# People's Perception and Response to Tornado of 2013: A study at SadarUpazila in Brahmanbaria District


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# People's Perception and Response to Tornado of 2013: A study at SadarUpazila in Brahmanbaria District

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# Acronyms

**BBS** Bangladesh Bureau of statistics

**CP** Community Participation

**CDMP** Comprehensive Disaster Management Programme

**CRA** Community Risk Assessment

**DM** Disaster Management

**DMB** Disaster Management Bureau

**DRC** Disaster Research Center

**DRR** Disaster Risk Reduction

**FGD** Focus Group Discussion

**GoB** Government of Bangladesh

**HH** Household

**IPCC** Intergovernmental Panel on Climate Change

**KII** Key Informants Interview

**MoEF** Ministry of Environment and Forest

**MoFDM** Ministry of Food and Disaster Management

**NGO** Non-Governmental Organization

**PIO** Project Implementation Officer

**RADAR** Radio Detection and Ranging

**SOD** Standing Orders on Disaster

**UDMC** Union Disaster Management Committee

**UNDP** United Nations Development Programme

**UZDMC** Upazila Disaster Management Committee

# Abstract

The geographical location and characteristics of Bangladesh make it one of the most disaster prone countries and rank it as the most climatically vulnerable country in the world.In every year, a number of storm strikes in different part of Bangladesh. Tornado is strongest one of them. Bangladesh hasrecently,on 22March 2013, experienced a tornadic event which also caused severely damages in the eastern part of Bangladesh more specifically in Brahmanbaria district of Bangladesh. This study is subjected to find out the local people's perception and response regarding to that tornado. It is evident from the study findings that there was no warning provided for this tornado and this was also occurred for first time in this area. Therefore, the local people were not prepared and almost knew nothing about this disaster. Most of the respondent defined tornado being influenced by the religious and cultural values and only 22 percent of the respondents said that they took shelter in their neighbor's building during tornado because there is no emergency shelter center and also disaster related information center in this area. But after the tornado local elite people, Government and Non-government organizations came forward to help them to adapt the situation and to minimize the damages.

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# Chapter One: Introduction

## 1.1 Introduction

It is a great concern of people living in the contemporary world that the global climate is changing rapidly. Scientists, observing the global average air and ocean temperatures, physical and biological systems, agree with all that the world climate is gradually changing day by day. The latest findings of the Inter-Governmental Panel on Climate Change (IPCC 2007) through its fourth Assessment Report (AR4) predicts that the average temperature might increase up to about 5.5 degree Celsius with respect to current mean values by 2100 in Asia (Cruz et al, 2007).

Climate change enhancing the vulnerabilities of many societies and communities, particularly those are already vulnerable to climate variability as well as lack of sustainable development. It also hampers many development efforts and activities specially in developing and under developed countries.The most adverse impact of climate change is the increasingof frequency and intensityin occurrence of different natural disasters.

Bangladesh is one of the most vulnerable countries around the world in terms of climate change and natural disasters. Floods, cyclones, tornadoes, storm surges, river bank erosion and drought are the main hazards of Bangladesh (Nasreen, 1995) and likely to become more frequent and severe through turning to disasters. This climate change induced disaster related vulnerabilities can cause the changes in the socio-economic condition of the country. These changes also threatens the significant achievements of Bangladesh has made over the last 20 years in increasing incomes and reducing poverty.

Experts have pointed out that climate change is not causing anything new in Bangladesh, but the frequency and intensity of events are increasing (Nishat, 2010). Currently climate change poses a new threat to life and livelihoods of the people of Bangladesh (World Bank, 2000).

As a developing country, Bangladesh is probably the worse victim of climate change and the disasters caused by this climate change is now a regular phenomenon to the people of Bangladesh. The recent vulnerabilities in terms of natural disasters are flood, cyclone, tornado, storm, tidal surge, drought, river bank erosion, water logging etc. (Nasreen, 2012).

Among the various fatal disaster of Bangladesh, tornado is a most threatening and devastating one, which has been hardly focused by the researcher. A few studiesare conducted on the tornado affected people of Bangladesh.The present study thus is an attempt to evaluate the local people's perception and response to tornado. As a devastating and mostly unfamiliar disaster to local people, tornado has severe impacts on the lives and livelihoods of the peoplewho have faced such disaster. Thestudy intended to explore the nature of knowledge and strategies taken by the local people of Brahmanbaria who had to face a severe tornado on 22 March, Friday, 2013 in Bangladesh.

### 1.2 Overview of Natural Disasters in Bangladesh

Natural disaster is a common scenario in Bangladesh due to its geographical location (Nasreen, 1995; Haque 1997) and the major natural disasters are flood, cyclone and storm surge, flash flood, drought, tornado, riverbank erosion, and landslide. However, human activities are also contributing to increase the frequency and intensity of disasters in Bangladesh (Nasreen, 2002).

Table 1: Types of Disasters and their Impacts in Bangladesh

| Types of Disasters | Areas Affected | Impact |
|---|---|---|
| Flood | Floodplains of the Brahmaputra- Jamuna, the Ganges-Padma and the Meghna river system | Loss of agricultural production, interruption of communication system and livelihood system, national economic loss, evacuation, and loss of human lives and biodiversity, displacement and sufferings of human population and biodiversity |
| Cyclone and storm surge | Coastal areas and offshore islands | Loss of agricultural production, interruption of communication system and livelihood system, damage and devastation of immobile infrastructure, national |

| | | |
|---|---|---|
| | | economic loss, loss of biodiversity and human lives |
| Tornado | Scattered areas of the country | Loss of human life and biodiversity, damage and devastation of property, damage of cash crops, interruption in lifestyle, national economic loss and loss of livelihood |
| Drought | Almost all areas, especially the Northwest region of the country | Loss of agricultural production, pressure on national economy and interruption in life style |
| Flash Flood | Haor Basins of the North-east region and South-eastern hilly areas | Harm of standing crops, interruption in life style, evacuation and devastation of properties |
| Erosion | Banks of the Brahmaputra - Jamuna, the Ganges-Padma and the Meghna river systems | Loss of land, displacement of human population and livestock, interruption of production, evacuation and loss of property |
| Landslide | Chittagong and Chittagong Hill Tracts | Loss of land, displacement of human population and livestock, evacuation, damage of property and loss of life |
| Earthquake | Northern and central parts of the country | Damage and destruction of property, loss of life and change in geomorphology |

(Source: Ministry of Environment and Forest (MOEF), State of Environment Bangladesh 2001.)

Because of having a vulnerable geographical location and social conditions such as poverty, overpopulation etc, Bangladesh is very much vulnerable to disasters. The occurrences of these natural disasters have made the country most susceptible by effecting of human lives, houses, agricultural land, crops, environment etc and these kinds of effects create hazardous threat to economic development also in the country (MOEF,2003).

**1.3 Background of the Study and history of Tornado**

Bangladesh is a low-lying deltaic country in South Asia formed by the Padma, the Jamuna and the Meghna rivers and their respective tributaries (DOE, 2009). The country has to face many climate change related disasters: cyclones, floods, tornadoes, droughts, riverbank and coastal erosion, erratic rain fall and saline intrusion into the coastal farmland (Rahman, 2010).

Being a disaster prone country Bangladesh is vulnerable to various fatal disasters. As with floods, cyclones, and storm surges, Bangladesh is also vulnerable to tornadoes.Each year this South Asian country experiences more than six tornadoes (Paul and Bhuiyan, 2004).

Bangladesh has a long history of tornado incidents. The first reported tornado in the territory occurred in March 1875 (Finch 2004). After a careful review of newspaper reports, Ono (2001) claims that Bangladesh experienced 191 tornadoes between 1967 and 1996 and thisrepresents an average of 6.4 tornadoes per year (Paul and Bhuiyan, 2004). Contemporary situation and evidence suggests that the frequencyof tornadoes has increased in recent years. According to the Bangladesh Disaster Report, 15 tornadoes occurred in 1998 (Ahmad and Kabir 2001). From January to November 2004, 33 tornadoes occurred in different parts of the country where17 of these 33 were killer tornadoes,which resulted in 153 deaths between January and November 2004 in Bangladesh (Paul and Bhuiyan, 2004).

There were 5,373 tornado deaths reported inBangladesh over the period of 1967-96 (Ono, 2001 and Paul and Bhuiyan, 2004) and it means that about 179 deaths per year;no other country has such a high death toll attributable to tornadic activity. TheUnited States, for example, which experiences more than one thousand tornadoes each year (Boruff et. al., 2003), recorded an average of 65 tornado fatalities per year between 1974 and 2003 (NWS, 2004). In Bangladesh,

Tornadoes are more deadly and destructive than those in the USA.Thisdifference in fatality rates is probably due to the fact that while many efforts have been made inthe United States to mitigate the tornado hazard, few such efforts have been implemented inBangladesh and thus, death tolls in Bangladesh from tornadoes remain high (Paul and Bhuiyan, 2004).

Ono (2001) reported that between 1967 and 1996, Bangladesh experienced 114 tornadoesthat involved loss of human life. Ono (2001) provided three potential explanations for a higher percentage of tornado fatalities inBangladesh: (1) tornadoes in Bangladesh are so violent that most of them result in fatalities, (2)poorly constructed housing common throughout Bangladesh increases the deaths, and (3) thereare many tornadoes occurring in Bangladesh that remain unreported (Paul and Bhuiyan, 2004). Being a densely populated country, having lack ofnecessary preparedness programsincluding tornado forecasting and warningsystemsand availability of tin houses built on elevated ground, Bangladeshhas to face high incidence oftornado and tornado related deaths in recent years. Tornadoes dismantle tin sheets like paper, turning theminto airborne missiles that can cause injury and death (Paul and Bhuiyan, 2004).

Since gaining independence in 1971, Bangladesh has experienced eight major tornadoes,each killing more than 100 people (Paul and Bhuiyan, 2004). Of these eight tornadoes, the most devastating oneoccurred on May 26, 1989, in Saturia (27 miles/40 km northwest of Dhaka) which killedbetween 800 and 1,300 people (Grazulis 1991). It is believed that this particular tornado was theworld's deadliest tornado in terms of lives lost (Schmidlin and Ono 1996). Almost all of thesemajor tornadoes occurred between late-March and mid-May in Bangladesh. Tornadoes occurred during every month except December, and most of the tornadoes occurred in a relatively small area of central, south-central, and southeastBangladesh (Paul and Bhuiyan, 2004).

According to Ono (2001), central Bangladesh has a higher frequency of tornadoes thanother regions of the country (Ahmad and Kabir 2001 and Paul and Bhuiyan, 2004). Between 1967 and1996, the average number of tornadoes that occurred annually per 10,000 square miles in the sixdistricts of central Bangladesh was the highest number in Bangladesh and comparable to the average in Ohio, South Dakota, Wisconsin, and Georgia in USA (Grazulis 1991).The nation's

tornadofrequency is 1.12 per 10,000 square miles. Although not a very high value, this figure doesindicate that tornadois a common weather phenomenon in Bangladesh (Paul and Bhuiyan, 2004).

The May 1996 Jamalpur and Tangail tornado was studied by Paul (1997) who examined how the tornado victims in Tangail adjusted to the losses and damages due to tornado. He identified the sources and extent of support received by the victims where his study was funded through the Quick Response program at the Natural Hazards Research and Applications Information Center at the University of Colorado at Boulder (Paul and Bhuiyan, 2004).

On April 14, 2004, a severe tornado swept through 38 villages of north-central Bangladesh, destroying everything in its path, including livestock, houses, crops, trees, and businesses where111 human remained dead and thousands sustained injurieswhich was studied by Paul and Bhuiyan in 2004 where the purpose of the study was to gain knowledge from tornado victims regarding the warning they received before the tornado (Paul and Bhuiyan, 2004).

In spite of the long history and high mortalities involved, tornadoes have received littleattention from hazards researchers in Bangladesh (Paul and Bhuiyan, 2004). According to Schmidlin and Ono (1996), thefirst serious attempt to study tornadoes in Bangladesh was by Peterson and Mehta (1981) whoanalyzed the physical characteristics of 51 tornadic events that occurred in India and Bangladeshsince 1835. Schmidlin and Ono (1996) examined reasons for the 605 deaths that resulted fromtornadic activity on May 13, 1996, in the districts of Jamalpur and Tangail in Bangladesh and theyconcluded that high population density, tin building materials, poor medical facilities, slowtransportation, a fatalistic public attitude toward nature, and a weak style of home building weresignificant risk factors for the tornado fatalities experienced in May of 1996(Paul and Bhuiyan, 2004). Theyalso mentioned that a high frequency of tornado occurrence with no warning systems and/orpreparedness programs expose people to high risk in the context of Bangladesh.

A horrible tornado destroyed a local area of Bangladesh Friday, 22 March 2013 in Brahmanbaria district. At least 36 people have been died along with women and children. Besides, thousands of

people have been injured in this tornado. The tornado ran about 3-15 minutes and fully destroyed 50 villages. Thousands of village home and trees had totally broken and fall down to the ground. This Bangladeshi Tornado of 2013 has destroyed many crop fields and uprooted a vast number of trees. The estimated losses of this tornado detected like 160 crore Taka.

The present study is an attempt to reveal the knowledge level of local people about the devastating tornado and the type of response and strategies taken to face or recover the damages due to tornado as there is a lack of research on this tornado.The research is important to do for lending some of the policy devises and awareness as many more may face such type of disaster in future.

### 1.4**Sociological Importance of the Study**

The geographical location of Bangladesh is in a naturally disaster prone area of the world. Therefore natural disasters such as flood, cyclone, storms, drought, river bank erosion, water logging etc. are normal for local people and they are adopted with these disasters. Among the different common natural disasters in Bangladesh, tornado is a most threatening and devastating one. From 1875 tremendous tornado's vulnerability is recorded in Bangladesh(Paul and Bhuiyan, 2004). The local people of Bangladesh have a traditional and hereditary knowledge to face these regular disasters and on the basis of that knowledge they response to these disasters.

The present study is attempted to identify these knowledge or responses along with the role of national and international institutions working or supporting in mitigating damage due to tornadoes which is mostly known as devastating disaster among the disasters faced by thepeople of Bangladesh.

It is postulated that, if we can integrate local people's knowledge with modern science and technologies then we will be able to reduce the disaster vulnerabilities more effectively and more accurately than ever before. The local people specially the affected people, the local government, local NGOs have some knowledge that is not possible to acquire suddenly for an outsider to work in there. So if it becomes possible to identify the types and nature of local people's perception on disaster and responses then it will be easier for policy makers to implement any recovery or emergency support activities.

If the local people's perception pattern and responses to tornado can be understood thenit will help to reduce and solve sudden problems and losses of policy implication. The knowledge on the people's attitude can help to understand their internal problems and implement initiatives for their needs.However, this study will help sociologists to identify the perception level of local people of Bangladesh about tornado and the pattern of responses to this specific disaster in disaster risk reduction. So, this study is hoped to be helpful for the useful allocation of national resources in more effective way.

This research work can help the vulnerable people to develop their consciousness about the risk and disaster. In the same way the policy makers, concerned people as well as government can know about the vulnerable situations of that particular people and take decision about the welfare activities of that affected areas. They can also help them by training and some strategies of coping mechanism to reduce the risk of that particular people.

## 1.5**Objectives of the Study**

In every study there has some purposes and researcher's main aim is to achieve those purposes through applying different procedures of research methodology. That purpose may be to: 1) discover new facts or verify and test of old facts, 2) analyze their sequences, interrelationships and causal explanations which were derived within appropriate theoretical frame of reference, 3) to develop new scientific tools, concepts and theories which facilitate reliable and valid study of human behavior (Young, 1966: 30). This study is also intended to achieve some purposes.

**General objectives**:

The thesis has broadly aimed to find out the nature of local people's perception on tornado and their responses to reduce damage and loss due to such disaster. Besides capturing the responses of local people, initiatives taken by local institutions, government, local and international NGOs have also been taken as important objectives to reveal.

**Specific objectives**:

1. To assess the nature and pattern of local people's perception on tornado.
2. To reveal the nature of response to tornado.

3. To explore people's perception and response in terms of education and status.
4. To examine cultural and religious impacts on perception of tornado.
5. To understand the nature of human actions influenced by the perception and responses to tornado.
6. To examine the type of initiatives taken by NGOs and GoB in regarding tornado response to the local people.

## 1.6Operational definitions:

**Tornado**:

A tornado is a powerful column of winds spiraling around a center of low atmospheric pressure which looks like a large black funnel hanging down from a storm cloud and its narrow end moves over the earth, whipping back and forth like a tail (Archer, 1991). No other weather phenomenon can match the fury and destructive power of tornadoes. It is a powerful and devastating disaster which can be strong enough to destroy large buildings, leaving only the bare concrete foundation.

**Perception of disaster**

Disaster perception is an invaluable concept in understanding and analyzing people's behavior when confronted with hazards and disasters (Bang, 2008). It is also considered as the process of attributing risk to an object, situation or an action and conceptualized within social science research as a socially constructed process (Plapp, 2001).Therefore perception of disaster indicates how the people feel about their own vulnerability to extreme weather events and other types of potential disasters.

**Disaster response**

Disaster response, means activities address the short-term, direct effects of an incident, includes immediate actions to save lives, protect property, and meet basic human needs and it also

includes the execution of emergency operations plans and of mitigation activities designed to limit the loss of life, personal injury, property damage, and other unfavorable outcomes due to any disaster (Emergency management institute, 1998). The first and immediate response is called emergency response. The level of disaster response depends on a number of factors and particular situation of awareness.

**Vulnerability**

The degree to which a system is susceptible and is unable to cope with and face adverse effects of climate change including climate variability and extreme prevalence of high or low temperature (IPCC, 2007). Vulnerability is a function of the character, magnitude and rate of climate change and variation to which a system of its sensitivity and its adaptive capacity is exposed.

**Local initiatives**

Local initiatives refer to the actions and plan taken by local people of the affected community and organizations from local area. Moreover activities of national and international organizations that work in the affected area also belong to local initiatives. There are three types of initiatives mentioned in the study. These are:

**Personal initiatives**: The initiatives taken in individually or family level.

**Community initiatives**: The initiatives taken in community level by its members.

**Institutional initiatives**: The initiatives taken by local government and by the local, national and international NGOs

## 1.7 Outline of the Thesis

The thesis has been divided into eight chapters. Each chapter has separate discussion about the study.

**Introductory Chapter**

In Introductory Chapter, discussion has been made on background of the study, importance of the study, objectives of the study and operational definitions of the study. The background knowledge and outline of the study has also been presented in thischapter.

**Chapter Two**

In the second chapter literature review has been discussed dividing it in two sub-sections namely global context andnational context. These two sub-sections reviewed the existingliterature to provide the background of the present research.

**Chapter Three**

In the third chapter theoretical framework and conceptual framework have been discussed matching with the study.

**Chapter Four**

In the fourth chapter methodology has been discussed along with presenting the rationality ofchoosing quantitative and qualitative method, study site, study population, sampling procedure, study instrument, pre-test, criteria of sampling, technique of data collection, dataprocessing and analysis, reliability and validity, ethical consideration, disclosure of theidentity and purpose of the study, confidentiality, privacy and limitation of the study. In aword, the overall methodological process has been discussed in this chapter.

**Chapter Five**

In the fifth chapter analysis has been presented. In this chapter the analysis section has been divided into five subsections that are socio-economicinformation of the respondent's household,Disaster related information,perception on tornado,impacts of tornado andresponse to tornado. Respondent's suggestions and expectations have also been discussed.

**Chapter Six**

In the sixth chapter qualitative data has been analyzed which was collected through Case Study, Key Informants' Interviews (KII) and Focus Group Discussion (FGD).

**Chapter Seven**

In the seventh chapter analytical discussion on findings has been presented in a brief way and conclusion has been drawn on the basis of the study findings and discussion. Besides these eight chapters, references and appendix have been presented in the end of this advance thesis paper that help to find out the sources of secondary data used in this research & questionnaire of the study.

# Chapter Two: Review of Literature

The background and context for the research problem can be represented by the review of the literature. It should establish the need for the research and indicates that the writer is knowledgeable about the area (Wiersma, 1995:406). A certain numbers of studies have been conducted over the decades on perception and response to disasters (tornado). The features of these studies are published in different news media, journal, books, and other sources to aware people about the climate change. However to provide the background of the current study a large number of articles have been reviewed. This literature review has been divided into two subsections that are: national context and global context. It is mentioned here that some of the relevant literature have also been highlighted in Chapter 1.3.

**2.1 National context:**

In national context very few studies have conducted on this issue. There are some literature related to this study are reviewed below.

*Schmidlin, Thomas and Ono, Yuichi (1996)* in their paper tries to understand the reason why so many fatalities occurred from the tornadoes in Bangladesh. They claimed natural hazards are the main problem of developing countries which cause average loss of 25,000 lives and damage in excess of $3 billion per year. Cyclone and flood hazards in Bangladesh are well-known for their large amount of damage and death. Bangladesh has a long history of tornado incidents also.They have tried to identify the risk factors regarding environmental, societal and cultural which are given below:

Environmental risk factors:

- The storm was tornadic.
- The affected areas were limited to narrow damage paths with very sharp boundaries.
- A series of tornadoes occurred one after another.

- There were four tornadoes produced by the cell
- The weather condition of the day
- There was no front in the synoptic weather charts in the area

Societal risk factors:

- No warning systems and preparedness programs for tornadoes in Bangladesh.
- There are no shelters for tornado, and
- People do not know how they should react when facing a coming tornado.

Cultural risk factors:

- More females died than males.
- Deaths of day labourers from outside of the area.
- Most of the wounded people could not go to the hospital immediately because oflack of access and practice.
- During tornadic activity, flying tin became deadly missiles and tin is also accounted for most of the death and injuries where most of the houses of the affected area were made of tin.
- The large amount of houses in the rural area are built on the elevated base of soil at the height of several meters above are easily destroyed and blown away by strong winds.
- People who took shelter in their houses became victims, ironically.
- The people in the locality are deeply religious and consider the tornado an act of God

Above all this study tries to assess the risk factors regarding tornadoes in Bangladesh which should be taken into concern by adhering authority.

*Paul, Shitangsu Kumar and Routray, Jayant K. (2013)* in their study explores the causes of non-response to cyclone warning and unwillingness to seek refuge and identifies natural methods for predicting cyclones and storm surge through local knowledge in coastal Bangladesh and reveals that coastal inhabitants are frequently familiar with cyclones and aware of the potential risk. They have mentioned some causes of not responding to cyclone warning and use of indigenous knowledge. These are:

- Poor road networks, long distances between home and cyclone shelters

- Low capacity of cyclone shelters
- Fear of burglary and stealing of household assets and goods
- Disbelief and misinterpretation of warning information
- Higher degree of fatalism among the people
- Poor understanding of cyclone warnings
- Past experience of the failure of warnings
- No or limited income-earning opportunities during and after the cyclone if people decide to evacuate
- Pressure from employers to go fishing etc.

This study also reveals some indicators regarding indigenous knowledge by which coastal people can predict a forthcoming cyclone. The nature of these indicators is given below:

*Indicators based on practical experiences of extreme weather* are drizzling and gloomy skies, abnormal wind circulation, strong wind circulation from the South or South–East, unusually hot weather followed by rain, circular wind patterns over deep-sea waters and a muddy smell in the air.

*Indicators based on water conditions* are abnormally hot water in river/sea, dark/smoky/cloudy colour of water, increase of water in the river while cyclone moves towards the coast, roaring sound of the sea/river, and gigantic waves of water in the sea.

*Indicators based on unusual animal behavior*are cattle and dogs howling endlessly at night before the strike of a strong cyclone, ants climbing towards the roof of houses, sea birds moving towards inland, abnormal jumping behaviour of fish in the pond, flies biting cattle to take shelter on them, bees/locusts moving in clusters in the sky, an increase in the number of flies and mosquitoes, crabs coming into courtyards or high places, and birds flying seemingly without destinations.

In this study, coastal people's perception and pattern of response to cyclone are measured in terms of indigenous knowledge and unwillingness to response to disaster for many reasons.

*Hossain, Md. Anwar (2013)* has presented a paper where he claimed Bangladesh as one of the most vulnerable country to disaster in the world. This paper mainly focuses on the concepts and approaches to disaster management, policies, institutional arrangement, disaster management

practices and role of social work to make disaster management fruitful with special reference to Bangladesh.This study also shows that because of traditional thinking of community, bureaucratic attitude of government officials, scarcity of resources and prevalent socio-cultural norms and values, community participation in disaster management was not possible to achieve at desired level. The barriers to community participation are given below:

1. People of Bangladesh has still belief in distributing relief materials during disaster where they think that it is the responsibility of government and/or voluntary agencies to provide all the facilities to the disaster victims.

2. The reluctance of most of the officials of local level administration to take into consideration of people's perception about disaster.

3. Lack of financial resources is a vital barrier of disaster management program.

4. Prevalent norms and values remain a challenge to community participation in disaster management.

5. Lack of facilities, especially in shelter home, remains a challenge to effective implementation of CBDM.

Community participation is an important element in the facts of in disaster management which can be influenced by social worker in many ways. These are:

- To create awareness among illiterate and ignorant rural people
- To reduce the damages and sufferings of people affected by disaster
- To make awareness among bureaucrats about acknowledging the social dignity of people and treat them with respect in policy making process
- Can enhance community participation by using several assessment and research tools
- To empower the community to build social capital and mobilize the community
- To raise fund from community chest, rich man of the community, and donors
- To arrange training for imparting knowledge to the volunteers and member of a particular community
- Imparting knowledge among the community about consequences and possible preventive measure of disaster so that the member of UDMC at local level could prepare disaster management plan properly.

- To disseminate information about climate change, and role of community to face the climate change
- May use the folk media in disseminating message to large number of people
- To stage street drama; to show film, documentary, and video show, and informal discussion
- To assess who are mostly affected
- To provide a comprehensive and multi-dimensional assessment and intervention
- Preventing/reducing disaster by encouraging people to develop mangrove forest in coastal areas
- To introduce multiple livelihood system for economic survival of poor people after disaster
- could also suggest the people to adopt substitute occupation

*Petersen, R.E. and K. C. Mehta, (1981)* have presented a paper focused on tornado climatology in the Indian Subcontinent using 51 tornadic events since 1835. A detailed distribution map was provided that showed several low-pressure troughs to explain that tornadoes occur near those frontal boundaries during the pre-monsoon period. However, there might be exist a tendency to report only the relatively significant tornadoes that leave more damage and attract more attention. This implies that the actual number of tornadoes in Bangladesh is still not clear or accurate. They also highlighted the large number of deaths caused by tornadoes and anticipated that large loss of life will be reported in the future.

*Nuruzzaman, Mohammad (2010)* has conducted a study on "People's and Meteorologist Perception on Cyclone Forecasting, Warning and Management System in Bangladesh". This study examines people's perception on cyclone forecasting, warning and management system by doing two questionnaire survey where one with meteorologists and the other with the people living in the coastal zone of Bangladesh. He said that increased awareness among the coastal people about cyclone forecasting and warning systems is necessary for reducing devastation in the coastal area. The responsible authority (Government, Private organizations, NGOs) have to ensure the forecasting and warning message for the secure living of cyclone prone zone and proper disaster preparedness.

