

# Flood-Induced Vulnerabilities and Problems Encountered by Women in Northern Bangladesh

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**Abstract** This study examines flood-induced vulnerabilities among women in northern Bangladesh. Poor and disadvantaged women are more vulnerable to disasters than men due to the conditions that predispose them to severe disaster impacts. Women suffer from physical injuries and are often evicted from their dwellings due to floods. Difficulties in finding adequate shelter, food, safe water, and fuel for cooking, as well as problems in maintaining personal hygiene and sanitation, prevent women from performing their usual roles at home. All of these are problems related to women's gender identity and social roles. Many poor and destitute women remain unemployed during and after floods. Women also suffer from domestic violence and are subject to harassment when taking shelter or refuge at community centers. These particular vulnerabilities and problems interrupt women's mitigation efforts and adaptation capacities in disaster risk reduction.

**Keywords** Bangladesh, flood, flood-induced vulnerability, vulnerability of women

## 1 Introduction

The frequency and magnitude of disasters in Bangladesh have increased over the last decades. Between 1991 and 2000 about 93 major disasters were recorded in Bangladesh (World Bank 2010). Geographical location, terrain, dense river networks, and monsoon climate expose the country to a high level of physical disaster risk and socioeconomic conditions have created a high vulnerability of communities to natural disasters (MoFDM 2006). Floods, river bank erosion, cyclones, tornadoes, cold waves, arsenic contamination in ground water, water logging, and salinity intrusion have frequently occurred. For these disasters, climate change has been identified as one of the main causes. But the nature, timing, severity, and extent of hazards are not the same in all cases (Nasreen 2010). Because of frequent floods, Bangladesh is projected as the sixth most flood-prone country in the world (UNDP 2004). It is also evident from several studies (Nasreen 1998; DMB 2008; Kumbetoglu and User 2010) that floods are the most significant natural hazard causing immense

suffering to a large number of people and damage to properties in Bangladesh. Women are particularly vulnerable to natural disasters compared to men because of their involvement in household tasks, such as collecting water and fuel wood, cooking, managing food, and providing child care. In all of these activities, women are at closest contact with the environment (Nasreen 1995, 2009). They may also become victims of violence and face additional problems because of long-existing gender disparities (Nasreen 2010). The present study identifies the persistence of female vulnerabilities and livelihood patterns, especially the disadvantaged, marginalized, poor, and destitute women during and after floods in northern Bangladesh.

The growing body of literature on vulnerability has explored use of the term from different points of view. For example, Warmington (1995) defines vulnerability as a condition or set of conditions that adversely affect people's ability to prepare for, withstand, and respond to a hazard from the socioeconomic context; Villagran (2006, 11) analyzes the concept of vulnerability from economic and disaster risk science points of view and perceived vulnerability as "...the probability or possibility of an outcome of the system when exposed to an external event associated with a hazard, expressed in terms of potential losses such as fatalities or economic losses, or as the probability of the person or a community reaching or surpassing a certain benchmark." Social scientists tend to view vulnerability as representing the set of socioeconomic factors that determine people's ability to cope with stress or change (Allen 2003). From the disaster management viewpoint, vulnerability is also defined as the predisposition of individuals, groups, communities, and other economic and infrastructure organizations to be affected by a natural disaster (OEP-EOP 1972). In an earlier definition given by Chambers (1989), vulnerability concerns both internal (individual and community incapacity influenced by social and economic factors) and external processes (shocks and stresses such as malnutrition, declining resources influenced by natural and biophysical processes). Vulnerability is viewed as the opposite of security, and livelihoods, income levels, and management of assets are the key components that provide individuals and communities with the opportunity to absorb and cope with the stresses and shocks of disaster

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events (Chambers 1989; Villagran 2006). Adger and Kelly (1999) argue that vulnerability is something that exists within systems independently of external hazards. It is viewed as an inherent property of a system arising from its internal characteristics, which may be termed as “social vulnerability,” determined by factors such as poverty and inequality, marginalization, food entitlements, access to insurance, and housing quality (Blaikie et al. 2003; Adger and Kelly 1999). Liverman (1990) developed an alternative approach to potential measures of vulnerability that incorporates a range of political, economic, environmental, and social activities and processes at the individual and larger scale levels (Table 1).

In disaster research, social vulnerability is concerned with the most vulnerable groups of society, and examines various types of vulnerabilities between and/or within geographical units (Downing and Patwardhan 2003). According to Brooks and Adger (2003), social vulnerability produces physical vulnerability when it comes into contact with a hazard that produces physical or economic damage or human mortality and morbidity. Watts and Bohle (1993) state that the individuals, groups, and communities who are unable or incapable of obtaining and managing their assets through legitimate economic means have increased vulnerabilities. Blaikie et al. (2003) have examined the underlying causes and origins of vulnerability by using a Pressure and Release Model of Vulnerability (PAR). This model provides a diagram on how the underlying causes, through a complex interaction, generate the events that produce vulnerability.

