Evaluation of Water Supply and Sanitation Status Related to Climate Change in Satkhira Sadar, Bangladesh

By

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Abstract

Climate change represents the most significant challenge of the study area and poses risks to water and sanitation services. Continuous climate change will increase the social and economic issues that the poorest currently experience, highlighting and increasing their vulnerabilities because of their reliance on climate-sensitive natural resources and their lack of social protection. The intention of this paper is to explore the relation between lack of portable. water and sanitation system with the effects of climate change. During January 2022 to June 2022 a survey covering 100 household with structured questionnaires in Satkhira Sadar Upazilla of Satkhira district. The study revealed that there were many types of climate change impact. Such as- salinity intrusion into surface water body, water logging. Respondents mention that water that they can easily access from shallow tube-well was not pure and unable to drink. 78% of the shallow tube-well contain saline water or Arsenic. Deep tube-well was away from home. The drinking water crisis is not so much as there is one deep tube-well in every one or two kilometers.63% respondents used kacha toilet, 26% used semi-paka and only 11% people used paka toilets. They used dirty or unsafe water from shallow tube-well water (58%) and pond water (22%) which causes various water borne diseases. Especially children are more at risk of health. Due to lack of drainage system and the impact of climate change water logging occurs most of the time of year. This discussion lays out the wide range of factors that must be considered when developing a climate-resilient sanitation and health strategy. It serves as a foundation for thinking about the wide range of policy, governance, financial, and personnel issues that need to be addressed at both the national and local levels.

Key words: Climate change, Climate resilience, Water supply, Sanitation, Disaster

1. Introduction

Coastal areas of Bangladesh are one of the biggest victims of poor sanitation and hygiene behavior and practice, which has taken a large toll and placed a terrible burden on the people. Climate change is clearly influencing the medium of water the most, altering both the source of water supplies and the quality of the water (e.g., pollution). In coastal Bangladesh, poor sanitation exacerbates the effects of climate change.

They interact in a unique way, causing and strengthening each other. The causes involve water logging and result burden of water borne diseases. In Bangladesh's coastal areas, the effects on water resources and water-dependent services have yet to be fully addressed (Islam, 2017). Water Aid Bangladesh is working to improve the human well-being and dignity of the people of Bangladesh's coastal districts, following the government's strategic plan. A project was implemented in Satkhira District. Climate change is expected to have a

significant impact on water and sanitation, with the biggest change occurring in coastal aquifers, where it is quite likely that significant saltwater intrusion will occur as a result of sea-level rise. India, China and Bangladesh are especially susceptible to entrance of saline sea water in coastal areas. Existing water quality concerns are projected to increase as a result of climate change (WHO Europe, 2007).

There are undeniable linkages between human health and access to secure, reliable water supplies, which might be worsened by increased climatic unpredictability. Increased flooding in areas with unimproved latrines and water sources might result in a considerable increase in diarrheal illness and infant mortality, and higher water temperatures could facilitate disease transmission. Climate change projections indicate changes to the timing, intensity, and spatial distribution of weather- and climate-related events. Increasing global and regional temperatures have the potential to increase the frequency, intensity, and duration some severe extreme weather events; increase variable and unpredictable. precipitation; and increase mean sea-levels (IPCC, 2014). These changes affect sanitation systems and the infrastructure, water resources, water services, and other social and governance systems on which sanitation depends. Many of the direct and indirect effects on sanitation pose a danger to human health and development. To bridge knowledge gaps and enhance practice, more attention to the linkages between climate change and sanitation is required (Howard et al., 2016). The World Health Organization (WHO) has issued sanitation and health recommendations (WHO, 2018), with the goal of assisting nations in meeting their development objectives under the 2030 Sustainable Development Goals agenda. These guidelines offer suggestions and direction for incorporating public health considerations into sanitation policies and initiatives. The important linkages between climate change, sanitation, and human health are further explored in this project (Howard et al., 2016). Global predictions frequently indicate increased scarcity because of changes in precipitation, rising temperatures, rising demand, and poor resource quality due to pollution. These analyses, on the other hand, ignore existing groundwater storage and mounting evidence that groundwater recharge might rise in future climatic scenarios (Taylor et al., 2013). Water supplies will be put under increased strain because of population expansion, economic growth, and urbanization.

