

Climate Change Adaptation Communication: A comparative study between women living in the village and wetland, *Jamalpur, Bangladesh*

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Abstract

With a focus on the experiences of rural and wetland women in Jamalpur, this study examines the vulnerabilities that women confront in the context of climate change. Based on a theoretical framework that includes concepts of innovation, crisis communication theory, social network theory and capability approach. The study uses in-depth interviews with 13 village and wetland women, and separate focused group discussions among them, and seven key informant interviews. Results show that women demonstrate resilience in the face of a lack of understanding about climate change and the dangers it poses by applying their local knowledge and experiences to adapt to difficult situations. Wetland women's communication patterns are notably different from village women's, suggesting differences in social practices. It would seem that village women are in a more privileged position and could have better access to resources and information. This study highlights the value of support networks and communication tools while illuminating women's ability to adjust to climate-related issues. The results highlight the necessity of customized interventions that identify and tackle the distinct vulnerabilities faced by women in various social and geographic contexts, ultimately leading to more efficacious measures for adapting to climate change.

Keywords: Women, Vulnerabilities, Climate change, Adaptation-communication, Innovation

INTRODUCTION

Climate change is one of the most pressing global challenges, impacting various aspects of human life, ecosystems, and economies. Bangladesh is regarded as one of the nations with the worst climate-related disaster impacts worldwide. This nation is physically and mentally vulnerable to climate change due to its unfavorable geographic location and its low-level typography. In addition, several socio-economic factors such as high population density, extreme poverty, gender inequality, reliance on climate-sensitive industries, particularly agriculture, and fishing, a lack of institutional resources, and institutional insufficiency are making people more vulnerable.

Therefore, forming adaptive policy by context and culture is very important. Bangladesh is the first country to develop and implement successful community-based adaptation (CBA) projects in the coastal areas to reduce Sea Level Rise vulnerabilities and enhance resilience capacity. Nowadays, researchers emphasize women and climate risk issues. Because women have much less access to financial resources, land, education, health care, and decision-making opportunities than men, women are increasingly more vulnerable to the effects of climate change than men. According to recent research from the International Institute for Environment and Development (IIED), Kingston University, the International Centre for Climate Change and Development (ICCCAD), and the United Nations Development Program (UNDP), women managing poor rural households in Bangladesh are spending up to 30% of their total expenditures on measures to protect themselves from the effects of climate change, including flooding and storms (UNDP, 2022). While climate change affects everyone, its impacts are not equally distributed, and vulnerable populations, such as women, are disproportionately affected both socio-economically and demographically. Plans, programs, and tactics are recognized to

consider gender roles in NDC adaptation measures. However, especially in the case of renewable energy, clear mentions of gender equality are unusual in migration efforts. Additionally, it is difficult to evaluate gender- related outcomes due to lack of evaluation frameworks, indicators, and gender-responsive monitoring methods. Additionally, insufficient implementation persists due to a lack of resources, capacity, and clear guidelines for putting policy into practice (UNDP, 2022).

Recent studies have shown that gender differences exist in climate change vulnerabilities and their effects on communities (Dankelman et al., 2008). However, almost all programs intended to increase local communities' capacity for adaptation do not consider the gendered aspect of daily realities and experiences (Alston, 2013).

The Jamuna River basin faces the devastating consequences of the historical floods in Bangladesh, including in 1988 and 1998 (Brammer, 1990). This research is focused on climate vulnerabilities and adaptation communication in *Jamalpur*. The research aims to investigate the vulnerabilities of women to climate change and its interplay with adaptation strategies and communication patterns, focusing on two distinct groups: *Chinitola* village women and women living in the wetland named *Ramvadra*. Two focus group discussions 13 in-depth interviews and 7 Key informant interviews are used for data collection. This study explores the comparison of two different socioeconomic backgrounds of women, their context-based vulnerabilities, and adaption communication. The main research question of the research is what strategies do women apply to mitigate the effects of climate change in the selected region and how do communication pattern differ from women living in the village and wetland.

METHODS

This study is conducted by primary data analysis as using qualitative methods provides a comprehensive picture of the whole research. The qualitative method has been used here. Qualitative methods help to explore or find new things. This method also helps to describe or explain any problem. In this research, there are 2 focused group discussions and thirteen in-depth interviews of village women and wetland women aged 25 to 60 and 7 key informant interviews administered. Focused group discussion is used to bring a small group of people together to respond to inquiries in a controlled environment. This method helps to get a lot of data in a short time. In this study, 2 separate Focused Group Discussions (FGDs) are used with village women and wetland women. Separate focus group discussions are organized for each group to encourage open dialogue and group dynamics to emerge on the subjects of climate change, and adaptation communication. Each discussion lasted 15 to 20 minutes, and there were 5 to 6 women in each group. This research method helped bring about a comparative discussion of the two groups' climate vulnerabilities, challenges, and adaptive strategies. 13 in-depth interviews are conducted with village women and women of wetlands to gather in-depth information about their perceptions, experiences, vulnerabilities, adaptation strategies, and communication patterns related to climate change. The women are been chosen conveniently. Attempts have been made to include women of different ages to understand their varying challenges and experiences. 6 interviews were conducted with village women and 7 interviews were conducted with wetland women. Interviews are transcribed. Interviews are semi-structured. Participants are asked about what vulnerabilities they face due to climate change, how vulnerabilities change their lives, and how they incorporate adaptation strategies and overall communication patterns. In-depth interviews are conducted in their natural setting, and last from 20 minutes to 25 minutes, depending on the topic and the depth of the conversation. In this study, typically used open-ended questions to allow the participant to express their thoughts and feelings freely, and may also use probing questions to clarify and explore specific issues or topics.

