2014

WaterAid

Report On

Endline Study of Adapting WASH for Climate Change

BISR Consultants Limited

BISR Consultants Limited

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Endline Study of Adapting WaSH for Climate Change Project

Submitted to:

WaterAid Bangladesh

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August, 2014

Acknowledgement

The Endline Study of Adapting WaSH for Climate Change Project (AWaSH) has been successfully conducted with support, specially financial and technical, from the WaterAid.

We gratefully acknowledge the contributions of the officials of WaterAid in assisting BISR Consultants Ltd. for final designing and completing the Endline Study of AWaSH project.

We express our gratitude and thanks to Ms. Amina Mahbub, Manager, Monitoring and Evaluation for her valuable contributions for the study.

Mr. Towhidul Islam, Program Officer, Monitoring and Evaluation, deserves special appreciation for ensuring continued support and professional guidance to implement and successfully complete the Endline Study in time.

A special thanks to Shahrukh Y. Mirza, Programme Officer, Organisational Learning for her comments and guidance during final report preparation.

We appreciate the contributions and cooperation of the program personnel of Union facilitators, community mobilisers of Rupantar and beneficiaries of the of the sample areas covered by the Study.

All field investigators, water sample collectors, supervisors, monitoring officers, data processing and entry personnel involved in different levels of the endline survey deserve special thanks for their sincere effort.

We fervently hope that the findings of the study obtained from the field and interpreted professionally would be useful in further strengthening the program performances and its quality.

The Study Team

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Abbreviation and Acronyms

ADP	Annual Development Plan
ATP	Arsenic Treatment Plant
AUSAid	The Australian Agency for International Development
AWaSH	Adapting WaSH for Climate Change Project
BBS	Bangladesh Bureau of Statistics
BDS	Bangladesh Drinking Standard
BISR	Bangladesh Institute of Social Research
BOT	Build, Operate and Transfer
CRI	Global Climate Risk Index
DP	Desalination Plant
DPHE	Department of Public Health Engineering
DRR	Disaster Risk Reduction
DRM	Disaster Risk Management
DTW	Deep Tube Well
EPI software	Software for Epidemiology
FGD	Focus Group Discussion
HHS	Households
HSC	Higher Secondary Certificate
IDI	In Depth Interview
IEC	Information, Education and Communication
JICA	Japan International Cooperation Agency
MDGs' 7	Millennium Development Goals'7
mg/L	Milligram/ Litre
NGO	Non-Governmental Organization
O&M	Operation & Maintenance
PCRWT	Piloting Climate Resilience Water Technology
PIC	Project Implementation Committee
PNGO	Partner Non-Governmental Organization
PSF	Pond Sand Filter
PWVA	Participatory WASH Vulnerable Assessment
RRAP	Risk Reduction Action Plan
RWH	Rain Water Harvesting Plant
Sida	Swedish International Development Authority
SPSS	Statistical Package for Social Sciences
SSC	Secondary School Certificate
STW	Shallow Tube Well
Tk.	Taka, Bangladeshi currency
TTC	Total Thermo-tolerant Coliform
UCP	Union Contingency Plan
UDMC	Union Disaster Management Committee
UKAid	The United Kingdom Agency for International Development
UN	United Nations
UNDP	United Nations Development Programme
UNICEF	United Nations Children's Fund
UNISDR	United Nations International Strategy for Disaster Reduction
UP	Union Parishad
USAID	United States Agency for International Development
WASA	Water Supply & Sewerage Authority
WaSH	Water Sanitation & Hygiene
WDMC	Ward Disaster Management Committee
WHO	World Health Organization
WTP	Willingness to Pay

Executive Summary

WaterAid is a leading independent non-governmental organization committed exclusively on improving poor people's access to safe water, sanitation and hygiene. After cyclone *Aila* struck the southwestern coast of Bangladesh in May 2009, safe water resources in the region were contaminated and household latrines were destroyed, leaving over 300,000 people without access to these basic services. From June 2012, in collaboration with PNGO (Rupantar), WaterAid undertaken a project entitled AWaSH (Adapting WaSH for Climate Change project), funded by BIGLOTTERY, to reduce the vulnerabilities of the community people of Koyra upazila under Khulna district.

This study sought to assess the impact of project AwaSH, including its role in access to safe water, improved sanitation and hygiene, and local knowledge of and response to climate change and disaster vulnerability. A quasi-experimental study design compared Koyra with the upazila of Dumuria in the same region. However, it should be noted that Dumuria is ahead of Koyra in terms of socioeconomic conditions and literacy, as well as being much less affected by Aila. The results of the evaluation have thus been interpreted keeping these differences in mind.

The study was conducted applying both quantitative (household survey) and qualitative (FGDs, intensive interviews, observation checklist and union profile checklists) method across 600 households. In terms of access to safe water, the project area community was highly benefited from the cost-benefit point of view, as currently they are able to access six times more water than they were able to get previously for the same cost. Before project implementation, people mentioned that they spent more than Tk.15-20.00 per day to collect safe water from nearby village or union, or in buying water from them who sell water through boat and water tank.

Nearly 60% of water sources in Koyra were found to be safe according to comprehensive water quality tests, a notable achievement as arsenic and iron contamination of water sources post-Aila had rendered the vast majority of water sources unusable (at baseline, only 29% of water sources were found to be safe). The mean distance of water collection has also been reduced and average water collection time was calculated at 19 minutes, almost half of baseline water collection time. This is even more impressive in light of the fact that post-Aila, Pond Sand Filters (PSFs) have become one of the dominant technologies in the region, and PSFs are traditionally connected to lengthy water collection times.

In case of sanitation and hygiene, observation showed that 59% percent (in baseline it was 43.2 percent) respondents in the project area used improved latrines, which in the context of post-Aila Koyra, with almost all latrines damaged and much of the population living in makeshift shelters by the roadside or on the embankments, is a very encouraging outcome with scope and need for more work. Hygiene behaviour in Koyra was found to similar to or stronger than Dumuria, with more people washing hands with soap and water and maintaining hand washing at critical times, a significant achievement of the project given the aforementioned advantages of the control area. The project appears to have had considerable impact on the knowledge and activities of project area communities with regard to climate change. Most respondents displayed some knowledge of the impact of climate change in the survey and focus group discussions, naming more frequent natural disasters, irregular rainfall, rising salinity, coastal erosion, etc. as their felt experience of climate change. The creation of ward level Disaster Management Committee (WDMC) involving local community members to work for pre-, during and post- disasters situation is one of the key innovations of the project. The WDMCs undertook participatory vulnerability assessment exercises called Participatory WASH Vulnerability Assessment (PWVA), which captured community knowledge on high risk areas and households, as well as mapped out possible solutions and potential support agencies. The WDMC also mobilised with representatives from the community to assist the Union Disaster Management Committee

(UDMC) in inclusive risk assessment, planning, implementation and monitoring of disaster preparedness and mitigation activities. Additionally, the formation and capacity enhancement of mothers' groups, adolescents' groups and children's groups created forums where WASH and climate change messages could be disseminated in a customised manner. The creation of a committee and groups at the grassroots level appears successful in promoting and utilising local knowledge, and using it to create pressure on local governance and other institutes to actively contribute to community initiatives to reduce vulnerability.

Encouragingly, the innovation of ward level committees is now being taken up by the partner NGO in their other projects, and WaterAid reports it is sharing its learnings within its own country programmes, as well as planning for nationwide dissemination in the near future. Lessons have already been shared in the Sixth Asian Ministerial Conference on Disaster Risk Reduction held in June in Thailand, contributing to the Hyogo Framework for Action, and sharing with sector networks including Action Research for Community Adaptation in Bangladesh (ARCAB), the Gobeshona research forum and South Asian Conference on Sanitation (SACOSAN) are in planning.

Overall, the project appeared to be need-based rather than a donor-driven project, which was appreciated by the local people. The community's participation in operation and maintenance of the water facilities provided was praiseworthy, as was their cost sharing in operation and maintenance. The NGO's role in following the Build, Operate and Transfer (BOT) approach was also commendable. The present process should continue as it has long lasting impact on climate–induced disaster risk reduction and mitigation as well as poverty reduction and climate change-induced out-migration. In case of augmentation of water sources more funding may be asked from the local community also. This can be tested following the Willingness to Pay (WTP) approach. A clear assessment on communities' willingness to pay in other areas should be conducted while planning for replication of such projects. Alongside, advocacy efforts should be continued to disseminate project lessons to various national and international forums to influence decision-makers to build on and extend project impacts.

Chapter I
Background

1. Introduction

Climate shocks and stresses already have a devastating impact on the vulnerability of the world's poor due to its adverse effects on economic, social and development activities. Increasing frequency and intensity of weather-related extremes, and gradual changes in the average temperature will exacerbate these impacts. Global Climate Risk Index (CRI) reported that from the year of 1992–2011, globally more than 530,000 people died as a direct consequence of almost 15,000 extreme weather events, causing economic losses to more than USD 2.5 trillion **(Harmeling and Eckstein 2013)**. United Nations International Strategy for Disaster Reduction (UNISDR) Secretariat noted that the climate change and disasters are interlinked and likely to increase the number and scale of disasters with more extreme weather events **(UNISDR 2008)**. Low-and middle-income countries are especially vulnerable to natural disasters (e.g., coastal flooding, cyclones and storm surges, prolonged droughts and sea level rise) due to their strong reliance on natural resources causing human, material, economic and environmental losses, and affecting human development **(UNISDR 2008)**. Most of the coastal areas of the world are at risk from natural disasters **(Rana et al. 2010)**.

The coastal areas of Bangladesh facing the Bay of Bengal comprise of 19 coastal districts which make the country one of the most disaster prone in the world **(World Bank 2006)**. The Bay of Bengal is a perfect breeding ground for tropical cyclones, and on an average annually 12–13 depressions are formed, and at least one or two powerful cyclone strikes Bangladesh each year, such as cyclones *Sidr* and *Aila* and more recently (on May16, 2013) cyclone *Mahasen.* In addition to the geophysical characteristics of Bangladesh coast, the poor socioeconomic conditions of coastal inhabitants also contribute to increasing the vulnerability of inhabitants to cyclones and storm surges. Livelihoods of coastal population are highly dependent on ecosystems linked to agriculture, fishery, forestry and salt farming, etc. Therefore, the increasing trend of cyclones will certainly affect the livelihoods of vulnerable population living in low-lying coastal Bangladesh. During the years 1797–2009, a total of 65 devastating cyclones swept over Bangladesh and cause immense harm to the people **(Rana et al. 2010)** and about 80–90% of global losses and 53% of total cyclone-related deaths worldwide occurred in Bangladesh **(Alam and Rahman 2014)**.

WaterAid is a leading independent non-governmental organization committed exclusively on improving poor people's access to safe water, sanitation and hygiene. WaterAid works in 27 countries globally, primarily in Africa, Asia and the Pacific region with a mission is to transform lives by improving access to safe water, hygiene and sanitation in the world's poorest communities. To date they have reached 17.5 million people with safe water and 12.9 million people with improved sanitation. It campaigns locally and internationally to change policy and practice and ensure water and sanitation's vital role in reducing poverty. WaterAid works with a diverse range of local partners, who understand local issues and provide them with skills and support to help communities set up and manage practical and sustainable projects that meet their real needs**.**

WaterAid has been working in Bangladesh since 1986 and has a total of 39 partners covering 33 rural Districts, seven City Corporations and one Municipality in urban areas. WaterAid and local partners initiated the Community-led Total Sanitation approach in Bangladesh, which focuses on developing understanding in communities of the links between unsafe sanitation and disease and motivating the whole community to take action (**www.rsr.akvo.org/organisation/481/).** Communities build their own latrines using low-cost, local materials and agree to completely eliminate the practice of open defecation. This approach is now being used by many other WaterAid country programmes as well as by many other organisations globally. They also helped

the government to develop the National Sanitation Strategy, which aims to bring universal sanitation facilities to Bangladesh by 2015.

From June 2012, in collaboration with PNGO (Rupantar), WaterAid has undertaken a project entitled AWaSH (Adapting WaSH for Climate Change Project to understand the WaSH situation in South-western Bangladesh) funded by BIGLOTTERY to reduce the vulnerabilities of the community people of Koyra upazila under Khulna district.

1.1 Background

Bangladesh is one of the world's most densely populated countries. 150 million people are crowded onto low-lying land where annual monsoon floods contaminate water sources and leave millions with appalling sanitary conditions. Bangladesh's geography provides many challenges. Natural arsenic contaminates water, putting 30 million people at risk. The lowland areas are also susceptible to flooding from seasonal monsoons and cyclones, further damaging the land. In Bangladesh, achieving the MDGs' 7 targets to halve the proportion of people without sustainable access to safe drinking water and basic sanitation was seriously challenged by climate change. In low-lying areas of the country prone to monsoon flooding, WaterAid is helping communities to construct water and sanitation facilities that are more resilient to disasters and the impacts of climate change.

Thereafter, following cyclone Aila in May 2009 in Bangladesh, WaterAid and partners were involved in the recovery efforts to help the population of Koyra. Safe water resources were contaminated and household latrines were destroyed, leaving over 300,000 people without access to these basic services. The scale of impact was unprecedented and two years later, many communities still could not access safe drinking water or hygienic latrines. This experience has generated a greater understanding of the vulnerabilities of these communities and their specific needs.

The AWaSH project aims to respond to the need for greater climate resilient access to water, sanitation and hygiene services (WaSH). WaterAid identified that these facilities need to be able to withstand disasters and planned with consideration of potential climate change impacts in the future if they are to remain sustainable. This means that post-emergency, communities will not find their lives dragged back to 'square one' and resort to drinking unsafe water and open defecation. For this to be achieved WaterAid also supported local government to understand their communities' needs and plan effectively for emergencies.

In order to do that many activities have been done following both hardware and software approaches and holistic approach. Moreover, WaterAid also developed few guidelines in each month e.g., June 2013, September 2013a, September 2013b.

1.2 Project Overview

The broad goal of AWaSH project was to contribute to achieve the national goal on WaSH through context-specific and scalable water supply, sanitation and hygiene promotion in climate vulnerable areas of Southwest Bangladesh. The expected project outcomes are as follows:

1. Greater access to safe water and improved sanitation through effective, appropriate and scalable climate resilient technologies, contributing to improve health amongst the communities of Khulna District, through a reduction in waterborne diseases;
2. Improved community resilience and ability to maintain WaSH behaviour in the face of natural disasters, contributing to sustained improved health;

3. Increased learning on climate adaptation techniques contributing to improve national knowledge management, which will be disseminated to promote greater access to water and sanitation and disaster response in areas beyond Khulna.

1.2.1 AWaSH project implemented by Rupantar

Implementation of AWaSH project has been finished; it will require maintenance by the community. The project must be monitored in future to ensure successful access to water, sanitation and hygiene for all. As a part of the project, the community has its own bank account to raise funds for further repairs and maintenance from monthly household/beneficiaries' contributions. The community will decide now how it can best collect money on a regular basis to ensure continued water access in future. Moreover, the community must also decide how to share the water sources with the surrounding communities who are non-beneficiary and did not contribute to the costs of the repair and maintenance but now wish to make use of it as well.

1.2.1.1 Activities taken under AWaSH project by Rupantar

- ✓ Formation of Ward Disaster Management Committee (WDMC) in each Union. WDMC ensures disaster management at community level and able to contribute to disaster management at the union level. WDMC also mobilised with representatives from the community to assist the Union Disaster Management Committee (UDMC) in inclusive risk assessment, planning, implementation and monitoring of disaster preparedness and mitigation activities.
- ✓ Development of action plan in each Ward and Union level. Under this plan, WDMC enlisted the community needs (e.g., road, infrastructure, safe water, sanitation and hygiene behaviour) through participatory process and prepare the action plan based on the needs.
- ✓ Construction of latrines
- ✓ Construction of different types of water sources
- ✓ Construction of water treatment plant
- ✓ Improvement of water and sanitation system in cyclone shelter
- ✓ Awareness raising activities on climate change impacts and disaster risks
- ✓ Video was shown to create awareness on climate risk, disaster preparedness, and safe water, sanitation and hygiene behaviour.
- ✓ Health and sanitation related IEC (Information, Education and Communication) materials distribution within school going children
- ✓ Training on different aspects to the project beneficiaries
- ✓ Creating awareness of project beneficiaries on health and sanitation. Beneficiaries also encourages non-beneficiaries that they can maintain sanitation and hygiene behaviour and set-up latrines in their household; and
- ✓ Other activities include public announcements and rally during day observation and validation meeting with upazila and Ward level stakeholders.

1.2.2 Training under AWaSH project

Project staff received several specific trainings under AWaSH project such as disaster risk reduction, foundation on climate change, water quality testing, water technology, module development, and financial management. Each training session consists of 2-7 days. Disaster risk reduction, climate change, water, sanitation and hygiene and WDMC related trainings were conducted by WaterAid through Rupantar and project management related trainings were organized by Rupantar itself.

During the implementation period of AWaSH project, Rupantar given training to the 265 peoples. The topics of trainings were: climate change and its impacts, safe drinking water, sanitation, disaster risk management and preparedness during disasters (**Table 1.1**).