*Paul, Bimal Kanti and Bhuiyan, RijuanHossain (2004)* has conducted a study where they studies a devastating tornado occurred in April 14, 2004 which swept over 38 villages Mymensingh and Netrokona districts of Bangladesh (killing 111 people, injuring 1,500, and destroying 3,400 homes). They have stated that since 1875, when it was first reported, tornado has a long history in Bangladesh and there have many devastating and deadliest tornado during this time.

The study conducted 216 respondents who have experienced damage from the tornado and the result shows that people had never confronted such strong winds in the past,there is no formal tornado forecast and/or warningsystem exists in the country, 90 percent of all respondents were at homeduring the tornado and other respondent indicated that they were scared about a severe windstorm and sought shelter inside theirhouses where most of the them took shelter under wooden beds and stayed inside until the sound of thetornado stopped. Respondents said that they had experienced this tornado for the firsttime in their lives. The study findings also show that the people stressed the need for construction of household and public tornado shelters alongwith tornado forecasting and warning systems.

Finally this study ends with strong recommendation of the introduction of tornado forecasting and warning systems and the establishment of a communications network to warn citizens of approaching tornadoes.

*Nasreen, Mahbuba and Hossain, Khondoker Mokaddem (2006)***,** in their studyfocuses some issues and problems related to sustainable development from environmental perspective and ecological balance in Bangladesh to reduce poverty. Thisstudy asserts that Bangladesh experiences various kinds of natural disaster such as cyclones, tornadoes, floods, droughts, arsenic contamination etc, which severely affect the people of Bangladesh and make them vulnerable and marginal poor. The key point of this paper is that it analyzes the development through aiming at reducing poverty and brings sustainable development in the country.

*Haque, C. Emdad in 1995* has conducted a study depicts that Science and technology cannot control entirely the causes of natural hazards. He stated that predicting, identifying, monitoring and forecasting extreme meteorological events are the preliminary actions towards mitigating the cyclone-loss potential of coastal inhabitants, but without the successful dissemination of

forecasts and relevant information and without appropriate responses by the potential victims, the loss potential would probably remain the same.

This study examines the process through which warning of the impending disastrous cyclone of April 1991 was received by the local communities and disseminated throughout the coastal regions of Bangladesh and found that identification of the threatening condition due to atmospheric disturbance, monitoring of the hazard event, and dissemination of the cyclone warning were each very successful. But, due to a number of socioeconomic and cognitive factors the reactions and responses of coastal inhabitants to the warning were in general passive as a result a colossal loss had to face at the individual and national level.

In Bangladesh people's response to a warning message depends on some factors which are asserted in this study. These are:

- The public is more likely to hear a warning from a local government source and/or a personal contact.
- The more disbelief a person has about an impending disaster, the less likely they are to respond to warning messages.
- The more potentially fatal the disaster/hazard, the more likely the public is to respond to a warning message.
- The greater the fear in looting a person has, the less likely they are to respond to a warning message.

This study recommends that the hazard mitigation policies should be integrated with national economic development plans and programs. Specifically, it is suggested that, in order to attain its goals, the cyclone warning system should regard the aspects of human response to warning as a constituent part and accommodate human dimensions in its operational design.

*Mallick, Bishawjit et al. (2009)*in their study examines the reaction and responses during cyclone Sidr 2007 among the people of Dacope Upazila, Khulna in Bangladesh. This study tries to understand the challenges of people in the context of cyclone Sidr 2007 in Bangladesh especially challenges being faced and or to be faced by the coastal communities. The resilience and response strategies of coastal peoples are analyzed in this paper in three levels: Household, Community and institutional level.

In household level they got information regarding cyclone *Sidr* on radio, neighbors, community volunteer, TV etc. Most of them took decision alone immediately after having the information while few discussed with their neighbors. 86% respondents decided to stay at own house to protect the family. Among the rest 14%, most of the respondents took shelter in their neighbor house. Because of being poorer segment of the society, most of the affected households were unable to repair their houses properly. The middle income group always tried to preserve their resources, reconstruct or repair their own shelter and also tried to preserve food like fried rice, chira, sweet using mud-pot or poly-packet under the ground.

In community level the previous experience helped make people aware of cyclone during Sidr. Study shows that the community level efforts were not too satisfactory as the respondents waited for more initiatives from the community volunteers. Against the question of community initiative some of the respondents replied that they received support from their community initiative in information distribution, rescue and relief work. Besides this the messengers, local volunteers, were shouting through loud speakers or megaphones to warn the people about the impending cyclone and let them to bring people to cyclone shelters.

In institutional level multipurpose cyclone shelter was made which generally are used as primary schools and also allowed to take shelter in cyclone centers, high schools, and religious places. Besides information distribution, rescue and relief work were done by Government of Bangladesh and other NGOs.

Finally the study suggests that adopted strategies of affected people to cope with cyclone address their vulnerability and it is necessary to integrate their local wisdom of living with unnatural situation into the future planning and development process of the coastal belt. Accordingly, the plans and development should not only be necessity, but also be accepted by the local community.

*Burt, Christopher C. (2011)* in his paper stated that Bangladesh has suffered the deadliest tornadoes most of whichusually occurred during the month of April and may specially during the beginning of the wet monsoon season. The tornado occurred on April 26, 1989 inManikganj districtwas the deadliest tornado in Bangladesh and thus the world history which cost at least 1,300 deaths. On May 13, 1995 another 700 lives were lost in the city of Tangail as the result of a violent tornado. Four other tornado events have killed 500 or more people in Bangladesh since

1964 (on April 11, 1964, April 14, 1969, April 17, 1973, and April 1, 1977). In fact, at least 6,500 people have died from tornadoes in Bangladesh in the past 50 years.

This paper tries to assess the tornadoes of Bangladesh in terms of list of world's deadliest tornadoes where Bangladesh has experienced some tornadoes characterized by huge damages and losses including a big amount of deaths of lives.

*Islam, M. Aminul, Ullah, Sifayet and Das, Kausik(2008)*in their article depicts tornadoes as unpredictable localized hazard which also a neglected severe disaster in terms of policy and institutional context in Bangladesh. This study assumes that Tornado risk reduction could more effectively be managed through strengthening the capacity of local disaster management entities like Union Disasters Management Committee (UDMC) and Upazila DMC according to Standing Order of Disaster provided by Government of Bangladesh (GoB).

According to this paper, tornado is a local disaster but it has huge impact on national context. Because of not having proper management system, still tornados are mostly dealt from a traditional response approach. Therefore, there has a crying need as well as scope to develop further policy and institutional strengthening attention to a localized disaster including tornados in the context of contemporary Bangladesh.

*NAPA in 2009* have presented a paper and stated that in Bangladeshfour regional stakeholder consultative workshops in each of the major administrative divisions of the country were held to solicit people's perception of impacts and vulnerability to climate variability and change. Stakeholders from various occupation and status including farmers, fishers, businessmen, social activists, representatives of civil society and women joined these workshops. These consultative workshops pointed to erratic behavior of weather sometimes first time in their memory such as fogs in places where these were never heard of during summer time, drought, salinity intrusion far from the sea, floods including flash flood, cyclone and storm surges as major problems they are facing in different parts of the country. Besides other disasters like: flood, drought, salinity and induced vulnerability of these disasters,stormsand cyclones appeared to have increased mostly in the coastal areas and also other part of the country. However, the local people have little knowledge on the cause of increasing of these disasters and it's relation to climate change

and climate variability. There was a clear sense from the entire workshop around the country that local people felt that the climate had indeed changed, mostly for the worse, over the years.

Schmidlin, Thomas W. (2009) states that Bangladesh has among the highest death rates in the world from the hazards of tornadoes, strong wind, lightning, and hail. This paper also shows some risk factors and social vulnerability to natural hazards especially to severe local storms of Bangladesh. These are:

- Poverty
- Weak housing
- Illiteracy
- Lack of emergency service
- Lack of access to resources such as information, knowledge, and technology
- Limited access to political power and representation
- Social capital including social networks and connections
- Local people's beliefs and customs
- Building stock and age
- Frail and physically limited individuals
- Type and density of infrastructure and lifelines
- Lack of Early Detection and Warning
- Lack of proper Education and Preparedness regarding disaster
- Lack of enough Shelter
- Gender

Finally this study suggests that four steps are to reduce risks from severe local storms in Bangladesh such as: (1) Install Doppler radar to detect storms, train meteorologists, and develop methods to convey warnings to villages and residents. (2) Develop severe local storm education materials with text and visual information about storms and storm safety. Distribute these to school children and in billboards, posters, and through emerging technologies such as mobile phones. (3) Construct household-level Bangladesh Ono Storm Shelters in a targeted community and monitor their acceptance and use. (4) Ensure that women are represented at equal numbers to men in the education and decision-making for severe local storm reduction and recovery.

**2.2 Global context:**

*Schultz, David M. et. al. (2010)* in their study tries to understand that how people receive warnings of hazardous weather and subsequently use this information to make decisions and suggests that more education is needed on the issue of facing devastating disasters like tornadoes.

The data were collected from 519 respondents of residents in Austin, Texas. The principal results are as follows:

- About 90% of respondents understood that tornado warnings are a greater threat than tornado watches.
- Sixty-three percent of respondents had a plan to keep their family safe from tornadoes at home, although only 41% had adequate in-home shelter.
- Most respondents (86%) did not believe that a limited number of false alarms or close calls would reduce their confidence in future warnings.
- When faced with a tornado while at home, 82% of respondents would stay at home.
- When faced with a tornado while driving, 72% of respondents would seek shelter, 39% would drive away from the tornado, and 19% would shelter in their car.
- About half (45%) of respondents would stop their car under an overpass and climb into the rafters during a tornado.

However, this study indicates that the Austin's public perceptions of tornadoes and tornado warnings and the potential actions that they would take when faced with two different tornado scenarios. In particular, many felt strongly that seeking shelter under a highway overpass was a safe action, pointing to the need for better education about the safety of seeking shelter under highway overpasses during severe weather.

Trumbo, Craig W. and McComas, Katherine A. (2003) has conducted a study and investigated that how credibility affects the way people process information and how they subsequently perceive risk. The major study findings are:

- Higher credibility for industry and the state directly predicts lower risk perception, whereas highcredibility for citizen groups predicts greater risk perception.
- A path model shows that perceivinghigh credibility for industry and state-and perceiving low credibility for citizen groups-promotesheuristic processing, which in turn is a strong predictor of lower risk perception.
- Alternately,perceiving industry and the state to have low credibility also promotes greater systematicprocessing, which consistently leads to perception of greater risk.
- Between a one-fifth and one third of the effect of credibility on risk perception is shown to be indirectly transmitted through information processing.

Therefore, this study relates risk perception on the basis of the availability of information processing.

*Porfiriev, Boris N. (1993)*depicts in his article "Uncertainties in natural hazards prediction and its effect on user community's perception: Soviet Union case study" that there are some factors of uncertainty in natural hazard forecasting and some types and modes of user communities perception.

In discussing the uncertainty factors, he said that the accurate forecasting regarding place, time and destructive force is difficult. Some complications and limitations are responsible for this difficulty which reflects the limits of modern knowledge and technology, though the progress in instrumental prediction in leading western countries is impressive.On the other hands explaining types and modes of user community's perception, he placed two main types of perception and reaction induced by uncertainty in natural hazard prediction. These are: (1) the radical (extreme) (2) the rational (moderate).

The radical type embraces two perception modes, one may be characterized as indifferent, passive and even fatalistic perception which more closely linked to the uncertainty of natural hazard prediction than is the rational type but other may be described as over-active or even apocalyptic characterized by the logic, reasoning and behavior situation which linked apocalyptic perception and reaction and in case of emergency and panic consider forecast uncertainty as under assessment or real risk.

On the other hand, rational or moderate type is inclined to activity defend against predicted natural hazard. Though it is incapable of changing the behavior mode, it relies upon trustworthy risk communication, existence of initiative and wise persons serving.

To conclude he stated about the situation in the Soviet Union where the situation can be changed only in the context of radical reforms in politics, economy, social and cultural areas. The morale of lay persons and whole communities primarily depends upon and closely linked with social stability and economic progress.

*Baker, Earl J. (1993)*has presented an article where he reviewed three research findings on tornado response level and discussed about some predictors of response to tornado. They stated that experience is not a good predictor of response. In their view some predictors are:

- Awareness
- Media's role
- Unusual weather
- Frequency of occurrence
- Type of warnings etc.

In the same article he also presents predictors of response in terms of hurricane and he said the evacuation rates vary from place to place in same hurricane and from storm to storm in the same place. He stated that predictors of response to hurricane depend on some important factors. Like:

- Risk area
- Evacuation notice
- Threat factors
- Hurricane experience
- Length of residence
- Hurricane awareness
- Crying wolf
- Housing etc.

In a summary Baker's presentation illustrates that the response levels and evacuation rates to tornadoes and hurricanes depend on various predictors of response.

*Rasmussen, J.L. (1993)*, in his paper stated that the ability to predict atmospheric phenomena depends upon the following five factors:

- Physical understanding of the phenomena, the model
- Observations (data base) available for the analysis.
- Sophistication of the analysis and initialization scheme for utilizing the observations.
- Horizontal and vertical resolution of the model.
- The model's ability to describe or replicate the physics of the atmosphere including subgrid scale processes.

He said a prediction capability for the small scale violent phenomena of tornadoes does not exist. Severe thunderstorms and tornadoes only possible to provide an outlook based on large-scale numerical weather prediction analysis and forecasts information. At present tornado warning schemes are based upon the detection of the rotation and cloud characteristics prior to funnel cloud formation. New technologies, including Doppler radar systems improved satellite observations are contributing to this detection capability.

*Bord, Richard J. et. al. (1998)* conducted a study concluding, both in the United States and in other 48 contiguous states including Canada, Europe and South America, in some points. These are:

- The public displayed solid environmental awareness and support for environmental goals at the general level;
- Demonstrated a general awareness and concern for global warming;
- Had a somewhat flawed understanding of global warming due to the application of a general pollution model;
- Perceived substantial threat from global warming, but the threat levels tended to be significantly less than those from other environmental and social problems; and
- Expressed a willingness to pay and to make sacrifices for coping more adequately with environmental problems in general.

So, the public perception on global warming and related risks are less important than the other environmental and social problems which suggests that the need for more concentration for the development of public perception on global warming and related risks.

*Hodler in 1982* has conducted a study on people's response to tornado warnings. He interviewed the residents of Kalamazoo, Michigan in USA. This study revealed that 48% said they went to shelters immediately after hearing the sirens, 22% attempted to verify the threat, and 18% ignored the sirens and 17% said they had no idea what the sirens signified.

*Semenzaet. al.(2008)* conducted population based, cross sectional surveys among 1202 respondents in Portland and Houston, two cities of USA, between june and September 2007 regarding awareness, concern and behavior change due to crisis for climate change. Virtually all respondents (92%) heard about global climate change or global warming and related crisis. Although most of the people of high income categories heard about climate change, 36 out of 48 of the low income individuals did not hear of global climate change. Gender and income were the only demographics that predicted concern about climate change across both cities. Women in both cities were significantly more concerned about climate change than men. Among those who were aware of crisis related to climate change, larger percentages of Portland (63%) and Houston (47%) respondents reported having changed their behavior. In terms of specific behavioral changes, of those who changed behavior, 43% decreased their energy usage at home, 39% reduced gasoline consumption and 26% cited other behavior and offered open-ended responses.

*Sims, John H. and Baumann, Duane D. (1972)* has conducted a study noting that US figures for potential or predicted deaths by tornado do not coincide with actual deaths by tornado, particularly in the southern region of the nation.This article explores four hypotheses that seek to explain the discrepancy where two hypotheses focus on the characteristics of the storm: 1) The South experiences more tornadoes at night, and thus the public is less frequently prepared; 2) the South has more severe and deadly storms and other two focus on differences in the human environment: 1) the construction of the buildings in the South is less durable than in the North; and 2) there are significant differences in the warning systems of the North and the South and/or response behavior of Northerners and Southerners.

The data was collected by way of a sentence completion test of 15 stems that sought to assess individuals' response behavior to tornadoes.The study present findings which suggest that

discrepancies in tornado death rates between north and south are related to the generalized psychological dispositions associated to locus of control. The study finding also shows that if a person feels some personal efficacy, they are more likely to respond to a warning message.
The study conclude that southerners are more fatalistic, have less faith in the efficacy of their own actions and have less trust in society's warning system and that psychological factors resulting in failure to take effective action cause higher tornado death rates in the South.

*Hanson, Vitek and Hanson in 1979*conducted a survey atMichigan in USA on public response to tornado warnings. There was no specific tornado warning before the targeted event, but respondents were asked in general what they did when they heard a tornado warning where 27% said they took shelter immediately, 48% said they checked the weather to determine if they were at risk and 25% said they had no response to the warning.

*Leiserowitz, Anthony A. (2005)*conducted a study on American risk perceptions and found that Americans as a whole perceived global climate change as a moderate risk. On an average, Americans were somewhat concerned about global warming, believed that impacts on worldwide standards of living, water shortages, rates of serious disease are somewhat likely, and that the impacts will be more pronounced on non-human nature. However, the interesting matter is that they were less concerned about local impacts, rating these as somewhat unlikely. The moderate level of public concern about climate change thus appeared to be driven primarily by the perception of danger to geographically and temporally distant people, places and non-human nature. A clear majority of respondents were most concerned about the impacts on people around the world and non-human nature. But only few were mostly concerned about the impacts on themselves, their family or their local community.

*Balluz, L., L. Schieve, T. Holmes, S. Kiezak, J. Malilay in 2000* conducted a study on Powerful tornadoes occurred in Arkansas, USA on 1 March 1997. This study based on a population-based cross-sectional study to determine factors associated with appropriate responses to tornado warnings. The study finding s shows that 96 percent of the respondents knew the difference between tornado watch and tornado warning and were aware of when the warning was announced. 45.7 percent responded to the warning by seeking shelter, and 90.6 percent out of those 45.7 percent acted within five minutes of hearing the warning. Four factors were positively

associated with those seeking shelter: having graduated from high school, having a basement in one's home, hearing a siren and having prepared a household plan of response when tornadoes occur.On the basis of these findings this study recommends three points:

First, the people who live in tornado-prone areas have a personal plan of action to help them respond immediately to warnings;

Second, public health and education officials in areas with frequent tornadic activity should do more to educate the public about what they can do to protect themselves from a tornado; and

Third, the emergency management officials planning protection measures for vulnerable communities should consider that most people have limited time in which to respond to a tornado warning. Thus shelters in tornado-prone areas should be quickly accessible by residents.

The study can be summarized in some points: the public is more likely to respond to a warning message if they hear sirens, Being a high school graduate increases the likelihood of a person responding to a warning message,who have more knowledge about protective responses are more likely to respond to warning messages,having resources increases the likelihood of a person responding to a warning message.

*Botterill, Linda and Nicole Mazur in 2004*have presented a report wherehe investigated the literature on risk and risk perception across a range of disciplines in order to provide a better understanding of the diverse theoretical approaches to risk and risk perception and contribute to improved policy outcomes in areas involving risk management. Some of the topics in this report include measuring risk; values and non-rational factors in risk perception; and differences between expert and lay person’s perceptions.

The understanding provided in this report shows that how stakeholders and the broader community perceive risk should assist policy makers in developing better policy and more effective means for communicating government policies and programs in areas involving risk management.

*Glass et al. (1980) conducted another survey in Texas, USA*, following a strong tornado and assess public response to tornado warnings**.** Findings show that 77 percent of the respondent said that they took shelter before the tornado struck, 53 percent of the respondents living in single family homes went to interior closets, bathrooms and hallways and 24 percent said that they went to basements or storm cellars. The most widely cited findings of this study is that a significant number of families left their single-family homes through evading the tornado in their cars , resulting in a higher than normal incidence of deaths where officials now explicitly advise against that response.

*Aguirre, Benigno E., Walter A. Anderson, Sam Balandran, Brian E. Peters, and H. Max White (1991)*in their study examines the effects of the tornado that struck Saragosa, Texas in 1987 killing 30 people, injuring 121, and destroying public buildings and many homes. Despite a severe thunderstorm watch and tornado warning issued for the area by the National Weather Service and carried by area radio and television stations, many residents were unaware of the danger. The report analyzes the tornado warning systems together with an evaluation of the warning process and its effects on the residents of Saragosa. Finally the study findings can be summarized in some issues such as:

- The public is less likely to hear and understand a warning if it is issued in a language other than their own.
- The public is more likely to hear a warning if they have a strong social network.
- If the public receives no communication from officials, they are less likely to hear a warning message.
- If sirens are not heard, the public is less likely to hear a warning message.
- The closer a person is to a disaster/hazards area, they more likely they are to understand a warning message.
- A person is less likely to respond to warning messages if environmental cues are lacking and/or if they are not geographically proximate to the disaster.

Suggestions and recommendation of the survey included some points such as: the tornado warning lead time was in excess of 20 minutes--significantly better than could be expected with the technology being used, many people in Saragosa were aware of basic tornado safety rules

and many individuals took proper protective actions and multiethnic or multilingual warning procedures need to be developed.

*Baker, E.J. (1979)*have reviewed four sample survey studies and presented a paper which was considered to provide the basis for most of what is known about human response to hurricane warnings and their analysis was extended with respect to a dependent variable of whether or not the survey respondent evacuated his or her home in response to the hurricane warning. The goal of the review was to identify useful variables.

The study reveals important criteria of people which make them more responding to the warning. These are:

- The public is more likely to hear a warning message via the television.
- The more frequently a sender relays warning information, the more likely the public is to believe the warning information.
- There is no relationship between age and a persons' likelihood of responding to a warning message.
- The less experience a person has with a disaster/hazard, the more likely they are to respond to a warning message.
- The more freedom a person has to leave their place of employment, the more likely they are to respond to a warning message.
- Being in geographical proximity to the disaster/hazard increases the likelihood of a person responding to a warning message.
- If a person has had experience with hazards before, they are more likely to respond to warning messages.
- Having membership in social networks increases the likelihood of a person responding to a warning message.
- The greater the perception of loss/risk, the more likely a person is to respond to a warning message.
- Having resources increases the likelihood of a person responding to a warning message.
- Observing social cues increases the likelihood of a person responding to a warning message.

- The greater the social influence, the greater the likelihood of a person responding to a warning message.
- Hearing, understanding, and believing in a warning message increase the likelihood of responding to it.
- The personalization of a warning message increases the likelihood of responding to it.

*Carter, Michael T. (1980)*have presented a paper and focused on the role of the media plays in disseminating severe or hazardous weather warnings to local communities. Four categories of communication systems are investigated for their effectiveness in providing warning linkages to commercial broadcast, the categories are: 1) two-way systems, 2) directed one-way systems, 3)radio monitor systems only and 4) no reliable method of communication.

Findings indicate that the very general statements issued by the weather service do not provide sufficient detail to convince all individuals that a serious situation exists in their locale. Lack of adequate information creates hindrance on appropriate warning response of people. Significant improvements are needed to expedite the transfer of emergency information from local emergency service agencies to the commercial broadcast media for public dissemination.

However, the study concluded that the public is more likely to hear a warning from the mass media. When the media reports on the hazard/disaster with adequate information, the public is more likely to understand the warning message. The more specific the warning message, the more likely the public is to respond to it.

*Slovic, Paul. (1987)*, in his paper, examined the judgments of people when they are asked to characterize and evaluate hazardous activities and technologies. This study aims to aid risk analysis and policy-making by providing a basis for understanding and anticipating public responses to hazards and improving the communication of risk information among lay people, technical experts, and decision-makers.

In this paper it has shown that extensive negative media coverage has led to the strong association in people's minds. Educating and reassuring the public to be more in line with opinions of industry experts seems impossible given the low probability of a serious accident makes it hard to demonstrate safety. People are more willing to tolerate risk when the activity is

viewed as highly beneficial. This study also stated that those who promote and regulate health and safety need to understand how people think about and respond to risk. Without such understanding, well-intended policies may be ineffective.

*Riad, Jasmin K. and Fran, H. Norris in 1998* in their study tested a model in which the decision to evacuate is a function of four processes such as: risk perception, preparedness, social influence, and economic resources.

The result indicates that higher risk perception and the belief that one is influenced by others are the strongest predictors of intentions to evacuate. Furthermore, risk perception was shown to mediate the influences of many background variables (e.g., experiences, demographics) on evacuation intentions. However the study makes the conclusions and reaches some points. These are:

- The more anxiety a person feels about an impending disaster/hazard, the more likely they are tobelieve a warning message.
- The greater the social influence, the more likely a person is tobelieve a warning message.
- Women are more likely than men to respond to a warning message.
- Black people are more likely to respond to a warning message than are non-blacks.
- There is norelationship between having children and responding to a warning message.
- A person is lesslikely to respond to a warning message if they have had prior hazards experience.
- If a personowns a home, they are less likely to respond to a warning message.
- If a person perceives anincreased risk or loss, they are more likely to respond to a warning message.
- Someone who is experiencing low social embededness is more likely to respond to a warning.
- There is norelationship between a person's resources and their likelihood for responding to a warningmessage.
- The greater the social influence, the greater the likelihood of a person responding to awarning message.
- If a person feels some personal efficacy, they are more likely to respond to awarning message.

From the above discussion it can be said that this study states evacuation behavior or response to warning message to a hurricane threat depends on people's perception of risk, disaster preparedness, social and individual resources etc.

*Davenport, A G. (1993)*in his articlestated about factors influencing the seriousness of a disaster ranging from preparedness and planning to the availability of relief and post disaster assistance. His discussion was mainly illustrated by the impact of hurricane Gilbert on the island of Jamaica on 11$^{th}$ September 1988 which caused the economic loss of 2 to 3 billion with the loss of 45 lives.

In discussing the prospects for reducing disaster, Davenport said that the root cause of this disaster was the failure and unservicability of structures due to wind action. He referred some important things to reduce such kind of disaster. Such as:

- Improved wind resistance like: high voltage transmission lines, reinforcing block wall etc.
- Establishment of appropriate construction code.
- Education and training and their application in practice.
- Improved post disaster services and recovery.
- Necessary dynamic response.
- The development of suitable standards and construction guides.
- Standards for roofing materials like: concrete slab roofs, hip roof over the gable roof.
- The use of hurricane straps to hold down rafters.

In a nutshell, davenport basically, in his article, discussed about the severity of Gilbert hurricane in terms of structural damages and a special emphasis on the reducing mechanism of this damage.

*Carter, Michael T et. al. (1983)* conducted a survey on the residents of Alabama, USA. Heinterviewed the residents after a hurricane in 1979 and assessed the effect of family structure on household response to natural hazard warnings. The manner inwhich residents decide to evacuate differs depending on the structural characteristics of thehousehold is the basic hypothesis which is examined in this study. The study results show that the complete nuclear

family (father, mother, and children) appearsto respond much more like relatively isolated groups relying on their own interpretation ofwarning information. On the other hand marriedcouples without children and single residents living alonerely on their prior perceptions ofrisk and their social contacts with other significant persons.
Finally the study summarized in apoint that the people with children are more likely to respond to disaster warning messages, than people without children.

