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Assessment of Women's Vulnerability in Natural Disasters: An Investigation into the Coastline Area of Bangladesh

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Abstract

The present study was conducted to identify women's vulnerability, disaster preparedness, disaster loss, and adaptability to disasters. They experienced high risk in disasters in terms of mortality, water, health, sanitation facilities, insecure livelihood and deprivation from relief materials. They were victims of sufferings and mostly enjoyed limited scope of participation in response or management activities. To recover the loss of disaster, women cope with several adaptation strategies like homestead gardening, seasonal vegetables cultivation, alternative farming, tree plantation, engaging in cash for work programmes and livestock rearing. Study strongly advocates for building comprehensive adaptation strategies that are helpful for community resilience and reducing women vulnerability.

Keywords: Cyclone warning; disaster preparedness; disasters risk; loss in disaster; adaptation; Patharghata Union.

Introduction

Most of the coastal areas of the world are at risk from natural disasters and meteorological disturbances as a result of climate change. The coastal areas of Bangladesh facing the Bay of Bengal cover 19 districts which make the country one of the most disaster prone areas (World Bank, 2006; Mannan, 2000). As the Bay of Bengal is a perfect breeding ground for tropical cyclones where on an average, annually 12-13 depressions are formed, and at least one or two powerful cyclones strike Bangladesh each year, For example, cyclones Sidr and Aila (Islam, 2011; Paul 2009a,b) and recent cyclone Mahasen struck the southern coast of Bangladesh (on May 16, 2013), lashing remote fishing villages with heavy rain and fierce winds that flattened mud and straw huts and forced the evacuation of more than one million people (Sullivan et al., 2013). In addition to the geophysical characteristics of Bangladesh coast, the poor socio-economic conditions of coastal inhabitants also contribute to increasing the vulnerability of inhabitants to cyclones, storm surges, floods and droughts (Paul, 2009a). Livelihoods of coastal populations are highly dependent on ecosystems linked with agriculture, fishery, forestry and salt farming. Therefore, the increasing trend of cyclones will certainly affect the livelihoods of vulnerable populations living in low-lying coastal Bangladesh (Islam, 2008; Mian, 2005). During the years 1797 to 2009, a total of 65 devastating cyclones swept over Bangladesh and caused immense harm to the people and about 80-90% of global losses and 53% of total cyclone-related deaths in the world occur in Bangladesh (Paul, 2009a,b).

International Strategy for Disaster Reduction (ISDR) defines vulnerability as a set of prevailing or consequential conditions resulting from physical, social, economic and environmental factors, which increase the susceptibility of a community to the impact of

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hazards (ISDR, 2002). According to DFID (2004), 'vulnerability is an indication of people's exposure to external risks, shocks and stresses and their ability to cope with and recover from the resulting impacts. Vulnerability may differ seasonally or at different times within people's lives. It also differs across groups within communities or individuals within a household, owing to their livelihood activities or social standing'. Hayles (2010) mentioned that vulnerability is also increasing due to rising poverty, a growing global population, armed conflict and other underlying development issues. Tapsell et al. (2010), address analyzing and measuring social vulnerability to natural hazards. They illustrated some empirical examples of social vulnerability in relation to natural hazards. Therefore, it is important to manage these vulnerabilities in order to reduce the impact of disasters.

Natural disasters in Bangladesh are considered to be great constraints for sustainable development as these are badly affecting the lives and livelihoods of the country especially for the coastal community (Alam, 2011). Women are supposed to be the most vulnerable and the vulnerable women of the coastal areas are not getting proper support from the government and non-government authorities but their indigenous coping capacities are appreciable (Islam, 2008). Up until now, a gender perspective has been mainly lacking from the international debate on environmental change which is the barrier to the effective and sustainable development programmes (Duddy, 2002). According to Climate Change Cell (CCC) of Bangladesh, women are even more vulnerable to the impacts of climate variability and change because they are often not allowed to participate in the public sphere, and are therefore, less likely to receive critical information for emergency preparedness (CCC, 2009). Moreover, most climate change issues, policies and programmes are not gender neutral and several areas like gender specific resource-use patterns; gender-specific effects of climate change; gender related pattern of vulnerability; women's capacity to cope with climate change; gender and decision-making on climate change; and gender aspects of adaptation and mitigation deserve attention (CCC, 2009; IPCC, 2007).

A study of DFID (2007) noted that it should include minority and excluded groups in the disaster management programme but the Comprehensive Disaster Management Programme (CDMP) of Bangladesh is not paying sufficient attention to gender issues in such cases. Moreover, United Nations Framework for Convention on Climate Change (UNFCCC) reported that the Adaptation Fund would be confirmed to ensure women's leadership central for decision-making around how those funds are disbursed and used, as well as by which projects those are implemented, monitored and evaluated. It would also be responsible for ensuring adaptation funds for meeting the needs of poor and marginalized women affected by changing environment and should coordinate closely with the multi-stakeholder committees (UNFCCC, 2013). For this reason, gender disaggregated research is required in order to shed more light on levels of vulnerability and coping mechanisms of men and women. The findings may feed into the climate negotiating process to enable decision-makers to have a better understanding of how women are affected and what capacity and support is needed. Given this premise it is the main rationale to carry out an analysis of women in natural disasters in a coastal area of Bangladesh with the following objectives: identify the women's vulnerability and risk in terms of natural disasters management; identify women's responses to natural disasters in pre-, during and post disasters; and finally, find out the effective strategies for women to cope with the natural disasters.

Materials and Methods

Profile of the study area

The study was conducted in Patharghata Upazila (sub-district) of Barguna, a coastal District in south-western Bangladesh, with an area of 1831.31 sq. km. of which 399.74 sq. km. being riverine and 97.18 sq. km. covered by forest. Barguna is also divided into 5 Upazilas namely, Amtali, Betagi, Bamna, Barguna Sadar and Patharghata having 38 unions and 560 villages (BBS, 2011; Banglapedia, 2006).