Table 1.1: Training received under AWaSH project

Area	Training participant	Topic of training
Mohessoripur Union	30	Safe drinking water, sanitation, preparedness during disasters
Amadi Union	1335	Climate change and its impacts, safe drinking water, sanitation, preparedness during disasters
North Bedkashi Union	224	Climate change and its impacts, safe drinking water, sanitation, disaster risk management and preparedness during disasters
South Bedkashi Union	60	Climate change and its impacts, safe drinking water, sanitation, disaster risk management and preparedness during disasters
KoyraSadar Union	138	Climate change and its impacts, safe drinking water, sanitation, disaster risk management and preparedness during disasters and preparation of development plan
Moharajpur Union	Caretaker: 26 WDMC: 235	Climate change and its impacts, safe drinking water, sanitation, disaster risk management and preparedness during disasters
Bagali Union	Caretaker: 44 WDMC: 231 UDMC: 33	Climate change and its impacts, safe drinking water, sanitation, disaster risk management and preparedness during disasters

1.2.3 Set-up of project infrastructure

To select the types of project infrastructure and location to set-up the infrastructure were fixed with the consultation of local community. Until all the members of the community were not agreed to set-up the particular infrastructure, Rupantar took no steps. More than 90% times, there was no conflict among the community people for the set-up of water infrastructure. But where the land had multiple owners then conflict arose. In that case, both Rupantar and community took decision to select another location.

1.2.4 Inspection and monitoring of project activities

Each project staff had specific tasks, so they carried out their daily activities and reported it to the office. Project and staff activities were periodically inspection and monitoring from Rupantar Head Office. Union Facilitators stayed all time in their respective field and WDMC and beneficiaries helped them. Project Coordinator, Monitoring Officer, Project Engineer and Community Development Officer also frequently visited the field and initiatives. There was also a supervision committee by WDMC members (a committee consist of 25 members) and 'Project Implementation Committee (PIC)' with 7 to 9 members involving local Union Chairman, members and civil society.

1.2.5 Participatory WASH Vulnerable Assessment (PWVA)

Participatory WASH Vulnerable Assessment (PWVA) was a tool developed under AWASH project which involves communities, local authorities and other stakeholders in an in-depth

examination of what makes them vulnerable. The PWVA provides a solid foundation for designing, planning, implementing and evaluating practical coping and adaptive strategies. Under this project, the main aim of PWVA was to identify the vulnerability of local communities on safe drinking water, sanitation and hygiene as well as prepare WASH mapping, seasonal calendar, institutional map, and development plan, etc. The specific tasks of the PWVA are as follows:

- ✓ Vulnerability assessment through involving community people
- ✓ Listing the most vulnerable people within community
- ✓ Identify the problems along with its minimization plan
- ✓ Coordination with other agencies, Union Parishad and NGOs to implement the plan.

1.2.6 Problems faced during project implementation

During project implementation, project staffs mentioned that they faced several problems such as:

- ✓ Political unrest during project implementation period
- ✓ Awful road communication system throughout the project implementation areas particularly during rainy season.
- ✓ Natural disasters are affected during the implementation period.
- ✓ Conflicts among local people and UP as well as conflicts among UP members.
- ✓ Dole-out mentality of the community people.

In these situations, most of the time they stopped the project activities and rest of the time consult with community to find out a probable solution on how to complete the project within timeframe.

1.2.7 Success of project outcomes

Respondents mentioned that after the project initiatives more than 60-70% community people were more aware about their health, sanitation and hygiene. Community people now use sanitary latrines, use shoe for using latrines, use soap for hand wash after toilet, use safe water for drinking and cooking purposes, and strictly follow the rules of maintaining safe water, sanitation and hygiene. Moreover, WDMC, clubs (Youth Club, Mother's Club, Child Club, Students Club, Ethnic Club, Professional Club, Adolescent Club) and volunteer committees also regularly monitor the activities and organise meetings and trainings. They had regular monitoring and supervision team through WDMC in 63 Wards and 190 of internal groups as well as volunteer committees that consist of 10 members. Such committees mainly focused on increasing beneficiary's awareness on maintaining water, sanitation and hygiene rules and encourage others to follow the beneficiaries.

1.2.8 Positive outcomes and restraint of the Project

1.2.8.1 Positive outcomes of the project

- ✓ Formation of WDMC and clubs
- ✓ Project staffs were dedicated to their work and responsibility
- ✓ Active participation of local community in decision making
- ✓ Positive role of WDMC and other clubs
- ✓ Strong coordination with Union Parishad, local government organization and NGOs
- ✓ Enhance capacity of the people through training and awareness raising activities
- ✓ Introducing with new water treatment related technologies
- ✓ Increased knowledge and advocacy capacity; and

- ✓ Community follows water, sanitation and hygiene rules.

1.2.8.2 Restraint to the project

- ✓ Short-term project/ implementation period
- ✓ Low salary, training and other facilities of the project staffs
- ✓ Some unskilled and inexperienced staffs
- ✓ Awful road communication system
- ✓ Political unrest and natural disasters; and
- ✓ Unsuccessful in mitigating personal conflict among UP Chairman, members and community.

1.2.9 Problems encountered and Initiatives Taken for the Sustainability of the WaSH Interventions

Respondents mentioned some important steps to maintain Rupantar's initiatives under AWaSH project as well as for the sustainability of the project outcomes such as:

- ✓ Follow precautions during use of water sources
- ✓ If damaged, to be repaired quickly
- ✓ Always keeping the water source area neat and clean
- ✓ Caretaker should be more responsible
- ✓ Developing a strong management committee/system to ensure that the initiatives will remain a dependable water source.

For the sustainability of the project initiatives, following measures should be taken:

- ✓ Ensure regular monitoring by Rupantar
- ✓ Pond re-excavation should be done on regular basis where PSF were established
- ✓ Capacity of PSF, rain water harvesting plant, pipeline distribution and desalinization plant should be increased
- ✓ WDMC and caretaker should be more responsible
- ✓ Local people should be taken care of infrastructure during use time
- ✓ Increased community monitoring and inspection on project initiatives
- ✓ Skilled project staff with best possible monthly salary
- ✓ A longer term implementation project with more budget
- ✓ More or frequent activities and training programmes should be taken for WDMC
- ✓ Strong coordination with WDMC and UDMC
- ✓ Fund raising through community participation for self-dependency.

1.3 Study Objectives

1.3.1 Broad objectives

1. To know about to what extent the poor and disadvantaged population in intervention areas have access to safe drinking water, improved sanitation and hygiene through effective, appropriate and scalable climate resilient technologies, contributing to improved health amongst the communities of Koyra in Khulna District, through a reduction in waterborne diseases;

2. To identify the level of community resilience and ability to maintain WaSH behavior in the face of natural disasters, contributing to sustained improved health; and

3. To assess the situation of knowledge of targeted population in intervention areas on climate adaptation techniques contributing to improved national knowledge management.

1.3.2 Specific objectives

1. To know the proportion of targeted households in intervention areas have access to context-specific (in AWaSH project context specific refers to coastal specific) safe water supply facilities.
2. To measure average time for water collection in a day of the targeted households in intervention areas.
3. To know the proportion of targeted households in intervention areas have access to improved latrine[1] facilities.
4. To understand the prevalence of water-borne[2] disease in the intervention areas.
5. To identify the proportion of households in intervention areas able to explain clearly the impact of climate change adaptation and disaster risk reduction.
6. To understand to what extent Union Parishads (UPs) of the intervention areas are able to maintain disaster risk reduction plan and budget.
7. To identify the extent of knowledge of the local caretakers (male and female) on operation and maintenance of WaSH interventions.
8. To find out the level of TTC[3], Iron and Arsenic in the water of the facilities in targeted intervention areas.

[1] Improved latrines are flush or pour flush to piped sewer system or septic tank or pit latrine, ventilitated improved pit latrine, pit latrine with slab and composting toilet and unimproved latrines are flush/pour flush to elsewhere, pit latrine without slab, bucket, hanging toilet or hanging latrine, no facilities or bush or field and shared facilities of any type

[2] Water-borne diseases include diarrhoea, jaundice, typhoid, dysentery, and skin diseases.
[3] Thermotolerant Coliform

Chapter II
Study Methodology

2.1 Implementation Strategies

The study was implemented in two upazilas consisting 14 unions and 14 villages covering 600 respondents from 600 households in Khulna District. BISR Consultants Ltd. implemented the study in the following three phases:

- **Preparatory phase:** Submitted Inception Report based on review of project documents; attending review meetings with WaterAid, designed data collection instruments, finalize samples, recruited and trained study manpower, pre-tested data collection instruments, reviewed data collection instruments with WaterAid and finalized data collection instruments and field data collection plan including supervision and monitoring system.

- **Field data collection phase:** It included advance sampling, contact with field project personnel, meeting with PNGO, collection of beneficiary lists from PNGO, conducting household level survey, conducting in-depth qualitative investigations at community and organization (Rupantar); observations, field supervision and quality control checks by field supervisors and also by BISR Consultants Ltd. BISR organized a consultative meeting with concerned personnel of Rupantar in the project area. The team leader of the study was present in the discussion.

- **Data consolidation and report writing phase:** Taking accounts of data collection by targets, editing of completed schedule, coding of quantitative findings, translation and consolidation of qualitative findings, data entry in the computer using D-base and EPI info, cleaning of data resolving inconsistencies and errors, prepare frequency tables, apply statistical techniques for data analyses using computer software like SPSS and submit draft report.

2.2 Study Area

2.2.1 Koyra upazila: the project area

Koyra upazila is situated in Khulna District with an area of 1775.41 sq. km (population density 108 per sq. km), located in between 22°12´ and 22°31´ N and in between 89°15´ and 89°26´ E. It is bounded by Paikgachha upazila on the north, the Bay of Bengal and Sundarbans on the south, Dacope upazila on the east, Assasuni and Shyamnagar upazilas on the west (**Figure 2.1**). Main rivers are Shibsa, Pasur, Kobadak, Dharla, Malancha, Ball, Arpangachhia (**www.banglapedia.org/HT/K_0370.htm**).

Koyra has 7 Unions and 131 villages. The Unions are: Bagali, Moheswaripur, Moharajpur, Koyra, Uttor Betkashi, Daskin Betkashi and Amadi. Total population is 192,534 of which male is 95,993 and female is 96,541; Muslim 149,321, Hindu 42,462, Buddhist 454 and others 297. Average literacy rate is 32.4% (male 43.6% and female 21.4%) (**www.banglapedia.org/HT/K_0370.htm**).

Main sources of income are agriculture (43.39%), forestry (3.21%), fishing (4.98%), agricultural labourer (20.42%), non-agricultural labourer (4.59%), commerce (9.46%), service (2.9%) and others (11.05%) **(www.ebanglapedia.com/en/article.php?id=3081#.U_SCUPl2w50)**. About 62.76% people are landowner and 37.24% are landless. On the other hand agricultural landowners are urban 63.51% and rural 50.74%. Major agricultural crops are paddy, potato and seasonal vegetables (**www.banglapedia.org/HT/K_0370.htm**).

Main sources of drinking water are tube well (43.82%) and pond water (54.97%). 30.97% (rural 32.43% and urban 7.36%) households use sanitary latrines and 59.80% (rural 58.03% and urban 88.29%) households use non-sanitary latrines and 9.24% of households do not have latrine facilities (**www.banglapedia.org/HT/K_0370.htm**).

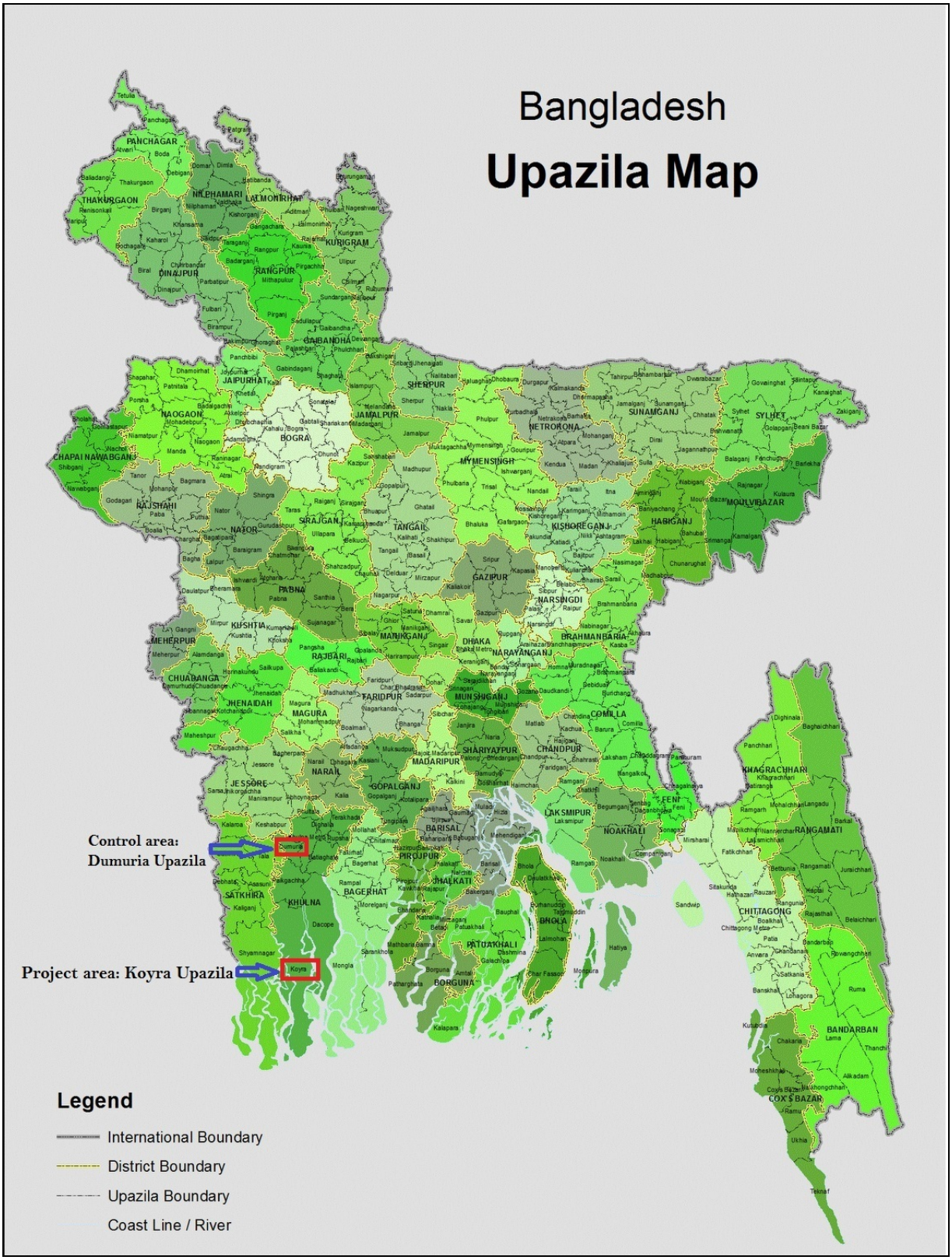

Figure 2.1: Location of the sample areas

2.2.2 Dumuria upazila: the control area

Dumuria upazila is situated in Khulna District with an area of 454.23 sq. km (population density 616 per sq. km), located in between 22°39´ and 22°56´ N and in between 89°15´ and 89°32´ E. It is bounded by Manirampur, Abhaynagar and Phultala upazilas on the north, Batiaghata and Paikgachha upazilas on the South, Khan Jahan Ali, Khalishpur and Sonadanga Thanas and Batiaghata upazila on thee, Tala and Keshabpur upazilas on the west (**Figure 2.1**). Main rivers are Shibsa and Singrail.

Dumuria has 14 Unions and 237 villages. The Unions are: Atlia, Kharnia, Gutudia, Dumuria, Dhamalia, Bhandar Para, Magurkhali, Maguraghona, Rangpur, Raghunathpur, Rudaghara, Sarappur, Sobhana and Sahas. Total population is 279,862 of which male is 144,334 and female is 135,528; Muslim 164,126, Hindu 115,245, Buddhist 264 and others 225. Average literacy rate is 48.66% (male 55% and female 41.91%) (**www.banglapedia.org/HT/D_0360.htm**).

Main sources of income are agriculture (65.43%), non-agricultural labourer (3.08%), commerce (14.05%), transport and communication (5.51%), service (5.54%) and others (5.25%). About 69.36% people are landowner and 30.64% are landless. On the other hand urban agricultural landowners are 42.14% and rural 71%. Major agricultural crops are paddy, jute and seasonal vegetables (**www.banglapedia.org/HT/D_0360.htm**).

Main sources of drinking water are tube well (97.19%) and pond water (0.69%). 50.61% (rural 51.75% and urban 31.69%) households use sanitary latrines and 35.54% (rural 34.16% and urban 58.40%) households use non-sanitary latrines and 13.86% of households do not have latrine facilities (**www.banglapedia.org/HT/D_0360.htm**).

2.3 Study Methodology

2.3.1 Secondary data collection

Secondary data were collected from different sources such as reviewed AWaSH baseline survey, related reports/documents and journal articles. A list of references is included at the end.