World leaders agreed on a new framework for development in 2015 the Sustainable Development Goals (SDGs) which include a goal on water (SDG 6) with ambitious targets for universal access to drinking water and sanitation by 2030. Achieving sustainable universal access under the influence of climate change will be a defining challenge for the SDG period. The SDGs also call for a focus on higher levels of service associated with much higher quantities of water (Wriege-Bechtold et al., 2010), which will create further challenges. In addition to the targets on drinking water and sanitation services, SDG 6 also includes targets to improve water quality (Taylor et al., 2013), improve water-use efficiency, implement integrated water resources management

(IWRM), and restore water ecosystems. All of these will be impacted by climate change and in turn have important influences on the resilience of drinking water and sanitation services (Aktaruzzaman et al., 2013). The south-west coastal regions of Bangladesh have been experiencing acute shortage of safe drinking water and increase in salinity intrusion in surface and ground water over the past few years. The reason is manifold and complex. Due to geographical disadvantage, this south-western region is commonly subjected to floods, river erosion and tidal surge but most importantly cyclones and storm surges. It has been estimated that Bangladesh is on the receiving end of about two-fifths of the world's total impact from storm surges (UNICEF, 2021). The main aim of this research work is to analyze the scenario of existing water supply and sanitation situation in coastal Bangladesh and identify the problems of sanitation system in coastal rural areas comparing with overall situation of Bangladesh for future development or progress.

2. Materials and Method

2.1 Study Area

Satkhira is in the south-western part of the country, and it is just upward to the Bay of Bengal. Satkhira Sadar is located at 22.7167°N 89.0750°E. It has 61839 households and total area 400.82 km2. Satkhira Sadar Upazila is bounded by Kalaroa Upazila on the north, Tala Upazila on the east, Debhata and Assasuni upazilas on the south and Basirhat and Baduria CD Blocks in North 24 Parganas district in West Bengal, India, on the west (BBS, 2021). Bashundhara (Binerpota), Gopinathpur, Khejurdanga and Kashempur village of Labsa Union of Satkhira Sadar upazila under Satkhira district of Bangladesh are selected as study area. It lies along the border with West Bengal, India. It is on the bank of the Arpangachhia River.
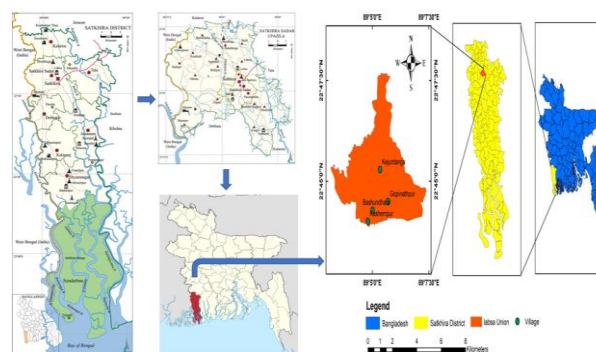

Fig. 1: Location of the study area.

2.2 Problem Identification

Water supply and sanitation in Bangladesh is characterized by a few achievements and challenges. Water scarcity is a common problem in coastal areas of Bangladesh. Because salinity is increasing day by day due to climate change (Hasan, M. 2021). As well as arsenic contamination is a barrier for meet the demand of fresh water. In my study area Satkhira district there are no sewerage systems in rural areas. So, one of the biggest problems of this area is water logging. There are several factors like number of hygienic latrine facilities, sources of water and distance of water source from

sanitation site where rural areas are comparatively lacking behind.

2.3 Village Selection Criteria

The respondents of the villages were selected based on the water and sanitation system of the area. A total of 100 households were selected with random stratified method from four study village that are showing in Table 1

Table 1: Selection of the study villages.

Sl. no.	Village	Latitude	Longitude	Sample Size	Union	Upazila
1.	Bashundhara	22.4504	89.0635	25		
2.	Gopinathpur	22.741373	89.091458	25		Satkhira Sadar
3.	Khejudanga	22.4506	89.0628	25	Labsa	
4.	Kashempur	22.735484	89.059471	25		

2.4 Respondent group selection

The respondents were selected based on different drinking water sources user and sanitation system. The respondents (both male and female) who are more 25 years of age group were selected as the major respondent group because they were more knowledgeable about the study area and with the topic of the study. They data also obtain from women to know their problem.

2.5 Sampling procedure and sample size

The questionnaire survey was completed through direct interview of the respondents. In the study area four village were identified for the basis the water and sanitation system and the effect of climate change. Total one hundred sample of questionnaire survey was selected. The opinion of respondents was written to the questionnaire sheet. After completing the questionnaire survey the photos of respondents were picked out.