We argue that the nature of vulnerability depends on the nature of hazard involved. Certain properties of a system make it more vulnerable to certain types of hazard. This study uses the term vulnerability to describe all the factors that determine the outcome of a hazard event of a given nature and severity.

## 2 Floods and the Vulnerability of Women in Bangladesh

Bangladesh is prone to various natural disasters of which cyclones, floods, tornadoes, river bank erosion, droughts, cold waves, earthquakes, water logging, arsenic contamination, and saline water intrusion are the most common (Nasreen 2008, 2012). Roughly once every 10 years, one-third of the

country is severely affected by floods, while the catastrophic floods of 1988, 1998, 2004, and 2007 caused inundation of more than 60 percent of the country's area (DMB 2008). Severe floods often occur in July and August. During August to September 1988, Bangladesh saw an unprecedented flood claiming 1,621 lives. In July to September 1998 the country experienced an exceptionally fierce flood season, which was regarded as the worst in recorded history with respect to duration and water level. These floods inundated nearly two-thirds area of the country, causing widespread damage to the economy (Brammer and Khan 1991). The 1998 flood caused 1,100 deaths, rendered 30 million people homeless, damaged 500,000 homes, and caused heavy damage to infrastructure. This flood lasted for 65 days, from 12 July to 14 September. Because it occurred near the Bay of Bengal, tropical cyclones and storm surges in the area made the situation worse.<sup>1</sup>

The 2007 flood spread over nearly the whole country (46 out of 64 districts), leaving millions of people marooned. This flood destroyed houses and infrastructure and devastated all types of agricultural activities, fisheries, and forestry. The number of deaths from water borne diseases, snake bites, drowning, and lack of medical facilities caused by this flood were more serious than any floods in the past (Nasreen 2008). While regular annual river floods affect about 20 percent of the country, approximately 37, 43, 52, and 68 percent of the country is inundated during floods of 10, 20, 50, and 100 years return period, respectively (MoFDM 2006). The four types of flooding in Bangladesh include flash floods caused by overflowing of hilly rivers of eastern and northern Bangladesh (April–May and September–November); floods caused by drainage congestion and heavy rains; floods of major rivers in the monsoon season (June–September); and coastal floods caused by storm surges (MoFDM 2006).

Flood is a regular phenomenon in Bangladesh and it has numerous devastating effects on human beings. These impacts include loss of life, an increase of disease, loss and destruction of property, and damage to agricultural crops, all of which result in poverty and an increase in women's vulnerability. Several studies (Nasreen 1995, 2008) indicate that women are usually much more affected than men during a disaster period. Women, further, may become victims of violence and face additional problems due to their gender (Nasreen 2008, 2012). Poverty is a relatively common phenomenon in Bangladesh among children and women,

**Table 1. An alternative approach to vulnerability by Liverman**

Environmental Conditions	Technological Conditions	Social Relations	Demographics and Health	Land Use and Ownership	Economy and Institutions
i.e. temperature, rainfall, soil types, storms, genetic varieties and meteorological extremes	i.e. the use of irrigation, reservoirs, genetically modified seeds and fertilizers, indigenous agricultural techniques	i.e. social class, income, gender, race and ethnicity	i.e. health, age, population density, populations growth rates	i.e. unstable land tenure, land productivity, levels of independence, landlessness	i.e. lack of access to markets, artificial or inflated prices, lack of supporting social safety net, debt

Source: Liverman (1990).

particularly in female-headed households, which makes children and women more vulnerable to natural disasters (Khondker 1996). Because of the patriarchal nature of society, the position of women, their needs, level and perception of risks, vulnerabilities, and capacities are different in comparison to those of men.

The gender division of labor critically determines women's economic opportunities, constraints, incentives, and capacity and women's position in different sectors (Nasreen 2000). Low level of education is one of the main factors that deter women from equal participation in socioeconomic activities with their male counterparts. Poor parents consider any expenses for educating a girl unproductive as she leaves their family after marriage (Islam and Sultana 2006). According to the World Economic Forum Report (2013), the literacy rate is 62 percent for males and 53 percent for females. Women's access to labor market is lower compared to men. UNDP Report on Human Development Index (UNDP 2013) ranked Bangladesh at 111th place according to its gender inequality index. In 2011, the rate of labor force participation was 84.3 percent for males and 57.2 percent for females (UNDP 2013) and the unemployment ratio of females to males is 7.4 : 4.2 (World Bank 2013). Women's participation in economic activities remains unvalued at the national level because of the patriarchal structure, tradition, and norms. For example, more than three quarters of employed women of 15 years and above are found to be unpaid family laborers as opposed to less than one tenth who are self employed and a few percentage contract workers (Islam and Sultana 2006).

