Cross-Sectional Analysis of Water Access and Health Conditions in Salinity and Cyclone Prone Areas: A Case Study of Nishanbaria Village in Southern Bangladesh

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ABSTRACT: The present study was conducted in Nishanbaria, a remote coastal village of Barguna district, Bangladesh where access to fresh water is the biggest problem due to salinity and cyclones along with poverty. The study applied several research methods (household survey, Key Informant Interviews, Focus Group Discussion, and observation) to conduct a cross-sectional analysis in order to identify the severity of the water problems and their impacts on people's health in this village. The study reveals that drinking and using saline and dirty water for a long time have direct impacts on health; 87.9% of the families had sick members during the field survey in 2022. The major health problems are skin diseases (according to 30.65 % of the respondents), gastric problems (25.39%), and waterborne diseases (19.35%). According to 90.3% of residents, the salinity of water has a direct impact on pregnancy and children's health and well-being. As the majority of the people collect drinking water from tube wells (80.43%), the number of people using tube wells goes down to only 24.4% after cyclones. Women are the main water collectors in this village; drinking water is collected by female members in 86.86% of the families, domestic water in 98.19%, and water for cleaning purposes in 93.56% of the families. Women are at risk of health problems; different types of pains (according to 49.36% of the residents), accidents (34.33%), and gender-based violence stem from carrying water from distant sources. Poverty (97.84% of the residents live below the poverty line) creates disparity among the residents in accessing proper treatments for all these health problems as well as collecting fresh water from distant sources. A comprehensive and context-based hazard and disaster management plan is required to help this disaster-prone village in improving freshwater availability, and their health and well-being.

Keywords: Salinity; Cyclone; Water Access; Health Problems; Poverty; Gender

INTRODUCTION

The southern region of Bangladesh frequently has been subjected to natural hazards and disasters such as cyclone, flood, riverbank erosion and salinity. Despite years of work in disaster preparedness and mitigation measures, the vulnerability of this region remains very high, and in some cases, is increasing due to newly added geographical areas on the disaster severity list, change in population density and socio-economic conditions, and most importantly, climate change. Water salinity is one of the natural hazards that affect new water sources every year, exacerbating coastal region's water crisis.

A large amount of land in the coastal region of Bangladesh is affected by salinity at varying degrees; about 105.6 million hectares of land were affected by salinity in 2009. The amount of salinity is increasing at an alarming rate; the rate has been at 26% during the last 35 years (SRDI, 2010 in Rabbani et al., 2018). Saline water intrusion has direct impacts on the environmental and hydrological conditions of the affected areas (Haque, 2006). As saline water intrusion occurs, water sources get polluted, and consequently, residents are compelled to abandon water sources that are already insufficient in number. Cyclones precipitate this crisis to the worst level by damaging tube wells, while polluting ponds and water bodies.

Cyclones are the most common natural disasters in the coastal regions of Bangladesh. This disaster has a long history in this country. Among the cyclones, Bhola Cyclone in 1970, Cyclone Gorky in 1991, Cyclone Sidr in 2007, Cyclone Aila in 2009, Cyclone Mahasen in 2013, Cyclone Roanu in 2016 (CDMP , 2014; Hossain et al., 2008; NIRAPAD, 2007; Tamima, 2009) are notable severe events that have occurred during the past 55 years. Death, injuries, economic loss, damaged infrastructures, and interrupted utility services are the direct impacts of cyclones; however, the lack of safe water during the post-disaster period is one of the problems that lead to another disaster – water-

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borne disease outbreaks. Ensuring safe water access becomes a great concern for the inhabitants and disaster responders, especially in salinity affected areas.

