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Freshwater Scarcity and Health Impacts in the Remote Areas of Rangamati District

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Abstract

Water scarcity presents a significant challenge for the communities residing in the Rangamati District of Chittagong Hill Tracts (CHT). This study aims to explore the consequences of contamination-induced water scarcity on human health in the remote areas of Rangamati. Primary data were acquired through four purposively conducted Focus group discussions and twenty-five in-depth interviews. Additionally, questionnaire surveys were administered to two hundred and two randomly selected households. The findings of this research indicate a severe lack of potable water in the study area. Consumption of contaminated water or inadequate water intake has led to various health issues such as migraines, gynecological problems, skin ailments, high blood pressure, diarrhoea, cholera, and hepatitis, among others. The challenging topography and deficient communication infrastructure impede residents from accessing safe water, resulting in a range of health problems. During dry periods, there is a rise in the levels of contaminants and pathogens in surface water. Statistical analysis illustrates the correlation between water scarcity and health challenges across different age groups and genders. The study underscores the susceptibility of the population to health issues resulting from water scarcity and underscores the urgency of ensuring water source reliability.

Keywords: *Freshwater Scarcity, Health Impact, Coping Strategies, Chittagong Hill Tracts (CHT).*

Introduction

Over the past several decades, it has been clear that freshwater shortage is becoming a danger to human society's ability to grow sustainably due to a continually rising demand (Mekonnen & Hoekstra, 2016a). The freshwater resources become inadequately renewable due to the exponential growth of the human population, extensive urbanization, rapid industrialization, and intensive agriculture practices (Barua et al., 2016). The crisis of fresh water supply is persistent across the world and is on the rise with the increasing rate of population (Dolatyar & Gray, 2000). About two-thirds of the global population lives under conditions of extreme safe drinking water scarcity for at least one month of the year (Mekonnen & Hoekstra, 2016b).

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Water plays a crucial role in improving human well-being (Crow & Sultana, 2002). Drinking water quality is a vital concern for mankind since it is directly linked to public health (Jha et al., 2020). The increasing stress on freshwater resources brought about by ever-rising demand and profligate use, as well as by growing pollution worldwide, is of serious concern. Concerning human health, the most direct and severe impact is the lack of improved sanitation, and related to it is the lack of safe drinking water, which currently affects more than a third of the people in the world (Schwarzenbach et al., 2010).

Freshwater bodies have a limited capacity to process the pollutant charges of the effluents from expanding urban, industrial, and agricultural uses. Water quality degradation can be a major cause of water scarcity (Petit, 2016). Drinking water quality has always been a major issue in many countries, especially in developing countries like Bangladesh. Although 97% of the total population in Bangladesh has access to water, the quality of water is always questionable (Pusch et al., 2005). The water quality is affected by water contaminants which ultimately affect human health. Physiochemical and microbiological parameters are important determinants for assessing industrial, irrigation, and domestic water quality. Among the physicochemical properties of drinking water, the common parameters used to present drinking water quality are pH, TDS, turbidity, hardness, nitrate, EC, chloride, phosphate, etc. The drinking water quality is compromised if its values exceed concentrations above the standard limits set by the World Health Organization (WHO, 2021).

Water-borne diseases are responsible for emerging and recurring infectious diseases worldwide, whereas about 80% of public health problems have been caused by contaminated water (Barua et al., 2016). Contaminated water can transmit diseases such as diarrhea, cholera, dysentery, typhoid, and hepatitis. Contaminated drinking water is estimated to cause 485000 diarrhoeal deaths each year. Globally, 785 million people lack even a basic drinking water service, including 144 million people who are dependent on surface water (Pérez et al., 2017). In South Asia home to nearly 1.6 billion people, cities are increasingly feeling the pressure of water shortages (Prasai & Surie, 2015). The impact of water on health derives principally from the consumption of water, containing pathogenic organisms or toxic chemicals. In developing countries, consumption of contaminated water is responsible for 80% of all diseases and hence, causes one-third of deaths (Samuel et al., 2016).

