Salinity Intrusion and its Impact on Menstrual Hygiene among Coastal Women in Bangladesh

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Chapter 1: Introduction

1.1 Introduction:

Bangladesh is one of the worlds most exposed to climate change regions and most affected by the global sea-level rise. According to the UN's Intergovernmental Panel on Climate Change (IPCC), if global warming keeps increasing at the current rate, around 17% of Bangladesh's population will have to relocate over the next two decades (Rezwan, 2022). Bangladesh is such a country that is highly susceptible to soil and water salinization due to its geographical location. The reason for Bangladesh's susceptibility to salinization is due to the ever-present occurrence of cyclones and storm surges annually across the country (Alam et al., 2017; Cochran et al., 2019; Kim et al., 2019). Saltwater intrusions in the southwestern coastal region of Bangladesh are having devastating consequences on human health. Saline soils are mainly found in coastal districts due to seawater infiltration and inundation by coastal tides (Karmakar et al., 2016). Bangladesh is especially vulnerable to saltwater intrusions, as the country has a vast area of low altitude near the coast and is often subject to tropical cyclones (Brammer 2014; Faneca et al., 2015). Saltwater intrusions have detrimental impacts on coastal people, by increasing the surface water salinity (Rahman et al., 2011).

Figure 1: A saline water pond in Gabura union of Shyamnagar upazila (Photo: Author)

In Bangladesh, more recently between the years 2000-2020, there have been eight major cyclones, including Cyclone Sidr in 2007 and its associated storm surges that affected around 3.45 million people (Hossain and Mullick 2020). According to the Intergovernmental Panel on Climate Change (IPCC) report, saltwater intrusion in low-lying coastal areas, river deltas and estuaries has increased, leading to salinization of groundwater, surface water and soil resources (Oppenheimer et al., 2019). Among the other area of Bangladesh, Freshwater reserves in southwest coastal region have been heavily damaged by

salinity intrusion driven on by sea level rise and unsustainable shrimp farming. Increasing saltwater intrusion to inward land and freshwater sources are limiting access to freshwater in many villages of Satkhira district. The climatic changeover affects the coastal people in many ways. Specially women in the coastal areas are getting affected not just in terms of their livelihoods but also in terms of adjusting to the severe health consequences on their life (PTI, Sundarbans, West Bengal; 2022). In this region, it can be difficult for women and girls to get access to clean water for drinking, let alone for maintaining their menstrual hygiene (Rezwan, 2022). Women and

Figure 2 & 3: Road and household of Shyamnagar Gabura union coastal area (Photo: Author)

adolescent girls are compelled to use cloth rags that they wash in increasingly saline water as poor families usually cannot afford sanitary napkins (Papri, 2022). Women and girls in the area can only wash their rags in filthy saline water and uses it again when they menstruate, which in turn causes them to contract infections and diseases, at risk for a variety of hygienic issues, such as skin disorders and problems with their reproductive systems (Abedin et al., 2019).

The excessive usage of saline water by coastal women as a result of climate change is leading to numerous uterine infections and affecting girls' and women's menstrual health and hygiene (“Climate Change Harsher on Women in Coastal Areas | The Daily Star,” 2023). In order to interrupt their menstrual cycle, women and girls in these regions often steal birth control pills from married women and thus bring a long-term health risk which eventually turns into infertility problems for them choosing whether to endanger long-term reproductive health or suffer with uterine disease (Papri, 2022).

1.2 Background and Problem Statement

Geographical location makes Bangladesh one of the world's most disaster-prone countries. According to German Watch's Global Climate Index, Bangladesh is the 7th country most affected by climate change, with related economic losses of 12 billion USD in the last 40 years. The people of the coastal areas of Bangladesh are facing more disasters linked to salinity, floods, cyclones, river erosion and thunderstorms than those in other countries. Bangladesh's coastal area is a considerable part of the country. About 29 per cent of the population live in the coastal areas (Ahmad, 2019). The entire southern region of our country lies just 2 metres above sea level. Almost all of the country's 19 coastal districts are affected by moderate to severe salinity, which has increased in the last five years due to the impact of different cyclones over a small area (Kabir et al., 2016). This salinity intrusion is increasingly rising in coastal areas of Bangladesh due to shrimp farming and rising of sea levels as a result of climate change, and the problem is getting worse with time. According to the World Health Organization, one of the major challenges of the twenty-first century is safeguarding health from the effects of climate change (World Health Organization, 2009). Due to climate change, there is a major freshwater scarcity in southwest Bangladesh. Coastal communities suffer a lot from salinity as it affects both soil and water on which human well-being crucially depends. About 20 million people have already faced the crisis of drinking water in the salinity areas of Bangladesh.

Figure 4: A mother of 2 children in Gabura union-facing uterine diseases (Photo: Author)

Many health effects are attributed to salinity in the water such as hypertension, stroke, dysentery, diarrhea, and skin disease. Among the coastal population, women have to endure more health adversities caused by water salinity because of their greater consumption of water, as compared to

men. Women and girls experience heightened vulnerabilities to reproductive health problems as a consequence of using saline water during their menstrual, maternity, and postnatal periods. Higher rates of miscarriage, child mortality, and the growing risk of female infertility are harsh realities in coastal districts. Moreover, high salt intake increases the risk of hypertensive disorders during pregnancy, including gestational hypertension and preeclampsia. Uterine diseases, which are especially frequent in regions with a lot of saline water, results from these infections (Kanya, 2022). The alarming fact is that, in order to avoid such uterine infections and diseases, coastal women and girls tend to interrupt their menstrual cycle for a long duration. In some cases, it is seen that women and girls in coastal regions often steal birth control pills from married women or from health centers to interrupt their menstrual cycle and thus bring a long-term health risk which eventually turns into infertility problems for them in the long run. In terms of choosing whether to endanger long-term reproductive health or to suffer from uterine diseases, they are generally seen to prefer interrupting menstrual cycles for their temporary comfort without even knowing the long-term consequences of it.

The local people of coastal areas are not the least aware of the health consequences occurring due to the result of excessive saline water use, they consider such issues as frequent as yellowish urine and are unaware of its causes. As the situation is getting more vulnerable day by day, this issue needs to be addressed properly to bring some sustainable solutions and to ensure feasible health facilities for women and girls in coastal areas.

1.3 Objectives of the Research

The aim of this research is to identify the menstrual hygiene problem due to the increasing salinity intrusion and its impact on the health of coastal women along with some ways to mitigate the health risk in Shyamnagar Upazila of Satkhira district. This research also aims to shed light on the intersection of salinity intrusion, menstrual hygiene, and women's health in Shyamnagar Upazila of Satkhira district, ultimately leading to recommendations for mitigating health risks and fostering resilience.

To achieve towards the research aim, some specific objectives has been determined which are:

- **To identify the health problems and menstrual hygiene scenario of coastal women for excessive salinity intrusion and climatic changeover on coastal areas.**

- **To assess the long-term impacts and associated risks on women's reproductive health in the study area**
- **To recommend some ways to mitigate the health risks associated with it.**

The main crisis in the coastal regions is the scarcity of freshwater. Due to this crisis, people tend to use saline water to meet their regular water demands. As they are using such salty water excessively, several health impacts are seen as a common phenomenon among them. Women are especially vulnerable in this context as they have to use saline water during their menstruation periods as well. This objective will try to find out the scenario of the practices regarding to menstrual hygiene and related health issues that are causing because of the frequent use of saline water by the women living in coastal area. Salinity intrusion in coastal area is gradually putting the reproductive health of coastal women at a greater risk. Without knowing the severe consequences, women themselves are adopting unhealthy practices in order to cope with the scarce situation of freshwater and eventually they are being the sufferer for a long term by initiating damages to their reproductive health. This objective will try to demonstrate the long-term consequences of coastal women's health and risks such as cervical cancer and infertility problems that are associated with it. This study will also try to illustrate the fatal impacts of this situation that creates severe health risks in the long run as the women in coastal areas are regularly taking contraceptive pills to break the menstrual cycle every month by being unware of the drastic impacts on them.

Based on the research findings, this study will try to put some recommendations which might help the government, NGOs and different stakeholders to plan new strategies to mitigate the devastating impact of salinity intrusion among coastal women of Bangladesh. This might further bring some significant contributions for the sector of health and associated issues on the livelihood of coastal women in Bangladesh.

Chapter 2:

Literature Review and Theoretical Framework

2.1 Salinity Intrusion in Coastal areas: Reasons Behind it

The coastal areas of Bangladesh, with its near flat topography and location at the tip of "funnel shaped" Bay of Bengal, is susceptible to a number of natural hazards: which includes cyclones and tidal surges, salinity intrusion, riverbank erosion, shoreline recession and so on. (Haider, R., 1992). Although all hazards are detrimental to agriculture, however sea level rise is likely to put the gravest threat by land submersion and salinity intrusion in coastal areas (Rashid et al, 2004). Irrigated water demand is highly affected by salinity intrusion in surface water and salt accumulation in the root zone of soil affects plant growth in coastal soil (Yadav et al, 2009). Besides constraining agricultural production, salinity limits the fresh water availability for drinking purpose and industrial production.

There are some specific reasons of increasing salinity intrusion on the coastal areas of Bangladesh. On the Bangladesh Southwestern coast, shrimp and prawn farming has become widespread (Ahmed and Diana 2015). These farms can be for freshwater and saltwater shrimp with saltwater shrimp farming, increasing salinity, especially in the southern coastal areas (Rahman et al., 2011). Farmers raise shrimp on their land in saline aquaculture ponds that can contribute to groundwater and soil salinity. Freshwater shrimp farms are, on the other hand, at risk due to saltwater intrusions increasing gher salinity and poisoning the shrimp (Ahmed and Diana, 2015). The total area of land affected by salinity in Bangladesh in 1973 was 83.3 million hectares; by 2000, it had risen to 102 million hectares, and by 2009, it reached 105.6 million hectares (Brammer, 2014).