A recent study conducted by Rabbani and his team (2018) revealed that cyclones are the main cause of water source disruption in the coastal region. Lack of drinking water is a big problem for these areas and the problem intensifies after such events. According to 81% of the coastal respondents of this study, cyclones have disrupted their water sources through storm surges (mentioned by 74%) and saline water intrusion (mentioned by 23%). Saline water intrusion has severe impacts on the health and growth of local children. The intake of higher amounts of salt and the use of saltwater increases the risk of several health problems (Paul & Jabed, 2018). People try to collect safe water from faraway water sources which require walking long distances. This phenomenon increases women's and girls' vulnerability to health problems due to heavy loads (Hunter et al., 2010), dropout of schools, and insecurity to different types of GBV (Gender-based violence). However, collecting water from a safe source is not possible for all. It depends on several factors; especially on socio-economic conditions, gender, and disability (Sultana, 2010; Crow & Sultana, 2002). Often, poorer inhabitants struggle most with salinity and safe water access (Wongsirikajorn et al., 2023), especially after cyclones. Female-headed families and disabled people face more difficulties when collecting water due to their inabilities and gendered social expectations. Along with severe cyclone impacts, no savings to buy safe water during emergencies, and lack of help and support from the responding authorities increase discrimination and vulnerability among the coastal inhabitants to water-related health problems. However, complex interrelationships of social inequalities and multiple disasters have not yet received proper attention, which are emphasized in the present research.

Barguna is one of the coastal districts of Bangladesh which experiences frequent cyclone events and saline water intrusions. This district is identified as a severely affected region in regards to salinity concentration in groundwater (BADC, 2011). However, 86.6% of people in this district depend on tube wells for drinking water, and only 1.8% of the inhabitants receive supplied tap water. The economic condition of the inhabitants is also poor and most of them depend on crop production and fishing for their livelihood. About 2.1% of the population of this district has disabilities and the male-female ration is 100:103 (BBS 2013). The present research aims to know the present condition and problems of water access during the disaster and non-disaster periods in salinity affected Barguna district and to find out the gaps in initiatives to improve water accessibility. The specific objectives of the research are (1) to assess the prevailing water access conditions in the study area, (2) to evaluate the impact of salinity on water access during the disaster and non-disaster periods, (3) to assess the impact of salinity and cyclones on health conditions, and (4) to analyze the relationship between social inequalities (economic condition, age, and gender), water access, and health conditions during disaster and non-disaster periods.

METHODOLOGY

Nishanbaria village of the Naltona union of Barguna Sadar Upazila was selected as the study area. This village is highly vulnerable to cyclones because of its geographical location and poor socio-economic condition. The total household number of this village is 350. The local people do not have access to safe drinking water. There is no tap water supply facility in this village. Many tube wells are affected by salinity. However, 50.7% of the households depend on tube wells for drinking water. Other water resources (e.g., ponds, wells, rivers) are used by 49.3% population (BBS, 2013). These statistics depict the poor water access of this village during the non-disaster periods which intensifies after cyclones. As the research aims to conduct a cross-sectional analysis to examine the water crisis and to reveal the impacts of water inaccessibility on the health conditions of the inhabitants of Nishanbaria village, a multi-strategy (both quantitative and qualitative methods) was applied. A household survey, a quantitative method, was conducted among 185 households to collect data from the study area. The sample size was calculated following a statistical procedure (www.raosoft.com, accessed on 08/02/2022). Qualitative methods involved key informant interviews (KII), focus group discussion (FGD), and observation. Key Informant Interviews were conducted with four informants: a schoolteacher, a local businessman, a housewife, and a local government official, and one focus group discussion (FGD) was arranged with female inhabitants to collect comprehensive data on water access and problems related to water salinity and the cyclone. Observations during the field visits were very helpful in understanding the real picture of the water crisis and its impact on people's lives.

RESULTS

What It is Like to Live in a Saline Water Affected Village

Water Sources and Problems

Nishanbaria village faces water problems of several types: all the water sources (tube wells and ponds) are polluted with salinity; the number of water sources is insufficient, and these water sources often are affected by cyclones. In this village, only 40% of inhabitants have their own water resources, others are dependent on shared sources. Some of the tube wells became useless and abandoned due to high levels of salinity in the water. According to 22.37% of tube well owners, their tube wells had been abandoned for 1 to 5 years, while 36.84% inhabitants reported theirs to have been redundant for 6 – 10 years and 40.79% had not been able to use their tube wells for the last 11 – 15 years. This condition created water source scarcity in this village and forced the inhabitants to use water from the ponds and canals. The pond water usually is very thick and murky (Fig. 1). During the rainy season, the level of salinity of the pond waters decreases; however, the saltiness still can be tasted. Nishanbaria inhabitants also use river water which must be collected quite far away (4 – 5 km) from this village. They rarely can get fresh water from the pond sand filter as there is only one installed in the village.

