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Article

Analyzing Coastal Community Situation of Water, Sanitation and Hygiene in Bangladesh

Sufia Khanam [1], Md. Abubakkor Siddik [2], Mohammad Abu Zahid [3]

[1] PhD in Natural Resource Management, West Bengal University of Technology, India. Environment and Population Research Center (EPRC), Dhaka, Bangladesh. ORCID: 0000-0001-9789-7800. E-mail: sufiak2003@yahoo.com

[2] PhD Student, Dr. Wazed International Research and Training Institute, Begum Rokeya University, Bangladesh. Dept. of Emergency Management, Patuakhali Science and Technology University, Patuakhali-8602, Bangladesh. ORCID: 0000-0001-6147-3571. Email: masiddik@pstu.ac.bd

[3] B.Sc. in Civil Engineering, Ahsanullah University of Science and Technology, Bangladesh. Environment and Population Research Center (EPRC), Dhaka, Bangladesh. ORCID: 0009-0000-3965-689X. E-mail: zahid_shipon@yahoo.com

ABSTRACT

There has been great success in expanding access to water, sanitation, and hygiene (WASH) services, but a large segment of the world's poor still lacks sufficient access to such facilities. This study aimed to analyze the community situation of WASH facilities in the selected five coastal unions of Bangladesh. We surveyed all the households in the selected unions and screened functional tube wells for arsenic concentration. This study revealed that about 79.7% of households use improved water sources for drinking and other purposes while 66% of functional tube wells had arsenic contamination. In addition, about 66% of the households do not have improved sanitation systems, for instance, pit latrine with water-seal. Besides, more than 90% of households do not have hand washing facilities on premises with soap and running water within 5 meters. The community situation analysis findings may assist concern authority to improve respective WASH facilities in the study area.

Keywords: Arsenic; community situation analysis; drinking water; sanitation.

RESUMO

Tem havido grande sucesso na expansão do acesso aos serviços de água, saneamento e higiene (WASH), mas um grande segmento da população pobre do mundo ainda não tem acesso suficiente a tais instalações. Este estudo teve como objectivo analisar a situação comunitária das instalações WASH nas cinco uniões costeiras seleccionadas do Bangladesh. Pesquisamos todos os domicílios nos sindicatos selecionados e examinamos poços tubulares funcionais quanto à concentração de arsênico. Este estudo revelou que cerca de 79,7% dos agregados familiares utilizam fontes de água melhoradas para beber e outros fins, enquanto 66% dos poços tubulares funcionais tinham contaminação por arsénico. Além disso, cerca de 66% dos agregados familiares não possuem sistemas de saneamento melhorados, por exemplo, latrinas com selo de água. Além disso, mais de 90% dos agregados familiares não têm instalações para lavar as mãos nas instalações com sabão e água corrente num raio de 5 metros. Os resultados da análise da situação comunitária podem ajudar a autoridade a melhorar as respectivas instalações de WASH na área de estudo.

Palavras-chave: Arsênico; análise da situação comunitária; água potável; saneamento.

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Introduction

The goal of safe water, sanitation, and hygiene (WASH) is to maintain a healthy environment free of disease by implementing various safety measures. There has been great success in expanding access to WASH facilities as a result of the Millennium Development Goals (MDGs), but a large segment of the world's poor still lacks sufficient access to such facilities (WHO and UNICEF, 2021). Failure to provide adequate drinking water supply, improved sanitation, and access to personal hygiene facilities not only has a catastrophic effect on the health and well-being of individuals, but it also imposes a considerable financial burden, which can lead to a sizeable drop in economic activity (Akhtar et al., 2018; Hoque et al., 2015; Hutton and Chase, 2017; Moniruzzaman et al., 2013). In addition, the maintenance of water, sanitation, and hygienic standards is more difficult in the areas along the coast, which are most frequently affected by natural disasters such as cyclones, storm surges, waterlogging, and other similar phenomena (Akhtar et al., 2018; Alam and Mukarrom, 2022; Hoque et al., 2022; Moniruzzaman et al., 2014; Moniruzzaman and Siddik, 2012; Siddik et al., 2022; Siddik and Islam, 2024a, 2024b).

Inadequate WASH facilities directly cause the deaths of about 0.8 million individuals per year in low- to middle-income countries; about half of these deaths are attributable to inadequate sanitation (WHO, 2022). Bangladesh has achieved remarkable progress in expanding the access to water and sanitation facilities, but not in promoting hygiene. People have post-defecation hand washing facilities in about 58% of households (WHO and UNICEF, 2021). The quality of water and sanitation services also needs improvement. Reducing open defection was the main improvement in sanitation sector. In 2019, we reduced open defecation to 1.5% of the total population but still question about improved sanitation facilities which is essential for human health. In Bangladesh, access to an improved latrine has improved to 84.6% (BBS and UNICEF, 2019). In addition, about 61% of households still lack safely managed sanitation services (WHO and UNICEF, 2021).

The Sustainable Development Goals (SDGs) cover a wide range of drivers across the three pillars of sustainable development and include a dedicated goal on water and sanitation (SDG 6) that sets out to “ensure availability and sustainable management of water and sanitation for all." In Bangladesh, overall water supply coverage is good, and achieving the water supply MDG is primarily a question of regressing the loss of access due to arsenic contamination and improving access for vulnerable and marginalized people (BBS and UNICEF, 2019). The persistent challenge of arsenic contamination in rural Bangladesh and other nations has been the potential hazards associated with water consumption (Hossain et al., 2015; Singh, 2015). For over a decade, millions of people in Bangladesh have faced the perils of drinking arsenic-contaminated water (Hoque et al., 2016). Consuming potable water is critical for the prevention and treatment of health issues associated with arsenic exposure.