*Arlikatti, Sudha, et. al. (2006)* conducted a study examined the accuracy with which Texas coastal residents were able to locate their residences on hurricane risk area maps provided to them. Only 36% of the respondents correctly identified their risk areas and another 28% were off by one risk area.
In a nut shell, risk area accuracy is minimally correlated with people's demographic characteristics but is negatively correlated with people's previous hurricane exposure. Risk area accuracy is uncorrelated with evacuation expectations and for this reason risk area accuracy appears to have little significance. But the hurricane experience is related to respondents' previous hazard experience and expected evacuation context. However, evacuation expectations are related to age, length of coastal residence, people's previous hazard experience and expected evacuation context.

*Baker, Earl J. (1995)* conducted an interview where400 residents were interviewed in Florida to assess the effect of hurricane probability forecasts and other risk indicators on public response to the threats. Evacuation pattern were more important than other threat variables, and use the probability information reasonably. Evacuation behavior in actual hurricane threats is consistent with the survey findings.

The study findings reveals that the public is more likely to believe a warning message if the sender includes probability information in the warning. If the probability of the event happening is high or low, there is no relationship between the probability and the public's likelihood of responding to a warning message. If there is medium probability of the event happening, the public is more likely to respond to a warning message. The more risk information the public has,

the less likely it is to respond to warning messages. The greater the severity of the threat, the more likely the public is to respond to a warning message.

*Christensen, Larry and Carlton, E. Ruch (1980)* have presented their paper wheretwo experiments were conducted to examine the hypothesis that a social influence effect exists and impacts a person's response to warnings of an impending hurricane. The first experiment investigated the influence of strangers' responses on one's own response. The second experiment, the influence of a spouse or friend's response on one's own response was investigated.
The two experiments suggest that advisories issued by authority figures such as the National Weather Service produce a significant impact on individuals in terms of generating a more extreme response. The surprising component identified by these two studies is that neither the actions of strangers nor the actions of a friend or spouse had any impact on an individuals' response.
To conclude this study stated that observing social cues increases the likelihood of a person responding to a warning message.

*Glass, Albert J. (1970)* in his study discussed about human behavior in terms of psychological aspects during an emergency situation. This study approaches the problem of psychological aspects of emergency situations by using a model which considers behavior over time, so that various phases of behavior can be viewed separately. This also considers impact, the time when the emergency happens, as its reference point. Pre-impact phase is present when impact becomes probable. The warning period is the period of imminent danger. The recoil period follows impact and is the phase when the individual grasps the situation around him and proceeds in some organized manner to cope with the environment. The post-impact phase is the period of mourning, repair, and rehabilitation for the individuals involved.
In one words it can be stated from this study that the more habituation of a disaster/hazard a person experiences, the less likely they are to respond to a disaster warning.

*Gruntfest, Eve. (1997)* in his study have tried to make understand that more public investments aim to improve forecasting capability than to evaluate the impact that predictions have on reducing loss of life or property damages. Warning systems are nonstructural measures which

can effectively reduce loss of life and mitigate damages from flooding. This study also presents some characteristics regarding response to a warning message. These are:

- The older a person is, the less likely they are to hear and/or respond to a warning message.
- Theclearer the warning message, the more likely the public is to respond to it.
- The more credible thesource of a warning message, the more likely the public is to respond to a warning message.
- Themore specific the warning message, the more likely the public is to respond to it.
- If a person hashad experience with hazards before, they are more likely to respond to warning messages.

This study looks at the advantages of systems in the USA, important warning and dissemination characteristics to ensure effective warning efforts. It further states that response to warning with short lead time depends on the nature of hazard and the nature of warning message.

*Hodler, Thomas W. (1982)* has conducted a study where a survey was conducted to the individuals residing directly in the path of the tornado that hit Kalamazoo in Michigan, USA. The residents' tornado preparedness and response were examined in an effort to evaluate the city's emergency warning system. The system was adequate for the people on the east side of the city and lacking for west side residents. Other factors pertaining to the storm event and human response were also evacuated.

This study concludes that if a person has had personal experience with a hazard/disaster in the past, they are more likely to believe and respond to a warning message. If confirmation of the disaster/hazard happens, people are more likely to believe and respond to a warning message. The personalization of a warning message is greater when the message is understood.

*Quarantelli, E. L. (1984)* has presented a paper which summarizes the major findings regarding reactions of humans to disaster warnings of an immediate event and including how this might affect evacuation. This article focuses on individual reactions to relatively short-term warnings and the reaction of individuals to longer-term warnings is not explored. More specifically, this

article addresses factors affecting the definition of the situation, factors affecting evacuation as well as provides implications for disaster planning and operations.

The key findings of this paper can be summarized in a way that the more specific the warning message is, the more likely the receiver is to believe it and/or understand it. If confirmation of the disaster/hazard happens, people are more likely to believe a warning message. A person is less likely to respond to a warning message if they have a fear of looting. If a person feels some personal efficacy, they are more likely to respond to a warning message. The more a person personalizes a warning message, the more likely they are to respond to it.

*Lindell, Michael K., Jing-Chein Lu, and Carla, S. Prater. (2005)* has conducted a study where they collected data on the evacuation from Hurricane *Lili*and to answer questions about households' reliance on information sources, the factors affecting their decisions to evacuate, the timing of their hurricane evacuation decisions, and the time it took them to prepare to evacuate. The result of the study is almost same as previous research regarding hazard information, evacuation concerns, and the timing of evacuation decisions. But in addition, they provide new information about evacuation preparation times and the finding that household characteristics are uncorrelated with evacuation decision times or evacuation preparation times. Further the study reveals some important findings which are given below:

- There is no consistent pattern between demographic variables and utilization of variousinformation sources about an impending hurricane.
- Utilization of peers and local authorities has the highestcorrelations with evacuation behavior.
- Environmental cues (i.e., proximity to the coast and inland waterways) and social cues(i.e., official evacuation recommendations, observations of peers evacuating and officialwatches and warning) correlate with evacuation decisions.
- Younger females with children in the home are more likely to evacuate.
- Personal experience (i.e., becoming trapped in a stalled evacuation, previous hurricaneexperience, previous experience of unnecessary evacuations) and evacuationimpediments (e.g., protecting property from storm damage, expectations of looting) are not correlated with evacuation decisions.
- Evacuation decisions are strongly dependent on the time of day.

- Total household preparation time for evacuation negatively correlates with distance fromthe coast which is primarily due to the effects of packing items, protecting property andsecuring the home.

Therefore this study is important for examining the factors determining household decision making and evacuation in response to hurricane like disaster.

*Perry, Ronald W. (1987)* in his article highlights the relative sparseness of empirical data regarding minority groups in terms of developing sociological theories of disaster behavior. He stated that despite intuitive and empirical evidence, race and ethnicity rarely appear as variables in models and theories of disaster response.

Thisstudy describes disaster preparedness and response among ethnic and minority group in terms of some characteristics. These are:

- A person is more likely to hear a warning message if it is delivered in the language in which they speak.
- A person with majority group membership is less likely to understand a warning message.
- The public is more likely to respond to a warning message if the message comes from a credible source.
- A person with membership in a minority group is less likely to respond to a warning message.
- If a person feels some personal efficacy, they are more likely to respond to a warning message.
- If a family is together in the same place at the same time, they are more likely to respond to a warning message.
- Believing a warning message increases the likelihood of responding to it.
- The more a person personalizes a warning message, the more likely they are to respond to it.
- A person with a high socio-economic status is more likely to believe a warning message.

Therefor the socio-economic and cultural traits make influence on disaster preparedness and response among ethnic and minority group of people.

*Carter, T. Mitchael (1993)*in his paper presents review of some hypothetical hurricanes. This paper stated some important issues which are important in measuring the role of technical hazard and forecast information in preparedness for and response to the hurricane hazard in USA. These are:

- The vulnerability analysis of the area
- The behavioral analysis of the citizens
- Evacuation time estimates
- Utility of the technical data report
- The hurricane forecast program
- Responding to the hurricane threat
- Utilizing hurricane forecast error
- Estimating hurricane forecast error
- Utilization of the program by local official

This paper summarizes the presentation by the evaluation of the U.S. hurricane preparedness and response program where it is claimed that this program has lost something in its implementation because without an identified and continuing technology transfer function, technical information provided to the practitioner community. However, the paper suggests that the primary issue that must be addressed in programs dealing with various aspects of preparing for and responding to natural hazards involves how to bridge the technical researcher with the practitioner.

*Mitchell, James K. (1993)* in his paper focuses on natural hazard prediction and associated responses in the context of large scale modern urbanization. He reviews some previous research and evidence from past disasters regarding earthquake, severe storm and wildfire disasters such as: The great Kanto earthquake (1923), the Ise Bay typhoon (1959), Honolulu Hawaii (1982), Hurricane Alicia (1984), London Windstorm (1987) etc. In each disaster there were a huge damage and loss of life and economic assets and all of them were either not predicted or not well predicted and no warning were issued but the responses in large cities were better than their rural counterpart though in many cases it were followed up with inappropriate.

To summarize the study Mitchell stated emerging problems of very large cities in the USA suggest that improvement in relief, recovery and mitigation systems might be more pressing

needs for very large cities and third world cities that are at risk to major earthquakes and severe storms require careful co-ordination with other hazard reduction measures.

*Blanchard-Boehm, R. Denise (1998)*inhis paper applies the risk communication framework and its principles to a case study where probabilities were increased of future earthquakes in the San Francisco Bay area. This study demonstrates that the risk communication model is an invaluable tool for helping us to understand the behavior of individuals who must learn of and act upon warning information that could save their lives and property. Further, researchers are urged to find ways to adapt this risk communication model to other types of natural and human-made hazards.

This study can be summarized in some points regarding public response to warning message. These are:

- The public is more likely to hear a warning about a disaster agent with which they are familiar.
- The greater the perceived vulnerability the public feels towards a disaster, the more likely they are to hear the warning message.
- If a person has had prior experience with a disaster, the more likely they are to hear the warning message.
- The older a person is, the more likely they are to understand a warning message.
- The greater the belief in science as a predictor of hazards/disasters, the more likely a person is to understand a warning message.
- The closer to a disaster/hazards area a person is, the more likely they are to understand a warning message.

However, the socio-demographic characteristics of the people have correlation with their belief and acceptance of a warning message.

*Mitchem, Jamie D. (2003)* have presented a report summarizing the research findings regarding the September 20, 2002 Indianapolis tornado, with a particular focus on the public response to the warnings and damage assessment difficulties. This study mainly assessed two research questionswhere important one is: How does the public receive, perceive and react to tornado warning information? Data was collect through aerial photographs surveys and media coverage

content analysis. Study conclusions include: 1) urban areas are biased in damage estimates based upon the Fujita Scale; 2) the majority (61%) of residents did not take the tornado warning seriously and that disseminating warnings in different ways is crucial to reach the most people and; 3) a large proportion of people (46%) did not take shelter during the tornado.

However, the study findings can be summarized in such a way that households experiencing power outages are less likely to hear a warning message, the public is more likely to respond to a warning if they receive that warning via multiple channels and Hearing a warning message increases the likelihood of responding to it.

However, the above literature of both national and global context has emphasized the disaster such as tornado on the basis of people's responses and adaptation strategies. But the present study is attempted to explore people's perception on tornado besides responses with a special emphasis.

# Chapter Three: Theoretical Framework

There is a close relationship between theory and research. Researcher can provide a proper guideline to the social research by supporting with the theory that helps them to find reliable research findings. An important characteristic of scientific research is to justify the hypothesis from the existing theory and strengthen the belief in the theory through the justification of hypothesis. The present research has been designed to assess the perception and response to tornado of 2013 of the people of local Bangladesh. For the present research several theories has been applied for understanding the perception pattern and response type to tornado of the affected people of local areas of Bangladesh.

### 3.1 Sociology of Disaster: Weberian perspective

Robert A. Stallings in his study (2002) argued that future empirical studies of disasters and hazards by sociologists are explicitly and systematically grounded in core theoretical concerns of Max Weber. Though Weber's work provided the framework for a number of propositions and tied those to fundamental sociological questions, it is his political sociology as sketched in his delineation of political communities in economy and society that focused on disaster studies (Weber, 1978; see more Stallings, 2002).

### 3.2 A Weberian Reexamination of Waco Disasters

The analysis that Moore (1958) made about the 1953 tornadoes that damaged much of downtown of Waco and a smaller residential section of San Angelo can be explained from two different levels. First at micro-level, the experience of self-reliance and individual resolve in the face of unexpected adversity brought on by the destructive forces of nature (Stallings, 2002). On the other hand at the macro-level, it had as an outcome of naturally self-equilibrating social systems reacting to an environmental intrusion to re-establish the status quo ante, although this experience is more implicit and surfaces mainly in the add-on theory (Moore, 1958:310-317). The Weberian perspective is mainly disaster in relation to class, economy, political power, gender, religion etc.

**Class, Economic Order and Disaster**

Reestablishing the status quo ante in disaster is more to do with the dominance of the property classes than with any natural process of social recovery (Stallings, 2002). For example, the tornado produce severe damage and property loss concentrated in the solvent people. One hundred ninety-six commercial buildings were destroyed, other 376 were damaged beyond the point of safety during Waco disaster and six big enterprises lost and 71% of the resources and property value of $220 million (Moore, 1958).Prior to the tornado in Waco, these property classes had tried to attract younger members of the commercial classes to invest into the city new manufacturing industries (Moore, 1958:31). According to Moore (1958:32-33), the property classes was also powerful to control local government and politics.

Therefore, the material interest of the property classes during disaster is predominant in both emergency and recovery activities following the tornado. However, the pre-disaster conflict between property and commercial classes are also common.

**Status Groups, Religion, and Disaster**

In contrast to classes and class conflict, Tornadoes over Waco gave explicit and systematic attention to the effects of disaster on a variety of status groups (Stallings, 2002). There were separate ethnic groups, i.e., 'Negro families' for whom considerable attention was paid (Moore, 1958). As someone both educated in and a long-time resident of the South was keenly aware of the caste-like structure of race relations in Southern cities such as Waco, whose 16.4% nonwhite population was al-most entirely African American (Moore, 1958). Thus he began with the hypothesis that differences between whites and blacks would be found in the recovery process(Stallings, 2002).

Other observations suggest that discrimination did not disappear even during the typically altruistic emergency period. After a downtown hospital was overrun by the first wave of disaster many were injured, especially Negro patients were taken to Connally Air Force Base Hospital some miles outside the city (Moore, 1958:23). It is interesting that Negro families were less likely to have received visits from clergymen following the disaster than white families, despite a greater increase in religious activity among black families after the tornado (Moore, 1958).

**Political Power, Government, and Disaster**

It is clear from Moore's (1958) analysis that Waco's political structure was dominated by the upper class. Although a government of notables local officials did not seem to possess the wealth or esteem that is characteristic of this type of political leader, the city government in Waco in 1953 certainly seemed to be a government headed by amateurs (1958:12).

It was further found that Waco's city officials on the whole had been at the mercy of the local property classes where every confrontation between downtown business interests and city government appeared to end with the latter giving in to the wishes of the former(Stallings, 2002). The row over the military's alleged destructiveness in searching for bodies and knocking down damaged structures resulted in the city negotiating the departure of all military units (Moore, 1958) and at the center of these conflicts were of private property but the local government had many limitations to resolve such conflicts (Stallings, 2002). Moore (1958) further described this issue in terms of local government's fear of litigation and financial liability.

**3.3 Analysis of Weberian perspective**

A Weberian perspective of Waco disaster changes the texture by placing the behavior of actors in the context of the city's class, status, and political structures. It provides an explanation for the reestablishment of the status quo ante, not as the result of self-restoration of a social organism, but through the exercise of power and also placing a sociological explanation between the research on newly emerging topics in disaster studies, and longstanding concerns of the discipline(Stallings, 2002).

It is not only the sociological perspective but renewed interest in power, conflict and inequality was given the increasing attention to the political side of disasters by geographers (Blaikie et al., 1994; Hewitt, 1997) and political scientists (Olson, 2000; see more Stallings, 2002). However Weber's political sociology offers a framework for investigating how inequalities in class, status, power, economy, religion etc. affect disaster victimization and recovery that avoids both the reductionism of Marx and the tendency toward tautology in newer frame-works such as vulnerability analysis (Blaikieetal, 1994 and Bolin, 1998; see more Stallings, 2002). Unlike Karl Marx, Weber denies the assumption that all inequalities are at base class inequalities (Giddens, 1971). Rather personal jealousy, racial prejudice, religious intolerance, and the will to power are

always some of the catalyst features in social inequality. Therefore, the inter-sections among and consequences of inequalities on dimensions of wealth, influence, age, gender, ethnicity, and religion are empirical questions in all aspects of disaster (Stallings, 2002). But disaster is yet to be central concern in sociology, geography and political economy.

In the present study, it is aimed to explore the local people's perception and response to tornado as a silent disaster in Bangladesh where class, education, economic condition, status, religion and political influence are the key elements to take into consideration. Therefore, theory of Weber in sociology of disaster is important to know in understanding the whole picture.

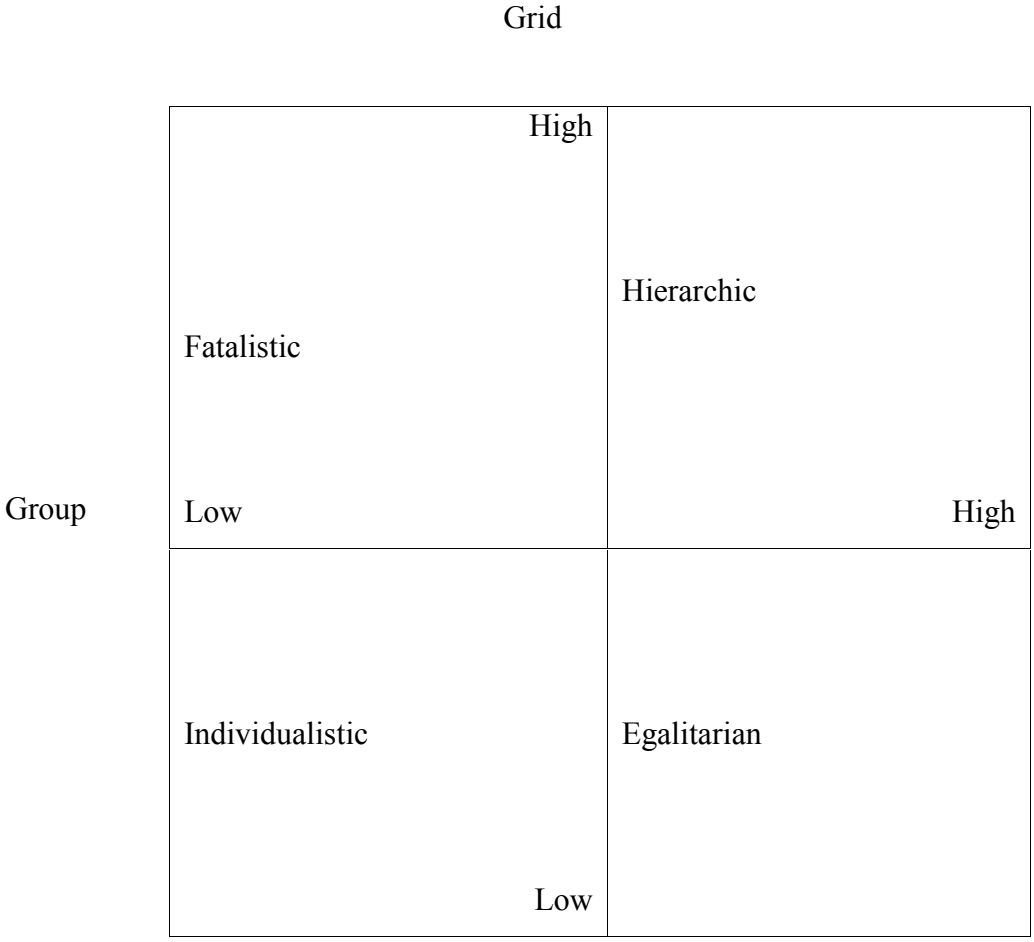
### 3.4 Cultural theory of risk perception and risk interpretation

Cultural theory, primarily given by Mary Douglas (1966, 1978) and Wildavsky (1982), has been important in the discussion on risk perception and risk interpretations (Dake, 1991; Wildavsky and Dake, 1990). Originally, Douglas developed the theory from neutral perspective where the morphology of societies could be compared irrespectively of their existence in time and space (Boholm, 1996). Basically the cultural theory is a general sociological theory which constructed according to tenets of positivistic reasoning and get reliance from some basic axioms, regarding human social beings and their interaction (Boholm, 1996). According to the theory, perceived risk is also closely tied to cultural adherence and social learning where people choose what to fear and how much to fear it (Oltedal et. al., 2004). Cultural theory aims at explaining how people perceive and act upon the world around them. More specifically the theory claims that this is largely determined by social aspects and cultural adherence. In a study Dake and Wildavsky found cultural adherence as one of the best predictor of risk perception and they claimed that the cultural theory of risk is capable to predict and explain what kind of people will perceive which potential hazards to be how dangerous (Oltedal et. al., 2004).

Douglas (1978) develops a typology called 'grid group typology'. According to Douglas (1978) culture is embedded in a person's way of lifethe way of life is the central idea in Douglas's group and grid typology (Oltedal et. al., 2004). Douglas made a distinction between cultural bias (shared values and beliefs) and social relations (patterns of interpersonal relations).

The grid-group analysis describes different modes of social control where the dimension of a person belongs to, will guide his or her interaction with the environment (Oltedal et. al., 2004). Each of them is therefore described as one of four *worldviews* or ways of life. These are termed *individualistic*, *egalitarian*, *hierarchical*, and *fatalistic* worldviews and they have a self-preserving pattern of risk perceptions.

**Figure 1**: Douglas' grid - group model




Source: SigveOltedalet. al., 2004

The individualistic perceive things and endanger their own way of life as risky. The individualistic worldview is characterized by low group and grid which fear things that might obstruct their individual freedom (SigveOltedal et. al., 2004). The ultimate obstacle is war, where certain people are physically controlled by others.

Egalitarians are members of high group and low grid cultures who fear development that may increase the inequalities amongst people andthey also tend to be skeptical to expert knowledge because they suspect that experts and strong institutions might misuse their authority (Oltedal et. al., 2004).

High grid and high group defines the hierarchical way of life which emphasizes the natural order of the society and the perseverance of this order. They have a great deal of faith in expert knowledge. The hierarchic sees nature as largely self-preserving, though within strict and rigid limits. If people cross these limits, nature will no longer be able to heal itself, and this may have dramatic consequences (Oltedal et. al., 2004).

High grid and low group people are therefore maintain some kind of fatalistic worldview which takes little part in social life, though they feel tied and regulated by social groups they do not belong to. This makes the fatalist quite indifferent about risk, what he fear and not is mostly decided by others (Oltedal et. al., 2004).

In addition to the worldviews as discussed above, one group does not fit this pattern. These people have cut all relations to their social environment and live more or less like hermits (Thompson et al., 1990). They are withdrawn from others and oppose all the other worldviews. Rather they follow the ways of life and make up the central part of the cultural theory (Oltedal et. al., 2004). Therefore, to deal with risk in a reasonable manner one must understand the underlying mechanisms. According to Thompson et al. (1990), people feel the need to justify their own way of life.

Another important and fundamental factor concerning peoples risk perceptions is their general attitude towards nature (Thompson et al., 1990). According to cultural theory, thoughts about the nature are interwoven with worldview and way of life. Even though people show different attitudes towards nature, this is not coincidental; people act in accordance to one of five so-called “myths of nature” (Thompson et al., 1990). Therefore the grid/group dimensions have several practical implications for how people understand and perceive risk (Oltedal et. al., 2004).

From the above discussion it can be said that cultural traits of human being (like: religion) have the great influence to the perception and interpretation of any risk toward the people of any particular society. If cultural theory is a fine theory for explaining risk perception and interpretation one would also expect it to produce strong research of high quality giving support to the hypothesized explanations (Boholm, 1996). Therefore, in studying people's perception and response to disaster, this theory is relevant theoretical framework. From this particular argument, I have tried to apply this theory in my study as one of the objectives of this study is to assess the nature and pattern of local people's perception on tornado of 2013 in Bangladesh.

**3.5 Theory of Disaster Response:**

Disaster response is an important part in the management of any disaster which includes the execution of emergency operations plans and of mitigation activities designed to limit the loss of life, personal injury, property damage, and other unfavorable outcomes due to that disaster (Emergency management institute, 1998).

During the analysis of Disaster Research Center (DRC) interviews on public response after Hurricane Camille (1969) conducted by DRC staff, Kreps et. al. (1987; 1989; 1994) has moved toward a generalized theory of disaster response (Drabek, 2005). When disaster strikes, emergency management including response becomes inevitable. A typology of organized disaster responses was also formulated by DRC which mainly reflects two criteria: structure and tasks (Dynes 1970; Drabek, 2005). Type 1 is *established organized response units* which reflected that old structures being used to accomplish regular tasks, Conversely, type 2 is *emergent organized response* units which reflected that new structures being used to accomplish non-regular tasks and type 3 is *expanding and extending units* which reflected non-regular tasks with old structures or regular tasks with new structures (Drabek, 2005). Many researchers found that this typology helped make sense of the complex responses they observed in the field. To document the patterns of social structure that emerged during responses to disasters resulting from such agents as tornadoes, hurricanes, and the like, Kreps and his associates coded hundreds of DRC interviews where four key elements reflected, i.e., domains, tasks, human and material resources, and activities (Drabek, 2005).

Their preliminary theoretical framework specified that various exogenous factors, e.g., activities were followed by social processes and their meticulous work lead them to conclude that the DRC typology was both an efficient and effective tool for understanding disaster behavior (Kreps et al. 1994 and Drabek, 2005).

Later Drabek (2003) formulated a model for predicting the relative effectiveness of disaster responses on the basis of Kreps team where he shows a different concept. He showed that local emergency managers are bound to state and federal systems that changed over time reflecting perceptions of threats, government policies, demographic trends, and other such factors (Drabek, 2003). He also proposed some strategies for co-coordinating disaster response which also helpful to predict the shape of the emergent response and its effectiveness.

Dynes (2002, 2003) also documented an analysis on social capital theory emphasizing social capital as a key elements to disaster response which was extended by Nakagawa and Shaw (2004) in their case study on the 1995 devastating earthquake in Kobe, Japan (Drabek, 2005) and the results of their study clearly showed that the high level of trust in local leaders by the community was the major factor that facilitated acceptance of the collective decisions made throughout the recovery process (Drabek, 2005). Therefore, it can be said that social capital and leadership in the community are the basic attributes in the case of disaster response and recovery in that community.