2.6 Data collection

Data collection is the most important part for any type of research. Because data are the primary element of the study. There are several ways of collecting data. To fulfill the objectives, set out for this study pertinent information and literature were collected from the two sources, which are-

2.6.1 Primary data collection

To achieve the stated objectives, primary data must collect from the study area by using questioner's survey method Field investigation and questionnaire preparation were conducted through the sequential completion of the following:

2.6.1.1 Field observation and pre-reconnaissance survey

To get a view of the nature of the study area and prior to data collection, a reconnaissance survey was initiated to acquire some basic ideas. Pre-reconnaissance survey was conducted to find out the water supply and sanitation problem and the effect of climate change in the study area. A field visit a lot of discussion was conducted to gate a clear idea about sector wise water use pattern, drinking water scarcity and local people's demand.

2.6.1.2 Questionnaire preparation

Considering the objective of the study a questionnaire was prepared for the selected community. A structured and pre-planned questionnaire was formed to complete the field survey. The questionnaire uses to collect the opinion of respondent was short in size, easily accessible. uncontroversial, and easily understandable in logical sequences

2.6.1.3 Questionnaire design and pre-testing and finalization

By using knowledge of the reconnaissance survey and informal discussion a model of questionnaire was designed and pretested that the objective can be achieved conveniently. After pretesting some issue may be rejected or added and some may be prepared to conduct this survey based on reconnaissance survey, objective of the study and the selected components of the study. The final questionnaire was free from error and omission and ready for final interview to the respondents in the study area.

2.6.2 Secondary data collection

The secondary data are those which have already been collected by someone else and which have already been passed through the statistical process. Secondary information such as statistical data, reports, maps have been collected from various offices of government, NGOs organization, journals, books, Bangladesh Burcaw of Statistics (BBS) and Upazila and Union Parishad of Satkhira.

2.7 Data processing and analysis

After collecting the data from primary and secondary sources efforts were made for processing the data After sorting out the data and information were categorized and interpreted according to the objectives and analyses were done by the help of different analytical methods and computer programs MS Word and Excel, 2019 and SPSS-20.

2.8 Data presentation and collection of feedbacks

After analyzing the total data obtained from primacy sources, it is present in a systematic way to reach the expected goal based on the objectives of the thesis. Finally, the interpreted and analyzed data were present in a draft report, containing different chapters and sub-chapters for the correction of

different mistake and different comments of supervisor. To present the data in a more authentic way some feedbacks were also collected from the experienced person.

3. Results and Discussion

3.1 Percentage distribution of socioeconomic demographic characteristics of the respondents (n=100)

The results on the selected category of the socioeconomic characteristics of the respondents are shown in Table 2

Table 2: Socioeconomic demographic information about respondents (n=100).

Category	Sub-category	Percentage (%)	Mean	SD
Gender	Male	52	50	2.82
	Female	48		
Age distribution	25-34	32	41.23	11.29
	35-44	38		
	45-54	16		
	55-64	9		
	≥65	5		
Educational Qualification	Illiterate	42	16.66	15.33
	Only signature	16		
	Primary	27		
	Secondary	8		
	Higher Secondary	5		
	Honors/Degree	2		
Occupation	Business	5	16.66	11.77
	Day laborers	25		
	Farmer	13		
	Fisherman	14		
	Housewife	36		
	Other	7		
Monthly Income (TK)	<5000	43	6340	3722.82
	5000–10000	35		
	>10000	22		
Monthly Expenditure (TK)	<5000	45	6060	3580.69
	5000–10000	37		
	>10000	18		
Area of Own Land (Acres)	0.1 – 0.5	22	0.4	0.11
	0.6 – 1.0	30		
	No land	48		

Gender identification is the most important part of the survey. Form the Table 2 it was stated that 52% people were male and 48% were female. In this table it was observed that, the mean age of the respondents was 50 while standard deviation is 2.82 and many respondents (38%) fall in 35 to 44 age group. Among the respondents 32% were 25-34 age group, 16% were 45-54 age group, 9% were 55-64 age group, and 5% were above 65-year age, respectively. In the educational qualification category where 42% people had no education, 16% people only signature, 27% completed Primary level, 8% Secondary level, 5% Higher Secondary level and 2% Honors/Degree level. Satkhira District had a literacy rate of 52.07% for the population 7 years and above for males it is 56.11% and for females 48.15%, and Satkhira Sadar had a literacy rate of 56.51% for the population (BBS, 2021).