Bangladesh's groundwater contaminating by arsenic is recognised as a serious public health issue. In a northern Bangladeshi area, the arsenic pollution was initially discovered in the tube-well water in 1993. In Bangladesh, tube wells are the primary source of drinking water for rural communities. However, they are contaminated with arsenic, with the exception of mountainous and terraced uplands. It was anticipated that 50 million people in Bangladesh might be exposed to arsenic by drinking water from polluted tube wells (Ahmad et al., 2018). The Government of Bangladesh has been trying to resolve this problem since arsenic found in groundwater. At present the government has committed to the provision of safe water and arsenic mitigation in drinking water and sanitation in the 8th five-year plan, the Sector Development Plan, and the Arsenic Mitigation Policy (GED, 2020; MLGRD&C, 2018, 2011, 2004). The recent results of the Multiple Indicator Cluster Survey (MICS) in 2019 estimated that approximately 11.8% of the household population has arsenic in source water containing over 50 ppb arsenic concentration (Bangladesh standard) (BBS and UNICEF, 2019).

Also, 82% of households' drinking water devices were tested and found to contain E. coli. It is important that water resources projects for sustainable development incorporate improvements to drinking water in water-stressed areas (BBS and UNICEF, 2019; MLGRD&C, 2021). Furthermore, safely managing services for drinking water is a challenge. In 2020, about 41% of households were out of such services (WHO and UNICEF, 2021). The declaration by the UN General Assembly about rights to safe drinking water and sanitation further strengthened and focused its inevitable scope for improvements in proper terms. The focus of mitigation efforts has shifted from identification of arsenic-contaminated areas to methods of providing alternative safe drinking water devices that are safe in terms of both arsenic and microbial contamination, with awareness of safe sanitation and hygiene (WHO and UNICEF, 2021).

Several scholars have placed emphasis on WASH issues in coastal Bangladesh. Amongst them, Hoque et al. (2023) analyzed the WASH situation of Matlab Uttar Upazila of Chandpur district. They mainly investigated the role of women members in creating WASH awareness. Alam and Mukarrom (2022) focused on the school sanitation and hygiene facilities as well as the quality of drinking water in Chattogram City. Hoque et al. (2022) focused on the importance of youth education for drinking water management in the coastal Narail district. Hossain et al. (2021) explored the causes of drinking water insecurity in the coastal areas of Bangladesh. They discovered that water insecurity stems from unimproved, deteriorating, unaffordable, and insecure sources with considerable time and distance constraints. Rahman and Moniruzzaman (2020) focused on the evaluation of water technology in a disaster situation. Hoque et al. (2019) analyzed the socio-ecological aspects of drinking water risk in Dumuria and Batiaghata upazilas of Khulna district. They discovered that extending access via public tubewells is frequent but insufficient to lower drinking water challenges. Saha et al. (2019) investigated the quality of drinking water and population exposure in Tala upaizla of Satkhira district. Rahman and Islam (2018) examined the scarcity of safe drinking water facilities in coastal Bangladesh. Moniruzzaman and Rahman (2017) investigated the quality of pond sand filters during post-disaster situations. Ghosh et al. (2016) explored the rate of women's participation in safe drinking water and human waste management in the Gulishakhali union of Borguna district. Siddik et al. (2014) investigated damage and loss of water and sanitation devices during cyclone Sidr. However, lack of provision of improved sanitation and clean water is recognized as the root of diarrhoea, and in recent decades, researchers have linked the disease to hindered growth of children and babies (Mahmud and Mbuya, 2016). Safe drinking water options, improved sanitation systems, and hygiene facilities have a significant impact on the social and economic growth of a community. Given the significance of these three factors, this study sought to investigate a community's water, sanitation, and hygiene situation in the selected coastal sub-district of Bangladesh. The specific objectives were to characterize the available drinking water facilities in the study area; to explore the nature of access to improved water sources in the study area; to assess the water quality used by the community dwellers in the study areas; and to assess the access to sanitation systems and hand washing facilities of the community dwellers in the study area.

Materials and Methods

Study Area

The coastal area makes up 47,201 square kilometres, or roughly 32% of Bangladesh's total land area (Siddik et al., 2018). The Assasuni sub-district is located in Bangladesh and is considered to be a coastal sub-district. The sub-district has been purposefully selected as the study area (Figure 1). The sub-district can be found between the latitudes of 22°21' and 22°40' north and between the longitudes of 89°03' and 89°17' east. In the north, the sub-district is surrounded by the Satkhira sadar and Tala sub-district of the Satkhira district; in the east, it is surrounded by the Paikgachha and Koyra of the Khulna district; in the south, it is surrounded by the Shyamnagar of the Satkhira district; and in the west, it is surrounded by the Debhata and Kaliganj of the Khulna district. The rivers that flow through Assasuni include the Marichchap, Betna, Kholpetua, and Kapotaksha. This sub-district encompasses a total area of approximately 374.81 square kilometers and is home to a total of 40,735 households. A total of 268,754 people were living in Assasuni. Males made up 49.86% of the population, while females made up 50.14% of the total. The percentage of people in Assasuni who were seven years old or older who could read and write was 49.83%. There are eleven union parishads that make up the Assasuni sub-district. These union parishads are as follows: Assasuni, Anulia, Baradal, Durgapur, Budhhata, Khajra, Kadakati, Sobhnali, Kulla, Pratapnagar, and Sreeula (BBS, 2015).