In Bangladesh, especially in the marginal locations, safe sources of drinking water supply are limited and the population depends on tube wells, ponds, lakes, etc. Tube-well exploited the underground water and was labelled as a safer source of drinking water until large-scale geogenic arsenic contamination was reported. On the other hand, the biggest obstacle to consuming surface water for potable purposes is its possibility of exposure to pathogenic bacteria (Amjad et al., 2013). Recent studies suggest that persistent levels of diarrheal disease are caused in part by drinking untreated groundwater (Escamilla et al., 2013). Moreover, the geogenic contamination of groundwater with high levels of arsenic in Bangladesh has caused widespread human exposure to this toxic element (Reddy et al., 2020), which makes the search for alternative sources of safe water for the people of Bangladesh a sheer necessity, according to a study conducted by (Luby et al., 2018).

The scarcity of fresh drinking water is an old-age problem in the Chittagong Hill Tracts. According to the statistics of the Public Health Engineering Department (DPHE), currently only, 39% of inhabitants in Khagrachari, 49% in Bandarban, and 65% in Rangamati districts are under supply coverage of safe drinking water that is 98% in other parts of the country (Lee et al., 2017). About 16 lakh inhabitants live in the Chittagong Hill Tracts area and almost 50% of them are deprived of water facilities (Chakraborty et al., 2020). Many of the villages of the Rangamati and Khagrachhari districts of Chittagong Hill Tracts are facing an acute crisis of water as most of the springs and streams in these villages are running dry. The situation is so bad that even after digging up to 150 feet, no groundwater could be found in some of the springs. They used to depend on natural sources of water like springs and streams for drinking water and their daily activities, including washing and bathing, but many of these have dried up in the last 5 years (The Daily Star, 2018). It has been observed that the ethnic people have to endure a day with only 5 litres of water on average, in contrast to a minimum per capita requirement of at least 50 litres for bathing, cooking, drinking, and washing. During the rainy season, people collect water from the small hole. This is locally known as '*pat-kuai*, indigenous people think that the well's water is clean and safe as well (Khan et al., 2015). This study aims to investigate the impact of water scarcity on human health in Rangamati's remote areas. The specific objectives were to explore major health issues and diseases related to water scarcity and to assess various coping strategies applied by the tribal people for adapting to health problems and related diseases with water scarcity.

Material and Methods

Description of the Study Area

This study was conducted in remote parts of the Rangamati district of Bangladesh. The Rangamati District spans 6116.11 square kilometres and is situated between latitudes 22°27' and 23°44' north and longitudes 91°56' and 92°33' east. It is bordered to the north by the Indian state of Tripura, to the south by the district of Bandarban, to the east by the states of Mizoram and Chinpradesh in Myanmar, and to the west by the districts of Khagrachhari and Chittagong (Banglapedia, 2023).

The main river of this district is Karnaphuli. The river originates from the Lusai Hills of India and enters the region through the mouth of the Thega River through the north-eastern border of Rangamati. The tributaries of Karnaphuli are - Kachalong, Chengi, Thega, Barahrina, Salak, Rainkhyong and Kaptai. These tributaries have enough flow during the monsoons, but the amount of water is not nearly there during the dry season. The climate of Rangamati belongs to the tropical monsoon climate. It is hot and humid. Here mainly three of the six seasons are strongly observed. The monsoon season usually lasts from May to October. During this time 90% of rain falls. Winter lasts from November to February. This season is very dry and cool, sometimes with little rain. March and April are considered as summer or pre-monsoon season. At this time the air is very hot and the water vapor in the air is very low. Sometimes there is 'Kal Baisakhi' or Norwester. Low temperatures are observed here in December and January with an average of around 20.9 degrees Celsius. The maximum temperature in April is 36.5 degrees Celsius and the maximum temperature in January is 10.2 degrees Celsius (GoB, 2024). Primary data for this study were collected from Chelachara union of Kawkhali upazilla, and Kutukchari and Sapchari union of Rangamati Sadar Upazila in Rangamati district (Figure 1).