Although natural disasters and social disparities cause Bangladesh grave difficulties and increase the vulnerability of women, they may also become "agents of change" during post disaster periods and family income may improve and poverty may be alleviated to some extent (Kabir 1992). Azad (2013) shows that the flood-affected women are mitigating their household risks induced by disasters through involvements in food processing such as making *khurma* (a type of sweetmeat dry food made of flour and sugar) and *chanachur* (dry food made of flour) and selling in local markets, rearing cattle and poultry, doing small business including weaving *pati* (a type of mat) and *noxikatha* (embroidered quilt), and saving for children's education and emergencies. Over the last years, women are further involved in afforestation and nutrition programs as well as protecting women from violence and early marriage programs. They are also involved in food for work program to support their family demands. As a result, many women are now self-sufficient and family income has increased in disaster prone areas in Bangladesh. Despite occasional unintended and unexpected consequences of disasters, gender disparity magnifies the impacts of disasters on women's working lives and undermines their long-term recovery. Therefore, special attention is required during and after disasters to improve women's access to recovery assistance and to enhance their capacity-building strategies.

### 3 Methodology

This article provides insights into the dimensions of vulnerability experienced by women in northern Bangladesh, and explores major problems encountered by women during floods. A combination of quantitative and qualitative research methods was adopted to collect primary information for the study. For quantitative research, field survey tools and instruments have been used to explore the nature of vulnerability and impacts of disasters on poor women living in flood prone areas. A detailed field survey was conducted through face to face interviews using semi-structured questionnaires. The closest contact with flood-affected women and direct observation of their challenging life enabled great objectivity of our research. For qualitative survey work, the study employed key informant interviews, observation (both participatory and nonparticipatory), and focus group discussions. By employing qualitative methods, this study attempts to understand the experiences of flood-affected women under harsh conditions, especially at the time of a severe flood.

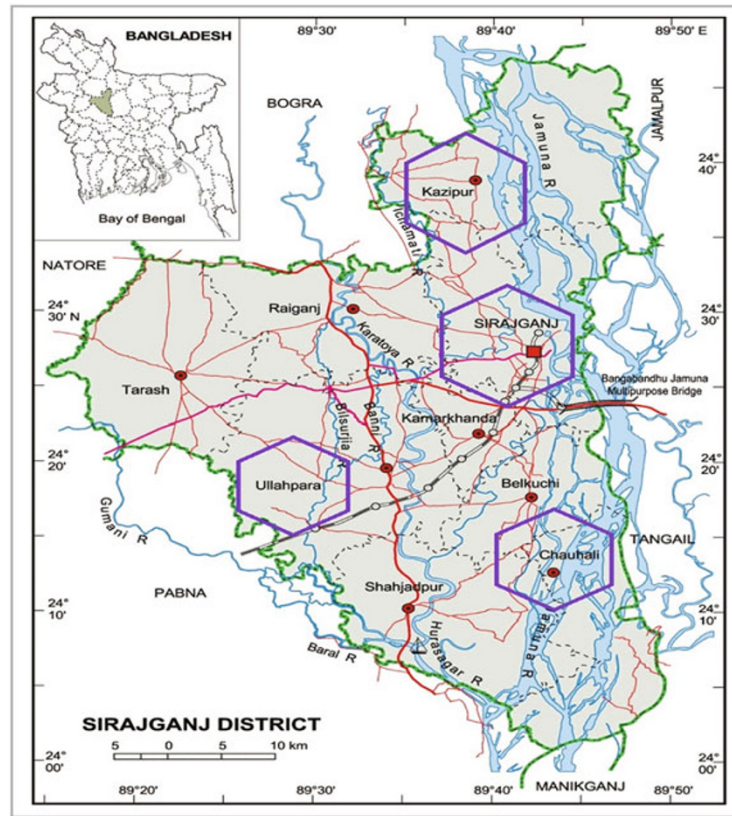
The target respondents comprised women living in flood-affected areas of northern Bangladesh. The case study area is Sirajganj District, which is prone to severe floods. Based on the severity of floods over the last five years, the present study covered four sub-districts (*upazilas*<sup>ii</sup>) namely Sirajganj Sadar, Kazipur, Ullahpara, and Chauhali, from which five villages were selected (Figure 1) These villages are Paikpara Adorsho Gram (Sirajganj Sadar), Gulta Slum (Sirajganj Sadar), Fulzor Char (Ullahpara), Muslim Para (Kazipur), and Hapaniar Char (Chauhali). Every year floods inundate these villages and the people live under very harsh conditions. River bank erosion is also a prominent problem, which displaces the local people and destroys their normal life. A total of 185 semi-structured individual interviews were conducted among flood-affected women. Five focus group discussions (one per village, eight to 12 participants in each group) were organized. In addition, five key informant interviews (two with the local representatives of union *parishad*<sup>iii</sup> and school teachers and three with nongovernmental organization officials of CARE Bangladesh and Manob Mukti Sangstha, local branch of a national organization working in flood prone areas in Bangladesh) were held. The field survey, interviews, and focus group discussions were undertaken in 2011 and assessed the experiences of flood-affected women in the last five years.