Bangladesh, a low-lying deltaic land, is particularly vulnerable to climate change and its associated hazards (Agrawala et al, 2003). Floods and storm surges caused by severe tropical cyclones such as Sidr (2007) and Aila (2009) are also responsible for the long-term salinization of soil and surface water (Kabir et al., 2016; Salehin et al., 2018). Excessive groundwater Mining has lowered the groundwater level, and rising sea levels have caused seawater to invade coastal aquifers from the ocean, leading to long-term salinization in southwestern Bangladesh (Salehin et al., 2018). During

the dry season, the flow of the lower Ganges becomes low, and seawater pushes inland saltwater into rivers and canals, through vertical filtration or infiltration into nearby land, resulting in salinization of groundwater and soil, which lasts until the onset of the rainy season (Lam et al., 2021; Salehin et al., 2018). This affects agricultural activities and people's livelihoods (Lam et al., 2021).

Another important driving factor increasing soil and water salinization over the previous half-century is climate change (Daliakopoulos et al., 2016; Gorji et al., 2019). This is because soil and water are closely associated with the atmospheric and climatic schemes through carbon, nitrogen and hydrological rotations. Therefore, the changing climate will impact soil and water processes. Low-lying semi-arid and arid areas are even further exposed to soil and water salinity due to declining groundwater quality and rainfall shortages (Kurylyk and MacQuarrie 2013). In these areas, irrigation-based cultivation is indispensable, despite causing the salinization of soil and water which can lead to land degradation (Baumhardt et al., 2015).

2.2 Review of the Existing Literatures

Jabed, A. M.; Paul A.; Nath T.K. (2020) investigated the impact of salinity intrusion on human health in his article. Water salinity levels in shallow tube-wells ranged from 5.11 to 6.48 dS/m, causing various health issues such as skin diseases, hair loss, diarrhea, gastric problems, and high blood pressure. Limited agricultural land was affected, hindering villagers' ability to practice agriculture. Rising salinity poses a serious threat to household water supplies. Recommendations of this research include improved management of freshwater resources in salinity affected areas and exploring rainwater harvesting as a sustainable solution to mitigate the adverse effects of increasing salinity in coastal areas.

Rahman, M. S. et al. (2023) methodically evaluated 27 publications in order to determine the effects of saline intrusion on human health in coastal Bangladesh between 2000 and 2018. Increased salinity in land and water due to cyclones and climate change causes hypertension, heart disease, cholera, kidney illness, and stroke. Pre-eclampsia and eclampsia are among the increased threats that pregnant women face. Tube wells in the dry season are more likely to have higher salt levels that affect adolescents and pregnant women. Outbreaks of cholera generally happen during the dry season. The study calls for focused interventions and management techniques, highlighting the major health effects of salinity in affected locations.

Khan A.E. et al. (2011) illustrated in his article that rising sea levels and climate change cause drinking water to become more salinized in coastal areas of Bangladesh, where sodium intake during the dry season is estimated to be between 5 and 16 g/day, surpassing the recommended guideline limits. In the research; a survey with 343 expectant mothers was conducted, those who used shallow tube-well water had greater salt levels in their urine. In comparison to the rainy season (5.1%), the hospitals rate of hypertension in pregnancy was considerably greater during the dry season (12.2%). In the view of possible health effects of saline intrusion into drinking water sources, this research emphasizes the urgent need for adaption measures in the face of sea level rise brought on by climate change impacts.

Shammi, M. et al. (2019) examined the detrimental effects of consuming more salt through the consumption of drinking water, which focuses on Bangladesh's drinking water sodium (DWS) utilizing the DPSIR framework. Saline water from coastal regions raises the risk of (pre)eclampsia and infant mortality by causing hypertension, particularly amongst the pregnant women. Controlling water sodium is examined using interventions such as solar-powered desalination, regulated aquifer recharge, pond sand filters, and rainwater harvesting. The study highlights the necessity of community education, inclusive technology interventions, and awareness raising to solve the increased sodium levels in drinking water.

Naser, A.M. et al (2017) addresses the lack of drinking water due to saltwater intrusion in southwest coastal Bangladesh, which can result in high blood pressure and pregnancy-related problems. Using a stepped-wedge cluster-randomized trial across 16 communities, the objective of this research is to determine if consuming water from Managed Aquifer Recharge (MAR) systems lowers blood pressure, hence improving human health. The study uses statistical models to examine the relationship between participants' blood pressure and their access to MAR water, providing important information for addressing health issues and sicknesses related to the drinking of brackish groundwater.

Rashid, M.B. et al. (2023) stated that the study was conducted in Bangladesh's southwest coastal region which shows that fresh drinking water is not easily accessible due to high salinity intrusion and harmful components. Investigations of physicochemical characteristics and levels of elements in water revealed higher amounts of hazardous components on drinking water. Water quality indexes indicated different levels of fit with possible health hazards for locals. In addition to highlighting the necessity of long-term coastal management plans to maintain environmental

sustainability, the study offers some sustainable solutions for environmentalists and lawmakers to put into practice for the region's clean drinking water supply.

Quader, A. M. et al. (2023) found on their study that rising sea levels and cyclones have caused saline intrusion into drinking water in one of the Bangladesh's coastal sub-district; Dacope Upazila, posing health dangers among coastal people. A total of 20,211 pneumonia patients, 31,164 diarrhea patients, and 843 arsenicosis patients were treated over a seven-year period. Although there was no direct association discovered between environmental indicators and illnesses, salinity was linked by important sources of poor maternal health, miscarriages, neonatal mortality, menstruation problems, skin ailments, and hypertension. To fully investigate these correlations, more research is advised in this article.

Ahmad M.M.; Saqib S.E. (2021) examined in his article that how the salt of the water affects the livelihood and general health of the poor in coastal Bangladesh. It identifies salinity-related health concerns through interviews with 318 respondents, which indicates over 80% of participants are affected. These risks include hypertension, diarrhea, dehydration, and respiratory problems. Due to medical issues and over expenses on treatment, both of the study area in this study was observed as lower income community, along with extra indirect expenses including joblessness, children quitting school, and migration. The results highlight how important it is for policymakers to take into account the increased health hazards associated with saltwater consumption in coastal areas while developing strategies for such specific areas.

Nahian, M. Al et al. (2018) investigated that, in coastal Bangladesh 'Assessing Health, Livelihoods, Ecosystem Services and Poverty Alleviation in Populous Deltas' project finds a strong correlation between high blood pressure and salinity in drinking water. Drinking water that is slightly or highly salinized, increases the risk of hypertension by 17% and 42% respectively. People over 35 years old, especially women are more vulnerable. Particularly for moderate salinity, frequency is higher than national rural statistics. When there is little seasonal change in salinity, hypertension shows a rising trend and peaks during the dry season. This study suggests immediate action due to the increase of salinity on groundwater.

Md, A.; Gomes, C.; Dias, J.M.; Cerdà, A. (2022) conducted this study in Bangladesh's Shyamnagar upazila under Shatkhira district, highlights how women are more vulnerable to the effects of climate change. Significant gender differences are found when it comes to how people respond to climate-related problems including natural disasters and long-term environmental

changes. In order to improve resilience and reduce inequality, the article emphasizes the significance of women's empowerment in climate adaptation and offers solutions like eco-friendly stoves, rural electrification, microfinance, and traditional sewing arts (nakshikantha).

2.3 Findings from the Existing Literatures

The existing theories and literatures of salinity intrusion and its impact on women which has been specifically conducted on coastal low-income communities; illustrates the vulnerable situation of women's health and well-being among the community. This literatures are the prominent sources of secondary data of this research. From the above literatures and the perspective from the respective authors, it is evident that salinity intrusion is continuously causing a serious threat to the low-income people especially the women in coastal areas. There has been so many studies found in Gabura union and Shyamnagar upazila as it is situated on the coastal belt of Bangladesh and one of the most vulnerable areas in terms of livelihood practices, agriculture, salinity intrusion and chronic health difficulties among the people. The existing literatures have drawn the focus on several health issues like hypertension, diarrhea, dehydration, respiratory problems, pneumonia, arsenicosis, skin disorders, hair loss, gastric problem, high blood pressure, heart disease, cholera, kidney illness, stroke, pre-eclampsia, eclampsia and so many similar kinds of diseases. But there are only a few, such few that it can be considered as totally negligible; portrayed about the menstrual hygiene problem and the long-term consequences regarding to uterine infections which leads to cervical cancer and infertility. Besides this; from the theoretical analysis of these literatures, some recommendations on livelihood practices and policies regarding to improve the health conditions of coastal people has also been found from above literatures. Existing policies and strategies regarding to health sector have also been discussed in some literatures which are merely implemented in coastal communities like the villages of Gabura union of Shyamnagar upazila. As there are some societal stigmas and taboos work behind operating thorough investigations on such sensitive issues like menstrual issues and reproductive health, most of the researcher consider to avoid this issue. Thus this threatening issue has been remained almost untouched though it needs proper attention of all stakeholders and policymakers. From this aspect, this research can bring some distinctive contribution on this reproductive health and menstrual hygiene sector of coastal women who are continuously dealing with severe health-threats.