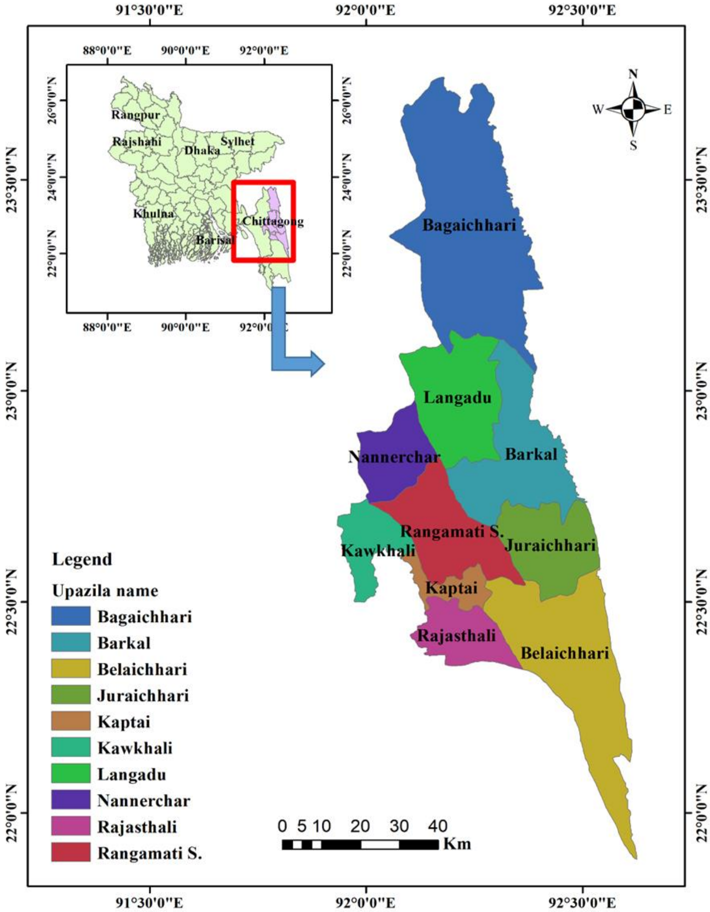

Figure 1: Location map of the study area (Source: Modified from Google Maps)

Data collection and analysis

In the present study, primary data were collected through a questionnaire survey, Focus group discussions (FGDs) and In-depth interviews. The 4 FGDs and 25 in-depth interviews were conducted following the purposive sampling method in the local Chakma language and later translated into English for analysis. In addition, 202 questionnaire surveys were conducted on the randomly selected households in three study locations of Rangamati. A pilot survey was conducted to understand the feasibility of the prepared data collection tools and to realize the accessibility in the chosen study sites.

To analyse qualitative data (such as FGD, and in-depth interviews) grounded theory has been applied. Contrarily, to analyse quantitative data Statistical Packages for the Social Sciences (SPSS) IBM version 25.0 and Excel 2016 have been used. Several methods including descriptive statistics, Pearson's correlation and Rank analysis were applied to correlate the association of the data.

Study Limitation

This study was conducted only in three localities of Rangamati where water scarcity is prevalent. We could not collect data extensively from all water-scarce localities of Rangamati due to the constraints of time and resources.

Results and Discussion

Drinking Water Sources and Travelled Distance

Due to the topographic conditions of the study area, the majority of water bodies are found at the foot of the hill whereas most of the population lives at the top of the hill. 92% of the water sources, according to the survey, are located away from human habitation at the base of the hills. Just above 96% of the respondents utilize well water as their main source of drinking water while more than half of people uttered that they also get drinking water from springs. A study by Chakma (2023) also found that the people who live in this area frequently rely on the lakes and springs that are close by for their clean drinking water. Seasonal variation is a factor in water variability since surface water is the main supply of water in the study area. Residents of the study area obtain water from a variety of sources, regardless of how safe the water is (Table 1). One of the most essential aspects in the collecting of water in the research area is distance. Water usage can be influenced by the distance between water sources and consumption places. About 66% of the respondents in the study have to collect water from a distance of less than 1km. 31% of respondents responded that they must obtain water across a distance of 1-2 kilometres. Approximately 3.5 % of respondents fetch water from a distance of 2-3 kilometres. In the study area, Water use is frequently influenced by the source's accessibility and distance. Chakma et al. (2020) found in their study that tribal population must trek for several hours to get water from springs that are between one and two and a half kilometres from the community, using ten to fifteen-litre pails made of earth or plastic.

Table 1: Drinking water sources and travelled distance.