The research addressed the following questions: (1) What is the nature of female vulnerability especially for women in the most destitute female-headed and vulnerable households? and (2) What are the major difficulties women face because of flood in northern Bangladesh?

### 4 Findings and Discussion

The present study identifies the nature of vulnerability and the problems women face during and after floods. The followings





**Figure 1. The study area of Sirajganj in northern Bangladesh**

Source: Banglapedia (2012).

are an overview on women's vulnerabilities and problems along with experiences of people living in flood prone areas in northern Bangladesh over the last five years.

#### 4.1 Socio-Demographic Characteristics of Flood-Affected Women

Among the 185 respondents, 56 percent are housewives and 25 percent are day labors. A significant number of respondents (nearly 8%) are involved in small business whereas just over 5 percent are actively engaged in animal husbandry. More than half of the respondents are literate (55%)—16 percent of them have completed primary education and 9 percent have completed secondary education, while nearly 20 percent are illiterate. More than 82 percent of them are married whereas only 1 percent is unmarried. Around 5 percent are separated while about 12 percent of these women are widows. Only 47 percent of the households own homestead land (ranging in area from 1 to 10 decimal<sup>iv</sup>) whereas 24 percent live on government land and 15 percent occupy pawned land and pay a rent for farming the land. Moreover, about 11 percent of the respondents live on neighbors' land. All women are involved in income-generating activities and spend on average 75 percent of their income for family sustenance, while 11 percent of income is spent on personal use such as sanitary pads, medicine, and purchasing clothing, while only 1.3 percent is saved for emergencies.

#### 4.2 Vulnerability: Its Dimensions

Flood as a natural disaster creates various types of vulnerabilities for men and women in Bangladesh. Vulnerability can be seen as social, economic, physical, structural, agricultural, and psychological. In the flood-affected areas nearly 25 percent of the respondents suffered from physical injuries while around 85 percent were affected by water borne diseases such as diarrhea, cholera, typhoid, and skin rashes due to using and working in flood water. Food scarcity was identified as an acute problem after flood and shortage of food led to malnutrition among the flood-affected women. Approximately 87 percent of the women surveyed faced widespread food scarcity during and after floods. Women also are particularly vulnerable to menstrual management problems, since limited possibility exists to find proper places for this when forced from home. Floods also give rise to unemployment. The survey data revealed that over 64 percent of female wage earners were unemployed. They had to work outside the households while men of the households migrated to other places to earn an income to support their families. In a crisis situation such as during a flood, women are also more susceptible to sexual and other harassments such as mental torture, verbal abuse, domestic violence, and so on. The study showed that around 35 percent of women had the experience of being harassed by a male during the social disruption caused by flooding. Flood

also disrupted normal life and created social problems such as crime (theft, robbery, begging, and burglary), which increased after floods in the last five years.

Amongst all types of vulnerabilities lack of clothing and fuel wood were indicated as significant problems that contributed to women's vulnerability during or after flood. Flood destroyed their preserved fuel wood, often collected from a long distant. They had to live under harsh conditions during disasters, since women were solely responsible for managing fuel wood and food for the households due to the patriarchal social structure of Bangladesh. Not having adequate spare clothing, more than 89 percent of women were wearing wet dresses and got sick. Although they were physically capable of working, they were unable to find jobs that enabled them to earn enough income to buy food and clothing. Over 89 percent of women were unable to manage clothing such as saris, chemise or blouse and petticoat as per demands during and after floods. Nearly 61 percent of the respondents were evicted from their normal dwellings in times of severe floods; flood at least partially destroyed their houses while also damaging the sanitation facilities of 21 percent of surveyed households. Those respondents with severe damage to their homes sought shelter in community centers, along the roads, or in the open air. Women also suffered from water crises due to the scarcity of clean drinking water. The majority of the women faced drinking water problem and communication problem due to damaged roads, culverts, and embankments.

Flood also affected crop production. Water logging prevented farmers from cultivating their land. Flood damaged crop production and homestead gardening for around 25 percent of the respondents. Although the livelihoods of women were more difficult in flood-prone areas in Bangladesh, they attempted to meet the basic needs of their households by rearing poultry and other animals. Floods damaged animal

farming as well. By examining the nature of vulnerabilities, it can be seen that flood is a probable event that can cause maximum community disruption and dislocation and lead to multiple problems among poor and vulnerable women. Table 2 shows the major forms of vulnerabilities reported in the flood-affected case study villages.