Chapter 3: Study Area

3.1 Description of the Study Area

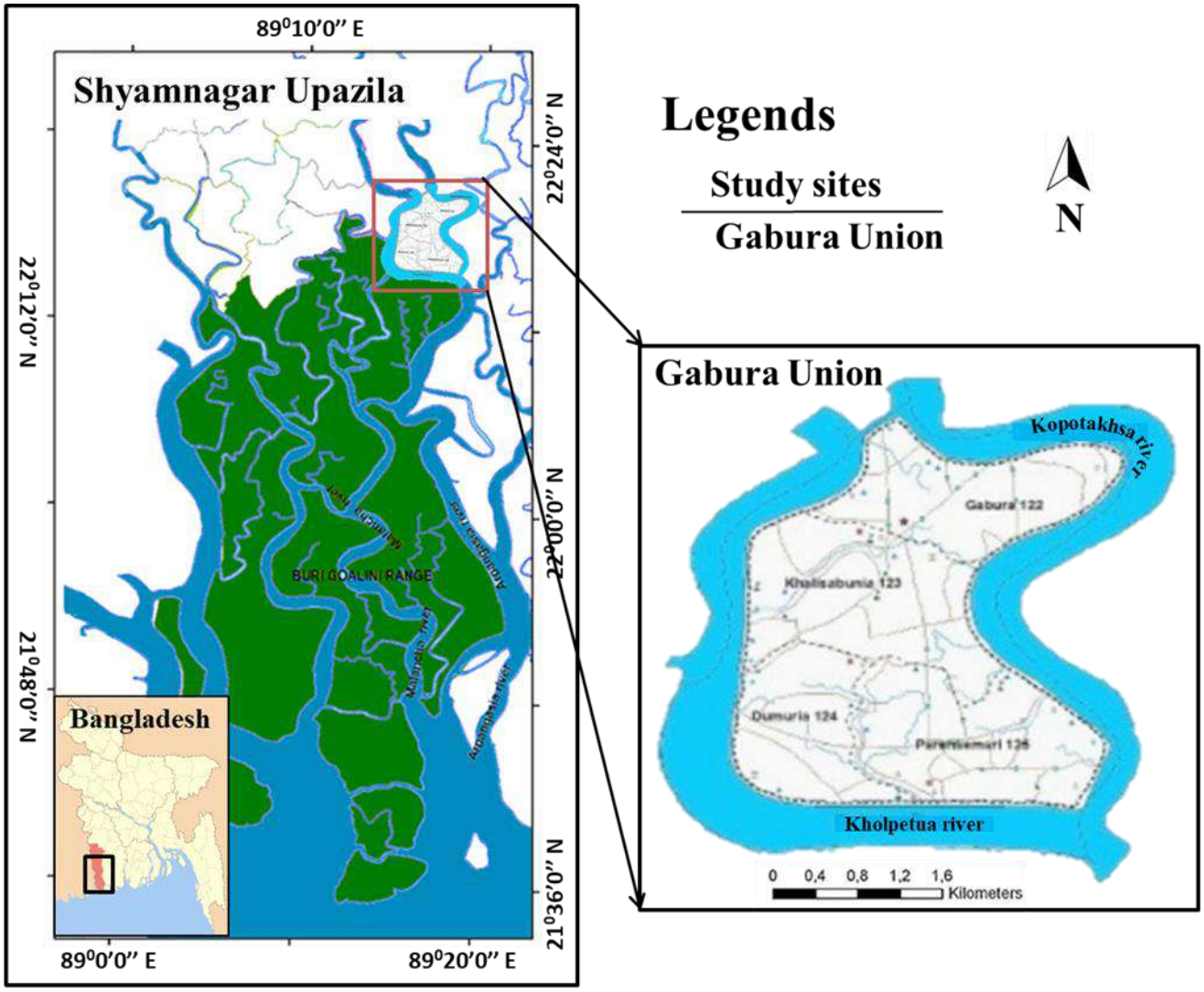
The research was carried out at the Shyamnagar Upazila of Satkhira District, situated between 22°36′ and 22°24′ north latitudes and between 89°00′ and 89°19′ east longitudes (BBS, 2011). The 2011 Bangladesh census identifies a population base of 318,254 in Shyamnagar alone whilst 10% of the nationwide population, 14 million people, reside in the South-western coast (Szabo et al., 2016; Efretuei 2016; ibid). The main rivers of the region are the Kobadak, Sonai, Kholpatua, Morischap, Raimangal, Hariabhanga, Ichamati, Betrabati, Kalindi and Jamuna. Usual rainfall is 1, 68 mm with a day-to-day temperature fluctuating from 21 to 30°C. (Kabir and Golder 2017) previously reported average maximum and minimum temperatures of 27.7 and 15.6°C during the dry season (November-February), 33.2 and 23.3°C during pre-monsoon season (March-May), and 31.7 and 25.5°C during monsoon season (June-October) for the South-western region of Bangladesh (Mukul et al., 2019). Shyamnagar came into existence in 1897 as Thana and was upgraded to upazila on 1982. The upazila occupies an area of 1,968.24 sq. km. including 1485.13 sq. km Sundarban area and 483.11sq. Km mainland, 13 unions, and 218 villages (BBS, 2011). In Shyamnagar sub-district, there are 13 unions which are- Atulia, Ishwaripur, Kashimari, Kaikhali, Gabura, Nurnagar, Padma Pukur, Bhurulia, Munshiganj, Ramjan Nagar, Shyamnagar and Satkhira Range. Among this 13 unions, Gabura union which is surrounded by waterbodies- has been selected as the study area of this research.

Figure 5: Shrimp Cultivation Gher in Chakbara village of Gabura union (Photo: Author)

3.1.1 Gabura Union

As this research demands vulnerable women community due to salinity intrusion, Gabura Union of Shyamnagar Sub-district has been selected as it shows the most vulnerable situation affected by salinity. Gabura is a coastal island union (this union has

several villages inside it), located at Shyamnagar Upazila (sub-district) in Satkhira district of southwest Bangladesh. The annual population growth rate is 1.70%. More than a century ago, it was a part of the world's largest mangrove (Sundarbans) where people started living for shelters and livelihoods (Alam et al., 2015). Gabura is basically an island and is surrounded by the Kholpetua and Kopotakhsa rivers, (Kholpetua in western side and Kapotaskha in eastern side) which separate it from the mainland.



Map 1: Map of the study site in Gabura Union of Shyamnagar Upazila, Satkhira district
(Source: Fisheries and Aquatic Sciences, 2022)

At present, it has become a distinct island covering an area of 33 km2 with a population of 43,262 in 8,321 households (Gabura Union Parishad, 2019).

Gabura was selected as the study site because it was one of the most affected unions in the worst affected district of Satkhira due to the adverse impacts of salinity. In addition, it was highly vulnerable to frequent cyclones and foods (Rakib et al., 2019). This island is situated less than 1 m above sea level and as a result, it is prone to being often flooded by storm surges and tidal surges. Over the last two decades, two super cyclones- Sidr in 2007 and Aila in 2009; caused huge loss and damage in this union. Cyclone Sidr inundated this area for a record time and resulted in immense loss and damage of lives and properties. The destruction of Aila was more devastating as death toll was 28, the number of lost houses was 11,450 and the heavily damaged shrimp farm areas were 43 km2 in Gabura (Tajrin & Hossain, 2017).

Figure 6 & 7: Household construction material and local transport of Gabura Island (Photo: Author)

Most of the people in Gabura Union depend on fisheries and agriculture-related activities for their livelihoods. According to Gabura Union Parishad (2019), almost 80% of the households are involved in shrimp farming. In this union, shrimp farms covered an area of 11 km2. In Shyamnagar, due to climate change, one of the most vulnerable and affected unions are Gabura union. In this union, excessive salinity intrusion along with polder failure makes the union most vulnerable. Drinking water crisis due to saline water intrusion makes this area more vulnerable where women and children suffer most. There are around 126 khals (canals) in the Shyamnagar Upazila, of them, most are illegally occupied. People of Gabura are suffering for leasing the canals as leaseholders sometime destroy polders. In Gabura union, there are several villages where women are mostly affected due to the excessive use of saline water. Notably, Chokbara, Harishkhali, Dumuria, 9 no Sora- these are the mostly salinity affected villages.

3.2 Socio-economic Condition of the Study Area

The socio-demographic conditions of Gabura Union are not good because of low-quality houses, poor transportation and medical facilities, low-quality social-infrastructure, lack of enough cyclone shelters, etc. The area of this Union is 33 km2. According to BBS, 38825 people are living in this village, among them 19307 are male and 19518 are female (BBS, 2011). Around 70% of the people depends on fishing and the rest 30% on agriculture (25%) and others (5%). It is one of the most extreme southern Unions of Bangladesh has exposed to Bay of Bengal through two rivers- Kholpetua and Kapatakkha. Chakbara village is one of the villages of Gabura Union. The study was conducted mainly in Chakbara village. This village was severe affected by the cyclone Sidr (2007) and Aila (2009). The Ghersystem is also prominent in this village. Around 70% of the houses are earthen which mostly made of low-quality materials such as mud and thatch. The transport system is not well developed because of having no direct land connection with the mainland. As a result, local people use waterway transportation such as mechanized and non-mechanized boats, trawlers, etc. The land transportation facilities inside the union are also very poor due to muddy roads which become very slushy and slippery during the rainy season, and full of dust, dirt and ditches during the dry season.

