

Impact of Waterlogging and Coping strategies of Women : A Sociological study on Jashore and Satkhira District

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[Abstract : Waterlogging is a common phenomenon in the southwest region of Bangladesh and women are the worst victims of waterlogging. This study examined the suffering of women during waterlogging and how they adapt to this adverse situation. The survey was conducted by random sampling of 105 respondents from Manirampur Upazila under Jashore District and Tala Upazila under Satkhira District. A pretested questionnaire was developed and multiplied for data collection. After analysis, it was found women faced different types of problems during waterlogging. Women were attacked by various diseases at that time. Besides, women are always worried about safety and the future. They always try to cope with this situation, but it is difficult for them during waterlogging. The findings of this research have been able to highlight the plight of women during waterlogging and provide insight into how they cope with these issues. This study will help policy makers to take next steps.]

Keywords : Waterlogging, Safety, Health hazard, Livelihood, Adaptation, Sanitation.

Introduction

Bangladesh is known as one of the most vulnerable countries in the world. Every year Bangladesh faces a severe natural disaster which damages our natural properties. At the beginning of the 21st century, a new problem called “waterlogging” emerged in the southwest coastal region of Bangladesh (Awal, 2014). The main cause of such intense waterlogging is the gradual replacement of sediments. Waterlogging problems can be more serious than floods (Chowdhuri, 2007). Waterlogging has negative effects on many socio-economic sectors, such as tree roots, salinity destroys all vegetation, fruit trees die, agriculture suffers, and livelihoods and livestock rearing becoming impossible (Unnayan Onneshan, 2007). Prolonged inundation has greatly reduced agriculture and allied occupations. Environmental disasters such as

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waterlogging, river siltation and salinity have become common events in the southwestern Bangladesh and are causing unimaginable human suffering (Ashraf-ul-Alam, 2005). People are severely affected by waterlogging, which damages a huge number of crops and infrastructural elements in the affected areas. Women are the worst sufferers due to waterlogging. Women, being the primary breadwinners of the family, are compelled to live within the waterlogged premises, shouldering the entire burden of managing and cooking food, collecting drinking water, and taking care of the family members and their livestock as well (Awal, 2014). Most of the time, they have to do work with contaminated water. As a result, they are exposed to many water-borne or infectious diseases as well. Furthermore, women are susceptible to various sexually transmitted diseases, such as vaginal infections and other reproductive issues. Pregnant women cannot walk properly in slippery and marooned conditions. They are forced to stay back inside the house and ultimately fall victim to unhygienic reproductive health conditions. Women always feel insecure, especially when the male members go out in search of work. Waterlogging is a global phenomenon, but its prevention and mitigation methods have received little attention to date. Specific research on waterlogging problems is scarce. Much research has been done on waterlogging but the dire situation women go through during waterlogging has been ignored. The researcher in this study has tried to give an accurate idea about what problems women face during waterlogging and how they deal with them.

The objective of the study

- To know the impact of waterlogging on women,
- To identify the nature of the suffering of women due to the migration of male members,
- To know the coping strategies of women.

The Rationale of the Study

Waterlogging is one of the most serious problems in the southwestern region of Bangladesh. In the last decade, the region faced a significant experience due to waterlogging. Areas in various upazilas of Satkhira and Jessore districts are more vulnerable and areas are severely vulnerable to various hazards such as water logging, floods, arsenic, salinity or water etc. Waterlogging has dangerous effects on both humans and animals. So, it is the most important of problems. It can have many effects such as infrastructure damage, human loss, human disease, socio-economic problems, lack of neighborhood interaction. There may even be severe epidemics in these areas. Tala upazila of Satkhira district and Manirampur