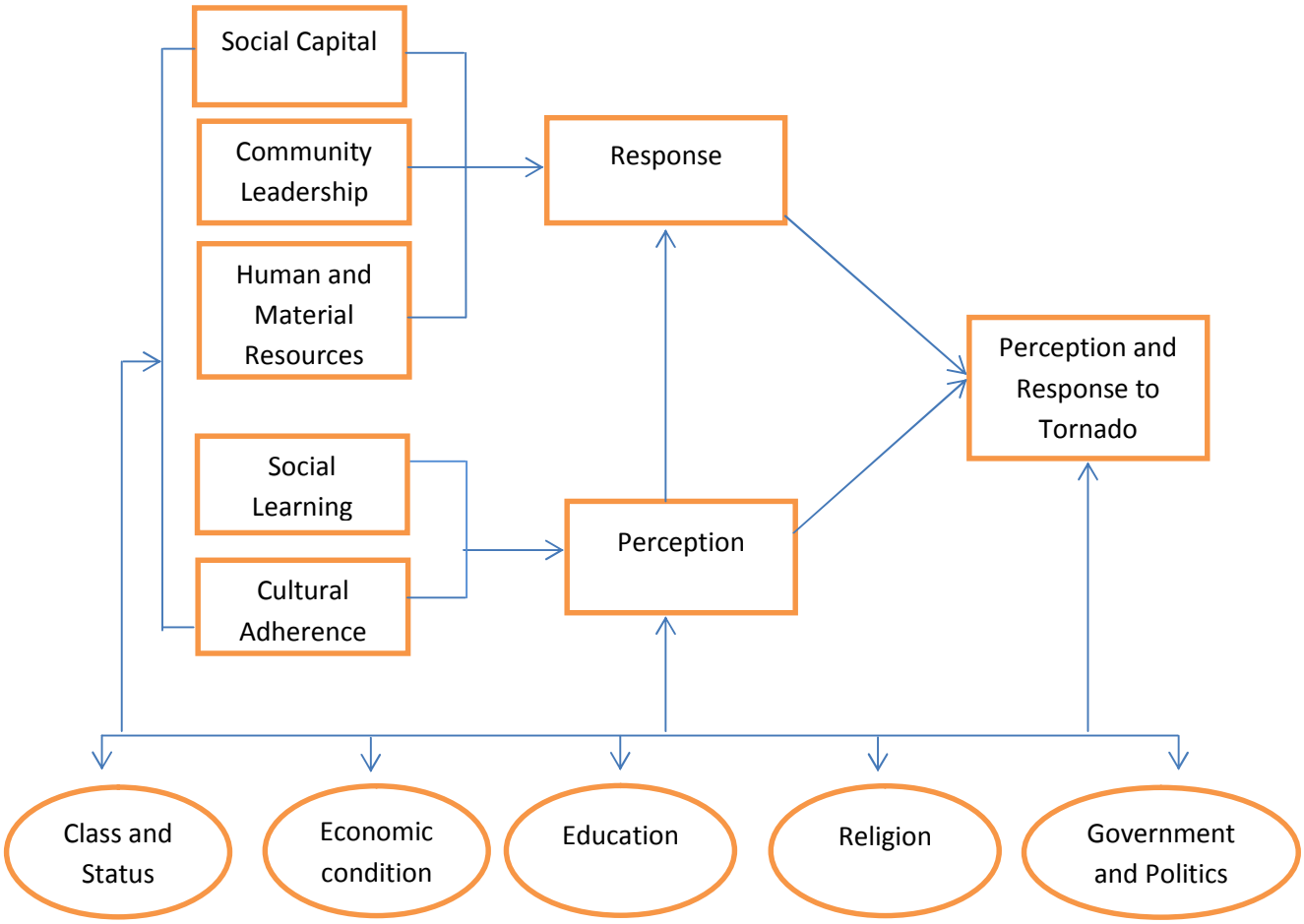
A continuing tradition in disaster research in social science is that it has tended to view hazards and disasters as challenges to the structure and organization of society and has focused on the behavior of individuals and groups in the various stages of disaster impact and aftermath (Oliver-smith, 1996). The perception, adjustments and response of individuals or households to the stress, impact and vulnerabilities due to tornado are the central themes of the present study. Therefore, the above theory is relevant to the study where one of its important objectives is to reveal the nature of response of people to tornado.

### 3.6 **Conceptual Framework**

A conceptual framework has been designed in this section on the basis of the theoretical framework of the study and factors influencingperception and response of people to tornado of

Sadar upazila under Brahmanbaria districts who have recently faced a trouble on their livelihoods due to the damages by tornado.

**Figure 3**: Conceptual framework




It is evident from the above conceptual framework that people's social learning (e.g. information, knowledge etc.) and cultural adherence (e.g. beliefs, norms etc.) determines the perception on disaster and it has impact on response to disaster which is determined by social capital (e.g. shelter center, disaster information center etc.), community leadership and human and material center of the society. One's class, status, economic condition, education, religion and government influence the perception and response to disaster and its determining factors. Thus a person of the society perceives a disaster and response to it.

# Chapter Four: Methodology

The chapter presents the methodology has been followed to conduct the present study. Methodology is the vital part of the research design which includes sampling, data collection methods, methods of data analysis etc. A methodology refers to the choices we make about cases to study methods of data gathering, forms of data analysis etc. in planning and executing a research study (Silverman, 2001:4).

**4.1 Theoretical Construction of Methodology**

The sociological approach to disaster research has to be taken in to consideration under the objectives of this study. Disaster research may be viewed as the study of 'social pathology' for its nature of bringing disruptions in normal social life, create chaos, destroy social structure and contribute to displace social order (Dynes, et al. 1978, see more Nasreen, 2004). Alexander (1993) identified six schools of thought on natural hazards and disaster studies: the geographical approach, the anthropological approach, the sociological approach, the development studies approach, the disaster medicine approach and the technical approach (Nasreen, 2004)

The sociological approach (Dynes 1970; Qurantelli 1978; Mileti, Drabek and Hass 1975; Drabek and Boggs 1968; Drabek 1986) discusses vulnerability and the impact of disaster upon community functions and organization (Nasreen, 2004) while most of the others approaches emphasizes on scientific and humanitarian aspects of disasters.

Although geographical and sociological approaches have dominated the field of research in developing societies, disaster research in Bangladesh mainly follows the geographical approach and disaster research from sociological approach in Bangladesh is done only rare occasion (Nasreen, 2004).Where Nasreen (2004) suggests that sociological research is very much relevant to identify what attempts should be made to grasp the different issues relating to disasters, such as the problems, coping with the wounds and differential impact of disasters on the survivors. However, in recent past a pioneer disaster research has just been conducted by Nasreen (2004) to picture of a disaster experienced by rural women and their activities during pre, during and post disaster period from a new environmental paradigm.In social science research, scientific procedure is possible to maintain toward acquiring answers to a wide variety of research

questions only through research methodology (Adamsand Schvacldet, 1985:16). Methodologies have differentiated between qualitative and quantitative research.

Research method is the functional action strategy to carry out the research in the light of theoretical framework and guiding research questionnaire and or the proposed hypothesis (Aminuzzaman, 1999:33). Therefore, in order to get an insight about nature of perception and response patterns of people on tornado which they have experienced recently, the study would like to follow mixed methodology means both quantitative and qualitative methodology. In this regard, methodological justification for bringing qualitative and quantitative methods together is provided by Bryman in 1988 (Punch, 1998). The specific reasons for combining the approaches should be considered in particular situation in the light of the practical circumstances and context of research (Punch, 1998:246). Therefore, this study combines both of the two methods capitalize on the strengths of the two approaches, and to compensate for the weakness of each approach.

**4.2 Quantitative and Qualitative methods:**

This study followed by the triangulation method, i.e., the combination of quantitative and qualitative method.

The quantitative analysis is an analysis of numerically coded data especially ordinal, interval and ratio data, often involving computation of statistical measures and test of significance. It is also well suited for several of the basic goals including the goals of identifying general pattern and relationships, testing theories and making prediction of social research and these three goals dictate examination of many cases- the more, the better and favor a dialogue of ideas and evidence that centers on how attributes of cases are linked to each other (Rogin, 1994). The purpose of this study is to assess the pattern of people's perception and response to tornado in Bangladesh especially local areas. Considering the importance of the study, the quantitative method has been applied as it is the most scientific method to assess the impact mathematically and numerically. This method is also suitable to analyze some of this research objective in a well-developed ways. Considering all the above traits, quantitative method has been applied in this research.

On the other hand qualitative method involves a process of reciprocal clarification of the image of the research subject and the concepts of the frame and images of investigation, sometimes by

looking for similarities among several examples of the phenomena that seem to be the same general category (Rogin1994:83). This method is also mostly helpful to discover the hidden, sophisticated and most complex social reality as well as to understand the core meaning of the situation to keep the respondents in their natural settings (Punch; 1998). Since the present study deals with the knowledge level, perception pattern and type of response of local people on tornado as a fatal disaster in Bangladesh, it is very difficult to quantify all the related information. Therefore some qualitative tools (Case study, KII, FGD) have been adopted to get the vivid and comprehensive picture of this disaster in a holistic manner. For example, by using case study, the study tried to find out the most challenging conditions of mostly vulnerable and disadvantaged group of people from social, gender, cultural and behavioral perspective. As many of the respondents of the study area are illiterate and lack of sufficient knowledge about climate change as well as disaster, therefore 5 Key Informants' Interviews (KIIs) have been taken from the experienced and knowledgeable persons to enrich the study by authentic and reliable data.

Therefore, in order to get an in-depth and insight about the nature of perception and their response to tornado of local people, both quantitative and qualitative method has been applied in the present study and the purpose combining two approaches was to capitalize the strengths of two approaches and to overcome the weakness of each approach.

**4.3 Study location**

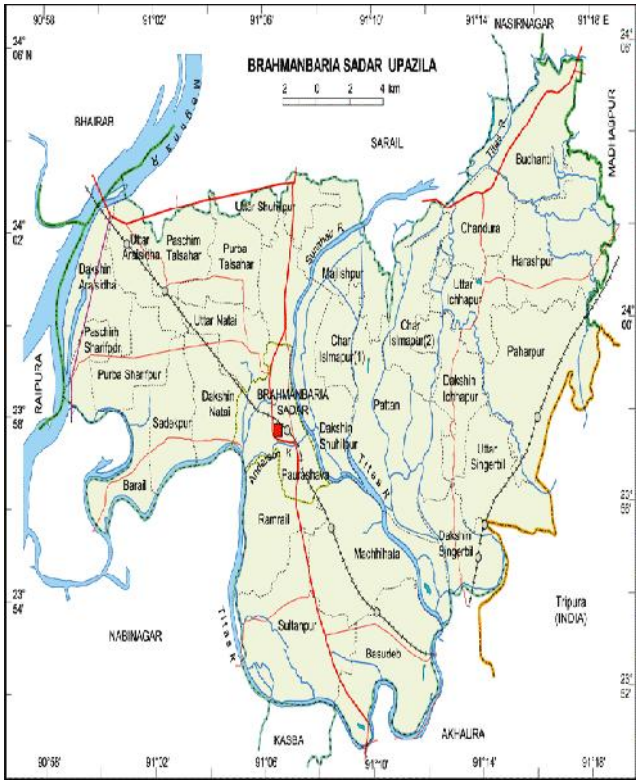
The study area is an important factor of the study. The present study has been conducted in some rural villages located in Brahmanbaria sadar upaziala in Brahmanbaria district. These villages have been selected because of its experience of a recent tornado occurred in March, 2013. Before selecting the study area, rapport was built with some with some people who are familiar with and hailed from Brahmanbaria sadar upazila. They provided valuable information of the major concentration of rural peoples in different villages of study area. For the purpose of the study we have selected 10 villages namely Ramrail, Chinair, Basudev, Sultanpur, Jarultala, Chandi, Ushiura, Machirhata, Fulbaria, Chakurfrom four unions namely Ramrail, Chinair, Basudev, Sultanpur. These areas were convenient to select because of its geopolitical locations and damages due to recent tornado. With all these consideration, finally, these areas have been selected for the present study.

### 4.4 The Short Profile of the Study Area

Brahmanbaria Sadar Upazila: Brahmanbaria Sadar Upazila is in Brahmanbaria district with an area of 495.85 sq km, is bounded by Sarail and Nasirnagar upazila on the north, Akhaura, Kasba and Nabinagar upazilas on the south, Madhupur upazila and Tripura (India) on the east, Bhairab and Raipur upazilas on the west. Main rivers are Meghna, Suinahair, Pagla and Titas. Dhupajuri and Laishka *Beels* are notable. Brahmanbaria thana was turned into an upazila in 1984. The upazila consists of one municipality, 4 wards, 27 union parishads, 378 mouzas and 398 villages.

Figure 4: Location of study area in maps


**Map of Bangladesh**




**Map of Brahmanbaria sadar upazila**

**Historical events**: During the WAR OF LIBERATION stray encounters were held between the freedom fighters and the pak army in many places of the upazila. The pak army killed many people and set on fire many houses. The pak army killed 22 persons of the Rongile Family by firing at village Birpasha of Dhubanti Union.

**Population and literacy**: The total population of Brahmanbaria Sadar Upazila is 659449 where male 51.38%, female 48.62%; Muslim 91.11%, Hindu 8.68% and others 0.21%. Average literacy is 29.95% where male 36.2% and female 23.7%.

**Educational institutions, Religious institutions and Cultural organization**: The number of college is 9, high school 46, madrasa 16, government primary school 175, non-government primary school 72. Noted educational institutions are: Brahmanbaria Government College (1948), Annada Government High School (1875), Mission Primary School.

There are 275 Mosque, 20 temples and 2 churches in Brahmanbaria Sadar Upazila, most noted of which are Younusia Jami Mosque and Kal Bhairab Mandir.

There are also 1 Public library, 2theatre group, 4cinema hall, 41women's organization, and 38playground.

**Main occupations of the people**: Agriculture 42.84%, agricultural labourer 12.88%, wage labourer 3.51%, commerce 14.32%, service 8.55%, fishing 1.64%, transport 3.28%, construction work 1.39% and others 13.23%.

**Land use and land control**: Total cultivable land 38262.65 hectares; fallow land 595.31 hectares; single crop 32%, double crop 47% and treble crop land 21%; land under irrigation 91%. Among the peasants 24% are landless, 46% small, 20% intermediate and 10% rich; cultivable land per head 0.06 hectare.

**Main crops**: Paddy, jute, wheat, potato, onion, mustard seed.

**Communication facilities**: Roads: pucca road 102.30 km and mud road 205 km; Dhaka-Chittagong Sylhet railway passes through Brahmanbaria, length of railway 41.66 km.

**Manufactories and:** Fertilizer factory, rice mill, flour mill, oil mill, ice factory, saw mill, printing press, welding, etc.

**Cottage industries:** Weaving, bamboo and cane work, goldsmith, blacksmith, wood work, potteries and tailoring.

**Hats, bazars and fairs**: Total number of hats and bazars are 45, most noted of which are Ananda Bazar, Jagat Bazar, Faruqui Bazar, satbarga and Suhilpur.

**Health centres**: Upazila health complex 1, health and family welfare centre 20, union family planning clinic 5, maternity and child welfare centre 1, satellite clinic 3.

(Source: Internet, Upazila office and BBS, 2013)

### 4.5 The Study Population

The population of the selected areas is subject to experience of recent tornado occurred in March, 2013 in this area. The population of the study is ten villages from four unions of Brahmanbaria sadar Upazila.

### 4.6 Unit of Study

Each male and each female (age not less than 18) who live in the selected area are the unit of the study.

### 4.7 Sampling Frame and the Size of Sampling

In general the sampling frame is the representation of a population by developing a specific list that closely related to all the elements in the population. Every research needs a standard sampling frame. The sample size of this study was 150. These 150 samples consist of both male and female respondents of the selected areas. The respondents are basically affected by recent tornado occurred in the study area in March, 2013. In this study both male and female are given importance, because both of them are victims of the disaster. For this way to comprehend the actual vulnerability 15 Case studies, 5 Key Informants' Interviews (KII) and 5Focus group discussions (FGD) were conducted in the particular areas. Therefore a well-developed comprehensive idea about the situation of the affected people becomes possible to find out from the study.

### 4.8 Sampling Procedure

As an important step in conducting any social science research, sampling is the process of selecting a sub-set of observations from among many possible observations for the purpose of

drawing conclusions about that larger set of possible observation (Babbie 1986:160). The key principle in sampling is the proportional representation. The purpose of scientific sampling is to select a few who can be taken to represent the universe (Babbie1986:160).

According to Babbie (2004) many research situations often make it inappropriate for a researcher to use probability sampling (every one having equal chances of being included) which is considered as the most scientific and most reliable form of sampling and in these instances non-probability sampling becomes the most appropriate form of sampling (Babbie, 2004:166). Moreover being a researcher, a student has limitation in terms of time, economic resource, and co-ordinations to draw a probability sampling. Considering the above constraints, the non-probability sampling technique was adopted for collection of information.

The data were collected following both quantitative and qualitative method. The study respondents were selected purposively.The purposive sampling method was highly representative since purposive sampling involves the use of judgment on the part of researcher. The study has taken different socio-economic groups and gender into consideration for the purpose of making it more acceptable to the people.

After defining the problem and determining the objectives, researcher has to choose the population who can be studied. The method of sampling for the foregoing research was not random rather selective based on purpose of the research. The target group for this study comprised women and men residing in rural areas of Brahmanbaria Sadar Upazila. With the help of local leaderssuch as: Union parishad member, chairman and elderly local people, the study areas were selected for the study. The following steps were followed as part of sampling procedure:

1. For the purpose of the study ten villages have been selected from four unions of the Upazila.
2. The selective rural people of the ten villages have been considered as study population. The households were considered as unit of analysis.
3. 150 households have been selected as total sample and were surveyed as study population.
4. The respondents were selected purposively.

### 4.9 Study Instruments

For conducting a study every research methods have their own instruments of data collection. Data need to be consciously identified, carefully selected, and methodologically collected. Accuracy& precision are obviously important quality in research measurement. In this study scheduled interview of survey method has been taken. This survey can be useful for descriptive, explanatory and exploratory purposes. This method is probably the best method in social research as it easy to collect empirical data with limited time and resource. However this method is useful to collect authentic data from lower educated people like the respondents of this study by asking scheduled questions and writing them from the respondents. So in this study interview scheduled survey method has been used. Thequantitative part of the present study was conducted through using a semi-structured questionnaire for data collection. At least 40 questions were structured in the questionnaire paper of which 5 are open ended and 35 are close ended questions. There are five sections of questionnaire and are as follow:

- Socio-demographic information of the respondent's household.
- Disaster related information of the study area.
- Perception pattern of respondents on Tornado.
- Impacts of tornado on the respondent's household.
- Type of response to tornado etc.

For the qualitative part of the study, Case Studies, KIIs, and FGDs, have been conducted. To conduct Case Studies, KIIs, and FGDs check list was developed. The checklist was constituted to find out seven criteria of the respondents which are personal identity, knowledge on disaster, knowledge on Tornado, vulnerabilities during Tornado, Community response to tornado, GOs and NGOs response, suggestions for future risk. However keeping mind the major objectives Case Studies, KIIs and FGDs have been conducted in the selected area (details of the methodology adopted for the study have been discussed below).

### 4.10 Pre-testing of Questionnaire

Before finalizing the questionnaire, a pilot survey was conducted to a selected number of respondents considering the background of the respondents. The pilot test was done to check

whether the questions were appropriate and the intended meanings were properly understood by the respondents. Moreover the following issues were closely examined:

- In addressing the sensitive issues.
- The sequencing of questions.
- The techniques for documenting respondent's information in assessing the impact of natural hazards and disasters.

Upon completing the pilot test, the necessary revisions, corrections and modifications were made in the questionnaire to make it final for the actual data collection.

**4.11 Criteria of samples:**

The sample considered the following criteria-

- Rural men and women
- Age of the respondents (not less than 18 years)
- Respondents physical and psychological capacity to response properly
- Voluntarily motivated to talk

Table-2: Determination of sample size for quantitative and qualitative study

| Name of the Union | Name of the Villages | Semi-structured questionnaire | Case studies | FGDs | KIIs |
|---|---|---|---|---|---|
| Basudev | Basudev | 15 | 2 | 1 | 1 |
| | Jarultala | 15 | 1 | | |
| Chinair | Chinair | 15 | 2 | 2 | 1 |
| | Fulbaria | 15 | 2 | | |
| | Chakur | 15 | 1 | | |
| Sultanpur | Machirhata | 15 | 1 | 1 | 1 |
| | Sultanpur | 15 | 1 | | |
| Ramrail | Ramrail | 15 | 1 | 1 | 2 in upazila office |
| | Chandi | 15 | 2 | | |
| | Ushiura | 15 | 2 | | |
| Total | | 150 | 15 | 5 | 5 |

### 4.12 Techniques of data collection:

Data collection is the process by which information is gathered from respondents (Lin, 1976:197). So techniques of data collection are the very crucial part of any research. The data need to have the accountability and validity to sketch the representativeness of population. Since this research is an exploratory, the researcher has employed semi-structured questionnaire as quantitative and case study, FGD, KII as qualitative technique for data collection. Both quantitative and qualitative methods have followed in this research to achieve the objectives of the study. To conduct the survey, a semi structured interview schedule was used containing pertinent questions in relation to the objectives of the study. Beside semi-structured interview, the qualitative data have been collected by case study FGD and KII. The researcher tried to spend almost one or two hours with each of the respondents to discover their insights, perceptions and responses to the tornado as devastating and mostly unfamiliar disaster. The procedure of data collection and the nature of data collected by each method have discussed in the followings sections.

**Methodological framework of the study**

**Quantitative tools:**

Sample survey: Semi Structured Interview Questionnaire

**Qualitative tools:**

Case Study, FGD, KII

**Sample Survey:**

The survey is used either for descriptive, explanatory or exploratory purposes (Babbie, 2004). Since the study is an exploratory research, the researcher has collected by data by applying sample survey method. The survey is a data collection tool in which an instrument has used to solicit responses from a sample of respondents. There are two types of surveys: the interview survey, in which the replies from the respondents are recorded by the researcher's collaborators, the interviewers; and the questionnaire survey, in which the respondents themselves are asked to record their responses on the instrument or form provided to them (Lin, 1976: 220-221). In this

study, a semi structured interview questionnaire was used containing pertinent questions in relation to the objectives of the study.

**Case Study:**

Case study is one of the most significant tools of qualitative method (Chakrabarty, 2004:8). This study includes case studies off field research within Brahmanbaria Sadar upazila. The case studies as a strategy of inquiry is an appropriate tool as it helps the researcher developing a deeper understanding of the place and actual events of the respondents (Merriam, 1988; Cresswell, 2002), and because it is well-suited to studies where the variables cannot be separated from their context (Yin, 1994). Case study is also a good tool because, unlike other forms of research, there are no specific methods of data collection and analysis associated with case study. As a part of the comprehensive study, some cases have been studied as part of the research. These case studies provided in-depth information about the perception and response of people in household and community level regarding tornado induced vulnerabilities.

**Focus Group Discussion:**

Focus group discussion is a form of qualitative research tool in which a group of people are participated and shared their perceptions, opinions, beliefs, and attitudes towards a particular issue. To find out the in-depth view and knowledge, perception, attitude about the disasters specially tornado which have recently experienced by local people at least 5 Focus Group Discussions (FGDs) had conducted for sharing the most challenging aspects of tornado victims.

**Key Informants Interview (KII):**

Key informants interview is an important qualitative tool in social science. Key informants will usually be selected more on the basis of their competence and the specific information they have, rather than on how representative of the community they are (FAO, 2001). This kind of interviewing is used to its best advantage when it is integrated with participant observation. As many of the respondents of the study area are illiterate and lack of sufficient knowledge about climate change as well as disaster, therefore 5 Key Informants' Interviews (KIIs) have been taken from the experienced and knowledgeable persons to enrich the study by authentic and reliable data.

### 4.13 Sources of Data

The study is mainly depended on the data collected from primary sources. Data were collected directly from the respective field through survey, case study, FGD, KII and also researcher's keen observation. Some secondary data have also been used to strengthen the rationality of the study and for better and comprehensive analysis. Secondary data were collected from different journals, books, research publications and other documents. Data from both secondary and primary sources helped a lot to give the study powerful logical framework.

### 4.14 Methods of Data Analysis

Methods for the analysis of data need to be systematic, disciplined and able to be seen (and to be seen through, as in 'transparent') and described (Punch, 1998:200). The use of multiple methods was extremely useful in gathering required data for the study, but presenting method in a consolidated manner was a difficult task because of different measurement levels. The measurement problem becomes complicated when the data were collected through different methods and were used for explaining one particular problem.

In this research, data collected through sample survey has been analyzed in terms of frequency distribution. In addition to that, necessary graphical representations have been used to represent data. These activities have been conducted by using SPSS. The other qualitative data gathered from case studies is analyzed manually and represent in descriptive mode. For qualitative data, both implicit as well as explicit meanings of the observed phenomena were emphasized.

### 4.15 Reliability and Validity

Reliability and validity are central issues in all scientific measurements. Both concern how concrete measures or indicators are developed for constructs. Reliability tells us about an indicator's dependability and consistency. Validity on the other hand, tells us whether an indicator actually captures the meaning of the construct in which we are interested. Perfect reliability and validity however, are virtually impossible to achieve (Neuman, 1997:138). In order to improve the reliability and validity of measures for the present study, the following steps were undertaken:

- The constructs were clearly conceptualized so that each measure could indicate one and only one concept. Otherwise, it would be impossible to determine which concept was being indicated.
- Attempts were made to measure constructs at the most precise level possible.

Finally, a pilot test was conducted through which the draft questionnaire was tested by asking respondents the questions and checking to see whether these were clear.

### 4.16 Ethical Consideration

Ethical issue is the unanticipated effect that any kind of fieldwork may have on the people being studied (Nachmias & Nachmias, 1997:299). As, cohen and Manion consider that ' a code of ethical practice makes researchers aware of their obligations to their subjects and also to those problems areas where there is a general consensus about what is acceptable and what is not? In this sense it has a clarificatory value;' (cited in Bell, 1999:39-40). In this regard ethical issue is the only way to gain access to qualitative and unbiased research works. Therefore, an ethical consideration is a very important aspect in this research work. As this research work is sensitive and related to the respondents' life, the researcher had to assure that the information which had been collected from the respondents would be used only for an academic research and their identity will be protected when necessary.