### 4.3 Intensity of Flood and Losses

Bangladesh experiences flood almost every year and the present study indicates that, over the last five years, 45 percent of the women who were surveyed experienced five severe floods and 18 percent were hit by four floods. An additional 28 percent confronted three floods during this time period, and only 9 percent encountered a flood twice. For 40 percent of the respondents, the duration of floods was longer while more than 43 percent reported that flood occurrences were more frequent. It was found from the qualitative survey that because of the more frequent and longer floods the affected population suffered from more severe disease situations, both physical and mental and livelihood challenges such as forced migration to cities or elsewhere for a permanent settlement. In this study, flood-induced vulnerability is defined as the degree of loss to a given element or set of elements at risk resulting from the occurrence of a disaster of a given magnitude. Fritz (1961, 655) argues that a disaster is "an event concentrated in time and space, in which a society or one of its subdivisions undergoes physical harm and social disruption, such that all or some essential functions of the society or subdivision are impaired." Physical harm and social disruption (now more commonly labeled physical and social impacts) occur because the event exceeds normal protections (Kreps 1984).

**Table 2. Types of flood-induced vulnerabilities for women ( $n = 185$ )**

Type	Nature of Vulnerabilities	Yes (%)	No (%)
Human Vulnerability	Physical injury	24.9	75.1
	Shortage of food	88.6	11.4
	Diseases	84.9	15.1
	Malnutrition	91.4	8.6
	Menstruation problem	46.5	53.5
Social Vulnerability	Unemployment	64.3	35.7
	Harassment	34.6	65.4
	Crime (burglary, robbery)	16.2	83.8
	Lack of clothing	89.2	10.8
	Problem finding fuel wood	83.8	16.2
Structural Vulnerability	Eviction from dwelling place and destruction of house	60.5	39.5
	Damaged sanitation facilities	21.1	78.9
	Damaged roads, culverts, embankment, and communication system	98.9	1.1
	Unavailability of clean drinking water	84.3	15.7
Agricultural Vulnerability	Damaged crop production	24.9	75.1
	Damage of poultry	71.4	28.6
	Damage of cattle herds	64.9	35.1
	Damaged homestead garden	74.6	25.4

Our survey result shows that floods damaged dwelling places, cattle herds, poultry, agricultural land and crops, and fisheries. On average, flood caused a loss of TK 2,400.00 (USD 33.8) per year to a poor rural household whereas the overall Gross National Income (GNI) per capita is PPP (Purchasing Power Parity) USD 1785 (UNDP 2013) and the estimated earned income of females is PPP USD 1284 (World Economic Forum 2013). The economic losses resulting from disasters have an adverse impact on gross national income. It also undermines initiatives and survival strategies taken by poor families towards reducing disaster risks. And women are the poorest of the poor. The focus group discussion participants revealed that among all floods the 2007 flood was the worst—half of their houses were under flood water and low-lying land was completely submerged. During the flood they left their own houses and took shelter along the elevated roads, on the local embankments, and in the Water and Power Development Authority (WAPDA) offices. Whenever they left their houses, they took as many of their belongings as possible to the new place. Increasingly frequent floods aggravated their vulnerability and they are unable to take effective measures to prevent losses. Two flood-affected women in Fulzor Village, Sirajgonj commented at a focus group discussion that:

We incur a loss of TK 1,000 [USD 14] because of flood every year. We have no homestead or farming land. We have to pay TK 4,000 [USD 56] per year for our dwelling place.

During flood we took our cattle, poultry, and other household belongings to a safe place or highland. Even we tried to save our necessities at the cost of our own lives. We got a blow on our waist, hand, and legs while doing these activities.

#### 4.4 Problems Women Encountered during Floods

Vulnerability is associated with a set of prevailing conditions and is related to specific events (Lewis 1999). It is observed that in northern Bangladesh flood always intensifies several vulnerabilities among affected people. But the nature of vulnerability among women is different in comparison to their male counterparts. During floods the respondents endured minor injuries to their hands (around 11%) and legs (nearly 24%) as well as fractured fingers (about 9%) and ribs (4%), snake bites and back pain, lost teeth, and head injuries. Because of their physical injuries during and after floods, women could not work properly but had to cook and perform daily activities despite sickness or injuries. They hardly ever were able to get treatment due to lack of money. Although these problems were not unique to women, females seemed to be the worst hit and these disadvantages imposed additional difficulties in their subsequent ability to cope with adverse circumstances.