The study area Patharghata Upazila occupies an area of 387.36 sq. km. with 37.29 sq. km. of forest (Figure 1) located between 21°58' and 22°14' N between 89°53' and 90°05' E. The main rivers of the area include Bishkhali and Haringhata (BBS, 2011). Patharghata Upazila comprises of seven unions (lowest level administration entity); among those Patharghata Union was chosen as the study area, because the union is situated at coastline of Bangladesh. Natural disasters e.g., cyclone, storm surge and coastal floods are common which affect the area frequently.

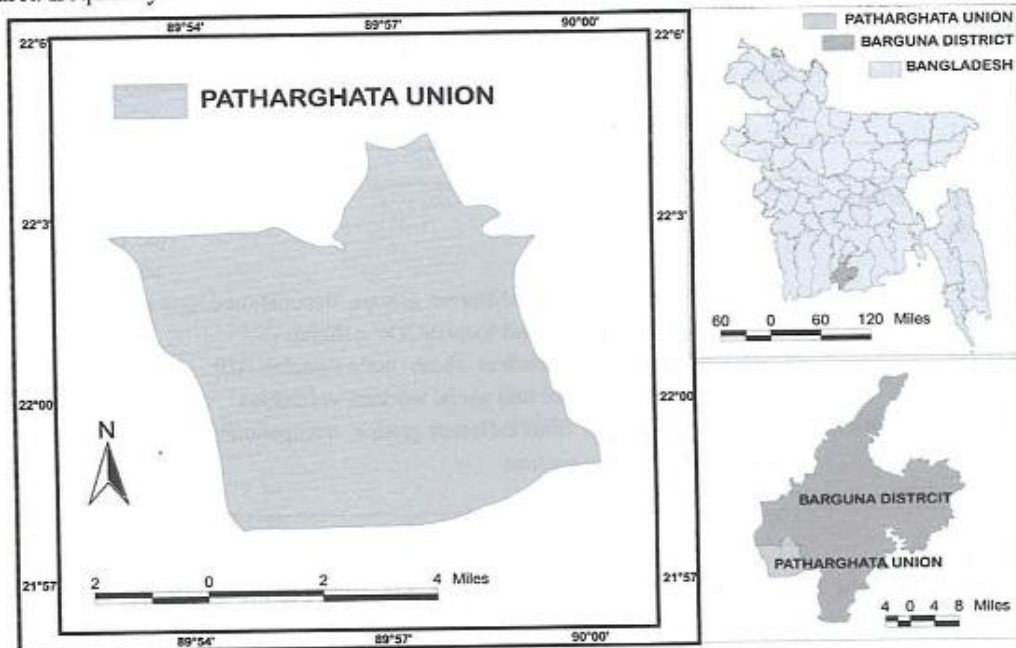


Figure-1: Location map of the study area

Methods

Data was obtained through secondary sources and a series of field visits. The recent documents and reports related to natural disasters, women in disaster and women's role in disaster mitigation was reviewed for the research purpose. The primary data was collected through household surveys (HHs), Key Informant Interviews (KIIs), Focus Group Discussions (FGDs), public consultations and case studies.

Selection of the study villages

Based on the preliminary idea gathered from the secondary sources and consultation with the local NGOs and administrations, out of nine union wards, three wards (spread over four villages) were selected to be surveyed to achieve the objectives of the study. From the three

wards, three villages namely, Boro Tengra, Char Padma and Char Lathimara were selected purposively for the surveys which were mostly affected by the previous disasters like Sidr and Aila.

Field techniques and data collection

Primary information were collected by using checklist and semi-structured questionnaire along with direct field observations in order to know the views about the disaster risk, women's vulnerability, women's response, etc. In FGDs and KIIs, the study includes the vulnerable men and women, representatives from local government, elites and NGOs. Public consultations were conducted at the local tea stalls where local people gathered spontaneously in the afternoon after their daily works and no formal invitation to the local people was made for participating at the consultations. During the HH surveys, household head (male or female) along with family members (if possible) were interviewed during the daytime. The HHs and KIIs survey outputs were validated during the FGDs. In order to achieve the objectives, 105 HHs, ten KIIs, four FGDs, six case studies (two from each village) and a series of public consultations were conducted (Table 1). On each survey topic, respondents were encouraged to express their views and provide additional information regarding natural disasters in the study area. Surveys were conducted during February to April 2013.

Table-1: Sample size of the study

Tools	Participants	Sample Size
HH questionnaire survey	Vulnerable women	105 (35 HHs from each village)
FGD	Community people from different groups, occupations, knowledgeable persons and local NGOs' officials	4
KII	UP Chairman, UP members (both male-female), UP secretary, schoolteacher and social workers/volunteers	10
Public consultation	Community people from different groups, occupations, and knowledgeable persons	Series
Case studies	Vulnerable women	6

Data analysis

The collected data was processed and analyzed through computers using MS Excel and SPSS software. Before reaching to any conclusion, different variables were checked and cross-checked from time to time. Then the processed data was analyzed using both qualitative and quantitative approaches. Women's vulnerability e.g., physical/material vulnerability, social/organizational vulnerability and motivational/attitudinal vulnerability was assessed through Anderson (1995).

Results And Discussion

Socio-economic and demographic features of the respondents

The basic demographic features of the surveyed vulnerable women were presented through Table 2. It was observed that the highest numbers of respondents were from the age group >30 years (48.57%) followed by 31-40 years (20.95%). Educational status of the surveyed respondents shows that 41.90% were illiterate, 39.05% completed their primary education and 12.38% secondary education. Survey found that the respondents had four types of occupation; among them 65.71% were housewives, followed by fishing (18.10%). It is important to note

that 8.57% respondents were engaged in day labour and 7.62% were in service oriented works like NGO worker and schoolteacher. Field survey reveals a clear evidence of occupational changes among the disaster affected women. It is further evident in the case of women group who lost their male earning members, had to go for work in the field or to the NGOs for loan to do some land based or home based activities rather than going for any water based activities. This is further evident from the case studies.