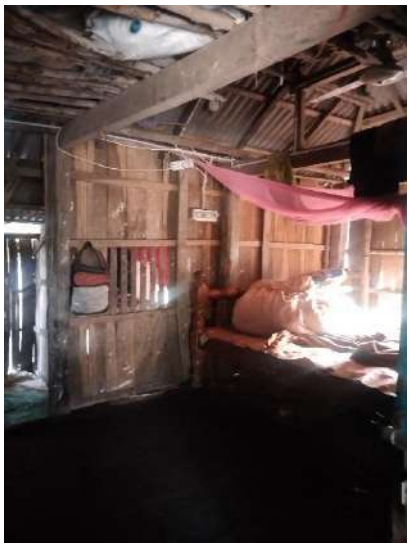




Figure 8, 9 & 10: Local road, household setting and tube-well in Gabura union (Photo: Author)

Local people also face great trouble with medical services due to lack of skilled doctors, inadequate supply of urgent medicines, lack of or insufficient urgent medical equipment's, etc. Salinity problem is very severe in those areas for more than 25 years. People of this area are facing livelihood insecurity, as well as health insecurity. A summary of the socio-demographic characteristics of the Gabura Union is given in Table.

Table 1: Socio-demographic condition of Gabura Union, Shyamnagar Upazila, Satkhira, Bangladesh

Socio-demographic factors	Category	Percentage (otherwise specified)	Remarks
Livelihood options	Fisheries	80	Most of the household members are involved in shrimp farming. Other fishery related activities are fishing, shrimp and fish marketing, boat making and repairing, net mending, etc.
	Agriculture and other alternative livelihood activities	20	Other alternative livelihood activities are day labouring, driving, poultry and goat rearing, groceries and shop-keeping.
Housing	Earthen	72	Earthen houses are generally made of low-quality materials such as mud and thatch.
	Semi-concrete	18	Semi-concrete houses have either bricks, cement and iron made foundation or concrete made plinths. Walls and rooftops are generally made of tin, thatch or woods.
	Concrete	10	This houses are made of concrete, bricks, cement and iron.
Literacy rate (mean)		35.9	Mean literacy rate of male and female is 38.8% and 33.2% respectively.
School	Primary and Secondary	Number: 14	Some of these schools are used as temporary cyclone shelters. A few of these buildings become very old and weak.
Market		Number: 3	Most shops are made of mud and bamboo fence. Infrastructure is not well developed

Road	Unpaved or earthen road (44 km)	85	In rainy season, they often become muddy, slippery and waterlogged and in the dry season, they become dusty, dirty and ditch.
	Unpaved or earthen road (44 km)	15	Brick pavement or soling road often gets broken.
Medical facilities	Community and satellite clinic	Number: 12	Lack of skilled doctors, inadequate manpower, insufficient urgent medical instruments and medicines, etc.
Sanitation facilities	Hygienic latrine	22	Hygienic latrines include both pit latrines and poured flush water seal toilets. Usually, 3-4 households' members are using one toilet.
	Unhygienic latrine	16	Unhygienic latrines are generally set beside ponds and rivers. As a result, feces contaminate the surrounding water and deteriorate the environmental condition.
	No latrine	18	Those households' members who do not have any toilet defecate on the open place. Female household members are the worst victim of these circumstances.
Drinking water facilities	Deep tube-well	95	Most people use deep tube-well water for drinking. However, they use river waters for bathing, washing clothes and utensils, etc.
	Pond Sand Filter (PSF)	23	PSF was introduced in the community with the help of few non- governmental organizations. However, the number of PSF is not adequate to provide safe water for most of the people.
Electricity facilities	Grid lines	0	No grid electricity is available in the union.
	Solar panel	100	Solar panels are used in all households.
Cyclone shelter		Number: 3	Insufficient in number, shortage of space, male and female members of different households stay tightly sharing common place. In this circumstances, female household members feel insecure in the cyclone shelters and as a result, they show reluctance to come in cyclone shelters during any disaster.

Source: Adapted from Bangladesh Bureau of Statistics (BBS, 2014) & Gabura Union Parishad (2019).

Chapter 4: Methodology

4.1 Methodological Approaches: Qualitative Study

Two essential techniques for gathering and analysing data in research are qualitative and quantitative analysis. Since each method has the same goals, they can all be employed separately or together. Quantitative analysis is a procedure in which data is gathered, categorized, and then computed for specific discoveries using a variety of statistical techniques, is frequently linked to quantitative analysis. A huge sample of data is randomly, purposively or sampling technique-wise selected, and it is then analysed. In order to determine "why" a specific phenomenon occurs, qualitative analysis enters the picture. For instance, it can be difficult to uncover relatively novel notions using quantitative research. Analysis of non-quantifiable data is the focus of qualitative analysis. Understanding and insights into the characteristics and aspects of objects are the focus of this type of data. Qualitative analysis can help us comprehend "why" a particular phenomenon occurs on a deeper level. In contrast to quantitative analysis, which is constrained by predetermined classification criteria or numerical values, qualitative data analysis is flexible and multifaceted. Additionally, it is exploratory in character, subjective, descriptive, and non-statistical. Qualitative analysis is based on classifying objects (participants) according to qualities and attributes. While quantitative analysis is objective, qualitative analysis is subjective. Qualitative data analysis has many different applications and facets. Additionally, it is exploratory in character, subjective, descriptive, and non-statistical. Such exploratory methodology is used when attempting to understand a phenomenon's causes in greater detail. Through qualitative analysis, social interactions are aimed to be better understood. Social researchers usually prefer to adopt a qualitative methodology while exploring people's life histories or everyday behaviour (Flick, 1998; Silverman, 2005). Analyses that are qualitative have limits. It cannot, for example, be applied to the population as a whole. An unstructured technique uses small samples that are not typical of the full population; as a result, the method cannot be utilized to generalize the entire population. Still qualitative research method is preferable to a good number of researchers for their detailed research purpose. Qualitative research designs tend to work with a relatively small number of samples with a wider scope of finding 'detail' or 'deeper' understanding of social phenomena than would be obtained from purely quantitative data (Silverman, 2005). Besides, the qualitative

research process goes by a variety of different labels while the researcher approaches the world with a set of ideas, a framework (theory, ontology) that specifies a set of questions (epistemology) that he or she then examines in specific ways (methodology, analysis) and collects empirical materials bearing on the question and then analyses and writes about them (Denzin and Lincoln, 2000). Throughout the 20th century, qualitative research played an important and distinguished role in various disciplines within the social-sciences having specific relevance to the study of social relations, owing to the fact of the pluralisation of life worlds (Flick, 1998) that also examines the complex social world, especially meanings and behaviours in a social context (Powell and Single, 1996; Rich and Ginsburg, 1999).

Here in this research qualitative methodology has been widely applied to get a detailed and explanatory idea about the overall livelihood conditions and health impacts of coastal women due to salinity intrusion and other social stigmas working among them. In the overall methodology of this research, data collection is the first phase and the result or outcome is the final phase. Both primary and secondary data has been used in this research focusing the qualitative data and analysis in priority. Primary and secondary data has been triangulated further to find out the result of the research. In the next section of this chapter this methodology will be briefly discussed along with the methodologies of fieldwork design, data collection and data analysis with detailed construction of this research.

4.2 Fieldwork Design

While planning the field survey, several issues were taken under consideration for planning survey methods, sampling procedure and documentation technique. The objectives and the specific aims were kept is focus while planning the field survey. According to that the qualitative data acquisition was considered as topmost priority. Some quantitative data has also been acquired to analyse the health scenario of coastal women. Such

Figure 11: Field-survey in Chakbara Village of Gabura Union

data and information were collected in several procedures. Among the procedures; observation, in-depth interview, questionnaire survey and focus group discussion (FGD) has been selected as the data collection tools. Primary data was collected through these processes. For secondary data; several reports, journals, articles and literatures has been reviewed to get secondary information. Some survey based information of previous times has also been used for analysis purpose. To acquire secondary quantitative data, it is found that most of the time manipulated data are used in several researches or reports. That is why I visited the field two times to acquire 'first hand data' as well as to ensure the proper validation of it so that manipulation of data can be avoided. Field survey design contains some procedures and issues to run it in a standard way. These issues are narrated in the following sections with relevant sources of data acquisition both from field of the study area or from secondary sources.

4.2.1 Field-survey Execution

In this section, the whole field survey experience will be described to portray the picture of the study area and the respective respondents. As salinity intrusion is mostly affecting the coastal unions of Shyamnagar sub-district, which is why it was necessary and more relevant to visit and collect data from those areas. As Gabura union is an island and surrounded by waterbodies, it is mostly affected by saltwater and at the same time the transportation system to reach towards it was quite difficult. On the days of data collection and field survey, I used to reach at Satkhira district on the very dawn and from Satkhira it takes almost two hours to reach Shyamnagar sub-district. From the center of Shyamnagar, there is no direct transportation system towards Gabura union. I had to change 4 vehicles to put my feet on the land of Gabura union and then I had to walk for almost half an hour to arrive at the villages where I could find my suitable participants for field survey. From Shyamnagar, I had to hire an

Figure 12: The targeted respondents from Gabura union

easybike which took me to Munshiganj Union in 1.5 hours. On Munshiganj bazar I had to change that easybike and hire another one, which further took me to Neeldumur Kheya Ghat in 1 hour. The roads from Munshiganj bazar to Neeldumur ghat was almost inaccessible and totally unpaved as well as full of dust. From Neeldumur ghat I had to travel through a trawler crossing Kapotaksha to Gabura Island surrounded by water, inside that island is Chakbara village, Dumuria village and Harishkhali village where I visited. All of these are a small beautiful villages in Gabura Island bordering the Sundarbans. It is bitterly cold, and the transportation system on it is quite inaccessible. But the people of Gabura were so welcoming and cordial towards me. They interacted with me in whole-heartedly, which I did not even expect before going to the area.