upazila of Jessore district are located in lowland areas. Rainwater cannot be drained properly due to silting of the river. In this situation, people are suffering severely due to waterlogging, which is indescribable. The area remains waterlogged for almost half a year and various roads and houses are damaged. Women get trapped in water during waterlogging. A large number of women said they suffered from severe vaginal infections and other reproductive health disorders. Women in rural Bangladesh always feel insecure both physically and mentally. In swampy conditions, males can take advantage of the helplessness of females. In general, a patriarchal society does not ensure justice, often due to the lack of eyewitnesses to an incident. In this society men are just men even in swamped situations. Only women are permanently water bound. Also, women accept the consequences of unsanitary conditions. Although, this is a serious issue in this field, only a small number of empirical studies have been conducted in the context of Bangladesh. This research has tried to find out an accurate scenario in this context and to ensure reliable information about the problem. Thus, it will be helpful for the academic sector, researchers and policy makers who want to increase their understanding of the problems faced by women due to waterlogging.

Literature Review

A review of literature provides researchers with knowledge and guidance about their research topic. This limits the previously published works of scholars and researchers in the respective fields. The present review is an attempt to highlight the impact of waterlogging on the local population. Generally, previous research reviews on relevant topics have been published before. It is an important part of sociological research. Below are some literature reviews based on watershed:

Shamind Neelormi et al. (2009) in their article titled “Gender dimensions of differential health effects of climate change-induced waterlogging: A case study from coastal Bangladesh,” they state that economic and agricultural activities are severely disrupted due to inundation. Loss of land, livelihood often forces men to go away for weeks in search of alternative livelihoods. Women, as the primary caretakers of the family, are forced to live in waterlogged areas, collect, manage and bear the burden of drinking water, cooking food, and taking care of family members and livestock. Women are the biggest victims of social evils. This article also shows that waterlogging greatly affects the health status of women in affected communities. Local sanitation systems are ineffective under water. The entire reservoir was found to be contaminated with human excreta and household waste. Women are

forced to stay close to the community and drink unclean water, as the tube wells are also contaminated. Pregnant women cannot carry out their daily activities in slippery and discolored condition.

Mubarak Arfin, Umrneh Saika and Khondaker Mohamad Shariful Huda et al. (2012) conducted a study on, “Causes of Water Logging and its Impact on Women: A Case Study on Dhaka City in Bangladesh”. The study was concerned with discussing the drainage system of the study area to analyze the causes of waterlogging and its impact on women in the study area. The study reveals various causes of waterlogging, such as improper drainage system, drainage congestion, lack of public awareness etc. The study briefly analyzes the impact of waterlogging on women in Dhaka city, such as their social harassment issues, socio-economic status, etc.

Another scholar, Namrata Chindarkar (2012) conducted a study on “Gender and Climate Change induced Migration: Proposing a Framework for Analysis.” Women who are forced to migrate with their families or on their own due to climate change also face unique challenges. It found that women from rural poor families in Bangladesh who migrate to cities like Dhaka are often forced into long hours and low-paying jobs such as sweet shops and domestics due to their lack of skills and education. Thus, climate change-induced migration could potentially push women into poverty traps or permanently displace them from their homes.

A group of studies was conducted using monthly panel data collected in the Chitwan Valley of Nepal that covers ten years (Shrestha and Bhandari 2007, Massey et al.2007, Bohra Mishra and Massey 2010). The main objective was the effect of environmental diversion on external migration; All studies disaggregated effects by gender. The methods and results of these studies differ but a common conclusion is that increases in fuelwood and fodder collection time and decreases in agricultural productivity increase the likelihood of local exodus.

The Disaster Crunch Model

A disaster is a simple and common event in our country. A disaster is usually the result of a natural or manmade hazard that impacts negatively on the natural environment. This diagram shows how hazard and vulnerability combine to squeeze or crunch a population, causing a disaster.



A hazard may be natural, for example, an earthquake, drought, waterlogging, or cyclone, or it may be a Conflict or industrial accident (for example, tree cutting can cause drought in this area). Climate change is increasing the risk of extreme weather events. This is also impacting the wider areas.

