

Report

on

Community Perspectives on Water and Sanitation towards 'Disaster Risk Reduction' (DRR)

For



August 2008

Study Conducted by



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Preface

In Bangladesh, one-third of the total 140 million populations live below the national poverty line. Furthermore, the intensity of poverty gets worse by high levels of vulnerability due to increasing frequency and magnitude of natural disasters in the coastal areas adjacent to the Bay of Bengal. The common disasters in Bangladesh include floods, cyclones, tornadoes, river erosion, landslides, droughts and earthquakes as well as the affects of these disasters. The situation is further exaggerated by a continuous rise of population and lack of functional community-based disaster management strategies. All of these impose a heavy toll on the poor people in Bangladesh particularly those who live in disaster prone areas.

Despite a considerable improvement in the coverage of water supply, Bangladesh is still facing a high degree of inequality in terms of service distribution and access of people to safe water. In such a densely populated country, where a large proportion of the land is inundated under water every year, sanitation remains as an immense challenge in Bangladesh. Every year much water and sanitation facilities such as, tube-wells and latrines are built without taking into consideration the effects of natural disasters. As a result, many of them are destroyed due to disasters, leaving the affected people deprived of the facilities and vulnerable to several health risks. The destruction of water and sanitation (WatSan) facilities also indicates avoidable loss of resources not only for the affected people but also for development efforts by international and national communities that are supporting WatSan projects in Bangladesh. The important disaster related consequences for the WatSan facilities are the damage to latrines and tube-wells, and contamination of tube-wells and some freshwater ponds. It is suggested that often, existing facilities can be upgraded to make them disaster resistant. The upgradations are simple and relatively inexpensive and, therefore, can be done also by households.

In such circumstances, Concern Universal-Bangladesh (CUB) with the perception of WatSan towards "Disaster Risk Reduction" (DRR) has initiated a project in four districts of Bangladesh. Before implementing the project at the community level, CUB initiated a comprehensive study to investigate the damages of the WatSan facilities in the disaster prone areas, existing WatSan practices in the communities in response to the damage done by different types of disasters and health hazards during disasters. The purpose of this investigation is to disseminate the initiative to a wider audience nationally and internationally. Therefore, Eminence, being a health and development research organization and as an implementing agency conducted the field survey and compiled the information for this report.

Acknowledgement

This challenging work would not have been possible without the positive attitude of all respondents and community people towards our field colleagues during data collection. I express my gratitude to Mr. Zahidul Islam Mamun, Project Manager, DRR, Concern Universal-Bangladesh for his immeasurable cooperation and prudent advice, to Mr. Mohammad Ali, Project Engineer, Dhaka Ahsania Mission (DAM), Ms. Eva, DAM, Mr. Reaz, Field Engineer, Mymensingh, Mr. Hasnat, Field Facilitator, Mr Romel, District Coordinator, CDPD, Mymensingh, Mr. Salam, Upazila Coordinator, Chilmari, Mr. Arif, Field Engineer, Patuakhali, Mr. Jalil and Mr. Aslam, Field Facilitators, Kolapara and Golachipa and Mr. Raju, Upazila Coordinator of Daulatkhan, for their constant supervision in the field and allthrough the study period. I highly appreciate the time they gave us despite their busy schedule. I would also like to express my gratitude to the management of Concern Universal-Bangladesh for their immense help and cooperation for this study.

Now, I would like to give my special thanks to our consultants Md. ARMM Kamal, Mr. Haroon Ur Rashid and Dr. Kuntal K. Saha for their generous guidance and advice in accomplishing this task. My sincere thanks and gratitude to Dr. Md. Mujibur Rahman, Professor of Civil Engineering Department, Bangladesh University of Engineering and Technology (BUET) and Director, International Training Network (ITN) for giving us his valuable time and feedback on the report. We believe that their contribution to the accomplishment of this task is immeasurable. My honest and sincere thanks to the management of Water Aid, VERC, World Vision, ITN, UNICEF, Save the Children UK, Department of Public Health Engineering, NGO Forum, Disaster Forum and Oxfam, who gave us their time and data for this study.

My thanks also go to the member staffs of Eminence, who have contributed in various ways to the successful completion of this study. In particular, I would like to mention S. M. Shajedul Haque Palash, Shusmita H. Khan, Sabia Kamal Shantu, Dina Farhana, Golam Rabbni Jewel, Khan Hasibul Hasan and Shaima Akter, for their highly effective and efficient supervision and coordination, Serajul Islam and Fazal Mahmood Khan, for their continuous work in the field and to take all the necessary steps in right time to make the report a quality work. All data enterer and collectors deserve special thanks for their splendid performance.

Last but certainly not the least, I express my heartfelt gratitude to the community people of the study area. Without their patience and cooperation, it would have been impossible to complete the study. They gave their precious time despite their very busy schedule and workload during day time.

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List of Abbreviations

BDHS	Bangladesh Demographic and Health Survey
BUET	Bangladesh University of Engineering and Technology
CBO	Community based organization
CHT	Chittagong Hill Tracts
CL	Community leader
CLTS	Community led total sanitation
CU-B	Concern Universal Bangladesh
DPHE	Department of Public Health Engineering
DR	Document Review
DRR	Disaster Risk Reduction
FGD	Focus group discussion
GoB	Government of Bangladesh
INGO	International non-government organization
ITN	International Training Network
KII	Key informants interview
NGO	Non-government organization
SES	Socioeconomic status
SM	Social mapping
THC	Thana Health Complex
UN	United Nations
UNDP	United Nations Development Program
UNICEF	United Nation Children's Fund
UP	Union Parishad
UTI	Urinary tract infection
VERC	Village Education Resource Centre
WatSan	Water and Sanitation
WHO	World Health Organization
WPT	Water purifying tablets

Glossary

Bagerhat	A coastal district under Khula Division situated in southern part of Bangladesh
Barisal	A coastal Division situated in southern part of Bangladesh
Bhola	A coastal district under Barisal Division situated in southern part of Bangladesh
Chilmari	A sub-district of Kurigram district under Rajshahi division in northern part of Bangladesh
Daulatkhan	A coastal sub-district in Bhola district situated in southern part of Bangladesh
Fulpur	A sub-district in Mymensingh district
Garo	Once a nomadic tribe of the <i>Bodo</i> group of Mongoloids now lives in different areas of Bangladesh and in the adjacent states of India. In Bangladesh, they mainly live in areas under old Mymensingh, Netrokona, Sherpur and Tangail districts. Some Garos live in Sunamganj of Sylhet, Sreepur and Kawraid of Gazipur and Raumari of Kurigram.
Golachipa	A coastal sub-district under Patuakhali district situated in southern part of Bangladesh
Hadi	An indigenous population mostly lives in Mymensingh district of Bangladesh.
Hajong	An ethnic group of indigenous population living in the hilly parts of Mymensingh district. Some of them live in the Sherpur, Sylhet and Netrokona regions
Jhalakathi	A coastal district under Barisal Division situated in southern part of Bangladesh
Kheshari	A variety of cheap pulse consumed mainly by poor people. Rich people do not consume it as this pulse causes lethargy.
Koch	An ethnic group of indigenous population mostly lives in Mymensingh district of Bangladesh.
Kolapara	A coastal sub-district under <i>Patuakhali</i> district situated in southern part of Bangladesh

Kurigram	A district in Rajshashi Division which was a subdivision established in 1874 and was turned into a district in 1984.
Madrasa	A typical Islamic school usually offers two courses of study: a <i>hifz</i> course that is memorisation of the Qur'an and an <i>'alim</i> course leading the candidate to become an accepted scholar in the community
Maktab	An elementary school for teaching children in Islamic subjects
Mymensingh	One of the older district of situated in Dhaka division
Mymensingh Sadar	A sub-district of Mymensingh district
Patuakhali	A coastal district under Barisal Division situated in southern part of Bangladesh
Pirojpur	A coastal district under Barisal Divisiond in southern part of Bangladesh
Pucca	Constructed with concrete
Swasthya Kendra	Health Complex
Thana	Local level administrative unit, now known as sub-district
Thana Swasthya Kendra	Local level government health complex
Union Parishad	Local level government institute
Upazila	Sub-district
Zila	District

Executive Summery

About 74% of the total population in Bangladesh has access to water supply¹ and about 86% of Bangladeshi households have some type of sanitation facility², including 59% having hygienic latrines. In Bangladesh, there has been a reasonably better coverage of water and sanitation (WatSan) facilities than many other developing countries. However, because of the lack of understanding³ about the link between hygiene practices and disease, faecal-oral transmission of diseases remains one of the main causes of water-borne diseases, such as diarrhoea. The victims of these WatSan related diseases are mainly the poorer people of the country. Despite some progress towards poverty reduction, Bangladesh still remains one of the least developed countries in the world. In Bangladesh, one of the many reasons of poverty and vulnerability is the annual events of flooding, which submerges land, damages crops, property, and WatSan facilities, disrupt economic activities and causes diseases and loss of life⁴.

Each year numerous WatSan facilities are built in the country without taking the disaster situation into account. In fact, regular natural disasters destroy a large number of these facilities and affects people by increasing their vulnerability to health risks. To prevent or at least to reduce the risk of the disasters, the concept of "disaster-friendly WatSan facilities" has been introduced in many countries, such as Yemen, Morrocco, Syria, Jordan with the title of 'Vulnerability and Capacity Assessment' by "International Federation of Red Cross and Red Crescent Society". Within this concept, the existing WatSan facilities can be upgraded to be disaster resistant, even by people themselves at the household levels. Therefore, the "disaster-friendly WatSan" initiative and technologies will allow people to have continuing access to the WatSan facilities during and after disasters. This concept is new in Bangladesh where it should particularly be welcomed and appropriate as it is one of the major disaster prone countries in the world.

This study was conducted to asses the perception of the community on the impacts of disaster towards WatSan in the study areas of *Kolapara* and *Golachipa* upazilas of *Patuakhali* district, *Daulatkhan* upazila of *Bhola* district, *Mymensingh Sadar* and *Fulpur* upazila of *Mymensingh* district and *Chilmari* upazila of *Kurigram* district. In this study, a total of 12 FGDs with male and female beneficiary groups, 45 KIIs with stakeholders (i.e. various actors such as UN, ITN, GoB, INGO representatives, Union Parishad Chairman, Female Member of Union Parishad, Health Service Provider, NGO Manager, Community Leader), and 24 documents review with 4 categories and 6 social mapping were included.

¹ Ahmed MF. Alternative Water Supply Options for Arsenic Affected areas of Bangladesh, ITN, BUET, Dhaka, Bangladesh and WSP-SA, January 2002

² Bangladesh Demographic and Health Survey, National Institute of Population Research and Training (NIPORT), Dhaka, Bangladesh, May 2005

³ WatSan Information Booklet, NGO Forum for Drinking Water Supply and Sanitation, Dhaka Bangladesh, 2006

⁴ "Inventory of Community Risk Reduction Programme", CDMP, Dhaka, Bangladesh, November 2006

Key Findings:

- Majority of the households had 1-5 members in their families with 1 earning member except in *Daulatkhan* (which has 6-10 family members) upazila. Mean monthly household income was 5,000 taka. Majority of the respondents stated that household food expenditure was around 70-80% of their total household expenditure.
- In the study areas, the most vulnerable groups who were exposed to the health risks during the disaster were children less than 5 years of age, pregnant women, adolescent girls, and the sick and the old. The dairy and poultry products were also highly vulnerable to disaster. By geographical locations, the most vulnerable areas were the areas adjacent to the embankments, char areas and the villages adjacent to the river banks.
- In the cyclone prone areas, the sanitation coverage went down drastically. Salinity in water was found in 100% of the tube-wells and pond water. About 90% of the latrines were either completely destroyed or partially damaged. During the last flood in 2007, more than 90% of the latrines and water sources were destroyed in the flood prone areas. According to the respondents and the key informants, losses due to the destruction of latrines and other physical structures were enormous and imposed a huge financial burden on them as they do not have the money to rebuild the damaged latrines and other structures.
- According to the respondents from all study areas, there was a severe shortage of safe water during and after the disaster. The roads were also extensively damaged and the mobile water treatment plants could not reach many parts of cyclone affected area.
- There was a substantial increase in the number of patients due to water borne diseases during the disaster. The children, older people and women were affected more than the other groups. The women from flood prone areas had a significant increase of urinary tract infections, which was higher than that of the women in the coastal areas.
- According to the key informants from the government of Bangladesh (GoB) [Department of Public Health Engineering, representatives of Local Government Institutes etc], there was no mention-worthy technology that can ensure disaster risk reduction (DRR) in the flood prone or coastal areas but installation of the tube-wells and construction of the latrines at the highest place of homesteads might be helpful.
- According to the female members of the focus group discussions (FGDs), the technology to ensure DRR has to be "women friendly" as they collect the water for household use. The female members of the FGDs also emphasized that women should also be included in the training for maintenance of the new technology to be introduced to prevent disaster risks.

Key Recommendations

Natural disasters have its own characters, which can not be completely controlled by any one. However, disaster preparedness can essentially prevent and reduce the destructive effects of natural disasters. Comprehensive and regular capacity building

processes of the community and other stakeholders is needed to increase and maintain their ability to face any future disaster. Following recommendations are made based on the findings from the study –

- In Bangladesh, there are no specific actions on strategies in the National Policy regarding safe water supply and sanitation facilities in the disaster prone areas. Thus, strong policy advocacy is required to ensure safe water supply and hygienic sanitation facilities in the disaster affected areas.
- Findings from the study show that there have been no appropriate technologies/options that are being used by the sector agencies. Due to lack of technological innovations, WatSan coverage in many places goes down during and after disaster. Therefore, it will be important to ensure the sustainability of the WatSan facilities in the study areas. An action research towards the innovation of a low-cost and sustainable technology will be essential.
- The role of the community people will be vital in advancement of a low-cost and disaster friendly WatSan facilities in the disaster prone areas. The respective authorities can maximize the efforts from the community people for the installation and maintenance of the community WatSan facilities.
- It is important to explore local resources to reduce dependency on the external support agencies. Both community participation and local resource mobilization will be essential for the sustainability of the WatSan projects.
- It is highly recommended to have provision of regular, active and effective pre- and post-disaster community consultation facilities with the community people in presence of the representatives from all related agencies.
- Dissemination of messages related to disaster preparedness in the disaster prone areas is essential. Simple and easy to understand communication materials should be developed for distribution. These materials can be used through different NGOs/GOs working in the disaster prone areas of the country.
- Institutionalization of the existing committees, such as Union WatSan Committee and Union Disaster Management Committee has to be activated as they are the permanent actors of local community. This can be done by ensuring actual bottom-up rather than a top-down approach in the decision making process.
- Capacity building of the Local Government Institutes (LGIs) and Local Communities including civil society could be an opportunity to ensure sustainability of WatSan facilities during and after disaster.
- For taking any new initiatives in the form of piloting, gender, environment, poverty, governance and local culture must be included as cross cutting themes.