7 key informant interviews are conducted in this research to get data from a variety of sources who have firsthand knowledge of the community, such as professionals, and leaders. In this study, they Key informants are the Lecturer of the Social work Department, *Bangamata Sheikh Fazilatunnesa Science and Technology University*, the *Upazila Nirbahi Officer* (UNO) of *Islampur* and *Melandaha* Upazila, the District Commissioner of *Jamalpur* district and 3 NGO officials from three different organizations; *Unnayan Sanghay*, World Vision and *Taranga Mahila Sanghya*. They all tried to provide more knowledge about the condition of women, their challenges, and governmental and non-governmental steps to make easy their adaptation process. All interviews are been transcribed. Sampling is a subject of the population that is the representation of the entire population (Wimmer & Dominic, 2011). In this research, a total of 13 women's views are been taken into account. They are from age 20 to age 60. These women are selected from each socio-economic backgrounded village. And 2 FGDs are administered among 5 to 6 women in those separate places. Participants are chosen conveniently. There are also 7 key informant interviews with administrative officials and NGO officials conducted.

Jerin et.al (2023) aim to demonstrate how differently vulnerable the Bangladeshi rural population is to flooding. Both Primary and secondary data were gathered, and a structured interview technique was used in the quantitative analysis to gather field data. Using the Livelihood vulnerability index they evaluated the gender-diverse vulnerability. They found that women are more susceptible to floods. Ashrafuzzaman et.al (2022) investigate the vulnerabilities and impacts of climate change on women in 12 Union in *Shyamnagar* Upazila, *Satkhira* District, and The Southwestern Coastal Region of Bangladesh (SWCRB). They found that women could experience unique forms of vulnerability in their daily lives and in society due to increased gender inequality and climate vulnerability. 320 home respondents were randomly chosen from the 9 unions to complete a survey. There were also interviews, case studies, focus groups, workshops and key informant interviews which indicated women are more vulnerable than men.

Arua & Rahman (2018) evaluate the contribution of traditional ecological knowledge (TEK) to the Disaster Risk Management (DRM) plans of the Bangladeshi people living on the islands of *Maheshkhali* and *Kutubdia*. The primary data was gathered through participatory rural appraisal techniques, including focus groups, household surveys, and key informant interviews. 385 people who live in the communities on the two islands were given the survey. The results demonstrate that in order to anticipate, prepare for, and deal with the effects of cyclones, floods, and storms, the respondents rely on their TEK in addition to information from the media. The findings may be helpful in developing a community-based DRM program that works for the aforementioned communities as well as acting as a manual or point of reference for other coastal areas that are at risk from climate change. Irfanullah (2016) examines three interconnected domains of adaptation. They are adaptation planning and implementation, nature-based adaptation technology creation and diffusion and evolution in programmatic approach. The study uses examples from coastal villages in Bangladesh to describe the adaptation strategies used, the opportunities they generated and the effects they had on both people and the environment. It goes on to address the obstacles that innovation in adaptation must overcome and how those obstacles might be overcome to create opportunities. To prevent maladaptation, the study recommends evaluating adaptation innovation both before and after scaling up. It highlights the creation and management of knowledge as a crucial element of adaptation programs to support well-informed decision-making.

Akhter et.al (2020) examines the socioeconomic status of the people living in *Islampur* Upazila in the *Jamalpur* district and the pattern of riverbank erosion. They found that the afflicted people moved away from their original location and settled in a new place, where they encountered problems with their basic necessities, employment, and security. In this study, both qualitative and quantitative methods were used. Data from primary and secondary sources were combined. In this study, an interdisciplinary strategy was adopted. Tools for mapping the riverbank trend were utilized. Participatory Rural Appraisal (PRA), and questionnaire surveys, 4 FGDs were used to gather data. *Kulkandi*, *Belgaccha*, *Sapdhari* and *Palbandha* unions were specifically chosen taking into account that their vulnerabilities were brought on by river bank erosion. This research also showed the rapid decline of living standards.

Asaduzzaman et.al (2020) find migration as a possible form of adaptation in regions where consequences are predicted to be significant. Migration brought on by climate change is dependent on people's freedom of choice at the individual and household levels in coastal areas of Bangladesh. They contend that a distinction should be made between voluntary and forced migration in line with Amartya Sen's capability approach. They conducted 14 Key Informant Interviews in the South- Western Bangladesh and 22 focus group talks (8-12 participants in each group).