In the occupational status, 5% people of the respondents are business, while 25%-day laborers, 13% farmer, 14% housewives, and 7% are involved in other activities among the respondents of the study area. The income levels of the respondents are divided into three categories: <5000Tk, 5000-10000Tk, >10000Tk. According to the surveyed households in the study area, about 43% of the respondents had an income below 5000 TK, 35% had an income of 5000-10000 TK and only 22% of the respondents had an income of more than 10000 TK. Satkhira in the 7th ranked poorest district of the country and people here are victim of extreme poverty (Rahman, 2019). The expenditure level was divided into same category as income level of household. About 45% of households had expenditure of below 5000 TK, 37% had 5000-10000 TK and only 18% had more than 10000TK. The area of own land was divided into three categories: 0.1 – 0.5 acre, 0.6 – 1.0 acre and no land. About 22% of people had (0.1 – 0.5) acre of own land, 48% people had no land and only 30% people had (0.6 – 1.0) acre area of own land.

3.2 Information about drinking water source and consumption pattern of family

3.2.1 Source of drinking water in different seasons

In the coastal belt, people mainly use different types of water sources to meet drinking water demand. The use of different sources in different season is shown in the figure 2
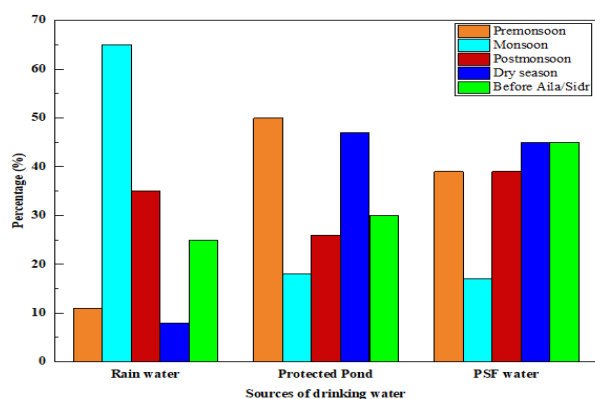

Fig. 2: Drinking water source in study area (Field survey, 2022)

Figure 2 represents the sources of drinking water during different season of the study area. Here the rainwater availability varies across seasons, with the highest availability recorded during the monsoon season (65%) and the lowest before Aila/Sidr (25%). Protected pond shows steady availability across seasons, with a peak in the dry season (47%) and the lowest during the monsoon (18%). The drinking water sources of pond sand filter maintains relatively consistent availability throughout the seasons, with the highest availability before Aila/Sidr (45%) and the lowest during the monsoon (17%). The availability of water sources, especially rainwater, is highly dependent on seasonal changes. The monsoon season offers a considerable advantage for rainwater harvesting, but availability drops significantly in the pre-monsoon and dry seasons. To further substantiate the discussion on water sources in Satkhira, research like can provide detailed insights into the groundwater quality and the

challenges with salinity and arsenic contamination in the region. So, in the study area, there were many problems regarding PSF, but people used it as alternative safe drinking water in their life existing and better performance. This research supports the findings from the table by emphasizing the limitations of groundwater, especially in coastal regions like Satkhira, where groundwater sources are vulnerable to salinization and contamination.

3.2.2 Distance of drinking water source from surveyed households and availability of water

In the study area people must travel a long distance to collect drinking water. The distance of drinking water sources from surveying household is given in Fig. 3.
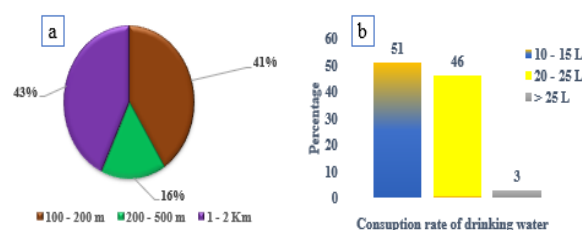

Fig. 3: a) Distance of drinking water sources from the respondent's house and b) consumption rate (Field survey, 2022).

According to figure 3 it was shown that, the distance range include all drinking water sources. About 41% house was situated in the range of 10-200m, 16% was 200-500m and 43% house were situated in the range of 1-2km. A significant amount of time is lost daily for fetching fresh water. It was learnt that people at time requires to walk for 2-3km. to avail fresh water (Haq, 2020). Additionally, about 51% of respondents consumed 10-20 liters, 46% consumed 20-25 liters and only 3% people consumed more than 25 liters and those ae mainly deep tube-well water.