### 4.17 Limitations of the Study

"Every study is more or less, best with the limitations in regard to timing, cost and staffing" (Moser & Kalton, 1971:43). And various other short comings accompany those with regard to the natures, scope, objectives etc. of the research. The limitations of the study are mentioned in the following:

1. A good survey requires a fairly long time schedule where conducting this study, there is a limitation of time.
2. All of the respondents did not want to co-operate in a well manner for many reasons.
3. The study was only limited to rural men and women of Sadar upazila, Brahmanbaria. So generalization about their situations cannot be made based on the findings for this study alone.
4. As a student, the researcher had very limited access to resources

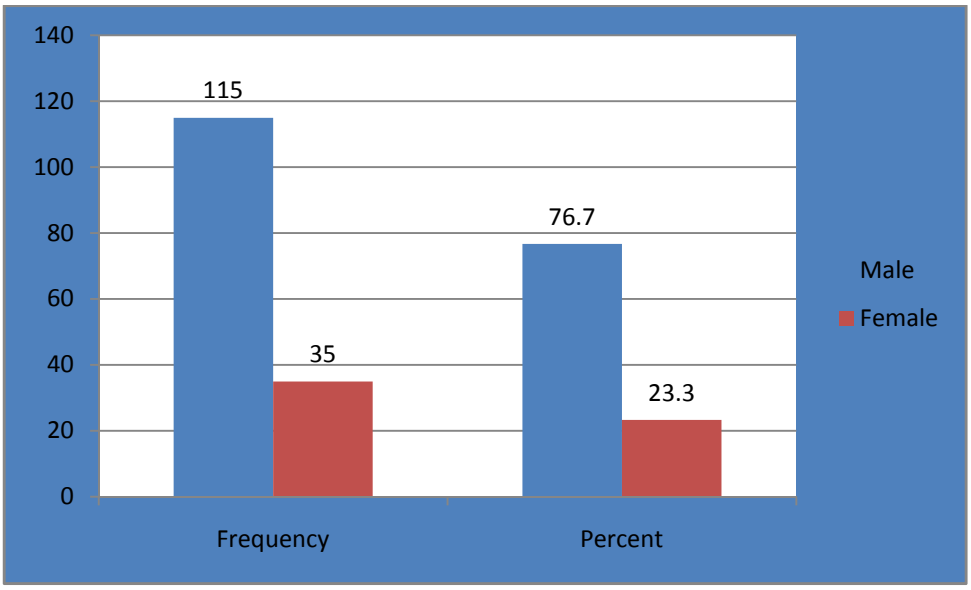
# Chapter Five: Quantitative Data Analysis of the Study

The information gathered from respondents constituted the basis of data analysis. The term data is used to present the recorded response patterns of the respondents to and instrument used in the study (Lyn, 1967:277). Therefore, data analysis is an important part of any research work.

### 5.1 Socio-economic Information of the Respondents' Household

Because of each household being considered as a unit of analysis in this study, this section constituted major socio-economic information of respondent's household.

**Figure 4:Percentage distribution by the sex of the respondents**




Source: Field work, 2013 N=150

Given the nature of research work, this study has tried to include both male and female as respondents in case of the availability of respondents in household. The sample of the study consists of 150 respondents where 115 (76%) are male and 35 (23%) are female.

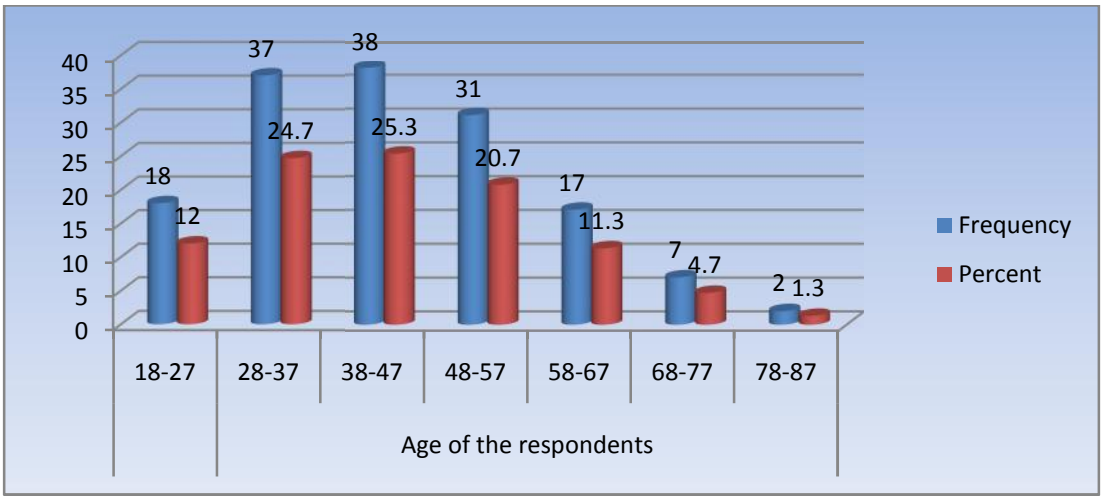
**Table 3: Percentage distribution of the respondents by the relationship with household head**

| **Category of relationship** | **Frequency** | **Percent** |
|---|---|---|
| Household Head (HH) | 90 | 60.0 |
| Husband / Wife of HH | 28 | 18.7 |
| Son/Daughter of HH | 16 | 10.7 |
| Father/Mother of HH | 16 | 10.7 |
| **Total** | **150** | **100.0** |

Source: Field work, 2013 N=150

Table-3 indicates that 60 percent (90) of the surveyed respondents are the head of the household. But among the other 40percent, 18.7 percent is wife, 10.7 percent is son/daughter and another 10.7 percent is the father/mother of the household head.

**Figure 5:Percentage distribution of the respondents by Age**

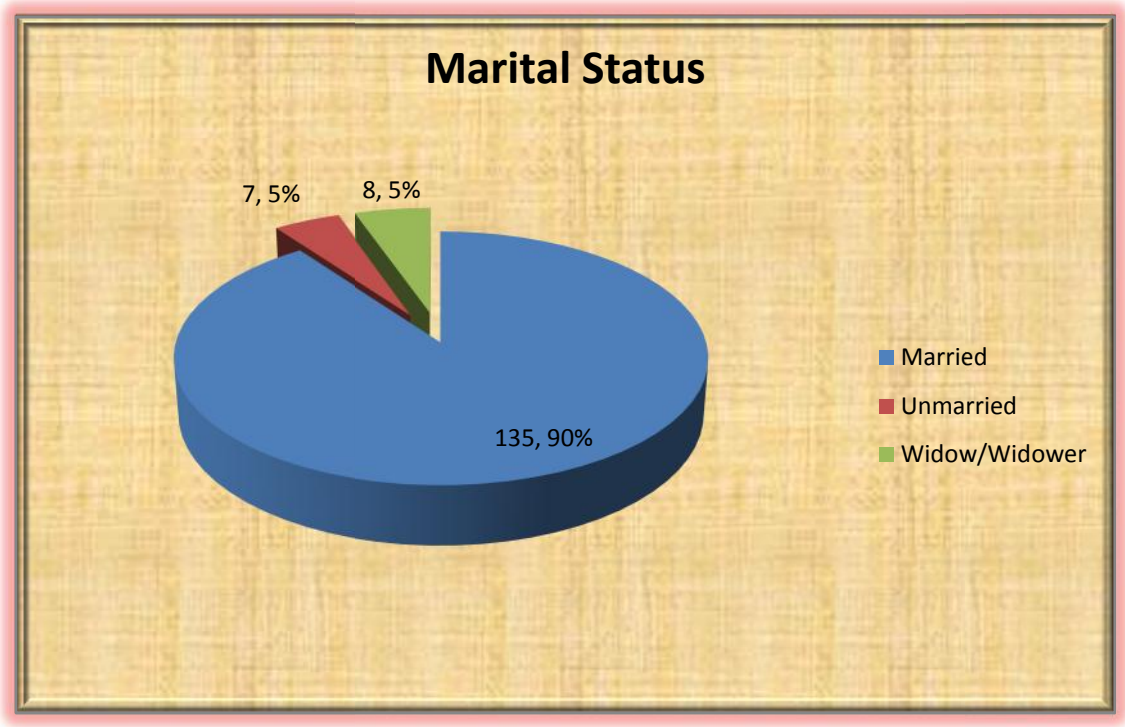



Source: Field work, 2013 n=150

In this study, all age group were targeted to be included as respondents; but below 18 years of age was not allowed to participate as respondents. The age distribution of the respondents according to ten-year age interval shows that the 18-27 years group comprised of 12 percent (18), 28-37 years group comprised of 24.7 percent (37), 38-47 years group comprised of 25.3 percent (38), 48-57 years group comprised of 20.7 percent (31), 58-67 years group comprised of

11.3 percent (17), 68-77 years group comprised of 4.7 percent (7) and 78-87 years group comprised of 1.3 percent (2) of total respondents.

**Figure 6:Percentage distribution of the respondents by marital status**




Source: Field work, 2013 n=150

Marital status is very important to understand the respondents' socio-demographic characteristics. It can be clearly observed from the Figure 6 that out of 150 respondents 90 percent (135) of the respondents were married where only 4.7 percent (7) were unmarried and 5.3 percent (8) were widow/widower.

**Table 4: Percentage distribution of the respondents by educational attainment**

| **Education level of the respondent** | **Sex of the respondent** | | | | **Total** | |
|---|---|---|---|---|---|---|
| | **Male** | | **Female** | | | |
| | **Frequency** | **Percent** | **Frequency** | **Percent** | **Frequency** | **Percent** |
| Illiterate | 32 | 21.3 | 15 | 10.0 | 47 | 31.3 |
| Primary | 49 | 32.7 | 13 | 8.7 | 62 | 41.3 |
| High School | 19 | 12.7 | 3 | 2.0 | 22 | 14.7 |

| | | | | | | |
|---|---|---|---|---|---|---|
| SSC | 4 | 2.7 | 0 | 0 | 4 | 2.7 |
| HSC | 7 | 4.7 | 2 | 1.3 | 9 | 6.0 |
| Graduate | 4 | 2.7 | 2 | 1.3 | 6 | 4.0 |
| **Total** | **115** | **100.0** | **35** | **100.0** | **150** | **100.0** |

Source: Field work, 2013 N=150

There is a substantial variation in education level among the sample respondents. Table 4 reveals that a big number 31.3 percent (47 out of 150) of respondents are illiterate in the study area where males are 21.3 percent and females are 10 percent. It is observed that about 41.3 percent respondents have attended primary education whereas male and female percentage is 32.7 and 8.7 respectively; out of 14.7 percent only 2 percent of the female respondents attended high school; out of 4 percent none of the female completed secondary education and 4 percent male and 2 percent female respondents attended higher secondary level. Only 4 percent of the respondents are graduates where 1.3 percent is female. From the table it is also evident that the number of illiterate people is in high in the study area because of their socio-economic and cultural condition.

**Table 5: Percentage distribution of the respondents by occupation**

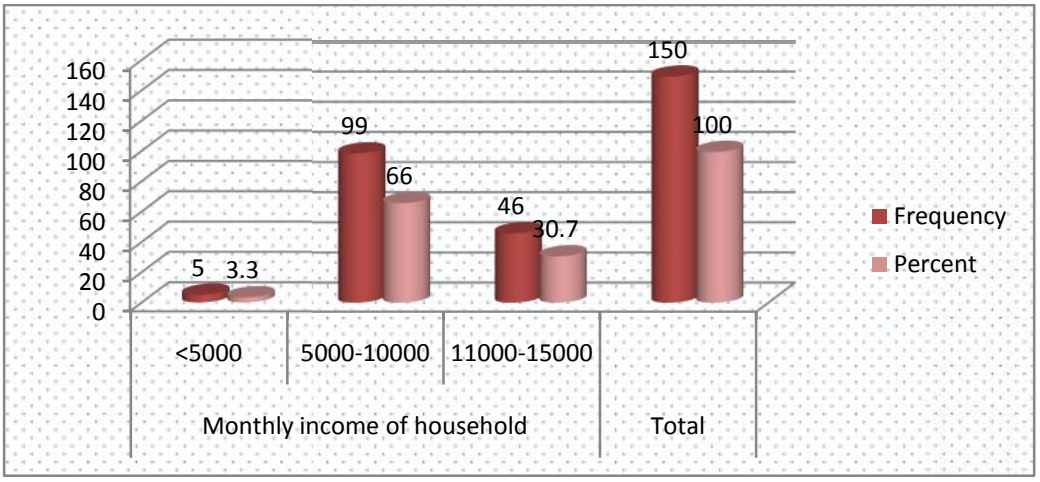
| **Occupation of the respondent** | **Sex of the respondent** | | | | **Total** | |
|---|---|---|---|---|---|---|
| | **Male** | | **Female** | | | |
| | **Frequency** | **Percent** | **Frequency** | **Percent** | **Frequency** | **Percent** |
| Agriculture | 62 | 41.3 | 0 | 0 | 62 | 41.3 |
| Labor | 11 | 7.3 | 2 | 1.3 | 13 | 8.7 |
| Fisherman | 2 | 1.3 | 0 | 0 | 2 | 1.3 |
| Petty business | 4 | 2.7 | 0 | 0 | 4 | 2.7 |
| Government service | 3 | 2.0 | 0 | 0 | 3 | 2.0 |
| Non-Government service | 3 | 2.0 | 0 | 0 | 3 | 2.0 |
| Household activities | 0 | 0 | 30 | 20.0 | 30 | 20.0 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Rickshaw/Van pulling | 10 | 6.7 | 0 | 0 | 10 | 6.7 |
| Student | 6 | 4.0 | 1 | 0.7 | 7 | 4.7 |
| Unemployed | 9 | 6.0 | 0 | 0 | 9 | 6.0 |
| Village doctor | 5 | 3.3 | 2 | 1.3 | 7 | 4.7 |
| **Total** | **115** | **100.0** | **35** | **100.0** | **150** | **100.0** |

Source: Field work, 2013 N=150

To know the occupation pattern of the respondents we have made an attempt to focus the frequency distribution and percentage of the respondents. Therefore, Table 5 exhibits the frequency distribution and percentage distribution of respondents by occupational status and sex. The table shows that about 20.0 percent of respondents are involved in household activities. It is further observed that as a part of patriarchal society, there are no male respondents who are involved in household activities. But it is interesting that besides household activities, only 1.3 percent females are engaged in labor activities and 1.3 percent is village doctor. On the other hand, 41.3 percent male are engaged in agriculture, 7.3 percent in labor, 1.3 percent is fisherman, 2.7 percent in petty business, government and non-government service holder are 2 percent and 2 percent respectively, 6.7 percent rickshaw/van pullers, 4 percent student, 3.3 percent village doctor and other 6 percent males are unemployed.

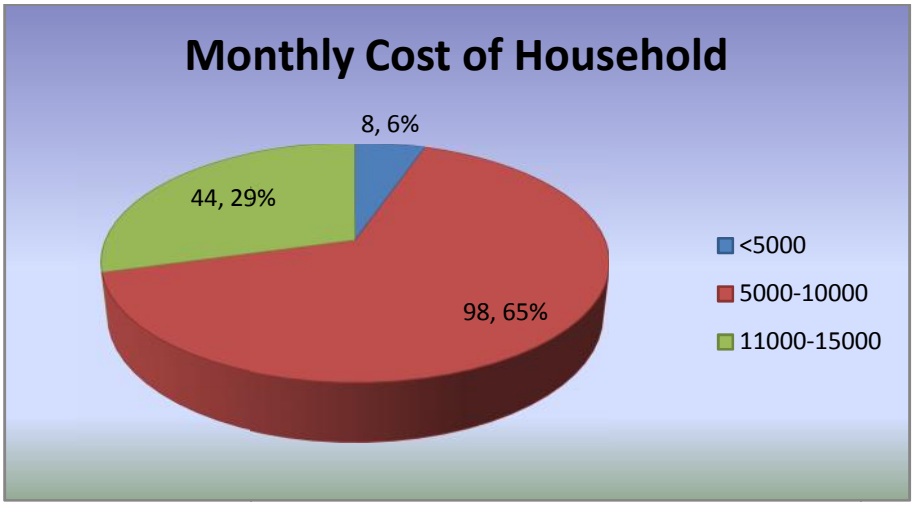
**Figure 7:Percentage distribution of the respondents by monthly income of household**




Source: Field work, 2013 N=150

According to Figure 7, the monthly income of about 3.3 percent of the households is less than 5000 BDT and on the other hand about 66 percent households earn about 5000-10000 BDT where another 30.7 percent of the households' income are lies between 11000 to 15000 BDT.

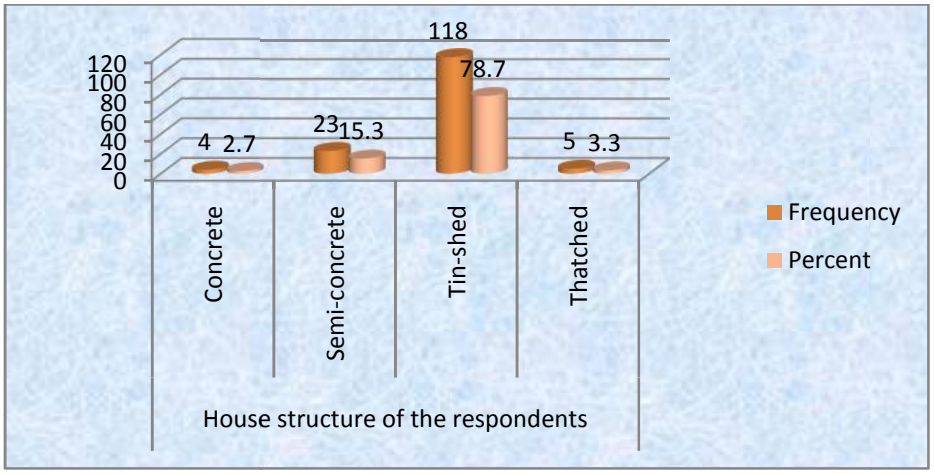
**Figure 8: Percentage distribution of the respondents by monthly cost of household**




Source: Field work, 2013 N=150

It is evident from Figure 8 that 65.3 percent (98 out of 150) of the households' monthly expenditure is between 5000-10000 BDT and another 29.3 percent is between 11000-15000 BDT, where only 5.3 percent (8 out of 150) of the households spend about less than Tk.5000 in month.

**Figure 9:Percentage distribution of the respondent by house structure**




Source: Field work, 2013 N=150

Figure 9 shows that most of the respondents (about 78.7%) live in tin shed houses and during tornadoes tin made structures become more dangerous and increases damages. The houses made of semi concrete are owned by about 15.3 percent respondents while about only 2.7 percent live in concrete or brick made houses. The figure also shows that 3.3 percent household are owned thatched house.

**5.2 Disaster Related Information of the studyArea**

This section presents the data analysis regarding disaster related information of study area.

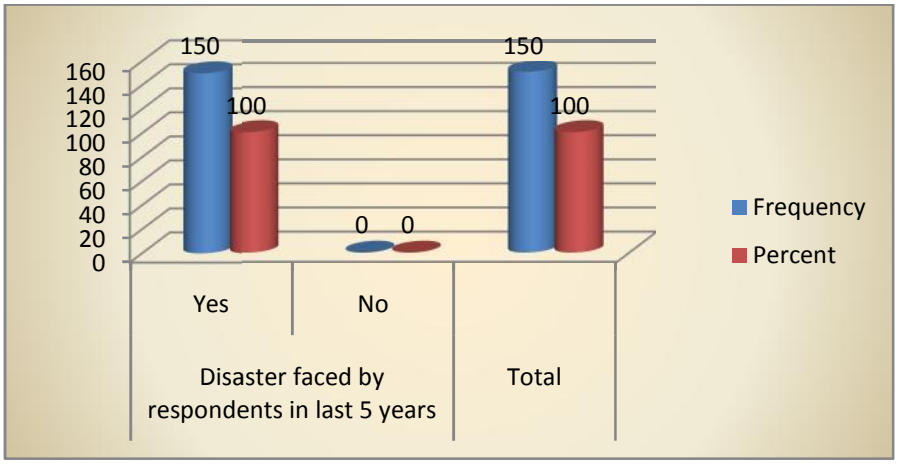
**Table 6: Percentage distribution of main disasters of the study area (Multiple responses)**

| **Main disasters** | **Frequency** | **Percent** |
|---|---|---|
| Flood | 108 | 72.0 |
| Storm | 125 | 83.3 |
| Tornado | 92 | 61.3 |
| Drought | 9 | 6.0 |
| Water logging | 26 | 17.3 |
| **Total** | **150** | **100.0** |

Source: Field work, 2013 N=150

The table 6 shows the main disasters faced by respondents in the area. On the basis of multiple response 72 percent, 83.3 percent and 61.3 percent of the respondents claimed flood, storm and tornado respectively as main disasters of their area where other 17.3 percent and 6percent also claimed water logging and drought.

**Figure 10**: **Percentage distribution of the respondents have faced disaster in last 5 years**




Source: Field work, 2013 N=150

It is observed from the figure 10 that all the respondents are affected by various disasters in last 5 years.

**Table 7: Percentage distribution of the respondents by the type of disaster they have faced in last 5 years (Multiple responses)**

| **Type of disaster** | **Frequency** | **Percent** |
|---|---|---|
| Tornado | 140 | 93.3 |
| Flood | 38 | 25.3 |
| Storm | 26 | 17.3 |
| Water logging | 9 | 6.0 |
| **Total** | **150** | **100.0** |

Source: Field work, 2013 N=150

From the table 7 it is observed that more than 93 percent of the respondents have faced tornado in last 5 years. 25.3 percent have faced flood, 17.3 percent have faced storm and other 6 percent respondents have faced water logging as main disasters of their area.

**Table 8: Percentage distribution of the respondents by the source of disaster related information (Multiple responses)**

| **Sources** | **Frequency** | **Percent** |
|---|---|---|
| Television | 117 | 78.0 |
| Bazar( local market)/from local people | 63 | 42.0 |
| Mobile phone | 6 | 4.0 |
| Radio | 33 | 22.0 |
| other specify | 2 | 1.3 |
| **Total** | **150** | **100.0** |

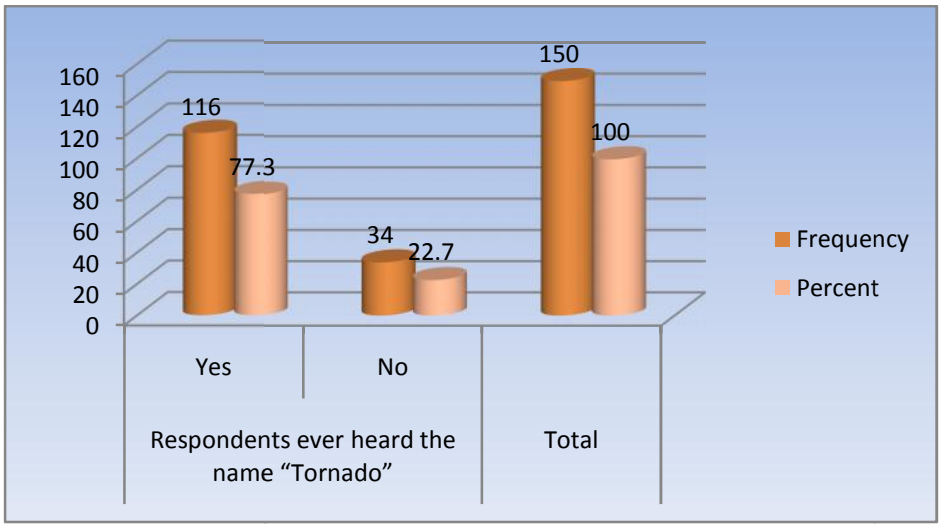
Source: Field work, 2013 N=150

Table 8 shows the sources from where respondents get disaster related information. It is evident from the table that most of the respondents get the information from television, bazar/local people, radio and the percentage are 78 percent, 42 percent and 22 percent respectively. Other 6 percent get from mobile phone and 2 percent said they get disaster related information from other sources like: neighbors, relatives etc.

### 5.3 Perception on Tornado

This section is formed of with the analysis of data regarding the respondent's perception on tornado

**Figure 11: Percentage distribution of respondents about their familiarities with the term 'tornado'**




Source: Field work, 2013 N=150

Although all of the respondents were affected by the tornado of March, 2013 which occurred in their area, the figure 11 indicates that out 150 respondents 77.3 percent were already familiar to the term tornado. Another 22.7 percent did not know what a tornado is.

**Table 9:Percentage distribution respondents by the definition of tornado given by them**

| Definition of tornado | Frequency | Percent |
|---|---|---|
| A long twisted air | 4 | 2.7 |
| Wind looks like as coiling snake | 6 | 4.0 |
| A pipe like wind goes ahead with roaring | 6 | 4.0 |
| A curse from almighty Allah | 18 | 12.0 |
| Playing of winds colored like black smoke | 11 | 7.3 |
| A pipe like wind tunnel | 2 | 1.3 |
| Outcome of our sins | 20 | 13.3 |
| A horrible natural disaster | 17 | 11.3 |
| Rolling of wind | 5 | 3.3 |

| | | |
|---|---|---|
| A miraculous incident | 4 | 2.7 |
| It seems as like as doomsday | 6 | 4.0 |
| A tunnel of wind coming forward with roaring like an airplane | 16 | 10.7 |
| Don't know | 1 | 7 |
| **Total** | **116** | **100** |

Source: Field work, 2013 N=116

It is observed from Table 9 that the respondents, who have known the term tornado, defined tornado in various ways. A majority of the respondents, 12 percent and 13.3 percent, labeled it as a curse from almighty Allah and outcome of our sins respectively. On the other hand the percentage who defined tornado as a horrible natural disaster, a tunnel of wind coming forward with roaring likes aero-plane and playing of winds colored like black smoke are 11.3 percent, 10.7 percent and 7.3 percent respectively. Almost 45 percent have seen tornado as wind which looks like as coiling snake, a pipe like wind goes ahead with roaring, seems like dooms day, rolling of wind, a long twisted into air, a miraculous incident etc.

**Table 10:Percentage distribution of the respondents by the reasons for tornado (Multiple responses)**

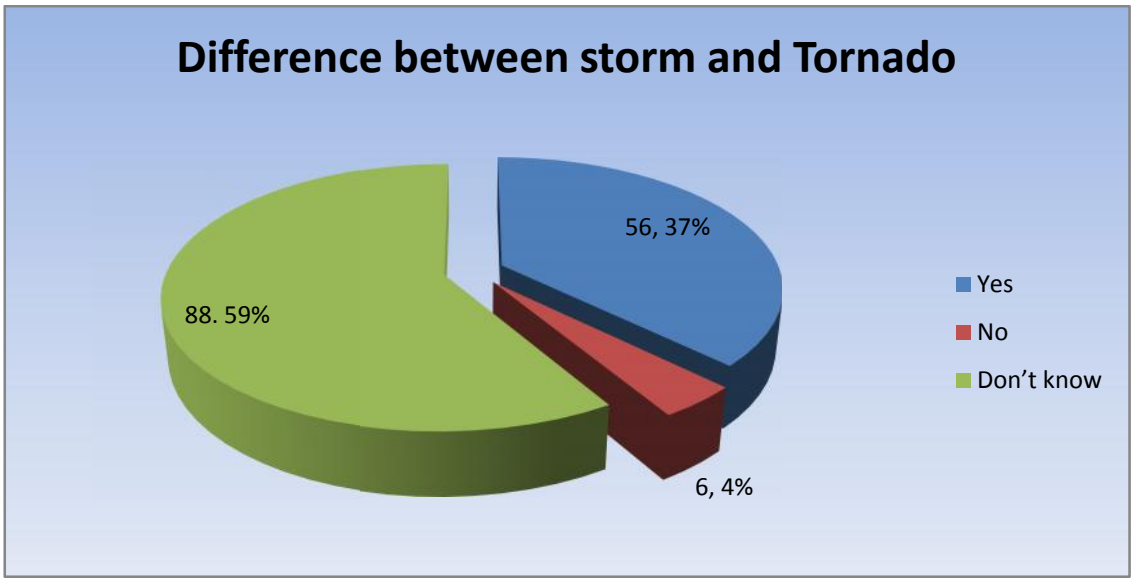
| **Reasons** | **Frequency** | **Percent** |
|---|---|---|
| collision of two masses of wind | 14 | 12.1 |
| Outcome of our sin | 64 | 55.2 |
| Curse of Allah | 87 | 75.0 |
| Unstable atmosphere | 13 | 11.2 |
| Roar of the wind | 5 | 4.3 |
| Cyclone | 7 | 6.0 |
| Don't know | 15 | 12.9 |

Source: Field work, 2013 n=116

On the basis of multiple responses the table 10 shows that 12.9 percent of the respondents said that they don't know the reasons for tornado where 55.2 percent and 75 percent have viewed tornado as outcome of our sin and curse of Allah respectively. Rest of the respondents identified

the reasons as collision of two masses of wind (12.1%), unstable atmosphere (11.2%), cyclone (6%) and roar of the wind (4.3%).