Roy et.al (2022) investigate climate change adaptation in Bangladesh's southwest coast, a highly vulnerable region. They examine gender dynamics and cultural sustainability's role in successful adaptation, focusing on governmental and NGO efforts. Using a systematic review of literature and field-based case studies, they looked into how gender and culture issues have been addressed to successfully implement climate change adaptation initiatives in the designated study area. According to the findings of this study, both male and female participants were strategic and able to deal with the effects of climate change, however, the former group's capacity for adaptation was relatively stronger than the latter. The study underscores NGOs' contribution to climate knowledge dissemination and gender-sensitive adaptation, highlighting complexities in rural development.

a. Adaptation-Communication

Adaptation-communication aims to increase action and support and further the global goal of adaptation. Adaptation communications also seek to inform audiences on actions and plans related to adaptation. The study of crisis communication is concerned with how people and organizations communicate before, during, and after critical situations or crises. It offers

a framework for comprehending the ideas and methods involved in successfully handling communication during a crisis. Crisis communication is to reduce damage, rebuild trust, and enable a well-coordinated response. The crisis communication theory is linked to several important ideas and models.

One of the most well-known crisis communication ideas is Situational Crisis Communication (SCCT), which was developed by W. Timothy Coombs. The SCCT provides a mechanism for anticipating how stakeholders will react to a crisis in terms of the reputational threat posed by the crisis (Nabuzale, 2016). Crisis communication can be a powerful tool in addressing the climate vulnerabilities of women by raising awareness, promoting inclusivity, improving access to information, tailoring crisis responses, and supporting long-term resilience-building efforts that take into account the unique challenges women face in the context of climate change.

UNICEF addressed four phases of communication management. The phase of preparation includes disseminating informational and inspirational messages to the populace in advance of impending disasters. The phase of response includes notifying, warning, evacuating, and updating the public on the status of the ongoing disaster. The phase of Recovery includes communication that gives those who have been impacted by disaster information on how to apply for and get disaster aid, as well as how to avoid illnesses epidemics, or other issues that arise in centers. The phase of mitigation includes communication encourages measures that will lessen the number of people killed and property destroyed in future catastrophes.

b. Innovation

Social innovation is the creation and use of novel ideas that call for conceptual, procedural, organizational, or product change and that ultimately seek to enhance the welfare and well-being of both individuals and communities. Innovation can also be proven as an adaptive strategy in disaster management or climate change issues while promoting economic growth. Adoption of existing mitigating technologies and innovation of new technologies can help reduce the impact of natural disasters and also can build resilience for future events (Li, 2017). The UNFCCC process has acknowledged the development of adaptation technology as a crucial tactic to achieve adaptation and reduce the severity and negative effects of climate change (UNFCCC, 2010). The term 'hardware' refers to capital goods and equipment like sea barriers, early warning systems, and draught-resistant crops while 'software' refers to procedures, knowledge, and capacities like energy-efficient practices and machine operation skills (UNFCCC, 2015).

c. Social Network Theory

Social network theory examines how individuals behave and how relationships are arranged. Individual conduct is both a cause and an effect of social networks. The global structure of social networks is determined by the individuals who create, build, maintain, and break relationships (Stokman, 2001). This theory provides the framework for understanding how different social entities are connected and how these connections influence social life. Social ties, community structures, and communication patterns can be investigated by social network theory. Particularly, social network websites and media are also influential factors in social networks and relationships. The media can affect how innovations are seen as well as how people adopt new technologies, important contributions, and upcoming directions. From the perspective of climate change and women's vulnerabilities, social network theory can be applied to information flow during climate-extreme events, adaptation strategies, and vulnerabilities as well.

d. Women and climate change

Bangladesh is regarded as one of the nations most severely impacted by climate-related calamities worldwide. People's vulnerabilities are being triggered by their unfavorable geographic locations as well as numerous socioeconomic variables. Regardless of race, caste, nationality, sex, or income level, the effects of climate change are diverse and unequally distributed (Mandal, 2014). Because females have much less access to financial resources, land, education, health care, and the ability to participate in decision-making than men. Because females have much less access to financial resources, land, education, health care, and the ability to participate in decision-making than men. UNFCCC (2005) reported that during natural disasters more women die than men because they are not warned, cannot swim, or cannot leave the house alone. Women can access natural resources and other property rights but they are unable to exercise control over them (Ribeiro & Chaque, 2010).

In addition, women perform the majority of reproductive and some productive tasks, whilst men are only in charge of the latter. According to Lambrou and Nelson (2010), there are structural disparities between men and women, including roles that are distinctive to each gender in society, the workplace, and domestic life. Due to extreme floods, women also face critical extreme conditions. Health insecurity is one of the hot zones for women in flood-affected areas where they face extreme vulnerability. According to the UN Women report, prolonged intervals create health problems. Tasrima Begum, a 38-year-old woman from *Melandaha* Upazila of *Jamalpur* District says “During a flood, animals and insects also look for dry places. My latrine, which was the only thing not submerged in my house during the flood, became a shelter for earthworms, snakes, and cockroaches. It was not usable. I held myself for two days. I was rarely taking a sip of water to stop myself from going to the toilet.” (UN Women, 2021, P.20)

The goal of the Sustainable Development Goals (SDGs) is to change the direction of world events. From them, the 5th goal of SDG is focused on achieving the main objective of real and sustained gender equality in all spheres of the lives of women and girls, which includes putting an end to gender disparities, violence against women, girls, early and forced marriage and equal access to opportunities. As the primary international forum for intergovernmental discussion of the global response to climate change, the United Nations Framework Convention on Climate Change is where discussions on the subject take place. According to the United Nations, Sustainable Development Goal 13, ‘take urgent action to combat climate change and its impact. Bangladesh is working to strengthen women's empowerment.