Daily Water Collection and Water Use in Salinity

Due to the freshwater scarcity, people have to collect water from several sources for the different types of water uses: drinking, domestic use and cleaning purpose. Some details of water collection from the field survey in Nishanbaria village are given in Table 1. First of all, drinking water is mostly collected from the tube wells. According to 80.43 % of the respondents, they collect drinking water from the tube wells, 18.47% of them collect from the nearby ponds and only 1.09% collects rainwater. People mostly collect water for domestic uses and cleaning purposes from the ponds, according to 69.47% and 64.7% of the respondents, respectively. They also use canal and river water for these uses.

Figure 1: A Pond in Nishanbaria Village

However, the river and canals are far from the village. Thus, children are taken to the river for bath few times a week, and are often washed in the dirty pond water as mothers mentioned during the focus group discussion.

People have to walk a longer distance to collect drinking water; 32.77% of the respondents collect drinking water from 401-600 m, 3.4% collects from 601-800 m and 2.25 % walk more than 1000 m. However, people do not go to distant water sources to collect domestic water and water for cleaning purposes, as it needs to be collected more than 1-2 times a day. However, there is a sharp gender difference among the people who are involved in water collection. Most of the water is collected by the female members of the family. Drinking water is collected by the female members in the 86.86% of families, domestic water in 98.19% and water for the

cleaning purpose in the 93.56% of the families, whereas male members collect drinking water in the 13.14% of families and water for cleaning purposes is in the 6.43% of the family. This shows that the water crisis has gendered impact on women and girls, who spend long hours daily to collect water and experience long lasting effects on their lives, health and well-being.

Table 1: Comparative Table (Water Sources and Access in Salinity)

Salinity	Source (%)		Distance (m) (%)		Number of water collection (Times) (%)		Water Collectors (gender analysis)	
Drinking water	Tube well	80.43	1-200	48.59	1-2	87.2	Men	Women
			201-400	7.34				
	Pond	18.47	401-600	32.77	3-4	12	13.14 %	86.86%
			601-800	3.4				
	Rain water	1.09	801-1000	5.65	4+	0.6		
			1000+	2.25				
Domestic use	Pond	69.47	1-200	86.29	1-2	83.89	Men	Women
	Canal	16.32	201-400	3.43			1.81%	98.19%
	River	11.05	401-600	6.29	3-4	14.09		
	Tube well	3.15	601-800	1.71				
			801-1000	2.86	4+	2.01		
Cleaning Purpose	Pond	64.7	1-200	85.4	1-2	81.94	Men	Women
	Canal	18	201-400	3.8	3-4	16.67	6.43%	93.57%
	River	15.9	401-600	5.9				
	Tube well	1.6	601-800	1.6	4+	1.39		
			801-1000	2.7				

Water Access and Cyclone

Safe Water Problems in Cyclones

Cyclones make the water condition worse in Nishanbaria; destroying water sources and walkways which are used to collect water from safer sources, leading to an intensified water crisis. The present study reveals that residents collect drinking water from ponds (42.71% of the residents), tube wells (24.47%), river (11.46%), water filters (9.38%) and some of them (7.29%) drink bottled water after cyclones (Table 2). However, water for domestic use and cleaning is mostly collected from ponds (73.02 % and 65.8%) and rivers (23.28 % and 24.5%). Most of the residents collect water for different uses from the sources located within 600 m, however more than 24% collect drinking water from the sources located more than 800 m away. Mostly women are responsible for collecting water for all uses: drinking, domestic and cleaning purposes (68.82%, 84.75% and 86.39% of the families, respectively), whereas men from 31.18% of families participate in collecting drinking water after cyclones (Table 2).

Table 2: Comparative Table (Water Sources and Access in Cyclone)

Cyclone	Source (%)		Distance (m) (%)		Number of water collection (Times) (%)		Water Collectors (gender analysis)	
Drinking water	Pond	42.71	1-200	42.33	1-2	89.81%	Men	Women
	Tube well	24.47	201-400	9.82				
	River	11.46	401-600	22.70	3-4	9.55%	31.18 %	68.82%
	Filter	9.38	601-800	1.23				
	Bottle water	7.29	801-1000	11.04	4+	0.64%		
	Rain water	4.17	1000+	12.88				
	Canal	.52						
Domestic use	Pond	73.02	1-200	69.05	1-2	88.68	Men	Women
	River	23.28	201-400	11.31			15.25%	84.75%
	Tube well	1.59	401-600	19.64	3-4	11.32		
	Rain water	1.59						
	Canal	.52						
Cleaning Purpose	Pond	65.8	1-200	66.26	1-2	88.23	Men	Women
	River	24.5	201-400	11.65	3-4	11.76	13.61%	86.39%
	Canal	6.5	401-600	22.09				
	Tube well	1.6						
	Filter	1						
	Bottle water	.5						