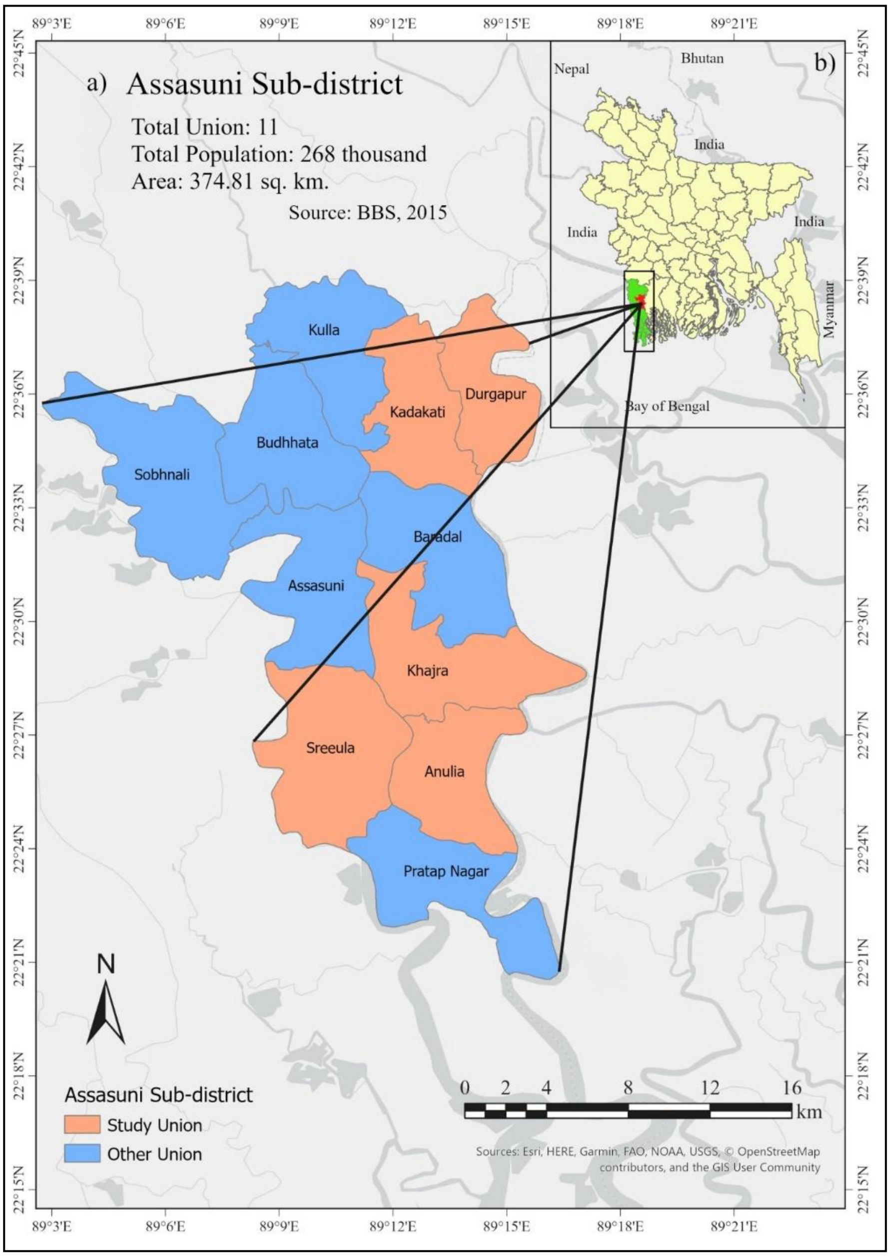

Figure 1: Map shows (a) selected unions (Cantaloupe colour) in the Assasuni sub-district. Inset map (b) shows the district map of Bangladesh indicating Satkhira district (Medium Apple colour) and Assasuni sub-district (Mars Red colour). Compiled by Authors, 2024

Household Data Collection

The community situation analysis (CSA) included quantitative and qualitative data gathering from different data sources, for instances arsenic screening of drinking water sources, household visits, and structured form fill-up. Indicators informing the CSA form were developed in close collaboration with UNICEF and other partner organizations. The tool was translated from English to Bangla. Wash Motivator (who worked as a data enumerator) trainings were organized before conducting the CSA survey. In total, data was collected from 28,499 households in 5 unions in the Assasuni sub-district of Satkhira district. We identified heads of household as the primary respondents for the data collection, and if they were unavailable, households self-selected respondents (Table 1).

Table 1: Number of households in the respective wards and unions in the study areas.

