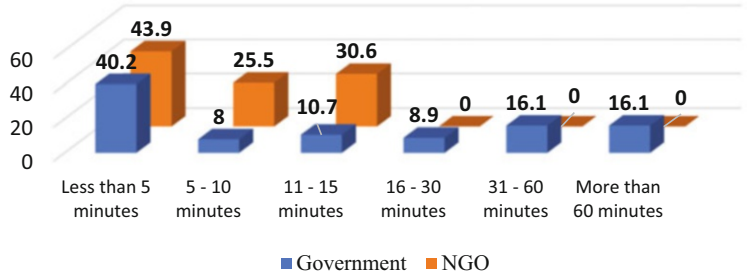
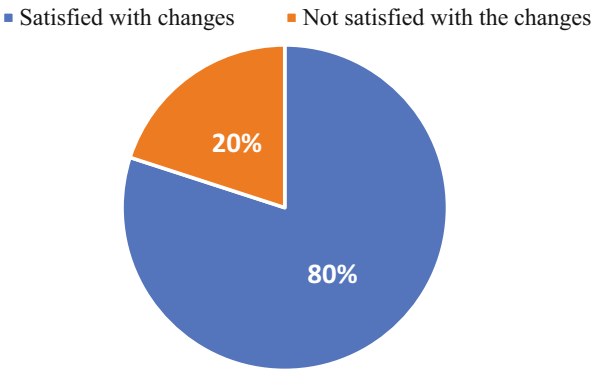


Fig. 3 Time taken to collect water from the interventions

Fig. 4 Percentage of respondents' satisfaction with the interventions



3.3 *Effectiveness of Water Interventions*

The core purpose of providing interventions in the community by the Government and NGOs is to supply safe water to the poor. Both Government and NGOs try to ensure maximum quality through utilization of their constrained resources.

3.3.1 Satisfaction with the Interventions

Any change in the community, whether good or bad, is bound to leave an impression on its inhabitants. While interventions from both Government and NGO ensued to address the immediate water needs of the people; some changes are bound to occur. Figure 4 shows that eighty percent (80%) respondents are happy with the changes brought on by these interventions.

3.3.2 Water Collection Time

As previously demonstrated in Fig. 3, NGO interventions take lot less time to collect water than that of Government provided interventions. Since the introduction of intervention in their community, maximum respondents (72%) think that it now

takes less time to collect water. This is an emblem of success for interventions trying to achieve water security for the urban poor (Fig. 5).

3.3.3 Intervention Cost

With the arrival of outside intervention in the community, changes are bound to happen; cost for water supply could increase, decrease or remain the same. According to respondents' responses majority (41%) consider that cost has not increased, while thirty-eight percent (38%) respondents have confirmed that cost has increased after the inception of interventions in the community (Fig. 6).

3.3.4 Availability of Clean Water

In the survey of the present study, it is found that (Fig. 7) approximately seventy-two percent (72%) of respondents' households believe that water is now more accessible

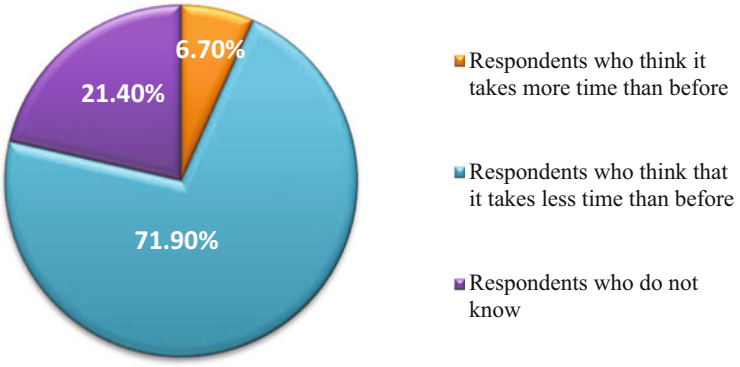
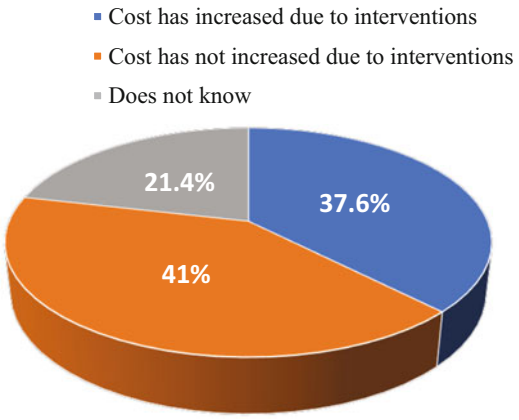