Sen (1981) states that disaster-affected individuals, groups, and communities who are unable or incapable of obtaining and managing their assets through legitimate economic means have increased vulnerabilities. More than 57 percent of the

flood-affected respondents in our study reported that floods submerged their whole house, approximately 23 percent revealed that flood submerged part of their house, and 20 percent reported that flood waters inundated the yard around their house. Even the owners of the partially submerged houses were forced to leave their home. The majority of the households (61%) was driven from their dwelling places and displaced women and men took shelter at different places. Amongst the evicted women 38 percent took shelter on a dam or embankment made by the Water and Power Development Authority, 19 percent found refuge at educational institutions, 12 percent located along roadways or rail lines, and 7 percent sheltered at communal centers. In shelters set up by the Local Government Engineering Department (LGED) with support of NGOs and INGOs, women experienced several types of problems. In these shelters, 53 percent encountered living and sleeping problems, more than 40 percent faced cooking and fuel wood complications, and 32 percent reported difficulties with latrine use. Women also suffered from insecurity, problems in taking baths, obstacles in getting their children to school, scarcity of work, inability to manage hygienic pads (cloth) or napkin to absorb menstrual flow, misbehavior by shelter staff or providers, conflicts with neighbors, movement problems, loss of poultry, and eviction threats from the places where they took refuge. Some of these problems also occurred to men, including sleeping difficulties, access to bathing facilities, scarcity of work, and problems in finding food. A woman from Sirajgonj commented that:

We encountered manifold difficulties at the makeshift houses built on the river bank, road, or WAPDA office. Water crisis was horrible because the number of tube wells were very insufficient. We also faced problems with toilets and latrines. We had to wait for a long time for a toilet or sometimes we had to stand in a queue. We fetched water from a distant place. Whenever we went to fetch water from others' tube well, they scolded and misbehaved with us.

Almost all of the women who participated in our study belong to poor households and make their living through income-generating activities. But during and after floods women often became unemployed for a long time; about 64 percent were unemployed. Among them around 97 percent were unemployed from 1 to 12 months and more than 3 percent remained unemployed for 1 or 2 years. During and after floods men also became unemployed, but this usually lasted for a shorter time span because, unlike women, migration to other places to find jobs is easier for men.

Disaster researchers identify two sides of vulnerability. One is an external side referring to the risks, shocks, and stress to which an individual or household is subject and another is an internal side characterized by a lack of means to cope without damaging loss (Chambers 1989). This study shows that both men and women are more prone to risks due to dynamic, external pressures. But, women are more sensitive to flood impacts. Approximately 35 percent of women were harassed during and after floods over the last five years. Out of 64 women who reported problems with harassment,



around 58 percent were harassed by husbands and an almost identical percentage reported similar treatment by neighbors. Near 5 percent of the women indicated that they were harassed by unacquainted persons, 6 percent by boys or youth, and 3 percent by brothers-in-law. Harassment during and after floods was frequent, and included mental, physical, and sexual dimensions. For example, around 33 percent of women encountered mental torture and more than 59 percent suffered verbal abuse. More than 34 percent of the women encountered physical abuse and 39 percent were beaten by their husband. A key informant indicated that during the floods sexual violence against women became rampant. The informant also added that sexual harassment of women was observed at the shelter centers. Pregnant mothers suffered worst during and after floods. Clearly floods create conditions that expose women to excessive harassment. Buly, a housewife from Sirajganj, commented that:

In the wake of the 2008 flood, I went to collect soil from my neighbor's land because soil around my house was washed away by flood water. But the neighbor scolded me and took away my *changari* (creel) along with spade. Later I collected soil from another's land.

Food is seen as an acute problem in the affected areas. According to political economists, social inequalities and injustices lead to struggles and conflicts between classes of people causing vulnerability and lack of control of assets for most marginal groups (Joakim 2008). Our study revealed that nearly 89 percent of women suffered from food insecurity due to lack of access to and control over resources. The flood-related food crisis generated serious problems among the women. More than 91 percent of the respondents suffered malnutrition, which led to physical weakness (54%), dizziness (25%), and inattention to work that sometimes created tension between husbands and wives. Lack of employment opportunities and limited access to resources had certainly contributed to the situation. Women are more vulnerable to food problems because they cannot move easily to other places or find a better job in the local area, while men can migrate to urban areas and get a better-paid job so that they suffer less from starvation. In normal condition women are also involved in agricultural and nonagricultural activities. To some extent they are now working in formal and informal labor markets. For example, some rural women living in disaster prone areas are now migrating to cities temporarily and work in garment industry. But comparatively their mobility is more limited.

Flooding threatens life and health not only through drowning and direct injury, but also through associated diseases and famine (Blaikie et al. 2003). Nearly 85 percent of the respondents contracted diseases. More than 64 percent of women stated that they suffered from diarrhea, while more than 62 percent contracted a viral fever. The women further suffered from cholera (3%), skin diseases (19%), rashes (34%), jaundice (10%), ophthalmia (8%), and conjunctivitis (33%). The flood-affected women also experienced hypertension, colds and coughs, stomach disorders, headaches, typhoid,

among other ailments. Like women, men also suffer from these diseases. But illness creates further stress to the flood-affected women's lives because, despite poor health, they are still responsible for doing chores and keeping the household functioning, which often require constant attention.