Ward	Unions					
	Anulia	Durgapur	Kadakati	Khajra	Sreeula	Total
Ward#1	743	623	570	737	957	3630
Ward#2	495	600	332	829	427	2683
Ward#3	500	517	331	726	500	2574
Ward#4	805	601	346	1029	760	3541
Ward#5	539	382	222	675	797	2615
Ward#6	972	791	303	684	834	3584
Ward#7	1138	572	705	594	720	3729
Ward#8	863	325	376	707	628	2899
Ward#9	549	407	500	937	851	3244
Total	6604	4818	3685	6918	6474	28499

Source: Field survey, 2019

Arsenic Screening

Arsenic screening was performed from April to November 2019 using the ECONO Quick Arsenic Testing Kit. The volunteers were provided with two days of training on the arsenic test method at the Union level by the Department of Public Health Engineering and the Environment and Population Research Center (EPRC). During the screening, all the functional tube wells were tested. The arsenic tester painted arsenic-safe (≤ 0.05 mg/l arsenic) tube wells green and arsenic-unsafe (> 0.05 mg/l arsenic) tube wells red and collected the GPS values (latitude and longitude) of every tested tube well. At the same time, they informed the community dwellers about the health and social impacts of drinking arsenic-contaminated water. One project officer (WASH motivator) per Ward supervised the tester. The project officers randomly checked about 3% of the results. In total, 10403 numbers of functioning tube wells were tested and painted in 5 Unions.

Data Analysis

We carried out descriptive statistics to explain the respondents' general characteristics (i.e., family size, population, and economic status) and information related to existing water, sanitation, and hygiene conditions. Further, the result of arsenic screening was presented by an arsenic contamination map prepared using ArcGIS 10.3. Arsenic concentrations less than 50 ppb in drinking water were considered safe, and the rest were considered unsafe.

Results

Socio-economic Characteristics

Community situation analysis was carried out in each and every household of the five selected unions in the Assasuni sub-district of Satkhira district. This section included the demographic and economic characteristics of the community dwellers, including the average size of households, population demographics, the ratio of males to females, and economic standing. Table 2 shows an overview of socio-economic characteristics according to unions. It was determined that the overall population is greater than 120 thousand, with males accounting for 51% of the population and females for 49%. In Bangladesh, the current average size of a household is 4.35 (BBS, 2012). The average size of the households that were included in the study was slightly smaller, 4.2. However, the result is consistent with district household size statistics (BBS, 2015). According to the data, the economic standing of the households in the study areas was about 68% of those households, either poor or ultra-poor. The household structure and annual income data were taken into consideration to get an estimate of the overall economic status of the households.

Table 2: Socio-economic characteristics of the surveyed households in the study areas.

Variables	Anulia	Durgapur	Kadakati	Khajra	Sreeula	Total
N	*6604*	*4818*	*3685*	*6918*	*6474*	*28499*
Family Size	4.1	4.2	4.2	4.2	4.4	4.2
Population	27271	20076	15331	29207	28677	120562
Male	51.4	50.9	50.9	51.6	51.7	51.4
Female	48.6	49.1	49.1	48.4	48.3	48.6
Economic status						
Rich	6.8	8.0	10.7	7.3	8.8	8.2
Middle	19.0	22.2	28.2	21.4	22.9	22.0
Poor	69.7	38.5	47.4	60.5	56.4	55.1
Ultra poor	4.4	31.3	13.6	10.8	11.9	13.0

Source: Field survey, 2019

Drinking Water Facilities

Table 3 shows that overall, about 20.3% of households reported direct surface water as their key drinking water options, and about 79.7% reported improved water sources, including reverse osmosis (RO), shallow tube wells (STW), deep tube wells (DTW), pond sand filters (PSF), rainwater harvesters (RWH), and pipe water tap points (PWT). Union-wise sources of drinking water show that Sreeula Union and Kadakati Union represent mostly improved water consumer households, while Khajra Union represents the least improved water consumer households (54.1%).

Table 3: Sources of drinking water facilities in the study areas

Variables	Anulia	Durgapur	Kadakati	Khajra	Sreeula	Total
N	*6604*	*4818*	*3685*	*6918*	*6474*	*28499*
Surface water	15.9	28.6	6.2	43.9	1.4	20.3
Improved water sources						
RO	17.1	52.5	59.8	7.7	8.1	24.3
STW	43.5	9.7	3.9	29.3	25.1	25.0
DTW	13.6	0.2	3.2	0.0	62.6	17.8
PSF	4.0	5.2	20.7	18.6	0.3	9.1
RWH	5.9	3.8	0.9	0.4	2.5	2.8
PWT	0.0	0.0	5.3	0.0	0.0	0.7

Source: Field survey, 2019

Results of drinking water option possession are presented in Figure 2, showing that 43% of households collected drinking water from privately owned water sources (mostly shallow tube wells) and 24% of entrepreneurs installed water options (here, reverse osmosis). In addition, government installed water options have been used by about 33% of surveyed households.