***Drinking water sources (%)**	
Spring	57.42
Wells	96.03
Ring wells	10.89
Reservoir	11.88
Chara	28.71
Rainwater	59.40
Seepage Water	6.43

Ghoda (dam over streams)	1
Lake	28.21
Distance from the source of water Source (%)	
Less than 1km	66
1-2 km	31
2-3 km	3

(Source: Field survey, 2021) (*Multiple responses are considered)

Seasonal Variation of Freshwater Deficiency

Respondents have provided diverse thoughts on the season calendar of water crisis in their areas. Almost 80% of people stated that they usually confront a moderate water crisis during January when winter signifies the country. Likewise, a significant number of responses were recorded about a similar crisis in February till when the winter persists. A study by Chakma (2023) also mentioned that the situation of the freshwater crisis gets worse during the dry season. Another research by Hossen and his colleagues (2016) reported that people in Rangamati confront severe water crisis during winter and hot summer seasons. Some people in this study opined that there are high freshwater scarcities in March when summer starts. Though a bit exceptional, just above half of the people talked about a moderate water crisis in August. On the other hand, participants talked about the abundance of freshwater or very low crisis in May (Table 2).

Table 2: Water shortages based on monthly calendar.

Month	Water crisis Status (%)				
	High	Moderate	Low	Very low	Extremely low
January	3.46	80.1	16.33	-	-
February	1.98	70.2	15.34	11.88	0.50
March	39.60	9.9	11.38	16.83	22.27
April	40.0	1.98	6.43	7.92	43.56
May	39.6	1.0	4.45	7.42	47.52
June	30.1	10.39	18.11	7.92	32.67
July	2.97	25.74	52.97	10.39	7.42
August	31.68	50.99	15.84	1.48	-
September	45.04	19.31	30.1	6.43	-
October	0.50	58.41	3.46	17.82	19.80
November	0.50	57.42	2.97	1.48	37.62
December	1.0	56.43	2.97	1.98	37.62

(Source: Field survey, 2021) (Multiple responses are considered)

Health Consequences of Inadequate Drinking Water

In the CHT, the majority of families, regardless of district, utilize contaminated drinking water (Barkat et al., 2008). During periods of water scarcity in the dry season, there is an increase in the concentration of pollutants and germs in surface water. This leads to a range of health issues among the surface water-dependent population in the study area. The provided table presents an analysis of the prevalence and significance of various health issues associated with water scarcity. A study by Karim and Rafi (2002) found that in general, the water used for drinking in CHT is unhealthy. They found the presence of contaminants beyond the permissible limit in water samples of CHT. Another study conducted in CHT demonstrates that in comparison with other water sources, ring wells are extremely polluted. Unwanted contamination in these drinking water sources is caused by poor sanitation, poor hygiene, a lack of health awareness and education, and the unavailability of water treatment (Chowdhury et al., 2024). Among the identified health issues from the current study, indigestion had the highest prevalence rate of 14.94%. Hypertension ranked third with a prevalence rate of 11.90% and a weight of 0.119, indicating its significant association with water scarcity. This finding suggests that stress-related factors resulting from limited water resources contribute to the development of hypertension among the population. Other health issues such as dysentery, diarrhoea, headache, vomiting, and nausea also exhibited notable prevalence rates, ranging from 10.11% to 7.19%. The findings from the table emphasize the urgent need for interventions to improve water quality, sanitation practices, and access to clean water sources (Table 3).

Table 3: Perceived health issues from water contamination.

Health Issues (%)	Percentage (%)	WAI*	Rank
Indigestion	14.93	0.149352	1
Skin diseases	12.04	0.120419	2
Hypertension	11.90	0.119041	3
Dysentery	11.21	0.112152	4
Diarrhoea	10.11	0.10113	5
Headache	7.19	0.071921	6
Vomiting	6.31	0.063103	7
Nauseous	5.75	0.057592	8
Fever	5.51	0.055112	9
Irritation	4.71	0.04712	10
Jaundice	4.10	0.041058	11
Food Poisoning	3.47	0.03472	12
Gynaecological Problems	1.37	0.013778	13
Cholera	1.35	0.013502	14

*WAI (Weight Average Index) (Source: Field Work, 2021)