How Water Crisis becomes Severe after Cyclone: A Comparative Analysis

It has already been mentioned that Nishanbaria village experiences safe water crisis all year round; however, it becomes severe after cyclones which can easily be seen from Table 1 and Table 2. Due to the damage caused by the cyclones, people have to switch from tube wells to ponds to collect safe drinking water. While 80.43% of respondents usually collect drinking water from tube wells during the normal time of the year, only 24.47% of them can collect water from tube wells after cyclone. The tube wells get drowned under the storm waters and the walkways to reach tube wells become inaccessible, which lead them to access other sources to collect drinking water after cyclones. Again, it is only 18.47% of the inhabitants who collect drinking water from the ponds during the normal time of the year, whereas it becomes 42.71% after cyclones. It is alarming for health because residents usually try to avoid drinking pond water because of its being muddy and dirty. However, pond water becomes more hazardous for health as different types of debris are left behind by cyclone storm water. It is very unsafe to use this water for any purpose. Again, rivers are also considered as a source of drinking water after a cyclone which is not on the list during the normal time of the year.

People have to cross a long distance to collect safe drinking water after cyclones. While comparing with the normal situation, it was found that 11.3% of the

residents collect drinking water from the sources which are located more that 600 m, whereas the percentage rises to 25.15% after cyclone. Even, about 12.88% of residents collect water from more than 1000 m away to make sure they are drinking safe water during the post disaster periods. Only some residents (less 17%) collect drinking water from the water filter and buy water bottles which means paying more for safe water.

Ponds, rivers, and canals become water sources for domestic and cleaning purposes among residents at higher rates of use which show dependency on polluted water after cyclones.

Cyclones have gendered impacts on water collection. Mostly women are responsible for collecting water during both disaster and non-disaster periods; however, during cyclones, participation of men in collecting water increases a little; the participation rate is 18.04% for drinking water, 13.44% for domestic water and 7.18% for cleaning water compared to usual. However, this participation is not enough as collecting water from distant sources creates health problems, and has social and GBV effects (Sultana 2010) on female members of society.

Impacts of Water Crisis and Salinity on People's Life

Lack of water is a serious problem in Nishanbaria village. It affects people's health, economic conditions, social life; it has gendered impacts on women. The following paragraphs present the problems mentioned by the inhabitants during the survey.

Safe Drinking Water Deficiency

Lack of drinking water is the first most problem of the water crisis. This dire condition affects the amount of drinking water intake among the inhabitants. According to the residents, 98% of them cannot drink enough water as they have to collect and carry the water from a long distance. Besides, they have to drink saline water in the most cases (according to 62.26% of the respondents) which create unwillingness to drink water along with several problems: feeling sick after drinking saline water (especially children, according to 27.92% of the respondents), and suffering from different diseases which was mentioned by 6.42% respondents.

Impacts of Saline Water on Domestic and Cleaning Works

Saline water decreases the taste of curry and spoils rice as 45.04% of respondents have mentioned in the survey. According to 52.48% of the respondents, utensils, furniture, and clothes become worn earlier due to saline water. However, according to 2.48% inhabitants they cannot wash vegetables properly and some time have to use dirty pond water which is less saline during the rainy season.

Lack of bathing water is experienced by 98% of the inhabitants. They cannot take bath everyday, which is essential in warm weather and they suffer from displeasing body odors and experience skin diseases. The same bathing problems are faced for the domestic animals. According to the 2% of the respondents, the domestic animals cannot be washed well due to freshwater crisis.

Saline Water, Health Problems and Healthcare Access in Cyclones

Health Problems in Nishanbaria Village

The present study has investigated the health problems of Nishanbaria inhabitants and identified some common problems among them (Table 3); those health problems, elaborately discussed later, were also identified in Chakraborty and his team's research, which was located in the coastal region of Bangladesh (Chakraborty et al., 2019). The most common health problem mentioned by the Nishanbaria residents (30.65%) is skin diseases. According to them, skin becomes dry and dark, and different types of skin diseases occur due to lack of water to keep them clean. It was mentioned earlier they cannot bathe regularly especially with clean water. Among the residents of Nishanbaria village, children suffer the most with these skin diseases.