The women of Gabura union talked with me about their health problems, associated risks and discussed about their demands and urges regarding to this menstrual hygiene issue. They also helped me to find out my targeted households and respondents by staying with me on the whole time. They roamed with me to show the features such as saltwater affected ponds, freshwater reservoir tanks, their water resources and other related things that I needed for my data collection purposes. On the dusk I used to return from Gabura in a same process with some wonderful experiences with me. To assess the NGO interventions as a role of relevant satkeholder, I visited almost all the NGOs of Shyamnagar and also got a welcoming and kind behavior from them. They talked to me about their contributions, current interventions and future plan along with providing the data that I required for conducting the research properly. Lastly I visited Shyamnagar Upazila Health Complex, Friendship Hospital and Digital Diagnostic Center and REDA Diagnostic center and talked with the designated doctors of Gynecology to validate the health scenario of women from several coastal unions of Shyamnagar upazila.

4.2.2 Sampling Procedure and Selecting Suitable Respondents

Sampling in qualitative research includes choosing the people, places, organizations, and circumstances that will be observed or interviewed. (Bouma and Ling, 2004). I chose purposive sampling method for selecting a small but "appropriate" sample of households for observation, semi- structured in-depth interviews, and FGD participants using purposive sampling. I was able to choose the categories of households and population groupings that best matched my theoretical stance and, more crucially, the explanations or accounts that I hoped to construct throughout this research by the use of purposive sampling. In order to choose participants for the FGDs, I also

used quota sampling and snowball sampling. Because the literature implies that adolescents, teenage girls and working women are the target group and more vulnerable in terms of exposure to salinity intrusion, even at the community level, quota sampling allowed me to purposefully set the different subcategories of participants. The study topic and research design, according to Onwuegbuzie et al. (2009: 3), "ultimately influence how the focus group is created." This made it easier for me to understand the widest possible range of people's opinions, vulnerabilities, coping mechanisms, and chances for employment and revealed the general similarities and differences between their common problems. However, I employed snowball strategies simultaneously to choose appropriate and willing samples for the FGDs. While sampling participants, I always talked with the initial respondents to propose another person before choosing the next participants, who would be interested in or qualified for the study.

Considering my theoretical stance, I chose the study sample that would best be able to supply the necessary data and information to achieve my research goal. In this study my purpose was to ensure the inclusion of different groups of women including adolescents, school and college going teenagers, working women and housewives.

4.2.3 Data Capturing and Documentation Technique

Capturing data and documenting them in the field survey is a process which takes times and sometimes breaks the concentration or mood of the researcher. On field data documentation about my observations was possible but when observing the study site and observing the recipient, taking notes are not troublesome but while talking to people it is unnecessary waste of time. Due to this reason, after getting their consent, the majority of the interviews and discussion sessions were recorded on my mobile phone's voice recorder. I tried to use this tool because I wanted to communicate with the interviewee rather than spend a lot of time writing the data on the paper. Furthermore, the voice recorders gave me a more

Figure 13: Data Collection from the respondents

thorough description of each spoken interaction than any amount of writing notes or reflecting could. In order to identify the primary themes and sub-themes for in-depth study, the fieldwork data was transcribed and thematically described in English after the field work. Though I have used the recorder for my research purpose, I requested the participants to forget about the recorder and to continue the conversation in a natural process. I also stopped the recorder when I felt that the respondents are feeling uncomfortable while talking about any sensitive issue when the voice recorder is on. Sometimes the important gestures of the respondents are documented as these are not capturable on the voice recorder. Research progress and important notes or any remarkable incidents were also documented by me during the field survey. Those helped me much further in the time of my analysis of this report. Photographs were also collected as the documentation purpose of important study features and some other photographs were also collected while collecting data and interacting with the coastal women of Gabura union and associated NGO personnel.

4.3 Data Collection Procedure

Although data is useful in any kind of researches, but having the incorrect data can be meaningless. The best data collection technique can make the difference between time-wasting misdirection and insightful discoveries. On the field survey, basically qualitative along with some quantitative data has been collected for the purpose of this study. Generally there are several methods of data collection for field survey. The data collection processes which are included in this research are-

- Questionnaire Survey
- In-depth Interviews
- Focus Group Discussion

All the four types of data collection methods are used consecutively on the field survey of Gabura union of Shyamnagar upazila. Questionnaire survey is the method to collect quantitative information and the others (observation, in-depth interview and Focus Group Discussion) are conducted for qualitative data collection. This methods of data collection is briefly discussed here with the descriptions and the procedures.

4.3.1 Questionnaire Survey

Questionnaire survey is a method for quantitative data collection where only some research questions are suited based on the selected area. Its applicability is determined by the types of data required to address a research issue and the subjects the researcher wants to interview. Questionnaire survey is only useful when participants are knowledgeable about the subject and capable of responding to the questions. Respondents must have the knowledge and capacity to respond, and questions must be relevant to them. Children are typically not included as potential respondents in household surveys because they frequently lack the knowledge necessary to respond, the topics under study are frequently irrelevant to them, and young children may not have the cognitive ability to understand and comprehend complex questions. In my questionnaire survey, I tried to design it in such a way that all the relevant information can be carried out. This questionnaire survey was based on the regular water use pattern of women and sources of this water, how they are maintaining their menstrual hygiene in such scarcity of freshwater and what are the practices in their menstruation periods. This questionnaire also includes the health problems they are suffering from due to the excessive use of saline water and how they are coping with it. Lastly some issues such as their awareness about long-term health risks and the steps taken by them to overcome health difficulties have also been taken in consideration for questionnaire survey among the affected women in Gabura union.

Figure 14: Questionnaire survey with a salinity induced disease affected woman

4.3.2 Key Informant Interviews

Social research relies on dialogue through semi-structured in-depth interviews (Crang and Cook, 2007). It is a flexible, discovery-focused strategy (Punch, 1998) with a wide range of applications (Fontana and Frey, 2000). As a method of gathering qualitative data, semi-structured interviewing is flexible since it allows for the use of both preset questions and subjects as well as the exploration

of new ones as the interview progresses. I interviewed eighteen people in-depth in the entire research design. All interviews were semi-structured, one-on-one, and open-ended and were focused on participants' perspectives on the total dimension of their health scenarios, and the consequences they are facing, as well as coping and other options for adaptation options in the crisis. The main focus of my KII theme for affected coastal women was about their health difficulties driven by frequent saltwater use and their regular practices regarding to such difficulties. Identifying their awareness level and corresponding demands were the other important themes for key informant interviews. Additionally, I conducted 8 key informant interviews in a lengthy, in-depth conversations with designated NGO personnel who are currently working for coastal women in Shyamnagar sub-district. This helped me to gain a deeper understanding of the various indirect subjective perspectives on the dynamics of the stakeholder's perspective by getting ideas about their current interventions, challenges during their work and future agendas or plans to work for affected communities and vulnerable women.

Figure 15: Key-Informant Interview (KII) session on a Local NGO office

4.3.3 Focus Group Discussion (FGD)

People with comparable backgrounds or experiences are brought together for a focus group conversation to discuss a particular topic of interest. They are questioned about their perceptions, attitudes, beliefs, opinions, or ideas in this type of qualitative research. Participants are permitted to converse with other group members during focus group talks, which, in contrast to other research methodologies, promote conversation amongst participants. It typically entails group interviewing, with typically 8 to 12 participants in the group. A moderator (interviewer) guides the discussion, which is loosely structured and covers a range of interesting subjects. According to HERD publication of Nepal, FGD is holding a structured conversation with a chosen group of people to learn more about their perspectives and experiences on a subject. It helps in acquiring insights into people's shared understanding of daily life and the ways in which individuals are

impacted by others in a group context. This process also particularly well suited for gathering many opinions on the same topic. Since effective group leadership and interpersonal skills are necessary to successfully moderate a group, the moderator's position is crucial. I conducted total 7 FGDs of which there were five FGDs on the salinity affected women of the residents of Gabura union. The other two FGDs were conducted with NGO workers and their representatives. The key theme of my FGDs were- coastal women's health problem, their awareness level regarding to it, coping mechanisms, health facilities and consultation with doctors, long-term consequences and contributions and interventions from several stakeholders. I looked for locations for FGDs that would be neutral, distraction-free, easily accessible, and pleasant for my participants. I acted as an observer, a moderator, and a principal during the FGDs and posed questions in an interactive group setting where participants were allowed to converse with one another. A variety of methods were used, including questioning, displaying photos, narrating stories, interpreting various themes, etc. My findings from the FGDs provided me a verified and intensive data about the above themes and helped to verify data in a different aspect of gathering necessary information.

Figure 16: FGD with women who have several health difficulties due to salinity

4.4 Methods of Data Analysis

Qualitative data analysis generally refers to the analysis on interviews, observations or focus group discussions. Such type of data analysis includes ethnographic analysis along with narrative analysis, descriptive analysis, content analysis or grounded theory approach. In this current research these four types of data analysis methods has been used to analyse the data acquired from field survey and also from secondary sources. Content analysis is a procedure of data analysis used to classify, summarize, and tabulate verbal or behavioural data. Narrative analysis is the researcher's reinterpretation of the original qualitative data. The reformulation of stories provided

by respondents using the narrative analysis method takes into account the unique experiences of each respondent as well as the context of each instance. Descriptive analysis refers to the description of study features and description based analysis through the point of view of the researcher. While discussing about grounded theory approach; to develop a theory, the grounded theory approach of qualitative data analysis first analyses a particular example. Then, extra cases are looked at to see if they support the idea. It is a bottom-up analysis approach among other qualitative analysis. The four interconnected steps of data analysis are data reduction, data display, conclusion, and verification (Silverman, 1993). I first documented and edited my data before assessing the data from numerous sources; including field observation, in-depth interviews, and focus groups. The next subsections provide an overview of my data analysis methodology, which is used in this research.