Table-2: Demographic features of the vulnerable women in the study area

Parameter	Respondents/village (%)			
	Char Padma	Char Lathimara	Boro Tengra	Total
Age classification				
<30	40.00	51.43	54.29	48.57
31-40	28.57	14.29	20.00	20.95
41-50	14.29	14.29	17.14	15.24
51-60	17.14	14.29	5.71	12.38
>60	-	5.71	2.86	2.86
Educational status				
Illiterate	48.57	45.71	31.43	41.90
Primary	40.00	34.29	42.86	39.05
Secondary	5.71	11.43	20.00	12.38
SSC	5.71	2.86	5.71	4.76
HSC	-	2.86	-	0.95
Graduation	-	2.86	-	0.95
Occupational status				
Housewife	74.29	54.29	68.57	65.71
Day labour	5.71	5.71	14.29	8.57
Service holder	11.43	8.57	2.86	7.62
Fishing	8.57	31.43	14.29	18.10
Monthly income				
<5,000	77.14	82.86	74.29	78.10
5,000-10,000	20.00	14.29	20.00	18.10
>10,000	2.86	2.86	5.71	3.81
Housing condition				
Tin shed	51.43	48.57	48.57	49.52
Thatched	45.71	37.14	45.71	42.86
Semi-building	2.86	5.71	5.71	4.76
Building	-	8.57	-	2.86
Source of house				
Family income	65.71	66.67	70.59	67.62
NGOs help	25.71	13.89	14.71	18.10
Relief	8.57	16.67	17.65	14.29

From the study, we recorded four types of household ownership. About 78.10% respondents mentioned that they lived with their husbands; about 12.38% respondents reported that they were the head of the household who lost their husbands, 6.67% lived with their sons' families and only 1.90% lived with their fathers. In terms of monthly family income it was Tk. <5,000 (78.10%), 5,000-10,000 (18.10%) and >10,000 (3.81%) (Table 2). From the income data it is

very clear that the people living along the coast are earning less and it applies to women further as women earn further less. It was clear from the case studies that, women headed households who lost their family earning male members suffer more in this case than before.

Moreover, we recorded four types of housing condition of the respondents e.g., tin shed (49.52%), thatched (42.86%), semi-pucca building (4.76%) and building (2.86%). They also reported that 80.95% houses were built on Khas land (government land) and the rest were built on their own land (19.05%). Every year, coastal people lose their houses; as a result, source of housing is an important issue to them. Study found three sources of their house structures: from family income/self made (67.62%), from relief/grant after disaster (14.29%) and from NGOs after disaster (18.10%) (Table 2), which indicates a kind of asset vulnerability. The higher the intensity of disaster, the more the asset is vulnerable; and thereby less interest for asset accumulation. For making houses, they collect wood and bamboo legally and illegally from the nearby Sundarbans forest.

Drinking water, health and sanitation status of the respondents

Scarcity of pure drinking water, not only for the human beings but also for the cattle, is the main problem for the study area. Women are the worst victim of it. About 84.76% respondents mentioned that there is insufficient water in all the seasons. Additionally, 85.71% reported that water was sufficient only in the rainy season. Moreover, in regard to the questions of distance of water source (km) from their houses, about 71.43% reported that they collect water from less than 1 km distance followed by 9.43% from 1.5 km distance, 11.43% from 2 km distance and 7.62% from 2 km and above distances. The study found six major sources of drinking water: filtered water (88.52%), boiled water (1.90%), pond and canal water (6.67%) and water collected from tube well (1.90%). Along with these, if somebody has the capacity to buy water, they buy water jars (0.95%) from the market for drinking purposes. In each study village only one or two ponds were available for drinking and daily household water. From those ponds, water was purified by the filters and people could collect water directly from the filters. After Sidr and Aila, all the water bodies including tube wells and ponds were affected by saline water and people could not directly drink and use this water. During that time, several NGOs cleaned up the ponds and connected the filters, thus they could use the water for drinking and cooking purposes.

Local people in the study area were frequently suffering from diseases like diarrhoea, dysentery, cholera, malaria, skin diseases, asthma and breathing problem, heat stroke, heart disease, high blood pressure, gastric and ulcer, eczema, arthritis and rheumatism. Women suffered from more diseases than men. However, women and adolescent girls also suffered from various gynaecological diseases caused by using saline water in daily household activities. Females need more health care during disaster than the males but they received the least compared to the demands. Although women need special health care services in disaster periods, they hardly have that opportunity in the coastal areas (Sharmin & Islam, 2013; Oxfam-GB, 2011; Alam & Collins, 2010).

In the case of latrine, most of them use thatched/straw made latrines (78.10%), followed by eco- san toilets (14.29%), finally building and open toilets (both 3.81%). In regard to the source of latrines, they reported that 84.76% latrines were self-financed where 11.43% were supported by NGOs, 2.86% from grant/relief after disaster and 0.95% from their relatives. They also mentioned that if they suffered health related problems, they contacted with the

village doctor/local pharmacy (92.38%) and then with the government health complex (7.62%). Studies reveal that health care becomes increasingly challenging in the study area which further remains worse in the case of women.

Disaster preparedness of women

Before disaster, women have least access to early warning. Women cannot hear warning signal, if the house is far from main road or they are busy with household works. A question was asked to the respondents about knowledge of any upcoming disaster. About 79.05% reported that they knew before about any upcoming disaster and 11.43% respondents did not know/hear, where 9.52% was not sure or had forgotten about it. In general, word-of-mouth from neighbours or relatives (93.18%), Red Crescent Society Volunteers (89.77%), radio (75%), local government and NGOs (56.82%), television (13.64%) and newspaper (9.09%) were the common sources of early warning of disaster in the studied villages.