It is also evident from the study that sanitation affects women badly during and after flood. Most flood-affected households lacked sanitation facilities. When asked about the sanitation issue, around 79 percent of women respondents reported that they had no sanitation facilities. There was also a lack of clean water and soap for hand washing and personal hygiene. The submersion of latrines during the floods forced flood victims to use open space and unsafe latrines that were located at a distance from their houses and they were usually unwelcome when using others' latrines. Women also faced a menstrual management crisis. The study revealed that more than 46 percent of women encountered menstruation management difficulties during floods. Amongst the 86 respondents, around 20 percent had irregular menstruation during and after floods and 15 percent suffered possible gynecological problems from using and wading in unsafe water. Unavailability of clean water and places to wash made taking care of personal hygiene a problem for 16 percent of females, and washing clothing was very difficult for 13 percent of the women. A key informant indicated that women found it difficult to manage menstruation at the shelter centers.

Unavailability of safe water is another major problem in the flooding area. Though flood water was available around them, they were unable to use it. The study revealed that lack of clean drinking water affected more than 84 percent households. The major sources of water were tube well (80%), pond water (1%), flood water (31%), rain water (17%), river (37%), and ring well<sup>v</sup> water (1%). Flood-affected communities encountered several diseases because of polluted drinking water. For household chores, women found no water in the vicinity and so they had to invest a great amount of time and labor in fetching water from a distance or they used flood water. A flood-affected woman from Paikpara, Sirajganj Sadar commented that:

Lack of clean drinking water during and after the flood in this area was a serious problem. This time most of the tube wells went under water paving the way for the scarcity of drinking water. We purified water by water purifying tablets but we faced difficulties to purify water in this way because tablets were not easily available during and after flood.

Floods cause the state of high unemployment among men and women. Nearly 23 percent of women responding to the survey worked outside their homes. Amongst them, 83 percent were harassed when working outside. They received lower wages than men while employers overloaded them with work. More than 25 percent reported sexual harassment and 23 percent reported physical torture, mostly by employers but also by coworkers. Working women were also harassed by neighbors, passersby, NGO officers, and government officials while receiving relief or assistance.

**Table 3. The root causes of vulnerability in northern Bangladesh**

Root Causes	Dynamic Pressures	Unsafe Conditions
Limited Access to <ul style="list-style-type: none"> <li>Decision Making Power</li> <li>Social sectors and structures</li> <li>Resources</li> </ul>	Lack of <ul style="list-style-type: none"> <li>Strong local institutions</li> <li>Confined training</li> <li>Appropriate skills and knowledge of women</li> <li>Home based industry: Cottage, Threads, food processing etc.</li> <li>Local markets (Bazer)</li> <li>Implementation rules and regulations</li> <li>Proper attitudes and ethical standers of people</li> </ul>	Fragile physical environment <ul style="list-style-type: none"> <li>Dangerous location</li> <li>River bank erosion</li> <li>Unprotected house made by soil and bamboo</li> </ul>
Ideologies <ul style="list-style-type: none"> <li>Lack of strong Political systems at the community level</li> <li>Distribution of Economic resources</li> </ul>	Macro-Forces <ul style="list-style-type: none"> <li>Increasing population due to lack of awareness</li> <li>Lack of afforestation</li> <li>Lack of available soil for building house</li> <li>Lack of productive land</li> </ul>	Fragile Local Economy <ul style="list-style-type: none"> <li>Low income</li> <li>Unemployment</li> <li>Food crisis</li> <li>Limited job opportunity</li> </ul>
Geographical location <ul style="list-style-type: none"> <li>Located in River area</li> <li>Frequent flood</li> <li>Increasing Intensity of Flood</li> </ul>		Vulnerable Society <ul style="list-style-type: none"> <li>Special groups: Women, Children, Elderly, Disable people</li> </ul>
		Public Actions <ul style="list-style-type: none"> <li>Lack of disaster preparedness or community participation</li> <li>Lack of cooperation of family members and community people</li> <li>Prevalence of diseases</li> </ul>

Floods destroyed communication systems and damaged roads, culverts, bridges, embankments, and boats. Under these circumstances, women could not find boats to use and had to move many times on foot through flooded areas. The respondents also had difficulty finding fuel wood during and after floods. A majority of the women (84%) in the study area faced a fuel wood problem. During flood conditions fire could not be made easily, making cooking difficult. Just over 8 percent of respondents indicated that they had to use wet fuel wood that produced a large amount of smoke. Flood waters washed away both collected and uncollected fuel wood and cow dung, but flood victims were unable to buy fuel wood due to a shortage of money.