4.4.1 Narrative Analysis

Form and content can be investigated combined in narrative analysis. A focus on narrative can put a spotlight on how informants use language to transmit specific meanings and experiences (Punch, 1998). I used narrative analysis to build a "thick description" of the stories my respondents used (Geertz, 1973). These explanations gave me insight into the core of the experiences, intentions, comprehensions, and motives around those experiences (Atkinson, 1998; Bryman, 2004) of the vulnerable women in this coastal area. Generally narratives are told in participants's social contexts. With the generous permission of my respondents, I properly cited quotes relevant to their perspectives on particular subjects with their names, with the exception of a few instances when I had to retain anonymity and privacy. I also included constructive paraphrases that follow the facts, more ethereal representations of the facts, or remarks on the recorded events' interactional aspects or narrative structure (Sandelowski, 1995 cited in Casterle et al., 2012: 365). The use of narratives is primarily related to three key areas of my research: systemic and/or purposeful

Figure 17: A college-going girl talking about health problems

analysis (Atkinson and Delmont, 2006); interpreting the "in place" experiences of various people and groups and how they interpret and give meaning to situated experiences; and direct ties to ethnographic methods. In this research, in-depth interview data were often evaluated with thick description, which is based on the person's speech (Flick, 2002), stories or narratives (Bruner, 2006), and interpreted to get a scenario of their daily lives and realities. While (Denzin and Lincoln, 2008) argue that "rich" descriptions of the social environment are important in qualitative research, the narrative approach ultimately improves the quality of those data. The health issues and the coping mechanisms along with their impact has been analysed here through narrative analysis The contributions of NGOs, health workers or other stakeholders from the respective designated personal and involved beneficiaries has also been demonstrated here in this research through narrative analysis approach.

4.4.2 Descriptive Analysis

Descriptive analysis generally refers to arranging, sorting, and manipulating data to produce meaningful information about the presented data in order to transform raw data into a form that will be simple to grasp and analyse. Descriptive analysis is a sort of data analysis that aids in accurately describing, displaying, or summarizing data points so that patterns may appear that satisfy all of the data's requirements. It is one of the most crucial processes in the examination of statistical data. It provides a summary of the data's distribution, aids in the detection of errors and outliers, and makes it possible to spot similarities across variables, preparing the data for further statistical analysis. This type of data analysis procedure has been used in this research to describe the overall phenomena of women’s health conditions and a summarized or comprehensive description about the consequences or adverse effects on their reproductive health. Descriptive analysis further prepares the field data to an extent that it can be used to analyse the vulnerabilities of coastal women with associated strategies and facilities by relevant stakeholders through field surveyed data where descriptive analysis helps to accumulate this information. Thus descriptive analysis has been used in this research to assist in field level data acquisition and to measure how vulnerable the coastal women are from the aspect of maintaining their menstrual hygiene as well as from the aspect of coping with the strategies to overcome their adverse health impacts for the contamination of saline water.

4.4.3 Grounded Theory Approach

Many research investigations use the well-known methodology of grounded theory. Grounded theory aims to find or build a theory using data that has been methodically collected and examined via comparative analysis. Although grounded theory is a flexible methodology by nature, it is a complicated one. It is widely acknowledged that the best definition of grounded theory is as a research technique (Punch, 1998) that provides a thorough and empirically rich interpretation of the social settings under study and then develops theory from this data.

I widely implemented the grounded theory approach to construct an explanation for the health impacts and vulnerability of the coastal women for salinity intrusion from the viewpoints of the grounded reality. It also aided me in recognizing and outlining the most important ideas and fundamentals, such as the circumstances and difficulties associated with maintaining menstrual hygiene of adversely affected women in Gabura union. Grounded theory approach is a bottom-up approach where a theory is provided by the author himself based on the ground reality. Grounded theory was used to analyze the field data in this research, particularly the data from the FGD and in-depth interviews. I was able to recognize and explain the main elements using the Grounded Theory approach, including the contexts, issues, and potential solutions in the coastal women's health sector that are primarily determined from field durvey. New theories or concepts are produced by the gathered empirical facts or evidence through inductive analytical procedure. Based on the data collected from the field survey, I tried to make the use of Grounded Theory approach in this research extensively.

Overall research strategies and methodologies have been discussed in this chapter. Several data collection tools have been used to collect data and information from the respondents. The collected data is analysed through using four types of data analysing methods. From the field work and survey experience, I eventually got the opportunity to verify and analyse the relations between the field reality and existing theories by different researchers. Previously reviewed literatures were verified from my own experience in this way. Increasing salinity and its adverse impact on the health of coastal women were visualized through my own observation and first hand data which helped me later to construct a meaningful unbiased research. Though having some challenges faced on the field survey, I tried to gather the unbiased information and eventually the survey resulted into a good experience on the study site. I also experienced to observe the GO-NGO roles on the coastal area to develop the health sector for the residents of Gabura union.

Chapter 5:

Result and Discussion

5.1 Health Issues among Coastal Women

The people from coastal areas like Gabura Union in Shyamnagar sub-district are suffering from a shortage of safe drinking water and fresh water for their regular activities like household work, bathing, cooking, and cleaning, as a result they are forced to use saline water. Salinity in the water is linked to a number of health problems, including skin disorders, dysentery, diarrhea, hypertension, uterine infections and in some cases it turns into cervical cancer. As coastal women are supposed to use more water than men during their regular activities, they are more likely to experience health problems due to saline water. In a recent study titled Climate Change and the Environment, researchers from Imperial College, London, examined the relationship between salinity and maternal health. Specifically, they examined the potential health effects and elevated risk of high blood pressure that could arise from salt water intrusion into low-lying coastal areas, particularly for pregnant women. Bangladesh was identified by the report as one of the most affected nations worldwide. In the Gabura union, this has been happening for long time. Numerous chronic illnesses are seen to affect people's skin, stomachs, blood pressure, menstrual cycles, reproductive systems, appendices, and other bodily parts. Because they use salty water more frequently for home chores and menstrual hygiene, women and girls in this context are the most sufferer. In the villages of Gabura union, the frequency of diseases is increasing among women and adolescents. Women who work in the fish fry collection sector, they have to spend a lot of time in saltwater. Fish fry collectors experienced serious gynecologic

Figure 18: People of Gabura union are working on the ponds which is full of saltwater (Photo: Author)

problems during menstruation. In the majority of cases, these women need to go to upazila hospitals for treatment, which puts a financial strain on them.

Shahanara Begum, a 40 years old lady from Chakbara Village of Gabura union narrates-

"After working in the shrimp collection field all day under waist-deep water, when I return home from work, I feel burning in my urine and pain in my uterus. But there is nothing to do, I have to work in salt water to run my family".

Before 20 to 25 years ago, there was very little or no salt incursion onto agricultural land, and women worked in agriculture during that time without facing similar health risks. The majority of agricultural land is being used for shrimp farming, which has caused a decline in the employment opportunities for women. Women have to thus participate in fish fry collection in order to support their families. By staying in the waist-deep water for a long time while working, this fact is working as one of the driving force for women to face severe uterine diseases. Another crucial fact is that, when they menstruate; due to the lack of freshwater they have to use salty water to wash the rags they use during their menstruation period. The lack of accessibility and affordability of sanitary napkins or pads drives women to use cloth rags during menstruation periods that require water-wash to reuse.

Figure 19, 20 & 21: Women from Gabura who have abdominal pain, uterus ablation surgery and uterine infections (Photo: Author)

Where it is challenging for them to afford three meals a day, spending 100 to 150 BDT on sanitary pads each month for girls and women in these coastal communities are really non-affordable. As a result, women use that rags throughout this time.

"Many times it happens that there is no money at home to buy foods for our children, where is the money to buy pads"!

Dipa Rani Mondol, 35 years old housewife from Chakvara Village of Gabura union says with discontentment regarding to this issue. Over 80% of women and adolescent girls in Bangladesh rely on using old cloth rags during their menses, according to the preliminary report of the Bangladesh National Hygiene Baseline Survey, which was carried out in 2014 with assistance from WaterAid, the International Centre for Diarrhoeal Disease Research, Bangladesh (ICDDRB), and the government of Bangladesh. Naturally, they cannot wash these cloths on bathing ponds. Washing the used clothes in the nearby dirty and salty water and using them again, leads to the various problems of the uterus. There are many other women like her in Gabura union, who are facing uterine diseases, abdominal pain, burnings in urine and similar kind of infections which leads to cervical cancel or sometimes it turns into infertility problem and these women has to remove their uterus through surgeries to avoid such kind of severe health difficulties.

Figure 22: Unsafe and unhygienic latrine of a household in Gabura union (Photo: Author)

Dr Fatema Idrisi Eva, Medical officer of Gynecology in Shyamnagar upazila health complex; talked about this health situation of women living in the coast. She says-

"The women from Gabura union are basically very low-income people. That is why they does not want to spend money on visiting doctors. Still the number of female patients with vaginal infections and UTIs is rising among the people living along the coastline".