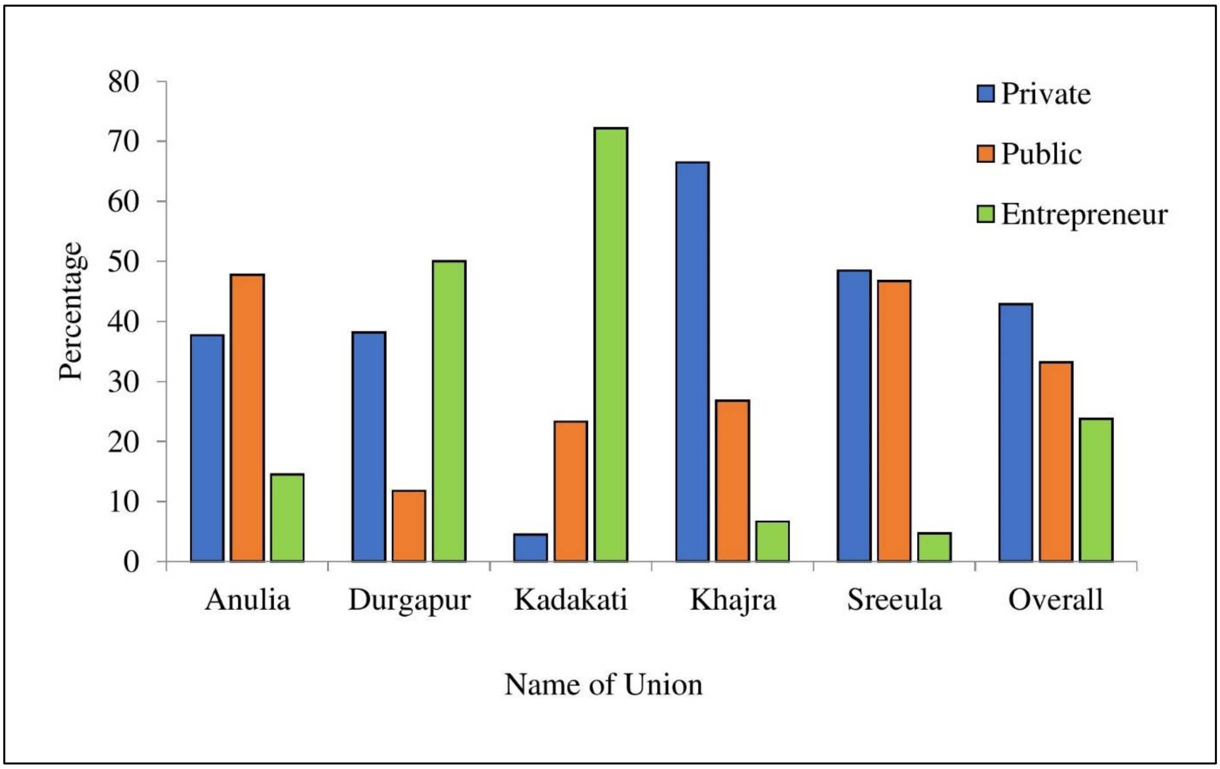

Figure 2. Types of ownership of water sources in the study areas. Source: Field survey, 2019

We conducted arsenic screening on 10403 functional tube wells in the study areas, which included 560 DTW and 9843 STW. Tube well screening effort included arsenic testing, colour marking, and raising awareness among stakeholders about the pollution, its effects, and safe drinking alternatives. Arsenic contamination in the functional drinking water tube wells exceeding the Bangladesh threshold was found in 6,907 out of 10,403 tube wells. Figures 3 and 4 illustrate the distribution of arsenic-contaminated drinking tube wells by unions. To varying degrees, each of the five unions had contamination. The proportion of contamination by Union varied between 93% and 36%. The rates of arsenic contamination of functional tube wells were about 44% in Anulia, 90% in Dorgapur, 93% in Kadakati, 54% in Khajra, and 36% in Sreeula Union.

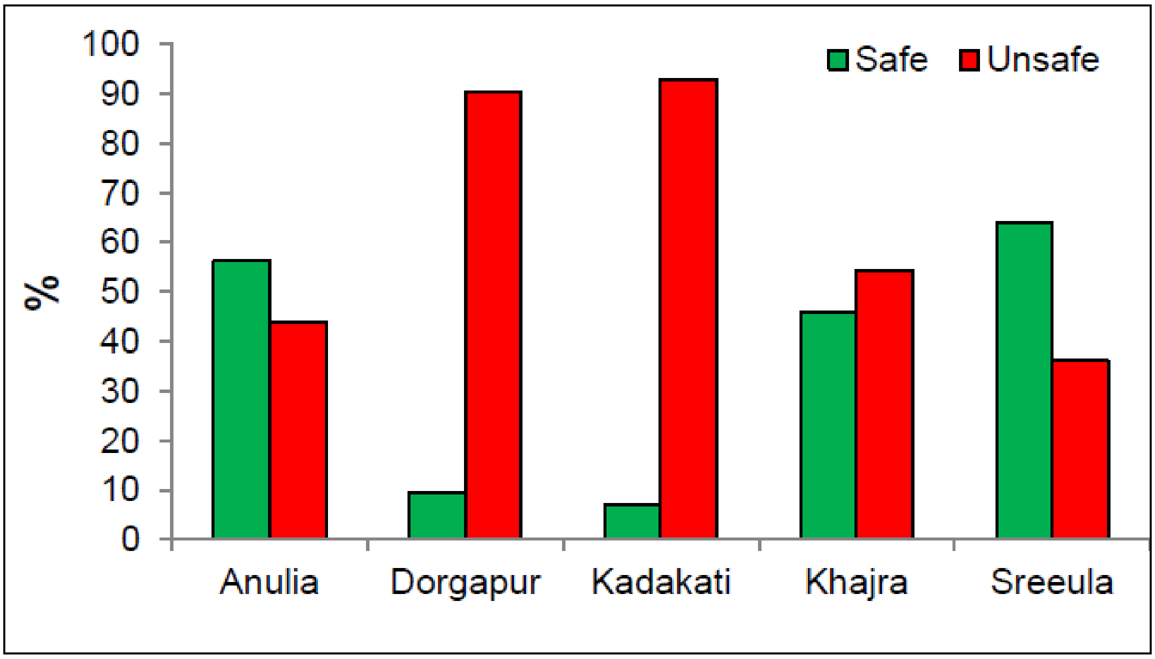

Figure 3. Arsenic concentration pattern in the functional tube wells by Unions. Source: Field survey, 2019