**Figure 12: Percentage distribution of the respondents about difference between storm and tornado**




Source: Field work, 2013 N=150

Figure 12 show that 59 percent of the respondents don't know the difference between other storms and tornado where 37 percent recognized the difference. Other 4 percent of the respondents said that there is no difference among other storm and tornado.

**Table 11**: **Percentage distribution of the respondents who have identified difference between other storm and tornado stated by them**

| Differences | Frequency | Percent |
|---|---|---|
| Tornado is more dangerous and horrible than storm | 17 | 30.4 |
| It has occurred suddenly and without signal | 6 | 10.7 |
| It is more destructive than storm | 13 | 23.2 |
| Weather becomes hot and feels like fire | 3 | 5.4 |
| It is a twisted wind take place in certain area | 10 | 17.9 |
| More speedy and unusual than storm | 7 | 12.5 |

| | | |
|---|---|---|
| **Total** | **56** | **100.0** |

Source: Field work, 2013 N=56

Table 11 shows that most of the respondents, amongst the ones who recognize the difference between other storm and tornado, describe the difference as tornado is more dangerous and horrible (30.4%) and more destructive (23.2%). Among the rest of the respondents 17.9 percent viewed that tornado occurred in a certain area with twisted wind whereas storm occurred in a vast area, 12.5 percent specified it as more speedy and unusual than storm, 10.7 percent stated that it has occurred suddenly which has no signal and another 5.4 percent said during tornado weather becomes hot and feels like fire.

### 5.4 Impacts of Tornado

As a devastating disaster, tornado has great impact on socio-economic life of the affected people. This section tries to reveal the nature of impact of tornado on the respondent's life.

**Table 12:Percentage distribution of the respondents by the tornado occurred in March, 2013**

| | **Frequency** | **Percent** |
|---|---|---|
| Yes | 150 | 100.0 |
| No | 0 | 0 |
| **Total** | **150** | **100** |

Source: Field work, 2013 N=150

It is observed from the table 12 that all the respondents were affected by the tornado occurred in March, 2013 in their area.

**Table 13: Percentage distribution of the respondents by the type of damages faced due to tornado (Multiple responses)**

| **Type of damages** | **Frequency** | **Percent** |
|---|---|---|
| Injury | 117 | 78.0 |
| Total damage of the household | 58 | 38.7 |
| Death of the household member | 16 | 10.7 |

| | | |
|---|---|---|
| Partial damage of the household | 50 | 33.3 |
| Loss of domestic animal | 17 | 11.3 |
| Loss of household resource | 40 | 26.7 |
| Health problem | 24 | 16.0 |
| Damages in agricultural land | 8 | 5.3 |

Source: Field work, 2013 N=150

Because of being affected by the tornado occurred at their area, all of the respondents have faced different types of damages. Table 13 shows 78 percent of the respondents got injured in the tornado where 38.7 percent have faced total damage of the household and 33.3 percent faced partial damage of their household. 10.7 percent of the respondents have lost their household member and 16 percent got health problems. 26.7 percent of the respondents have lost their domestic animal, 11.3 percent lost their household resources and other 5.3 percent of the respondents have faced damages in agricultural land.

**Table 14: Percentage distribution of the respondents by the type of strategies they have taken to survive from the damages (Multiple responses)**

| **Type of strategies** | **Frequency** | **Percent** |
|---|---|---|
| Received the help of relatives and neighbors | 62 | 41.3 |
| Received the Government and NGO support | 129 | 86.0 |
| Personal initiatives | 55 | 36.7 |
| Take loan | 10 | 6.7 |
| Alternative income | 10 | 6.7 |
| Others | 4 | 2.7 |
| **Total** | **150** | **100.0** |

Source: Field work, 2013 N=150

Table 14 reveals that 86 percent respondent, on the basis of multiple responses, received government and NGOs support to survive from the damages by tornado. The table also shows that 41.3 percent received the help of relatives and neighbors where 36.7 percent depended on

personal initiatives and almost 13 percent took loan and adopted alternative income. 2.7 percent said that they have taken other strategies like: used savings, sold resource etc.

**Table 15: Percentage distribution of the respondents by the opinions on kind of preparedness should be taken to face tornado like disaster risk (Multiple responses)**

| **Type of preparedness** | **Frequency** | **Percent** |
|---|---|---|
| Necessary deposit of food, money, essentials etc. | 38 | 25.3 |
| Primary concept to face disaster | 38 | 25.3 |
| Disaster enduring infrastructure | 30 | 2.0 |
| Collect necessary disaster facing instrument | 19 | 12.7 |
| Have knowledge on source and information of disaster | 26 | 17.3 |
| Knowledge on disaster warning | 19 | 12.7 |
| Keeping connection with disaster assistance organization and person working on disaster | 10 | 6.7 |
| Have knowledge on local shelter center and infrastructure | 13 | 8.7 |
| Don't know | 52 | 34.7 |
| Others | 5 | 3.3 |
| **Total** | **150** | **100.0** |

Source: Field work, 2013 N=150

The table 15 depicts that about 50.6 percent respondents think that they should know primary concept to face disaster and keep necessary deposit as precaution of tornado risk where 34.7 percent don't know what they should do. The table also shows 17.3 percent thinks they should have knowledge on source and information of disaster, 12.7 percent thinks collecting necessary disaster facing instruments and another 12.7 thinks they should keep knowledge on disaster warning. The rest of the respondents said they should have knowledge on local shelter center and infrastructure, keeping connection with disaster assistance organization and person working on disaster, disaster enduring infrastructure etc.

### 5.5 Response to Tornado

This section presents the type of responses by the community and organizations to tornado affected household.

**Table 16:Percentage distribution of the respondentsrelated to receivingwarning for last tornado**

| | **Frequency** | **Percent** |
|---|---|---|
| Yes | 0 | 0 |
| No | 150 | 100.0 |
| **Total** | **150** | **100** |

Source: Field work, 2013 N=150

It is observed from the table 16 that none of the respondentsreceived any warning for the tornado occurred in March, 2013 in their area.

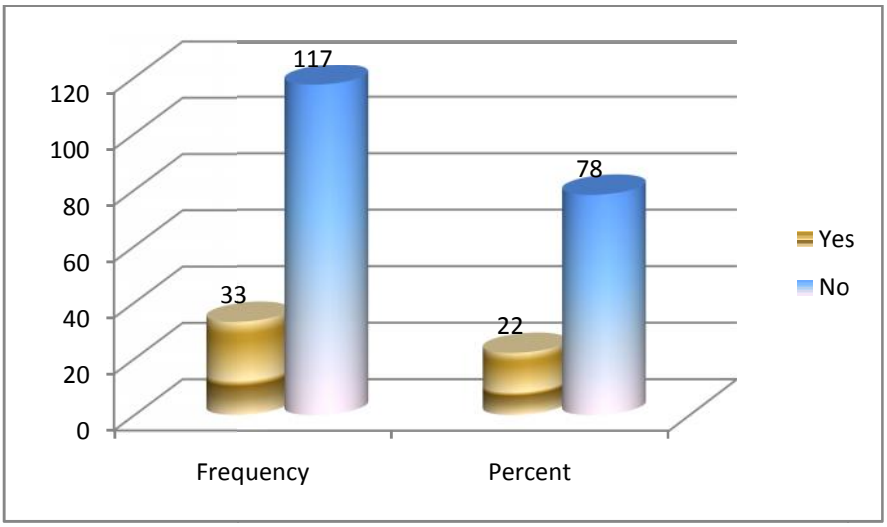
**Table 17:Percentage distribution of the respondents by their activities during tornado**

| **Category of activities** | **Frequency** | **Percent** |
|---|---|---|
| Left the house | 26 | 17.3 |
| Stay in house | 104 | 69.3 |
| Remembering the name of Allah | 46 | 30.7 |
| Taking shelter | 14 | 9.3 |
| Instant communication with someone for help | 1 | .7 |
| Other | 9 | 6.0 |

Source: Field work, 2013 N=150

The table 17 digs out that during tornado 69.3 percent respondents stayed in household where 17.3 percent left the household. This table also shows that 30.7 percent of respondents were remembering the name of Allah and 9.3 percent trying to take shelter where only 0.7 percent was trying to communicate someone for help. 6 percent of the respondents said they were doing other activities like: engaged in work, stayed in *Bazar* (local market), stayed far from the home etc.

**Figure 13**: **Percentage distribution of the respondents by whether they have taken shelter during tornado or not**




Source: Field work, 2013 N=150

The figure 13 shows that 78 percent (117 out of 150) of the respondents did not take shelter during tornado where only 22 percent tried to take shelter in a secure place.

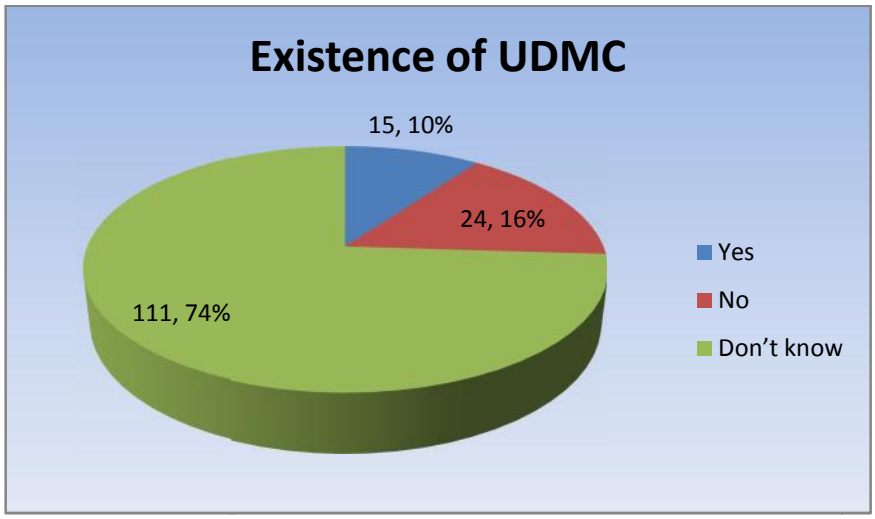
**Table 18: Percentage distribution of the respondents'places of taking shelter**

| | **Frequency** | **Percent** |
|---|---|---|
| Neighbor's building | 33 | 100.0 |
| **Total** | **33** | **100.0** |

Source: Field work, 2013 N =33

It is observed from Table 18 that all of the respondents who tried to take shelter during tornado took shelter in their neighbor's building made by concrete. It also can be assured as the study found from qualitative study that there is no shelter center in study area.

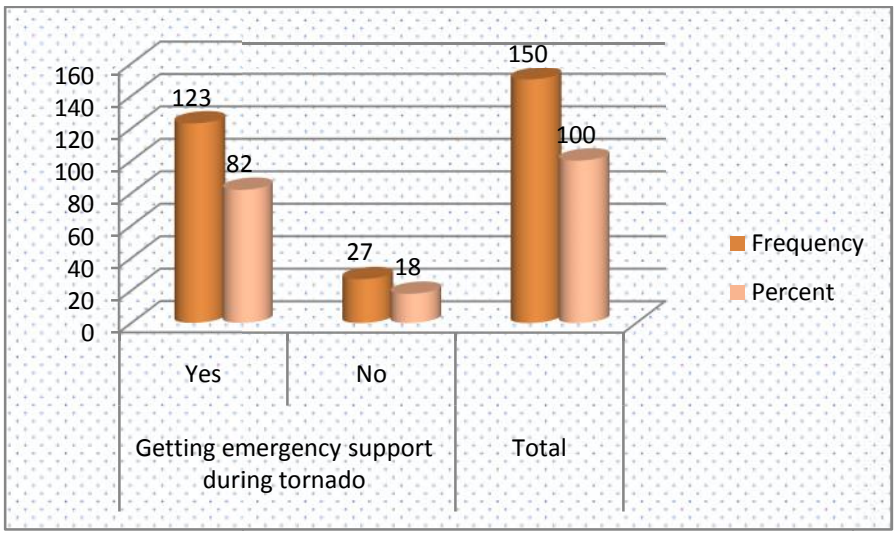
**Figure 14: Percentage distribution of the respondents'knowledge related tothe existence of Union Disaster Management Committee (UDMC) in the Union Parishad**




Source: Field work, 2013 N=150

The figure 14 reveals that only 10 percent of the respondents said they have Union Disaster Management Committee (UDMC) in their Union Parishad and 16 percent said they don't have anywhere 74 percent don't know about the existence of UDMC in their area.

**Figure 15:Percentage distribution of the respondents by recieving emergency support during tornado**




Source: Field work, 2013 N=150

It is observed from the Figure 15 that 82 percent of the respondents got emergency support during tornado where 18% said they did not get any emergency support.

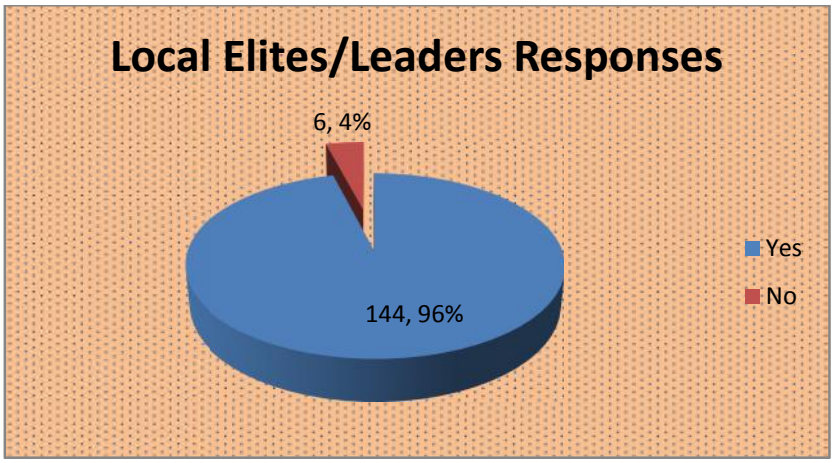
**Table 19:Percentage distribution of the respondents by the type of support they have received during tornado (Multiple responses)**

| Type of support | Frequency | Percent |
|---|---|---|
| Looking after affected people | 87 | 70.7 |
| Providing necessary information and suggestion | 21 | 17.1 |
| Taking measures in reducing damages | 53 | 43.1 |
| Transferring dead bodies | 4 | 3.2 |
| Continuous communication | 90 | 73.2 |
| Health and food aid | 5 | 4.1 |
| Transferring the affected in safe place | 13 | 10.6 |
| **Total** | **123** | **100.0** |

Source: Field work, 2013 N=123

On the basis of multiple responses the table 19 indicates among those respondents who got emergency support during tornado. 70.7 percent said that they were looked after by the local people who were not affected, 73.2 percent saidthat they were communicated with them and other 43.1 percent said that during tornado the people took measures in reducing damages. Rest of the respondents said they got support in transferring the affected in safe place, getting information and suggestions, food help and first aid, transferring dead bodies etc.

**Figure 16:Percentage distribution of the respondents by their opinions on responses of local elites/ local leaders**




Source: Field work, 2013 N=150

It is observed from Figure 16 that 96 percent of the respondents said they have got support from local elites and local leaders where only 4 percent said they did not get any support from local elites and leaders.

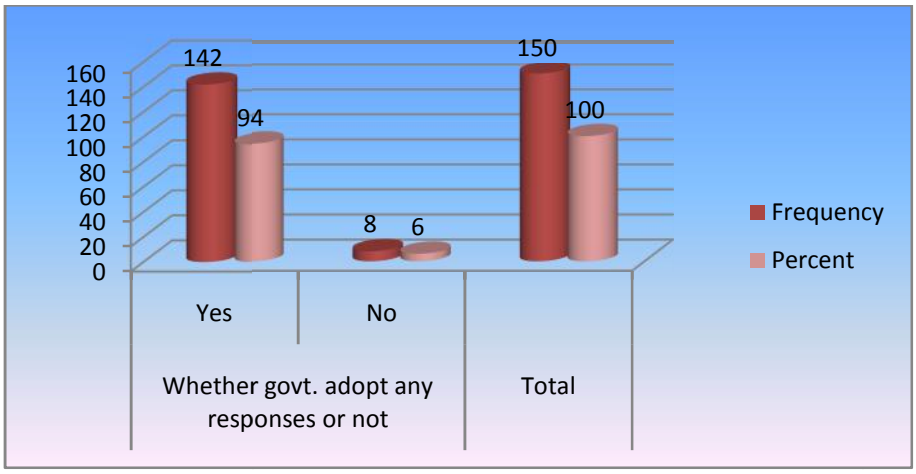
**Table 20:Percentage distribution of the respondents by the type of responses from local elites/leaders (Multiple responses)**

| Category of responses | Frequency | Percent |
|---|---|---|
| Make shelter | 21 | 14.6 |
| House reconstruction | 37 | 25.7 |
| Provide construction materials | 33 | 22.9 |
| Provide relief | 44 | 30.6 |
| Financial help | 52 | 36.1 |
| Provide loan | 5 | 3.5 |
| Make volunteer | 1 | .7 |
| Provide training | 4 | 2.8 |
| Health treatment | 7 | 4.9 |
| Agricultural accessories | 2 | 1.4 |
| Maintenance | 21 | 14.6 |
| Provide information | 1 | .7 |
| **Total** | **144** | **100** |

Source: Field work, 2013 N=144

The table 20 indicates that among the respondents, who have recieved support from local elites/leaders, around 66.7 percent said that local elites or leaders provided relief and financial help and 48.6 percent said that they have got construction materials and reconstruction of household. The table also shows 14.6 percent said that local elites/leaders made shelter for them, another 14.6 percent have got maintenance and 4.9 percent got health treatment. Rest of the 9.1percent of the respondents said they have got loan, agricultural accessories, training, volunteer and information from local elites/leaders.

**Figure 17:Percentage distribution of the respondentson responses from Government**




Source: Field work, 2013 N=150

The figure 17 shows that 94 percent of the respondents said they have got support from government where only 6 percent said they did not get any support from government.

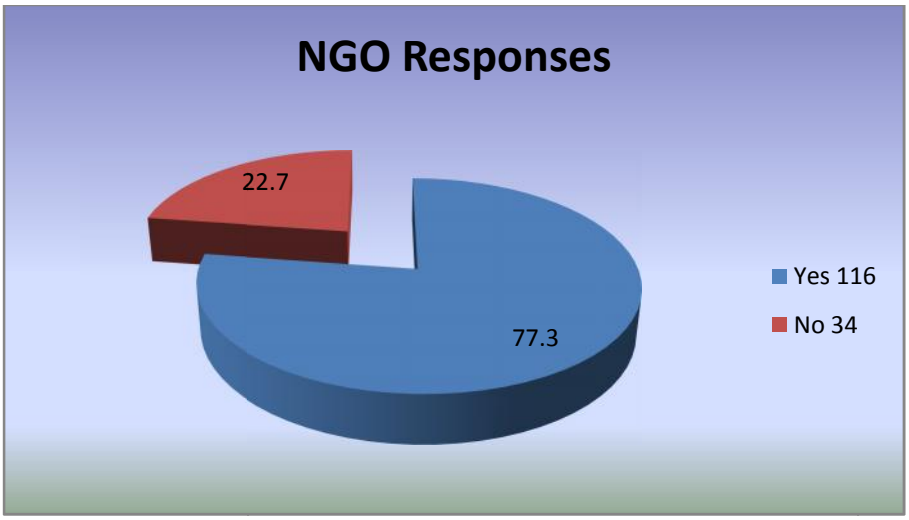
**Table 21:Percentage distribution of the respondents by the type of responses from Government after tornado (Multiple responses)**

| **Category of responses** | **Frequency** | **Percent** |
|---|---|---|
| House maintenance | 21 | 14.8 |
| Provide construction materials | 74 | 52.1 |
| Provide training | 10 | 7.0 |
| Treatmentfacilities for the injured | 2 | 1.4 |
| Make shelter | 16 | 11.27 |
| House construction | 41 | 28.9 |
| Create awareness | 2 | 1.4 |
| Provide relief | 95 | 66.9 |
| Provide domestic animal | 4 | 2.8 |
| Financial help | 77 | 54.2 |
| Provide loan | 4 | 2.8 |
| **Total** | **142** | **100** |

Source: Field work, 2013 N=142

On the basis of multiple responses the table 21 shows that among the respondents, who have got support from government, around 81 percent have got construction materials and reconstruction of household where 66.9 percent said that government provided relief and 54.2 percent have got financial help. The table also shows 11.27 percent said that local government made shelter for them, another 14.8 percent have got maintenance and 7 percent got training. Rest of the 8.4 percent of the respondents said they have got loan, domestic animal, health treatment and awareness from the government.

**Figure 18:Percentage distribution of the respondentsresponses received from NGOs adopt any responses or not**




Source: Field work, 2013 N=150

It is observed from the Figure 18 that 77.3 percent of the respondents said they have got support from NGOs where only 22.7 percent said they did not get any support from NGOs.

**Table 22: Percentage distribution of the respondents by the name of NGO's who provide support after tornado (Multiple responses)**

| | **Frequency** | **Percent** |
|---|---|---|
| BRAC | 95 | 81.9 |
| Abdul Monem Foundation | 51 | 44.0 |
| Shahajalal Islami Bank | 43 | 37.1 |
| *Radhika* (local NGO) | 10 | 8.6 |

| | | |
|---|---|---|
| UNICEF | 22 | 19.0 |
| **Total** | **116** | **100** |

Source: Field work, 2013 n=116

Table 22 shows the name NGOs mentioned by the respondents where most of the respondents 81.9 percent said BRAC and 8.6 percent mentioned *Radhika* (local NGO). Others said that Abdul Monem Foundation, Shahajalal Islami Bank and UNICEF also help them. But through the qualitative study, it was found that there were some other NGOs (name of the NGOs mentioned in chapter 6) helped the affected people to survive.

**Table 23: Percentage distribution of the respondents by the type responses from NGOs (Multiple responses)**

| **Type of responses** | **Frequency** | **Percent** |
|---|---|---|
| Make shelter | 10 | 8.6 |
| Maintenance | 7 | 6.0 |
| Provide construction materials | 38 | 32.8 |
| Provide relief | 36 | 31.0 |
| Financial help | 25 | 21.6 |
| Provide loan | 2 | 1.7 |
| Provide training | 22 | 19.0 |
| Health treatment | 2 | 1.7 |
| Agricultural accessories | 2 | 1.7 |
| House reconstruction | 6 | 5.2 |
| Create awareness | 15 | 12.9 |
| Other | 1 | .9 |
| **Total** | **116** | **100** |

Source: Field work, 2013 N=116

The table 23 indicates that among the respondents, who have got support from NGOs, around 52.6 percent said that NGOs provided relief and financial help and 38 percent said that they have got construction materials and reconstruction of household. The table also shows 19 percent said that NGOs provided training for them, 8.6 percent said that NGOs made shelter for them, 6

percent have got maintenance and 12.9 percent have got awareness about the activities from the NGOs. Rest of the 6 percent of the respondents said they have got loan, agricultural accessories, health treatment etc. from local NGOs.

**Table 24: Percentage distribution of the respondents by the measures should be taken to face tornado (Multiple responses)**

| **Proposed measures** | **Frequency** | **Percent** |
|---|---|---|
| To build strong houses | 14 | 9.3 |
| Adoption of Pre-caution | 16 | 10.7 |
| To construct strong shelter centre | 11 | 7.3 |
| It is not possible to take any measure for tornado | 6 | 4.0 |
| To take shelter in a safe place | 10 | 6.7 |
| To reduce environment pollution | 4 | 2.7 |
| Nothing to do because it's a curse of Allah | 8 | 5.3 |
| To follow the direction of Islam and Allah | 18 | 12.0 |
| To plant more trees | 2 | 1.3 |
| To provide more relief and necessary help | 33 | 22.0 |
| Try to deposit money for emergency situation | 4 | 2.7 |
| To be alert on weather news and warning | 2 | 1.3 |
| To take the grace of religious saint and elderly people | 2 | 1.3 |
| Don't know | 51 | 34.0 |
| **Total** | **150** | **100** |

Source: Field work, 2013 n=150

The table 24 depicts that 34 percent of the respondents don't know about the measures in reducing damages by tornado and 4 percent thinks to take any measure is not possible for tornado where around 19 percent claimed tornado as curse of Allah, therefore, we have nothing to do, to follow the direction of Islam and Allah and to be honest and to take the grace of religious saint and elderly people to be safe from tornado. The table also indicates that 22 percent of the respondents thinks of providing more relief and help, 20 percent intended to adopt precaution and build strong houses and another 20 percent of the respondents said about making strong shelter center and taking shelter in safe place for tornado. Only 4 percent of the

respondents said that we have to reduce environment pollution and plant more trees, 2.7 percent thinks to deposit money for emergency situation and only 1.3 percent said that need to be alert on weather news and warning to reduce tornado like disaster risk.

However, the above chapter (chapter 5) presents the qualitative findings of the study by the analysis of field data collected from the respondents through a semi structured interview questionnaire.

# Chapter Six: Qualitative Findings of the Study

In this Chapter the qualitative findings of the study are going to be discussed. The qualitative data were collected through 15 Case Studies, 5 FGDs and 5 KIIs. Based on the guideline and the study objectives, the summary of these case studies, FGDs and KIIs are discussed below.

### 6.1 Summary of the Key Informant's Interview:

From different responsible segments of the society five people were taken as KII participants. This study tried to include local leader, civil society people, teacher, government and NGO service holder as participants.