Table 3: Response activities taken up by the women at the time of pre-, during and post disastrous situation

Pre-disaster	During disaster	Post-disaster
<ul style="list-style-type: none"> ✓ Gather children and family members and taken special care to the old age, sick and disabled family members; ✓ They inform and meet with their neighbours; ✓ Changing their dress habit from sari to salwar kameez; ✓ Changing their hair style from normal to curl/ braid style; ✓ They tie and fix their baby by the sarce and towel with their body; ✓ They collect and preserve enough dry food like <i>chira</i>, <i>muri</i>, <i>khoi</i>, molasses, biscuits and clean drinking water; ✓ If possible save an amount from family income; ✓ Make <i>chhika</i> with jute so that utensils could be kept hanging above the floor during flood; ✓ They also plant fruit trees, banana trees and dhol kolmi (<i>Ipomoea carnea</i>) around their houses; ✓ Covering tube well with plastic and cloth; ✓ Dung earthen hole to keep jewelleryes and documents; ✓ Search safe place for the livestock; ✓ Sometimes go for saying prayer and read Holy Quran. 	<ul style="list-style-type: none"> ✓ They stay at cyclone shelter with the family members; ✓ They remain busy to keep safe children, sick, old age and disabled persons; ✓ Taken special care to the pregnant women and adolescent girls; ✓ They cooperate with neighbours; ✓ Sometimes go for saying prayer and read Holy Quran. 	<ul style="list-style-type: none"> ✓ They unite their whole family members; ✓ They help male members to rebuild their house structure; ✓ They make new cooking stove and buy other cooking materials; ✓ They work in the field with male for earning more money; ✓ Sometimes they participate in rehabilitation works if possible; ✓ They repair fishing nets; ✓ Enrich homestead garden with seasonal vegetables and planting fruit trees. ✓ They take loan from NGOs to do IGAs something like livestock rearing.

Women differ widely with men in the case of disaster preparedness, but they play a complementary role rather than a competing role. They have separate preparation techniques for pre-, during and post disastrous situation (Table 3). As pre-disaster preparations, women make portable stove, pile up firewood, collect dry food, if possible, save an amount from their family income, plant trees around their houses, cover tube wells with plastic, sometimes they dig holes to keep their jewellerys and documents, change their dress habit and hair style, among others. During disaster, they generally stay at the cyclone shelter with family members, take special care of the pregnant women, adolescent girls, children, sick, old age and disabled persons and cooperate with their neighbours. In the post-disaster period, women first unite their family members, help male members in rehabilitation activities, work in the field with male members, enrich homestead gardens with seasonal vegetables and plant fruit trees and take loan from NGOs to do income generation activities.

Social norms and role behaviours provide reasons for gendered disaster vulnerability in putting women at a clear disadvantaged situation when it comes to rescue attempts. Generally, women follow these social norms and roles often derive from the unequal distribution of power between men and women in many societies (Neumayer & Plumper, 2007). In many countries women's roles are to look after and protect children and the elderly as well as the family's domestic property, which hampers their self-rescue efforts in almost any type of natural disaster (Schwoebel & Menon, 2004; Oxfam International, 2005). Dress codes can restrict women's ability to move quickly, and behavioral restrictions can hinder their ability to relocate without the consent of husband, father, or brother (Neumayer & Plumper, 2007). For example, in rural Bangladesh women are expected to wear a sari, traditional clothing that hampers running and swimming; and to remain in the house, typically the houses of the family and near kin. These strictures can impede their movements and their access to information about cyclone-induced floods (Ikeda, 1995). Moreover, a social prejudice against women learning to swim drastically reduces their survival chances in flooding (Cannon, 2000).

Problems faced in the cyclone shelter

Disaster increases women vulnerability in three disaster periods e.g., pre-, during and after disaster. In regards to the question of problems faced in the cyclone shelters, they mentioned several problems faced as a woman during taking shelter in a cyclone shelter (Figure 2). They reported about no. separate toilet and washroom facility (89.52%), insufficient food supply (76.19%), insufficient medicine supply (36.19%), lack of fresh water supply (78.10%), not enough space for livestock (86.67%), lack of coordination among organizations (74.29 %), injustice in relief distribution (77.14 %), sexual harassment of adolescent girls (60.00%), chance of robbery (60.95%) and not considered women's special need (89.52%). Women got inadequate relief materials as they are not considered main breadwinner of a family. Many disaster researchers have noted that in most countries relief efforts are almost exclusively managed and controlled by men, systematically excluding women, their needs, competences, and experiences from contributing to these efforts (Enarson, 2000; Bradshaw, 2004). Although, women responded first to rescue disaster affected people, they were not involved in planning and management of institutional relief and rehabilitation activities due to traditional discrimination (Sharmin & Islam, 2013; Oxfam -GB, 2011; Alam, 2003; Fothergill, 1996).