The research is done by analyzing the analytical framework obtained by this theory and conceptual analysis.

RESULT AND DISCUSSION

A. Use of innovation and adaptation technologies of women

Needless to say, the dire effects of climate change have a huge impact on people's lives and women are especially victims of this effect. Financial capital, natural capital, social capital, human capital, everything is affected by climate change. It greatly affects the livelihood and capabilities of women. The resources available to them are also affected. Over time, women again try to adapt themselves with ongoing resources knowledge, and innovation. In addition to public, private, and non-government measures, women struggle with the resources available to them to adapt to the situation. In this case, government and private action must be a kind of cooperation for them! But since they are unconscious and ignorant, they cannot help themselves much nor show much solidarity with government and non-government measures.

By using adaptation strategies, the damage and vulnerabilities can be reduced which develops the lives of people. From the interviews and focused group discussions, it is found that the women of *Jamalpur* practice some specific adaptation strategies. They are:

- a) Using Indigenous knowledge
- b) Migration as adaptation
- c) Using adaptation technologies

B. Using indigenous knowledge

People mainly try to solve or overcome their problems or crises with their knowledge. They decide according to their ideas, they consult with ‘*Kabiraj*’ instead of meeting a doctor, they do not feel encouraged to go to shelters because of their feeling insecure. Above all, they try to adapt to the situation with what they have. Local knowledge is the reflection of their livelihood.

Local knowledge is considered useful to enable active participation between the local people in a community, the NGOs, and also government (Sillitoe, 2006).

C. Do not feel comfortable staying in another place

Village women do not feel that much encouraged to leave their houses and stay in another place during any climate extreme situation or natural disaster. They don't feel comfortable staying in other places like shelters and they feel insecure in staying in unknown places with unknown people in bad management. So, they stay in their house and choose to struggle with what they have to live.

Respondents of FGDs shared that they had never gone to centers. They live at '*Chowki*' or bamboo pillar and their cattle also stay with them under one roof. She also shared about her getting pensions and Trading Corporation of Bangladesh (TCB) products. They just again get used to the damage.

It just takes time. From time to time, we again become used to new life. I have also seen the terrific flood of 1988 (FGD 1, 3 Oct, 2023)

From the interviews, it is also found that those who stay in a shelter during any climate extreme situation do not have a positive experience of the low maintenance and security issues of the shelter. So, they find it more preferable to stay at home.

During an interview, the interviewee shared her experience about staying in shelters. She also shared the overall condition of centers. She stayed in a shelter during Covid-19 as her family had no other choice as water came up at their houses and they didn't have money, or food. So, they went there but the overall experience was very horrible! Many people went there but there were no safety measures like masks, sanitizers, and other necessary things. She added that she didn't lose any family members but lost lands and houses. Now they have a very small part of land and most of the land is already washed away during floods. They also don't get proper treatment. Her husband or son sometimes goes to the Upazila health complex and brings some medicines otherwise she goes to '*Kabiraj*' or local hawks.

There were no safety measures like masks, sanitizers, and other necessary things and we had to live under one roof with unknown persons. Then we chose not to go to the shelter again. We stay in our houses. (Interviewee 6, 4 Oct, 2023)

D. Coping up with what they have

From the in-depth interviews, it is also found that women tried to adapt to damages with what they have.

During an interview, an interviewee of *Chinitola* pointed out the vulnerabilities and also mentioned how they try to cope with what they have. She said that they got information from getting announcement through microphone or a local imam. They collected all dry foods and kept them in a safe place. They went to the washroom through polluted water. But they passed the days like this.

We try not to go to the washroom frequently as we have to go through the polluted water. So we try to drink less as it becomes difficult to boil water. (Interviewee 8, Oct 4, 2023)

An interviewee from *Ramvadra, Islampur* Upazila expressed that they participated in the decision-making process because they realized that they had to work as their main support. She said that they didn't get any help or support or any kind of strategy from local NGOs or members and chairmen. Moreover, the women hardly tended to go to doctors. So, they consult with local hawks.

We accept our fate and try to help each other. We cannot go to the hospital as it is far from here. It just takes time for us to cope with the damage. (Interviewee 10, 5 Oct, 2023)

Relief Web highlights that when it comes to the effects of climate change, women typically bear more of the burden and greater dangers. Despite this, and frequently precisely because of this, women are leading the charge in climate change adaptation.

When it comes to address climate change, women showcase their skills in sustainable practices at the home and community level management (Relief Web, 2019).

E. Migration as the adaptive strategy

a. Using Adaptation technology

Innovation is very effective in reducing climate vulnerabilities. Every crisis prompts people to adapt to something new. Although women are still lagging due to a lack of awareness in *Jamalpur*, they are gradually making progress. Innovation can be used in two ways. They are hardware and software (UNFCCC, 2015).

Hardware Capital goods and equipment like drought-resistant crops, early warning systems, etc.

Software: Capacity, knowledge, and processes like energy-efficient practices and know-how to operate machinery, etc.

b. Hardware used as adaptation technology

From the In-depth interviews and FGDs, it is also found that to stop or block the river flow they put sandbags in the bank of the river.

During FGD, The people of *Ramvadra* village, *Islampur* also shared their initiatives to stop the river flow. They put sandbags in the bank though this did not work permanently but temporarily it helped. They also shared that they still didn't have many ways to store dry foods as every year, flood water washes away their assets.