The relationship between water scarcity and male indigestion has a P-value of .000 < 0.5. As a result, the null hypothesis of a link between water scarcity and male indigestion is rejected. There is a link between male indigestion and health issues caused by water scarcity. The correlation between water scarcity and male skin illnesses has a P-value of .002. So, there is a link between health issues caused by water scarcity and male skin illnesses. People are more susceptible to skin problems in the research location if they drink and use dirty water. The relationship between water scarcity and male hypertension has a P-value of .000 < 0.05. As a result, the null hypothesis is ruled out. There is a clear link between male hypertension and health problems caused by water scarcity. The P-values for male diarrhoea, male vomiting, male nausea, and male dysentery are .000, .000, and .000, respectively. As a result, Water scarcity is linked to male diarrhoea, male vomiting, male nauseousness, and male dysentery. The connection between water scarcity and male headaches had a P-value of .002 < 0.05. The P-value for the link between water scarcity and male food insecurity is .000 < 0.05. As a result, the null hypothesis is found to be false. There is a relationship between male headaches and water scarcity-related health problems and a clear link between health issues such as water scarcity and male food insecurity (Table 4).

Table 4: The link between male indigestion, skin diseases, hypertension, diarrhoea, vomiting, nausea, dysentery, headache, food poisoning, and health problems caused by water scarcity.

		Variables		**X^2**	**P-value**
		Male indigestion			
		Yes	No	45.183[a]	.000
Water scarcity	Yes	160 (93.6%)	21 (67.7%)		
	No	10 (5.8%)	1 (3.2%)		
		Male Skin diseases		12.674[a]	.002
Water scarcity		Yes	No		
	Yes	42 984.0%)	139 (91.4%)		
	No	1 (2.0%)	10 (6.6%)		
		Male Hypertension		18.453[a]	.000
Water scarcity		Yes	No		
	Yes	114 (97.4%)	67 (78.8%)		
	No	2 (1.7%)	9 (10.6%)		
		Male Diarrhea		52.994[a]	.000
Water scarcity		Yes	No		
	Yes	153 (98.1%)	28 (60.9%)		
	No	2 (1.3%)	9 (19.6%)		
		Male Vomiting		27.238[a]	.000
Water scarcity		Yes	No		
	Yes	123 (98.4%)	58 (75.3%)		
	No	1 (0.8%)	10 (13.0%)		
		Male Nauseous		15.578[a]	.000
Water scarcity		Yes	No		
	Yes	90 (98.9%)	91 (82.0%)		

	No	0 (0.0%)	11 (9.9%)		
		Male Dysentery		30.546[a]	.000
Water scarcity		Yes	No		
	Yes	148 (95.5%)	33 (70.2%)		
	No	6 (3.9%)	5 (10.6%)		
		Male Headache		12.232[a]	.002
Water scarcity		Yes	No		
	Yes	114 (95.8%)	67 (80.7%)		
	No	2 (1.7%)	9 (10.8%)		
		Male Food Poisoning		18.207[a]	.000
Water scarcity		Yes	No		
	Yes	35 (79.5%)	146 (92.4%)		
	No	8 (18.2%)	3 (1.9%)		

(Source: Field survey, 2021)

The P-value for the association between water scarcity and female indigestion is .000 < 0.05. The P-value for female diarrhea, dysentery and female vomiting is also .000 < .05. Thus, the null hypothesis is proven false in these cases. As a result, it can be said that female indigestion, diarrhea, dysentery and vomiting are linked to water scarcity. The P-value for the link between female hypertension and water scarcity is 0.009 < .05. As a result, the null hypothesis of a link between water scarcity and female hypertension is rejected. There is a link between female hypertension and health problems caused by water scarcity. Water shortage and female hepatitis had a P-value of .038 < .05. As a result, we rule out the null hypothesis that female hepatitis is caused by water scarcity. In the case of the P-value between health problems from water scarcity and female nauseous .007 < .05. So, there is an association between health problems from water scarcity and female nauseous. The significant level of the link between water scarcity-related health concerns and female gynecological issues is 0.039 < 0.05. Therefore, the null hypothesis is ruled out. As a result, there is a link between health issues caused by water scarcity and female gynecological issues. The P-value between health problems from the water crisis and female headaches is .002. Therefore, the null hypothesis is rejected between health problems from the water crisis and female headaches. There is an association between health problems from the water crisis and female headaches (Table 5).