2.3.2 Primary data collection

Endline evaluation was carried out basically using three methods: (i) pre- and post method using recall; (ii) project and control method using baseline data; or (iii) simply project and control method using new sampling method. A baseline study was conducted for SDC-funded projects in 2012 which covered Koyra upazila, but the indicators of that baseline survey in most cases did not match (except income, expenditure, access to safe drinking water and use of improved latrine) with the Big Lottery-funded project output framework. However, comparison was made between baseline and endline where applicable in the discussion part of the report. Due to this lack of comprehensive baseline data, as a best scientific method BISR Consultants Ltd. adopted to have the project and control method using new sampling approach. However, as in many aspects the control area (Dumuria upazila) is ahead of the project area, it would have been preferable to have comprehensive baseline data for equal comparison (for details please see section 2.3.2.1).

Household level sample survey was done in the catchment areas where project has been implemented. The targets include randomly selected sample households (within catchment of the project where project has been implemented) and from each household preferably adult female of the household were interviewed using structured (household survey questionnaire is given in annex 3) and standardized questionnaire for interpersonal interviews. The samples were taken from both the treatment (project intervention: upazilas, unions and villages) and comparison

areas from the adjacent upazilas, unions and villages where project was not implemented by WaterAid.

Six types of data collection instruments were developed for the study. To meet the objectives of the study, following data collection instruments were developed which was approved by WaterAid.

- A pre-coded structured and standardized questionnaires for household survey for adult male and female (Form 1).
- Semi-structured open ended questionnaires for Intensive Interviews with Rupantar officials and field staff at upazila and Union level (Form 2).
- Guidelines for FGDs with WDMC, and community leaders (Form 3).
- Checklist of Union profile (Form 4).
- Checklist for observations and physical verifications of water source (Form 5).
- Checklist for observations and physical verifications of water source and latrine at school (Form 6).

Each field team was guided and managed by a Field Supervisor, who regularly maintained contacts with the Project Coordinator in BISR office to report on day to day basis on the progress of data collection. The field supervisor in each team was responsible for ensuring supervision and management of each team at the field level by assigning and taking stock of team's day's work by individual interviewers; arrange and accommodation, coordinate with local influential and maintain regular liaison with BISR office at Dhaka. The Field Supervisors in addition to their functions of supervision and field management ensured quality control checks through random interviews.

The Team Leader and the Monitoring Officers visited field and discussed with the project personnel of PNGO as well as beneficiaries of the project.

2.3.2.1 Selection of the study area

The study was conducted in Koyra upazila as project area and Dumuria upazila as control area of Khulna district. The AWaSH project was implemented in all unions (7) of Koyra upazila. To compare the findings of the water, sanitation and hygiene status of project area community people, we selected a control area. Generally, control area is selected adjacent to project area where same type of project has not been implemented. Dacope upazila is adjacent to project upazila but same type of intervention was going on Dacope upazila so the Consultant in consultation with WaterAid selected Dumuria upazila as control area.

From the two upazilas, the study has been conducted in 14 unions of Koyra and Dumuria upazilas. According to the union checklist, the average population of each union of the project area was more (32, 494) than that of the control area (27,643) but average functional water source is more in the control area (795) than that of the project area (283). The literacy rate in project area is below than control area (for details please section 2.2.1). The mean income of study household is higher in control area (please see section 3.7 for details). On an average 10 NGOs in the project area and 15 NGOs in the control area are working in each union. Among the NGOs, average 3 NGOs both in project and control unions are directly working on WaSH (**Annex 1**), though there are more WaSH facilities in the control area than project area. In both the areas responsibilities of NGOs that have been working in WaSH program was to create awareness on WaSH and technology support, ensure safe water, hygiene and sanitation and pond digging, disaster risk reduction and decrease mother and child mortality and create personal hygiene to adolescent girls. Communication facilities is well in the control area than the project area and others infrastructure is also developed in Dumuria than Koyra. The study shows that although the

project area is socio-economically backward but WaSH project made the project beneficiaries fully aware about living in hygienic environment similar to the control area. The population of project area is more vulnerable than control area in terms of number of natural disasters it faced and severity among the people (for details see the chapter VII).

2.3.2.2 Survey design and sample selection

The endline study had been done on quasi-experimental design. A quasi-experiment was an empirical study used to estimate the causal impact of an intervention on its target population. Target population of the study was those households that received the project services under project implemented area. Respondent was adult person preferably adult female member of the household. One respondent was interviewed from each selected household.

A stratified multi-stage sampling methodology was applied to select the survey unit (i.e. household). The sampling was comprised of two stages − at first from 7 project unions 7 villages (1 from each union) were selected randomly. Finally, required number of beneficiary households was selected within each selected village. As the project had list of targeted beneficiaries so the beneficiary households were selected following systematic random sampling procedure using an appropriate sampling interval (depending on the number of potential respondents and required number of samples).

In order to determine the required sample size an approach based on confidence level and precision rate were followed. The advantage of the approach was that the statistical validity of a sample did not depend on its size relative to the population being investigated. Rather what matters was the required level of probability (confidence level), required degree of precision and the variability of the population. The following formula had been used to estimate the required sample size:

Sample size had been worked out for the quantitative survey following the formula (**Islam 2011**) depicted below:

$$n = \frac{Nn_0}{N + n_0}$$

Where, $n_0 = z^2p(1-p)/d^2$

We first calculated n_0. If n_0/N was negligible, then n_0 was a satisfactory approximation to n.

$$n_0 = \frac{(1.96^2)(0.5)(0.5)}{(0.05)^2} = 385$$

As N *(34,045 Target beneficiaries in the upazila)* was known the formula lead to the following:

$$n = \frac{34045X385}{34045+385} = 380$$

Where, n = sample size, p=0.50; z=1.96 to 95% was the confidence limit and d=desired level of precision or significance was 0.05 or 5%.

As per statistical requirement the study was needed to cover minimum 385 sample and to make the figure round the sample it was fixed at 400. To meet the objective a control area was selected for the study. Upazila where no work was implemented by WaterAid was treated as control upazila. A total of 200 (50% of the project sample) households had been selected from

control upazila. The control upazila was selected adjacent to the project upazila. From the control upazila 7 unions were selected randomly and from the selected unions, villages were selected randomly and from the selected village required number of households had been taken following systematic random sampling method.

The above sampling frame ensured confidence level to the extent of 95% in the case of project area and above 90% in the case of control area.

2.3.2.3 Recruitment and training of survey manpower

In total 18 eligible surveyors were recruited by BISR Consultants Ltd. for data collection. The recruitment criteria included their educational background, ability to interact with people, willingness to stay in the field and previous experience in other surveys. The distribution of recruited manpower (field base) for the survey was as follows:

- ✓ Interviewers: 14
- ✓ Water Sample Collectors: 2
- ✓ Supervisors: 2

All the recruited manpower for field investigation was trained for 3 days (including field practice combined with pre-testing of data collection instruments) that started on 11th June, 2014 and ended by 15th June, 2014. The training was conducted in a participatory method and all the trainees participated actively in different sessions. The training program was conducted by the resource persons of BISR Consultants Ltd. and was enriched by active participation of officials from WaterAid together with guest Experts on water quality. The Principal Investigator (Team Leader) of the study constantly supervised all the sessions to ensure proper quality of the training.

2.3.2.4 Pre-testing and finalization of data collection tools

During the training of the Field Investigators, 1 field visit was performed for field practice combined with pre-testing of the questionnaires under intensive supervision. The field visit was conducted at Bhasantek, Mirpur-14 (catchment area of WASA) on 12th June, 2014. During the field tests all different types of questionnaires were completed several times by the Field Investigators. After the field practice a whole day training session was held for reviewing of field experience. Based on observations in the field practice and suggestions made by the team and concerned personnel of WaterAid, data collection tools were further modified and finalized.

2.3.2.5 Field data collection

After completion of the training program all the field personnel involved with the study were briefed about their field assignment and overall management of data collection activities. Two teams were formed for survey purposes. A well designed field movement plan for effective implementation of the survey was developed and all the team members were briefed about the field action plan properly. Prior to study in the field, necessary request letters to the concerned agency (WaterAid) were sent to elicit cooperation from the field offices of the respective PNGO. Data collection activities at the field level commenced on 16th June, 2014 and ended by 28th June, 2014.

Total 600 households were surveyed from both project (400 households) and control (200 households) areas. One respondent was interviewed from each selected household. Respondents were adult person preferably female member of the selected households. Reasons behind that, adult females know well about the water, sanitation and hygiene issues and they also available in houses during data collection time.

2.3.2.5.1 Focus Group Discussion (FGD)

Total 7 FGDs were conducted in 7 Unions (1 FGD from each union). Each FGD comprised of 8 participants including both male and female of the community leaders. Among 7 FGDs, 5 were conducted in project area (2 with WDMC and 3 with community leaders) and 2 were conducted in control area (with community leaders).

2.3.2.5.2 Intensive interviews

10 intensive interviews were conducted (1 from each project union and 3 with upazila level officers) with the project personnel (Rupantar).

2.3.2.5.3 Sample water collection and testing

Water sample was collected from 70 sources in 14 Unions of both project and control areas (5 sources from each Union) to find out the level of Thermotolerant Coliform (TTC), Iron and Arsenic in the water of the locality.

2.3.2.5.4 Household and school observation

Total 60 households (10% of the total sample) were observed during data collection to know the actual scenario of water, sanitation and hygiene practice of the target household.

Moreover, four schools from project area also observed and filled up a checklist to know the status of latrine and water sources facilities.

2.3.2.5.5 Union profile checklist

14 Unions profile checklist was filled up. Using the Union Profile Checklist data on catchments' (Unions), primarily development aspects, NGO working on hygiene, sanitation, health centers and their working area, communication network, development works, trading, market places and growth centers, and the disadvantaged population groups were taken.

2.3.3 Data Consolidation and Analysis

Data collection and data consolidation occurred simultaneously. Completed interview schedules were brought to BISR office Dhaka for processing. Data consolidation activities, such as editing, coding, translating, classifying and data entry into the computer software for analysis have been carried out separately. Frequency tables (bi and multi ways) are prepared for interpretations and analysis. Statistical and computer tools (SPSS, d-Base and EPI software) were used for data analysis.

The distribution of targeted and completed interviews of both quantitative and qualitative investigations has been shown in **Table 2.1**.

Table 2.1: Distribution of targeted and completed survey data collection of both quantitative and qualitative investigations

Survey techniques	Target (N)	Completed (N)	Achieved (%)
Quantitative interviews for households survey at project area	400	400	100
Quantitative interviews for households survey at control area	200	200	100
Household observation at project area	60	60	100
Intensive interviews with withRupantar officials and	10	10	100

Survey techniques	Target (N)	Completed (N)	Achieved (%)
field staff at upazila and Union level			
FGDs with WDMC, and community leaders	7	7	100
Collection of Union profile checklist	14	14	100
Checklist for observations and physical verifications of water source in project area	70	70	100
Checklist for observations and physical verifications of water source and latrine at school in project area	4	4	100

2.4 Limitations of the Study

The main limitation of the study was to select the control area as there was no comprehensive baseline data on the project output. Based on geographical location of Dacope upazila of Khulna district was appropriate to select as control area but a similar program was intervening in Dacope. As a result, study team discussed with WaterAid on this issue and Dumuria upazila was selected as control area for the study.

Study respondents were the direct beneficiaries in project area but in Moheswaripur Union the PNGO installed only one PSF which covers only 35 beneficiaries. To identify the required number of respondents, study team consulted the PNGO to solve the problem. Based on their suggestion, indirect beneficiaries were taken as sample to cover the sample of that union who used pond water.

During data collection period, the consultants and field staff faced problem due to bad weather condition and poor communication system which lengthen the data collection period for 2-3 days.

Chapter III
Household Demographic Features

3.1 Demographic Characteristics

The study found that 95 percent of the household heads were male in the project area and 94 percent in the control area (**Table 3.1**). This may not match with the national average where female headship ranges from 8-12% even up to 15%. It is mainly because the sample here was purposive. Impacts also vary which have been well articulated in an article by **Joshi (2004)**.The maximum age was 90 in the project area and 80 in the control area and minimum age of the household heads in the project area was 20 where the control area it was 26. The average age of the household heads was 44 in the project area and 46 in the control area.

3.2 Educational Qualification

Educational attainment of the members of the households ranges widely. Study reveals that, in project area 45 percent were found illiterate, 28 percent completed their primary education, 19 percent completed their secondary level, and 7 percent have SSC/HSC level education and only 1 percent graduate+ in the project area. In contrast in the control area, 32 percent illiterate, 26 percent completed primary level, 24 percent secondary level, 16 percent got SSC/HSC and only 2 percent has got their graduation degree (**Table 3.1**). Control area is more accessible than project area and has good communication system as well as their economic condition is better than the project area as more than two-third people are literate here. This figure is higher than the national average of 46.15 percent and 57.80 percent of Khulna District. Sanitation is a matter of priority rather than an opportunity alone; it is also linked to community behaviour rather than a household behaviour, widely shaped by the community practices rather than an individual practice. Therefore, any effort to be made, has to be made at the community level with adequate community participation. Education, therefore, acts as an instrument to bring about a change in the community behaviour.

3.3 Occupational Status

Major occupations of the household head in the project area were farming (54%) followed by business (25%), day labouring (10%), house-making, service and fishing (3%). In case of control area, majority of the respondents were also farming (42%) followed by business (30%) and day laboring (15%). On the other hand, the unemployment rate is 1 percent and 3 percent in the project area and control area respectively (**Table 3.1**).

Table 3.1: Basic demographic features of the household head

Parameter	Project area (%)	Control area (%)
Household head		
Male	95	94
Female	5	6
Educational status		
Illiterate	45	32
Primary	28	26
Secondary	19	24
SSC/HSC	7	16
Graduate	1	2
Occupational status		
Housewife	3	4

Parameter	Project area (%)	Control area (%)
Service	3	8
Business	25	30
Farming	54	42
Day Laborer	10	15
Unemployed	1	3
Fisherman	3	1
Driver	1	0
Sex of the respondents		
Male	32	5
Female	68	95
Respondent's relationship with Head of HH		
Respondent cum HH	30	5
Wife	62	88
Daughter-in-law	1	3
Son	4	0
Mother	2	3
Daughter	1	1

3.4 Respondent's Profile

Study surveyed 32 percent male respondents from the project area and 5 percent from the control area. In case of female, this ratio was 68 percent in the project area and 95 percent in the control area. Study also reveals that 30 percent of the respondents in the project area were operated by head of household where 5 percent in the control area. 62 percent household was operated by the wife of head of household in the project area, and it was 88 percent in the control area; 4 percent household was controlled by son of head of household in the project area (no such household in the control area); 2 percent household by mother in the project area and 3 percent in the controlled area; 1 percent operated by daughter in the project area where it was found same in the controlled area (**Table 3.1**).

3.5 Religious Status

Both Muslims and Hindus were found in the project and control areas. Majority of the respondents (87%) in the project area and 61% in the controlled area reported to be Muslim by belief. The others were Hindus (13% in the project area and 39% in the control area). The national figure of Hindus in Bangladesh was 8 percent, so both the project area and to a much greater extent the control area has a relatively high percentage of Hindu households.

3.6 Family Members

Average household size of the study was found 4.51 (project area 4.59 and control area 4.33) which were 4.50 at the national level **(BBS 2011)**. Over 14 years old average male people was found 1.74 in the project area and 1.55 in the control area where 14+ aged female were found 1.64 and 1.53 in the project area and control area respectively. Average male child (aged 0 to 14 years) in the project area was 1.31 and in the control area was 1.22. On the other hand, female child (aged 0 to 14 years) was 1.30 in the project area and 1.32 in the control area. Maximum member of household was found 14 in the project area and 13 the control area (**Table 3.2**). Uniform rate of distribution of water from the treatment plant causes problem to large size households, while smaller sizes enjoy more water which is the comparative advantage for them.

Equal distribution rather than progressive distribution is practiced following the principle of social justice under the project.

Table 3.2: Mean family members of the surveyed household

Age class	Project area	Control area
Total members	4.59	4.33
Old aged male (14+)	1.74	1.55
Old aged female (14+)	1.64	1.53
Male child (0-14)	1.31	1.22
Female child (0-14)	1.30	1.32
Maximum	14	13

3.7 Household Income and Expenditure

The maximum, minimum and mean monthly income of the household was Tk. 40,000.00, 1,500.00 and 6,897.00 respectively in the project area. In case of control area, the maximum, minimum and mean monthly income of the household was Tk. 30,000.00, 2,500.00 and 9,825.00 respectively. On the other hand, the maximum, minimum and mean monthly expenditure of the household was Tk. 25,000.00, 1,500.00 and 6,217.00 respectively in the project area and Tk. 25,000.00, 2,000.00 and 8,459.00 respectively in the control area (**Table 3.3**). Control area is more accessible than project area and has good communication system with Khulna city. As a result, they have more opportunities to earn income through business, job and others. So, their economic and living condition as well as purchasing capacity is better than the project area. Rich households in the area enjoy some comparative advantages as they have increased access to the government facilities like some rainwater harvest tanks are given from the local government at the cost of Tk. 1,100.00, which they can avail. Moreover, they can buy increased number of containers for rainwater harvesting, having increased facilities for storage. Thus the rich by virtue of the financial capacity manages more water resources. In case of sanitation they can also afford hardware more than the poor, as is evident from survey responses, which cited financial barriers as the main reason for households still using unsanitary latrines in project area. The area also faces a challenge of salinity in the soil which spoils the cement-made ring slab rapidly. The NGO is now promoting plastic slab for the same.