Chapter: One

1.1 Introduction

Access to water supply and sanitation is a fundamental need and a human right⁵. Safe water and hygienic sanitation for the poor is a key factor in improving health and economic productivity and thus an essential component of any effort to alleviate poverty. In Bangladesh,⁶ around 74% of the total population has access to water supply and 86% of Bangladesh households have some type of sanitation facility, of which 59% have hygienic toilets⁷. Despite a reasonably better coverage of WatSan facilities than many other developing countries, faecal-oral transmission remains as one of the main causes of water borne diseases in Bangladesh⁸. Moreover, the estimated annual cost of treating hygiene-related diseases in Bangladesh is about 5 billion taka (US\$ 80 million). This cost imposes a heavy toll on the poor and vulnerable population particularly those living in the disaster prone areas of the country.

Disasters are almost inevitable annual events in Bangladesh⁹ which range from ravaging tornadoes and cyclones to devastating floods that submerge land, damage crops, WatSan facilities, and other physical structures. As a process, there is an increase of both morbidity and mortality and disruption of economic activities. Beyond the physical and economic threats, natural disasters induce psychological trauma¹⁰ that affects all people, particularly the most vulnerable groups, such as pregnant and lactating women, children less than 5 years of age, the disabled and the elderly people.

1.2 Background

The adverse effects of disasters are multifaceted ranging from immediate losses crops, households and livelihood to destruction of safe water sources and sanitary latrines. In *Patuakhali, Bhola, Mymensingh* and *Kurigram*, where this particular study took place, the patterns of disaster are not similar. For instance, *Bhola* and *Patuakhali* being coastal areas are more prone to cyclone. On the other hand, *Mymensingh* and *Kurigram* are situated in the northern part of the country and are more prone to flood, river erosion and flash floods. In Bangladesh, floods are an annual phenomenon with the most severe form during the months of July and August. Bangladesh experienced several severe floods during the last decade. The estimated deaths during the flood

⁵ Global Water Supply and Sanitation Assessment Report: WHO, UNICEF, Water Supply and Sanitation Collaborative Council, 2000

⁶ Ahmed MF. Alternative Water Supply Options for Arsenic Affected areas of Bangladesh, ITN, BUET, Dhaka, Bangladesh and WSP-SA, January 2002.

⁷ Bangladesh Demographic and Health Survey, National Institute of Population Research and Training (NIPORT), Dhaka, Bangladesh, May 2005

⁸ WatSan Information Booklet, NGO Forum for Drinking Water Supply and Sanitation, Dhaka Bangladesh, 2006

⁹ Inventory of Community Risk Reduction Programme, CDMP, Dhaka, Bangladesh, November 2006

¹⁰ Lazarus PJ, Jimerson SR, Brock SE. Natural Disasters. In Brock SE, Lazarus PJ, Jimerson SR (Eds.), Best Practices in School Crisis Prevention and Intervention. Bethesda, MD. 2002. (Available at www.nasponline.org). Date accessed: August 12, 2008

were more than 2,000¹¹, the number of tube-wells that were inundated and contaminated was 70,367¹². As a result, an estimated 50,000 people had diarrhoea or other water-borne diseases¹³. Just after the severe flood, the devastating cyclone Sidr hit coastal areas of Bangladesh affecting 1.6 million acres of cropland. Damage to sanitation facilities and infrastructure due to Sidr was enormous. In some of the worst affected areas¹⁴, around 70% of the slab latrines was partially damaged or completely destroyed, and most of the sources of drinking water were contaminated by salinity and debris. Official reports of the Department of Public Health Engineering (DPHE)¹⁵ illustrated that a total of 11,612 hand tube-wells and 7,155 ponds were fully or partially damaged in the Sidr affected districts. Highest number of ponds was damaged in *Pirojpur* (2,836) followed by *Bagerhat* (1,814). It was reported that the damage of tube-wells in *Patuakhali* (2,275) was the most severe followed by *Jhalakathi* (1,959) and *Pirojpur* (1,458). An estimated total loss due to the damage from Sidr was about 0.4 million US dollars. According to the official information of the DPHE as of 21 January 2008, a total of 55,279 latrines were partially or fully damaged in the Sidr affected districts. Highest damage of the latrines was in *Bagerhat* (22,000) followed by *Gopalganj* (15,259) and *Barisal* (5,631). The estimated total loss in these districts was about 1.3 million US dollars.

In Bangladesh, natural disasters occur at a regular interval. Each year, a significant number of WatSan facilities are built in Bangladesh without taking into account the impact of natural disasters. As a result, a large number of these WatSan facilities are destroyed by floods and cyclones. Consequently, people living in the affected areas suffer from deprivation of the WatSan facilities and become vulnerable to several health risks. However, the destruction of WatSan facilities can be easily avoided and thus the losses can be minimized.

An official report of the DPHE indicated that the estimation of the nine short-term and two mid- to long-term rehabilitation of the WatSan system will be required to excavate and re-excavate ponds including land acquisition and dewatering of damaged ponds¹⁶. This report also highlights that the estimated costs for this rehabilitation projects will be about 18 million US dollars. Furthermore, the report also suggested that a total of 1.28 million USD will be required for rehabilitation of Pond Sand Filter (PSF) System, 28.5 million USD for installation and repairing of tube-wells and about 30 million USD for installation of new latrines and repairing of damaged latrines. However, when these strategies were reviewed the disaster risk reduction (DRR) approach was non-existent. Although small measures such as upgrading existing facilities to be disaster resistant, can help prevent or reduce the extent of damages, these are often overlooked. Usually the upgradation is simple and

¹¹ South Asia floods death toll passes 2,000; India releases disaster relief. Available at Forbes, Date accessed: August 10, 2008

¹² Consolidated damage and loss Assessment, Lessons Learnt from the Flood 2007 and Future Action Plan, Disaster Management Bureau Ministry of Food and Disaster Management, With the assistance of Comprehensive Disaster Management Programme (CDMP), November 2007

¹³ "Hunger, disease stalk children hit by South Asia floods", AlertNet, Reuters Foundation, 8 August 2007, Date accessed: July 10, 2008

¹⁴ Cyclone Sidr: United Nations Rapid Initial Assessment Report, with a focus on 9 worst affected districts, 22 November, 2007

¹⁵ Super Cyclone Sidr, 2007; Impacts and Strategies for Interventions: Ministry of Food and Disaster Management, Bangladesh Secretariat, Dhaka, Bangladesh, February 2008

relatively inexpensive which generally consist of simple elevation of the platform of the structure, an easy system of hermetically sealing the tubes, and a better choice of site. All these small measures can be defined as "Disaster Friendly WatSan" concept and these technologies allow people to have continuing access to water and sanitation facilities during and after disasters. It also contributes in limiting the spread of diseases due to contaminated water and lack of sanitation facilities.

This concept is new in Bangladesh where it should be particularly welcomed and appropriate as it is a major disaster prone country. Concern Universal, Bangladesh (CU-B) initiated to compile the information on perceptions of selected communities on the impacts of disaster on WatSan with a perspective of Disaster Risk Reduction. The field implementation of this study was conducted by Eminence.

1.2.1 Specific Objectives of the Study

The specific objectives of the study were as follows:

- To conduct a thorough review and analysis of existing knowledge on WatSan issues related to disasters with particular attention to WatSan facilities and practices and new disaster friendly WatSan and their implementation.
- To assess the impacts on WatSan and related economic losses due to disasters.
- To assess and identify the needs and challenges of WatSan during disasters.
- To consolidate the analysis by making sound recommendations on WatSan aspects in projects promoting 'Disaster Risk Reduction (DRR)'.

1.3 Justification of the Study

Concern Universal, Bangladesh started to implement two 'Disaster Friendly Water Sanitation' projects supported by *IrishAid* and *Cordaid*. The implementation of the project was based on an understanding that a high number of Water Sanitation facilities are damaged every year during disasters and many people suffer from health problems due to unsafe drinking water, unhygienic sanitary latrines and water-borne diseases. In this situation, a comprehensive community based study was needed to clearly analyze the community perception regarding the damages of the Water Sanitation facilities in the disaster prone areas, existing community practices in response to Water Sanitation during different types of disasters and health hazards during disaster for wider dissemination of the concept nationally and internationally. Furthermore, the assessment study was essential for the projects to help project management in project planning, implementation, modification of the project components or strategies. This study on the community perspective will assist in measuring the progress of the projects, determining the success or failure, identifying the drawbacks and evaluating the project impacts compared to the expected outputs.

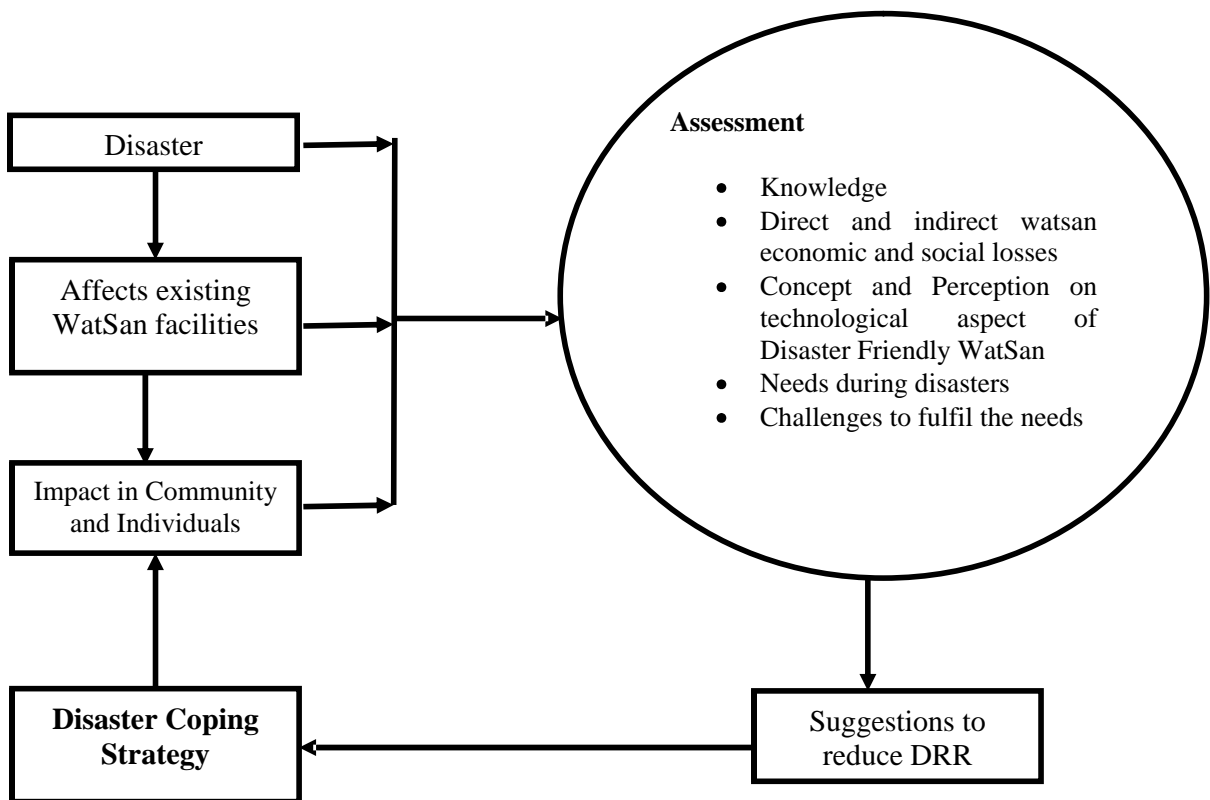
Chapter: Two

2.1 Methods and Techniques

2.1.1 Framework of the Study

Prior to the study, the researchers conceptualized a framework for the particular study. It has been seen from past experiences that disasters to a large extent generally affect the existing WatSan facilities with adverse impact in the community and at the individual level. By assessing the current knowledge related to WatSan in disaster, direct economic and social WatSan losses, needs during the period and challenges to fulfil the need will help to identify the suggestions and specify the technological aspect and ways to reduce Disaster Risk Reduction (DRR). Identified suggestions will assist in preparing a disaster coping strategy with perspective of WatSan facilities at the community level; which also lays an impact in the community along with individuals (Figure 1).

Figure 1: Schematic presentation of framework of the study



2.2 Study Areas and Respondents

The areas of the study were *Kolapara* and *Golachipa* upazilas of *Patuakhali* district, *Daulatkhan* upazila of *Bhola* district, *Mymensingh Sadar* and *Fulpur* upazila of *Mymensingh* district and *Chilmari* upazila of *Kurigram* district. One Union from each upazila and one village from each union were selected for the study. The study subjects were divided into two groups - beneficiaries and stakeholders. Among the beneficiaries, there were males and females of the households in the study areas. Among the stakeholders, there were six sub-groups, such as local government representative of the Union Parishad Chairman, female member of the Union Parishad, a physician from the Thana Health Complex, NGO Manager/representative working in the union in WatSan sector, and community leaders (Imam or school teacher) and various actors working in WatSan issues at national level, such as INGO, ITN, UN and donor agencies (Table 1).

2.3 Study Design and Tools were Used

This study was conducted using primarily the qualitative research methods, such as focus group discussions (FGDs) and key informant interviews (KIIs). In addition, socioeconomic status (SES) data were collected using structured questionnaire. This methodology was decided in consultation with the CU-B. The data on SES were collected using structured questionnaire from the respondents who participated in the FGDs. Purposive sample selection method was used to collect the qualitative data. Separate checklist and guidelines were prepared by Eminence Research Unit for the collection of field level data. The total duration of the study was 16 weeks including 3 weeks of field survey.