Table 5: The association between water scarcity and indigestion and hypertension, diarrhoea, vomiting, cholera, hepatitis, nausea, dysentery, gynecological problems, headache, and food poisoning of females, X^2, and P-Value.

		Variables		X^2	P-value
		Female indigestion			
		Yes	No		
Water Scarcity	Yes	153 (93.3%)	28 (73.7%)	25.840[a]	.000

	No	9 (5.5)	2 (5.3%)		
		Female Hypertension			
		Yes	No		
Water Scarcity	Yes	106 (94.6%)	75 (83.3%)	9.517[a]	.009
	No	5 (4.5%)	6 (6.7%)		
		Female Diarrhea			
		Yes	No		
Water Scarcity	Yes	153 (97.5%)	28 (62.2%)	47.503[a]	.000
	No	3(1.9%)	8 (17.8%)		
		Female Vomiting			
		Yes	No		
Water Scarcity	Yes	127 (97.7%)	54 (75.0%)	25.767[a]	.000
	No	2 (1.5%)	9 (12.5%)		
		Female **Hepatitis**			
		Yes	No		
Water Scarcity	Yes	68 (97.1%)	113 (85.6%)	6.538[a]	.038
	No	1 (1.4%)	10 (7.6%)		
		Female Nauseous			
		Yes	No		
Water Scarcity	Yes	91 (96.8%)	90 (83.3%)	9.938[a]	.007
	No	2 (2.1%)	9 (8.3%)		
		Female Dysentery			
		Yes	No		
Water Scarcity	Yes	146 (96.1%)	32 (68.1%)	34.136[a]	.000
	No	5 (3.2%)	6 (12.8%)		
		Female Gynecological Problems			
		Yes	No		
Water Scarcity	Yes	43 (86.0%)	138 (90.8%)	6.507[a]	.039
	No	6 (12.0%)	5 (3.3%)		
		Female Headache			

		Yes	No		
Water Scarcity	Yes	114 (95.8%)	67 (80.7%)	12.232[a]	.002
	No	2 (1.7%)	9 (10.8%)		
		Female Food Poisoning			
		Yes	No		
Water Scarcity	Yes	35 (81.4%)	146 (91.8%)	12.945[a]	.002
	No	7 (16.3%)	4 (2.5%)		

(Source: Field survey, 2021)

Children are usually the most vulnerable to infections due to their limited immunity. The correlation between water scarcity and children's skin illnesses has a P-value of .001< 0.05. The P-value for the link between water scarcity and dysentery in children is .014 <0.05. The P-value for diarrhoea, children's vomiting, and food poisoning in children are .000 <0.05. Thus, the null hypothesis is rejected. There is a link between water scarcity and these health issues in youngsters. Diarrhoea is the most common waterborne disease in the study region, with children being the primary sufferers of diarrhoea (Table 6).

Table 6: Frequency and percentage of the health problems from water scarcity and children's health problems.

		Variables		**X^2**	**P-value**
		Children Skin diseases			
		Yes	No		
Water scarcity	Yes	43 (86.0%)	138 (90.8%)	14.707[a]	.001
	No	0 (0.0%)	11 (7.2%)		
		Children Diarrhea			
		Yes	No		
Water scarcity	Yes	121 (97.6%)	60 (76.9%)	22.082[a]	.000
	No	2 (1.6%)	9 (11.5%)		
		Children Vomiting			
		Yes	No		
Water scarcity	Yes	109 (97.3%)	72 (80.0%)	16.325[a]	.000
	No	1 (0.9%)	10 (11.1%)		
		Children Dysentery			
		Yes	No		

Water scarcity	Yes	93 (95.9%)	88 (83.8%)	8.507[a]	.014
	No	3 (3.1%)	8 (7.6%)		
		Children Food Poisoning			
		Yes	No		
Water scarcity	Yes	30 (76.9%)	151 (92.6%)	21.572[a]	.000
	No	8 (20.5%)	3 (1.8%)		

(Source: Field survey, 2021)