5.2 Long-term Consequences on Women's Reproductive Health

The excessive salinity intrusion and current health difficulties can turn into a devastating long-term consequences for the women in coastal area like Gabura union. The International Center for Diarrheal Disease Research, Bangladesh, monitored 12,867 women from the time of conception to delivery between 2012 and 2016. They encompassed ladies from hilly and coastal regions. According to the study, women who live in coastal locations- that is, within 20 kilometers of the sea- have a higher risk of miscarrying than women who live in highland areas. During the field survey in Gabura union, it was found as frequent among the adolescents and women that they cannot maintain menstrual hygiene due to the scarcity of freshwater and living with so many health difficulties due to this saltwater use. As they usually avoid to visit doctors or hospitals because of their financial crisis, these minor problems sometimes turns into serious health difficulties. It is also evident among the women that they take birth control capsules through injecting it inside their body from a very early age. That also prevents them from menstruating for almost 2-3 years, as the validity of one capsule is 2-3 years. After 3 years they again take another capsule to control childbirth which eventually stops their menstruation again for a long time. While this cycle continues, once the menstruation permanently stops early before the certain age of menopause.

Figure 23 & 24: A woman showing injected birth-control capsule inside her body part (Photo: Author)

Masuma Akter who is a 22 years old woman living in Dumuria village of Gabura union, shows the capsule inside her hand which she injected 1 year ago and says-

"I take this capsules to control child birth in every 3 years and as a result my menstruation gets stopped. It is one kind of benefit for me because I do not have to maintain menstrual hygiene and avoid uterine diseases through this".

Another 32 years old woman named Khairun Begum says-

"I used to take those birth control capsules on a regular basis and now my menstruation has been permanently stopped in this early age"

But while discussing about whether they are aware of its long-term consequences or not, the response was totally negative. They are not merely aware of what can happen due to their activities. This is eventually causing infertility, surgical ablation of uterus and sometimes turns into cervical cancer in many cases.

"I have cut off my uterus through surgery due to my severe infections. And I am not the only one, there are many like me".

Narrated Jinnatun Begum who has recently eliminated her uterus because she was suffering from chronic abdominal pain and uterus infection. After visiting to the hospital, doctor suggested her to cut the uterus off because she had to chance to affect in cervical cancer as her infections were quite acute. She did the surgery and now living without uterus. From the field survey it was evident that the number of such cases are increasing.

Dr Soheli Afroz, Designated Medical Officer from Shyamnagar Upazila Health Complex says about the long-term results of such health issues-

"The practice of maintaining menstrual hygiene is not adequate among the women in our coast. These are causing an increase in infertility, irregular periods, and pelvic inflammatory disease. The majority of women over 40 who seek treatment have undergone hysterectomies, or the surgical ablation of the uterus. An early removal of the uterus can result in a variety of hormonal issues down later on, such as osteoporosis, disturbed sleep, irritability, and mental health issues that can also cause issues for the patient in their social and familial relationships."

According to the doctor, a lot of people, particularly women, have high blood pressure, or hypertension, which can lead to heart attacks and other cardiovascular illnesses, as a result of the saline density. Excessive salt intake can also result in malnutrition, poor digestion, and iron deficiency. Anaemia has developed in these areas because of rising rates of vitamin B12 deficiency. Patients who are pregnant and seeking treatment frequently have iron deficiency, which can have a lifelong impact on the growth of the babies.

Local climate activists from Gabua union also brought up an important fact which is salinity has an impact on child marriage and separation. After the ages of 18 to 20, girls began to develop chronic skin disorders as a result of their constant use of salted water. The salinity effects darkens their skin. In a village setting, most people refuse to marry a girl who has skin conditions and a dark complexion. Therefore, parents anticipate that their daughter will marry between the ages of 10 and 15 since they believe that it will burden them later. The majority of them developed uterine problems at a very young age, and in these situations, their husbands abandons them to marry another adolescent girl. And with two or three children and additional liabilities, they has to return to their parents. This is another consequence the women are facing from their societal and family perspectives.

Jinnatun Begum also narrates regarding to this-

"My husband is trying to send me back to my father's house since after my uterine surgery. I know his intensions, he is going to marry another girl. This salinity has totally destroyed my happy family!"

5.3 NGO Interventions for the Health Issues of Affected Women

A good number of Non-Governmental Organizations are found to work on Shyamnagar upazila of Satkhira district. To combat the cumulative effects of salinity on women's health, local grassroots organizations are raising awareness to the issue and providing communities with necessary services. The government has launched a number of development initiatives in recent years that aim programs to improve the livelihoods of the coastal population and solve concerns of coastal zone management. Most of the non-governmental organizations address common coastal concerns, aid in resolving specific coastal difficulties, and carry out initiatives within specific

coastal areas. But they usually restrict their operations to a few specific sectors. Among them, only a small number of NGOs work for women's health development. From the field survey, a picture of the interventions of the NGOs that are working on the health issues of coastal women can be portrayed along with their activities.

Figure 25: A saline water filtration Plant in Gabura Union (Photo: Author)

Local Environment Development and Agricultural Research Society (LEDARS)

LEDARS is basically working with landless, marginal farmers, labour and women headed families, children and adolescents in the climate vulnerable areas of Bangladesh focusing Shyamnagar upazila in main priority. LEDARS have established two water treatment plants in


Figure 26, 27 & 28: Freshwater collection booth through rechargeable card system and water treatment plant by LEDARS (Photo: Author)

Munshiganj upazila of Shyamnagar district in the funding of Bread for the world. From this treatment plant local people can avail water through a rechargeable card system and every 1 liter of water costs 0.60 taka from this plant. People are seen to take fresh drinking water from this treatment plant for their households. LEDARS is also working with Manusher Jonno Foundation

Figure 29, 30, 31 & 32: Leaflets and banners for awareness raising by LEDARS (Photo: Author)

(MJF) and Oxfam Bangladesh to implement their projects in Shyamnagar coastal areas. During the field survey on Gabura union, it was found that LEDARS have built 450 of sanitary toilets under their COVID sensitive amphan rehabilitation project. The platform of these toilet are quite higher so that they can be used during the tides or floods. LEDARS also provided 85 water reservoir tanks for coastal households in Gabura union where they can store almost 1000 liter of rainwater at a time for their further use. They also provided 6 water tanks for community use where almost 10000 liter water can be stored.

Figure 33: Srijon- An initiative by LEDARS to promote sanitary pads at a cheaper rate (Photo: Author)

Mr Mohon Kumar Mondal, Executive Director of LEDARS narrated about their initiaves-

"We have been relentlessly working for the health and water security of coastal women, tiger-widowed women and adolescent girls since 1996. In recognition to that we have won the Zayed Sustainability Award of 2023 in water category".

Among the tiger-widowed women, LEDARS created a 'Self-help Saving Group' where they collects money from the group members on a monthly basis and maintain such saving group. There

Figure 34 & 35: LEDARS's intervention in Gabura union (Photo: Author)

are 3101 beneficiaries of LEDARS in Gabura union where the field-workers from this organization created 66 CRGs (Climate Resilience Groups). They also provide seeds of sunflower, potato and onion 2 times of a year among the women so that they can get themselves out of shrimp cultivation water fields and can work on agricultural fields.

They also provides paddy on both Amon and Boro seasons. LEDARS frequently organizes medical camps on Gabura union in every month and in every 3 months they organize specialized camp where the gynecologists from upazila hospitals come and provide services to the affected women of Gabura union.

"When we go for medical camps in Gabura, we find so many women facing health problems due to salinity; but they does not visit doctors due to financial crisis. For them we brought up specialized gynecologist campaigns".

Shampa Rani Biswas, Senior Field Facilitator of LEDARS said. Another initiative of LEDARS is they have manufactured sanitary napkins named 'Srijon' and engaged tiger-widowed and divorced women in this manufacturing sector. They usually sell it on a very cheaper rate which is BDT 50 so that the low-income coastal people can afford it.

Sajeda Foundation

Sajeda Foundation is another prominent NGO working in Gabura union for the development and advancement of coastal women. They installed 3 freshwater tanks as a rainwater reservoir for coastal households. These freshwater tanks can contain 20000 liter water at a time. They also provide regular WASH (water, sanitation and hygiene) training among coastal women to raise awareness about menstrual hygiene and health issues. In accordance to this project, they also included mental health counselling services where the field workers visit the households and through a screening process they select the women who needs counselling. A para-counselor has been designated for Gabura union who provides mental health counselling

Figure 36: A woman beneficiary with her freshwater reservoir tank (Photo: Author)

and support towards them. Mr Julfikar Haider, Assistant Coordinator of Climate change programme of Sajeda Foundation, said-

"We provide free medicine towards the coastal women for several salinity induced diseases. I think this is one of our crucial contribution to overcome the health difficulties of them."

Sajeda Foundation also organizes free medical camps where a team of DMF (Diploma in Medical Faculty) members work for the health issues of salinity affected women. In the severe cases, they refer the patients to the specialized hospitals for better treatment. They call it 'Static Clinic' for proving medical check-ups and free medicines. Besides, they provide trainings among coastal women about Climate Resilient Agricultural Practices (CRS) and supplies free seed, fertilizer and vermicompost along with regular follow-ups.

BRAC (Bangladesh Rural Advancement Committee)

Though BRAC has not yet been fully started their intervention processes in Gabura union, still they are doing some activities for vulnerable women is Shyamnagar upazila. This interventions include medical check-up for women, intimated care check-up for pregnant women and post maternal care. They are also doing regular awareness raising campaigns and sessions to tackle difficult health issues and prevent child marriage.