Elements at risk

Many parts or elements create human life, like building family networks, livelihoods, and available natural resources, elements of human life. These elements are very important, but if an element is in danger of being harmed by a hazard or problem, then they are known as an element at risk, or we can say that this is an element at risk. Individual (male/female), Social (including spiritual), Natural, Physical (including constructed), and Economic are the five categories into which we can be classified.

Underlying causes

The structures and processes considered often have deeper roots known as “underlying causes”. Such causes are embedded in the culture, customs, or beliefs of the community concerned. They operate from power bases many miles away from the community concerned. They fall into four main categories.

Politics : For political reasons or issues, the nationalized government may provide resources to a particular government that is always going to retain power in the next election. For those reasons, the government takes many steps, and it is one of the main aims of a government.

Economics : The national government has an important role in economics. The national government must make decisions about how to spend its money or property. For example, if more money is directed toward defense or debt repayment, health and agricultural services may be underfunded.

Culture and Beliefs : A culture that attributes disaster to the bad behavior of spirits may not be willing to embrace measures to reduce disaster risk.

Natural Environment : Climate, soil type, and geography are the main elements of the environment that affect vulnerability. The environment and land are the main factors in farming. For example, as steep hillsides

will influence what types of farming practices are used and increase the livelihood of landslides.

As discussed in this chapter, the present study mainly incorporates the Crunch Model in explaining the coping strategies as well as the waterlogging situation adaptation mechanism from a sociological viewpoint.

Methodology

Method and Techniques : “Triangulation methods” is used in this study. To ensure greater validity in the findings quantitative and qualitative method is the best way to find out proper data about the problem of the research. The study is mainly focused on primary data. “Quantitative data” has been collected through the questionnaire as a part of the survey method. On the other hand, a checklist for the case studies has been used as the tool of the research. That is the technique of “qualitative methods”.

Sampling and sample size : Sampling are a procedure of choosing subgroups from the populations. Mainly there are four types of sampling procedure techniques followed in different research. Purposive sampling is taken in this research. Purposive sampling always represents the researcher’s own judgment about the study. In this research total sample size is 105 respondents that are selected from that area’s population.

The sample mean : Sample mean is the average of the total data that a researcher collected from the whole population in the specific study area.

$$\text{Sample Mean} = \frac{\sum x}{n}$$

Study problem restatement : The main problem of the study is to find out the waterlogging problem of the Jashore and Satkhira districts. Women face miserable conditions in the waterlogging in this area. This study focuses on finding out the condition of women during the disaster time and what types of coping strategies they have taken on the condition.

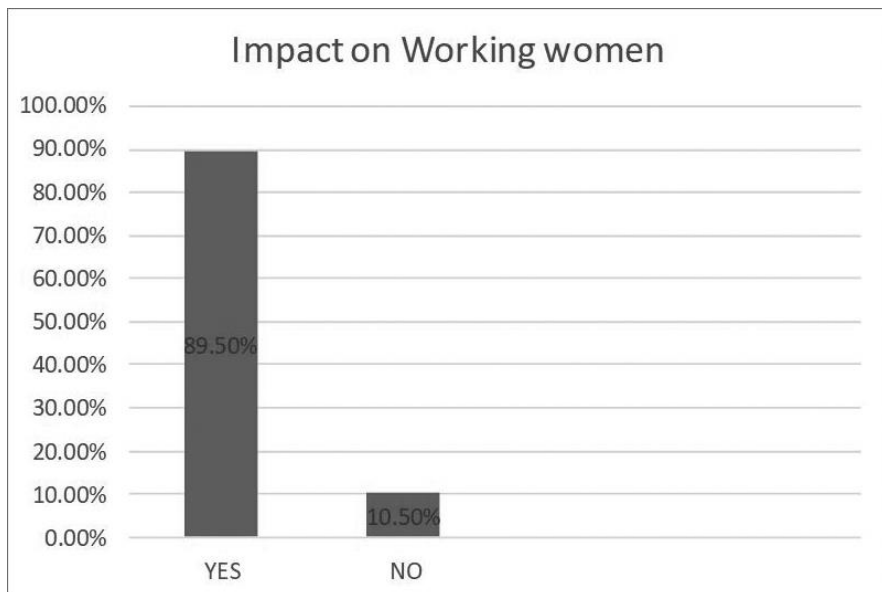
Study area of Jashore District : The study was conducted in two upazilas, Manirampur under Jashore and Tala under Satkhira district, considering their vulnerability during waterlogging. Manirampur is located between 22°55' and 23°06' north latitudes and between 89°09' and 89°22' east longitudes. The area of Manirampur Upazilla is 444.72 sq km. It is bounded by Jashore Sadar Upazila on the north; Kalaroa, Keshabpur, and Dumuria Upazila on the south, Abhaynagar Upazila on the east, Jhikargachha Upazila on the west.