Coping Strategies with the Water Crisis

Storing rainwater had the highest percentage (14.787%) and ranked first (weight: 0.148), indicating its significant role in water scarcity adaptation. Reducing household water use and personal hygiene shared the same percentage (14.634%) and ranked second (weight: 0.146), emphasizing their importance in conserving water resources. Reducing daily bathing (14.329%) and daily washing (14.177%) ranked fourth and fifth, respectively, contributing to water conservation efforts (weights: 0.143 and 0.142). Reducing drinking water (13.796%) and water use in cooking (13.643%) were less common but still relevant strategies (weights: 0.138 and 0.136). Hossen et al. (2016) has mentioned about rainwater harvesting, the construction of dam and the installation of deep tube well as copies strategies for the water crisis in Rangamati. The findings of current study demonstrate how individuals employ diverse coping mechanisms to address water scarcity (Table 7).

Table 7: Coping strategies followed by the respondents.

Variables	Percentage	WAI	Rank
Storing Rain Water	14.787	0.148	1
Reducing Household Water	14.634	0.146	2
Reducing Personal Hygiene	14.634	0.146	2
Reducing Daily Bathing	14.329	0.143	4
Reducing Daily Washing	14.177	0.142	5
Reducing Drinking Water	13.796	0.138	6
Reducing In Cooking	13.643	0.136	7

(Source: Field survey, 2021)

The respondents in the study area reported seeking professional advice for curing health problems based on disease patterns. The Table presents the distribution of responses, including percentages, Weight Average Index (WAI), and ranks. Among the respondents, the highest percentage (21.830%) sought assistance from doctors, ranking first with a WAI of 0.2183. Local healers were also frequently consulted, with a percentage of 20.287% and a rank of the second (WAI: 0.2029). The respondents relied on local medicine shop owners (19.184%) as a source of treatment, ranking third with a WAI of 0.1918. Experiences from aged people (18.633%) were highly valued, ranking fourth and contributing to the understanding and management of health problems (WAI: 0.1863). The use of ethnomedicinal plants (14.002%) ranked fifth, indicating the significance of traditional remedies (WAI: 0.1400). Lastly, *Kobiraj* (traditional medicine practitioners) had the lowest percentage (6.064%) and ranked sixth (WAI: 0.0606). These findings highlight the diverse sources of medical consultation and the significance of traditional healing practices in the study area. The reliance on both modern and traditional approaches to healthcare underscores the need for a comprehensive understanding of local health-seeking behaviors and the integration of different healing systems (Table 8).

Table 8: Managing health problems with a number of factors.

Variables	Percentage	WAI	Rank
Manage Health Problems with Doctor	21.830	0.2183	1
Local Healer	20.287	0.2029	2
Local Medicine Shop Owners	19.184	0.1918	3
Experience From Aged People	18.633	0.1863	4
Ethno Medicinal Plants	14.002	0.1400	5
Kobiraj	6.064	0.0606	6

(Source: Field survey, 2021)

Conclusion

Since water is necessary for life, everyone should have access to plenty of it that is suitable, safe, and easily available. There is a significant water deficit in the Rangamati areas of the Chittagong Hill Tracts at present. During the monsoon, surface water sources such as streams, springs, and rivers are fairly easy to access, but during the dry season, the majority of these sources dry up, causing a severe water deficit in the study area. The majority of people in the study region suffer from several diseases and health conditions and these have a possible connection with contamination induced water scarcity. Due to the unavailability of freshwater in the studied localities of Rangamati, people tend to drink and use contaminated water which results in health problems like indigestion, hypertension, diarrhoea, dysentery, skin ailment, food poisinoning etc. People from both gender and all ages usually experience these problems. While suffering the health problem people of the study localities often visit local doctors though many other tend to rely on ethno-medicinal plants, *Kobiraj* or just buy medicine from nearby pharmacy stating their health problems. On the other hand, to survive in the such freshwater scarce situation, people have adapted different strategies including rainwater harvesting and limited use of water for daily needs. The results thus support the notion that the residents of the study area are adversely susceptible to health issues due to water inaccessibility. Extensive epidemiological research can be done in future to establish the link between water contamination and health crises in the CHT. Governments and non-governmental organizations (NGOs) should work together to ensure that this hilly region has access to safe and sufficient drinking water.

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