Figure 37 & 38: Discussion on BRAC's intervention on Gabura union

Mr Kamal Hossen, Territory Officer at Integrated Development Programme of BRAC in Shyamnagar upazila says-

"Our intervention has not been started in a full fledge in Gabura yet, still we have a team of 50 women and adolescents with whom we are working now and we have further plans to expand our projects here".

BRAC also has some other interventions like installing water reservoirs, installing deep tube wells and proving microfinance to the coastal women in Gabura union of Shyamnagar upazila.

Jagorani Chakra Foundation

Jagorani Chakra Foundation has a specific sector which works for health support of low-income women. This organization is working in Gabura union which puts priority on the health facilities of their beneficiary women. They generally work to raise the reproductive health awareness of Microfinance Program (MFP) beneficiaries who are women, guarantee that these services are available to them from government and non-government service centers, slow the spread of uterine infectious diseases among coastal women, and offer free gynecological problems operations. Jagorani Chakra Foundation is supplying the money required out of its own resources to protect women's health and release them from degrading circumstances. The necessary surgeries are sometimes carried out by government hospital physicians in private clinics in some cases.

Figure 39 & 40: Discussion with the official of Jagorani Chakra Foundation about their initiatives

Most of the women are getting treatment for prolapsed, uterus tumor, breast tumor, uterus infection, perennial tear, piles-fistula-anal fisher, eye operation and hernia.

Center for Natural Resource Studies (CNRS)

CNRS basically works with USAID Ecosystems/Protibesh Activity through Project Governance for Climate Resilience (G4CR). They also initiate another project named Climate Resilient Ecosystems and Livelihoods (CREL) project. Under such projects, they work for mitigating the impact of saltwater intrusion by proving access to freshwater. In recent times they intervened some canal digging in Munshiganj union near Gabura, where freshwater can be found.

Mr. Md. Shahidul Islam, the site office of CNRS under USAID Ecosystems/protibesh activity uttered regarding to their intervention-

"We work to ensure freshwater for the women of coastal Gabura union. When freshwater will be available for them, I think every other problems related to their health and hygiene will decrease with time".

Figure 41, 42 & 43: Discussion about the initiatives of CNRS on Coastal area

He also stated that CNRS carried out a few WASH and health-related projects during the recent years. WASH and health have been linked in many CNRS programs.

Besides these above NGOs, there are some other NGOs can be found who also works for the livelihood development of coastal community, Akong with this, a good number of NGOs work with microfinance on Gabura union. Though so many interventions are ongoing in Gabura union, still any sustainsble and long-term adaptive strategy is not seen to develop and reduce the health risks of the women of Gabura union.

Figure 44, 45 & 46: Some other NGOs working on Shyamnagar coastal area (Photo: Author)

The southern region is generally salinized. A finding from field survey about NGO operations in Gabura union is, there is no coordination among them. The same individual may receive assistance from two or three NGOs in one location. An NGO worker does not seem to conduct a thorough screening survey to determine the true needs of affected women. They usually provide benefits to the same person using the list of other NGOs. However, different NGOs should emphasize more concentration in various sectors of livelihood on the coastal area.

Chapter 6:

Recommendations and Conclusion

6.1 Recommendations

Women's health and wellbeing are seriously threatened by the increasing saline intrusion in Bangladesh's coastal areas, especially with relation to managing menstrual hygiene and health difficulties. This study explores each aspect of this problem and tries to offers some concrete solutions that can protect women's health, strengthen their awareness of authority, and help them adapt to an ever-changing environment. Therefore, all stakeholders involved in salinity intrusion reduction and health development projects might have more specific goals to act toward to achieve a sustainable adaptation strategy for coastal women who are affected by excessive salinity. Some measures can be suggested here through this research as the recommendations to step toward resilient and healthy coastal community.

- To boost freshwater availability, community-based rainwater gathering systems, desalination technologies, and methods for managing water like ponds should be restored. To guarantee that all local people including women and girls, have fair access to clean water, it is important to upgrade and expand the current water distribution networks, especially in underserved areas of coastal villages. The key to maintaining the area's wellbeing is embankment management, which prevents salt water from flooding the villages' water supplies.
- The freshwater reservoirs which are installed by several NGOs in household level, they can contain maximum 300-1000 liter of water which people store during the rainy season. But this is so much inadequate for a family to meet their needs till next rainy season. In this context, water reservoir tanks should be provided in such a dimension that has more capacity to store water for a whole year. Anwara Khatun, a housewife from Chakbara village of Gabura union, uttered with disappointment-

  "We have got water reservoir tanks from several NGOs but these are such small in size that it can only reserve water for only 3 months. After 3 months we again have to use the available saline water".


Figure 47 & 48: Freshwater storage tank and other storages of household (Photo: Author)

Figure 49: Water storage vessels on a household of Chakbara village (Photo: Author)

- Comprehensive information and knowledges on menstrual hygiene management in the curriculum of schools from primary level should be included as well as community awareness initiatives to tackle uterine diseases, encouraging medical check-ups and necessary treatments, breaking down mensuration taboos, advocating safe practices, and simplifying menstrual waste disposal should be promoted. Organizing regular media campaigns, workshops, and community discussions to dispel the stigma attached to menstruation can build a more accepting environment where women and girls can handle their menstruation issues with dignity.
- The production of sanitary pads and menstrual cups locally and distributing them at discounted prices should be encouraged by the stakeholders, so that women from all socioeconomic backgrounds can use them.
- To ensure that their needs and perspectives are understood and taken into consideration, women should be involved in decision-making processes related to resource allocation, water management, and climate adaption techniques and healthcare facilities so that they can manage and take steps towards their health issues on their self-initiatives.
- By promoting agricultural practices like paddy, potato and other crop and vegetable production, coastal communities need to pursue less saline-dependent agricultural methods as their sources of income to reduce the dependence on shrimp farming, which contributes to salt intrusion. Especially women who works at shrimp farming on a regular basis, they should be shifted to other agricultural works because regularly staying in such waist-deep water eventually leads towards severe health consequences.
- Associated medical personnel should be provided with the information and abilities they need to identify and handle urogenital infections as well as other health issues linked to risky menstrual hygiene practices in salty surroundings.
- Reproductive healthcare services should be easily accessible for coastal women. Proper initiatives towards women's access to and availability of menstrual health services and

Figure 50: Discussion with the emergency duty doctor of Shyamnagar upazila health complex

other reproductive healthcare services in coastal areas should be ensured by Government, working agencies and non-governmental organizations.

In the context of Gabura union, it is found from field survey that several NGOs are arranging medical camps but due to the absence of any female doctor in the camps, affected women from Gabura union seems to feel ashamed to talk about their menstrual issues or uterine diseases to a male doctor. This is one of the significant reasons why medical camps are going in vain and creates less benefit than expected among coastal women.

Afiza Khanam, 25 years old woman from Gabura union who is also mother of 2 children, uttered with embarrassment-

"I suffer from severe abdominal pain and uterine infections. NGOs sometimes arrange medical camps but they bring male doctors. I feel embarrassed to talk to him and that is why I do not go there. It would be better if they bring a female doctor as well".

Figure 51 & 52: A medical centre in Gabura union where the doctor remains absent almost all the time (Photo: Author)

Menstrual hygiene can become more than just an essential necessity by strongly addressing the issues caused by saltwater intrusion and giving coastal women's needs top priority. This will help to ensure that menstruation hygiene becomes a fundamental component of empowerment, resilience, and well-being in the face of climate change. By putting these recommendations into practice, coastal women can be benefitted just not simply by reducing the detrimental effects of saline intrusion but by trying to build a future in which coastal women will have the necessary assistance to handle their menstrual hygiene in a safe, dignified manner without endangering their health or wellbeing.

6.2 Conclusion

Salinity intrusion, a consequence of climate change and shrimp farming practices, is continuously pushing a severe threat to the well-being of all residents, especially for women, the consequences are particularly profound. The research focuses to the concerning pattern of rising salinity intrusion in Bangladesh's coastal regions during the previous 20 years and how the women in coastal belt are getting extremely affected by this. The livelihoods of the women living along the coast are greatly impacted by salt, which also affects practically the health of those woman similar to those of Gabura union of Shyamnagar sub-district. This study also shows that there are insufficient adaptive strategies; and in order to address this problem, traditional and scientific procedures must be combined. The local women of Gabura union are not the least aware of the health consequences occurring due to the result of excessive saline water use, they consider such issues as frequent as yellowish urine and are unaware of its causes. Due to this very reason, raising awareness among local women is the first and foremost need to eradicate the issue. Another solution can be developing a sufficient amount of freshwater reservoirs which contains enough water for a whole year and can be accessible and available towards local women to use for their hygiene provisions. The use of sanitary napkins needs to be more accessible and affordable so that local people can buy them on a cheaper rate. Local people have to be more educated and conscious so that they can come out from social stigma of buying sanitary napkins from shops and markets. Eventually, a collaborative approach is necessary that includes GOs, NGOs, community people, and other stakeholder's contributions to improve this alarming situation of local women in coastal areas Shyamnagar sub-district. In fact, reducing the women's health concerns and difficulties in this area will be greatly supported by an improvement of the extreme saline water situation. Therefore, it is essential to create a particular policy model that will fill the gaps between policy and practices and provides solutions that meet the needs of the community. Implementing better health policies and finding sustainable solutions for excessive salinity intrusion in coastal areas like Shyamnagar sub-district can ensure the well-being and better hygiene practices in the coastal areas of Bangladesh. Interventions and projects by several stakeholders are expected to work arm in arm with the aim of securing safe water for coastal people as well as maintaining better adaptation strategies and coping mechanisms of women's health and hygiene on the coastal areas.

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