3.2.3 Person involve, time required, and transport facilities for water collection among the surveyed households

Drinking water is scare in the study area. So, people must travel a long distance to collect drinking water. The modern transport facility is rare in coastal area of Bangladesh. The foot and bicycle are the main and cheap means of transport in the study area.
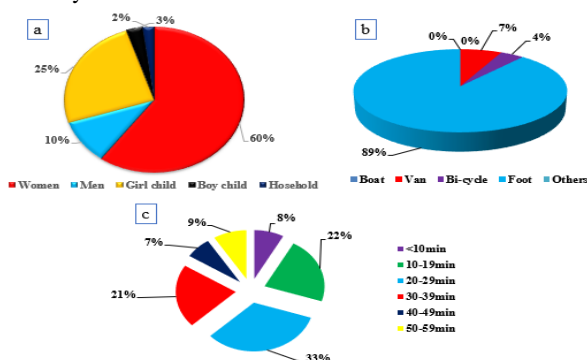

Fig. 4: Person involve, time required, and transport facilities for water collection.

Figure 4 shows that, Women carry drinking water for 60% of households and girl child 25%. From the percentage we can say that in most of the case women was related with drinking water collection. Only 10% male, 3% boy child and 2% household people are involved with drinking water collection from distance source (Field survey, 2022). Women are mostly collected drinking water for the family. Sometimes they are also accompanied by their husbands and children mostly girls (Zaman, 2020). As most of the people in the study area live below the poverty line, they were unable to use vehicle and 89% of household collect drinking water on foot. Only 7% of household used van 4% used bicycle. The long distance of drinking water source and transport on foot indicate the economic solvency of people. In the study area, 8% of households spend<10 min for drinking water collection, 22% of households spent 10 to 19 min, 33% of households spent 20 to 29 min. 30 to 39 min (21%), and small number of respondents spends 40 to 49 min (7%). Only 9% of user spends 50 to 59 min to collect drinking water, those families have van to collect fresh water from upstream region. The long distance of drinking source and transport on foot indicate the economic solvency of people. Women and girls waste time traveling long distances to collect water that could be spent on education or earning money (Gonsalves et al., 2015).

### 3.2.4 Water source for cooking purposes among surveyed household
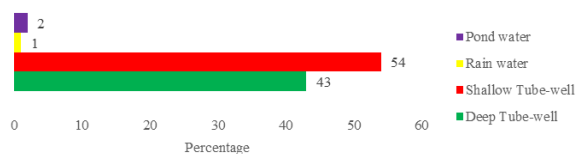
Fig. 5: Cooking water source in the study area in different time (Field survey, 2022).

Among the respondents most of the people about 54% used shallow tube-well water for cooking purposes, 43% used deep tube-well water and only 2% used pond water, 1% used rainwater. Shallow tube-well water is most available in that area. But the water of these tube-well water is arsenic contaminated or saline water. Most of the people in the study area suffer from water crisis in the summer season. Families in the southern coastal districts of Satkhira have been afflicted by a continuous and severe dry period, which has harmed groundwater supplies and resulted in rising saline levels and a shortage of clean, safe drinking water (Action Aid, 2021).

3.3 Information about the water related problem
3.3.1 Households source and problems of drinking water during disaster

During disaster households' source of drinking water are given in Fig. 6
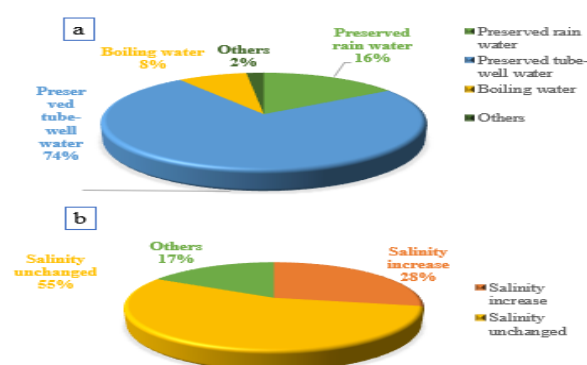
Fig. 6: a) Drinking water source and b) problem of drinking water during disaster (Field survey, 2022).