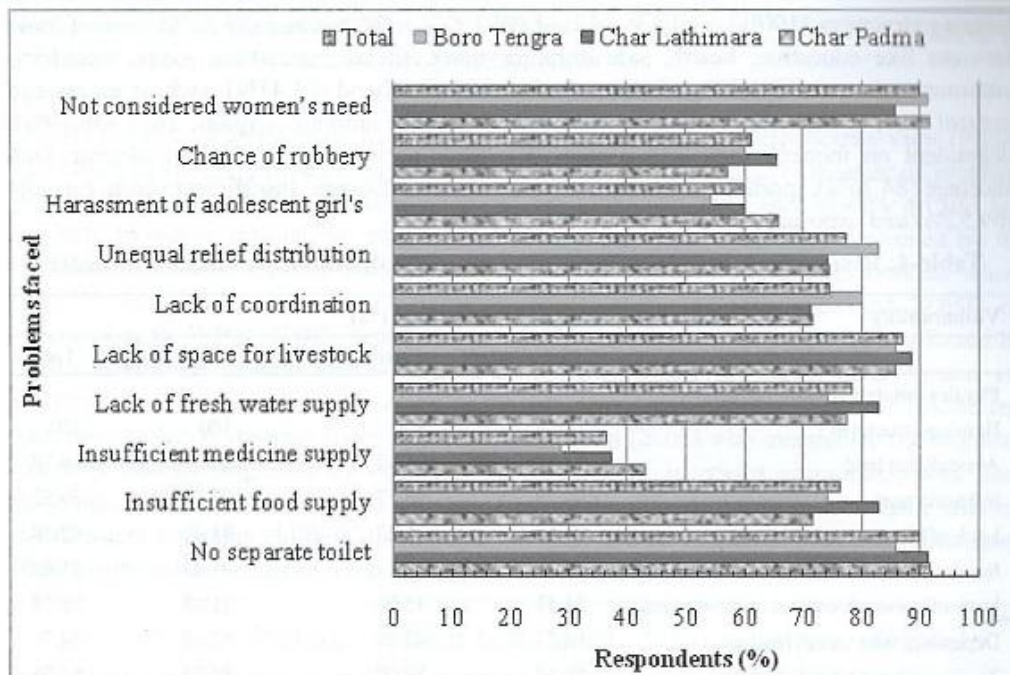


Figure-2: Problems faced by women in cyclone shelter

Vulnerability of women in natural disaster

Women's vulnerability arises from their assumed subordinate position in our society. Traditional beliefs and social discriminations define a role for women that force them into this subordinate position. Families or the communities rarely take note of women's views and almost have no rights to take decision. Women cannot apply risk reduction related skills or knowledge in real life because of lack of knowledge or scope of the same. Moreover, they have almost no opportunity to earn money; they have limited control over and access to their own or family assets. As a result, they cannot invest to reduce disaster induced risks. There are various social restrictions on women's movement. Swimming, running and climbing trees by women are prohibited socially. For this reason, most of the women cannot obtain these skills and become relatively more vulnerable and exposed to the risk during disaster. Especially, women's education, medical care and nutrition related issues never get priority in poor families. As a result, women's thoughts and wisdom are kept confined, thus they cannot become aware. At the same time, they remain weak physically; and it becomes difficult for them to face disaster. Managing household activities and nurturing children is vested on women. Women cannot go to shelter leaving their houses unprotected or children unattended. They do not get cyclone related early warnings timely and accurately (Oxfam-GB, 2011).

Poor people of the study area were more vulnerable, suffer more and recover slowly during crisis than the richer because they had little or no savings, inadequate income or production options and limited resources. Table 4 shows the respondents opinion on physical/material vulnerability, social/organizational vulnerability and motivational/attitudinal vulnerability due to disasters. In case of physical/material vulnerability, almost all of the respondents of the three study villages mentioned that due to disasters the following areas were vulnerable:

housing structures (100%), agricultural land (96.19%), infrastructure (89.52%), lack of basic services like education, health, safe drinking water, shelter, sanitation, roads, electricity, communication, etc. (92.38%), insecure sources of livelihood (91.43%), lack of access and control over means of production (land, farm inputs, animals, capital, etc.) (56.19%), dependent on moneylenders and usurers (84.76%), occurrence of acute or chronic food shortage (84.76%), mortality, malnutrition, occurrence of diseases, insufficient caring capacity (69.52%) and exposure to violence (42.86%).

Table-4: Respondents responses regarding women vulnerability in natural disaster

Vulnerability	Respondents/village (%)			
	Char Padma	Char Lathimara	Boro Tengra	Total
Physical/material vulnerability				
Housing structures	100	100	100	100
Agricultural land	97.14	91.43	100.00	96.19
Infrastructure	94.29	88.57	85.71	89.52
Lack of basic services	97.14	88.57	91.43	92.38
Insecure sources of livelihood	97.14	85.71	91.43	91.43
Lack of access & control on production	51.43	45.71	71.43	56.19
Dependency on moneylenders	88.57	82.86	82.86	84.76
Acute or chronic food shortage	88.57	80.00	85.71	84.76
Mortality, malnutrition and diseases	74.29	65.71	68.57	69.52
Exposure to violence	48.57	45.71	34.29	42.86
Social/organizational vulnerability				
Weak family/kinship structures	82.86	68.57	77.14	76.19
Ineffective decision-making	54.29	45.71	37.14	45.71
Injustice practices	54.29	48.57	8.57	37.14
Absence or weak COs	80.00	68.57	71.43	73.33
Neglected GO relationship	71.43	60.00	80.00	70.48
Lack of social security	91.43	82.86	74.29	82.86
Social and political harassment	68.57	62.86	54.29	61.90
Motivational/attitudinal vulnerability				
Negative attitude towards change	60.00	60.00	77.14	65.71
Negative beliefs/ideologies	51.43	42.86	88.57	60.95
Unawareness about hazards and consequences	60.00	60.00	77.14	65.71
Dependency on external support/dole-out mentality	94.29	88.57	97.14	93.33

In case of social/organizational vulnerability, data shows that respondents' responses on weak family/kinship structures (76.19%), ineffective decision-making (45.71%), injustice practices (37.14%), absence or weak community organizations (73.33%), no or neglected relationship with government, administrative structures (70.48%), lack of social security (82.86%), social and political harassment of women (61.90%) (Table 4).

Responses regarding motivational/attitudinal vulnerability are as follows: negative attitude towards changes (65.71%), negative beliefs/ideologies (60.95%), and unawareness about

hazards and consequences (65.71%) and till today respondents have mentality to depend on external support or dole-out mentality (93.33%) (Table 4).