We put sandbags on the banks to stop the regular flow of water. We do have not many ways to store dry foods as every year flood water washes away everything.(FGD 2, Oct 5, 2023).

It is found from the FGDs that they cultivate crops, vegetables, and fishery and they also store paddy for crisis time.

During a focused Group Discussion, the respondents of *Chinitola* also mentioned their adaptive strategies like cultivating crops, vegetables, fishery, and storing paddy for crises. They said

They were also planning to relocate their houses and design so that water could not come up to the house. They also farmed fish in the pond. They tried to cultivate seasonal crops under the soil. They also tried to dig their ponds to manage waterlogging.

We store paddy in our houses so that we can eat it or sell it during crises. We also cultivate crops, and plant trees but that is not enough (FGD 1, Oct, 3 2023)

Another interviewee of *Chinitola* also mentioned their cultivating crops, vegetable, fishery, and their storing of paddy for crises. She shared about cultivating seasonal crops under the soil and digging out the ponds to manage waterlogging.

We try to cultivate seasonal crops under the soil. We also try to dig our ponds to manage waterlogging. We store paddy in our houses so that we can eat it or sell it during crises (Interviewee 3, Oct 3, 2023)

NGO workers also try to reach them and meet with the women about their do's and don'ts before and after-period of any disaster. They take necessary steps to reduce gender discrimination which also reduces women's vulnerabilities not only in climate change issues but also in social and economic vulnerabilities. They also shared knowledge about climate change and disasters and created awareness among them.

One of the Key Informants, the Director, of the Human Resource Department, Unnayan Sangha, *Jamalpur*, shared that they also had a child club in *Dewanganj*, *Bakshiganj*, *Islampur*. They were also trying to involve 32 schools in *Dewanganj*, *Bakshiganj*, and *Islampur* and took classes so that at least every student could have primary education and the students who generally sit behind, they tried to take special care of them so that they could participate actively in classes. They were also providing tuition to them if needed. They were providing tractors, promoting the cultivation of vegetables, and 8000 goats altogether and they were trying to ensure at least 3 goats in one family. He shared about their rescue boats and storage of dry foods and 18 items like

napkins, clothes, nail cutters, etc. in stock which can be required the most during any climate extreme situations. With these items, they could provide help to 2000 women during disaster situations in the primary stage

We are providing tractors, promoting the cultivation of vegetables, and 8000 goats altogether and we are trying to ensure at least 3 goats in one family (KII 3, Oct 5, 2023)

Additionally, Key informant interviewee, Gender DRR & CC officer, Gender Inclusive Market Systems for Improved Nutrition (GESMIN) project, World Vision addressed their project for a safe environment and to make women self-sufficient. They had taken the initiative to plant more trees and they also promoted tree plantation. They always tried to keep day observation and tried to secure adults, women, and children. She added that they always tried to motivate people to go to community clinics and the availability of medicines is there. They were also setting up and promoting "Eco Village" concepts. They also collected seeds and tried to address fuel insufficiency.

We established the eco-village in *Kendua, Shatkara, Ranagacha* Union, and *Berapathalia* to restore the ecosystems. We also buy them goats which help them to become self-dependent (KII 4, Oct 5, 2023).

In a key Informant interview, Upazila Nirbahi Officer of *Islampur* Upazila, stressed the importance of equal participation of men and women and mentioned the steps taken in this regard. He addressed the vulnerabilities of women living in wetlands and then shared the strategies. He shared the strategies of the nutritional gardens where everyone can meet their nutritional needs and those who had more land, can be self-dependent by selling the vegetables and fruits. He also addressed "Mujib Kella", where more than 100 people can be accommodated and everything is managed at a few hours' notice. When needed like baby food, and cow's milk everything is provided by the government, he also mentioned forming boys' clubs and girls' clubs to prevent child marriage and other types of vulnerabilities of women.

We are also facing the positive consequences of taking these huge steps. We are establishing 'Mujib Kella', a nutritional garden. The number of malnourished children has decreased, and early marriage has decreased (KII 6, Oct 7, 2023)

Additionally in another Key informant interview, The District Commissioner of *Jamalpur* spoke about the various initiatives taken by the government and NGOs. He added about establishing houses for homeless people under the shelter scheme. He mentioned arranging various mass awareness campaigns, and technological support to address the gap. They also provided the women with agricultural incentives, fertilizers, and seeds for free, training, shelter.

We also provide them relief by arranging temporary camps. We are establishing houses. We are promoting girl guides, and freelancing so that both males and females can be self-dependent (KII 7, Oct 8, 2023)

c. Software Used as Adaptation Technology

From the focused group discussion, it is found that NGO workers come to talk to them about how they can preserve dry foods and how they can boil pure drinking water.

NGO workers come to us and do a meeting where they try to aware us of the climate vulnerabilities and how we can preserve food and important documents and they also provide us with tablets (FGD 1, Oct, 3, 2023).

In a key informant interview, Upazila Nirbahi Officer of *Melandoho* Upazila talked about income-generating work and shared the steps taken by the Government to empower women. He also shared about the short courses on sewing, fashion designing, and beauty courses which help women to be self-dependent in their capacity.