The United Nations set SDG 6.1 to ensure common and impartial access to affordable and safe drinking water for all dwellers by 2030. UNICEF recommends 150 meters as the maximum distance level to have access to at least one safe (in the context of arsenic exposure) improved water point or deep tube well for every household. In the study area, only 29.7 of the households had used improved sources of drinking water within 150 m from their homestead, and about 32% of the dwellers spent 30 minutes (round trip) for collecting water for drinking purpose (Table 4). Of the households in CSA, only 9% had a water source that was on-premise. About 61% of the households had to travel >150 meters to collect safe drinking water. In Khajra Union, this percentage was higher (85%) than in other unions. They claimed that they collected arsenic-safe water from identified safe tube wells or alternative water sources at distances longer than 150m from their respective households. Reportedly, they undertook the effort since the arsenic screening and marking of the tube wells in order to prevent health problems from exposure to arsenic. In case of round the year (12 months) water availability for drinking purpose, about 96% of households stated that they have such facility. The pattern of drinking water availability was more or less typical across the unions.

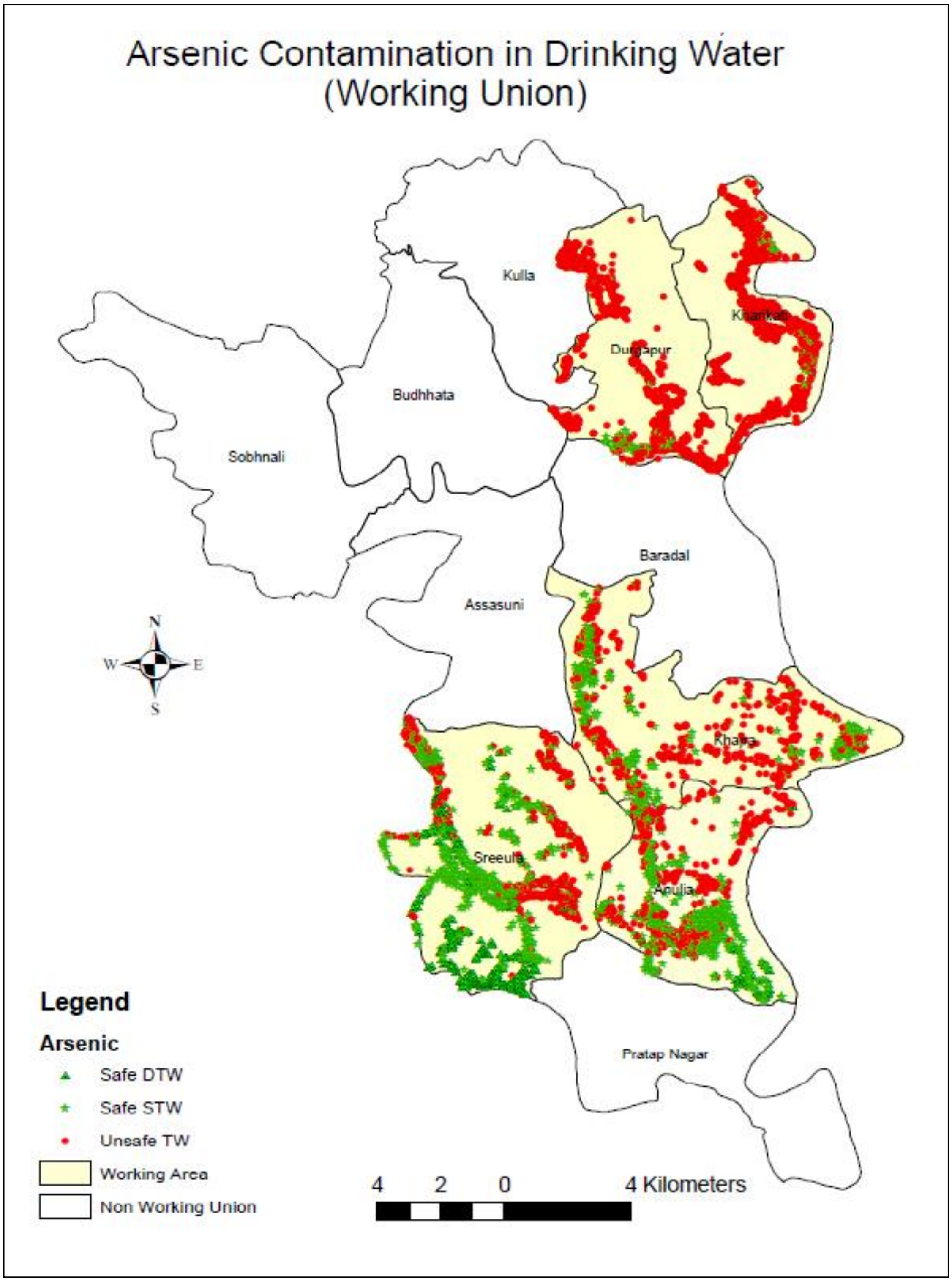

Figure 4. Arsenic contamination in drinking water tube wells (functional) by Unions. Source: Field survey, 2019

Table 4: Nature of access to improved water sources in the study areas.