Different NGOs and government organizations came forward to help the flood-affected people during and after the floods, including women, by mitigating disaster impacts through relief distribution, training, and replacement of lost livestock, particularly poultry. But some respondents also reported problems with relief material distribution, including harassment, long periods standing in queue, inadequate amounts of relief, and having to pay bribes. About 26 percent of the respondents reported having to bribe local representatives of their union *parishad* at the time they received relief and assistance. Our study indicates that although the affected communities took preparatory measures against flood-induced vulnerabilities, low and impaired local capacities to cope made these efforts very ineffective.

Blaikie et al. (2003) argue that individuals and groups who are marginalized and powerless economically, politically, and

socially are exposed to a double source of vulnerability. Our study demonstrates this double vulnerability in the flood-affected area in northern Bangladesh in the sense that women are more exposed to vulnerability due to limited access to social support and limited control over resources when compared with their male counterparts. Women are less likely to have secure access to quality livelihoods and resources. For example, the level of unemployment (64%) was higher among women than men. Dynamic pressures and structural weaknesses such as lack of strong institutions, limited training, and a scarcity of hospitals, industrial jobs, planned market opportunities have reduced resource availability in flood-prone areas in Bangladesh. Unsafe conditions such as low income, food crisis, diseases, and unemployment were generated among the flood-affected women. Thus, we maintain that these unsafe conditions are the specific forms of vulnerability that are expressed in conjunction with floods. Table 3 represents the root causes of vulnerabilities in northern Bangladesh.

## 5 Concluding Remarks

Bangladesh is frequently affected by disasters, of which floods are the most common. Women are more affected by flood-induced vulnerabilities, experiencing deficits in food, clothing, communications, fuel wood, and increases in disease exposure, water quality problems, and sexual harassment. During floods women face various difficulties and



challenges. Particularly, women have to go through hardships for want of fuel and food for their regular activities. They also suffer from increased incidence of disease, including eye infection, cholera, dysentery, skin diseases, diarrhea, and jaundice. Apart from these difficulties, women experience specific types of economic crisis, poverty, and insecurity. Although the pioneer research by Nasreen (1995) on women's coping mechanisms during floods indicates that women's contributions are vital to the sustenance of their families, these roles have not been fully recognized. Nasreen (2012) also indicates that women are not only vulnerable but also resilient in the face of disasters. Women in flood-affected communities strive to develop their own mitigation and adaptation strategies to reduce flood risks and rebuild homes, protect property, and ensure livelihood security. But these efforts cannot produce the expected positive results without adequate support from government and society at large.

Based on the present study in the flood-affected area in northern Bangladesh, we can recommend a number of measures to reduce the vulnerability of women to flood hazards. These initiatives include policies and programs on disaster management based on gender mainstreaming efforts. The reality women face during floods is gloomy in the region. Despite their heroic efforts, women's contributions are not given due recognitions as they continue to fight with challenges. The social, economic, psychological, and health-related problems faced by women can be reduced by taking several steps. Laws should be implemented with legal support to prevent violence against women. A market system can be developed in the local area so that the flood-affected people are able to receive a fair price for the cattle, poultry, and other goods they sell, as well as to insure that essentials can be purchased by women at affordable prices. To reduce the vulnerability among women, the government, working together with NGOs, can introduce local and home-based industries such as food processing mills, cottage industry, and thread mills. Flood resistant crops and the distribution of these seeds in flood prone areas can be introduced with special emphasis on women's home-based crop cultivation.

Repair of embankments is crucial. Building roads and culverts and maintaining them well are also necessary. To maintain infrastructure, a community committee can be introduced. Flood forecasting and warning system should be adequately planned and implemented, and preparedness programs should be developed for disaster management. Gender-friendly toilet facilities such as separate toilets at shelter centers and portable toilets should be made available at the shelters or flood refuges, or temporarily constructed during flood periods. For maintaining livelihoods women can be provided with financial supports to rear cattle and engage them in other income-generating activities. Improvement of the functioning of various community committees, including the sanitation and nutrition committee, family planning committee, protecting from violence and early marriage committee, and school managing committee should be ensured. Each committee should include women and consider women's resilient

capacities. Finally, the organizations working in disaster prone areas to facilitate the building of sustainable local livelihood should continue the existing programs for a longer time period, beyond the currently normally five years.

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## Notes

- i The 1970 and 1991 cyclones that caused 300,000 and 138,000 deaths were among the worst ever disasters in the world. Other meteorological hazards such as tornadoes also have caused severe localized devastation. A severe tornado that hit the Tangail District in Bangladesh on 13 May 1996 left 540 people dead and injured 34,000 (DMB 2000).
- ii *Upazila*: A rural administrative subdivision of a district.
- iii Union *Parishad*: A rural administrative unit, subdivision of a sub-district (*Upazila*).
- iv A decimal is a unit of area in Bangladesh, approximately equal to 1/100 acre.
- v Ring-well is an age-old option for safe water in Bangladesh. A ring-well is constructed by excavating a shaft, generally manually and installing a casing where needed (WaterAid Bangladesh 2006).

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