Table 3.3: Monthly income and expenditure (Tk.) of the household

	Project area	Control area
Monthly family income (Tk.)		
Maximum	40,000	30,000
Mean	6,897	9,825
Minimum	1,500	2,500
Monthly family expenditure (Tk.)		
Maximum	25,000	25,000
Mean	6,217	8,459
Minimum	1,500	2,000

3.8 Land Occupancy Status of the Household

Respondents were asked about their land occupancy status which covered homestead and other land and no land. About 60 percent household in the project area and 41 percent in the control area have homestead land only; 36 percent and 56 percent households in project and control

areas have both homestead and other lands respectively, and 4 percent and 3 percent households in project and control areas having no land.

The maximum amount of land was 594 decimals of homestead land of the respondents in the project area and it was 80 decimals in the control area. The mean amounts of land were 12.88 decimals and 10.61 decimals in the project and control areas respectively.

On the other hand, homestead and other land of the households were maximum 528 decimals and 300 decimals in the project and control areas respectively. The mean amount of lands was 73.43 decimals in the project area and 92.17 decimals in the control area and the minimum was 3 decimals and 10 decimals in the project and control areas respectively.

Homestead land is crucial for water supply and sanitation. For setting up rain water harvesting container, tubewell, PSF and latrine land is very important. People in the project area also suffer from shortage of land for setting up all those crucial infrastructures which also restricts the multiplier effect of the project.

3.9 Household Category under AWaSH Project

Under the AWaSH project, community households were categorized into four categories e.g., A, B, C, D. It was found that, there was no (0%) household under 'A' category. 5 percent of the household were under 'B' category, 17 percent under 'C' category and 78 percent under 'D' category in the project area. On the other hand, there is no such kind of household category in the control area, a stark indicator of the relative disadvantage many inhabitants of Koyra are at relative to their regional counterparts.

Chapter IV
Access to Safe Drinking Water

4.1 Safe Water Sources, Access to and Uses of Safe Water

A recent study of **UNICEF (2010)** provided some important insights about water and sanitation practice in Bangladesh which include: (1) a lack of awareness about health and environmental sanitation means that many still don't use hygienic latrines and that many, often newly-installed latrines, are contaminating the surrounding environment and ultimately the water points; (2) hygiene expenditure is often a low priority for poor households, who have limited awareness of the benefit of products such as soap; (3) while the number of people defecating in the open has decreased overall, and a growing number of people are installing latrines, open defecation remains a major issue, particularly in the Chittagong Hill Tracts; (4) some schools do not have latrines available for students to use. Those that do often lack the resources and awareness to keep them clean; (5) menstrual hygiene is a problem for many adolescent girls and women, who lack the privacy to properly wash and dry menstrual rags.

Keeping all those points in mind the respondents were asked about the safe water sources and its uses. Findings of the study show that 3 percent and 2 percent respondents of the households used STW water in project and control areas respectively. DTW water has been used by 39 percent and 85 percent of the respondents in project and control area respectively. The main reason behind this difference is the purchasing capacity of people since average household income in control area was found to be much higher than project area and by virtue of the financial capacity this community can manage more water resources. Also in control area the number of water facility is much higher than the project area since there are a number of government-implemented water sources. Respondents also used rain water from RWH plant by 12 percent and 43 percent household collect water from PSF in the project area. PSF is more appropriate for the coastal area. In the control area, there was no PSF or RWH found. In the uses of RWH and PSF project area has far better success rate than control area. Moreover, 13 percent household used arsenic free water from ATP in the control area where another 13 percent also collect drinking water from DP in the project area (**Table 4.1**).

Table 4.1: Safe water sources in the study area

Sources of water	Project area (%)*	Control area (%)
Shallow Tube well (STW)	3	2
Deep Tube well (DTW)	39	85
Rain Water Harvesting(RWH) Plant	12	-
Pond Sand Filter (PSF)	43	-
Arsenic Treatment Plant (ATP)	-	13
Desalination Plant (DP)	13	-

*Total is more than 100 percent due to same respondent use more than one water source

From the FGDs with WDMC and community leaders, they also mentioned that people collect safe water from the above mentioned water sources in both project and control areas. Community leaders reported that in Mohessoripur Union, most people collect pond water for household works and PSF water for drinking. Men, women and children collect water through earthen and silver jar as well as in plastic container. They also store rain water which is used for drinking. Except RWH plant, people store rain water in earthen jar. In control area, people collect safe drinking and cooking water from DTW, STW, pipe line distribution plant and ATP. For other household works such as bathing and washing they collect water from nearby pond. In addition, people of Magura Gona Union facing arsenicosis problem in underground water.

Moreover, during household observation it was found that 2 percent households in the project area and 5 percent households in the control area have their own safe water source and 98 percent and 95 percent households in the project and control areas didn't have their own safe water sources.

4.2 Water Collection

Only 1 percent respondent in project area collects water from his/her own water sources and in control area this was 2 percent who collect water from their own source. Remaining 99 percent (project area) and 98 percent (control area) collect water from those sources which are installed by different NGOs supported by donors (e.g., WaterAid, UKAid, AUSAid, USAID, UNDP, Kingdom of Netherlands, Sida) and government organization e.g., DPHE. Respondents stated that most of the water sources were under joint ownership system (91 percent) in the project area. Neighbours also owner of some water sources (4 percent in project area and 6 percent in control area) as well as government (DPHE) also installed tube wells (5 percent in project area and 94 percent in control area). Community people both in the project and control areas didn't face any barrier (both 99 percent) for water collection from joint ownership sources.

Respondents reported that the mean and median distance of safe water collection was 172.36 m (152.03 m during baseline) and 137.16 m in the project area and 87.96 m and 68.58 m in the control area. They need to cross a minimum distance of 2.11 m and 3.52 m per day in the project area and control area respectively. The maximum distance of the water source was 1237.72 m in the project area which was 2000 m during the time of baseline and 562.6 m in the control area. Study observed that, project area people mostly use DTW water, PSF water and RWH plant water rather than STW water and pond/ canal/ river water. The PSF are far from the house. So the distance is much higher in project area than control area. In control area there was no PSF so the distance is less. In the control area, people mostly use STW and DTW water due to availability and being safe.

Several studies **Karim et al. (2013**), **Islam et al. (2011), Karim et al. (2005)** and **Ahmed et al. (2005**) showed that coastal area peoples collect safe water from a long distance i.e., more than 2-5 km and also to have a long queue to collect PSF water. Despite this, mean time required for water collection was a reasonable 19 minutes in project area, much lower than the 37.5 minutes calculated during baseline, and 14 minutes in control area, and the maximum time required was 60 minutes in the project and 40 minutes in the control area. Moreover, most of the time wife (77 percent) collects water from water sources both in project and control areas as well as daughter-in-law (5 percent in project area and 15 percent in control area), daughter of household head (5 percent in project area and 4 percent in control area) and by respondent (11 percent in project area and 4 percent in control area) (**Table 4.2**). If the water source is nearby/ adjacent to the house then male, child and adolescent girls are collect water but if the source is far away from house then male and female collect water. Moreover, to collect water from PSF, women are ahead and they go there by forming a group consisting of 4-5 female. Women also played a vital role in cleaning both owned and shared tube well and PSF platform on regular basis which ensure safe water.

Table 4.2: Household information on water collection

Issue	Project area	Control area
Distance of household from water source (in meter)		
Mean	172.36	87.96
Median	137.16	68.58
Minimum	2.11	3.52
Maximum	1237.72	562.6

Issue	Project area	Control area
Time requirements to collect water (in minute)		
Mean	19	14
Median	15	12
Minimum	1	1
Maximum	60	40
Household member who collect water		
Respondent	11	4
Daughter-in-law	5	15
Daughter of respondent	5	4
Wife of respondent	77	77

FGDs findings reveal that, on an average each family needs to go more than 650 meter to 700 meter for water collection (WDMC members) and needs 20 to 30 minutes for water collection. Community leaders in the project area reported that each family needs to go more than 250 meter for water collection and spent more than 20-30 minutes for water collection. In addition, people of Mohessoripur Union and Bagali Union crossed more than a kilometre daily to collect water. In Amadi Union, they need more than one hour to collect water from PSF. In control area, people of Atlia Union crossed only 100 m to collect water where as people of Magura Gona Union crossed 0.5-1 km for water collection. Again in Magura Gona Union, those who collect water from nearby Union they spent more than one hour to collect safe water.

4.3 Water Availability

Water source was available throughout the year as mentioned by 76 percent respondents in the project area and 97 percent in the control area. On the other hand, 24 percent respondents of the project area and 3 percent in the control area didn't have available source of water due to depletion of water layer in the dry season in the project area (31%) and control area (100%). Drying of pond water was a common problem during summer, which causes serious water problem for the household (69%) as water shortage in PSF is impossible during that period in project area (**Table 4.3**).

Respondents also mentioned that, water was unavailable in both Chitra and Boishak (58% in the project area and 100% in the control area). In the project area, water was unavailable throughout the year particularly during Shrabon to Ashbin (7%) and Kartik to Falgun (26%) (**Table 4.3**).

Table 4.3: Availability of water in the study area

Issue	Project area (%)	Control area (%)
Year round availability of water		
Yes	76	97
No	24	3
If No, what is the reason?		
Water layer goes down in summer	31	100
Drying of pond water in summer	69	-
In which month water is unavailable?		
During Chitra and Boishak (March-May)	58	100
During Jyoistho to Ashar (May-July)	9	-
During Shrabon to Ashbin (July-October)	7	-
During Kartik to Falgun (October-March)	26	-

4.4 Payment for Maintenance of Water Source for Smoother Operation of Water Collection

Study found that people do not actually need to pay any money for water collection but they pay a minimal rate of money for the maintenance of the respective water source. In that case, only 15 percent respondent in the project area and 12 percent in the control area mentioned that they need to pay a little amount of money. They also stated that who collect water from DP they need to pay Tk.120/month for maintenance purpose. Those who collect water from other water sources like PSF, DTW and STW they used to pay in four modes such as cost recovery method, no cost method, actual cost method, and monthly cost method. In some Unions, beneficiaries' need to pay Tk. 5/month; in some Unions they pay actual recovery cost. Some 96 percent respondents of the control area have to spent Tk.1, 4 percent spent Tk. 2 in each day for water collection from ATP but this amount was not paid in the project area. Only 3 percent spent Tk. 3 and 97 percent Tk. 4 every day (to collect water from desalination plant in terms of repairing the source) in the project area and this practice was not also found in the control area (**Table 4.4**).

Table 4.4: Spent money for water source repair or maintenance

Issue	Project area (%)	Control area (%)
Money paid for water collection/ repair of water source		
Yes	15	12
No	85	88
If Yes, amount in taka/ day		
Tk. 1	-	96
Tk. 2	-	4
Tk. 3	3	-
Tk. 4	97	-

The above statement also supported by FGDs. During the discussion it was found that people do not actually need to pay any money for water collection but they pay a minimal rate of money for the maintenance of the respective water source. Each family needs to pay Tk. 120.00 per month for water collection from DP as maintenance cost of the plant. Those who collect water from PSF, they pay Tk. 60.00 per month for the maintenance cost of the PSF. Moreover, in Mohessoripur Union, PSF committee collected Tk. 2.00/month from each household for the maintenance cost. In case of a big problem, committee informs to the Rupantar for its repairing. In the control area, people of Magura Gona Union collect water from ATP by paying Tk. 1/day. Again, those who collect water from nearby Union they spent Tk. 10.00 as transportation cost in alternate three days. From the findings, it can easily be said that the project is successful in terms of ensuring safe water for all without any cost. Before project implementation, people mentioned that they spent more than Tk.15-20 per day to collect safe water from nearby village or Union, or in buying water from them who sell water through boat and water tank.

Opportunity cost is not there directly as they live in the village where women rarely get involved in cash earning activities but they face series of other problems like woman who has minor baby, has to wait for turn in the queue for long time, to stand for long time in the queue, when anyone in the house remains sick, wage labourer has to collect only after completion of working hours, girl who has to attend school or coaching, person who can't collect physically has to collect through rickshaw van paying daily or monthly basis (Tk.10-20 for 10 litre 20 litre per day or on monthly basis), etc. Thus, although there is no direct cash cost (except in some cases) for collection of water but other challenges are there which affect their daily lives. It is not altogether hazard free for them who were compelled to collect water from far away.

4.5 Usage Pattern of Collected Water

Observation shows that people uses STW water for cleaning vegetables, fruits and betel leaf (2 percent in the project area and 40 percent in the control area), for cooking and drinking purpose (2 percent in project area and 27 percent in control area), for fermenting rice (locally called *Pantha* rice) (2 percent in project area and 22 percent in control area), for cleaning of dishes (2 percent in project area and 45 percent in control area), for hand washing before taking meal (2 percent in project area and 43 percent in control area) and for other domestic chores like washing clothes (2 percent in project area and 40 percent in control area) (**Table 4.5**).

People also uses DTW water for cleaning vegetables, fruits and betel leaf (35 percent in the project area and 51 percent in the control area), for cooking and drinking purpose (35 percent in project area and 65 percent in control area), for fermenting rice (42 percent in project area and 74 percent in control area), for cleaning of dishes (27 percent in project area and 41 percent in control area), for hand washing before taking meal (33 percent in project area and 54 percent in control area) and for other domestic chores (23 percent in project area and 38 percent in control area) (**Table 4.5**).

Project people uses PSF water for cleaning vegetables, fruits and betel leaf (14 percent), for cooking and drinking purpose (21 percent), for fermenting rice (32 percent), for cleaning of dishes (6 percent), for hand washing before taking meal (13 percent) and for other domestic chores like washing clothes (5 percent). Project people uses rain water from RWH plant for fermenting rice (5 percent) and for hand washing before taking meal (2 percent) (**Table 4.5**).

Similarly, people also uses pond/ canal/ river water for cleaning vegetables, fruits and betel leaf (50 percent in project area and 8 percent in control area), for fermenting rice (21 percent in project area and 2 percent in control area), for cleaning of dishes (65 percent in project area and 15 percent in control area), for hand washing before taking meal (54 percent in project area and 4 percent in control area) and for other domestic chores (71 percent in project area and 22 percent in control area) (**Table 4.5**). The study showed that women in the project area displayed high level of awareness and practice in keeping drinking and cooking water safe before use. A large proportion of them are even aware about using safe water during cooking and cleaning. Study also observed that, project area people mostly use DTW water, PSF water and RWH plant water rather than STW water and pond/ canal/ river water. STW and pond/ canal/ river water are saline and contaminated water; so they don't use such water sources particularly for cooking, drinking and fermenting rice. While in the control area, people use STW and DTW water due to availability and being safe.

Table 4.5: Usage pattern of collected water

Issue	Project area (%)	Control area (%)
Cleaning of vegetables, fruits, betel leaf		
Shallow tube well	2	40
Deep tube well	35	51
Pond Sand Filter	14	-
Pond/ canal/ river water	50	8
Cooking and Drinking		
Shallow tube well	2	27
Deep tube well	35	65
Pond Sand Filter	21	-
Pantha/Fermented rice		
Shallow tube well	2	22
Deep tube well	42	74

Issue	Project area (%)	Control area (%)
Pond Sand Filter	32	-
Pond/ canal/ river water	21	2
Rain water (Rain Water Harvesting Plant)	5	-
Cleaning of dishes		
Shallow tube well	2	45
Deep tube well	27	41
Pond Sand Filter	6	-
Pond/ canal/ river water	65	15
Hand washing before taking meal		
Shallow tube well	2	43
Deep tube well	33	54
Pond Sand Filter	13	-
Pond/ canal/ river water	54	4
Rain water (Rain Water Harvesting Plant)	2	-
Other domestic chores		
Shallow tube well	2	40
Deep tube well	23	38
Pond Sand Filter	5	-
Pond/ canal/ river water	71	22

4.6 Maintenance of Water Sources

Respondents were asked to know about the maintenance of the water sources. Some 89 percent respondents in the project area and 17 percent respondents in the control area mentioned that caretaker is looking after the water sources (see below 4.9 for details of role of caretaker in maintenance of water sources). If water source becomes dysfunctional respondents reported that caretaker himself repairs this (77 percent in project area); they also got to outside mechanic and workshop for repairing (17 percent in project area and 28 percent in control area). In the control area, user group (71 percent) repaired the water sources through immediately collecting money from beneficiaries as well as monthly paying maintenance money by the beneficiaries (93 percent in project area and 92 percent in control area). When need a big amount of money for repairing the water source, project area people consult with implementing NGO (Rupantar) to bear/ share the cost (3 percent in project area) (**Table 4.6**).

Table 4.6: Information of maintenance of water sources

Issue	Project area (%)	Control area (%)
Caretaker looking after the water source		
Yes	89	17
No	11	83
If water structure becomes dysfunctional repaired by		
Caretaker himself	77	1
Outside mechanic and workshop	17	28
User group	8	71
Cost of maintenance borne by		
Individual user	3	5
User group	93	92
Government	1	3
Rupantar/ other NGOs	3	-

4.7 Management and Maintenance of Project Interventions

Water infrastructure in the village: Village level water infrastructures were managed under an operation and maintenance committee and maintenance carried out by a caretaker. The caretaker has been selected by the committee without any salary (for PSF and tubewells). Generally, caretaker was selected from the person who is the owner of the land where the infrastructure is installed. In case of desalination and arsenic treatment plants, caretaker has been appointed by the committee with a monthly salary. This caretaker may be from outside village. WDMC also plays significant role in management and maintenance of village level infrastructure.