Variables	Anulia	Durgapur	Kadakati	Khajra	Sreeula	Total
N	*6604*	*4818*	*3685*	*6918*	*6474*	*28499*
Improved and less 30 min collection time (round trip)	40.6	18.7	23.8	14.7	56.3	32.0
Improved and within 150 m from households	38.9	16.7	22.0	11.9	53.5	29.7
Improved and on premises	4.4	12.9	4.3	3.1	19.8	9.0
Available year round (usable)	97.2	94.9	97.9	94.2	97.5	96.2

Source: Field survey, 2019

Sanitation Facilities

According to the JMP, "basic or improved sanitation refers to a latrine, toilet, or facility that hygienically separates human waste from human contact; a flush toilet; a connection to a piped sewer system; a connection to a septic system; a flush or pour-flush to a pit latrine; a ventilated improved pit latrine; and a composting toilet. While this definition categorizes latrines as basic, to be effective, the latrines must also be properly constructed and maintained". Table 5 shows that about 66% of the surveyed households did not have improved sanitation systems, for example, pit latrine with a water-seal. There were 0.5% who practiced open defecation, and 9% used unimproved latrines. Only 34% (9785) of the households were using their own improved latrine in the study area. Approximately 2580 (9%) households shared their latrine with other families, including about 57.3% of households sharing their latrine with other 2-3 households, and about 43% shared with other four households or more. The worst situation was observed in Dorgapur Union, where 79% of households used an unimproved latrine, and a better situation was observed in Sreeula Union.

Table 5: Types of sanitation systems in the study areas

Variables	Anulia	Durgapur	Kadakati	Khajra	Sreeula	Total
N	*6604*	*4818*	*3685*	*6918*	*6474*	*28499*
Open defecation (OD)	00.2	01.1	00.7	00.8	00.0	00.5
Unimproved	64.6	76.7	51.9	59.1	31.2	56.1
Limited/shared	09.2	02.5	14.1	12.0	07.7	09.1
Basic/improved	25.9	19.7	33.3	28.1	61.1	34.3

Source: Field survey, 2019

Hand Washing Facilities

Proper hand washing is the most effective, least complicated, and least expensive way to lower the frequency of HAIs and the propagation of antibiotic resistance. So, it is an important and effective barrier to the spreading of diseases (Mathur, 2011). In this we observed availability of hand washing facilities including hand washing device and soap inside the latrine or near to 5 m distance. Data collections observed these facilities in all the respective households. Figure 5 shows union-wise hand washing facilities, i.e., soap and water on premises within a 5-meter distance. Results found that the majority of the households did not have hand washing device, available soap and water inside the latrine or within 5 m distance. Overall, only 8.9% of households reported that they had hand washing facilities on premises. One-fourth of the households in Kadakati Union have hand washing and water (22.2%) facilities, and the rest of the unions are below 15%. However, only 3.5% of households have a hand washing place along with available water and soap in Anulia and Khajra Unions.

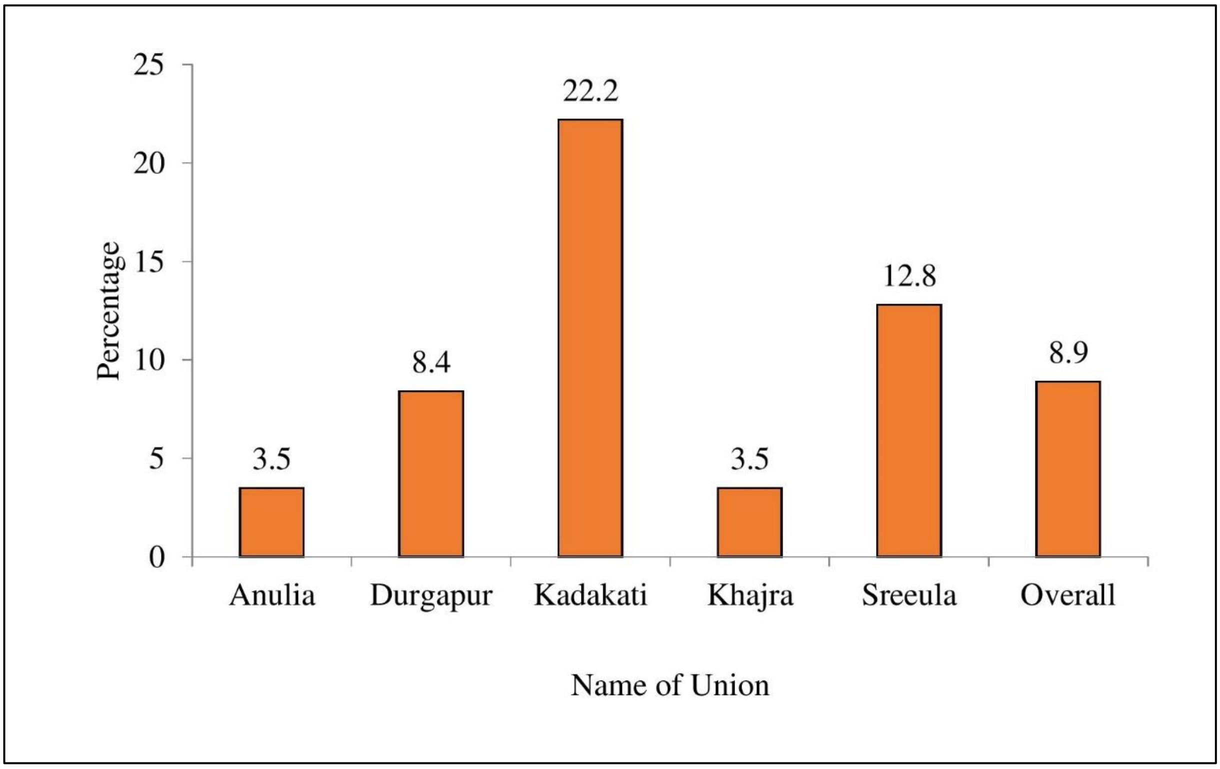

Figure 5. Hand washing facilities (soap and water) within 5 m distance. Source: Field survey, 2019