**Identity of the participants:**

**Table 25: Identity of the KII participants:**

| Name | Age | Sex | Education | Occupation | Designation |
|---|---|---|---|---|---|
| A K M Shibli | 43 | Male | Masters in Applied Physics | Teacher | Vice principle of Chinair High School and College |
| Mst. Taslima | 43 | Female | H.S.C | Teacher | Primary School Teacher |
| Mizanur rahman | 38 | Male | B.S.C | Govt. job | Project implementation officer, Sadar upzilla, Brahmanbaria |
| Moshiur rahman selim | 45 | Male | B.A | Business | Chairman, Ramrail Union Parishad, Sadar, Brahmanbaria |
| Mst. Hosneara | 30 | Female | H.S.C | service | Field officer, BRAC |

Note: The participants have permitted the researcher to use their identities

**Disaster related information of the study area:**

Main disasters of the area:

According to KII participants main disasters of the study area are:

- ✓ Storm
- ✓ Nor'wester
- ✓ Flood
- ✓ Drought
- ✓ Water logging
- ✓ Tornado

Flood, storm, water logging and northwester are seen as frequent disasters in the area of study however, drought and earthquake also occur too. Although tornado of March, 2013 is the first tornado occurred in this area, the participant thinks that it also should be included in the list of main disasters of the area.

There is no system to warn about tornado in this area. Generally they get to know about the probability of an incoming storm through the news in television and radio. But they do not pay much heed to it thinking that the storm is still out of the risk boundary.

According to the KII participants necessary and immediate actions during disasters must include:

- ❖ Provide treatment to the injured people
- ❖ Provide financial, material and food help to the affected
- ❖ Community should come forward
- ❖ Govt. and NGO response
- ❖ Local elites should give emergency support
- ❖ Safe shelter

**Sources of knowledge and information on disaster:**

Through the KII it was found that there is no disaster information center in the participants' area. They generally get this information from:

- Television
- Radio
- Internet
- Newspaper
- Mobile

The KII participants said that during disaster electricity gets cut off in the area. Therefore the above mentioned sources also become inactive and useless for getting any emergency information related to disaster.

**Knowledge on tornado**

The participants of KII thought that tornado is a strong twisted wind created due to the rapid increase in level of carbon-dioxide in earth surface with high magnetic force and it blows away everything on its way.

They learned the reasons for tornado are:

- Atmospheric pressure
- Air gap in a certain area
- Rapid increase of carbon di oxide in earth surface
- Magnetic power of the air
- Extreme hot weather

Almost every participant said that there is no certain time for a tornado to occur. One of them said that Bengali month '*Vadra'* is more favorable for a tornado occurrence.

**Vulnerabilities due to tornado:**

The KII participants said that due to tornado the vulnerabilities regarding damages, social problems and crises are aroused. These are:

Damages:

- Death and injury of both human and animal.
- Damage in households, trees, crops and agricultural land

- Loss of resources
- Damages in tube wells, roads, bridges, culverts
- Damages in school, religious institutions, social institutions etc.

**Table 26**: **Description of Damages Given by Upazila Office of the Area Due to Tornado**

| **Extent of damage** | **Number/amount** |
|---|---|
| Depreciated Household | 1515 |
| Number of Death of people | 36 |
| Number of injured | 692 |
| Seriously injured | 184 |
| Agricultural land (totally) | 173 Acre |
| Agricultural land (partially) | 1112 Acre |
| Educational institution (totally) | 2 |
| Educational institution (partially) | 8 |
| Religious Institution | 5 |
| Roads (*Pucca*) | 2.25 Km |
| Deaths of Domestic Animal | 250 |
| Deaths of Chicken and Ducks | 1100 |
| Village roads (*Kacha*) | 10.95 Km |
| Damaged Tube-well | 30 |

**Social problems and social crises:**

- Social disorder
- Increase of poverty
- Problems in education system
- Increase of unemployment
- Lack of food and water
- Household members become helpless
- People lose shelters
- Problems in rituals and culture

- Financial and social crisis
- Increase of psychological problems and depression

**Community response to tornado:**

The KII participants said that "*during the tornado the people got scared and frustrated. They had nothing to do except remembering the name of Allah. They could not figure out what should be done that was the first ever tornado in this area.*" Although many people were injured, there was no significant response by the community during the tornado.

But after tornado, there was an immediate community response to overcome the crises. Those were:

- Instant food supplied to the affected village from neighboring village.
- People came to help the affected people from far away from the affected area.
- Local elites/leaders instantly came forward for emergency help.
- Local people came to help with their own endeavor.
- Local elites distributed food and made camps by tenting for homeless.
- Medical teams came from faraway from treatment of the injured.
- Media correspondents also came immediately.
- Local government (Union parishad and Upazila) also came to look after the affected people.

**The response of Govt. and NGO regarding tornado:**

It was informed by the KII participants that there was no warning message provided from the government or NGO to the people who were affected. They also believe that warning system for tornado is not feasible in Bangladesh.

Although there was no significant response during tornado, a satisfactory response was given from government and NGOs afterwards. They provided relief and financial support among the affected households. The names of the major govt. and non govt. organizations and the type of support given by them are listed below in a table.

Table 27: Type of emergency support to the tornado affected household by government and non-government organization

| **Government** | **Type of support given to the households** |
|---|---|
| Ministry of Agriculture | Seeds and saplings |
| Fisheries Division | Loan and financial support |
| Livestock Division | Cow, goat and loan |
| Ministry of Disaster Management and Relief | 30 kg rice, Tk 5000 per household |
| Ministry of Social Welfare | Tin and money |
| Youth Development Division | Treatment and relief |
| **NGOs** | |
| Dutch-Bangla Bank ltd. | Tin and money |
| Bangladesh Development Bank ltd. | Tin |
| BRAC Bank | Tin |
| Sonali Bank | Money |
| BRAC | Relief box |
| Prothom Alo (daily newspaper) | Tin |
| Islami Bank | Tin and money |
| Bashundhara Group | Tk 5000 and tin |
| Grameenphone | Tin |

In spite of getting a satisfactory response, the participants claimed that the distribution system of the relief and help was not appreciable. Biasness and unequal distribution were practiced under local leaders and elites management. They also claimed govt. or NGOs only provided relief but they did not work for any proper rehabilitation and recovery. The participants, however, mentioned that some of the voluntary academic institutions and organizations provided supports to students of schools, colleges and disaster victims. These were not coordinated or recorded by anybody or even recorded by Deputy Commissioner's office were not known to them.

**Suggestions and expectation:**

The suggestions and expectations stated by the participants are given below:

- Houses should be strong and storm enduring
- Construction of safe shelter center in the area
- To take shelter in a safe place during tornado
- Perfect assessment of the damage and a list of the affected people to be made
- Rehabilitation of the affected people
- Development of warning system
- Provide proper knowledge and information regarding disasters such as tornadoes.
- Government should be more concerned
- Proper and co-ordinated management of relief distribution

### 6.2 Summary of Focus Group Discussions (FGD):

The qualitative information of the study was also collected through five Focus group discussions (FGD). There were various types of participants based on age, sex, occupation and education included in those FGD.

**Demographic information of the participants:**

Total people were included as participants in five FGD. The core demographic information of the FGD participants is given in below table.

Table 28: Characteristics of FGD participants

| **Age structure** | Number of people | **Sex** | Number of people | **Education** | Number of people | **Occupation** | Number of people |
|---|---|---|---|---|---|---|---|
| 18-28 | 8 | Male | 25 | Illiterate | 8 | Farmer | 8 |
| 29-38 | 13 | Female | 15 | Primary | 13 | Household activities | 12 |
| 39-48 | 14 | | | High school | 13 | Day labor | 7 |
| 49-58 | 10 | | | SSC | 4 | Service holder | 2 |
| | | | | HSC | 2 | Petty business | 2 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | | | | emigrants | 3 |
| | | | | | | Rickshaw/Van puller | 2 |
| | | | | | | Unemployed | 2 |
| | | | | | | Fisherman | 2 |
| Total | 40 | | 40 | | 40 | | 40 |

**Knowledge on disaster:**

Main disaster of the area:

According to FGD participants main disasters of their area are:

- ✓ Storm
- ✓ Norwester
- ✓ Flood
- ✓ Drought
- ✓ Water logging
- ✓ Tornado

Although they have claimed flood, storm, norwester, water logging are seen frequently, drought and tornado is not frequently occurred disaster in this area.

The FGD participants said that they generally have not got any warning message during disaster from authority. They generally have heard the warning of flood and storm like disaster from the local people and *Bazar* (local market), but they did not get any warning for the tornado occurred at their area in March, 2013.

The FGD participants informed that during disaster immediate and necessary response means:

- ❖ Provide treatment to the injured people
- ❖ Families of dead in disaster should be get priority and more financial help
- ❖ Provide financial, material and food help to the affected people
- ❖ Relief distribution

- ❖ Chairman and members of the Union Parishad should take initiatives.
- ❖ Govt. and NGO response
- ❖ Local elites and rich people should give emergency support
- ❖ Enough shelter center and proper rehabilitation of the affected

**Sources of knowledge and information on disaster:**

Through the FGD it was found that there is no disaster information center in participant's area. They generally have got disaster related information from:

- ➢ Television
- ➢ Radio
- ➢ *Bazar* (local market)
- ➢ From local people
- ➢ Newspaper
- ➢ Mobile

The FGD participants said that during the crisis period the above sources are also not available in this area. Therefore they become more vulnerable during any crisis period regarding disaster.

**Knowledge on tornado**

Most of the participants in focus group discussion claimed tornado as horrible natural disaster they have ever faced. They were scared and perplexed while tornado hit because it was the first tornado in their area. Almost all of the participants labeled tornado as

- A pipe like wind goes ahead with roaring
- A curse from Almighty Allah
- Outcome of our sins
- A miraculous incident
- A strong and horrible storm looks like a long twisted and black wind that has the power of blowing everything.

> "While I was returning from the Bazar (local market), I noticed a black twisted cloud coming faster to our village and rushed to the house. Within few seconds it caused just a massacre to our households and lives. I was stunned and I thought it is the last day of our life. I has very little knowledge on tornado and exactly don't know why it occurs. But I think that it may occur, because of our sins, as curse of Allah.
>
> Abdur Rahman, 45 years old farmer

They also think that the reasons for tornado are:

- Presence of dust and smoke in the air
- A curse from Almighty Allah
- Outcome of our sins
- Atmospheric pressure
- Hot weather

Almost the entire participant said that there is no certain time for tornado occurrence. Some of them also said that because of being first occurrence of the tornado, they don't have enough knowledge on tornado. Therefore they also don't know what should they do before, during after tornado. But some of them think that during tornado safe shelter place and after tornado enough help and relief should be provided for loss recovery and rehabilitation.

**Vulnerabilities due to tornado:**

The FGD participants said that they have not proper knowledge on vulnerabilities due to tornado but they think some vulnerability regarding damages, social problems and crises are aroused. These are:

- Death and injury of both human and animal.
- Damage in households, trees, crops and agricultural land
- Loss of resources
- Damages in tube well, road, bridge, culvert
- Increase of poverty
- Problems in education system
- Lack of food and water
- Household members become helpless
- People become shelter less
- Chronic financial crisis
- Damages in electric pole and thus absence of electricity
- Corruption in relief distribution are also seen

**Community response to tornado:**

The FGD participants said that during tornado the affected people became frustrated and perplexed and most of them just remembering the name of Allah. But after the tornado the people who were not affected came immediately to help the affected people. They helped the injured to send them hospital and help to rescue people. They also provide food and help in reconstruction of the destroyed household and rehabilitation of the affected people. Although many people were injured, there was no mentionable response by community in the time of tornado occurrence.

There was a great community response to overcome the instant crises immediately after the tornado mentioned by the participants. These are:

- Food was supplied to the affected village from neighbor village.
- People came to help the affected people far from the affected area
- Local elites/leaders instantly came forward for emergency help.
- Local people came to help with their own endeavor.
- Local elites distributed food and made camp by tenting for homeless.
- Medical team came from far areas to provide treatment among the injured people.
- Local government (Union parishad and Upazila) also came to look after the affected people.

The affected people adapted the situation by taking loan from the neighbors and relatives and receiving support and relief from different GOs and NGOs.

**The response of Govt. and NGO regarding tornado:**

It was informed by the FGD participants that there was no warning message provided from the government or any source to the people who were affected. They were totally unprepared while tornado hit.

Although most of the FGD participants could not remember the exact name of the organizations, they said that after the tornado occurrence Government organizations and NGOs came forward to help the affected people. They distributed relief including money, food and water, domestic animals, household reconstruction materials, loan, seeds and saplings, rice and wheat, relief box,

treatment etc. They also said that an army medical team was sent from the government who distributed free medicine and made tent as temporary shelter for the homeless.

After all the participants have claimed that the distribution system of the relief and help was not so good. There were seen a certain number of biasness and unequal distribution by the control of local leaders and elites. They also claimed that they were deprived in some cases for those biasness and unequal attitude of the local leaders.

**Suggestions and expectation:**

The suggestions and expectation mentioned by the participants to face tornado like disasters in future are given below:

- House should be strong and storm enduring
- Should pray to god to save us from tornado and other disasters
- Stay opposite to the twisted wind of tornado
- Follow the rules of religion properly
- Construction of safe shelter center in the area
- Rehabilitation of the affected people
- Warning should be provided
- Provide proper knowledge and information regarding tornado like disasters
- Government and NGO should provide more relief and financial help
- Proper management of relief distribution

### 6.3 Summary of the Case Studies:

The qualitative data of the study were also emphasized to collect through 15 case studies. This study also tried to include various types of participants based on age, sex, occupation, education and specially the people who were seriously harmed by the tornado of March, 2013 in those case studies.

**Table 29: Socio-demographic information of the participants:**

| Sl. No. | Name | Age | Sex | Religion | Marital status | Education | Occupation |
|---|---|---|---|---|---|---|---|
| 1 | Saifullah | 52 | Male | Islam | Married | Literate | Unemployed |
| 2 | Abdur Rahman | 45 | Male | Islam | Married | Primary | Farmer and day labor |
| 3 | Kanon | 45 | Male | Islam | Married | S.S.C | Petty business |
| 4 | Elu Bhuiyan | 65 | Male | Islam | Married | Primary | Farmer |
| 5 | Nura Mia | 70 | Male | Islam | Married | Illiterate | Unemployed |
| 6 | Thantu | 35 | Male | Islam | Married | S.S.C | Shopkeeper |
| 7 | Basir Uddin | 40 | Male | Islam | Married | Primary | Farmer |
| 8 | Jahangir | 50 | Male | Islam | Married | Primary | Tea stall owner |
| 9 | Selim Uddin | 45 | Male | Islam | Married | Primary | Petty business |
| 10 | Selina Begum | 45 | Female | Islam | Married | High School | Housewife |
| 11 | Nisa Khatun | 32 | Female | Islam | Married | Primary | Day Labor |
| 12 | Shamima Banu | 40 | Female | Islam | Married | Primary | Housewife |
| 13 | Rokeya Begum | 52 | Female | Islam | Married | Illiterate | Housewife |
| 14 | Shafi | 30 | Female | Islam | Married | Primary | Day Labor |
| 15 | Amena Begum | 34 | Female | Islam | Married | High School | Housewife |

Note: The participants have permitted the researcher to use their identities

Out of 15 case studies 9 are male and 6 female whose age is not less than 30 and all of them are married and Muslim. The highest education of the participants is S.S.C where 2 are illiterate and 2 only literate. Varieties of occupation of the participants were prioritized.

**Knowledge on disaster:**

Main disaster of the area:

According to the participants, who were studied as case, main disasters of their area are:

- ✓ Storm
- ✓ Norwester

- ✓ Flood
- ✓ Drought
- ✓ Water logging
- ✓ Tornado

> "We generally have got disaster related information and weather forecasting from Television and Bazar (local market). But we did not get any information regarding tornado before. Although we had television in our home, we didn't get any information from there. In fact there is no warning system for disaster in our area. We depend on our previous experience to estimate about any upcoming disaster specially storms"
>
> -Kanon. 45 years old farmer

Although they have claimed flood, storm, norwester, water logging are seen frequently, drought is not frequently occurred disaster in this area where most of the participant said that the March, 2013 tornado is the first time in their area.

The participants said that they generally have not got any warning message during disaster from the authority. They generally have got disaster related information from the local people, *Bazar* (local market), radio and television but they did not get any warning for the tornado occurred at their area in March, 2013. They also said that during the crisis period they have had the unavailability of reliable source of disaster related information.

The case study participants informed that during disaster immediate and necessary response means:

- ❖ Reconstruction of the damaged household
- ❖ Provide treatment to the injured people
- ❖ Families of dead in disaster should be get priority and more financial help
- ❖ Provide financial, material and food help to the affected people
- ❖ Relief distribution
- ❖ Chairman and members of the Union Parishad should take initiatives.
- ❖ Govt. and NGO response
- ❖ Local elites and rich people should give emergency support
- ❖ Enough shelter center and proper rehabilitation of the affected

**Knowledge on tornado:**

Most of the participants in case studies claimed tornado as horrible and destructive natural disaster they have ever faced. They were scared and perplexed while tornado hit because it was the first time tornado occurred in their area. All of the participants in case studies do not know about what is tornado and what the reasons for tornado are. Their thinking and knowledge on

tornado is with full of superstitions. Actually because of not having the source of proper and necessary knowledge and information on disaster, the participants have least knowledge on tornado. Almost all of the participants labeled tornado as

- A pipe like wind goes ahead with roaring
- A curse from Almighty Allah
- Outcome of our sins
- A miraculous incident
- A strong and horrible storm looks like a long twisted and black wind that has the power of blowing everything.

They also think that the reasons for tornado are:

- Presence of dust and smoke in the air
- A curse from Almighty Allah
- Outcome of our sins
- Hot weather

Almost all of the participants said that there is no certain time for tornado occurrence. Some of them also said that because of being first occurrence of the tornado, they don't have enough knowledge on tornado. Therefore they also don't know what they should do before, during and after tornado. But some of them think that before tornado warning message, during tornado safe shelter place and after tornado enough help and relief should be provided for loss recovery and rehabilitation.

**Vulnerabilities due to tornado:**

Trough the case studies it is observed that the participants have not proper knowledge on vulnerabilities due to tornado but they think some vulnerability regarding damages, social problems and crises are aroused. These are:

- Death and injury of both human and animal.
- Damage in households, trees, crops and agricultural land
- Loss of resources

- Damages in tube well, road, bridge, culvert
- Increase of poverty
- Problems in education system
- Lack of food and water
- Household members become helpless
- People become shelter less
- Chronic financial crisis
- Damages in electric pole and thus absence of electricity

**Community response to tornado:**

The participants said that during tornado the affected people became frustrated and perplexed and most of them just remembering the name of Allah where they thought that it were a curse from Allah. But after the tornado the people who were not affected came immediately to help them. They helped the injured to send them hospital and help to rescue people. They also provide food and help in reconstruction of the destroyed household and rehabilitation of the affected people. Community people also helped to identify and bury the dead bodies.

There was a great community response to overcome the instant crises immediately after the tornado mentioned by the participants. These are:

- Food and water was supplied to the affected people from the community.
- People came to help the affected people far from the affected area
- Local elites/leaders instantly came forward for emergency help.
- Local people came to help with their own endeavor.
- Local elites distributed food and made camp by tenting for homeless.
- Medical team came from far areas for treatment of the injured.
- Local government (Union parishad and Upazila) also came to look after the affected people.
- Some people took shelter in their neighbor's building during tornado

The affected people adapted the situation by taking loan from the neighbors and relatives and receiving support and relief from different GOs and NGOs. Some of them also used their savings and tried to get alternative income.

**The response of Govt. and NGO regarding tornado:**

It was informed by the case study participants that there was no warning message provided from the government or any source to the people who were affected. They were totally unprepared while tornado hit.

Although most of the participants could not remember the exact name of the organizations, they said that after the tornado occurrence Government organizations and NGOs came forward to help the affected people. They distributed relief including money, food and water, domestic animals, household reconstruction materials, loan, seeds and saplings, rice and wheat, relief box, treatment etc. They also said that an army medical team was sent from the government who distributed free medicine and made tent as temporary shelter for the homeless. The names of some organizations stated by the participants are given below:

- BRAC
- Abdul Monem Foundation
- UNICEF
- Radhika
- Different Government Organizations, and
- Several national and international NGOs

After all the participants have claimed that the distribution system of the relief and help was not so good. There were seen a certain number of biasness and unequal distribution by the control of local leaders and elites. They also claimed that they were deprived in some cases for those biasness and unequal attitude of the local leaders.

**Suggestions and expectation:**

The suggestions and expectation mentioned by the participants to face tornado like disasters in future are given below:

- House should be strong and storm enduring
- Should pray to god to save us from tornado and other disasters
- Stay opposite to the twisted wind of tornado
- Follow the rules of religion properly

- Construction of safe shelter center in the area
- Rehabilitation of the affected people
- Warning should be provided
- Government and NGO should provide more relief and financial help

# Chapter Seven: Discussion and Conclusion

The major focus of this study is to explore the nature of people's perceptions and responses to tornado. Thepresentstudy examines the cultural and religious impact on perception and response to tornado. The study also explores the nature of human action influenced by the perceptions and responses due to tornado. Results related to the objectives have been discussed in different chapter. However, in order to know the pattern ofperceptions and responsesto tornado, the present study incorporates a conceptual framework on behalf of precise theoretical analysis and predetermined objectives. The present chapter discusses the major findings of the quantitative and qualitative study.

### 7.1 Educational System

Brahmanbaria Sadar Upazila was the main victim of March, 2013 tornado where the peoples average literacy is 29.95% (male 36.2% and female 23.7%)(Source: BBS). This study covers some unions of this Upazila and surveyed 150 respondents. 31.3percent (47 out of 150) of the respondents are illiterate in the study area where males are 21.3 percent and females are 10percent. It is observed that 41.3percent respondents have only attended primary education.

### 7.2 Income and Occupations

Brahmanbaria Sadar Upazila is located around the Brahmanbaria city where the peoples percentage of main occupations are: Agriculture 42.84%, agricultural laborer 12.88%, wage laborer 3.51%, commerce 14.32%, service 8.55%, fishing 1.64%, transport 3.28%, construction work 1.39% and others 13.23% (Source: Upazila office). But among the respondents in study area 41.3 percent male are engaged in agriculture, 7.3 percent in labor, 1.3 percent is fisherman, 2.7 percent in petty business, service holder are 4 percent and 6.7 percent are engaged in rickshaw/van pulling. It is also found from the study 20.0 percent of the respondents are involved in household activities where all of them are female.

Because of having city proximity and facilities, the income of the people of Brahmanbaria Sadar are better in compared with other rural part of the country. It is found from the study that out of 150 only 3.3 percent of respondent's income is below 5000 where 30.7 percent of respondent's income is above 10000 and rest of the respondents income lies between 5000 to10000. But it is true that the lower income group suffer much to meet their needs in present time of inflation. During disaster the people of this locality have faced miseries due to the damages and their socio-economic condition has fallen down. Most of the respondents said that after the tornado their income has fallen down and decreased than that of it was before.

**7.3 Disaster and Disaster Related information:**

Because of being a climatically vulnerable and disaster prone country among the world, all parts of Bangladesh have to face great problems due to various disasters. Therefore, Brahmanbaria Sadar is also vulnerable to disaster but it is less disaster prone than the coastal areas of Bangladesh. According to the respondents flood, storms specially nor'wester, water logging are frequently seen disaster of this locality but sometimes drought and earthquake also occurred. The March, 2013 Tornado is the first time tornado in this locality. The survey data of the study shows that all of the respondents have faced these disasters in the last five years. A characteristic of the respondents also was that they all are the victim of tornado occurred in their area at 22 March, 2013.

> "The most familiar disaster of our area is mainly flood, nor'wester, drought etc. I generally have got disaster related information from Television, Radio and Bazar (local market). I did not get any warning for disaster in my whole life. But after severe disaster the local rich people, some government and non-government organizations usually come forward and help us with relief" Jahangir said.

It is observed from the study that there is no organization or disaster information center to provide disaster related information to the people of Brahmanbaria Sadar Upazila. The study respondents said that they have not got any warning message during disaster. Most of the respondents said that they have generally got disaster information from Television (78%), Radio (22%) and *Bazar* or local market (38%).Weber's sociology of disaster is applicable here where

the people of the area have the lack of education, lack of access in proper disaster related information and warning. Thus they have the less chance to properly perceive or response to a disaster like: tornado.

### 7.4 Perception on Tornado and Actions during Tornado

One of the major objectives of this study is to explore people's perception and actions regarding tornado. It is observed from the study that religious and cultural factors influences the definition of tornado given by the respondents where there is a great impact of superstitions leads by their norms and beliefs. Most of the respondents defined tornado as a curse of Allah, outcome of our sins, a tunnel of wind coming forward with roaring likes aero-plane etc. and they also thoughts these factors as reasons for tornado.

> "Tornadois like a twisted wind seems like fire around the air and created a hollering noise as if anaero planeiscomingforward fast. It is a curse of Allah. I have never experienced this type of disaster before in my life. Only Allah knows why, whereand when tornado strikes. My house was totally destroyed by the tornado along with the household goods. Stored paddies and other crops alsoruined.I was injured and hospitalized while falling under the broken house. My wife and other family member took shelter in neighbors building"
>
> -*Saifullah*, fifty two yearsold illiterate

People's perception has a great influence on the actions they have done during the crisis period. During tornado the affected people of Brahmanbaria sadar Upazila became scared and perplexed because it was the first time they have faced this disaster. Most of the respondents said that they stayed in household and remembering the name of Allah during tornado. Some of them left the house and 22 percent of the respondents tried to take shelter in their neighbor's building where there is no shelter center in their area.

According to Douglas's cultural theory of risk perception, cultural influences and social learning determined the people's risk perception and interpretation where the present study found that religious and cultural factors influences the local people's perception on tornado and their actions during this disaster. Douglas's individualistic worldviews can be applicable to the analysis of people's perception on tornado occurred in the study area on 22 March, 2013.

### 7.5 Community and Institutional Responses to Tornado and Peoples Survival Strategies:

People's responses to tornado and survival strategies from the damages and losses due to tornado are also key findings of this study. During tornado the affected people became scared and perplexed and most of them just remembering the name of Allah where they did not know what should they do. But the people who were not affected came immediately to help the affected people. They helped the injured to send them hospital and to rescue people. They also provided food and helped in reconstruction of the destroyed household and rehabilitation of the affected people.

> "We did not get any warning for the last tornado and there is also no warning system in our area. But after the tornado local people immediately came to help us and provided us food, water. They made shelter for us and helped to transfer the seriously injured people to hospital. From the government a medical team was sent to provide free treatment among the injured people and different organizations of government also distributed relief and support among the affected people. NGOs helped us by providing relief, financial support, house reconstruction materials and technical support. Besides domestic animal, seeds and loan was also provided to the most affected households from both Govt. and NGOs." -Rahman, 45 years old farmer

The tornado affected people mentioned that there was a great community response to overcome the instant crises immediately after the tornado. People came to help the affected people far from the affected area. Local elites/leaders instantly came forward for emergency help. Local people came to help with their own endeavor. Local elites distributed food and made camp by tenting for homeless. Medical team came from far areas for treatment of the injured. Local government (Union parishad and Upazila) also came to look after the affected people.

Although the local people did not get any warning message or emergency support before and during tornado, the local institution like GoB authorities (Union Parishad, Upazila Parishad), local NGOs, INGOs and different government and private organizations across the country have played an effective role to minimize the damages and losses due to tornado. They distributed relief including money, food and water, domestic animals, household reconstruction materials, loan, seeds and saplings, rice and wheat, relief box, treatment etc. Some of the organizations also provided training and information and created awareness among the local people. The study

people also said that an army medical team was sent from the government who distributed free medicine and made tent as temporary shelter for the homeless.