According to figure 6 it was found that about 48% respondents drink preserved tube-well water during disaster, 16% drink preserved rainwater and only 8% drink boiling water, 2% use other resources. Most of the people preserve water in plastic jar or dram. While the respondent's opinion about the problem of drinking water salinity was increased 28%, salinity was unchanged 55% and others are 17%. The main problem of the coastal region is salinity intrusion (Md Anwarul Abedin et al., 2014).

3.3.2 Respondent's opinion about the disease occurred for drinking unsafe water

In the coastal belt safe drinking water is not available. People use unsafe drinking water and faces various problem and diseases. Various dieses are shown in the Table 3.

Table 3: Diseases occurred for drinking unsafe water (Field survey, 2022).

Disease name	Percentage (%)
Diarrhea	21
Skin disease	34
Wok worm	9
Jondis	8
Typhoid	9
Arsenicosis	17
Other	2
Total	**100**

According to respondents the main effect of drinking unsafe water was skin disease (34%), diarrhea (21%), arcenicosis (17%), wok worm 9%, typhoid 9% and jondis 8%. Children are more prone to skin diseases in these areas. Each year, it is estimated that 829 000 people die from diarrhea as a result of inadequate drinking water, sanitation, and hygiene practices worldwide (WHO, 2019).

3.4 Water and sanitation related information

3.4.1 Types of toilets and location from house in surveyed households

The percentage of people using unimproved latrines has reduced from 44% in 2000 to 29% in 2017 (UNICEF, 2020). Types of toilets used by respondents are given in Fig. 7.
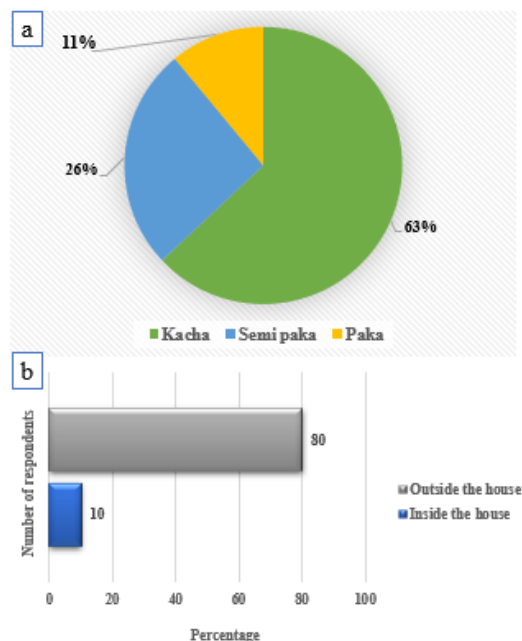

Fig. 7: a) Types of toilets and b) location of toilet from household.

Almost every house has a toilet. Among them 63% have Raw/Kacha toilet, 26% have Semi-paka toilet and only 11% have paka toilet. Otherwise, 80% respondents have toilet outside the house and only 10% have toilet inside the house. Inadequate indoor sanitation and the need to go to outdoor toilet facilities are two major risk factors for sexual assault (Gonsalves et al., 2015).

3.4.2 Source of water used in latrine

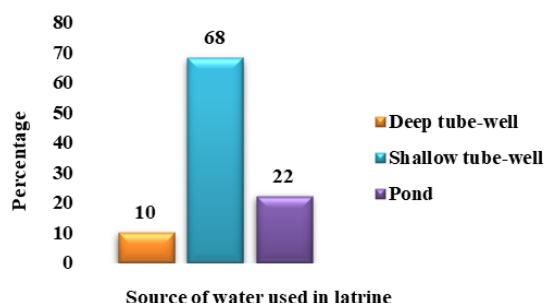Water sources for sanitary purposes among surveyed households are given in Fig. 8

Fig. 8: Water sources of sanitary purpose among households (Field survey, 2022)

Figure 8 reveals that, among the respondents 68% people used shallow tube-well water, 22% used pond water and 10% used deep tube-well water for sanitary purpose. In this case, most of the tube-wells they use are salt water and arsenic

contaminated water. In 2017, 45 % of the world's population (3.4 billion people) utilized a sanitation service that was well maintained (WHO, 2019).