We are trying to motivate women in income-generating activities so that they can income on their own and also the people who don't get facilities easily, we also try them to come under training on income-generating activities (KII 2, Oct 4, 2023).

The key informants also think that if the discrimination of women cannot be reduced then, the vulnerabilities of women cannot be mitigated. In a key informant interview, field facilitator, *Taranga Mohilla Kollyan Sangha* focused on child marriage, abuse of women, and their activities to stop these and promote the importance of education. She shared their process of mediation. They have their counseling center where they try to sit with both sides of people and discuss and then try to resolve for free of cost! She added that, if they could not come to a solution, they referred them to legal aid. She shared that anything related to dowry, child marriage, dowry, and land they would like to try to solve. She also addressed that it could be seen that even if child marriage is stopped in one house, they go to another relative's house and get married which we cannot reach at all. But even after marriage, they tried to make sure that their education did not stop. In this case, we talk to their families and arrange.

We work to stop abuse or violence against women. We arrange awareness programs too. We have our counseling center where we try to sit with people and then try to resolve their problems free of cost! (KII 5, Oct 5, 2023)

One of the Key Informants, the Director, of the Human Resource Department, *Unnayan Sangha, Jamalpur*, shared that they were promoting a 'Man care' approach where they were trying to motivate the males to get involved in household chores so that they could also share the responsibilities of their families which are generally addressed to be women's responsibility. He also addressed that they were working together to ensure gender equality. They were working on a project with World Vision which focuses on child health. They have provided technical training to around 5000 people till now and most of them are self-dependent now as they believe. They were trying to focus on washing, sanitation, and nutrition health and motivate males and females to be aware of it.

We are also establishing a "Boat School" in *Islampur, Dewanganj* so that during disasters, children and students can study. We provide them with tractors, promoting the cultivation of vegetables, and 8000 goats altogether (KII 3, Oct 5, 2023)

Additionally in another Key informant interview, The District Commissioner of *Jamalpur* spoke about the various initiatives taken by the government and NGOs. At the same time, he thinks that women are now more aware than before with the help of information technology. He shared about providing training and arranging open meetings to discuss different issues like climate change, and disasters and tried to ensure women's participation there. As *Jamalpur* has the lowest literacy rate in Bangladesh, they always tried to focus on education even for the adults. He addressed the laws to mitigate violence against women. He mentioned the field-level workers and women's cells in every area at the *Upazila* level where any woman could claim justice. He also shared about arranging guardian assemblies in schools where they could talk about the different risks and vulnerabilities of women and try to aware the students aware and also the guardians aware. To promote education they also provided students technological support so that they could be involved with smart education, Tin, etc. By dint of Smart Bangladesh projects, any information could be shared on social media, and as the news spreads very quickly anyone could also get weather forecasts through the internet and internationally So that they can be aware. They also motivated the well-to-do natives to advance and motivated them to stand by the people.

The most impactful support they can do for themselves is engagement. We arrange different types of awareness programs not only on climate change or disaster issues but also on violence, education, women's rights, self-employment, etc. (KII 7, Oct 8, 2023).

F. Communication Dynamics of Village Women and Wetland Women

Village women and wetland women face many differences in their lives due to their geographical limitations. Wetland areas are geographically different from villages. So, there are differences in the livelihood of the people of the two areas, their vulnerabilities, and communication patterns even in climate extreme situations. Challenges and adaptation patterns for women in the two areas are also different. People in wetlands do not have access to any resource as easily as they have access to any resource as the communication system is relatively better towards the village than the wetland area. So women in wetlands struggle more than village people, especially women.

From the interviews, the differences in communication patterns can be split among the following three factors that influence communication pattern and information dissemination.

- a) Communication and geographic diversity
- b) Communication and economic activities
- c) Communication and social practice

1. Communication and Geographic Diversity

People of wetlands have fewer opportunities for jobs and limited resources. But due to geographic reasons and also for better communication, village people don't have to face the limitation. Village people can easily go to hospitals and executive authority but wetland people cannot get easy access to hospitals and authority. Not only this but also they cannot go to the district to meet their because of low transportation quality.

During a focused group discussion, women living in the wetland said that they could not go out easily. She added that if any disaster occurred, they all had to sit idly but village people could switch their jobs during a crisis if they wanted. They also said that they could not go to better hospitals for treatment as they lived far from hospitals and markets. They mostly depended on natural resources like paddy, water, fish, and vegetables whereas village people could easily get access to good doctors and markets. They did not need to be dependent on natural resources.

We do not have anyone except ourselves. We always have to live with the fear of losing our assets. We consult with each other before making any decision and everybody living here works hard at their level best (FGD 1, Oct 3, 2023).

On the other hand, village people get the privilege that they don't need to be with themselves as they can have external help and support from others. They can involve themselves in different types of work business. They don't need to be dependent on natural resources.

During an interview, an interviewee shared that his husband worked in cropland and also had a shop she also helped his husband with his land and they had much land where they could cultivate and sold that to market and also stored that for any upcoming crisis.

We don't have to depend only on natural resources. We also have mobile phones, television, and electricity which make our lives easier. My husband has a shop and my son is also a lawyer. So our lives are not that miserable (Interviewee 11, Oct 6, 2023).

NGO and government initiatives cannot reach the wetland women like the people of the village. They also face challenges in reaching them due to low transportation systems and a lack of communication channels.