Effect of disaster on women

A list of effects of disasters on women has been recorded based on respondents' view (Figure 3). About 38.10% respondents mentioned that they observed the effect of disaster on pregnant women followed by 25.71% observed effect on adolescent girls and 70.48% on old age women. However, disaster has negative effect on family unit which was mentioned by the 42.86% respondents. Family food insecurity was mentioned by 90.48% respondents where 87.62% observed that disaster has negative impact on women occupation and 79.05% on women health. WHO (2002) reported that women and children are particularly affected by disasters and the general effects of natural disaster are lack of health care, women are vulnerable to reproductive and sexual health problems, and increased rates of sexual and domestic violence. Another study was done by Enarson (2000) who mentioned that women's work is heavily impacted by disasters, domestic work increases enormously and their economic losses can be enormous although they are the primary caretakers for those affected by disasters including children, the injured and sick, and the elderly-substantially increasing their emotional and material work load.

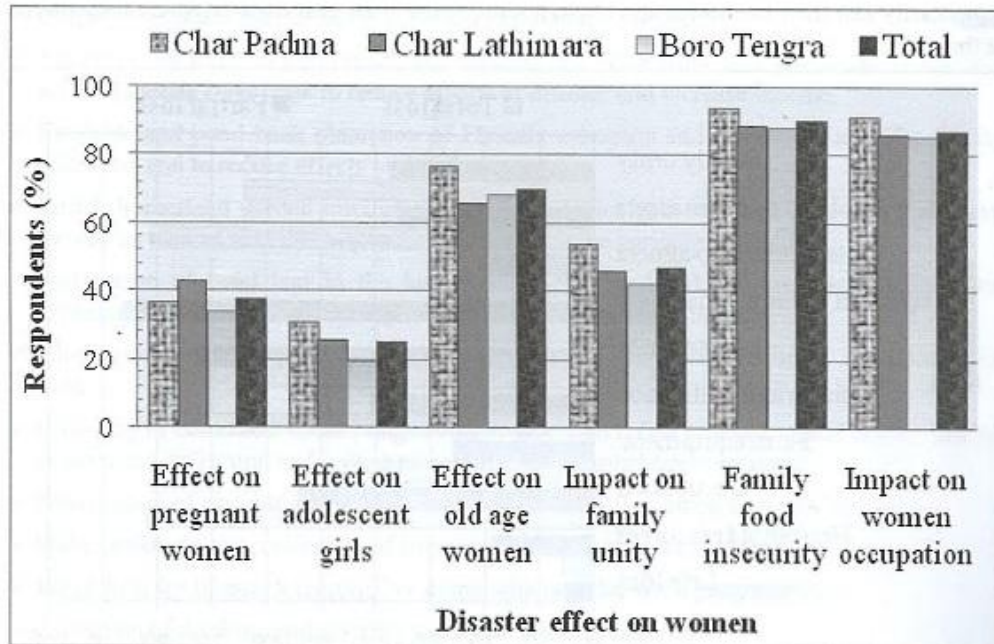


Figure-3: Observed effect of disasters on women: respondents view

Loss of women due to disaster

Women's vulnerability is increased in disaster by the loss of men and livelihoods, especially when a male head of household has died and the women have to provide livelihoods for their families. For those whose income is based on homework, the loss of house structures often means the loss of work spaces. In addition, domestic violence appears to increase when men's sense of control is diminished in disasters (Enarson, 2000). According to Yonder et al., (2005),

women suffer from four types of indirect losses following disasters: loss of productive employment outside the home; loss of household production and income; increase in reproductive work; and other economic damages resulting from outstanding debts or loans. However, women's restricted mobility and access to assets and resources make their links to everyday survival precarious and increase their vulnerability before, during, and after disasters (UN/ISDR, 2001).

In the present study, loss of women in disasters has been divided into two segments which were partial loss and total loss (Figure 4). In case of partial loss the highest percentage of respondents reported about education of their family members (86.67%) followed by life security (73.33%) and loss of occupation (54.29%). On the other hand, 81.90% respondents mentioned about total losses of their household resources followed by important/necessary documents (80.95%), agricultural materials (74.29%) and loss of other assets (63.81%). A total of 11 respondents lost their family members during the disasters, where among seven were from Char Padma village, two from Char Lathimara and Boro Tengra villages each. They also mentioned that five family members came back within one to three months after disasters where among them three from Char Padma village, one from Char Lathimara and Boro Tengra villages. It is reported that who came back to their families they partially and/or temporarily lost their memories and could not recognise their past lives or where they stayed at that time.