3.5 Disaster and climate change related information

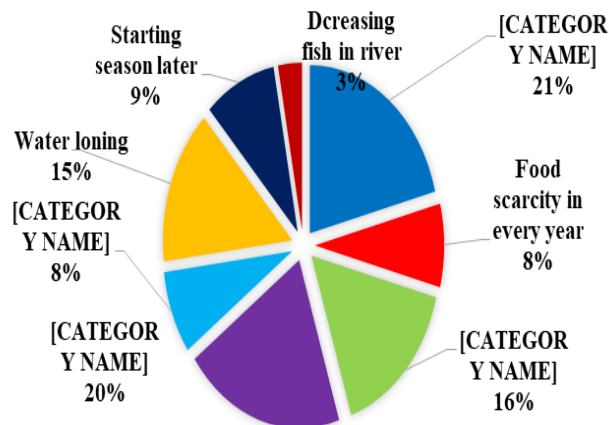#### 3.5.1 Respondents concept about the meaning of climate change

Fig. 9: Respondents concept about climate change (Field survey, 2022).

The Fig. 9 shows that most of the people 21% said climate change means changing rainfall pattern, starting season early 20%, frequent occurrence of storms 16%, water logging 15%, starting season later 9%, Increasing water and soil quality 8%, decreasing fish in river 3%, Food scarcity in every year 8%.

3.5.2 Climate change related disaster occurred in the study area

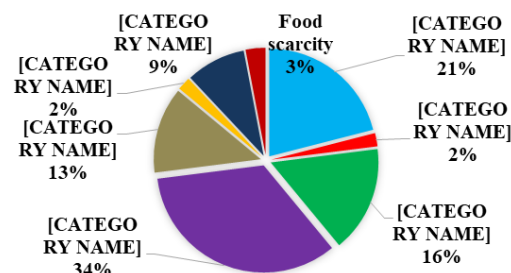The climate change related disasters that are occurred in the study area are given in Fig. 10.

Fig. 10: Climate change related disaster occurred in the study area.

According to figure 10 the current study estimated that, disaster that are occurred in the study area due to climate change were Water logging 34%, Cyclone 21%, Flood 16%, Strom 13%, High temperature 9%, Food scarcity 3%, Tornado 2% and others 2% respectively.

3.5.3 Disaster occurred in study area in last 10 year and its impacts on water sources

**Table 4:** Disaster occurred in the study area and its impacts (Field survey, 2022).

Disaster	Frequency	Impact	Frequency

	(%)		(%)
Cyclone	16	Sink	55
Salinity	12	Breakdown	10
Flood	14	Destroy	4
Water logging	21	Slightly damage	14
Strom	3	Do not harm	17
Sidr	16	-	-
High temperature	1	-	-
Aila	16	-	-
Others	1	-	-
Total	**100**	**Total**	**100**

Table 4 shows the different types of disaster were occurred in the coastal region as well as its impacts on water sources in the study area. Among them Aila and Sidr 16%. Other disaster occurred in the study area identified by respondents' concept was cyclone 16%, salinity 12%, flood 14%, water logging 21%, storm 3%, high temperature 1% and others 1%. Most frequent disaster was Super cyclone Amphan (Field survey, 2022). The people affected by cyclones Sidr and Aila are still dealing with major issues because of the negative effects of climate change, and storms have increased their vulnerability. Natural hazards caused by climate change cause damage on poor people's livelihoods and make them more vulnerable (R. Kabir et al., 2016).

Almost all the water sources are affected by natural disaster. The study shows that most of the water source was sink (55%), other was breakdown 10%, destroy 4%, slightly damage 14%, do not harm 17%. Most recent occurred disaster in the study area is super cyclone Amphan. People had to switch to new sources of water because Amphan rendered many of the earlier sources dangerous or non-functional (Rafa et al., 2021).

3.5.4 Households migrate and migration place during Cyclone
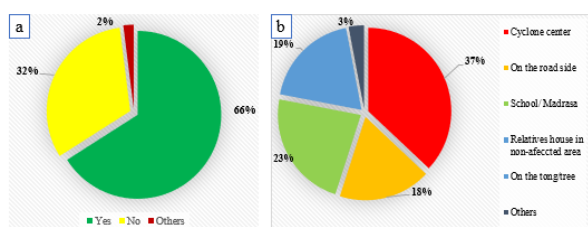
Fig. 11: a) Respondents migrate b) Migration place of the respondents during disaster (Field survey, 2022)

In the study area people during Amphan, Aila, Sidr most of the people were migrate in various places. Among them 66% were migrate during disaster and 32% were not migrate. They

stay in their own house (Field survey, 2022). Fig. 11 states that during disaster most of the people migrate to cyclone center (37%). About 23% respondents said that they were went to school or madrasa during disaster, 19% went to relative's house in non-affected area, 13% were on the roadside and 3% migrate into other places. During super cyclone Amphan approximately 4.2 million people were evacuated in coastal India and Bangladesh, with roughly 2.2 million from Bangladesh (*Cyclone Amphan - Wikipedia*, n.d.). There are different reasons that influence people to take shatters rather than cyclone shelters. Distance of cyclone shelter, inadequate accommodation of cyclone shelters and poor road conditions are the three most important reasons for not evacuating at cyclone shelters (Parvin et al., 2019).