Figure 2: Schematic presentation of study design

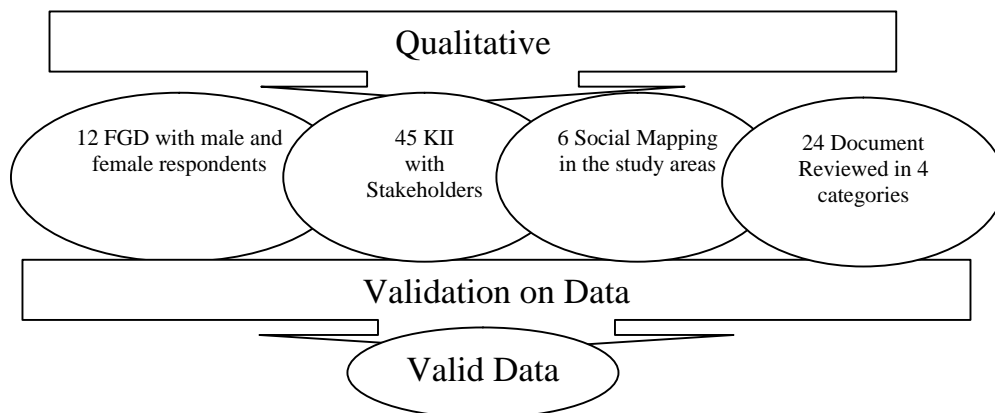


Table 1: Diagram of the sample size

Sample Type	SQ	FGD	KII	Documents Review	Social Mapping
Male	108 (during FGD conduction to get the SES)	6	-	-	6
Female		6	-	-	
DPHE Engineers	-	-	6	-	
Union Parishad Chairmen	-	-	6	-	
Female members of the Union Parishad	-	-	6	-	
NGO Manager/Representatives	-	-	6	-	
Community leaders	-	-	6	-	
Doctor from Thana Sastha Kendra/Hospitals	-	-	6	-	
Various actors working in WatSan issues in National Level (INGO, ITN, UN, Donor	-	-	9	-	
Local Hospital/Clinic/Shastha Kendras	-	-	-	6	
Partner NGO/ Other NGO/Private offices working in WatSan	-	-	-	6	
Union WATSAN Committees	-	-	-	6	
DPHE Engineers offices	-	-	-	6	
Total	107	12	45	24	

2.4 Data Collection and Compilation

The field survey team was divided into two groups. One team with four enumerators went to collect data in the *Patuakhali* and *Bhola* region and another team comprising of the same number of enumerators went to *Chilmari* and *Mymensingh*. Two Assistant Research Coordinators from Eminence went to two different fields to supervise the field implementation of the study and stayed with the enumerators. The supervisors also took part in the FGD sessions and KIIs and were present during the document reviews and social mapping. The data on SES were entered using Epi-Info 2000 (CDC, Atlanta, GA, USA) and was analysed by using SPSS version 11.5 (SPSS Inc., Chicago, IL) software. Double entry method was implemented to avoid internal data error. The qualitative data were transcribed and translated into English manually, then compiled as a text format for analysis using matrix. The final report was prepared based on the results from both the quantitative and qualitative data.

2.5 Challenges of the Study

The challenges of the study were as follows:

1. The field implementation of the study was in May 2008, which was almost seven and six months after the last flood and Sidr respectively. So, in many cases the recall period was long.
2. There were difficulties in coordinating community groups, particularly for those who were from the remote and hard-to-reach areas.
3. Most of the male participants were working during the day. Therefore, it was difficult for the study team to convince them to participate fully in the FGDs and for the structured interviews.

Chapter: Three

3.1 Details of the Study Area

This study was conducted in four districts of rural Bangladesh. Two of these districts were from coastal areas named *Patuakhali* and *Bhola*. The other two study areas were *Mymensing* and *Kurigram* districts. While the former two districts are mainly prone to cyclone, the latter are mainly prone to flash floods and seasonal floods. In this section, a brief description on each study area is presented from secondary data source.

3.1.1 Patuakhali

Geographical Location

Patuakhali district¹⁶ is situated in the *Barisal* division; with an area of 3204.58 sq-km. This district is bordered by *Barisal* district on the north, the Bay of Bengal on the south, *Bhola* district on the east and *Barguna* district on the west. The district is composed of some small *chars* (a tract of land surrounded by the waters of an ocean, sea or river). In this district, the maximum temperature is 33.3°C and minimum is 12.1°C with an annual rainfall of 2506 mm. The main rivers of this district are the *Andharmanik*, *Agunmukha*, *Payra*, *Lohalia*, *Patuakhali* and *Tentulia*. The upazilas of this district are *Bauphal*, *Dashmina*, *Golachipa*, *Kolapara*, *Mirzaganj* and *Patuakhali Sadar*.

Population and Administrative Profile

The total population of *Patuakhali* district is 1,444,340 with a split of 50 between males and females. The religion of this region is mainly Islam with 91.45% Muslim, 8.39% Hindu, 0.13% Buddhist, 0.03% Christian. The density of population per sq-km is 397. In *Patuakhali*, the average literacy rate is 36.4% with 42.7% of male and 30% of female being literate. Among the educational institutions, there are two government colleges and 24 non-government colleges, one Science and Technology University, two Teacher's Training Colleges, two government high schools, 225 non-government high schools, 37 junior high schools, 300 *madrastas*, 1,150 primary schools, one Primary Training Institute, one Polytechnic Institute, one Nursing Institute, three Vocational Training Institutes, 10 Community Schools, 15 Satellite Schools and 14 Kindergartens.



Figure 3: Map of Patuakhali district
Source: NDI

¹⁶ http://banglapedia.search.com.bd/HT/B_0482.htm, Date accessed: July 12, 2008

Socioeconomic Status

The main occupations of the household heads of this area was agriculture (45.84%), fishing (3.32%), commerce (9.94%), service (6.12%), agricultural labourer (16.72%), wage labourer (4.53%), construction work (1.31%), and others (12.22%). In this area, around 30% of the households were landless, 24% small farmerst, 41% intermediate and only 5% of them were rich.

Main crops of this region is paddy, jute, potato, mug, lentil, *Khesari*, gram, sesame, chilli, mustard, linseed, coriander seed, ground nut, betel leaf, sugarcane, watermelon and vegetables. There are around 144 fisheries, 53 shrimps, 30 livestock, 103 poultries, two hatcheries and one fish nursery in *Patuakhali*. There are 417km of *pucca* and semi-*pucca* roads, 5,341 km of dirt road of and 224 nautical miles of waterways. The traditional transports are bullock cart and country boat. The main export goods of *Patuakhali* are fish, dry fish, pottery goods and cereals.

Sources of Health Service and NGO activities

Among the health centres in *Patuakhali* district, there are one *Zila* Health Centre, four hospitals, NGO operated hospital and health centres, six Upazila Health Complex, 19 Satellite Clinics, one Chest Diseases Clinic, one Mother and Child Care Centre, four Child Care Centres, one Family Health Centre, 40 Family Planning Centres, 10 Private Clinics and 175 proposed Community Clinics. The operationally important NGOs of *Patuakhali* are BRAC, Proshika, ASA, CARE, CODEC, Tere Des Homes, DANIDA, Urban, SAP Bangladesh, Caritas, CIKODA, Solve, Sound, VOSD, CDS, SCI, BDC, RDS, ISWA, BAOPA, CEP, BARD, SNOB, PDO, CSDP, Yubak, Sangkalpa, CALB, Mauchak, Anirban, Mahila Sangstha, Adarsha Mahila Sangstha and Palli Seba Sangha.

Profile of the Respondents

In *Patuakhali* district, this study was conducted in *Kolapara* and *Golachipa* upazilas. The mean age of the respondents was 42 ± 14.6 years (median 40 years) (Table 2). In both areas, the highest percentage (29.4% in *Kolapara* and 27.8% in *Golachipa*) of the respondents was from the age group of 20-29 years. In *Kolapara*, majority (52.9%) of the respondents were male whereas in *Golachipa*, majority (55.6%) were female. The educational qualification of the respondents in *Kolapara* was low with more than half (58.8%) of them being illiterate. In contrast, more than half (55.6%) of the respondents completed primary level of education in *Golachipa*. This is due to the fact that the average literacy^{17,18} rate in *Kolapara* is less than that of *Golachipa*.

About half (47.1%) of the respondents in *Kolapara* was involved in agricultural works, where in *Golachipa*, most (55.6%) of them were housewives. The reason for this was that the majority of the respondents of *Golachipa* were female and almost all of them were housewives. All respondents from *Kolapara* and *Golachipa* were Muslims (76.5% and 61.1%, respectively), having number of family members up to 5 with one earning member (94.1% and 66.7% respectively) (Table 3). In *Kolapara*, the average earning of the respondents was less than 3,000 taka in most (64.7%) cases of which around 52.9% spent more than 71-80% of their total monthly expenditure to

¹⁷ http://banglapedia.search.com.bd/HT/G_0008.htm, Date accessed: August 18, 2008

¹⁸ http://banglapedia.search.com.bd/HT/K_0030.htm, Date accessed: August 18, 2008

buy food items. In case of *Golachipa*, the average earning of the respondents was 3,001 to 5,000 taka in most (41.2%) cases of which around 58.5% spent more than 71-80% of their total monthly expenditure to buy food items (Table 4). (Detailed data on respondent's characteristics, family characteristics and household income and expenditure are presented in the Annex Table 2, 3 and 4)

3.1.2 Bhola

Geographical Location

Bhola district¹⁹ is situated in *Barisal* division, the southern part of Bangladesh. *Bhola* is an offshore island with an area of 3,403.48 sq-km. *Bhola* is bounded by *Lakshmipur* and *Barisal* districts on the north, Bay of Bengal on the south, *Lakshmipur* and *Noakhali* districts, *Meghna* river and *Shahbazpur* Channel on the east, *Patuakhali* district and *Tentulia* river on the west. The annual average temperature is maximum 32.7°C and minimum 11.6°C with the annual rainfall of 2360 mm. The upazilas are *Bhola Sadar*, *Daulatkhani*, *Burhanuddin*, *Tazumuddin*, *Manpura*, *Lalmohan* and *Charfasson*.

Population and Administrative Profile

The total population of *Bhola* is 1,676,600 with the proportion of male 51.17% and female 48.83%. In this area, the proportion of Muslim is 93.42%, Hindu 6.50%, Christian 0.02%, Buddhist 0.02% and others 0.04%. The average literacy rate is 21.47% with 25.60% male and 17.05% female. Among the educational institutions there are three government colleges, 18 non-government colleges, six government high schools, 95 non-government high schools, 63 Junior High Schools, 424 government primary schools, 548 non-government primary schools, 169 madrasas, five kindergarten schools, one Government Technical Institution and one Non-Government Technical Institute.

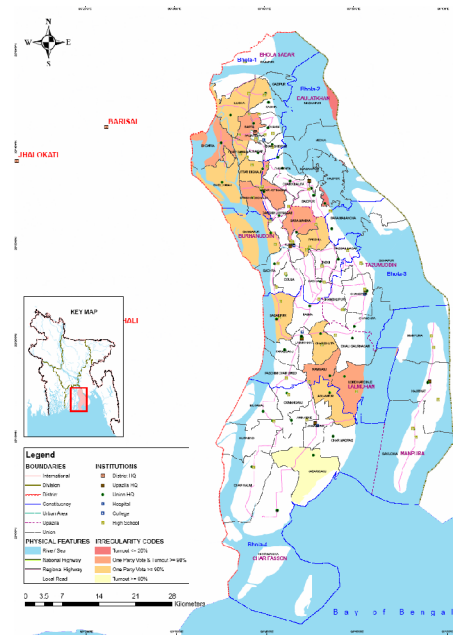


Figure 4: Map of Bhola district, Source: NDI

Socioeconomic Status

The main occupations of people in *Bhola* are agriculture (38.74%), fishing (5.9%), agricultural labourer (24.52%), wage labourer (4.67%), business (9%), service (4.47%), construction (1.11%) and other occupations (11.59%). The area of cultivable land is about 158,923 hectares and cultivable land under irrigation is 18.5%. In this region, around 15% of the households are landless, 49% marginal, 29% intermediate and 7% rich.

Main crops of this region are paddy, potato, onion, chilli, garlic, mustard seed, nut, betel leaf and betel nut. There are around 330 Fishery, 25 Dairies, 224 Poultrys, 88 Hatcheries and one Shrimp cultivation hatchery in *Bhola* district. The communication facilities are with *Pucca* 239 km, *Semi Pucca* roads of 143 km and mud road of 5161

¹⁹ http://banglapedia.search.com.bd/HT/B_0489.htm, Date accessed: July 12, 2008

km. The traditional transport is bullock cart. The main export goods of *Bhola* are Paddy, Betel nut, Chilli and fish.

Sources of Health Service and NGO activities

Among the health centres in *Bhola* district, there are one Health Centres District Hospital, seven Upazila Health Complexes, 41 Health and Family Planning Centres and 11 Satellite Clinic 11. The operationally important NGOs of *Bhola* are ASA, BRAC, Proshika, Caritas, Action Aid, Vision, Char Development Project, Bandhujan Parishad, RASA, Coast and Social Development.

Profile of the Respondent

In *Bhola* district, the study was conducted in *Daulatkhan* upazila where the highest percentage (33.3%) of respondents was from the age group of 40-49 years, with majority (55.6%) of the respondent being male (Table 2). The educational qualification of the respondent of *Daulatkhan* was a bit depressing with almost all (94.4%) of them being illiterate. The reason for this might be that the village from where data was collected is situated in a distant Char, with limited amount of educational institutions and the average literacy²⁰ rate in this region is also less than that of many other upazilas of that district. Among the respondents, majority of them were housewives (44.4%). All the respondents from *Daulatkan* were Muslim with maximum percentage (55.6%) having number of family members up to 10 with one earning member (61.1%) (Table3). In *Daulatkan*, the average earning of the respondents was less than 3,000 taka in more than one-third of (33.3%) cases in which around 44.49% spends more than 51-70% t of their total monthly expenditure to buy food items (Table 4). (Detailed data on respondent's characteristics, family characteristics and household income and expenditure are presented in the Annex Table 2, 3 and 4)

²⁰ http://banglapedia.org/HT/D_0068.HTM, Date accessed: August 18, 2008

3.1.3 Mymensingh

Geographical Location

Mymensingh district²¹ is situated in the Dhaka division with an area of 4,363.48 sq-km. It is bordered by *Meghalaya* State of India and *Garo Hills* on the north, *Gazipur* district on the south, *Netrokona* and *Kishoreganj* districts on the east and *Sherpur*, *Jamalpur* and *Tangail* districts on the west. The main river of this area is *Brahmaputra*. Besides, there are many small rivers, marsh, canals and forestry in the district. The annual average temperature is maximum 33.3°C, minimum 12°C with an annual rainfall of 2,174 mm. The *upazilas* of this district are *Bhaluka*, *Dhobaura*, *Fulbaria*, *Gaffargaon*, *Gauripur*, *Haluaghat*, *Ishwarganj*, *Mymensingh Sadar*, *Muktagachha*, *Nandail*, *Fulpur* and *Trishal*.