Water infrastructure and sanitation in school: Such initiatives are managed under school management committee and WDMC, and maintenance done by a caretaker. The committee consists of 5-7 members. The caretaker has been appointed by the committee with a monthly salary. School teacher also plays important role in management and maintenance.

4.8 Management and Maintenance Costs of Project Interventions

Water infrastructure in village: Operation and maintenance committee bears all management and maintenance costs. Community people give a token money on daily/monthly basis for the maintenance. If they need a huge amount of money then Rupantar helped them through WaSH project.

Water infrastructure and sanitation in school: Both WaSH project and School Management Committee bear the management and maintenance costs.

4.9 Role of Caretaker in Maintenance of Water Sources

In both project and control areas water sources are operated and maintained by caretaker. Caretakers are moderately efficient in operation of these infrastructures. To operate and maintain the water infrastructure, caretaker received training from Rupantar and WaterAid but they mentioned that these trainings would be more effective with refreshers.

In case of village level water sources (i.e., STW, DTW, PSF and small RWH plant), caretaker play role in maintenance of the water source without any salary because he is the owner of the land where the water source was installed. The caretaker (or the land) has been selected by the management committee with full consent of the land owner. For the maintenance of DP and large RWH plant (project area) and ATP (control area) caretaker has been appointed with a monthly salary. This is not mandatory to be selecting the land owner as caretaker for the maintenance of such plants. Moreover, for the maintenance of the school level water infrastructure and sanitation caretaker has been appointed by the committee with a monthly salary.

4.10 Quality of Drinking Water

Respondents reported that before setting any water source and plant water quality (e.g., Iron, Arsenic, Bacteria and Salt, etc.) has been tested. 96 percent respondents in the control area and 91 percent in the project area mentioned that Arsenicosis problem is not a problem for the study areas. Some 96 percent respondents in the project area and 90 percent respondents in the control area mentioned that collected water tastes good to drink. A few of respondents (2 percent in the project area and 1 percent in the control area) mentioned that their collected water is saline water and also contaminated. For this, DP is provided among project area beneficiaries.

A total of 70 water sources (35 from project area and 35 from control area) were tested duly to find out the level of TTC, Iron and Arsenic in the water of the facilities. The water sources were

installed in the catchment area where household interviews were conducted. From the following source water was collected for test (**Table 4.7**):

Table 4.7: Water samples collected for testing water

Water Facility	Project Area (n)	Control Area (n)
Shallow Tube Well (STW)	3	4
Deep Tube Well (DTW)	20	30
Rain Water Harvesting (RWH) Plant	5	0
Pond Sand Filter (PSF)	2	0
Arsenic Treatment Plant (ATP)	0	1
Desalination Plant (DP)	1	0
Pond	1	0
Ring well	2	0
Piloting Climate Resilience Water Technology (PCRWT)	1	0
Total	**35**	**35**

According to Bangladesh Drinking Standard (BDS), acceptable limit of arsenic (mg/L) was 0.05. Analysis of water sample shows (**Table 4.9**) that majority (94% in project area and 89% control area) of the water facilities are free from arsenic contamination. In baseline 81 percent of the water facilities were found completely free from arsenic contamination. Only a very meagre proportion (6% project area and 11%control area) of sample water sources cross the acceptable limit of Arsenic.

Table 4.8: Level of Arsenic contamination in water sources

Village/Ward	Union	Upazila	Sample Source	Arsenic (mg/L) LOQ: 0.001, BDS: 0.05	
				Concentration	Method used
Fatekati	Bagali	Koyra	STW	0.085	AAS
Amadi	Amadi	Koyra	DTW	0.108	AAS
Uttarpara	MagurGhona	Dumuria	STW	0.138	AAS
Aroshnagar	MagurGhona	Dumuria	STW	0.146	AAS
Ward-06	MagurGhona	Dumuria	STW	0.131	AAS
Ward-05	MagurGhona	Dumuria	STW	0.109	AAS

According to BDS, acceptable limit of iron (mg/L) was 0.3-1. Presence of iron in the most (77 percent) water sources of the project area is found within safe limit. In about one forth (23 percent) water facilities found presence of iron which was not at acceptable limit. Presence of iron in the most water facilities of the control area (86 percent) in the control area were found within safe limit. According to DPHE protocol the acceptable limit of iron was up to 5 mg/L in rural areas and in that case only one water facility in the project area was found beyond the limit.

In the project area 60 percent water sources are free from fecal coliform. More than one tenth was within acceptable limit in respect of Bangladesh context and their TTC level was below 5.

More than one forth (28 percent) water sources are fully contaminated that means 72 percent water sources are in acceptable limit. In the control area 50 percent water sources are free from fecal coliform. One fifth was within acceptable limit in respect of Bangladesh context and their TTC level was below 5. About 14 percent water sources are fully contaminated that means 86 percent water sources are in acceptable limit in the control area and 72 percent in the project area.

Table 4.9: Analysis of water sample or considering presence of Arsenic Iron and TTC, at an acceptable level, the access of safe water is analyzed below by steps:

Steps	Project area (%)	Control area (%)
Step 1: Presence of Arsenic <0.05 mg/L	94	89
Step 2: Presence of Iron within 0.03- 1 mg/L	77	86
Step 3: Presence of Fecal Coliform <5	72	86
Step 4: Presence of Arsenic <0.05 mg/L; Iron within 0.03- 1 mg/L and Fecal Coliform <5	57	77

The findings of the above table shows that if we consider presence of arsenic then 94 percent water source in the project area and 89 percent water sources in the control area are free from arsenic but the water sources which are free from arsenic may not be free from iron or fecal coliform. In the same cases the water sources which are in the acceptable limit of iron may not be free from arsenic of feccal coliform. But if we consider Arsenic, Iron and TTC, at an acceptable level by steps then it was found that 57 percent water sources in the project area (in baseline this was 29.4 percent) and 77 percent water sources in the control area are safe.

Chapter V
Sanitation & Hygiene Status of Household

5.1 Improvement in Sanitation Services

The use of improved latrines in hard to reach areas of rural Bangladesh is still inadequate. Under AWaSH project, Rupantar as well as other NGOs conduct awareness campaigns and influences activities about the importance of sanitation and hygiene. This is done with the understanding that once communities learn the link between poor hygiene and disease, they feel inspired to improve their hygiene practices leading to their willingness to establish water and sanitation facilities themselves. The hygiene promotion approach includes stopping open defecation, safe disposal of child stool/ faeces, maintaining key hygiene practices by people in house and school. School going children are aware more about the sanitation through different awareness raising activities like campaigns, leaflets distribution, cultural programmes and others by Rupantar.

The study found that, 59 percent household in the project area uses sanitary latrine compared to 68 percent in the control area. However, this is a considerable achievement give that during baseline, only 43.2 percent of households were using improved latrines.

Study shows that 43 percent respondents in the project area and 50 percent in the control area used sanitary latrine with slab; uncovered water framed latrine (partly broken water frame) used by 30 percent respondent both in the areas; and open, bushy places or hanging latrine used by 11 percent and 2 percent respondents both in project and control area correspondingly (**Figure 5.1**). Community people also stated that due to flood and excess water their toilets became damage and most of the time they have no capability to repair the latrine in due time.

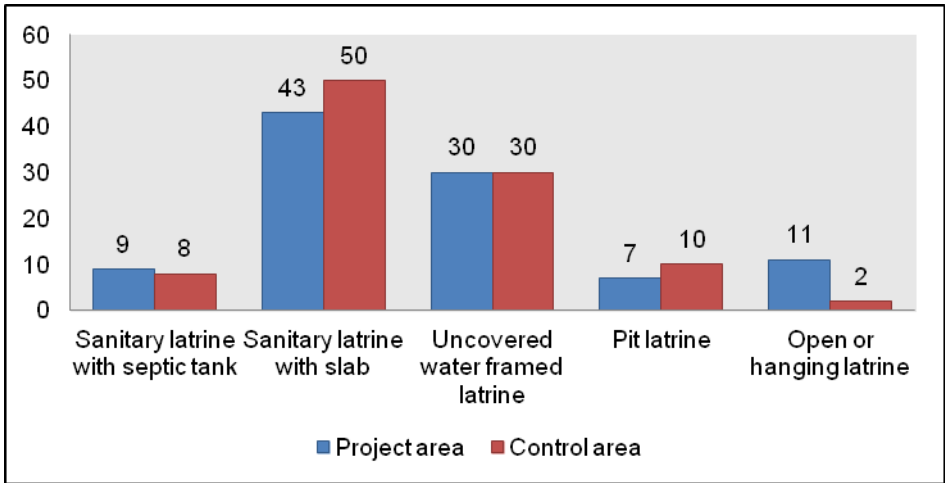

Figure 5.1: Information on sanitary latrine (%)

Respondents were asked to know about the using of latrine by their children in their household. Some 90 percent (93 in project area and 84 percent in control area) respondents mentioned that their female child uses existing latrine in their household. On the other hand, existing latrines in the household also used by male children was reported by 93 percent respondents (96 percent in project area and 88 percent control area) respectively.

A few of both female (6 percent in project area and 15 percent in control area) and male child (4 percent in the project area and 8 percent in the control area) use their household yard for latrine purpose. Respondents also mentioned that, male and female children (1 percent) used open spaces/ beside road/ jungle for toilet purpose. Data show that male children in both the project

and control areas were more conscious about using existing latrines but female children used household yard as latrine both in the project and control areas.

Household who did not have sanitary latrine mentioned several reasons for not using sanitary latrines. The major reasons include financial problem by the hardcore poor to install a sanitary latrine (95 percent in project area and 92 percent in control area), lack of space for installation (2 percent in project area and 2 percent in control area), unavailability of sanitary latrine in the locality (3 percent in the project area), and old habit to use open space (6 percent in control area). There is separate arrangement of latrine for the disabled person in project area, however, which was not found in control area. The study identified that the main reason for not using latrines is financial crisis. This information would be useful to mobilize and reallocate government loans (e.g. ADP loan) to bring these people with economic hardship under sanitation coverage.

5.2 Cleanness of the Latrine and Other Factors

Most of the respondents (70 percent in project area and 75 percent in control area) are regularly cleaning their latrine and remaining did not care to clean their latrine regularly even if they were made aware from AWaSH project about this for their health protection. In case of using shoe for going to latrine, 99 percent respondents in project and 60 percent in control area reported that they were wearing sandal for going to latrine. In case of disposing of children's stool, most of the respondents reported that they use latrine (89 percent) and digging hole in soil (6 percent in project area and 3 percent in control area) as well as through with garbage in the adjacent and surrounding river/ pond/ canal (5 percent in project area and 8 percent in control area). Findings show that although the project area is socio-economically backward but AWaSH project made them fully aware about living in hygiene environment similar or some case better to the control area. However, most of the time female members of the household clean their latrine which increases the workload of females. On the other hand, this is an interesting achievement for AWaSH project that women act as agent to bring about change.

Household observatory data shows that, 93 percent and 85 percent households both in the project and control areas used to keep their latrine clean. On the other hand, 100 percent household in the project area cover their water pot where as it was 90 percent in the control area. One interesting findings was that, 85 percent household in the project area and 75 percent in the control area used to throw their homestead garbage in a fixed place or under a hole. With regard to the maintenance of sanitation facilities there are no possible threats at present in project area. In project area most of the installed latrines have not filled up yet and when they did, in most cases they were cleaned out or the users of that latrine switched to other latrines.

5.3 Hand Washing Habits

Respondents were asked about their awareness and hygiene habit for maintaining good health. Data show that people used soap after latrine (97 percent in project area and 94 percent in control area), before taking meal (50 percent in project area and 32 percent in control area) and after cleaning children's bottom (12 percent in project area and 11 percent in control area). Most of the respondents reported that their family members use soap and water (69 percent in project area and 67 percent in control area) and ash and soap (21 percent in project area and 20 percent in control area) for hand wash after using the latrine. In case of hand wash after cleaning children's bottom, data show that more than half of the people use soap and water (55 percent in project area and 63 percent in control area) (**Table 5.1**).

Above findings don't show any difference between project and control areas using soap for hand wash particularly after latrine and cleaning of children's bottom.

Table 5.1: Hand wash habit of the household members

Issue	Project area (%)	Control area (%)	Total
Use of soap for hand wash			
After latrine use	97	94	96
Before taking meal	50	32	44
After cleaning children's stool	12	11	12
Before feeding children	3	3	3
Before cooking and food supply	11	11	11
Family members doing hand wash regularly after latrine by			
Water only	1	3	1
Ash and water	21	20	21
Soap and water	69	67	68
Soil and water	9	10	10
Hand washed after cleaning children's stool			
Water only	20	14	18
Ash and water	25	23	24
Soap and water	55	63	58

Household observation data found that, 80 percent household in the project area and 35 percent in the control area have hand washing places beside their latrine and 68 percent and 25 percent household both in the project and control areas respectively habituated to keep water for hand wash beside their latrine. Similarly, 47 percent household in the project area and 25 percent in the control area keep soap for hand wash after toilet beside their latrine. However, data also found that 100 percent household in the project area and 80 percent in the control area have separate soap to use after toilet. On the other hand, data shows that used soap was found in the 95 percent household in the project area and 92 percent household in the control area. Finally, the overall survey on sanitation and hygiene presented interesting insights into the awareness and practice of the study household. Level of hygiene awareness as well as personal hygiene and sanitation practices was found to be good in the project area.

Chapter VI
Household Affected by Water Borne Diseases

6. Prevalence of Water-borne Diseases

Diarrhoea, dysentery, cholera, jaundice, and skin diseases are the major water borne diseases in the study area. Chronic arsenic exposure has physical, psychological, economic and social problems to the life of people. They also identified some common problems like social instability, social discrimination, refusal of victims by community and families, and marriage-related problems due to water borne diseases in both the areas.

6.1 Old Aged People Suffering from Water Borne Diseases in the Last Year

Water borne disease related information was collected for both project and control areas in the last one year for both old aged male and female. Respondents mentioned a number of water borne diseases such as diarrhoea, dysentery, cholera, typhoid, hepatitis, itching, cold fever and worms were suffered by old aged people in the last year. The data shows that old aged suffered mostly by dysentery (57 percent in project area and 22 percent in control area) followed by diarrhoea (32 percent in project area and 22 percent in control area), itching-enteritis (4 percent in project area and 29 percent in control area) and cold fever (1 percent in project area and 21 percent in control area). It was found that there is some distinctive variation in water borne diseases in both project and control areas. In project area, old aged people also suffered from cholera and typhoid which is absent in control area. In the control area, itching-enteritis and cold fever were common for the old aged people (**Table 6.1**).

Table 6.1: Old aged people suffered from water borne diseases in the last year

Water borne diseases	Project area (%)			Control area (%)		
	Male	Female	Total	Male	Female	Total
Diarrhoea	26	39	32.21	18	25	21.82
Cholera	1	2	1.40	-	-	-
Typhoid	1	1	1.40	-	-	-
Dysentery	61	51	56.58	22	22	22.18
Worms	1	0	0.56	1	3	2.18
Hepatitis	1	5	3.08	7	1	3.64
Itching-enteritis	8	3	4.20	1	49	29.45
Cold fever	1	0	0.56	51	26	20.73

Data showed that, old aged female in the project area suffered mostly from diarrhoea (39 percent) and hepatitis (5 percent) than male. But males suffered mostly from dysentery (61 percent) and itching-enteritis (8 percent) than females in the project area. The reasons behind this could be that males spent considerable time outside, particularly in boat for fishing and drink unsafe water also use river water for bathing. So they easily suffered by dysentery and itching. On the other hand, in the control area, male suffered mostly from cold and fever (51 percent) and hepatitis (7 percent), and female suffered mostly from diarrhoea (25 percent) and itching (49 percent) (**Table 6.1**). Additionally, as the economic condition of control area is better than the project area and more families can afford to use hygienic latrines in the control area, so there is a difference between the two areas regarding the suffering from diarrhoea and dysentery.

By suffering from water borne diseases, old aged patient spent a considerable time due to illness. They opined that, on an average patient got water borne diseases by 4 times in a year in the project area where it was only 1 time in the control area. In case of total illness days for the last one year, they suffered on an average 13 days in the project area and it was only 6 days in the control area. They also reported that on an average 10 days in the project area and 4 days in the control area patients didn't went to work due to illness.

Surprisingly it was found that male members (4.19 times) suffered more times than female members (3.23 times) as well as they also suffered more days than female (15.46 days for male and 11.38 days for female). In case of missing working days, male members (13.27) missed double days then female (7.46 days).

Respondents also mentioned that, patient received medical treatment (99 percent in the project area and 98 percent in the control area) due to illness in the last one year. As a result, patients spent a considerable amount of money (Tk.) for their treatment in the last year. For example, in the project area patient they have had to spent mean money of Tk. 513 and maximum money of Tk. 7000. On the other hand, patients in the control area spent mean treatment money of Tk. 166 and maximum of Tk. 4000 in the last year.