Gastric is another health problem mentioned by the inhabitants (25.39%). As residents cannot drink a proper amount of water for a healthy life and they drink saline water, they experience 'gastric' as a health problem. Not only do the respondents suffer themselves, their family members (16.75%) also face these health issues. Waterborne diseases are the third most mentioned diseases among the respondents (19.35%). As mentioned earlier, people have to use pond water for domestic and cleaning purposes, which are dirty and unsafe. While visiting the Nishanbaria village, it was revealed that the pond water became dark

in color and different debris, like leaves, plants and dirt could be seen even from the bank. Besides, residents cannot wash the vegetables and utensils properly due to lack of water. These reasons work behind the higher number of waterborne diseases in Nishanbaria village. Beside these, constipation, headache, high pressure, eye diseases, respiration problems and kidney and urine infections are the health problems which have been mentioned by the respondents.

Table 3: Impacts of Salinity on Health (Respondents)

Impacts of salinity on health (respondents)	Number	Percentage
Skin diseases	198	30.65
Gastric	164	25.39
Water borne diseases	125	19.35
Constipation	47	7.28
Headache	44	6.81
Chest pain and high pressure	27	4.18
Eye diseases	19	2.94
Respiration	17	2.63
Urine infection and kidney	5	0.77
Total	646	100

Healthcare Access in Water Salinity and Cyclones

The present research reveals that the inhabitants of Nishanbaria village do not get proper treatment for the health problems they experience from drinking and using saline water. They mostly (55%) visit local quacks and pharmacies for any health problems and 25% visit Government Hospitals and 20% visit private chambers and hospitals. However, 9.3% do not take any treatment for any health problems. Again, they have to travel to the Barguna municipality or other districts to receive treatment. According to the survey more than 64% of the inhabitants have to travel and receive their treatment from Barguna municipality (39.19%), 34.46% of them travel to Barisal, Dhaka (10.13%) and other districts (Table 4).

Table 4: Treatment Centers and Places (Non-disaster Periods)

Treatment centers			Treatment place		
Centre	Number	Percentage	Place	Number	Percentage
Quack	25	31.25	Barguna Municipality	58	39.19
Government Hospital	20	25	Barisal	51	34.46
Pharmacy	19	23.75	Dhaka	15	10.13
Private hospital	11	13.75	Khulna	12	8.11
Private Chamber	5	6.25	Patuakhali	8	5.41
			Jashore	2	1.35
			Bagerhat	2	1.35
Total	80	100	Total	148	100

Healthcare accessibility becomes a challenge for the residents of Nishanbaria village during the post-cyclone periods. Damaged transport systems and local healthcare centres, lack of money and time prevent 27% of the patients from visiting healthcare centres. However, among those (83%) who visit facilities, 71.2% take treatments from pharmacy and quack. Only 4.5% visits Government Hospital whereas 22% depend on

private chambers and hospitals (Table 5). It is alarming that even during medical emergencies, 45.65% of the patients buy medicine from the pharmacy or visit quack. This picture of health problems due to environmental hazards and poor health care access demands analysis of underlying reasons and cross-cutting factors.

Table 5: Treatment Centers (Cyclone Periods)

Treatment place (General time)	Percentage	Number
Pharmacy and quack	71.2	178
Private chamber and hospital	22	55
Govt. hospital	4.5	11
Total	100	244

Cross-Sectional Analysis of Water Crisis: Poverty, Age, and Gender

The present study applied intersectional analysis considering factors such as socio-economic conditions, education, age, and gender among the residents of Nishanbaria village for an in-depth understanding of the water crisis and its strong impact on the people's lives. It has already been discussed that people are experiencing water crisis due to salinity and cyclones, the question arises in regard to why residents are not taking any measures to adapt the situation? From the discussions (KII and FGD) it was revealed that poor socio-economic conditions are one of the strong factors which affects the resident's vulnerability to water crisis.