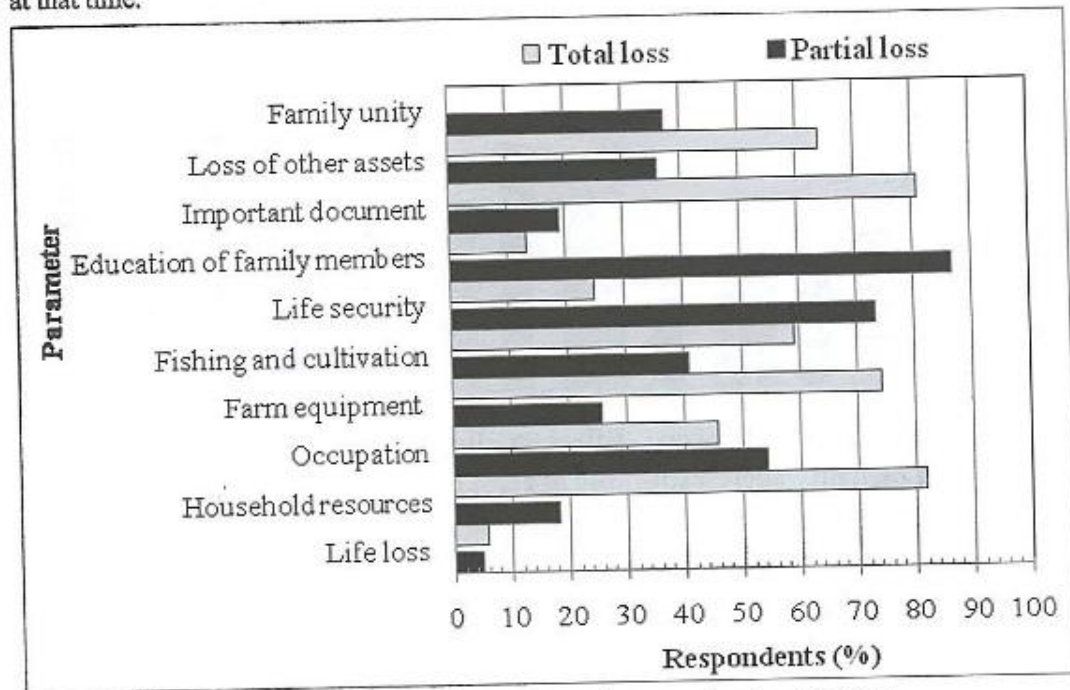


Figure-4: Partial and total loss of women during disasters

Women in coping with disaster in the study area

As a result of changing environment, women have seen their workload increase in many activities which have traditionally been women's responsibilities. In times of climate disasters like cyclones and floods, a lot of pressure is put on women whose responsibilities are still that

of keeping families together and feeding them. IPCC (2007) notes that in Bangladesh women's traditional knowledge and skills on disaster preparedness, water shortages, food security and maintaining local biodiversity helped their families and community to cope with natural disasters. Present study noted several indigenous adaptation techniques reduce the risk, food security and increase the community resilience against disaster management and climate change. Some coping strategies were done by women specifically, and some were with the help of male family members and some were financially and technically helped by NGOs. The most common NGOs are Shushilon, Grameen Bank, Shankalpo Trust, Red Crescent Society, Shangram, ASA, BRAC, Islamic Aid, Uddipon, Muslim Aid, Dhaka Ahsania Mission, BARCIK, Multi Task, SAP-Bangladesh, CCDB, INCIDIN Bangladesh, UBOMUS, CARE Bangladesh are common which started their activities after cyclone Sidr and Aila with donors' fund. About 75% of the respondents were members of any NGO and got adaptive support from them. NGO's activities mainly focused on first aid, rebuilding house structures, fresh water supply, health and sanitation facilities as well as livelihoods support with focus on women empowerment.

However, the most popular adaptation strategies involving women in the study area are as follows:

- ✓ Plantation of trees in heap and make drain surrounding the root;
- ✓ Plantation of trees in homestead, surrounding the pond bank and plantation of coconut seedlings along river bank to reduce affects of disaster and increase income;
- ✓ Roadside and pond bank plantation of Phoenix sylvestris and Borassus flabellifer for sap collection and to reduce affects of disaster;
- ✓ Enrich homestead garden through seasonal vegetables and fruit tree species for seasonal income as well as seasonal vegetable cultivation in the agricultural field;
- ✓ Cultivation of betel leaf in the homestead garden and fodder grass like Napier grass (*Pennisetum purpureum*) in the marshy land as a subsistence income;
- ✓ Alternative farming like sunflower, pulses, pea and maize cultivation in the agricultural field;
- ✓ Involving in collection of fish fingerlings (whole year), fish processing and drying (during season) and collection and selling of cotton seeds as subsistence income;
- ✓ Preservation of agricultural and vegetables seeds as well as crops on a routine basis;
- ✓ Make cooking stove, collection of firewood and cow dung for cooking;
- ✓ Taken loan for livestock rearing, involving with cash for work programmes;
- ✓ Collection of drinking and cooking water from distant filter.

Conclusion

The present study reveals that women are significantly vulnerable than men during disaster because of women's status and position in the society. Therefore, consideration of women's special needs is imperative to minimise the disaster risk. Study reveals that while facing disaster, women gain knowledge, capabilities and skills by using their own perspective and attitude which is different from men that help the whole family to cope better at disaster. Reasoning that women's risk reduction strategies are different from mainstream risk reduction

strategies; yet women are playing a vital role at different stages of disaster to minimise their own and families' losses by using their own strategies. Women are more aware of the disaster risk, resulting this they think about it and adopt necessary strategies throughout the year to mitigate it. It has, therefore, the following policy recommendations:

- ✓ To conduct regular survey and research on the demand for water, availability of water in the water bodies, coping strategies and choice of alternative sources;
- ✓ A gender balance view has to be developed in disaster relief and ensuring post-cyclone law and order; ensure the reflection of the women's needs and experiences in the disaster mitigation. Long term and consistent mass awareness through campaign is very effective to change attitude towards women;
- ✓ More innovative service and production oriented income generation activities are necessary and a donor-dependency mentality has to be reduced through increased empowerment;
- ✓ Should improve cyclone shelter environments and conditions through separation on gender basis;
- ✓ Need more training for women on pre-, during and post disaster situation;
- ✓ Community clinics need to be equipped and ensure continuous monitoring.

References

- Alam, E., & Collins, A.E. (2010). Cyclone disaster vulnerability and response experiences in coastal Bangladesh. *Disasters*, 34(4), 931-954.
- Alam, K. (2011). Mode of adaptation of coastal dwellers: the case of Bangladesh. *Man and Development*, 33(3), 91-111.
- Alam, M.E. (2003). Post cyclone adjustment process: basic needs perspective. *Oriental Geographer*, 47(2), 47-60.
- Anderson MB (1995). Vulnerability to Disaster and Sustainable Development: A General Framework for Assessing Vulnerability. In: M. Munasinghe & C. Clarke (Eds.), *Disaster Prevention for Sustainable Development: Economic and Policy Issues* (pp. 41-59). International Decade for Natural Disaster Reduction. Washington DC: World Bank.
- Banglapedia. (2006). Patharghata Upazila. Banglapedia: National Encyclopedia of Bangladesh. Asiatic Society of Bangladesh, Dhaka: Bangladesh. Retrieved from: http://www.banglapedia.org/HT/P_0112.HTM.
- BBS. (2011). *Statistical Yearbook of Bangladesh-2010: Area, population, household and household characteristics*. Bangladesh Bureau of Statistics, Planning Division, Ministry of Planning, Government of the People's Republic of Bangladesh. Dhaka: Bangladesh.
- Bradshaw, S. (2004). Socio-economic impacts of natural disasters: A gender analysis. Serie Manuales-33, Sustainable Development and Human Settlements Division, Women and Development Unit. Santiago: Chile.
- Cannon, T. (2000). Vulnerability analysis and disasters. In: D. J. Parker (Ed.), *Floods* (pp. 45-55). London: Routledge.
- CCC, (2009). *Climate change, gender and vulnerable groups in Bangladesh*. Climate Change Cell, Department of Environment, Ministry of Environment and Forests, Component 4b, CDMP, MoFDM. Dhaka: Bangladesh.
- DFID. (2004). *The impact of climate change on the vulnerability of the poor: the key sheet-03*. London, UK: DFID Public Enquiry Point, Department for International Development.
- DFID. (2007). *Key sheets on climate change and poverty-03*. London, UK: DFID Public Enquiry Point, Department for International Development.