6.2 Children Suffering from Water Borne Diseases in the Last Year

Study explores the data of children (0-14 years old) who suffered from water borne diseases in the last year. Data shows that 74 percent and 43 percent children were suffered from diarrhoea both in the project and control areas respectively. 20 percent and 10 percent were suffered from dysentery in project and control areas accordingly. It was also found that project area children additionally suffered in cholera (0.63 percent), typhoid (1.90 percent), Para typhoid (1.27 percent) and worms (0.63 percent), where in control area, children additionally suffered from hepatitis (1.53 percent) and cold fever (44.39 percent) (**Table 6.2**).

Table 6.2: Children suffered from water borne diseases in the last year

Water borne diseases	Project area (%)	Control area (%)
Diarrhoea	74.68	42.86
Cholera	0.63	-
Typhoid	1.90	-
Para Typhoid	1.27	-
Dysentery	19.62	10.20
Worms	0.63	-
Hepatitis	-	1.53
Itching-enteritis	1.27	1.02
Cold fever	-	44.39

Child's average total illness days were 8 days in the project area and 5 days in the control area. Child didn't work and went to school/ work for 4 days in the project and control areas.

Respondents stated that, 100 percent children both in the project and control areas received medical treatment during their illness. Children's parents spent on average Tk. 472 in the project area and Tk. 250 in the control area. In case of maximum, it was TK. 4000 in both the project and control areas respectively.

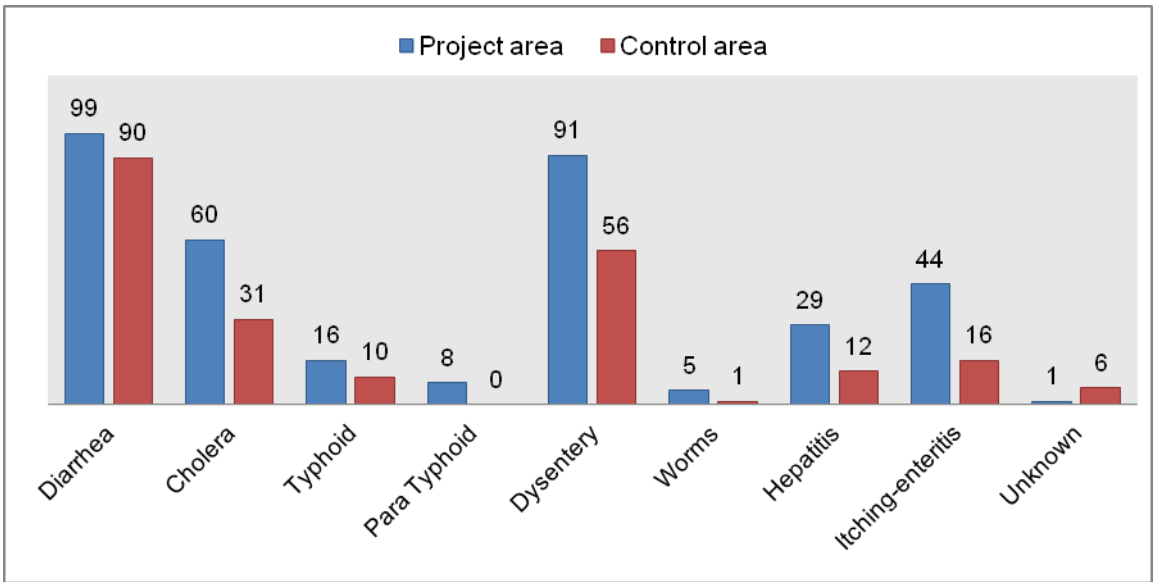

Figure 6.1: People suffered by water borne diseases in the last year

On the other hand, by overall people suffered from water borne diseases, it was found that 99 percent people in the project area and 90 percent in the control area suffered from diarrhoea. 60 and 31 percents people from project and control areas were suffered by cholera in the last year. 91 percent from project area and 56 percent from control area suffered from dysentery. Peoples also suffered from hepatitis (29 percent in the project area and 12 percent in the control area) and itching-enteritis (44 percent in the project area and 16 percent in the control area) (**Figure 6.1**).

6.3 Water Sources Contaminated by Arsenic

Although in the last year, none of the family members was affected by arsenicosis problem in the project area but people of Amadi Union said that, most of the tube wells in that area are affected by groundwater arsenic contamination as a result all people go to PSF for safe water collection rather than water collection from tube wells. All respondents from project area reported that they don't know whether the PSF water was affected by groundwater arsenic contamination or not.

On the other hand, FGDs with control area people was found that Arsenic poisoning or arsenicosis problem in underground water was the foremost problem in Magura Gona Union.

Chapter VII
Community Perception on Climate Change and Natural Disasters

7.1 Natural Disasters in the Project Area

Respondents were asked about their knowledge and perception on natural disaster. Some 99.5 percent respondents stated that they observed devastating natural disasters like cyclone *Sidr*, *Aila* and *Mohasen* in the last 10 years. The most common natural disasters in the project area were flood, drought, tornado, cyclone, over flow of water, river erosion and suffering from saline water. So, their safe water sources and latrines were sunk and damaged during disasters. Water sources went under flood water during disaster making it non-suitable for drinking due to increased salinity in the water, and also contaminated water. As a result they faced several problems like water collections from distance places, time constraints for safe water collection and higher cost for safe water collection. They mentioned that, due to damage to latrines they had to travel far to find toilets, or used open spaces and boats for toilet. But most of the problems were faced by women as they did not use open spaces and could not go far toilets. They were thus restricted to going only once a day and once a night within the homestead boundary area.

7.2 Impact of Climate Change on Community

Under the AWaSH project in project area, the PNGO and WDMC increased the community awareness level on causes and impacts of climate change through campaigns, programmes and video show. So the questions were asked to the respondents about the negative impact of climate change in their locality, life and livelihoods. They reported that due to climate change cyclones and tornadoes are frequently occurring (87 percent), overflow of water (86 percent), drought (26 percent), earthquakes (42 percent) and unusual floods (20 percent) are common.

FGDs with WDMC members and community leaders responded more elaborately on the above issue. Conversely, control area people have little knowledge on climate impacts. Project area respondents mentioned that climate is changing frequently and the most common climate change related impacts are:

- ✓ increased temperature and drought condition
- ✓ variation of rainfall patterns (irregular rainfall, high and low rainfall)
- ✓ salinity intrusion
- ✓ increased the frequency of cyclone, tornadoes and storm surges
- ✓ flood, water logging and coastal erosion
- ✓ damage house, road and infrastructure
- ✓ damage agriculture field and shrimp farm, and
- ✓ sea level rising.

7.3 Climate Change Adaptation

To respond to the impacts of climate change that are already happening, while at the same time prepare for future impacts to prevent or minimise the damage they can cause, or taking advantage of opportunities that may arise are called climate change adaptation. These responds/ adjustments can be protective (i.e., guarding against negative impacts of climate change), or opportunistic (i.e., taking advantage of any beneficial effects of climate change).

To adopt with the changing climate, following adaptation measures can be follow by the local people with the help of different agencies and NGOs:

- ✓ tree plantation activities in the roadside, dam and homestead
- ✓ raise the platform of house, tube well and toilet
- ✓ repair road, culvert, dam and shelter centre
- ✓ ensure drainage facility for water discharge
- ✓ make portable stove and pile up firewood
- ✓ collect dry food like Chira, Muri and Khoi (both made form rice), molasses, biscuits, and essential medicines
- ✓ store safe drinking and cooking water; and
- ✓ save an amount from family expenditure whenever possible.

7.4 Preparedness for Disaster Risk Reduction and Climate Resilience

Community people are more aware and conscious about climate change and disasters impacts. They prepared themselves with the help of WaterAid and government organizations. Such organizations organized training and discussion session on disaster preparedness and activities for during and post disaster as well as supply relief materials during disaster. Respondents were posed to collect information about their preparation for disaster risk reduction (DRR) and climate resilience. They reported that they were fully aware about to go to cyclone shelter after hearing disaster warning (99 percent respondents in project area and 62 percent in control area), preservation and store safe drinking water and dry foods (61 percent respondents in project area and 36 percent in control area), put important documents and jewelry under soil (64 percent respondents in project area and 16 percent in control area), roadside and homestead tree plantation activities (37 percent respondents in project area and 36 percent in control area) and raising homestead land and latrine (39 percent respondents in project area and 43 percent in control area), etc. (**Figure 7.1**).

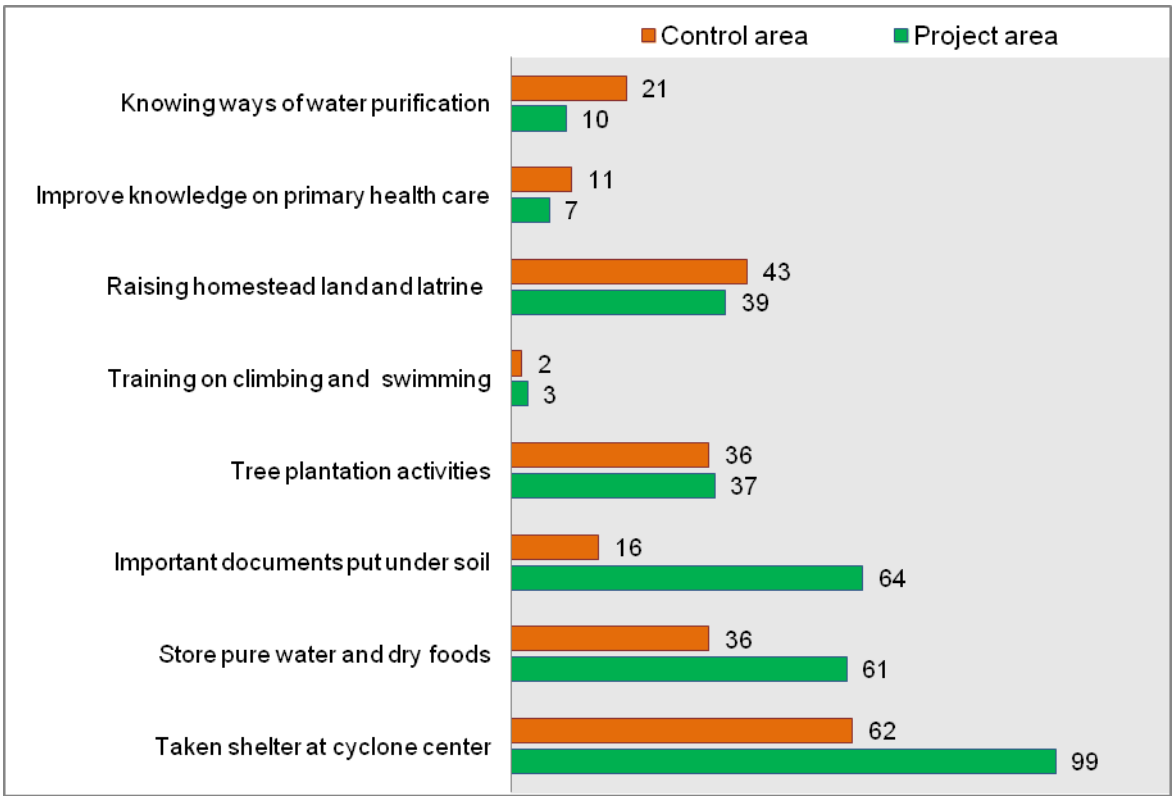

Figure 7.1: Preparedness for disaster risk reduction and climate resilience (multiple response %)

During discussion with the WDMC and community leaders they mentioned several activities or planned adaptive reduction strategies for DRR, such as:

- ✓ increase tree plantation activities under social forestry programme
- ✓ construction and repair of cyclone shelter, dam, bridge, culverts and road
- ✓ increased the number of dams, culverts and cyclone shelters
- ✓ proper drainage facility for quick water discharge after disasters
- ✓ increase the number of safe drinking water sources including rain water harvesting plant
- ✓ organized more training on disaster preparedness (e.g., early warning, go to cyclone shelter, know swimming, and primary aid)
- ✓ increased disaster management budget within Annual Development Plan (ADP) and budget of Union Parishad; and
- ✓ increased the number of government projects on DRR.

Chapter VIII
Role of WaSH Project in Community Development

8.1 Ward Disaster Management Committee (WDMC)

Ward Disaster Management Committee (WDMC) was a local committee formed by the local community members and work for pre-, during and post- disasters situation. The WDMC was headed by the Ward Member and also by different persons from the community. WDMC was formed by the Rupantar under AWaSH project with the following objectives:

- ✓ To monitor and manage the volunteers activated for disaster preparedness.
- ✓ To update the database or information of their respective ward.
- ✓ To refer the timely guidance to the ward level disaster management club.
- ✓ To coordinate with government functionaries with regard to vulnerability and hazard risk reduction.

However, there is no WDMC in control area, so comparison was not possible here between control and project area.

8.1.1 Role of WDMC in community development

WDMC ensure disaster management at community level and able to contribute to disaster management at the union level. WDMC also mobilized with representatives from the community to assist the Union Disaster Management Committee (UDMC) in inclusive risk assessment, planning, implementation and monitoring of disaster preparedness and mitigation activities. The particular tasks of the WDMCs are as follows that play vital role in community development and increase the community resilience capacity:

- ✓ Participatory WASH Vulnerable Assessment
- ✓ Prepare Ward Development Plan and implementation of this plan
- ✓ Coordination with other NGOs working in the area
- ✓ Site selection for infrastructures; ensure quality of works, and monitoring
- ✓ Awareness raising activities on WaSH behavior, and climate change and disasters
- ✓ Ensure safe drinking water for all beneficiaries
- ✓ Ensure sanitary latrine for all beneficiaries and also encourage others to set up latrine in their households
- ✓ Maintain strong linkages with Union Parishad
- ✓ Motivate people to follow health, sanitation and hygiene rules
- ✓ Warning about upcoming disasters through miking and siren
- ✓ Evacuation and rescue for minimizing human causality and shelter management for minimizing distress
- ✓ Help in relief distribution (e.g., dry food, water, medicine) during disaster
- ✓ Repairing road and culvert after disasters; and
- ✓ Training of people on disaster preparedness.

8.2 Union Disaster Management Committee (UDMC)

The Ward Disaster Management Committee (WDMC) was coordinated by Union Disaster Management Committee (UDMC). UDMC headed by the Chairman of the Union Parishad (UP) (lowest administrative tier) to coordinate, review and implement the disaster management activities of the concerned Union. Female and Male UP member of each ward and some elite persons from each community also participated in the meeting.

UDMC prioritize the major activities under Ward Development Plan and included the approved activities in the annual budget for implementation, coordination with other institutes and NGOs, monitoring of ongoing projects, and working actively with WDMC.

8.3 Linkages between WDMC and UDMC

WDMC and UDMC are working together under an umbrella during disaster. Both the committees work for evacuation, rescue and relief distribution during disaster and repair road and culvert after disaster as well as ensure safe drinking water throughout the year.

WDMC first identify and prioritize the problems and disclose to the UDMC. UDMC then prioritize the major problems from all mentioned problems in each ward. After that UDMC included such problems with their probable minimization cost in their annual budget.

8.4 Gaps between WDMC and UDMC

From the survey and discussions it was found that there is no conflict and gaps between WDMC and UDMC. They actively work together for the sustainability of WaSH interventions.

8.5 Union Contingency Plan

In each Union, UDMC carry out the risk assessments working with WDMC. Based on the risk assessment, a Union Risk Reduction Action Plan (RRAP) and a Union Contingency Plan (UCP) are prepared. Both the RRAP and UCP include in the process and reflect the needs of the most vulnerable communities keeping in mind the gender equity, the needs of children, persons with disability, aged and other socially excluded groups. Similarly, resource mobilization also carries for the instruments which need to be in place for the implementation of UCP. Where necessary, the funds from the Annual Development Budget will be accessed for the UCP.

The UCP was a comprehensive plan which includes all types of preparedness activities such as:

- ✓ functional early warning system (e.g., signal through flag on and miking) for disasters
- ✓ volunteers groups and task forces to respond in the immediate disaster phases (e.g., prepare transport, collect phone number of doctors and shop-keepers, given priority to sick, women and adolescent girls, and motivate people to go to cyclone shelter, etc.)
- ✓ regular mock drills, and coordination with other response agencies
- ✓ linkage with institutional contingency plans (e.g. schools, hospital)
- ✓ buffer stocks of essential materials (e.g. food and non-food items); and
- ✓ establishment of a disaster contingency/ response fund.

8.6 Role of Union Parishad in Disaster Risk Reduction

Union Parishad can play the most important and leading role in DRR in the concerned area. UP was the leader in grass root level and they have to be in front in any disaster. Each UP has its own budget (5-10%) for disaster risk management but such a low budget was insufficient like this coastal area where natural disaster was a regular phenomena. Moreover, if the allotted fund was properly spent for disaster risk management, people would be benefitted. But in reality, most of the fund was not spent properly by the UP Chairman and members as well as local elites. UP also fully depends on NGOs or outsiders' help; as a result, their tendency were changed from self-dependency to outsiders' help. They think that NGOs will help the people; they have no responsibility for those people.

Respondents stated several ways by which UP can play active role in DRR:

- ✓ Disseminate safe drinking water plan among the community people

- ✓ Send disaster related messages to all Union level offices
- ✓ Identify water sources and take initiative
- ✓ Hand tube well distribution among poor and ultra poor
- ✓ Increasing awareness to use safe drinking water
- ✓ Regularly do the follow-up of caretaker's activities
- ✓ Repairing and construction of road and culvert
- ✓ Tree plantation activities
- ✓ Relief, medicine and water distribution
- ✓ List of affected people and rehabilitation activities; and
- ✓ Open and more budgetary allocation for disasters.