Economic Condition

According to the household survey, 97.84% of the inhabitants in Nishanbaria village live below the poverty line (US$2.15 per person per day, World Bank 2023). Only 4 families among 185 families who participated in the survey are living above the poverty line while only 8.6% of the family's monthly income is more than 30,000 taka or 279 USD (Table 6). The major occupations of the residents include fishing, daily labour, farming, business, and service. Besides this, 96.8% of the residents live in *Katcha* houses and 83.3% do not have any sanitary toilets in their houses. These economic conditions show that inhabitants of Nishanbaria do not have extra money to spend on water collection from a distant source, and even that they are economically unable to buy water tanks for harvesting rainwater. Rainwater harvesting is only conducted by very few families who are economically solvent and aware of the procedure. According to one of the key informants, *"rainwater harvesting needs money as you have to buy tanks, keep it clean and ready to collect rainwater. Most of the villagers do not have enough money to buy water tanks. Again, some of them do not know how to maintain tanks. Once a few numbers of tanks had been distributed amongst some families, but they could not maintain them and they abandoned the notion of collecting rainwater in those tanks"(Male, Barguna).*

Table 6: Monthly Income

Monthly Income (Taka)	Number	%	Monthly Expenditure (Taka)	Number	%
1-5000	22	11.9	1-5000	18	9.7
5001-10000	104	56.2	5001-10000	104	56.2
10001-15000	27	14.6	10001-15000	34	18.4
15001-20000	10	5.4	15001-20000	15	8.1
20001-25000	4	2.2	20001-25000	10	5.4
25001-30000	2	1.1	25001-30000	3	1.6
30000+	16	8.6	30000+	1	.5
	185	100		185	100

The quotation above presents that education and awareness is also necessary to reduce the water problem. However, literacy level is also poor in this village; 86% of the respondents did not pass SSC and 12.3% of them are illiterate. These poor educational and economic conditions also reveal higher levels of health problems related to water crisis. People are unaware; while they sometimes ignore or have to ignore the fact that using dirty water increases risk to water borne diseases. Again, most of them do not know how to preserve rainwater

properly which was mentioned by the participants of the focus group discussion.

Here it should be highlighted that residents often have to spend a good amount of money on water related health problems and diseases. According to the survey, 57.14% of the respondents have to spend 1,001-5,000 Taka monthly for treatments, 9.74% spend 5001-10000 Taka, and 1.3% even spend more than 10,000 Taka monthly. Only 31.82% of the inhabitants spend less than 1000 Taka on the treatment of different diseases. These statistics reveal that the water crisis keeps the poverty cycle running in this village. While most of the villagers live below the poverty line, they have to spend money to collect fresh water and spend money for several health problems created by the water crisis. Wongsirikajorn and her team also revealed impacts of salinity on creating pathways to chronic poverty in Tanzania (Wongsirikajorn et al., 2023). Again, Nishanbaria residents cannot migrate to other areas where water crisis is lower or absent as 'poorest of the poor do not migrate' (Fransen & Kuschminder, 2009, p 1). Survey findings reveal that 89.19% of the respondents believe that no one left their village due to water crisis, rather they stay and try to cope with it. However, this is not easy for all members of society while age and gender work as a strong factor to differentiate among the members in regards of effects of water crisis on people's health and wellbeing.

Age and Gender

During the household survey, a question was asked, "who is at the risk of water crisis in regards of health and wellbeing? Make a list from 1st to 4th position". The answers revealed a significant pattern and represent age and gender as the strong factors of water crisis impacts.

According to 76% of the respondents, children are at the top of the first risk position. In regards of the second risk position, 49.1% believe that women are at the top, 43.7 % believe aged women at the top of the 3rd risk position and 48.4% believe aged man is at the top of the fourth position in regards of health risk related to water crisis (Table 7a and 7b). Here, it is clearly presented that young age has increased children's risk and older age for men during water crisis, whereas 'gender' works as a strong factor for women of all ages (Sultana, 2010).