During an interview, field facilitator, *Taranga Mohilla Kollyan Sangha* said that the condition of wetland people is very miserable. The vulnerabilities of women are more than that of village women. She also shared her personal experience of providing relief to the flood-affected area. She and her team went there by boat.

The boat was about to sink due to the relief products and also for the people! But somehow, they survived and successfully distributed the relief among the people.

The village people cannot understand the dire effects of any climate extreme situations but the wetland people feel that so much. They cannot get a job. They cannot store enough food. They get kind of blocked in their area. They can't communicate with the outside (KII, 5, Oct 5, 2023)

When a natural calamity or extreme situation occurs, it becomes difficult to disseminate information and spread weather forecast to wetland people. They depend on nature to guess the weather conditions. During floods, their roads, and lands wash away. Water goes up to their homes but women have to work in that situation as they don't feel comfortable to stay in another place. They become dependent on their local knowledge and previous experiences.

An interviewee from *Ramvadra* village, *Islampur* Upazila mentioned that they did not feel encouraged to leave their houses during floods and stay in another place. They felt comfortable staying in their own houses in every situation. She also addressed the limitations like moving by boat through polluted river water. As they had to move in a hurry, they could not store that much food for the future or take it with them. She also shared how they made a new start after the flood and river erosion. They chose the struggle and work hard to adapt to their damage. She said that she and her husband worked together in our lands. They cultivated crops. Her husband sold the crops. Their son and daughter also helped them in our work. They also work on other's land when they lose our land during floods. Then they lead their life with money. They tried from their knowledge and they are not given any training by the government or NGO.

We feel comfortable staying in our houses in all situations. We just work hard. We have no male or female. We are not given any training or adaptive strategy by the government or NGO (Interviewee 7, Oct, 4, 2023).

2. Communication and Economic Activities

The communication patterns of wetland women are shaped by their primary economic activities whether based on riverine resources or agriculture. Economic dependence influences the nature and emphasis of communication in daily life.

Wetland women often rely on fishing, farming, cultivating vegetables, cattle, etc. Village women often depend on agriculture as a primary source of income. Wetland women are lagging far behind in all opportunities. They lag behind village people in communication systems and resources and they get fewer job opportunities and fewer education opportunities which influence their communication too. When any disaster or natural calamity occurs, their lives become miserable. The vulnerabilities of women are even greater due to social factors and when a natural calamity occurs, their vulnerability increases. Wetland women face greater vulnerability to their particular limitations.

Village women do not have to face those miseries like the wetland women. They don't have fixed economic sources like the wetland women have. They don't have the fear to loss their land and other physical capital. So they can store their paddy and other resource and also sell for money.

During a focused Group Discussion, the respondents of *Chinitola* also mentioned their adaptive strategies like cultivating crops, vegetables, fishery, and storing paddy for crises. They said

They were also planning to relocate their houses and design so that water could not come up to the house. They also farmed fish in the pond. They tried to cultivate seasonal crops under the soil. They also tried to dig their ponds to manage waterlogging.

We store paddy in our houses so that we can eat it or sell it during crises. We also cultivate crops, and plant trees but that is not enough (FGD 1, Oct 3, 2023).

On the other hand, during a focused group discussion, the women living in wetlands shared that they didn't get enough opportunities to work after and during climate extreme situations. They told us that, we had no work when the flood occurred here. Then after the water went down, they started working in other fields for money. Then after getting some money, they again tried to relocate their house and gradually they again got back to their old life. They added that they cultivate chilies, vegetables, etc.

We have to accept the damage. We cannot store food as we have to sell crops to lead our lives. We work in others' fields for money after flood water goes down. Males get more money than females (FGD 2, Oct 5, 2023)

IPCC (2007) indicates that communities with limited financial resources have reduced adaptive capacities and are sensitive to effects on natural resources.

3. Communication and Social Practices

Communication processes are also influenced by social practice. People living in wetlands face a scarcity of education, resources, and inadequate training than the women of the village. So their coping mechanism, adaptation is also different. Where people of the village experience development, and advancement of civilization, the people especially women still don't know how to use the development due to their limitations. They face more obstacles than the women living in villages.

During an interview, a key informant, Lecturer, Department of Social Work, *Bangamata Sheikh Fazilatunnesa Mujib* Science and Technology University, *Jamalpur* shared the differences in social, cultural, and economic conditions of village women and women living in the wetland. He said that village women were now much more aware about what was happening around them. They were coming in touch with the advancement of civilization, the development more than wetland women. He also added that development was also going to the wetland level but still, wetland women didn't know how to use the development properly due to lack of social, economic, and geographic limitations.

One-third of women live in the wetland of *Jamalpur*. Still infrastructural development is needed there. They still don't have enough knowledge of how to use the development positively. They still don't get better treatment and they believe in superstition (KII 1, Oct 2, 2023)

For women in such situations, cultural barriers are obstacles that restrict women's skills development and limit their ability to formulate adaptation strategies (Dasgupta et al., 2010).

From the interviews and Focused group discussion, it is found that village women are in a privileged position. They have different sources of income, they have no limits on resources like education, transportation, and communication. Most of the person holds a smartphone there. They also take necessary long-term steps easily to combat any emergency.