Fig. 5 Percentage of respondents' time consumption of interventions

Fig. 6 Percentage of respondents' identifying increase of cost



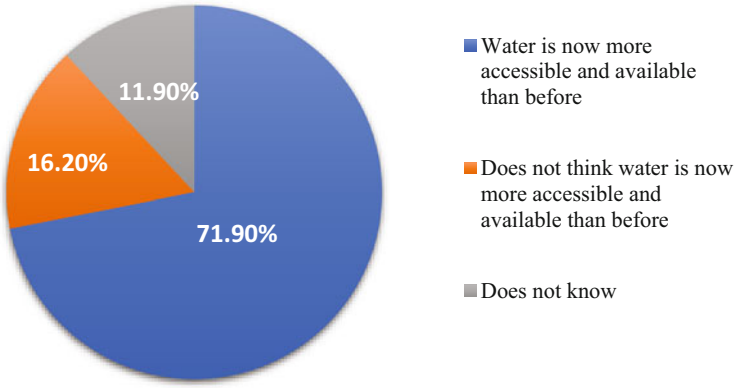


Fig. 7 Percentage of respondents' identifying water supply accessibility and availability

and available than before due to newly installed government and/or NGO interventions. While around sixteen percent (16%) respondents have reservations about that notion.

3.3.5 Water-Borne Diseases

Health risk is one of the reasons why people are usually concerned with having safe water source; better the quality of water, lesser the chances of suffering from water-borne diseases. Presently in three separate study areas: Diarrhea is the prevailing water-borne disease; closely followed by Chikunguniya. Majority (67%) of respondents' household has cited a new installed intervention as a reason for reducing water-borne diseases in the study sites.

3.3.6 Changes Brought by Interventions

Interventions are not always going to bring about positive changes, according to some respondents' household surveys, there are some negative changes brought on by these interventions as well. Majority (71%) of respondents' households believe that no negative changes have been brought on by the interventions installed by the Government and NGOs.

Bulks of the respondents agree that no negative changes have been brought by the interventions. By default, it means that majority of the households think that both the Government and NGO installed interventions have brought on positive changes in the society.

3.3.7 Government and NGO Interventions

The core purpose of providing intervention in the community by the Government and NGOs is to supply safe water to the water insecure. Both Government and NGOs

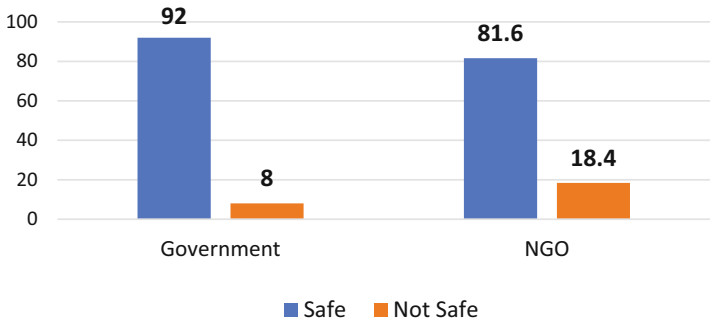


Fig. 8 Percentage of respondents' think intervention water is safe

try to ensure maximum quality through utilization of their restricted resources. However, trustworthiness among beneficiaries varies based on intervention providers. Figure 8 illustrates that most of the Government beneficiaries (92%) believe that supplied water from the Government provided intervention is safer, compared to NGO provided interventions, where around eighty-two percent (81.6%) NGO beneficiaries believe that their water is safe.

4 Discussion

4.1 Government and NGO Installed Water Interventions

Based on the aforementioned results from both qualitative and quantitative field level and secondary data, the following findings can be deliberated.

Majority respondents have identified 'less than 5 minutes' as the most common amount of time spent for water collection. In addition, NGO provided interventions take lot less time for water collection than government provided interventions. While none of the NGO-intervention-beneficiary respondents have answered that it takes them more than 11–15 min to collect water from the source, around sixteen percent (16%) beneficiaries have stated that sometimes it takes them more than 60 min to collect water from Government installed water interventions.