Table 7(a): Perception on Person at Risk to Water Crisis

Person at risk (1st position)	%	Number	Person at risk (2nd position)	%	Number
Children	76	140	Woman	49.1	90
Aged woman	21.8	40	Aged man	26	48
Women	1.6	3	Children	13.0	24
Total	100	183	Aged Woman	10.3	19
			Man	1.1	2
			Total	100.0	183

Table 7(b): Perception on Person at Risk to Water Crisis

Person at risk (3rd position)	%	Number	Person at risk (4th position)	%	Number
Aged woman	43.7	80	Aged man	48.4	88
Aged man	26	48	Woman	35.2	64
Woman	14.1	26	Man	9.9	18
Children	9.7	18	Aged woman	5.4	10
Man	5.9	11	Children	0.5	1
Total	100.0	185	Total	100.0	181

Collecting Water and Health Impacts: Women and GVB

Water collection from distant sources is always a problem for a family. This chore has physical and mental health, economic and social impacts as well as gendered perspectives. According to the present study, women are responsible to collect water of different uses for her family and they are the ones who face these problems to more severe degrees compared to men. Physical suffering is the main problem faced by the water collector of the family; about 49.36% of the inhabitants mentioned that water collectors feel very tired and face several health problems (Table 8) due to carrying water from a distant source. About 34.33% of them feel vulnerable to any accident like sudden falls and being wounded. Social problems like water source owner's (tube well and ponds) misbehavior while collecting water is also mentioned by 8.58% of the respondents.

Table 8: Health Impacts of Collecting Water

Health impacts of collecting water	Percentage (%)
Wrist pain	41.83 (146)
Leg pain	21.48 (75)
Knee pain	16.33 (57)
Hand pain	6.59 (23)
Whole body pain	4.01 (14)
Shoulder pain	3.15 (11)
Back pain	2.87 (10)
Paraplegia of leg/ hand	2.29 (8)
Other pain	1.20 (3)
Neck pain	0.28 (1)
Sometimes become sick	0.28 (1)
Total	100 (349)

Women have to spend long hours to collect water, postponing household work, and hence, maintaining cleanliness of the households becomes difficult for them. However, water salinity and lack of fresh water have different types of health impacts on women at the reproductive age, which are discussed in the following paragraphs.

Water Salinity and Gendered Health Impacts

Water collection has a direct impact on the health of girl and women of Nishanbaria village which have been mentioned in the previous point. However, drinking saline water increases women's risk of other health problems like high blood pressure. Nahian and his team conducted a research in the coastal region Bangladesh and also revealed that women have higher chance of being hypersensitive to high blood pressure due to drinking saline water compared to men (Nahian et al., 2018). Besides, lack of bath water during menstruation creates reproductive health problems. More than 90% of the respondents mentioned in the survey that the water crisis has direct impacts on pregnancy and pregnant women's health. According to 37.32% of the respondent, pregnant women cannot drink the amount of water they need due to the lack of water availability, according to 33.87 % women experience bathing problems and 28.81% of them believe women face proper sanitation problems due to lack of fresh water. All these problems have relations to the health problems of pregnant women as child death and miscarriage is apparent among them (Hossain, 2020; Joseph et al., 2019). About 22.7% of the respondents highlight that salinity in water increases child mortality, have an impact on children's developments (according to 78.4% respondents) and some of them believe that miscarriage is triggered by the water crisis. Khan and his team also revealed negative relationship of water salinity and health condition of pregnant women in their study in Bangladesh (Khan et al. 2014).

Water Crisis, Collecting Water and Gender-Based Harassment

There is a risk of sexual harassment on the way to collect water, which is mentioned by 51.66% of the respondents while discussing the problems related to water collection. However, 7.28% of the respondents mentioned that it is not only a risk, but it also happens against the women and girls while collecting water. While women and girls are responsible when it comes to collecting water from distant water sources several times a day to fulfill the needs of the family, their vulnerability increases to several gender-based harassments. Tallman and his team also presented similar situations in sub-Saharan Africa and South Asia in their paper (Tallman et al., 2023). However, 41.06% of the respondents believe that women do not face gender-based harassment while collecting water from a distant source.

CONCLUSION

Nishanbaria is a beautiful village with lots of trees and plants. However, the inhabitants are not in good health. The unavailability of fresh water is so high in this village that it can be easily seen in local people's appearance, especially the children look grubby, and their skins are mostly dry and dehydrated. Salinity and cyclone are the main causes of the water crisis in this village, whereas poor economic conditions have intensified the situations. Age and gender work on creating disparity among resident; increasing women's vulnerability to freshwater crisis. Women are always worst affected in disasters irrespective to geographical location and economic condition; whereas water salinity and cyclone are not different. The present study emphasizes considering salinity as a unique environmental hazard which needs a comprehensive and contextual hazard and disaster management plan to combat cyclone impacts and improve water access in Nishanbaria village.

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