Study area of the Satkhira District : On the other hand, Tala Upazila is located between 22°32' and 22°50' in the fourth latitude and between 89°05' and 89°20' east longitude with a 344.15 sq km area. It is bounded by Paikgachha Upazila on the east, Kalaroa, Keshabpur, and Dumuria Upazilla on the north, Satkhira Sadar Upazila on the west, and Assasuni Upazilla on the south (Banglapedia, 2016).

Among the two Upazila, the Haridaskathi union from Manirampur Upazila and the Islamkati union from Tala Upazila were selected. Four areas in two unions have been selected for facilitating the study. These are Kumershima, Pachbaria, Kharail, and Bhabanipur. By using purposive sampling, a total of 105 samples were selected as samples for face-to-face interviews. The respondents included all categories, i.e., housewives, working women, and self-dependent through cattle rearing. As it is an exploratory type of study, the researcher has considered some case studies.

Results and Discussion

Figure 1: Percentage distribution of the impact on working women during waterlogging.



Source : Field survey, 2018

Women are the worst victims of waterlogging. They face problems from various sides. Working women are facing problems due to waterlogging. Of the respondents, nearly 90% said they faced problems during the situation. Most of them opine that they play dual roles as housewives and working women. In a general sense, it is difficult for a person to manage two jobs. So, the situation worsens during waterlogging. Working women face safety issues related to their transportation. During this time, the roads are submerged in water and sometimes the roads are broken, resulting in lack of regular vehicles. So, everyone has to walk, but it is very unusual for women. Because after returning from work she has to finish her housework. If she can't come earlier, she won't be able to finish her homework. At the same time, it creates problems with their security. The lack of normal transport forced her to take a crowded car. Many times, women cannot get into the car. So, they are late to return home. As a result, family members are worried about her safety.

Table 1: Percentage distribution by nature of the effect on women's occupation

Nature of effect	Percentage (%)
Low Wage	10.50
Doing more work	57.50
Becoming Jobless	18.30
Different Harassment/ Security	4.70
Others	9.00
Total	100.00

Source: Field survey, 2018

Table 1 shows the nature of the impact on women's occupation during waterlogging. Most of the respondents (57.5%) said that they worked more during this period. On the other hand, about 18.30% of the respondents said that they lost their jobs due to waterlogging, and some respondents (10.5%) said that they get low prices at their workplaces. Moreover, various types of harassment and safety issues affect their profession. Apart from the workplace, they are dealing with this situation by engaging in various small businesses and producing various handicraft products. Besides, they seek alternative livelihood opportunities like: duck rearing, cage fish farming, craft training, tailoring, poultry and fish feed farming etc.