The cost of water supply for NGO interventions is higher than Government provided intervention support. Majority of the Government intervention beneficiaries, around sixty-three percent (63%) pay 50 taka per month, the remaining thirty-seven percent (37%) pay 30 taka. Whereas, most of the NGO intervention beneficiaries, seventy-two percent (72%) pay 100 taka and the remaining beneficiaries (28%) pay 80 taka per month for their services.

Ninety-two percent of government intervened users believe that supplied water which is provided by the government is safe, whereas around 82% NGO beneficiaries believe that that NGO provided water is safe. In the study area, people trust the Government more than NGOs Respondents who do not think intervention provided water is safe usually boil the water for safety (Table 1).

Table 1 Details about the intervention providers in three separate study sites

Name of the area	Provider of the intervention	Type of support provided	Method of water collection	Intervention for	Details about the intervention
Baimail Nadir Parr	Gazipur City Corporation (Government)	Submersible pump with 1000-liter tank	Public piped into yard	130 families	Creating water source on 37 district cities for providing water (submersible pump).
					Installed by: Public Health Engineering Department
					Completed in: 2014–15 fiscal year
	Care Bangladesh, C&A Foundation and Village Education Research Center – VERC (NGO)	Submersible pump with 5000-liter tank	Public piped into dwelling	85 families	**Project name**: Building Resilience of the Urban Poor (BRUP)
					Installed by: Care Bangladesh, C&A Foundation and VERC
					Installed in: 2016
Koroitola	United Nations Development Programme – UNDP (NGO)	Submersible pump with 2 (two) 1000-liter tank	Public piped into yard	200 families (approximately)	**Project name**: Urban Partnerships for Poverty Reduction (UPPR)
					Installed by: UNDP and Gazipur City Corporation
					Installed in: 2009
Tongi (Machimpur)	Gazipur City Corporation (Government)	Water line from WASA	Public piped into yard	20 gypsy families	With the permission of 57 number Ward Commissioner, taking a water line from WASA
					Installed by: Individual families
					Installed in: 2017
		2 submersible pumps with 2 (two) 1000-liter tank	Public piped into dwelling	100+ families	Provided by the Gazipur City Corporation
					Installed in: 2011 and 2015

Table 2 Assessing the indicators of water security with the collected data

Indicators		Yes (%)	No (%)	Comments
1.	Satisfied with change	80	20	Majority of respondents are satisfied with the changes brought on by the interventions
2.	Less time consuming water collection	71.90	6.70	Bulk of the respondents agree that water collection has become less time consuming than before
3.	Increase in cost	37.6	41	This data is inconclusive due to the fact that 21.4% respondents were not able to compare between the two
4.	Improved availability and accessibility of water	71.90	16.20	Most of the respondents settled that water is easily accessible and more available than before
5.	Reduction of water-borne diseases	67.1	32.9	Majority of the respondents came to an understanding that after the inclusion of interventions water-borne diseases have reduced.
6.	Negative changes brought on by the interventions	29	71	Most of the intervention users think that these interventions did not bring influx of negative impact on the community.

4.2 Indicators of Water Effectiveness

Based on the pre-set indicators of assessing Government and NGO-based water interventions in Gazipur Sadar areas to fulfill the long-term basic water needs of the urban water insecure, their efficacies are arbitrated below:

Aforementioned Table 2 illustrates that 5 out of 6 indicators have been met with positive feedback from the respondents' after the introduction of Government and NGO provided interventions. This means that the once susceptible water insecure community is now in a better shape than before. However, it is still far from achieving water security – but this movement is towards the right path nonetheless.

5 Conclusion

Majority of the people are becoming dependent on artificial water interventions (Government and NGO installed), as opposed to natural sources (Turag river), due to this they are now being contaminated in multiple self-destructive ways with no way for them to recover. Without Government and NGO water interventions access towards clean and accessible water for the urban poor of Gazipur sadar would have been problematic. However, it will not be possible to achieve water security through these interventions alone. The positive side of all these newly installed interventions is that people are responsive and satisfied with the visible social

influences brought on. Forthcoming studies focusing on water security issues might be able to use this study as a baseline for the Government and NGO interventions scenario, perception of the people, and the importance of achieving an urban water secure community. Further researches can be done by using an established scientific method for assessing the effectiveness level and comparing them with the perception based data from this research.

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