During a focused group discussion, they said that, they got TCB products, and relief products from the government and NGOs, They were planning to relocate their houses and design so that water could not come up to the house. They farmed fish in the pond. We also tried to cultivate seasonal crops under the soil. They also tried to dig their ponds to manage waterlogging.

NGO workers advise us to call through the hotlines if any help is needed. We all have tv and phones. We get messages from govt. and NGOs also.

Information has been spread here through miking, also school teachers also advise about the do's and don'ts. Our males move by boat to get food to market during flood (FGD 1, Oct 3, 2023).

From the key informants, it is also found that they thought wetland women always faced lack of resources, proper communication, transportation and other opportunities. To alert them before any disaster or climate extreme situation, they also found it difficult to spread information to wetland due to lack of proper infrastructure. They all addressed the role of media to disseminate and spreading information. They all accepted the fact that social media helped to spread information before, during and post disaster period. NGO workers also face obstacles to provide help and relief products for the wetland people.

Wetland women face more obstacles than the women living in villages. They lack education, knowledge, resources, proper transportation, employment, etc. When we go to the wetlands we have to take risks and go there by boat during a flood or any type of disaster and we don't have safety equipment (KII 4, Oct 5, 2023).

During the interview, the District Commissioner of *Jamalpur* district thought that though wetland women has more obstacles, they had more mental strength than village women. They were more struggler than village women.

We always try to focus on *Dewanganj, Islampur, Bakshiganj, Madarganj* Upazila and address their needs and we have field-level workers so that the gap can be eradicated and we are also facing positive consequences (KII 7, Oct 8, 2023).

From the focused group discussion and in-depth interviews it is also found that wetland women are now using mobile phones as their communication channel. They are also becoming aware about education, despite having lots of risks.

During a focused group discussion of women living in wetlands, they said they had to always deal with lots of communication obstacles but mobile technology has made communication easier. They can communicate anywhere during a crisis if communication is not disrupted during natural calamities. They all live together. So they all kept in touch during climate extreme situations. But they had phones now. So, they could get information about natural disasters from other places too and also their male members went outside more than them. So, the males also get information from others.

Technology has made our lives better. Though we still are facing so many problems and limitation. Many of our relatives stay outside *Jamalpur*, and we can communicate with them through phones. Some of our young sons and daughters know about the use of the Internet (FGD 2, Oct 5, 2023).

NGO workers also trying to address their communication barriers. They also faced challenges to help them. In a key informant interview, a field facilitator from *Taranga Mahila Sangstha* told that people living in the wetland face more risk than people in normal villages. And women are more confined in their wetlands. They usually didn't go out from their homes to market. They also lose their land and had to migrate or gradually again they start their new normal life.

Their lives are very difficult than the people of the village and sometimes we also cannot reach the wetland people because of low transportation quality and lack of resources (KII 5, Oct 5, 2023).

During an interview, the director of the human resource department, *Unnayan Sanghya* said they were trying to create awareness among people and specially women living in the wetland. They were trying to address the issues, which women face. They also used social media in this case. They sent messages to every phone before any emergency and also they did meeting with the women. They were also establishing community clinics so that women could get help immediately.

We have a producer committee, *Kishori club*, child club where people can come with their problems and also if any information we get, we share it on social media. As we have separate groups in social media, the news or information spread as early as possible (KII 3, Oct 5, 2023).

Key informant, Upazila Nirbahi Officer (UNO), Islampur Upazila said that wetland women were more ahead in struggle, effort, and achievement and they were trying to overcome their barriers and men were also becoming aware of their social rights, and position.

It's true, village women are very privileged but now women in the wetland are also not that much dependent on men. Women face a lack of resources and opportunities for social roles but now they are also becoming united. The rate of migration has also decreased as we are getting the advantages of our initiatives (KII 6, Oct 7, 2023).

In conclusion, it is found that communication pattern differs between wetland women and village women based on their geographic limitations, economic activities, and social practices. Village women are in a more privileged position than wetland women.

CONCLUSION

The findings show that women are trying to adapt to the situation with their experiences and local knowledge, and government and NGO actions also supported their adaptation process. Their specific adaptation strategies are using experiences and knowledge, using migration as their adaptive strategies, and using adaptation technologies. They don't feel comfortable to stay in another place during climate extreme situations. They try to adapt with the resources they have. Wetland women put sandbags on the bank to stop the regular flow of water. Village women store paddy in our houses so that they can eat it or sell it during crises. Government and NGOs also help them to with different adaptive strategies and awareness programs. There are also arranged income-generating activities to motivate women so that they can have income of their own.

Furthermore, the research explores, it has become evident that communication pattern differs between wetland women and village women based on their geographic limitations, economic activities, and social practices. Because of geographic factors village women face less damage than wetland women, and village women get any help or initiatives easily than wetland women. Village women get information more easily than wetland women. Village women are more in a more privileged position than wetland women.

The government should emphasize awareness activities that are required for women in climate extreme situations and the warning message should be allocated among the people through the mass media and it must be ensured to reach information to wetlands too. Disaster management training at the local level should be launched by the government and NGOs. Active participation of the women should be ensured. It must be ensured that women should have access to education and training programs. Improved transport facilities are needed during and after disasters so that women can come easily to get treatment or fulfill other needs. Local administration should take strong initiatives to avoid the events of theft, robbery, hijacking, torturing women, and other unexpected events during disasters.

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