3.6 Covid-19 information
3.6.1 Maintenance of public health guideline
Almost all respondents were aware about the symptoms of Covid-19. But they do not take any kind of precaution. They do not follow the public health guideline like social distancing, wearing mask, washing hands using soap and sanitizer. There is a major lack of awareness among the respondents of the study area (Field survey, 2022).

3.6.2 Food crisis and work for livelihood during Covid-19
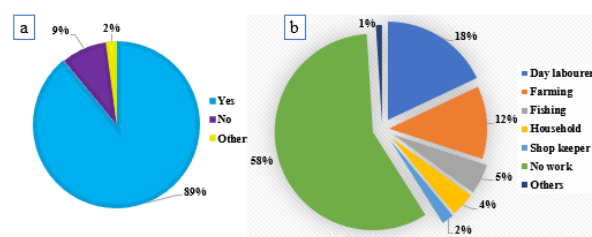
Fig. 12: Respondent's opinion a) about food crisis and b) work for livelihood during Covid-19 (Field survey, 2022).

According to respondents' opinion (Fig.12) almost 89% people had food crisis during lockdown because of Covid-19. 9% had small arrangements for food and other 2% did not give any clear opinion about it. Among the respondents 58% people do not have any work. They used to run the family by taking loans or selling ornaments or furniture (Field survey, 2021). In addition, 12% people used to work in agriculture on others land or their own land. 18% people start working as day laborer in different factories or private property. 5% start fishing, 4% start working in others houses, 2% became shop keeper after losing job and other 1% started to do different work for livelihood. COVID-19 and related government limitations had a major influence on rural livelihoods in Bangladesh, with (fear of) illness having a more severe impact than other COVID-19 impacts on livelihood outcomes. It had a greater total impact on families than other factors, such as travel limitations. COVID-19 has a considerable impact on agricultural productivity, and the effect is much more significant in families where there is a fear of illness. Changes in market exchanges are another effect of COVID-19. Households, in particular, significantly reduced the amount of

agriculture products sold at local markets (Gatto & Islam, 2021).

4. Conclusion

Bangladesh is one of the most vulnerable countries to climate change impacts also struck by the COVID-19 pandemic. Climate change is causing weather patterns to be disrupted, resulting in extreme weather events, unpredictably available water, worsening water scarcity, and contaminated water sources. Such consequences can have a significant influence on the quantity and quality of water that everyone require to survive. Respondents also opinioned about the salinity problem and Arsenic contamination problem of the shallow tube-well water in the study area. The study was revealed that due to using unhygienic toilets people are suffering from various waterborne diseases. The distance from house to drinking water is very far and time consuming. Especially the women and girls of the family do this work. The present study shows that higher percentage of the respondents can only signature 38% and illiterate 62%. Most of the people are day laborers, van drivers, fishmongers, and housewives as the education rate in this area is very low. Water and sanitation services are also significant producers of greenhouse gases; however, their overall contributions are difficult to quantify, necessitating further research. Nonetheless, via the selection of technology and sound management, decisions may be taken to reduce emissions. Given that initiatives to enhance climate resilience, more water, and sanitation are likely to promote development, programs should explore using climate financing in the future.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

All data generated or analyzed during this study are available for sharing when the appropriate request is directed to the corresponding author.

Authors' contribution

Md. Rajib Hossain: Conceptualization, supervision, methodology, data curation, formal analysis, editing; **Md. Shamsur Rahman:** writing review, and Data collection, validation, visualization, review, and editing; **Ayrin Akter:** Writing original draft, data collection, data analysis; **F. K. Sayema Tanzia:** Review and editing; **Md. Mirhazul Islam:** Investigation, software, data collection; **Rifat Islam:** Data collection, resources, map creation and review. All authors critically reviewed the manuscript and agreed to submit the final version of the article.

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