Population and Administrative Profile

The total population of *Mymensingh* is around 4,439,017 and the density of population is 10,392 per sq-km; with the proportion of male 50.62% and female 49.38%. In this area, the percentage of Muslim is 94.73%, Hindu 4.25%, Christian 0.75%, Buddhist 0.06% and others 0.21%; along with this there are ethnic nationals with around 0.89% of total population of *Garo*, *Hajong*, *Koch* and *Hadi*. Literacy rate among the population is 60.4% among which 30.7% are male and 20% female. This area has many educational institutions with one Agricultural University, two Medical Colleges, one Homeopathy Medical College, one Polytechnic Institute, one Vocational Institute, one Veterinary Training Institute, one Primary Teacher's Training Institute, two Teacher's Training Institute, one National Institute of Primary Education, five Government Colleges, 57 Non-Government Colleges, nine Government High Schools, 368 Non-Government High Schools, 129 Secondary Schools, 1212 *Madrasas*, 1249 Government Primary Schools, 794 Non-Governments Schools, 33 Kindergartens, 1065 NGO operated Schools and one Art School.

Socioeconomic Status

The main occupations of the household heads of *Mymensingh* are agriculture 57.67%, commerce 8.15%, transport 15.66%, construction 2.13%, service 1.21% and others 15.18%. Main crops of this region are paddy, jute, sugarcane, wheat, oil seed and pulse, betel leaf, *karalla*, sweet potato, turmeric, ginger, *brinjal*, cauliflower and chilli. There are around 67 fishery, 130 dairies, 390 poultries and 143 livestock's in

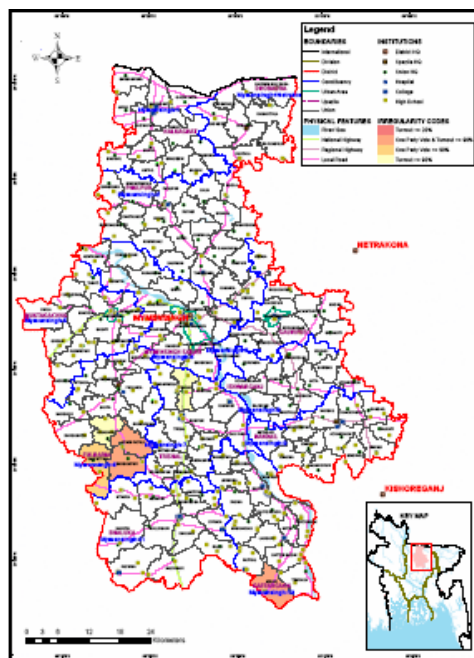


Figure 5: Map of Mymensingh district
Source: NDI

²¹ http://banglapedia.search.com.bd/HT/M_0432.htm, Date accessed: July 12, 2008

Mymensingh district. The communication facilities are with *pucca* 770 km, Semi *pucca* roads of 4,062 km waterways 365 nautical mile and railways 147 km. The main export goods of *Mymensingh* are jute, paddy, oil seed, egg, eanana, leather, milk products, jackfruit, chicken and chilli.

Sources of Health Service and NGO activities

Among the health centres in *Mymensingh* district, there are two hospitals, 11 Upazila Health Complexes, one Missionary Hospital, one Homeopathy Hospital, one School Health Clinic, one Police Hospital and one Leprosy Hospital. The operationally important NGOs of *Mymensingh* are BRAC, Proshika, Caritas, Gonoshahajjo Sangstha, ASA, World Vision, Palli Unnayan Prayas, MCC, Gramous, Adarsha Samaj Sheba Samiti, Human Development Programme, Khagra Mohila Unnayan Samiti, NGO Forum, Sara and Sirak.

Profile of the Respondents

In *Mymensingh* district, the study was conducted in *Mymensing Sadar* and *Fulpur* upazila. In *Mymensing Sadar*, the highest percentage (33.3%) of respondents was from the age group of 30-39 years, whereas in *Fulpur* the highest percentage (33.3%) was from 40-49 years of age (Table 2). In *Mymensing Sadar*, majority of the respondents was female (55.6%) whereas in *Fulpur* majority were male (55.6%). The educational qualification of the respondents from both the area was low with more than a half (66.7% in *Mymensing Sadar* and 61.1% in *Fulpur*) of them being illiterate. The reason for this might be that the average literacy rate^{22, 23} in both the areas is less than other upazilas of that region. Among the respondents of *Mymensing Sadar*, most (33.3%) of them were housewives, where as in *Fulpur* most (22.2%) were agricultural workers. The reason for this is that, the majority of the respondents of *Mymensing Sadar* are female and almost all of them were housewives.

All the respondents from *Mymensing Sadar* and *Fulpur* were Muslims with maximum percentage (61.1% and 55.6% respectively). The mean household size of these two districts is up to 5 members with only one earning member (66.7% and 61.1% respectively) (Table 3). In *Mymensing Sadar*, the average earning of the respondents was less than 3,000 taka in most (33.3%) cases in which around 44.4% spends more than 81-90% of their total monthly expenditure to buy food items. In *Fulpur*, the average earning of the respondents was 3,001 to 5,000 taka in most (43.8%) cases in which around 40.0% spends more than 71-80% of their total monthly expenditure to buy food items (Table 4) (Detailed data on respondent's characteristics, family characteristics and household income and expenditure are presented in the Annex Table 2, 3 and 4)

²² http://banglapedia.search.com.bd/HT/M_0433.htm, Date accessed: August 18, 2008

²³ http://banglapedia.search.com.bd/HT/P_0164.htm, Date accessed: August 18, 2008

3.1.4 Kurigram

Geographical Setup

Kurigram district²⁴ is situated in *Rajshahi* division with an area of 276.45 sq-km. This district is bounded by West Bengal of India on the north, *Gaibandha* district on the south, *Asam* Province of India on the east, West Bengal of India and *Rangpur* and *Lalmonirhat* districts on the west. The annual average temperature is maximum 32.3°C and minimum 11.2°C with an annual rainfall of 2,931 mm. The main rivers of this district are *Brahmaputra*, *Dharla*, *Tista*, *Dudhkumar*, *Phulkumar*, *Sonaburi*, *Jinjiram*, *Gangadhar*, *Halhali* and *Jalchira*. The *upazilas* are *Bhurungamari*, *Char Rajibpur*, *Chilmari*, *Phulbari*, *Kurigram Sadar*, *Nageshwari*, *Rajarhat*, *Raumari* and *Ulipur*.

Population and Administrative Profile

The total population of *Kurigram* is around 1,782,

277 with the population density 4,109 per sq-km. The proportion of male and female was 49.62% and 50.38%, respectively. In *Kurigram*,

the percentage of religion is Muslim 91.65%, Hindu 7.7% and others 0.65%. The average literacy rate (22.3%) of this district is one of the lowest in Bangladesh with the proportion of male 29.9% and female 14.7%. Among the educational institutions, there are three Government Colleges, 29 Non-Government Colleges, one Commerce College, three Government High Schools, 167 Non-Government High Schools, 11 Junior High Schools, 464 Madrasas, one Primary Training Institute, one Veterinary Training Institute, one Nursing Training Institute, one Youth Training Centre, one Deaf School, one Mentally Retarded School, 563 Government Primary Schools, 595 Non-Government Primary Schools, 12 Satellite Schools, eight Kindergartens and 155 *Maktabs*.

Socioeconomic Status

The main occupations of the heads of the households in *Kurigram* are agriculture 45.91%, agricultural labourer 29.57%, wage labourer 2.83%, commerce 7.12%, service 3.78% and others 10.79%. Main crops of this district are paddy, jute, wheat, potato, corn, chilli, peanut, bamboo, betel nut, betel leaf, pulses and vegetable. There are around 289 fishery, 235 dairies, 397 poultries, 28 fish nursery and eight hatcheries in *Kurigram* district. The communication facilities are with 241 km of *pucca road* and 62 km of semi-*pucca* road, 4,532 km of mud road, waterways 163 nautical miles and railways 43 km. The traditional transports are bullock cart, buffalo cart and horse carriage. The main export goods of *Kurigram* are jute, paddy, peanut, bamboo, potato, peanut, betel nut and chicken.

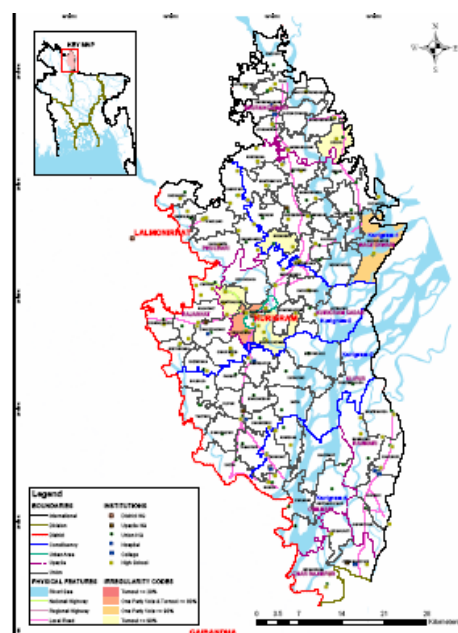


Figure 6: Map of Kurigram district, Source: NDI

²⁴ http://banglapedia.search.com.bd/HT/K_0322.htm, Date accessed: July 12, 2008

Sources of Health Services and NGO activities

Among the health centres in *Kurigram* district there are one Government Hospital, two NGO hospitals, 12 Private Clinics, two Veterinary Hospitals, one Chest Diseases Hospital, 65 Union Health and Family Planning Centres, 20 Satellite Clinics, one TB Hospital, one Rural Health Centre, one Eye Hospital, two Maternity and Child Welfare Centres and 13 Clinics. The operationally important NGOs of *Kurigram* are BRAC, RDRS, Care, ASA, Save the Children, Swanirvar Bangladesh, Jibika, Diganta Samaj Unnayan Sangstha and Chinnamukul.

Profile of the Respondents

In *Kurigram* district, the study was conducted in *Chilmari* upazila where the highest percentage (44.4%) of respondents was from the age group of 30-39 years, with majority of the respondents being males (55.6%) (Table 2). The educational qualification of the respondents of *Daulatkhan* was a bit dismal with more than two third of all (72.2%) being illiterate. The reason behind this low rate of literacy was might be the location of the study area, which was a char situated in a distant place far from the main district. And the average literacy²⁵ rate in this region is also less than that of many other *upazilas* of that district. All the respondents from *Chilmari* were Muslims. About 66.7% of the households had family members up to 5 with one earning member (Table 3). In *Chilmari*, the average earning of the respondents was less than 3,000 taka. About 44.4% of the households spent more than 51-70% of their total monthly household expenditure to buy food items (Table 4). (Detailed data on respondent's characteristics, family characteristics and household income and expenditure are presented in the Annex Table 2, 3 and 4)

²⁵ http://banglapedia.search.com.bd/HT/C_0200.htm, Date accessed: August 18, 2008

Chapter: Four

4.1 Knowledge on WatSan Related to Disasters

This Chapter presents the information on the knowledge and existing practices of the respondents regarding WatSan issues and the information on existing knowledge and practices on WatSan towards DRR among the actors, key stake holders and the respondents.

4.1.1 Existing Sources of Water

In the coastal areas, all (100%) respondents in both *Kolapara* and *Golachipa* reported that they use deep tube-well for drinking purposes (Table 5). In contrast, 88.9% of the respondents in *Daulatkhan* reported drinking river water. About 94.1% and 83.3% of the respondents in *Kolapara* and *Golachipa*, respectively, reported that they use river water for domestic uses. In *Daulatkhan*, all respondents (100% in) reported using river water for domestic purposes. However, people who live in *char* areas mostly use river water after treating water with water purifying tablets (WPT) or bleaching powder.

In the flood prone areas, majority (83.3% in *Chilmari*, 100% in *Mymensingh Sadar* and 83.3% in *Fulpur* respectively) uses shallow tube-well as the source of drinking water and domestic use (Table 5). Around 88.2% in *Kolapara*, 66.7% in *Golachipa*, the owner of the water point are government, where as in *Mymensingh Sadar* (72.2%) and *Fulpur* (72.2%) where major portion of the respondents owns their personal water points. After the last disaster all the respondents of *Kolapara* were using deep tube-well as water source. However, the percentage of people using tube-well as a source of water decreased by 6% at *Golachipa*. According to the Union Parishad Chairman, the supply of tube-well was not enough to meet the demand in the region. Therefore, about 6% of respondents were using surface water for their daily use. In *Daulatkhan*, the use of water sources after the disaster was almost same as before the disaster. Most of the households were using river water treated with WPT or bleaching powder.

In the flood prone areas, majority (61.1% in *Chilmari*, 88.9% in *Mymensingh Sadar* and 72.2% in *Fulpur*) of the households used shallow tube-well as the source of water. The proportion of use of shallow tube-well decreased as during flood the duration of water stagnancy is longer than that of the cyclone situation. So people tend to use surface water treated with WPT or bleaching powder.