8.7 Role of Following Interventions under AWaSH Project in Community Development

Ward Development Plan: Enlisted the community needs (e.g., road, infrastructure, water, sanitation and livelihoods) through participatory process and prepare a development plan based on the needs.

Emergency Plan: This plan gives direction to the people during the emergency situation, such as, where you can contract during disaster period, prepare transport, collect phone number of doctors and shopkeepers, plan for evacuation and rescue, shelter management for minimizing distress, etc.

Mobile Treatment Plant: Mobile water treatment plants offer quick, reliable and cost effective service to meet the problem of water crisis. Basically, this was a saline water treatment and distribution plant. The plant can reach the site within no time and can provide safe drinking water to the population particularly during disaster.

Raised Tube well Platform: To protect the tube well from saline and flood water, platform of each tube well was raised above the highest known flood level with a concrete platform. As a result, community people can access clean drinking water all the year round even in during disaster.

8.8 Role of Following Clubs under AWaSH Project in Community Development

Youth Club: Youth Club is called the force of WDMC. They help WDMC by providing information on various issues. They participate in development activities, create awareness on climate change and disaster impacts and adaptation, organize campaign and conduct regular household observation.

Mother's Club: All beneficiary mothers of the project intervention area are involved in this club. They create awareness about WaSH practice and behaviour to other mothers of that area.

Student's Club: School and college going students are involved in this club. They create awareness on WaSH practice and behaviour to their friends.

Child Club: Child Club is formed with different age's children in the respective area. They create awareness to other child on personal hygiene.

Ethnic Club: This club is formed with ethnic people where available (in Mohessoripur Union). This club creates awareness among their community about WaSH practice and behaviour.

Professional Club: Professional Club is formed by the combination of different professionals. Mainly old aged people from different professions are involved in this club. They discuss with each other in different issues like climate change and inform other about it.

Adolescent Club: Adolescent from beneficiary families is involved in this club. They create awareness on WaSH practice and behaviour as well as personal hygiene to other adolescent on that area.

Chapter IX
WaSH in Schools

9. Situation of Water, Sanitation and Hygiene in Schools

Four schools from project and control area were observed and filled up a checklist to know the status of latrine and water sources facilities. In the project area the study covered of Daskhin Kalikapur Government Primary School at Moheswaripur Union and Koyra Madinabad High School of Koyra Union and in the control area the study covered Uttar Usha Nagar Government Primary School under Magura Ghona Union and Rangpur Kalibati High School under Rangpur Union of Damuria upazila in Satkhira district to collect information on safe water, neat and cleanness and to look after health improvement services at the school level. Below Table 9.1 shows the of latrine and water sources tatus of the surveyed schools:

Table 9.1: Situation of water, sanitation and hygiene in schools

Issue	Findings	
	Project Area	Control Area
Student attendance	Daskhin Kalikapur Government Primary School -99%	Uttar Usha Nagar Government Primary School -87%
	Koyra Madinabad High School -95%	Rangpur Kalibati High School – 89%
Water reservoir type	Daskhin Kalikapur Government Primary School – Water Tank for storing rain water	Uttar Usha Nagar Government Primary School – don't store drinking water
	Koyra Madinabad High School – Deep Tube Well (colored by green)	Rangpur Kalibati High School – Deep tube well (no color marked)
Water reservoir source	Daskhin Kalikapur Government Primary School – Rain water	Uttar Usha Nagar Government Primary School – shallow water
	Koyra Madinabad High School – Ground water	Rangpur Kalibati High School – Ground water
Distance of water source	Daskhin Kalikapur Government Primary School- 1m	Uttar Usha Nagar Government Primary School – 50m
	Koyra Madinabad High School – 0m	Rangpur Kalibati High School – 20m
Drinking water pot	Daskhin Kalikapur Government Primary School- glass (every 10 male and female students used a glass) & Jag (75 male and female students used a jag)	Uttar Usha Nagar Government Primary School – water bottle used by individual students;
	Koyra Madinabad High School – (every 50 male and 45 female students used a glass) & Jag (150 male and 100 female students used a jag)	Rangpur Kalibati High School – Jag (40 male and 40 female students used a jag)
Number of toilet	Daskhin Kalikapur Government Primary School; only one toilets used by all (teachers + students); no separate toilet for male and female students and teachers	Uttar Usha Nagar Government Primary School – no toilet in the school but used to other house-based toilets
	Koyra Madinabad High School – 8; 5 for	Rangpur Kalibati High School –

Issue	Findings	
	Project Area	Control Area
	male students, 2 for female students, 1 for male teachers & none for female teachers.	separate toilets for male and female students but no separate toilets for male and female teachers.
Hand washing	Daskhin Kalikapur Government Primary School- no hand washing system;	Uttar Usha Nagar Government Primary School – soap storage facility existing but no soap was found there
	Koyra Madinabad High School – soap available in the specified place	Rangpur Kalibati High School – soap stored in the toilet
Waste Management System	Daskhin Kalikapur Government Primary School- no waste management system;	Uttar Usha Nagar Government Primary School – solid waste thrown to nearest pit/swam area
	Koyra Madinabad High School – no waste management system	Rangpur Kalibati High School – Pit / sewerage pipe
Type of toilet	Daskhin Kalikapur Government Primary School- pan latrine;	Uttar Usha Nagar Government Primary School – other houses toilet had septic tank
	Koyra Madinabad High School – Pit latrine	Rangpur Kalibati High School – septic tank
Condition of toilet	Daskhin Kalikapur Government Primary School- dirty and unhygienic;	Uttar Usha Nagar Government Primary School – no toilet
	Koyra Madinabad High School – clean and hygienic	Rangpur Kalibati High School – clean and hygienic
Vulnerability situation	Daskhin Kalikapur Government Primary School- not vulnerable for natural disaster	Uttar Usha Nagar Government Primary School – not vulnerable for natural disaster
	Koyra Madinabad High School – not free from natural disaster	Rangpur Kalibati High School – safe for natural disaster

Chapter X
Discussion and Recommendations

10.1 Discussion

The AWaSH project was implemented in Koyra upazila, a disaster prone area of Khulna District which suffered from a devastating cyclone in 2009 called *Aila*, the effects of which linger to date. The study also selected a control area, Dumuria upazila, a non-disaster prone area, to compare the status of water, sanitation and hygiene practices of community people. The socio-economic status of Dumuria is much better than that of Koyra, and government interventions in the sub-district mean that it has much better access to safe water. The results of this study have been interpreted keeping this in mind.

The study finds an overall positive impact of the project on water, sanitation and hygiene status, as well as on local knowledge, commitments and actions relating to fighting climate change. As Koyra is an especially vulnerable upazila, bordering on the coast and suffering massive saline intrusion following *Aila*, people's felt experiences of climate change are strong and the project has successfully captured this impetus and directed it in productive ways to more preparedness through the WDMCs. The study also finds that due to project implementation in Koyra, the health status of the population has improved because of accessibility of safe water, use of sanitary latrine and practice of hygiene.

Nearly 900 million people in today's world, one person in eight, collect water from contaminated source, which often is quite some distance from the home (**World Vision 2011**). Typically, the back-breaking burden for collecting this water falls upon women and adolescent girls (**UN 2010**). The endline study found that in project area, more than 90 percent safe water collector was women and they crossed on average 172.36 m with 19 minute round trip. This is within the 30 minute roundtrip standard set by WHO and UNICEF **(2010)** as part of their indicator on safe water supply, and is nearly half of the baseline time of 37.5 minutes.

Several studies **Karim et al. (2013**), **Islam et al. (2011), Karim et al. (2005)** and **Ahmed et al. (2005**) showed that coastal area people collect safe water from a long distance i.e., more than 2 to 5 km and also to have a long queue to collect PSF water. During baseline only 0.2% was using PSF, but in the endline survey it was found that 43 percent of households are using PSF, as post-*Aila* this is one of the few technologies viable in the context of the area.

On the other hand in control area, use of tube well water was much higher in control area for due to its financial advancement. As mentioned before, **WHO and UNICEF (2010)** standard for safe water supply is 20 litres (5 gallons) per person per day within a 30 minute roundtrip walk from the home. In this regard, it can be said that the AWaSH project is achieved its objective to ensure safe water source for the rural people within a short distance, despite the difficulties of water source options being limited to typically far away PSFs. **UNICEF (2009)** recommended that increased access to safe water close to home means more time and energy for women to engage in economic activities, and for girls to attend school.

Project area people spent minimum money for safe water collection from water sources based on maintenance costs. People in the project area also value the water issue which is currently reflected in their willingness to pay (WTP) for water. A Contingent Valuation Method study was conducted by **BISR Consultants Ltd. (2011)** for JICA shows that people in the rural area is willing to pay not only for pipe water, even share the water quality monitoring cost. However, this can be augmented further through a process of inducement of the same.

According to Bangladesh Drinking Standard (BDS), acceptable limit of arsenic (mg/L) is 0.05. Analysis of water sample shows that majority (94% in project area and 89% control area) of the water facilities are free from arsenic contamination. At baseline, 81 percent of the water facilities were found completely free from arsenic contamination whereas in endline 94% water facilities were found completely free from arsenic contamination in case of project area. Likewise, if we consider Arsenic, Iron and TTC, at an acceptable level by steps then it was found that 57 percent water sources have safe drinking water in the project area, which is a near doubling of the 29.4% that was found during baseline. The community was highly benefited from the cost-benefit point of view as well as currently they are getting six times more water at the same cost as they paid before the project. On the other hand, 100 percent household in the project area cover their water pot where as it was 90 percent in the control area.

One of the main focuses of the AWaSH programme was to improve the level of sanitation and hygiene through access and practices in the project area. To achieve its targets, project tried to improve both the level of awareness and level of sanitation and hygiene practices in the project area. The endline study found 59 percent household is using improved sanitary latrines (National Sanitation Strategy 2010 definition) which are better than the national standard (49.4 percent) and similar to rural WaSH (58 percent). This result should however be interpreted in light of the situation after Aila, when almost all latrines were destroyed (0 percent was sanitary latrine coverage). However, this is a considerable achievement give that during baseline, only 43.2 percent of households were using improved latrines while this is a definite improvement on the previous situation since, there is scope to further continue this work. Providing economic incentives to the right agents would again be vital in achieving an overall improvement across all the economic sections of the society also it is imperative that special focus must be on the poorer people.

According to **Global Handwashing (2009)**, handwashing with soap could prevent half of diarrheal deaths, a third or more of neonatal deaths, and a quarter of pneumonial deaths, flu and other communicable diseases. In case of hygienic practices study results showed promising findings. Household members and school going children's maintaining the AWaSH practices rules properly in their daily activities like before and after eating, preparing food, after toilet and cleaning the children's stool. The study also identified that, after AWaSH interventions the water borne diseases related death particularly child death were reduced at a satisfactory level.

In case of social mobilization, the AWaSH project achieved its several targets such as forming community based WDMC in each ward, preparing disaster management plans with the help of UDMC and implementing it, preparing Union Contingency Plan, Ward Development Plan and Emergency Plan, assessing the Participatory WaSH Vulnerability, year round extensive awareness raising activities including school, maintaining strong linkages with UP, other NGOs and government organizations, ensure safe drinking water for all the beneficiaries and ensuring sanitary latrine for all beneficiaries, and encouraging others to set up latrine. WDMCs are active in keeping up motivational work on following health, sanitation and hygiene rules, warning about upcoming disasters, training people on disaster preparedness as well as playing vital role in disastrous situation (pre-, during and post-).

The formation of different clubs under WaSH project is a unique achievement of the project. These clubs play significant role in awareness raising, motivational work as well community development by sharing and learning method. WaSH also influenced and built the capacity of the UP to become better at DRR preparing community on disaster response, identifying water sources and disseminating safe drinking water, following up on caretakers' activities, distributing relief, medicine and water, repairing and construction of road and culvert, tree plantation and preparing a list of disaster affected people and rehabilitation activities. The project ensures people's participation from its all activities including in O&M where cost of O&M are also borne by

the community. To sustain the project outcomes, there is need of another long-term project with improved technology and more or frequent activities and training programmes.

The project was a need-based rather than a donor driven project which was appreciated by the local people. The project design seems to be appropriate as it was a participatory one – both physical and financial – such as donation of space, funding the maintenance and providing a caretaker from the locality for operation and maintenance. It was a good example of addressing the disaster and climate changed-induced problems in close association of the local community. It has more relevance as in coming days, more such problems likely to occur, for example, in last week (July 2014) huge area of Patuakhali and Bhola districts has gone under water due to abnormal high tide from the Bay of Bengal.

Such operations may be required in other coastal areas of Bangladesh in the near future. Lessons learned from the project would be very useful. People's participation in O&M was praiseworthy, costs of O&M are also borne by the community, cooperation rather than competition was noticed. The NGO's role in giving support to the community was also commendable in not taking the role of operator of the schemes as the project, following the Build, Operate and Transfer (BOT) approach. Cooperation with the caretaker was also good; no feud was reported centering the control over the water sources, and local elites were also not interfering the project activities. The community was highly benefited from the cost-benefit point of view as currently they are getting even six times higher water at the same cost in some cases.

10.2 Recommendations

Though the AWaSH project has overall been successful in tackling the critical WaSH challenges in Koyra, there is scope for extension of the work or improvements in similar projects. These recommendations are listed below:

- Mean time required for water collection was 19 minutes in the project area, which can be reduced with the increased facilities. Or alternatively an opportunity cost study can be carried out whether this needs to be reduced.
- Resource mapping can be done to increase the knowledge of water sources in the area.
- Pay in four modes such as cost recovery method, no cost method, actual cost method, and monthly cost method (2%). Four alternative costing methods need to be studied intensively and rationalization may be attempted. That can be another contribution of such project in post-disaster management approach in future.
- Refresher trainings should be provided to caretakers for more effective O&M.
- In case of sanitation although significant achievement of the project is there, more works to be done. Water borne disease is still very high; more actions are needed on monitoring of water quality from such project.
- WDMC first identify and prioritize the problems and disclose to the UDMC. UDMC then prioritize the major problems in each ward. After that UDMC included such problems with their probable minimization cost in their annual budget. The process may be strengthened further to ensure more actions from the UP side. Moreover, a strong coordination mechanism with NGOs may be worked out to ensure better result.
- In case of augmentation of water sources more funding may be asked from the local community also. This can be tested following the WTP approach. A clear assessment on communities' willingness to pay in other areas should be conducted while planning for replication of such project.
- WaterAid and Rupantar should continue to advocate based on the learnings of the project in various national and international forums.

The present process should continue as it has long lasting impact on climate–induced DRR and mitigation as well as poverty reduction and climate change-induced out-migration. Future projects can similarly consider interventions where NGO interventions act as a supporter and facilitator to community-driven initiatives rather than the main operator, thus increasing sustainability and increasing local ownership and innovation.

References

Ahmed MF, Shamsuddin SAJ, Mahmud SG, Rashid H, Deere D, Howard G (2005). *Risk Assessment of Arsenic Mitigation Options (RAAMO)*. APSU, Dhaka, Bangladesh.

Alam K, Rahman MH (2014). Women in Natural Disasters: A Case Study from Southern Coastal Region of Bangladesh.*International Journal of Disaster Risk Reduction,* 8: 68-82.

BBS (2011). *Report of the Household Income and Expenditure Survey 2010*. Bangladesh Bureau of Statistics, Ministry of Planning, Dhaka.

BISR Consultants Ltd. (2011). Contingent Valuation Study (CVM) Study for Strengthening Capacity for Water Quality Analysis and Monitoring System in Bangladesh funded by JICA, Dhaka.

Campbell and Stanley JC (DT (1963). *Experiment and Quasi-Experimental Designs for Research*. Houghton Mifflin Company, Boston. Dallas. Geneva, III. Hopewell, N.J. Palo Alto, London.

DATASEARCH (2012). *Baseline Report on AWaSH Project*, Dhaka.

Eisenman DP, Wold C, Fielding J, Long A, Setodji C, Hickey S, Gelberg L (2006). Differences in Individual-Level Terrorism Preparedness in Los Angeles County.*American Journal of Preventive Medicine,* 30: 1-6.

Fothergill A (1998). The Neglect of Gender in Disaster Work: An Overview of the Literature. In: E Enarson and BH Morrow (Eds.), T*he Gendered Terrain of Disaster*, Westport: Praeger, 11-44.

Fothergill A (1996). Gender, Risk and Disaster.*International Journal of Mass Emergencies and Disasters,* 14:33-56.

Global Handwashing Day: Planner's Guide (2009). 2nd Edition. Available at: http://www.who.int/gpsc/events/2008/Global_Handwashing_Day_Planners_Guide.pdf

Harmeling S, Eckstein D (2013). *Global climate risk index 2013: who suffers most from extreme weather events?* Weather-related loss events in 2011 and 1992 to 2011.

Islam MA, Sakakibara H, Karim MR, Sakine M, Mahmud ZH (2011). Bacterial Assessment of Alternative Water Supply Options in Coastal Areas of Bangladesh. *Journal of Water and Health,* 9(2): 415-428.