Table 2: Percentage distribution by nature of the effect on household activities

Nature of effect on household activity	Percentage (%)
Cooking Problem	20.95
Washing Problem	2.86
Lack of pure drinking water	30.48
All problems	45.71
Total	100.00

Source : Field survey, 2018

Table 2 indicates the types of problems faced by women during their household activities due to waterlogging. First, women work at home, and they face problems with their work. Every day they have to prepare food for their family members. But they face scarcity of materials like rice, vegetables etc. 21% of the respondents said that cooking was the main problem during this period. 30% of respondents said that lack of pure drinking water affects their household activities. About 46% opined that all these problems affect them. We know that waterlogging destroys homes, latrines and sources of safe drinking water and disrupts daily life. The picture is similar to the research results. Women have to struggle to cope with this situation. Women take various steps to solve this problem. They store rainwater in large pots at home to use for cooking and washing and even drinking as drinking water.

Table 3: Percentage distribution of the problem faced by women due to the migration of male members

Effect of Women during male member's migration	Percentage (%)
Maintain children alone	42.00
Lack of social security	30.00
Searching livelihood	3.00
Lack of food security	9.00
Sexual Harassment	2.00
All Problem	14.00
Total	100.00

Source : Field survey, 2018

Through informal interviews, the researcher obtained information that, due to severe financial crisis, many people could not eat three meals a day even after removing the stagnant water. Lack of food or safe drinking water has forced many villagers to migrate.

In this context, the researcher tries to find out what kind of problems women face due to the emigration of male members. In response to this question, the respondents said that the absence of male members for the maintenance of children is the most problematic because, in the absence of male members, the entire responsibility of the family falls on a female member. Lack of social security (30%) and food security (9%) are other problems. These things hurt women emotionally. But get no help from anyone. They have to wait for relief from various organizations. Not everyone is relieved there either. They are forced to resort to local dignitaries hoping for help from various agencies.

Table 4 : Percentage distribution by nature of diseases among women

Nature of diseases	Percentage (%)
Waterborne	74.28
Malnutrition	16.19
Infectious	9.52
Total	100.00

Source : Field survey, 2018

Since it is very difficult to cook meals every time, family members do not eat three meals a day. During waterlogging most of the family members take one meal a day. Thus, the calorie requirement per person is incomplete. Thus, it creates a different health risk for the problem, especially for women. Women are suffering from various diseases due to waterlogging. Most of the respondents (74%) suffer from water borne diseases such as diarrhea, cholera, typhoid etc. About 10% of the respondents reported that they suffer from various infections, and acute vaginal infection is one of them. Collection of clean drinking water is a serious problem at this time. Hence lack of clean drinking water is responsible for various diseases. When the women complete their daily household chores, they go over the water. Contaminated water causes various skin problems and infections. Also, malnutrition played an important role during this period.

Table 5 : Percentage distribution of the problem of using firewood

The problem of firewood	Percentage (%)
Yes	93.33
No	6.67
Total	100.00
Type of problem	Percentage (%)
Go to another place to collect firewood	17.35
Drying problem of firewood	11.22
Lack of adequate firewood	29.59

All problem	41.84
Total	100.00

Source : Field survey, 2018

The researcher wanted to know whether, due to waterlogging, the respondents faced any problem in using firewood. In response to this question, 93% of the respondents said that they faced problems. They lack firewood and stoves. A stove made of clay is destroyed by water. Knowing this, the researcher tried to determine the nature of the problem in the use of firewood. Among them, about 30% of the respondents said that they lacked enough firewood, 17% of the respondents said that they went to other places to collect firewood, and some respondents said that the problem of firewood drying was another problem. To solve this problem, the use of cylinder gas and the use of electric equipment have increased significantly in the studied area.