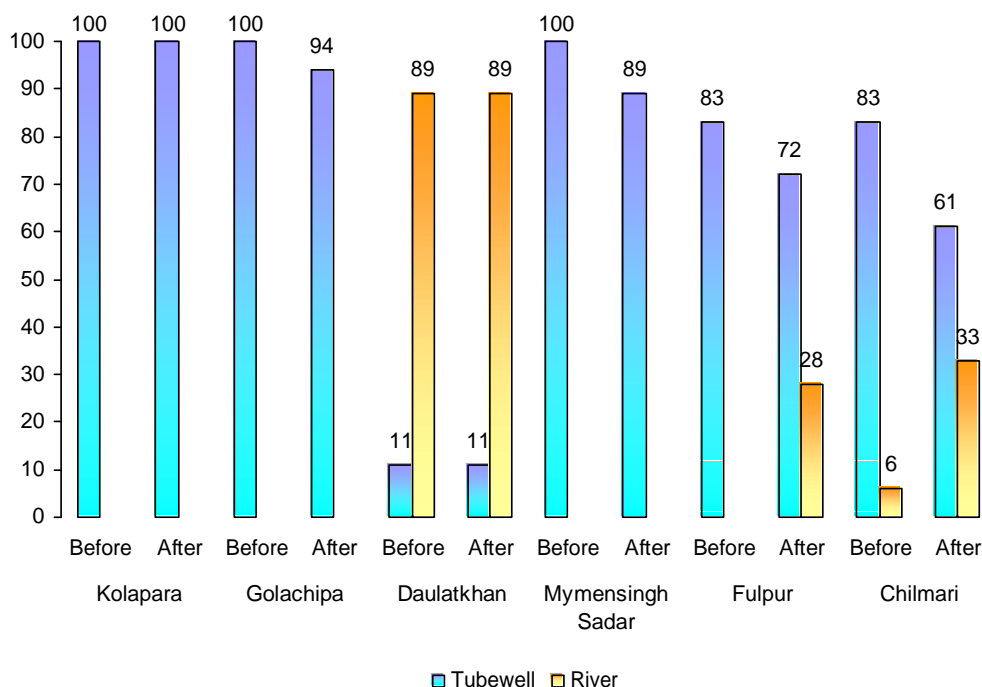


Figure 7: Water source in the study areas before and after disaster period

4.1.2 Types and Uses of Latrines before and after disaster

Before disaster, majority (47.1% in *Kolapara*, 72.2% in *Golachipa*, 50% in *Chilmari*, 44.4% in *Mymensingh Sadar* and 33.3% in *Fulpur*) of the respondents in all places except those from *Daulatkhan* reported that they had used slab latrines (Table 6). In *Daulatkhan*, around one-third (33.3%) of the respondents used pit latrines (Table 6). After disaster, however, the use of slab latrines in *Kolapara* increased by 11.7%. According to the Union Parishad Chairman and sub-Assistant Engineer of the DPHE, this was due to the supply of sanitary latrines in that region. Nevertheless, in rest of the areas, the proportion of people using pit latrines decreased as the supply was not sufficient. As stated by the DPHE engineer of *Kolapara*, “We have almost covered all the areas with sanitary latrine and here the NGO’s are also working. So, access to sanitary latrine is not a problem here”. It is important to note that in all areas except *Kolapara*, the rate of open defecation increased after the disaster. (Detailed data on the use of latrines before and after distaster are presented in the Aneex Table 6).

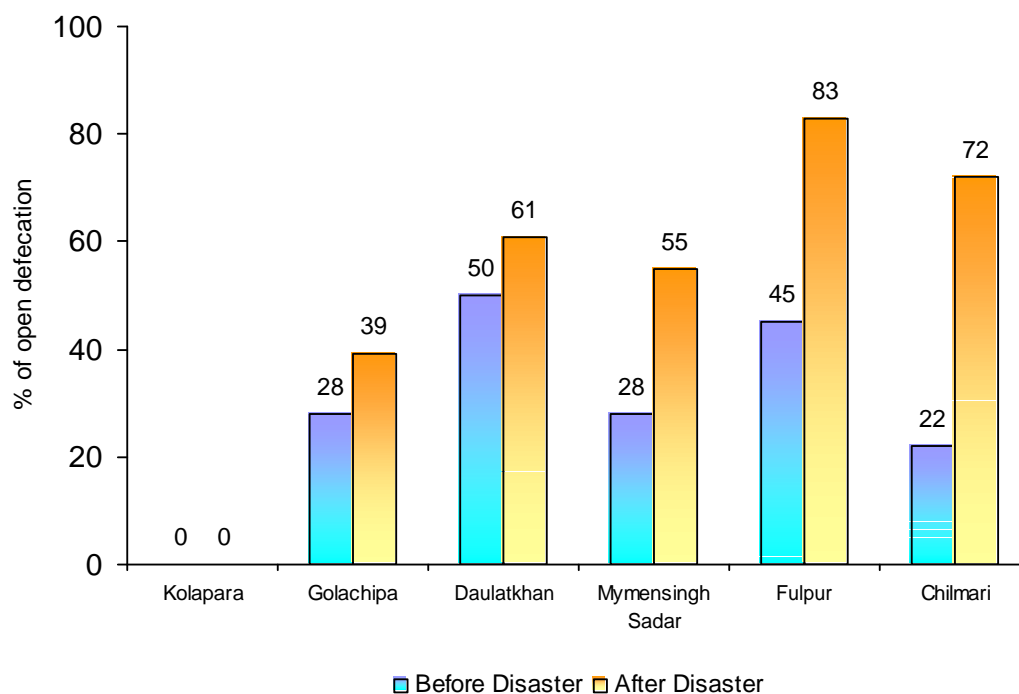


Figure 8: Percentage of open defecation in study areas before and after disaster period

4.1.3 Hygiene Practices before and after disaster

Before disaster, the rates of washing hands with water and soap before taking food and after defecation were 29.4%, 61.1%, 22.2%, 27.8%, 38.9%, and 38.9% in *Kolapara*, *Golachipa*, *Daulatkhan*, *Chilhari*, *Mymensingh Sadar* and *Fulpur*, respectively (Table 7). There was a deterioration of hygiene practices after disaster, as reflected by their practices after disaster. In *Kolapara*, however, the use of sanitary latrine was increasing instead of decreasing.

The potential reason of worsening of hygiene practices in the disaster affected areas might be the unavailability of resources and low priority. In a situation where most people are displaced, do not have a permanent shelter and struggle for basic needs, such as food, hygiene practice is not expected to bear a high priority. According to *Ambia Khatun* (37 years old) of *Daulatkhan* “After the disaster we hardly have money to buy our food and meet the requirements of basic needs. The use of soap is nothing but a luxury to us”. (Detailed data on the use of latrines before and after disaster are presented in the Annex Table 6).

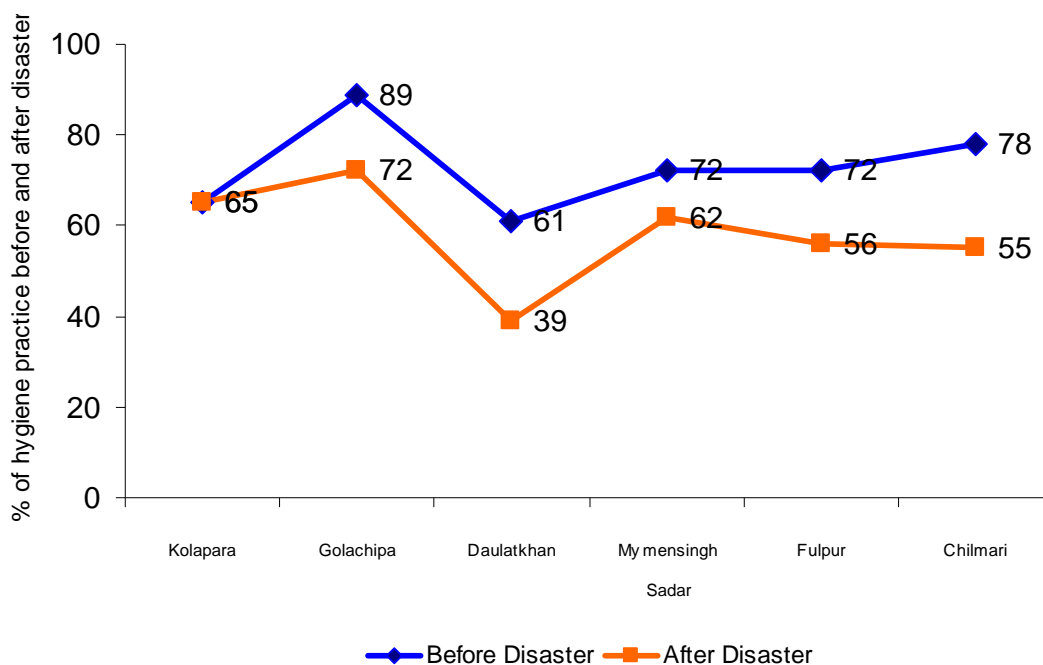


Figure 9: Percentage of hygiene practice in study areas before and after disaster period

4.1.4 Existing knowledge and practices of various actors on WatSan in response to disasters

The study discussed the social and technological aspects of the stated issues with the NGOs, INGOs, UN, GoB and respondents from the ITN. These organizations were important actors in the field of WatSan. The respondents were from the DPHE, VERC, World Vision, Disaster Forum, ITN, Water Aid, NGO Forum, Oxfam and UNICEF. The following section summarises the outcome.

Social Aspects

The respondents from DPHE, Dhaka office stated that establishing tube-wells at a level 5 feet higher from the surrounding ground level in flood shelter centres will be an effective method. This would give easy accessibility to all people irrespective of gender, age, race and culture. On the other hand, the respondents from VERC, emphasized community participation all the way, which will help achieve the program goals. According to VERC, the concept of community led total sanitation (CLTS) through active community participation by formation of active community based organizations (CBO) may fulfil the criteria of social aspect of DRR. When the social aspects of DRR was discussed with NGO Forum the representative replied that in case of emergency people do not get enough time to save their water but if the latrines and tube-wells are installed using disaster friendly technologies with a special

emphasis on hygiene behaviour, the risk of damage will be reduced. According to the respondent from ITN-BUET, *"To explain the disaster friendly water sanitation at first we should learn the relationship between disaster and water sanitation in disaster period and after disaster period."* He also added that lack of knowledge among people, poor considerations to disaster in building houses, water source and latrines, absence of community involvement in decision making, little consideration to needs of women/pregnant women, resource constraint and lack of policy guideline are all essential factors for disaster friendly WatSan concept. The representative from ITN stated that dissemination of messages related to disaster preparedness is essential in the disaster prone areas. But these messages should be simple and easy to understand which can also be used through different NGOs/GOs working in the disaster prone areas of the country.

Regarding the practice on social aspects of WatSan during disaster towards DRR, the respondent from DPHE, Dhaka office said *"Though it is much needed but we still have not taken any initiative at household or community level on this after the last disaster"*. Here he commented that if there were any specific actions on strategies in the national policy for safe water supply and sanitation facilities in disaster prone areas, it might have been easier to plan such concept and implement those. The respondent from the Disaster Forum said *"In disaster affected areas we did not take any significant initiative before or after the disaster. But we have done some awareness building program after the disaster in the affected areas. Other than this they have compiled a hand book in Bangla from "The Sphere Project" which is a very informative handbook to maintain safe WatSan system during and after disaster."* In practice, Oxfam generally emphasis the selection of proper site and this is one of their most important priority which in many cases serves the social aspects of DRR concept. In this regard the UNICEF representative stated that *"Community awareness building programmes can be initiated to understand the direct and indirect effects of WatSan facilities due to disaster"*. It is mentioned that UNICEF mainly works as a donor in collaboration with DPHE and mainly conducts awareness raising activities.

Success Story

"We had to bring water from a long distance during and after a disaster period, floating on banana craft. Pregnant women had to face trouble too and in many times fell down and had serious injury" said Fatima. During rainy season generally roads go under water so they had to bring water on banana plant raft often crossing waist deep water. As a result, diarrhea, dysentery and water-borne diseases were their daily companion. Fatima informed, *"During last disaster all our family members suffered from diarrhea and we had to spend 3,300 taka including doctor's visit and medicine."* The Union Parishad installed a deep tube-well on a high platform which was not damaged by the last disaster. So, now the women do not face troubles in fetching water. The level of water-borne disease is also low.

Story Credit: WAB

Technological Aspects

Regarding the technological aspect of WatSan towards DRR the representative of DPHE said *"There is no noteworthy technology for flood prone or coastal belt areas but setting the tube-wells on a high platform can help the community"*. According to VERC officials, there is no option for temporary Char but they have more than one option for permanent chars. Other than this, they have 32 disaster friendly options which cost 15 taka to 15,000 taka. Regarding this matter the respondent of VERC said *"Of all the models of sanitary latrine the best and cheapest model is offset model which costs 15 taka."* The book which was adapted by the Disaster Forum from "The Sphere Project" has depicts many technologies which can be used to maintain safe WatSan system during and after disaster. According to Oxfam, *"We advised the community to attach the rings of slab latrine properly to ensure the risk of leaching even if the water level increases."*

Site selection is also a significant factor because generally people have a tendency to install their latrines in the dirtiest place of the homestead, which can be harmful and inconvenient. Because the latrine is far away from the house, they have to face difficulty during the time of flood, especially at night. In disaster prone areas, such as flood prone or costal belt areas, UNICEF suggests the implementers to set up the tube-wells and latrines at the flood and cyclone shelter. They also suggest for alternate use of water, such as PSF in a pond which is on a higher land, rain water harvesting etc. In this connection, WAB official says, *"During the disaster and post-disaster, the awareness of hygiene education is essential and we have to make the community aware of this situation."*

According to DPHE, Dhaka office they have provided safe water through mobile treatment plant in flood shelters and cyclone shelters of disaster affected areas. They have also supplied alum and lime to purify pond water along with water purification tablets. Four kinds of initiatives are taken in 36 disaster prone areas: replacement of last flood affected damaged tube-wells, high raised platform for tube-wells, high raised platform for latrines, and setting up of 30,000 new tube-wells and latrines. VERC does not provide any tube-wells at household level and prefers to provide it at community level so that everybody has access. Generally, one tube-well is allotted to 15-20 families.

After the last disaster, World Vision arranged an alternative source of water in the disaster affected areas, provided logistics support and encouraged community participation. They are also thinking of some technology to provide safe water and to set up hygienic latrines in cyclone center. They are also thinking of setting up of mobile latrines and high platform tube-wells. Oxfam mainly supplies WPT, jerry cans and buckets to preserve water. They also consider DRR concept for the new installation of the facilities. WAB made some guidelines on the awareness and precautions to be taken on these matters. They disseminate these guidelines through CBO and regarding this they stated that, *"Our method is to make the people self developed more or less so that they can make themselves independent."* Regarding this, the WAB officials think that an opportunity can be found to ensure sustainability of WatSan facilities during and after disaster by builing capacities of the LGI's and local communities including the stakeholders.

4.1.5 Existing knowledge and practices of the community people on WatSan in response to disasters

Social and technological aspects of the stated issue were discussed with the NGO managers, DPHE engineers, community leaders, UP chairmen and female members of the UP, and males and females of the area.

Social Aspects

According to the DPHE engineer in the study areas of Patuakhali, DRR concept towards WatSan is very important and socially needed as it will help reduce the amount of damage and help the community cope with the damage in a long run. The NGO manager of that area was from a DANIDA funded project and according to his comments; DANIDA has tried to implement the DRR concept towards WatSan but could not maintain it. In this regard, he commented that institutionalization of LGI's, such as Union WatSan Commmittee and Union Disaster Management Committee might help to plan and ensure WatSan towards DRR concept. According to the community leader of this area, the main social aspect of DRR concept is to reduce the amount of damage or vulnerability according to age and gender and socio-economic condition. He commented that community participation will play a vital role to implement such concept at field level. The same comments came out from the male FGDs. In *Daulatkhan*, the females mentioned their vulnerability during the disaster and after disaster. Their vulnerability was social, psychological and economic. They wanted their opinion considered in decision related to WatSan either at individual or community level. They also commented that a pre- and post-disaster consultation meeting with the women can play a vital role as they collect the water and faces most of the problem regarding WatSan issues. It is mentionable that in all areas women participants stated that they suffer a lot while collecting water during disaster as well as during the normal times. They also face sanitation related problem due to lack of proper facilities. Here the female respondents stated that during flood period they do their defecation while bathing at day time due to security problem. The male respondents just use any existing bush or open place for their defecation. In the flood prone areas, though the gender issue was not much emphasized but they mentioned the issue of poverty and the risk of women getting harassed during defecation in an open place.