Discussions

This study aimed to analyze the community situation of water, sanitation, and hygiene in the selected five coastal unions of Bangladesh. All the households (n = 28,499) of the selected unions were surveyed, and functional tube wells were screened for arsenic concentration. This study found that about 79.7% households were using improved water sources for their drinking purpose. The included improved water sources are reverse osmosis, shallow and deep tube wells, pond sand filters, rainwater harvesters, and pipe water tap points. We screened all the functional drinking water tube wells (shallow and deep) and found about 66% arsenic-contaminated based on Bangladesh standards (<50 ppb). A similar result was also found by Hoque et al. (2015). They found about 61% of the screened tube wells to be arsenic-contaminated with >50 ppb. However, in another project area, Srinagar sub-district of Munshiganj district, Hoque et al. (2016) found more than 70% of the drinking water tube wells to be arsenic-contaminated during 1999–2002. Likewise, Saha et al. (2019) discovered that 74% of tested drinking water devices exceeded the permitted arsenic limit in Tala upazila of Satkhira district. However, the national survey of arsenic-contamination in groundwater was first conducted by Bangladesh Arsenic Mitigation Water Supply Project in 2003. The survey results reported that about 29% of the screened tube wells were found arsenic-contaminated (Ahmad et al., 2018).

This study reveals that, overall, about 0.5% of households practiced open defecation. Similar results were also found in other coastal sub-districts in Bangladesh by Hoque et al. (2015). They found about 0.7% of households practicing open defecation in the Kalia sub-district. This study found that only 34% of the households are using improved latrine in the study area, and approximately 9% of households are using shared latrine. Further, this study identified that only 10.8% of the households used a safely managed sanitation service. The safely managed sanitation service in SDG means that excreta are safely disposed of in situ or transported and treated off-site (UN, 2015). Hoque et al. (2018) found that about 44% of the households in intervention areas and 46% of the households in comparison areas were using their own improved latrine in Cumilla and Dinajpur. In addition, they also found similar results in terms of latrine sharing. They observed about 9% shared latrine in intervention areas and about 16% in comparison areas. However, Sultana et al. (2018) found that approximately 10% of surveyed households utilise improved latrines in the Niapara villages of Paikgacha upazila in Khulna distirct.

Results found that the majority of the households did not have hand washing facilities either inside or within 5 m of their latrine or premises. Overall, only 8.9% of households had hand washing facilities on premises with soap and water within 5 meters, which is the lowest compared to the national database. According to the Bangladesh National Baseline Hygiene Survey 2014, approximately forty percent of households had access to soap and water after using toilets, even though 63% had a designated spot next to the toilet for this purpose (MLGRD&C, 2014). Hoque et al. (2023) carried out action research in three unions in Matlab Uttar sub-district, Bangladesh. About 84% of those who participated in the study reported that they washed their hands with soap after using toilets. Cairncross et al. (2010) found that 19% of infant mortality and 7% of total illness burden are caused by poor sanitation, a lack of safe drinking water, and inadequate hygiene practices.

Conclusions

Providing sanitary facilities is a crucial step towards enhancing public health and achieving sustainable national development. This study analyzed the community situation of water, sanitation, and hygiene in the five selected coastal unions in Bangladesh. The community situation analysis showed that of the tested functional tube wells, more than 66% were detected to be contaminated with arsenic above Bangladesh standards. The majority of households (79.7%) had used improved drinking water sources, while the rest (20.3%) used surface water as their main source for drinking water and other purposes. However, about 43% reportedly used tube wells or deep tube wells as a source of drinking water. Only 29.7% households were using improved sources of drinking water within 150 m from their homestead, and 32% of household members' collected drinking water within 30 minutes of collection round trip time. Moreover, about 43% of households were collecting drinking water from privately owned tube wells, about 24% from entrepreneurs installed water points, and the rest from government-installed water sources. However, they also claimed that it was difficult to collect water every day from safe drinking water sources more than 150 meters from the households, especially during the rainy season and for the households located in the higher elevated areas. In the case of sanitation, about 66% of the studied households did not have access to improved sanitation facilities. Only 32% of the households had cleaned out the tank or pit and buried the sludge, while others put the faecal matter in a ditch or made holes in the pit. Overall, about 8.9% of households found that the hand washing facility on premises had soap and water within 5 meters.

The study areas and survey techniques represent some limitations in this study, which are as follows:

- We carried out our study in the five selected unions (coastal lowest administrative units) of a coastal sub-district, while it would have been more fruitful to examine data from other sub-districts spanning both the coast and the interior of the country.

- We considered household surveys and arsenic screening of functional tube wells. For more comprehensive results, it can be worth considering a variety of strategies for gathering data, such as surveys, focus groups, and key informant interviews.

Although this study possesses some limitations, our findings have notable repercussions for improving water and sanitation facilities as well as promoting hygiene behaviour in the selected coastal unions of Bangladesh.

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