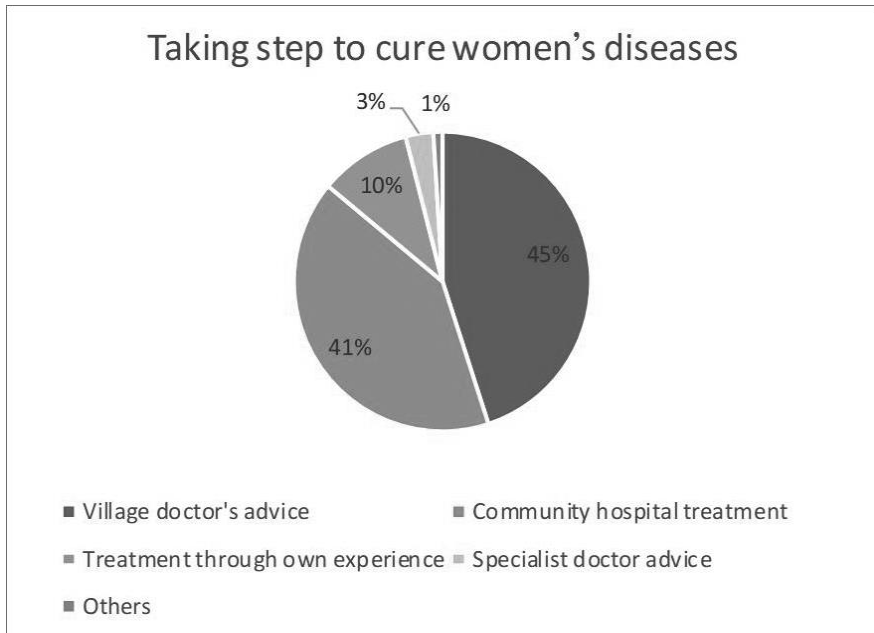
Table 6 : Percentage distribution of the respondent's opinions about the problem of the pregnancy period

Create a problem for women during pregnancy time	Percentage (%)
Strongly agree	32.4
Agree	49.5
neutral	14.3
Disagree	1.9
Strongly Disagree	1.9
Total	100.00

Source : Field survey, 2018

The researcher tried to know the opinion of the respondent about the problem of pregnancy. However, we know that pregnant women are the most victims of this situation. Villagers face problems with sanitation, and most villagers do their normal work in the open. But the sanitation problem of women and girls is beyond description. Thus, it poses a serious health risk to women and girls. The situation creates a bitter experience for pregnant women. Their problems cannot be expressed in words. The table also shows that about 50% of the respondents agree and 32% strongly agree that waterlogging causes many problems. Respondents said that women do not move freely due to waterlogging. All kinds of social activities, i.e. weddings, social interactions, everything seems to be suspended. There are hardly any opportunities for entertainment. Except in emergencies, they do not go out and they do their daily household chores very carefully.

Figure 2 : Percentage distribution by taking steps to cure the diseases



Source : Field survey, 2018

A major concern in health and nutrition lies in food security. Due to decrease in production and income, people reduce food consumption. They also said children are suffering from severe malnutrition as mothers try to feed their children with what they have when they are half-fed or even starving. In previous Table 4, we have shown that during waterlogging, respondents suffer from various diseases due to lack of adequate food and clean drinking water. Women are unable to wash their clothes due to lack of clean water. So, they use dirty clothes and utensils which are the fuel of disease. Figure 2 shows the steps taken by the respondents to cure the disease. The pie chart shows that most of the village women visit the village doctor for consultation and treatment. About 45% of the respondents prefer to go to the village doctor for consultation and treatment. 41% of the respondents visit a community clinic for consultation and 10% of the respondents take medicine from their previous experience. Only 3% of the respondents visit a specialist and these people belong to the upper class of the society. Some people rely on Kaviraj for traditional treatment and their spiritual beliefs. This segment belongs to only 1% of the respondents. Thus, a large number of respondents are deprived of modern medical facilities.