Key Points:

The level of knowledge on social aspect of DRR concept towards WatSan has been better in the flood prone areas (Mymensingh Sadar, Fulpur and Chilmari) than the coastal areas (Kolapara, Golachipa and Daulatkhan) The respondents mainly focused on -

- *Gender aspect of DRR*
- *Role of poverty in implantation of such concept*
- *Due to security reason and risk of getting sexually harassed, women of flood prone areas defecate while they take bath in ponds or river during day time*

Technological Aspects

According to the DPHE engineer in the study areas of the coastal belt, the platform of the tube-wells has to be high and according to the NGO manager, the latrine platform has to be at the same level of the dwelling place (*Bhita Bari*). According to the community leader, male respondent and the UP chairman of this area, tube-well and latrine platforms have to be raised and along with that a provision could be taken to attach a ring with the head of the tube-wells to prevent the loss of tube-well heads during the storm. The female members of the FGDs commented that high embankment around the pond will be useful.

According to the DPHE engineer in *Golachipa* upazila, the best way to ensure safe water is by chlorination but he could not mention the exact method of chlorination to address salinity of water. In *Daulatkhhan*, the team went to a village which is in Char area, where the number of tube-wells as well as the habit of using sanitary latrine and tube-well water is very low. The respondents in that area stated that water purification tablets should be ready before any disaster. The community leader and the male members said that the technology for WatSan has to be "comfortable" for "children, old people, and disabled people". According to the female members of FGD, the technology has to be "women friendly" as they are the ones who collect water. The chars of *Chilmari* are very vulnerable to river erosion and floods. According to the respondents, no other technology is appropriate here except water purification tablets and social mobilization. In *Mymensingh Sadar* and *Fulpur* upazila, household level WatSan facilities will not be feasible so the implementers should go for community level implementation. All respondents from all areas unanimously said that raised platform of tube-well and latrine can be a good technological perspective of DRR towards water sanitation.

Though the knowledge level was high but in practice the implication of knowledge was non-existent. After Sidr and 2007 flood, a good number of facilities were installed or renovated but none followed the DRR concept apart from using bleaching powder, alum and water purification tablets. Therefore, social and technological issues related to WatSan need to be addressed simultaneously to reduce the vulnerability of disaster and to maximise the existing opportunities.

Key Points:

Level of knowledge on technological aspect of DRR concept towards WatSan

- High elevated concrete platform for tube-wells.
- High elevated level for sanitary latrines with the prevention of any kind of leaching.
- High wall or embankment all around the ponds.
- Women friendly and "comfortable" technology for "children, old people, and disabled people".

Common practices related to WatSan

- Use of bleaching powder, alum and water purification tablets.
- Slightly raised platform of tube-wells but the height or level of the platform were not built according to the last mentionable flood level.

Chapter: Five

5.1 Disaster and Its Vulnerability

In the study areas, there have been two major disasters in last one year, which damaged and destroyed homes, croplands, livelihood activities and day to day life saving facilities, such as sources of drinking water and latrines. In 2007, there was a series of floods in Bangladesh. According to the initial reports, the death toll due to these floods was more than 2,000²⁶ and the number of people affected was approximately 20 million. According to the government²⁷ reports, around 70,367 tube-wells were inundated and contaminated in the affected areas. In 2007, a devastating cyclone Sidr hit the coastal areas of Bangladesh, which affected approximately 4.7 million people. There was a massive destruction of the infrastructure including WatSan facilities in the Sidr affected areas²⁸. In some of the worst affected areas, about 70% of the slab latrines were damaged or completely destroyed.

Similar to other infrastructures, disasters normally causes serious damages to the water supply and sanitation system. The tube-wells are broken or partially damaged and rendered unusable as they are under water. Ponds and tanks in the affected areas are contaminated by the onrush of saline water and sludge. Therefore, there is a serious impact on WatSan after any disaster, which causes direct and indirect financial losses. This hinders the livelihood of individual and the community. In this section, the impact of disaster on the most vulnerable groups in the study area has been described.

5.1.1 Vulnerable Groups:

The vulnerable groups who are most exposed to disaster in our study areas are *children less than 5 years of age, pregnant women, adolescent girls, sick or older people and dairy and poultry products.*

5.1.2 Vulnerable Areas:

In Kolapara upazila, the most vulnerable area is the area adjacent to the embankment and Ward number 9, near to "Andarmanik River. In Golachipa upazila, the most vulnerable area is adjoined to rivers, such as many chars. In Daulatkhan upazila, the most vulnerable areas are the south-east and south-west parts of the upazila. In Mymensingh Sadar upazila, according to the key informants as well as the community people, the most vulnerable area during the disaster period are "Khamarbaspara",

²⁶ South Asia floods death toll passes 2,000; India releases disaster relief. Available at Forbes, Date accessed: August 10, 2008

²⁷ Consolidated damage and loss Assessment, Lessons Learnt from the Flood 2007 and Future Action Plan, Disaster Management Bureau Ministry of Food and Disaster Management, With the assistance of Comprehensive Disaster Management Programme (CDMP), November 2007

²⁸ Cyclone Sidr: United Nations Rapid Initial Assessment Report, with a focus on 9 worst affected districts, 22 November, 2007

“Maijhbari”, “Ward no 8” , “Datiar Char”, “Manusmara”, Astomir Char, Charmudapur” and “Chalipara”. In Fulpur upazila the most vulnerable area during the disaster period are “Charkalibari”, “Chariswardia”, “Charupardia” “Charjhaogora” and “Chargorotia”. In Chilmari upazila, the most vulnerable areas during the disaster period are “Charbahadur”, “Charrambhadrapur” , “Charniyamat”, “Ramnathpur”, “Charnarpur”, “Charsalpa”, “Charashabat” and “Singimari”,

5.2 Impact of Disaster on WatSan

5.2.1 Loses of WatSan facilities during and after disasters:

Disasters cause serious damages to the water supply and sanitation system and have a serious impact on physical as well as economic well being. In this section of the report, a description on the physical damage and the financial losses due to these damages has been provided. Moreover, the investment on new water points and latrines were also reviewed. This section is based on the available data provided by the DPHE and other, NGO office. No data were available from the WatSan Committee from any of the study area. Therefore, this section does not provide the actual picture on the losses but it gives an idea about the enormous losses caused by the disaster.

Infrastructural losses in relation to Physical Damages:

In *Kolapara*, the sanitation coverage went down drastically. Salinity has been in 100% of the tube-wells and pond water. About 90% of the latrines were either completely destroyed or partially damaged. The respondents and key informants of *Golachipa* stated the similar nature of infrastructural losses like *Kolapara*. In *Daulatkhan*, salinity has been in 100% of the water sources. More than 90% of the latrines have been either destroyed or partially damaged with almost 100% super-structure and more than 90% sub-structure destroyed. Among the flood prone areas in the last flood in 2007, more than 90% latrine and water source has been destroyed in *Chilmari*, around 95% latrine and 100% water source has been destroyed in *Mymensingh Sadar* and more than 80-90% latrine and water source has been destroyed in *Fulpur* upazila. Total 820 shallow tube-wells and 916 ponds were totally damaged in the study area. Again total of 2,992 deep tube-wells, 960 shallow tube-wells and 205 ponds were partially damaged. To recover these losses total 817 deep tube-wells, 55 shallow tube-wells and two ring-wells were reinstalled, 250 pond were treated (Table 10). In case of latrine, total 12,527 slab latrines were totally damaged, 2,144 were partially damaged. The number of pit latrine was uncountable. The number of newly installed slab latrine was 2,309. From the collected information's the study team got a very segregated data on the number of physical damage and the financial loss due to this reason (Table 11). The information gathered here does not represent the total yarn but from these numbers it is easily assumable that the amount of losses is a big portion in the local economy and hence affects the GDP.

Financial losses in relation to Physical Damages:

Form review of documents from DPHE, NGO and WatSan Committee Office, the approximate amount of estimated loss and costs of new installation was collected. For the destroyed water sources, the approximate total loss was 477,400 taka. In case of partially damaged water sources, the loss was approximately 4,746,500 taka. A total of 39,668,258 taka was spent to re-install and treat the damaged water sources. For sanitation, the estimated loss was about 20,014,850 taka for damaged latrines, 3,490,700 taka for partially damaged latrines. A total of 2,430,400 taka was spent to install new latrines (Table 10 and 11). The respondents and the key informants of *Kalapara* upazila informed that the financial losses due to the physical losses were a big burden to all of them as they do not have enough money to spare. Almost all people in that area live hand to mouth. Therefore, the losses and the amount they had to pay were a huge burden for them. After the last disaster there has been comprehensive sanitation and water installation projects implemented by many NGOs and organization as well as the GoB. In the later of this section we have presented the number of physical loss of the WatSan and the amount of financial loss as well as the number of new installation and estimated cost according to the data available from different agencies. Unlike the physical losses, people generally counts the direct financial loss of the facilities but the indirect loss has a great impact on the future of the locality, which is often left unaccounted for.

5.2.2 Safe water and sanitary latrine crisis during and after disasters:

According to the respondents in all study areas, the safe water and sanitary crisis during and after the disaster period was enormous. Most of the sources of safe water were out of order. The present numbers of latrine facilities were inadequate compared to the actual requirement. Therefore, there was always a long cue for the use of latrines. Furthermore, due to the scarcity of water people in the flood prone areas used untreated and unsafe flood water. During the disaster, the first priority of people generally was to save their household assets and their own lives. Therefore, many people drank whatever water they got and defecated wherever they found a place. However, as time passed and the acute phase of the disaster was over they started to think about hygienic WatSan facilities. Nevertheless, their first priority was to rebuild their home, look for food and livelihood. During and after the disaster, women of that area had to suffer the most as they had to collect water in a very difficult situation. Privacy of women during defecation was another big problem. Because the roads were also damaged, the mobile water purification plants could not reach many parts of the cyclone affected areas.

Key Points

- As most of the sources were out of order the level of crisis was very deep.
- The present number of facilities are much less than the requirement so there is always a long cue
- As the roads were also affected the mobile plant could not reach many parts of the area
- Women, children, adolescents, older and sick people suffered the most.

5.2.3 Emergence of Health hazards (during and after disaster):

In addition to its destructive effects on the infrastructures including Wat San facilities, disasters, such as cyclone and flood cause enormous health problems in the affected areas. These health hazards range from immediate loss of lives of human as well as livestock to long-term health problems of the affected people. Health problems of people in the disaster affected areas may range from physical to psychosocial health. In this section briefly presents the findings from the reviews of documents and indepth interveiwes with the healthcare providers.

Prevalence of Water Borne Diseases:

Among the study areas, majority (64.7% in *Kolapara*, 55.6% in *Golachipa*, 66.7% *Mymensingh Sadar*, 83.3% *Fulpur* and 72.2% in *Chilmari*) of the respondents stated that at least one of their family members got sick due to water-borne diseases during and after the last disaster (Table 8). In *Daulatkhan* upazila, the study was conducted in *Chorpodda village*, which is surrounded by rivers on all sides. In general, people from this village usually drink river water after treating it with WPT or bleaching powder. A potential reason for low rate of illnesses in this area might be due to their regular habit of treating water with water purifying agents.

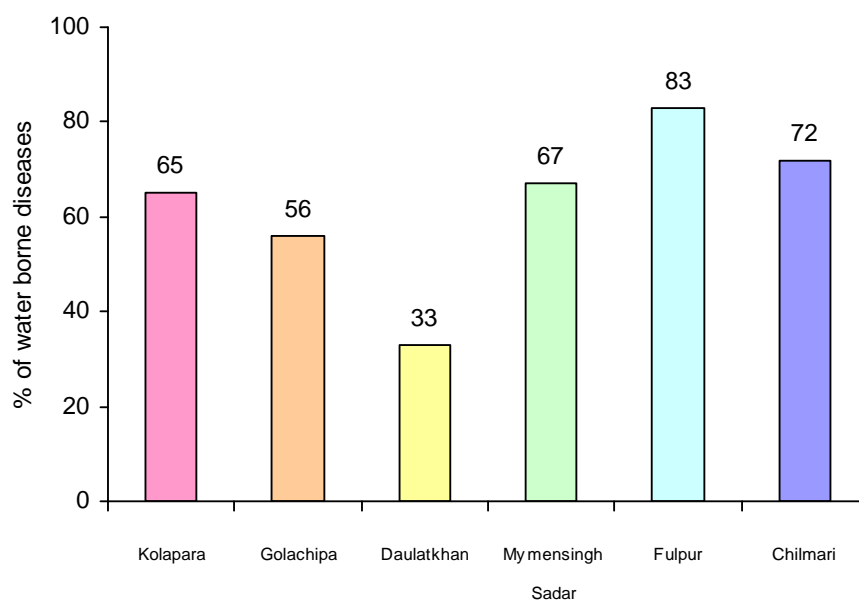


Figure10: Prevalence of water-borne diseases in study areas

Type of Water Borne Diseases:

The type of water-borne diseases was almost same in all the disaster affected areas. The prevalence of diarrhoea was the highest in all upazilas (81.8% in *Kolapara*, 60.0% in *Golachipa*, 83.3% in *Daulatkhan*, 100% *Mymensingh Sadar*, 73.3% *Fulpur* and 69.2% in *Chilmari*). Among other water-borne diseases, there were dysentery, jaundice, blood dysentery, cholera and typhoid (Table 8). The potential reason of the

high prevalence of diarrhoea²⁹ is poor WatSan situation during and after the disaster in the affected areas.