- Duddy, J. (2002). Is climate change a gender issue? Association for Women's Rights in Development (AWID), Toronto: Canada. Retrieved from: <http://www.awid.org/Library/Is-climate-change-a-gender-issue2>.
- Enarson, E. (2000, May). Gender issues in natural disasters: talking points and research needs. Paper presented at the ILO in Focus Programme on Crisis Response and Reconstruction Workshop, Geneva. Retrieved from: www.gdnonline.org/resources/ilo-talking.doc.
- Fothergill, A. (1996). Gender, risk and disaster. *International Journal of Mass Emergencies and Disasters*, 14(1), 33-56.
- Hayles, C.S. (2010). An examination of decision making in post disaster housing reconstruction. *International Journal of Disaster Resilience in the Built Environment*, 1(1), 103-122.
- Ikeda, K. (1995). Gender differences in human loss and vulnerability in natural disasters: a case study from Bangladesh. *Indian Journal of Gender Studies*, 2(2), 171-93.
- IPCC. (2007). *Climate Change 2007: Impacts, Adaptation and Vulnerability*. Cambridge University Press, UK: Contribution of working group-II to the fourth assessment report of the Intergovernmental Panel on Climate Change.
- ISDR. (2002). *Disaster Reduction for Sustainable Mountain Development*. Geneva, Switzerland: International Strategy for Disaster Reduction-ISDR.
- Islam MA (2008). Climate change and development risk: Local Perspective. *The Daily Star* (March 15, 2008). Available at: <http://archive.thedailystar.net/newDesign/news-details.php?nid=27722> (Accessed on April 13, 2013).
- Islam, M.R. (2011). Vulnerability and coping strategies of women in disaster: a study on coastal areas of Bangladesh. *The Arts Faculty Journal*, July 2010-June 2011, 147-169.
- Mannan, M.A. (2000). Female headed households in rural Bangladesh: strategies for wellbeing and survival. Dhaka, Bangladesh: CPD-UNFPA paper 10.
- Mian, S.M. (2005). Generating sustainable employment in the coastal zone of Bangladesh present situation and future potentials. Working paper-WP042, Program Development office for Integrated Coastal Zone Management. Dhaka: Bangladesh.
- Neumayer, E., & Plumper, T. (2007). The gendered nature of natural disasters: the impact of catastrophic events on the gender gap in life expectancy, 1981-2002. *Annals of the Association of American Geographers*, 97(3), 551-566.
- Oxfam International. (2005). *The tsunami's impact on women*. Oxford, UK: Briefing Note, March 2005.
- Oxfam-GB. (2011). *Handbook: Women Leadership in Disaster Management*. Dhaka, Bangladesh.
- Paul, B.K. (2009a). Why relatively fewer people died? the case of Bangladesh's cyclone Sidr. *Natural Hazards*, 50(2), 289-304.
- Paul, B.K. (2009b). Human injuries caused by Bangladesh's cyclone Sidr: an empirical study. *Natural Hazards*, 54(2), 483-495.
- Schwoebel, M. H., & Menon, G. (2004). *Mainstreaming gender in disaster management support project*. Center for Development and Population Activities, Washington, DC: USA.
- Shamin, Z., & Islam, M.S. (2013). *Consequences of Climate Change and Gender Vulnerability: Bangladesh Perspective*. Bangladesh Development Research Working Paper Series-16 (January 2013). Retrieved from: <http://ssrn.com/abstract=2200116> or <http://dx.doi.org/10.2139/ssrn.2200116>.
- Sullivan, T., Gecker, J., & Alam, J. (2013, May 16). Cyclone Mahasen hits coast of Bangladesh, sending 1 million people fleeing. *Fox News*. Retrieved from: www.foxnews.com/world/2013/05/16/cyclone-mahasen-hits-coast-bangladesh-sending-1-million-people-fleeing/.
- Tapsell, S., McCarthy, S., Faulkner, H., & Alexander, M. (2010). *Social Vulnerability and Natural Hazards*. CapHaz-Net WP4 Report, Flood Hazard Research Centre-FHRC, Middlesex University, London: UK.

- UN/ISDR. (2001). *Countering Disaster, Targeting Vulnerability 2001: Information Kit*. Geneva, Switzerland: United Nations World Disaster Reduction Campaign.
- UNFCCC. (2013). *Adaptation Fund*. New York City, USA: United Nations Framework Convention on Climate Change.
- WHO. (2002). *Gender and health in disasters*. Geneva: World Health Organization.
- World Bank. (2006). *Bangladesh Country environmental Analysis*. Dhaka, Bangladesh: Bangladesh Development Series Paper 2, South Asia Environment and Social Unit.
- Yonder, A., Akcar, S., & Gopalan, P. (2005). *Women's Participation in Disaster Relief and Recovery*. New York, USA: SEEDS, Population Council.