Islam MN (2011). *An Introduction to Research Methods: A Handbook for Business and Health Research.* 2nd edition. Mullick and Brothers, Dhaka.

Joshi S (2004). *Female Household-headship in Rural Bangladesh: Incidence, Determinants and Impact on Children's Schooling.* Yale: Yale University, September.

Karim MR, Rimi RA, Billah MS (2013). *Reliability Analysis of Household Rainwater Harvesting Tanks in the Coastal Areas of Bangladesh Using Daily Water Balance Model*. 20th International Congress on Modelling and Simulation, 1–6 December 2013, Adelaide, Australia, pp. 2639-2645.

Karim MR, Shelly AB, Biswas M (2005). *People Perception and Acceptance of Rainwater Harvesting. In: A Coastal Area in Bangladesh*. Proceedings of the Twelfth International Conference on Rain Water Catchment Systems, November 2005, New Delhi, India.

MoFDM [Ministry of Food and Disaster Management] (2010). *Standing Order of Disaster (SOD)*. Disaster Management Bureau, Government of the People's Republic of Bangladesh, Dhaka.

Pruss-UstunA, Bos R, Gore F, Bartram J (2008). *Safer Water, Better Health: Costs, Benefits and Sustainability of Interventions to Protect and Promote Health*. WHO, Geneva.

Rana MS, Gunasekara K, Hazarika MK, Samarakoon L, Siddiquee M (2010). Application of Remote Sensing and GIS for Cyclone Disaster Management in Coastal Area: A Case Study at BargunaDistrict, Bangladesh. *The International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences*, XXXVIII (8): 122–126.

Tekeli-Yeşil S, Dedeoğlu N., Braun-Fahrlaender C and Tanner M (2010). Factors Motivating Individuals to Take Precautionary Action for an Expected Earthquake in Istanbul. *Risk Analysis,* 30: 1181-1195.

UN [United Nations] (2010). *Millennium Development Goals: Gender Equality and Women's Empowerment*. New York.

UNICEF (2010). *WaSH in Schools: Raising Clean Hands-Advancing Learning, Health and Participation through WASH in Schools*. UNICEF, New York.

UNICEF (2010).*Sanitation, Hygiene Education and Water Supply in Bangladesh (SHEWA,B)*, Dhaka.

UNICEF [United Nations Children's Fund] (2009).*Evidence base: Water, Sanitation and Hygiene Interventions. Literature Review: December 2009*. WaSH Section, UNICEF, New York.

UNISDR [United Nations International Strategy for Disaster Reduction Secretariat] (2008). *Briefing Note 01: Climate Change and Disaster Risk Reduction*. Geneva: International Environment.

WaterAid (2013). *Mid Year Report for Big Lottery Fund (Six Monthly Report Covering 1 June to 30 Nov 2013)*, Dhaka, Bangladesh.

WaterAid (June 2013). *Water Safety Plan*, Dhaka.

WaterAid (September 2013a). *Handbook- Adaptation to Climate Change: Safe Water, Sanitation and health Practice,* Dhaka

WaterAid (September 2013b). *Adaptation of Climate Change at School: Safe Water, Sanitation and Health Practice,* Dhaka.

WHO [World Health Organization] & UNICEF (2010). *Joint Monitoring Programme for Water and Sanitation: Progress on Drinking Water and Sanitation*. Available at: http://www.wssinfo.org/.

World Bank (2006). *Bangladesh Country Environmental Analysis.* Bangladesh Development series paper 2. Dhaka: South Asia: Environment and Social Unit.

Annexure

Annex 1: Union checklist of the study area

SN	Name of Union	Name of upazila	Population	Functional water source	Population per water source	Number of NGOs	NGO in WaSH Program
1	Uttar Bedkashi	Koyra	16,234	409	40	11	3
2	KoyraSadar	Koyra	37,134	304	122	17	3
3	DaskinBedkashi	Koyra	19,543	296	66	12	3
4	Bagali	Koyra	38,743	237	163	8	3
5	Amadi	Koyra	35,735	229	156	9	3
6	Mahessaripur	Koyra	45,084	105	429	7	5
7	Moharajpur	Koyra	34,987	401	87	7	2
	Sub-total		**227,460**	**1981**	**115**	**71**	**22**
1	Atlia	Dumuria	36,000	736	49	15	3
2	MaguraGhona	Dumuria	26,606	591	45	3	3
3	Shovona	Dumuria	24,180	571	42	10	3
4	Damuria	Dumuria	29,800	871	34	15	2
5	Gutudia	Dumuria	26,642	1252	21	10	2
6	Rangpur	Dumuria	18,730	841	22	15	2
7	Rudaghora	Dumuria	31,557	701	45	25	2
	Sub-total		**193,505**	**5563**	**35**	**102**	**17**

Annex 2: List of unsafe water sources in the study area

Village /Ward	Union	upazila	Sample source	Arsenic (mg/L) LOQ:0.001, BDS: 0.05		Iron (mg/L) LOQ:0.01, BDS:0.3-1		Total Coliform CFU/100ml, BDS: 0	
				Conc.	Method	Conc.	Method	Conc.	Method
Ward-05	MagurGhona	Dumuria	ATP	0.027	AAS	0.35	AAS	27	MFM
Uttarpara	MagurGhona	Dumuria	STW	0.138	AAS	2.93	AAS	0	MFM
Aroshnagar	MagurGhona	Dumuria	STW	0.146	AAS	2.25	AAS	3	MFM
Ward-06	MagurGhona	Dumuria	STW	0.131	AAS	1.95	AAS	13	MFM
Ward-05	MagurGhona	Dumuria	STW	0.109	AAS	2.21	AAS	0	MFM
ArajiSajiyara	Dumuria	Dumuria	DTW	0.004	AAS	0.74	AAS	11	MFM
ArajiSajiyara	Dumuria	Dumuria	DTW	0.004	AAS	1.48	AAS	13	MFM
Rongpur	Rongpur	Dumuria	DTW	0.022	AAS	0.01	AAS	17	MFM
4 No. Koyra	Koyra	Koyra	DTW	0.002	AAS	2.04	AAS	13	MFM
1 No. Koyra	Koyra	Koyra	DTW	0.001	AAS	0.39	AAS	15	MFM
Madinabad	Koyra	Koyra	DTW	0.001	AAS	0.05	AAS	7	MFM
Bara Angtihara	D. Bedkashi	Koyra	DTW	0.004	AAS	0.03	AAS	6	MFM
Islampur	Bagali	Koyra	RWH	0.007	AAS	0.01	AAS	7	MFM
Fatekati	Bagali	Koyra	STW	0.008	AAS	5.21	AAS	0	MFM
Fatekati	Bagali	Koyra	STW	0.085	AAS	4.87	AAS	13	MFM
Deara	Maharajpur	Koyra	DTW	0.001	AAS	0.42	AAS	7	MFM
Choukuni	Moheshwaripur	Koyra	Ring-well	0.002	AAS	0.73	AAS	9	MFM
Kalikapur	Moheshwaripur	Koyra	RWH	0.001	AAS	0.01	AAS	34	MFM
Kalikapur	Moheshwaripur	Koyra	Pond	0.001	AAS	1.95	AAS	22	MFM
Amadi	Amadi	Koyra	DTW	0.108	AAS	2.46	AAS	0	MFM
Amadi	Amadi	Koyra	DTW	0.014	AAS	1.31	AAS	0	MFM
Amadi	Amadi	Koyra	DTW	0.007	AAS	2.61	AAS	0	MFM
Amadi	Amadi	Koyra	DTW	0.005	AAS	1.97	AAS	0	MFM

FORM-1

Annex 3: Household Survey Questionnaire

Endline Study of Adapting WaSH for Climate Change Project

Household Survey Questionnaire

Introduction: Assalamu Alaikum. We are from BISR Consultants Ltd. to conduct Endline field survey of AWaSH project. You are informed that WaterAid/Rupantar is providing services on safe water, sanitation and hygiene covering Koyra Upazila of Khulna District. The purpose of the project was to prevent water borne diseases in this area by supplying safe water and its use.

You can contribute to this research by giving your valuable opinion. Your opinion will be used only for research purpose. If you give permission we can start interview.

1. Give consent; ii. Didn't give consent

Case No.: | | | |

Upazila	:	_____	Code	:			
Union	:	_____	Code	:			
Ward	:	_____	Code	:			
Village	:	_____	Code	:			
Household Identification number	:	_____					

Interviewer	:	_____	Date	:			
Supervisor	:	_____	Date	:			
Time/ Duration	:	Start _____	End	:	_____		

Section 1: Household Demographic Features

1. *Name of household head:* .....
   a. Sex: i. Male ii. Female

   b. Age: ……..Year

   c. Education: ……. (Highest class)

   d. Occupation:

   i. Housewife ii. Service holder iii. Business iv. Day Labor v. Farmer vi. Unemployed vii. Others (specify)…….

2. *Respondent's name:* ..... Cell : .....
3. *Relation with household head:*
   i. Household own ii. Wife of household head iii. Son of household head iv. Daughter-in-law of household v. Others (specify).....

4. *Religion:* i. Islam ii. Christian ii. Buddhist iv. Hindu v. Others (specify).....

5. *Household family members:* …….total, ……old aged male……, old aged female……., male child (0-14 years old)……., female child…..
6. *Household monthly income*: …….Taka (approximately)
7. *Household monthly expenditure*: …….Taka (approximately)
8. *Land holding status of household:*
   i. Only homestead ii. Only other lands iii. Both homestead and other lands iv. None of them

a. Amount of land: i. Homestead ……decimal ii. Others…..decimal
9. *Household category under AWaSH project:*
   i. A category ii. B category iii. C category iv. D category

Section 2: Access to Safe Drinking Water

10. *From which source(s) you collect safe water?*
    i. Shallow tube well
    ii. Deep tube well
    iii. Ring well
    iv. Rain water (Rain Water Harvesting plant)
    v. PSF (Pond Sand Filter)
    vi. Others (specify)……
11. *From which source, mostly you collect your safe water? How far that from your home?.....*yard
12. *How much time you need to collect safe water from your home?*.....minutes
13. *Is water available throughout the year from your water source?* i. Yes ii No
    a. *If No, what is the reason?* .....
    b. *In which season/ month, water is unavailable?* .....

14. *Do you spend any money to collect safe water?* i. Yes ii. No

    a. *If Yes, how much you spend per day?*.....Taka

15. *Who collects safe water most of the time for your household?* .....

16. *Do you face any problem during water collection from water sources?*
    i. Yes ii. No ii. Don't know

    a. If yes, what types of problems? .....

    b. How these problems been solved? .....

    c. Who financially supported? .....
    d. have anybody face any barrier during water collection from water sources ? i. Yes ii. No

    e. If Yes, what types of barriers? .....

17. *Have this water source is owned by you?* i. Yes ii. No
    a. If No, who is the owner of the water source?

    i. Neighbour ii. Share with others iii. Government iv. Others (specify) .....

18. *Did you found arsenic in your water source?* i. Yes ii. No iii. Don't know

a. If Yes, is there any alternative water source to collect safe water? i. Yes ii. No

b. Taste of water: i. Tasty ii. Salty iii. Muddy iv. Others (specify).....

19. *Please explain the usage pattern of collected water:*

Using pattern	Code
i. For drinking	
ii. Cleaning of vegetables, fruits, betel leaf	
iii. For cooking	
iv. Pantha/Fermented rice	
v. Cleaning of dishes	
vi. Hand washing before taking meal	
vii. Hand washing before cooking	
viii. Other domestic chores	

Code: 1. Shallow tube well ii. Deep tube well ii. Pond Sand Filter iv. Ring well v. Rain water (Rain Water Harvesting Plant) vi. Pond/ canal/ river water vii. Others (specify)…….

20. *Is there any Caretaker to maintain the water sources in your locality?*

    i. Yes, name of the Caretaker: …….

    ii. No iii. Don't know

21. *Who is repairing the water sources when damaged?*

    i. Caretaker ii. Mechanic iii. User group iv. Others (specify) .....

22. *Who bears the cost of repairing?*

    i. Owner ii. User group iii. Government iv. Rupantar v. Other NGOs

Section 3: Sanitation & Hygiene Status of Household

23. What type of latrine do you have in your household?

I. Sanitary latrine with slab
II. Uncovered water framed latrine
III. Hanging latrine
IV. Sanitary latrine with septic tank
V. Pit latrine
VI. Open latrine
VII. Don't have any latrine (use open and bushy places)
VIII. Others (specify) .....

24. Where are your children (0-14 years) do their defecation?

Female child	Male child
i. Existing latrine	ii. Existing latrine
iii. Household yard	iv. Household yard
v. Open spaces/ beside road/ bushy places	vi. Open spaces/ beside road/ bushy places
vii. Others (specify)	viii. Others (specify)

25. Why do you have no hygienic latrine in your household (household who don't use latrine)?

1. Financial problem
2. Lack of space
3. Unavailability of sanitary latrine & materials in the locality
4. Damage by frequent flood
5. Old habit to use open space
6. Others (specific)…….

Section 4: Hygenic Behiaviour (Usage latrine in hygienic manner)

26. *When you use soap for hand washing?* (multiple answers)

i. After toilet ii. Before taking meal iii. After cleaning children's bottom iv. Before feeding children v. Before preparation of meal

27. *Do you regularly clean your latrine?* i. Yes ii. No

28. *How your family mebers washing their hand after toilet use?*

i. Only water ii. Ash & water iii. Soap & water iv. Soil & water v. Others (specify).....

29. *How do they wash hand after cleaning their children's stool?*

i. Only water ii. Ash & water iii. Soap & water iv. Others (specify).....

30. *Do your family members use sandle to go to latrine?*

i. Go to bare footed ii. Use sandle iii. Others (specify).....

31. *How do you do disposal of your children's (less than 5 years old) stool?*

i. By digging hole ii. In toilet iii. In garbage iv. Others (specify).....

Section 5: Water Borne Diseases

32. Information of household family members affected by water borne diseases in the last year:

Age	Disease (code)	How many times in a year	How many days?	Absent in working place	Treatment received	Money spent
a. Old aged female						
b. Old aged male						
c. Male child (0-14 years)						
c. Female child (0-14 years)						

Disease code: *i. Diarrhoea ii.Dysentery iii.Cholera iv. Hepatitis v. Skin diseases vi. Typhoid vii. Itching viii. Cold fever ix. Worms x. Para typhoid xi. No disease xii. Others (specific)*

33. Have your family member suffered from arsenicosis in the last year?
i. Yes ii. No

a. If Yes, information on arsenicosis:

Number of affected people: .....person

Number of disable person: .....person

Description of disability: .....

34. Do you know what types of diseases are spread out from water?

i. Diarrhoea ii.Dysentery iii.Cholera iv. Hepatitis v. Skin diseases vi. Typhoid vii. Itching

viii. Cold fever ix. Worms x. Para typhoid xi. Others (specify) xii. Don't know

Section 6: Climate Change Adaptation and Disaster Risk Reduction

35. *Have you faced any natural disasters during the last 5 years?* i. Yes ii. No

a. *If Yes, please explain what types of disasters you faced (multiple answers):*

i. Flood ii. Drought iii. Tornado iv. Cyclone v. Over flow of water vi. River erosion vii. Increased

salinity viii. Others (specify).....

36. *Did you lost your water source during disasters or water source has been damaged by disasters?* i. Yes ii. No

a. If yes, how water source been damaged (multiple answers)?

i. Submerged under water

ii. Saline water

iii. Water level goes down

iv. Drying of water sources

v. Others (specify).....

37. *What problems did you face after damaged/ loss of water sources? Or, how will you collect safe water after disasters?*

i. Water was collected from another area

ii. Spent more time to collect water

iii. Spent more money to collect water

iv. Quarrel with owner of the household

v. Others (specify).....

38. *What step did you take to solve the safe water related problems?*
.....

39. *Did your latrine been damaged by natural disasters?* i. Yes ii. No

a. If yes, how it has been damaged (multiple answers)?

i. Submerged under water

ii. Fully damaged/ lost

iii. It was unusuable due to lack of water

iv. Others (specify).....

40. *What problem did you face after damage/ lost of latrine? Or, where did you do defecation?*
i. Went distance place or neighbour's latrine

ii. Used open space/ bushy place

iii. Latrine only used at night

iv. Used homestead areafor toilet

v. Others (specify).....

41. What step did you take to solve the latrine use problem?

.....

42. What are the impacts of climate change?

i. increased temperature and drought condition
ii. variation of rainfall patterns (irregular rainfall, high and low rainfall)
iii. salinity intrusion
iv. increased the frequency of cyclone, tornadoes and storm surges
v. flood, water logging and coastal erosion
vi. damage house, road and infrastructure
vii. damage agriculture field and shrimp farm, and
viii. sea level rising
ix. Others (specify).....

43. What step should be taken to reduce the impacts of climate change?

i. tree plantation activities in the roadside, dam and homestead
ii. raise the platform of house, tube well and toilet
iii. repair road, culvert, dam and shelter centre
iv. ensure drainage facility for water discharge
v. make portable stove and pile up firewood
vi. collect dry foods, and essential medicines
vii. store safe drinking and cooking water; and
viii. save an amount from family expenditure whenever possible
ix. Others (specify).....

**********Thank you very much for your kind cooperation**********