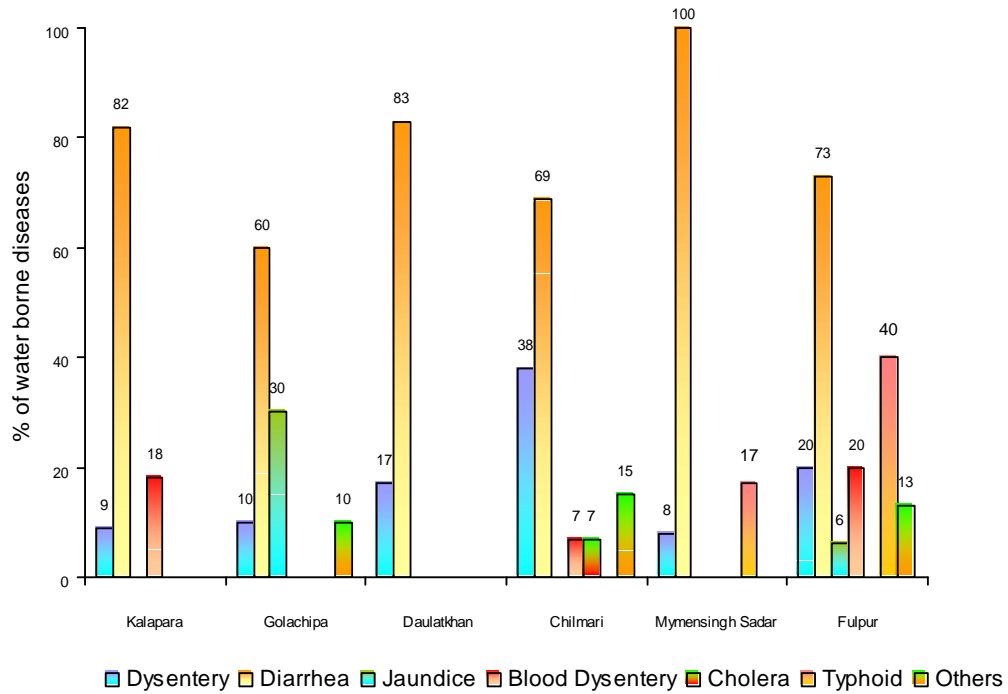


Figure11: Prevalence of different types of water-borne diseases in the study areas.

²⁹ Cairncross S. Health aspects of [WatSan](#). In: Kerr C, ed. Community health and sanitation. London, Intermediate Technology Publications, May 1990

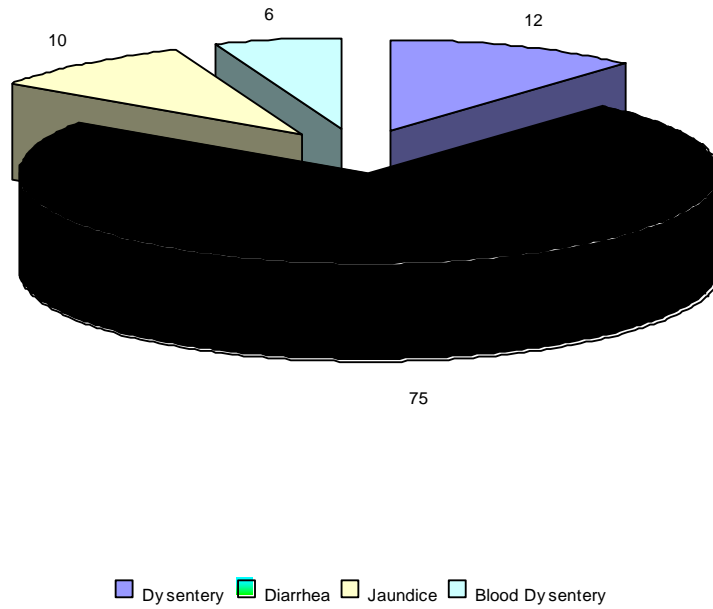


Figure12: Prevalence of different types of water-borne diseases in cyclone affected areas

Flood

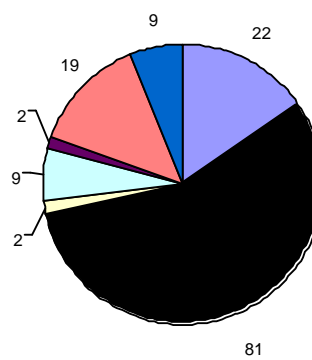


Figure13: Prevalence of different types of water-borne diseases in flood affected areas

Levels of health hazards during normal time and disaster time:

As expected, the levels of health hazards and water-borne diseases were much higher during and after the disaster period than that in normal situation. The patients' flow was higher immediately following a disaster than that in normal times. As expected, children, older people and women were the most affected groups presented mostly with water-borne diseases like diahorrea, dysentery, cholera, skin diseases etc. In contrast, the woman from flood prone areas presented with a higher level of UTIs than that of the coastal areas.

Key Points

- The number of patient in disaster period is much higher than at normal times
- The number of water borne diseases patients increases generally 20 days to one month after the disaster
- Skin diseases is less in other areas than in flood prone area
- In flood prone are women have higher and alarming rate of UTI's

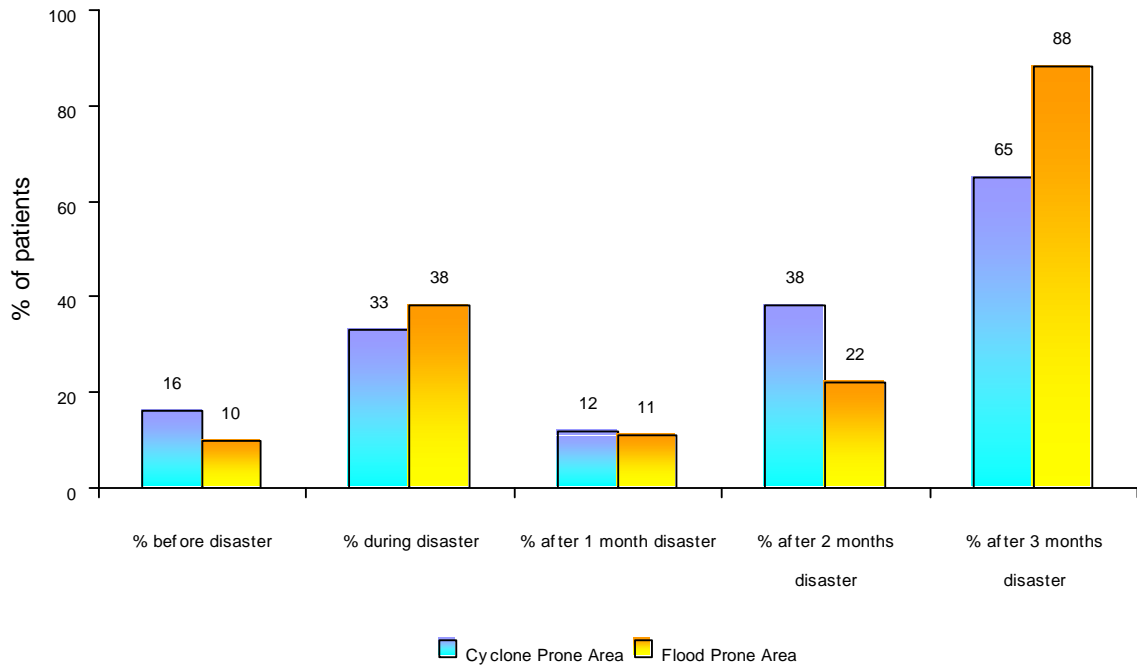


Figure14: Levels of health hazards in the study areas before, during and after disaster

Financial Losses in relation to Health Hazards:

Health hazards have some financial burden on the common people of disaster prone areas. To get a picture of financial burden due to disasters, the healthcare providers in all but in Golachila and Daulatkhan gave some data available at that time. According to the respondents of Kolapara, the financial burden due to illnesses was enormous for them. On this Jarina Khatun (29) said *"It is a big burden for us. We have lost almost everything in the disaster and the diseases are also making us more vulnerable"*.

Though government helped in many ways but the supply was inadequate compared to the need of people. According to the doctor from Daulatkhan Upazila Health Complex, *"For one family if the level of diseases is high they have to spend around 500 taka per day per person"*. Another interesting finding of this study was that the male child got more attention from the family than the female child. It is important to note that the data on this were lacking and the number presented here were obtained from the health facilities at the time of documents review.

Key Points

- It is a big burden for them
- Though government helped in many ways but the amount of requirement was much higher than the supply.
- In both the areas the boy child tends to get more service from the family than the girl child.

Chapter: Six

6.1 Community Needs and Opportunities

After getting an idea of the knowledge, attitude and practices of the people in the community and stakeholders about the damage and safe water crisis due to disaster, this study delved into the assessment of need, existing opportunities, challenges and problems related to WatSan in response to disasters. In this section, we presented the issues of community needs and opportunities in relation to disaster.

6.1.1 Community needs and demands with WatSan facilities in response to disasters

Key Points

- Hardware installation training at community level is a must
- Women should be included in the training programme
- Sanitation related education has to be ensured at community and household level
- Provision of separate latrine for male and female
- Female participation in the WatSan committee has to be ensured
- The platform of the tube-wells and latrines should be of concrete and elevated

According to the DPHE engineer of *Kolapara*, 815 tube-wells and 150 latrines has been installed by DPHE office from *Kolapara upazila*. In all the other areas, all of the respondents reported that disaster destroyed the WatSan facilities of individual households and community. For this reason, the need for WatSan facilities was very high. The respondents also suggested that the WatSan facilities should be at the community level rather than at household level. According to the respondents, it would be better if one water point and one latrine are installed for 5 households. This can be sustainable

if necessary training is given on hardware installation at community level. The respondents also opined that women should be included in the training programme. In the *Char* areas, however, some different views were found. The respondents in *Char* areas stated that the platform of the tube-wells should be concrete. They also suggested that there should be separate latrines for male and female. It was emphasized that there should be health education on WatSan at community and household level to ensure prevention of diseases due to disaster.

6.1.2 Existing opportunities to address WatSan during and after disasters

In this study, the existing opportunities related to addressing WatSan problems during and after disasters were explored. It was found that there are some high elevated places available in all of the areas. If fund was available, communities as well as the NGOs were willing to work. The community seemed to be interested to participate in this process as there was community sensitization to improve the WatSan facilities.

Key Points

- If fund was there the community will participate
- If the technology is easily maintainable and comfortable for women then the women will work for it.
- The technology has to be user friendly and easily maintainable

Community people were aware of the technology as well as social aspects. Many female respondents said "If the technology is easy to maintain and comfortable for women then we will work for it". However, the local government representatives of the study areas except the DPHE engineer of *Kolapara* seemed to be reluctant and said that all of these depend on the policy makers.

6.1.3 Challenges and problems to address the community needs and demands in response to disasters with WatSan facilities

- There were frequent natural disasters in the study areas
- Identification of locally and culturally acceptable technology and adaptation
- Some people were bound to use flood water as there was no source of safe water in the vicinity
- Lack of priority for WatSan at the time of reconstruction of home
- Lack of community empowerment
- Lack of individual level, community level and policy level planning to reduce disaster risk
- Lack of main streaming gender issue in WatSan related decision making
- Lack of realisation of indirect cost of unhygienic WatSan related behaviour
- Lack of communication facilities

Chapter: Seven

7.1 Recommendation

In Bangladesh, there has been a poor infrastructure development in the disaster prone areas. The situation gets worse with regular and repeated natural calamities, such as floods and cyclone in those areas. The problem related to WatSan during and after the disasters is enormous. The challenges to solve the WatSan related problems are crucial for the prevention of health hazards and mitigation of costs. The following recommendations have been formulated based on the results of this study. If translated from policy to action, these recommendations might be of use to alleviate the human sufferings in the affected areas.

- In Bangladesh, there are no specific actions on strategies in the National Policy regarding safe water supply and sanitation facilities in the disaster prone areas. Thus, strong policy advocacy is required to ensure safe water supply and hygienic sanitation facilities in the disaster affected areas. Water safety plan should be developed and promoted.
- There should be community awareness building programmes to understand the direct and indirect effects and costs of WatSan facilities due to disaster. Comprehensive and regular capacity building process of the community and other stakeholders is needed to increase and maintain their ability to face any future disaster.
- According to the study findings, there have been no appropriate technologies/options that are being used by the sector agencies. Due to lack of technological innovations, WatSan coverage in many places goes down during and after disaster. Therefore, it will be important to ensure the sustainability of the WatSan facilities in the study areas. An action research towards the innovation of a low cost and sustainable technology will be essential.
- Capacity building of the Local Government Institutes (LGIs) and Local Communities including civil society could be an opportunity to ensure sustainability of WatSan facilities during and after disaster.
- Local resource mobilization needs to be explored to reduce dependency on the external support agencies. Both community participation and local resource mobilization will be vital for sustainability of the WatSan projects.
- The role of community people will be vital in the advancement of a low-cost and disaster friendly Wat San facilities in the disaster prone areas. The respective authorities can maximize the efforts from community people for the installation and maintenance of the community WatSan facilities.
- It is highly recommended to have a provision of a regular, active and effective pre- and post-disaster community consultation facilities with the community people in presence of the representatives from all related agencies.

- Dissemination of messages related to disaster preparedness in the disaster prone areas is essential. Simple and easy to understand communication materials should be developed for distribution. These materials can be used through different NGOs/GOs working in the disaster prone areas of the country.
- Institutionalization of the existing committees, such as Union WatSan Committee and Union Disaster Management Committee has to be ensured as they are the permanent actors of local community. This can be done by ensuring actual bottom-up rather than a top-down approach in the decision making process.
- A big push is needed to overcome the local and traditional beliefs and practices, such as women should collect the water and the absence of community participation in the decision making on WatSan issues. Such mindset makes individual and community especially vulnerable.
- For taking any new initiatives in the form of piloting, gender, environment, poverty, governance and local culture must be included as cross cutting themes.
- Security of the women should be ensured at both household and community level. As in many cases it was found that women face sexual harassment while going to latrine at night or at shelter houses. The latrines and water points should be in a safe place where there is enough light and air. Separate toilet for every 10 males and females living in the shelter house has to be ensured.