Case study analysis

Case Study-1

Case study analysis also shows that women are the most vulnerable during waterlogging. This will appear more evident from the statement made by a woman, age 25, who discussed her experience as follows:

Waterlogging is a regular issue in her area, especially during the rainy season. Because there is no proper way to pass the water. The water drainage system has broken because of siltation in the local rivers. She lives in a joint family with eight members. She described the impact of waterlogging, which they faced in the last four years. She said their yard was under 3–4 feet of water. At that point, they cannot go out without a boat. Their toilet also sank underwater. She described that she faced a tremendous sanitation problem because she or other female members of her family cannot go to the bathroom in the daytime. They faced a major problem in cooking and rearing domestic animals because they could not manage firewood, food, or other necessary elements to live. She has tremendous experience related to waterlogging. She has two daughters. The elder daughter is four years old, and the younger daughter is one year old. When her elder daughter is about one year old, her house drowns underwater. One day when she was cooking in the kitchen, her daughter was fallen into the water. One of her neighbors rescued her daughter. Her eyes got wet at the time of describing the incident.

Case Study-2

Case study 2 was created by a woman who is a school teacher. She is the only married breadwinner in her family. After coming back from school, she has to finish the housework. Her husband is a farmer, but most of the land remains under water due to waterlogging. So, he is not able to cultivate crops. So, it is not easy for her to maintain everything. She has two children and they both go to school. Children cannot go to school during waterlogging. The school grounds are under water most of the year. So, students cannot play and their physical health is deteriorating day by day. Being a teacher and attending regular academic activities is also problematic for her to go to school. When the waterlogging continued, she had to go by boat as her school was five kilometers from her home. Most of the roads are under water. So, boats are the only way to get from one place to another.

A health hazard is a major threat at that time. She faced various health problems caused by water and some problems related to psychology. She received some basic treatment from the village doctor, but could not go to a hospital or any specialist as her family did not agree with her. It created some physical problems and every day she fights with herself to overcome the problems. Every member of the women's family in that area

faces various mental and physical problems, but the women cannot express themselves. One of the main problems is that family members never pay attention to their problems.

Another important issue is related to livestock safety. She had three cows, but during the waterlogging she lacked food. Her cowshed was submerged under water. So, she had to shift his cow to her relative's house. But the cow drank the contaminated water and contracted a waterborne disease and all the cows died.

General Discussion

The Crunch model primarily focuses on both processes and structures, which involve local, institutional and government agencies in disaster response strategies as well as watersheds. This model suggests that several social, economic, political and environmental factors negatively affect disaster risk mitigation as well as adaptation processes, which is one of the fundamental concerns of current research. Also, this model plays an important role in understanding adaptation processes during disasters as well as waterlogging. This model analyzes how certain social factors disrupt disaster mitigation and adaptation processes. The primary concern of this study is the risk to women. This model helps to understand such hazards. Women are subjected to various types of harassment during natural disasters. Then natural calamities and their vulnerability combine to become major calamities that create mental barriers for them to deal with calamities. For this reason, I think this study is closely related to the disaster crunch model.

Women are the worst victims of waterlogging. They face problems from various sides. First, if women work at home, they face problems in their work. Every day they have to prepare food for their family members. But they face shortage of materials like rice, vegetables etc. At the same time, they lack fire wood and stove. A stove made of clay is destroyed by water. As the family members do not eat three meals a day it is very difficult to cook every meal. During waterlogging most of the family members take one meal a day. Thus, the calorie requirement per person remains incomplete. Hence, it poses various health risks to people especially women.

Women cannot wash their clothes due to lack of clean water. So, they use dirty clothes and utensils which spread disease. Working women face safety issues related to their transportation. During this time, due to waterlogged roads, there is a regular shortage of vehicles, sometimes the roads are broken. So, everyone has to walk but it is very unusual for women. Because after returning from work, she has to finish the housework. If she can't come earlier, she won't be able to finish her

homework. At the same time, it creates problems with their security. Lack of normal transport forces him to take crowded vehicles. Many times, women cannot get into the car. So, they are late to return home. As a result, family members are worried about his safety.

When waterlogging continues for months, family members take shelter along high roads or in schools or relative's homes. So, sheltering on the roadside is totally unsafe for everyone especially women. Women face both physical and mental problems. She cannot do her regular work. She is always worried about security and future. At the same time, they are under tension of various types of physical attacks. There is a lack of psychologists or social workers to help women in those places. Villagers face problems with sanitation and most of the villagers do natural work in the open. But sanitation problems for women and girl's are indispensible. Thus, it poses serious health risks to women and girls. The situation creates a bitter experience for pregnant women. Their problems cannot be expressed in words.

Conclusions and Recommendations

Waterlogging is an acute problem in the study area located in southwestern Bangladesh. During this time people face various mental and physical problems. Health risks for women and girls are dire. They face problems like sanitation, drinking water, medicines etc. Although there is a lot of research on waterlogging, the issue of women has not been given much importance. Some recommendations are made in light of the findings from the above research:

- The government should take initiatives to re-drench the Kapotaksha and Mukteshwari rivers located in Satkhira and Jessore districts respectively.
- Proper earth spoil management during river mining or dredging.
- Health facilities should be increased especially for women.
- To create alternative sources of livelihood and ensure social security for women.
- Establishing new small and medium industries for income generation where women can easily work.
- Relief agencies should extend their hands massively especially for women during waterlogging.
- Government should appoint a women psychologist or psychiatrist to whom women can freely express their feelings during waterlogging.

The women who did not give up in the battle of life in spite of various adversities saved their families with utmost mercy during the waterlogging with their own abilities. Women play a more prominent role

than men in dealing with flood-related disasters. Due to their efforts, the study area has survived several natural calamities every year. However, if this problem is not eliminated as soon as possible, this region will face extreme danger. So, policy makers need to take quick steps to sustain this region and free women from various problems.

References

- Arfin, M., Saika, U. and Huda, K.M. (2012). *Causes of Waterlogging and its effect on women : A case study on Dhaka city (ward no-53) in Bangladesh*. LAP LAMBERT Academic Publishing
- Ashraf-ul, A. (2005). "River management in Bangladesh : a people's initiative to solve waterlogging". *Coastal Development Partnership (CDP)*. Khulna, Bangladesh.
- Awal, M. A. (2014). "Water logging in the south-western coastal region of Bangladesh : local adaption and policy options", *Science Post print I(1)* Bangladesh Agricultural University, Bangladesh.
- Blaikie, P., Cannon, T., and et al (1994). *Disaster Pressure and Release Model in At Risk : Natural Hazards, People's Vulnerability and Disasters*, Routledge London.
- Bohra-Mishra, P. and Massey, D.S (2010). *Environmental Degradation and Out Migration : New Evidence from Nepal*. J: Office of Population Research, Princeton University, Princeton
- Chindarkar N. (2012). "Gender and climate change induced migration proposing a framework for analysis", *Environmental Research Letters*, IOP Publishing Ltd, Vol. 7, No-2.
- Chowdhury R.K (2007). *Climate Change Impact and Disaster Vulnerabilities in the Coastal Areas of Bangladesh*. Dhaka.
- Massey W., Axinn W., and Ghimire D. (2007). *Environmental change and Out-Migration : Evidence from Nepal*. MI: Population Studies Center, University of Michigan Institute for Social Research, Ann Arbor.
- Neelormy S., Adri N., and et al (2009) *Gender dimensions of differential health effects of climate change induced waterlogging : A Case study from coastal Bangladesh*, Climate change : Global Risk, challenges and Decisions, IOP conf. series: Earth and Environmental science 6, IOP Publishing.
- Onneshan U. (2007) *The Development Disaster Water logging in the Southwest region of Bangladesh*. Dhaka, Bangladesh
- Rahman A, (2008). *Land Cover and Environmental Hazard; Satellite Remote Sensing Approach and Solutions in Bangladesh*, Austria, 9-12 September.
- Shreshtha S.S, and Bhandari P. (2007). *Environmental security and labor migration in Nepal Popul*. Environ, 29. P. 25-38.