Annex

Findings at a Glance

Table 2: Socio-demographic characteristics of the respondents (age, sex, educational qualification and occupation) by upazila

Categories	Upazila					
	Kalapara (%)	Golachipa (%)	Daulatkhan (%)	Chilmari (%)	Mymensingh Sadar (%)	Fulpur (%)
Age of the respondents (Mean: 42.36 ± 14.60, Med: 40, Min: 20, Max: 80)						
20 to 29 years	29.4	27.8	11.1	22.2	27.8	5.6
30 to 39 years	17.6	22.2	22.2	44.4	33.3	27.8
40 to 49 years	17.6	16.7	33.3	5.6	11.1	33.3
50 to 59 years	5.9	11.1	16.7	11.1	16.7	22.2
60 to 69 years	29.4	16.7	11.1	5.6	5.6	11.1
>70 years	-	5.6	5.6	11.1	5.6	-
Sex of the Respondent						
Male	52.9	44.4	55.6	55.6	44.4	55.6
Female	47.1	55.6	44.4	44.4	55.6	44.4
Educational qualification of the respondents						
Illiterate	58.8	16.7	94.4	72.2	66.7	61.1
Primary Complete	29.4	55.6	5.6	11.1	16.7	5.6
Secondary Complete	11.8	11.1	-	11.1	11.1	27.8
SSC	-	5.6	-	5.6	5.6	-
HSC	-	11.1	-	-	-	5.6
Occupation of the Respondent						
Small Business	5.9	5.6	-	16.7	22.2	11.1
Rickshaw Puller	-	-	-	-	5.6	-
Day Labour	-	-	-	16.7	-	-
Service	-	5.6	-	-	5.6	-
Transport Worker	-	-	-	5.6	5.6	-
House Wife	35.3	55.6	44.4	11.1	33.3	16.7
Maid Servant	5.9	-	-	5.6	5.6	22.2
Unemployed	5.9	5.6	-	11.1	5.6	-
Agricultural Work/Farmer	47.1	22.2	27.8	11.1	-	22.2
Fisher Man	-	-	22.2	-	-	-
Cattle Rearing	-	-	5.6	-	-	-
Others	-	5.6	-	22.2	16.7	27.8

Table 3: Household information of the respondents (religion, family size, number of earning member) by upazila

Categories	Upazila					
	Kalapara (%)	Golachipa (%)	Daulatkhan (%)	Chilmari (%)	Mymensingh Sadar (%)	Fulpur (%)
Religion of the Family						
Muslim	100.0	100.0	100.0	100.0	100.0	100.0
Number of family members						
1 to 5	76.5	61.1	33.3	66.7	61.1	55.6
6 to 10	23.5	38.9	55.6	27.8	38.9	38.9
11 to 15	-	-	11.1	5.6	-	5.6
Number of earning members						
One	94.1	66.7	61.1	66.7	66.7	61.1
2 to 3	5.9	27.8	27.8	33.3	27.8	27.8
4 to 5	-	5.6	11.1	-	5.6	11.1

Table 4: Socioeconomic status of the respondents (monthly income, monthly expenditure and monthly expenditure on food items) by upazila

Categories	Upazila					
	Kalapara (%)	Golachipa (%)	Daulatkhan (%)	Chilmari (%)	Mymensingh Sadar (%)	Fulpur (%)
Monthly Income						
< 3000 taka	64.7	23.5	33.3	50.0	33.3	12.5
3001 to 5000 taka	29.4	41.2	11.1	33.3	27.8	43.8
5001 to 7000 taka	-	29.4	22.2	5.6	22.2	18.8
7001 to 9000 taka	-	-	22.2	5.6	11.1	6.3
9001 to 11,000 taka	5.9	5.9	11.1	5.6	5.6	18.8
Monthly expenditure						
< 3000 taka	58.8	23.5	27.8	38.9	11.1	5.9
3001 to 5000 taka	35.3	52.9	44.4	44.4	50.0	58.8
5001 to 7000 taka	-	17.6	5.6	11.1	27.8	11.8
7001 to 9000 taka	-	-	5.6	-	11.1	11.8
9001 to 11,000 taka	5.9	5.9	16.7	5.6	-	11.8
Monthly food expenditure						
< 50 Percent	5.9	-	5.6	-	-	-
51 to 60 Percent	17.6	23.5	22.2	11.8	5.6	13.3
51 to 70 Percent	23.5	17.6	44.4	17.6	11.1	6.7
71 to 80 Percent	52.9	58.8	5.6	35.3	22.2	40.0
81 to 90 Percent	-	-	11.1	23.5	44.4	20.0
>90 Percent	-	-	11.1	11.8	16.7	20.0

Table 5: Sources of water for drinking and other household use by upazila

Categories	Upazila					
	Kalapara (%)	Golachipa (%)	Daulatkhan (%)	Chilmari (%)	Mymensingh Sadar (%)	Fulpur (%)
Source of drinking water of the family						
Deep tube-well	100.0	100.0	11.1	-	-	-
Shallow tube-well	-	-	-	83.3	100.0	83.3
River	-	-	88.9	5.6	-	-

Others	-	-	-	11.1	-	16.7
Source of water for domestic use						
Deep tube-well	5.9	16.7	-	-	-	-
Shallow tube-well	-	-	-	61.1	83.3	66.7
Pond	94.1	83.3	-	-	16.7	5.6
River	-	-	100.0	27.8	-	11.1
Others	-	-	-	11.1	-	16.7
Owner of the water source						
Own	-	5.6	-	16.7	72.2	72.2
Combined	-	11.1	-	5.6	11.1	22.2
NGO	-	-	-	5.6	-	-
Govt	88.2	66.7	11.1	22.2	-	-
Others	11.8	16.7	88.9	50.0	16.7	5.6
Water source after the last disaster						
Deep tube-well	100.0	94.4	11.1	-	-	-
Shallow tube-well	-	-	-	61.1	88.9	72.2
Well	-	-	-	-	5.6	-
Pond	-	5.6	-	-	5.6	-
River	-	-	88.9	33.3	-	27.8
Others	-	-	-	5.6	-	-

Table 6: Types of latrine used before and after the disaster by upazila

Categories	Upazila					
	Kalapara (%)	Golachipa (%)	Daulatkhan (%)	Chilmari (%)	Mymensingh Sadar (%)	Fulpur (%)
Type of latrine						
Double pit	-	-	-	-	16.7	5.6
Slab	47.1	72.2	5.6	50.0	44.4	33.3
Pit	52.9	11.1	33.3	27.8	11.1	16.7
Open	-	11.1	33.3	5.6	5.6	22.2
Hanging	-	-	-	11.1	-	5.6
Bamboo/Bush /Field	-	-	16.7	-	22.2	11.1
Others	-	5.6	11.1	5.6	-	5.6
Type of latrine after the last disaster						
Double pit	-	-	-	-	16.7	5.6
Slab	58.8	61.1	5.6	27.8	27.8	11.1
Pit	41.2	22.2	33.3	-	-	-
Open	-	16.7	55.6	22.2	11.1	22.2
Hanging	-	-	-	5.6	-	-
Bamboo/Bush /Field	-	-	5.6	11.1	33.3	50.0
Others	-	-	-	33.3	11.1	11.1

Table 7: Respondnets hygiene behaviour by upazila

Categories	Upazila					
	Kalapara (%)	Golachipa (%)	Daulatkhan (%)	Chilmari (%)	Mymensingh Sadar (%)	Fulpur (%)
General hygiene behaviour						
Only with water	17.6	-	33.3	-	22.2	27.8
With water and soap	29.4	61.1	22.2	27.8	38.9	38.9
With water and mud	35.3	27.8	38.9	50.0	33.3	33.3
Others	17.6	11.1	5.6	22.2	5.6	-
Hygiene behaviour after the last disaster						
Do not clean	5.9	-	-	-	-	5.6
Only with	17.6	16.7	55.6	33.3	27.8	38.9

water						
With water and soap	23.5	33.3	11.1	11.1	55.6	38.9
With water and mud	41.2	38.9	27.8	44.4	16.7	16.7
Others	11.8	11.1	5.6	11.1	-	-

Table 8: Prevalence of water borne diseases by upazila

Categories	Upazila					
	Kalapara (%)	Golachipa (%)	Daulatkhan (%)	Chilmari (%)	Mymensingh Sadar (%)	Fulpur (%)
Information regarding any family member getting sick due to water borne diseases after the last disaster						
Yes	64.7	55.6	33.3	72.2	66.7	83.3
No	35.3	44.4	66.7	27.8	33.3	16.7
Type of diseases						
Dysentery	9.1	10.0	16.7	38.5	8.3	20.0
Diarrhea	81.8	60.0	83.3	69.2	100.0	73.3
Jaundice	-	30.0	-	-	-	6.7
Blood Dysentery	18.2	-	-	7.7	-	20.0
Cholera	-	-	-	7.7	-	-
Typhoid	-	-	-	-	16.7	40.0
Others	-	10.0	-	15.4	-	13.3

Table 9: Healthcare seeking behavior during illness due to water-borne diseases by upazila

Categories	Upazila					
	Kalapara (%)	Golachipa (%)	Daulatkhan (%)	Chilmari (%)	Mymensingh Sadar (%)	Fulpur (%)
Taken any treatment						
Yes	100.0	90.0	66.7	92.3	83.3	80.0
No	--	10.0	33.3	7.7	16.7	20.0
Place of treatment						
Govt. Hospital/ Medical College	9.1	-	25.0	8.3	70.0	8.3
Family Health Care Centre	9.1	-	-	-	-	-
Thana Health Complex	27.3	-	-	-	-	-
NGO Clinic	-	-	-	25.0	-	-
NGO Satellite Clinic	-	-	-	16.7	-	-
Private Hospital/Clinic	-	11.1	-	-	10.0	-
Quack	54.5	55.6	75.0	33.3	20.0	75.0
Traditional Healer/Kabiraj	-	33.3	-	-	-	-
Pharmacy	-	-	-	16.7	-	16.7

Table:10 : Losses and investment matrix for source of water point by upazila

Area	R. Type	Destroyed water source				App. Loss (Tk)	Partially damaged water source				App. Loss (Tk)	Reinstallation/renovation of new water source				Estimated cost for the installation of water source (Tk)
		Deep Tube well	Shallow Tube Well	Ring well	Pond		Deep Tube well	Shallow Tube Well	Ring well	Pond		Deep Tube well	Shallow Tube Well	Ring well	Pond	
Kola para	DPHE	-	-	-	365	-	369	-	-	-	184500	125	-	-	250	5625000
	NGO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	--
	WAT San	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gola chipa	DPHE	-	-	-	-	-	1200	-	-	-	25000	270	-	-	-	13230000
	NGO	-	-	-	-	-	1200	-	-	-	-	270	-	-	-	13230000
	WAT San	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Daulat kahn	DPHE	-	-	-	200	-	380	-	-	-	-	31	-	-	-	100000
	NGO	-	-	-	-	--	200	-	-	-	100000	119	-	-	-	6009500
	WAT San	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chil mari	DPHE	-	372	-	-	1860000	-	825	-	-	181500	-	2	2	-	292725
	NGO	-	270	-	1	555000	-	40	-	-	100000	-	-	-	-	-
	WAT San	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
My. Sadar	DPHE	-	-	-	-	-	-	250	-	50	515500	-	29	-	-	638000
	NGO	-	17	-	-	638000	16	-	-	-	110000	-	3	-	-	51129
	WAT San	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fulpur	DPHE	-	41	-	-	205000	-	320	-	-	1280000	2	21	-	-	463554
	NGO	-	120	-	350	1516000	-	350	-	155	2250000	-	-	-	-	28350
	WAT San	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total		-	820	-	916	477400	2996	960	-	205	4746500	817	55	2	250	39668258

Table 11: Losses and investment matrix for latrine by upazila

Area	R. Type	Destroyed Latrine		App. Loss (Tk)	Partially damaged Latrine		App. Loss (Tk)	Reinstallation/renovation of new Latrine	Estimated cost for the installation of Latrine (Tk)
		Slab/Ring slab	Pit		Slab/Ring Slab	Pit		Slab/Ring Slab	
Kola para	DPHE	8724	100 %	14830800	2817	-	2535300	205	348500+
	NGO	-	-	-	-	-	-	-	-
	WAT San	-	-	-	-	-	-	-	-
Gola chipa	DPHE	-	100 %	-	-	-	-	210	256500
	NGO	-	100 %	-	-	-	-	210	256500
	WAT San	-	-	-	-	-	-	-	-
Daulat kahn	DPHE	919	100 %	-	374	-	-	100	-
	NGO	250	100 %	25000	400	-	200000	64	115200
	WAT San	-	-	-	-	-	-	-	-
Chil mari	DPHE	660	100 %	546000	385	-	77000	38	375800
	NGO	650	100 %	930000	-	-	-	-	-
	WAT San	-	-	-	-	-	-	-	-
My. Sadar	DPHE	50	100 %	250000	100	200	155000	200	110000
	NGO	60	-	-	168	-	-	1311	774000
	WAT San	-	-	-	-	-	-	-	-
Fulpur	DPHE	382	100 %	305600	450	--	90000	176	193900
	NGO	832	100 %	3128450	267	287	433400	-	-
	WAT San	-	-	-	-	-	-	-	-
Total		12527	100%	20015850	20015850	487	3490700	3490700	2430400

Table 12: Matrix of health hazards in the disaster affected areas by upazila

Area	Outdoor patients number in last 6 months						Indoor patients number in last 6 months						Outdoor water borne diseases patients number in last 6 months						Indoor water borne diseases patients number in last 6 months						Outdoor water borne diseases patients number during last disaster period	Indoor water borne diseases patients number during last disaster period	outdoor water borne diseases patients number three months after last disaster period			Indoor water borne diseases patients number three months after last disaster period			Approximate cost per day per patient	
	*M '8	F '8	J '8	D '7	N '7	O '7	M '8	F '8	J '8	D '7	N '7	O '7	M '8	F '8	J '8	D '7	N '7	O '7	M '8	F '8	J '8	D '7	N '7	O '7			F '8	J '8	D '7	F '8	J '8	D '7		
	Kolapara	58 64	47 47	52 34	56 33	60 18	46 49	470	352	396	447	406	291	685	808	10 48	854	10 11	760	87	48	70	49	23			11	32	N/A	854	10 48	808		49
Golachipa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Daulatkhan	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Months</i>	F '8	J '8	D '7	N '7	O '7	S '7	F '8	J '8	D '7	N '7	O '7	S '7	F '8	J '8	D '7	N '7	O '7	S '7	F '8	J '8	D '7	N '7	O '7	S '7			S '7	O '7	N '7	S '7	O '7	N '7		
Chilmari	19 9	20 9	21 0	20 6	16 6	25 6	-	-	-	-	-	-	8	13	29	15	21	30	-	-	-	-	-	-	10	-	15	21	30	-	-	-	120 tk	
My. Sadar	32 7	25 8	18 6	26 8	35 0	32 0	-	-	-	-	-	-	9	15	8	14	12	18	-	-	-	-	-	-	38	N/A	17	21	20	-	-	-	100 tk	
Fulpur	21 75	16 80	10 00	96 8	13 06	88 9	-	-	-	-	-	-	12 0	17 0	11 0	10 0	12 5	90	-	-	-	-	-	-	170	N/A	10 0	12 5	90	-	-	-	150 tk.	

* M '8= March 2008, F '8= February 2008, J '8= January 2008, D '7= December 2007, N '7= November 2007, O '7= October 2007, S '7= September 2007

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