The affected people adapted the situation by following some strategies which was reported to be mostly in use to include:

- Taking loan from the neighbors and relatives
- Relying on relief distributed by community people and various institution
- Using savings to meet the damages and losses
- Receiving support from different GOs and NGOs

Very few respondents of the study also said they have taken alternative income to cope up with the emergency situation aroused due to tornado.

Kreps's disaster response theory can be relevant to the findings of the present study regarding response of people to the last tornado of study area. Among the three typology of disaster response, the third one, *expanding and extending units,* is applicable herewhere the mechanism of institutional response to tornado of Brahmanbara on 22 March, 2013 was only distribution of reliefs. People's responses to the tornado and their adaptation strategies were also depend on their social capital and community leadership.

**7.6 Conclusion:**

Bangladesh is considered one of the most vulnerable countries to natural disaster. The Geographic location and Geomorphologic conditions of Bangladesh have made the country this vulnerable situation (Paul and Bhuiyan, 2004). Floods, cyclones, tornadoes, storm surges, river bank erosion and drought are likely to become more frequent and severe in the coming years (Nasreen, 1995). Among the various fatal disaster of Bangladesh, Tornado is a most threatening and devastating one which has a long history of incidents in Bangladesh. A few studies are conducted on the disaster tornado of the people of Bangladesh but this study is aimed to evaluate the local people's perception and response to tornado as a fatal disaster. Because of being an unfamiliar and devastating disaster, tornado has a great impact on the people of Bangladesh especially local areas.

This study was conducted to aim at a horrible tornado occurred on Friday, 22 March 2013 in Brahmanbaria district (a local area of Bangladesh). This devastating natural disaster affect massively to their life and livelihoods as this have destroyed their lives, standing crops, livestock, bridges and culverts and blow out house structure, schools, colleges, electric poles, as well as other infrastructures of that locality. This disaster were caused 32 people killed and 388 others injured with a huge amount of economic loss when it moved through 15 villages of Ramrail, Basudeb, Chinair, Sultanpur union of Sadar Upazila and North Akhaura union of Akhaura upazila in Brahmanbaria district (source: Upazila office). This study intended to know the local people's nature of knowledge on tornado and survival strategies have taken to overcome the losses due to this tornado.

A mentionable number of the respondents of the study area are illiterate and other majority attended only primary education. Most of the people of this locality depend on agriculture and labor works for their livelihoods. It is also found from the study most of the females are engaged in household activities. Therefore it was assumed that the local people's perception and response to tornado was influenced by their culture and beliefs. It was found from the study that religious and cultural factors influences the definition of tornado given by the respondents where there is a great impact of superstitions leads by their norms and beliefs. Most of the respondents defined tornado as a curse of Allah, outcome of our sins, a tunnel of wind coming forward with roaring likes aero-plane etc. and they also thoughts these factors as reasons for tornado.

Because of having lack of proper knowledge and information, the affected people of the area did not know what they should do to be safe. They became scared and perplexed and most of them just remembering the name of Allah. But immediately after the tornado the community people including local elites/leaders and various local, national and international (government and non-government) organizations came forward to support the affected people to recover the losses and damages due to tornado. Although during tornado the people were stuck by unexpected occurrence, after the tornado the actions of community people and national organizations was better than ever before.

However, the affected area is still vulnerable to such kind of disaster and the people need widespread risk assessment and strong strategic support to reduce the vulnerability. The people

also should have proper knowledge and information on disaster management to face devastating disaster like tornado in future. The development of warning systems for tornado like storm and safe shelter place during disaster is also the crying needs of the people of local areas in Bangladesh. Coordinated efforts on the relief and rehabilitation mechanisms are also required proper attention.

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# Annexure-1: Case Studies

## Case Study-1

Salim Uddin is a fifty years aged fruit vendor who studied up to primary level. He lives in Sultanpur, Sadar, Brahmanbaria. Apart from his personal experiences he has no proper knowledge about natural disasters. Storm, flood and tornado are considered as the major disasters in this area. Television is the only source of getting weather forecasts. But no attempts have been taken by the local authority for announcing weather calamities beforehand.

He described this tornado mess as a new experience for the inhabitants of this area as it occurred there for the first time. They were absolutely unaware when and why this event occurs. But he could realize it was an unusual event and the amount of disasters occurred proved its power. Many of them has described it as a curse and warning from Allah.

Salim said as it is a sudden event there is no scope to take caution in advance. But he said during disaster period everyone should go to shelter centers or a safe building. Work pressure has increased after the disaster. Many local volunteers took responsibility for arrangement of first aid treatment, burial of dead members and road cleaning. Moreover, reconstruction of damaged houses, safe drinking water, and foods are also arranged by the volunteers.

He informed the strong wind force due to tornado wiped out houses, domestic animals and trees; thus roads are blocked by uprooted trees. Tornado destroys everything over the area where it passes. He said social insecurity is also a result of tornado. Especially, adolescents and women became the worst victim of this insecurity. Lack of drinking water and dry foods arrived after the disaster. Beside this, electricity system broke down and communication got interrupted as roads were collapsed.

“During tornado everyone should be aware for their safe shelter. If possible neighbor’s building can be used as shelter place”, said by Salim. But, he thinks the main responsibility begins after the event. He recovered his situation by taking loans from relatives and supports from government and non-government organizations.

According to Mr. Salim, it is hard for Government and NGOs to come with emergency relief immediately after disaster. Initial supports can be arranged by the community. Mr. Salim is

satisfied with the local people, Government and NGOs supports regarding tornado. He informed that tents and dry foods for the survivors, reconstruction of broken roads and economical supports were also provided by the Government. Army supervised all these works. A Monem Foundation and other local institutions co-operated greatly. NGOs played a vital role; more than Government in respect to resource mobilization.

Mr. Salim suggests if government made an early preparation of foods and water as immediate response for the victims that would be beneficial for all. He also thinks every village in Bangladesh must have a shelter center.

**Case study-2**

Md. Thantu Mian is a 35 years old shopkeeper and he completed his SSC. He lives in Fulbaria, Chinair, Sadar, Brahmanbaria. He has two sons and one daughter. His house and shop was totally damaged and his family members were injured during tornado.

He said, "People here know flood is the most frequent disaster in this area and I also noted flood as a main disaster which affects the living standard of our area. But after the tornado occurred, I fear if it occurs every year, it will be the most devastating disaster in our area and I also hope that it will not happen again". Usually they do not concentrate on disaster related information. But generally they get information regarding disasters from television, radio and bazar (local market). He said "we did not get any warning before tornado from anywhere. But we got some necessary help from Govt., NGOs, and local people".

Thantu defines tornado as the most powerful disaster and said "I have experienced tornado and it is a powerful twisted wind which has immense power". He has very little knowledge on tornado and exactly does not know why it occurs. But he thinks that it occurred because of their sins and as curse of Allah. He also doesn't know much about what should be done before, during and after the tornado. He said "I think we have nothing to do before tornado but during tornado we can take shelter in a secure and safe place and after the tornado various kinds of helps and relief is expected"

His shop and house were totally damaged by tornado. He and his son got injured. His wife and daughter took shelter in a neighbor's house as there was no shelter center in their area. He said during tornado there was no mentionable social problem in their area because people thought their death was very near. The tornado has caused him economic and food crises.

During tornado most of the people of this area became perplexed and frustrated for its terrible nature. But immediately after the tornado, local people and neighbors helped each other a lot. They helped the affected to make shelters and provided food, water and financial support. Local people also helped voluntarily to transfer the injured and dead people to hospital. Thantu Mian recovered from the situation by borrowing money from local NGOs and relatives. He also took relief and other support from Govt. and NGOs. A committee was also formed by the Chairman of Union Parishad which helped the severely affected and injured people.

He said they did not get any warning about the tornado and there is no warning system in their area. A medical team was sent by the government to provide free treatment to the injured people and different organizations of government also distributed relief and support among the affected people. NGOs helped them by providing relief, financial support, house reconstruction materials and technical support. Besides these, domestic animal, seeds and loan were also provided to the greatly affected people from both Govt. and NGOs.

He thinks that this type of disaster risk should be reduced, help and support should be provided from both Govt. and NGOs and the people should pray to Allah to save them from these disasters.

**Case study-3**

Md. Basir Uddin is a 40 years old farmer who lives in Chakur, Sadar, Brahmanbaria. He studied up to Class Eight.

He said that basically flood and northwester is more familiar disaster in their area. This tornado occurrence is the first time in this area and this destructive disaster is no more expected. They generally get disaster related information from television, radio and bazar (local market). They hardly get this kind of information from Government or other local organizations. There is no warning system about disasters in this area.

He said, "I know nothing about tornado and why it occurs. It looked like a twisted roaring wind coming forward with fire and smoke which was very powerful and could destroy everything. At first I thought a plane was coming but when I saw a black twisted cloud, I was really stunned". He does not know the actual causes of tornado but he thinks that it may have occurred as a result of people's sins and as a curse of Allah.

Tornado caused great damages of Basir's household. A tree broke and fell on his house which destroyed it. He said it was like doomsday. Communication system, houses, electricity poles, shops etc. were destroyed. Some people died and many got injured. It is only God's grace that we are alive. He has to face strong food and economic crises because of this tornado. He said that there was no increasing of crime or unrest because all people were afraid to see the awfulness of tornado. But poverty and unemployment is increasing and income is decreasing. The injured people could not be transferred in hospitals because of destruction of roads and transportation. Accommodation problem also aroused because many people lost their houses.

Basir said that the people were perplexed and stunned when tornado occurred. But immediately after the tornado the local people came to help the affected voluntarily. They provided food and water and took the injured in hospital. Basir recovered from the situation by taking loans from neighbors and relatives. Besides he took Government and Non-government help and support. "I sold my domestic cow for some money", said Basir.

"We got no emergency warning message before the tornado occurrence", said Basir. When he was returning from his agricultural land, he suddenly noticed in sky a black colored twisted wind coming toward their village. Then he rushed to his house and got injured falling under a tree in his destroyed house. Government and Non-government organizations provided relief and other support to them after the tornado. They provided medical support, relief, house reconstruction materials, financial support, technical support, household resource, foods etc.

He suggested, to reduce the risks and damages from this disaster, government should construct shelter center, develop emergency warning and response system and provide more relief and support to the affected people after the tornado. Finally we should repent to Allah for our sins and pray to Him to be safe from this types of disasters.

**Case Study-4**

Rokeya Begum is a 52 years old housewife, lives in Jarultala, Sadar, Brahmanbria, who is illiterate and can only give her signature. When asked her about the main disasters of her area she told northwester, storm, water logging and tornado were frequent. Rokeya Begum did not know about any of the NGOs or government agencies that provide disaster related information. According to her, they do not get any disaster related information and they have no authentic source from where they can get disaster alert. They use their traditional way of forecasting weather. They predict weather based on the movement of clouds.

Rokeya Begum define tornado as a twisted speedy wind which is more devastating in nature. It creates a frightening atmosphere. When asked her about why and when tornado occurs, she became totally astound and told that she does not know when tornado will occur. She mentioned it as a curse of Allah and Allah knows well about why and when tornado occurs. She said that they built strong houses before tornado. During tornado, taking shelter in a safe place would be a good measure and after tornado, poor and affected family must be helped by others.

Enormous damages occurred in tornado. Trees, houses and agricultural lands were affected. The ponds also got polluted. She said, tornado is the cause of many social problems and the homeless and unemployed people. Children were deprived of education schools were damaged. According to her, purified water, shelter, food and money crises were mainly faced after tornado.

In last tornado, affected people were being helped by neighboring villagers. "They cooked *khicuri* (vegetable, rice and lentils cooked together) for them and took injured people to hospital", said Rokeya Begum. Rokeya Begum adapted her situation after tornado by taking help of the government and non-government organizations. Immediately after the tornado they got support only from their neighboring villagers. Later, army men came and made tents for homeless people.

Rokeya Begum asked whether there is any warning system available for tornado. In regarding the issue of resource mobilization, Rokeya Begum informed, they were helped a lot by local elites/leaders, government and non-government organizations in terms of economic help, house reconstruction materials, household resources etc. Rokeya Begum said, "Tornado is a curse of Allah. So we can avoid such tornado only by following the rules and regulation of Quran".

**Case Study -5**

Mohammad Nuru Mia, 80 years old, lives in Ramrail, Sadar, Brahmanbaria. He has no institutionalized education but can sign his name in Bangla and has no income source of his own due to aging. He reported that the main disasters in this area are flood, northwester, tornado, water-logging etc. People of this area usually get information about disaster through radio, television news and from other people in the Bazar (local market). Normally they do not get any warning from concerned authority, e.g, 'Union Disaster Management Committee'. They receive very poor amount of relief after any disaster occurs.

When the tornado was rushing towards their area, he was in his bed and heard a horrible noise which sounded like a train going over their house. According to Nuru Mian, the tornado is a curse of Allah given to the people for their misdeeds. He has never experienced such an awful incident in his life. He said that no one but Allah knows why or when tornado occurs. According to him, if one can anticipate a tornado is striking, he or she should rememberthe name of Allah and go to the mosque if they get time for it.

During the sudden tornado, a tin from roof of the house hurled on him and he fainted as he was injured severely on his head. He was hospitalized for five days. For bearing the cost of treatment and medicine, the rich people, local leaders and other good people have helped him a lot. Besides, his house was totally destroyed by the tornado, along with the household resources, crops, domestic animal such as cow. It created a lot of problems in the area, e.g. houses and roads went under trees and other garbage. Injured people suffered a lot because they could not get transportation vehicles for going to hospital due to blockade on the road by the trees. At the same time it was quite difficult to receive help from other people. After the tornado, Nuru Mian said with grief, people of this area became economically helpless as they have lost all the resources and only living house.

Relatives and neighbors helped a lot in getting the injured people to hospitals, he said. People of their community, those who have vehicles like CNG auto rickshaw and rickshaw, took injured people to hospitals for free. Union Parishad Chairman and members, journalists and other government and non-government officials helped so much in rescuing them, provide treatment among affected people, supplying dry food and safe drinking water by forming a committee led by the chairman as an immediate response to the disaster. Businessman and other rich people of the locality also played a big role in the recovery period.

Nuru Mian asserted that there is no warning system in this area because it is not as highly disaster-prone as the coastal areas. As part of government assistance and relief, they sent an army medical team, handed over 6000/- BDT and two bundle of tin among the affected households. A number of NGOs, such as RED CROSS, UNICEF, BRAC etc. worked for the development of the tornado affected people.

**Case Study-6**

Hazi Md. Elu Bhuiyan, lives in Machirhata, Sadar, Brahmanbaria, is a 65 years old male who studied up to primary school, said "What else should I tell about disaster? Disaster is made for the poor people by Allah". This was the most catastrophic disaster in their locality among the ones he has ever experienced. Most common disaster in the area he has seen from his childhood is Flood. Some years the flood water reached almost knee-level. Another familiar disaster is Drought, which means no rain. It is mostly harmful for their paddy field and other crops. During the Bangla months Chaitro-Baishakh the strong wind usually destroys their homes and other buildings as well. These types of disasters also uproot the trees. They get the news and information about disasters from the Bazar (local market). When it warns about the disasters on television the people used to talk about it. "Basically we get these types of news after it is announced on television or in the local market" said Elu.

"We can get necessary help from the Government during disasters but now the local people also come to help the affected people. The rich Muslim people and national organizations are also very much helpful in this matter" said Elu Bhuiyan. He thinks that tornado is a curse from God (Allah). He has never seen this type of disaster before in his life. That day he has seen this in front of his eyes which destroyed his entire household. "Within one minute it had blown away my entire house" he stated. He left his house and had nothing to do except looking. "Before the tornado we had crops, foods, and house. But it has taken all we had and now we are poor. We could not ask for money to anyone just because of our family background" said Elu.

He also thinks that before disaster Government could set up a center to warn them about the disaster, during disaster the poor people should take shelter in to their neighbor's building and after the disaster they should come back to their home with the help of Government and non-government organizations. The Union Parishad provided them relief. Local people helped them

with food, crops and shelter. The government and non-government organization came forward to help and they also distributed relief among the affected people. Some of them provided clothes and other necessary things. Elu Bhuiyan said, "We don't have any type of plan as a precaution of disasters. Allah gives us property and our lives. He has the right to take them away. He is our hope. After all we are grateful to Almighty Allah".

After this disaster he did not have any idea what to do. He had no sense how to adapt to this situation. From where they were to eat and where to find work; in one word they were at a loss. At this situation the local people, government and non-government organization helped them a lot. They provided them relief, house reconstruction materials, economic assistance, treatment and medicine, information etc.

To reduce this disaster risk, the rich people should assist the poor people by allowing them to stay in their building. The Government should give at least 50000 Tk each only for the construction of their own household. People should be careful in every moment of their life.

**Case study-7**

Jahangir Hossain is a 50 years old petty businessman who has passed his primary level education. He has a tea stall of his own and lives in Fulbaria, Chinair, Sadar, Brahmanbaria. He said natural disasters are such a thing where there is no control of human and dangerous for human life. According to him the familiar disaster of their area is mainly flood, northwester etc. He generally got disaster related information from radio and bazar (local market). "I did not get any warning in my whole life. But after severe disaster the local rich people, some government and non-government organizations usually come forward and help us with relief" Jahangir said.

Jahangir said that he doesn't know much about tornado but it is not like other storms, it looks like a trunk of elephant and comes forward like a Catherine-wheel. It goes over certain areas and destroys all things on its way. He doesn't know why and when tornado occurs and said "we have nothing to do, during and after tornado. Only Allah can help us from this type of disaster." But he thinks that before tornado arrives they can take some precautions and during tornado it is better to move away from the track of tornado wind.

In the last tornado, Jahangir's house was collapsed and his cow died. He thinks that this disaster has the power to destroy everything and can take lots of human lives. During tornado, Jahangir had to face strong food, economic and accommodation crises. Social safety was also a great problem. He said "we did not even get a cloth to wear. It seems like starting a new life and after the tornado this area looked like a desert. All communication and transportation were destroyed. Dead bodies could not be shifted and injured were not transferred to hospital. In one word, it seemed like doomsday". Poverty, unemployment, lack of food and shelter were increasing in the society.

Jahangir said that local people helped them a lot immediately after the tornado by providing food and aid. They also made shelters for the affected. A medical team was sent from the government to provide free treatment and medicine among the injured. He said he coped up with the situation by taking loans from the neighbors and relatives and taking help from government and non-government organizations. He also tried to manage alternative income.

"There was no warning for the last tornado from any source. It attacked so suddenly that we did not get enough time to move anywhere". He also believes that the warning for tornado is not possible. Immediate response by local people was astonishing, he said. Local people including local elites came to help them by providing food, treatment and shelter. Government and non-government organizations came forward immediately after the tornado and provided them relief, loan, house reconstruction materials, economic assistance, treatment and medicine, information and support etc.

Government should make shelter in this area and more support and relief should be provided to reduce the damage of this type of disaster, said Jahangir. Besides, people should make strong houses. He also stated, we should be conscious about our misdeeds and must repent to Allah because He only can save us from this type of disaster.

**Case Study -8**

Saifullah, 52 years illiterate old male, lives in Chandi, Sadar, Brahmanbaria and has no fixed job. He said that most frequently occurring disasters in their area are- nor'wester, flood, water-logging, tornado etc. People of this area usually get information about disaster through radio,

television news and bazar (local market). Normally they do not get any warning from concerned authority in regarding any disaster. But after the disaster, they got a little amount of relief.

When the tornado was rushing to their locality, he heard a hollering noise as if an aero plane was going over their area and it looked like a twisted wind fire around the air. He labeled it as a curse of Allah. He has never experienced this type of disaster before in his life. He said that only Allah knows why, where and when tornado strikes.

His house was totally destroyed by the tornado along with the household goods. Stored paddies and other crops were ruined. He was injured and hospitalized after getting stuck below the broken house. His wife and other family members took shelter in neighbors' building. The local people and local leaders helped them a lot to cope up with the situation immediately. Houses and roads went under trees; as a result injured people suffered a lot as they could not reach the hospital. Instant response from other community was received. After the tornado people of this area became economically helpless and lost their shelter and occupation.

Saifullah said that he adapted to the situation by taking financial and material help from the relatives, local people and different government and non-government organizations. They helped in rescuing them and provided treatment among the injured people. They also provided dry food, house reconstruction materials and safe drinking water. A committee was formed by the chairman of Union Parishad who was active to sort out the helpless people. Financial help and household resources like domestic animal were provided by local and national organizations.

They did not get any warning for last tornado and he thinks that it is not also possible to warn people for tornado because it occurs suddenly. Government should make shelter in this area and more support and relief should be provided to reduce the risk of tornado, said Jahangir. He also thinks, we should be conscious about our misdeeds and must repent to Allah because of he only can save us from this type of disaster.

**Case study-9**

Abdur Rahman is a 45 years old farmer and day labor and completed primary level education. He lives in Chinair, Sadar, Brahmanbaria. He has two sons. His house was totally damaged. His son died and other family members were also injured during tornado.

He said that flood and drought are main disaster of their area but the last tornado was first time in their area. Usually they do not pay any concentration on disaster related information of their area. But they generally get information regarding disaster from Television, Radio and Bazar (local market). He did not get any warning message for any disaster in his life.

Abdur Rahman defines tornado as the most powerful disaster and said, "while I was returning from the Bazar (local market), I noticed a black twisted cloud coming faster to our village and rushed to the house. Within few seconds it caused a massacre to our households and lives. I was stunned and I thought it is the last day of our life". He has very little knowledge on tornado and exactly doesn't know why it occurs. But he thinks that it may occur because of their sins, as a curse of Allah. He also doesn't know much about what should be done before, during and after the tornado occurrence. He said "we should construct strong household and when tornado comes need to stay at the opposite direction of the wind".

His house was totally damaged by tornado and one son died. He, his wife and another son got injured. He said during tornado there was no mentionable social problem in their area because people got afraid seeing the catastrophe caused by the tornado. Because of being affected by tornado, he has to face strong economic, accommodation and food crises. Poverty and unemployment was increasing in the society.

During tornado they were in the house and saw that everything was blowing away. His son fell under a tree which destroyed one of his houses and died by that. Immediately after the tornado local people and neighbor helped them a lot. They helped the affected to make shelter and provided food, water etc. Local people also helped to transfer the injured people to hospital voluntarily and his son also buried by them. Abdur Rahman adapted the situation by borrowing money from neighbors and relatives.

He said they did not get any warning regarding the tornado and there is no warning system in their area. From the government a medical team was sent to provide free treatment among the injured people and different organizations of government also distributed relief and support among the affected people. NGOs helped them by providing relief, financial support, house reconstruction materials and technical support. Besides domestic animal, seeds and loan was

provided to the most affected people from both Govt. and NGOs. The family got priority and extra privileges if any of their members died.

More support and relief should be provided to reduce the damage of this type of disaster, said Abdur Rahman. The people should pray to Allah and repent to him to keep them safe from disaster.

**Case Study-10**

Kanon is a 45 years old male who have passed Secondary School Certificate. He is a petty businessman and lives in Basudev, Sadar, Brahmanbaria. He said that in their locality the main disasters are flood, storm and drought. March, 2013 tornado was the first tornado in their area which has washed away their locality. "We generally get the disaster related information and weather forecasting from Television and Bazar (local market). But we did not get any information regarding tornado before. Although we had television in our home, we didn't get any information from there. In fact there is no warning system for disaster in our area. We depend on our previous experiences to estimate about any upcoming disaster especially storms", Kanon stated.

He said that he knew nothing about tornado. The village people called it "Bankura" (strong storm). He thinks that tornado is a bigger version of Bankura. He also doesn't know when and why it occurs. He had no idea about what should be done before, during or after the tornado. But now he thinks that during tornado everybody should take shelter in safe place and after tornado come back to home by taking the help of Government and Non-government organizations. He said that people must construct strong houses.

He had three houses. But tornado has blown away all the three. Kitchen elements, foods and crops, household resources, domestic animal, television etc. everything got ruined by this disaster. His wife and children were injured while he was out of home. A food crisis, accommodation crises was the main problem. Later financial crises also became acute and people became poor. Many of them also became jobless.

The local people helped them instantly and provided dry food like chira, muri etc. They have also given them cooking rice and *khichuri* and fed them for almost 15 days. They tried to adapt

to the situation by taking loans from relatives and receiving help and relief from different national and international organizations.

They did not get any warning for last tornado. Usually when any storm comes, they can assume before on the basis of their previous experiences. Government and Non-government organizations helped them a lot. They provided medical support, relief, house reconstruction materials, financial support, technical support, household resource, foods etc. An army team was sent from the government to give the injured people medical assistance and to make tents for the homeless.

Finally Kanon said, "Allah can save us from any danger so we should be grateful to Him." He thinks that during the disaster one should try to save one's life first and then the assets.

**Case Study-11**

Selina Begum is a 45 years old housewife. She lives in Ushiura, Sadar, Brahmanbaria and has read up to Class 8.She has customary knowledge on disaster. When asked her about the main disaster of this particular area, she mentioned seasonal rain, storm, and flood and last tornado.According to her commentary, this area has infrastructural lacking regarding sources of knowledge and information on disaster. She informed there are no warning system and responsible authority to forecast weather update in this area.

When asked about tornado, she replied that, it was just few months ago when they experience tornado for the first time ever. "We had seen that a blowing wind coming together with heavy metallic sound like as *sho…sho.* It was more devastating in nature than other disasters we have experienced." Selina Begum said that tornado doesn't come to with a warning beforehand. She mentioned tornado as a curse of Allah. She thinks that, tornado is the result of human crimes. "If we follow the rules and regulation of Islam properly, we will certainly be protected", she stated.

According to Selina Begum, tornado is very much devastative. Trees, agricultural lands and homes are ripped off by tornado. Due to tornado many social problems aroused. Beggars and unemployed people increased rapidly. She prioritizes the rules and regulation of Islam and asserts that Allah's satisfaction plays an important role in the manifestation of tornado.

Selina Begum heard that government and NGOs are aiding many more items but she only got shelter and 20 kg rice. She didn't get any big amount of help. Nobody warned them about tornado beforehand. Rokeya Begum adapted to her situation by taking loans from the relatives and selling the resources. Rokeya Begum, being very concerned, said, "It is impossible to face such kind of tornado. It is actually a curse of Allah. If we take lessons from Allah's message and practice Islam, we will be saved from all disasters."

**Case Study-12**

Nisa Khatun is a,32 years old female, day labor. Sheread up to primary level education and lives in Ushiura, Sadar, Brahmanbaria. She said that storm, flood and tornado are considered as the major disasters in this area. Television and the radioare the source of getting weather forecasting. There is no warning system regarding disaster in this area.

She stated this tornado as a new experience for the inhabitants of this area as it was for the first time disaster in this area. They don't know about why and when it occurs. But they said that it is more devastating disaster than others which have they ever experienced. Nisa said thattornado may be a curse and warning from Allah.

She said it is not possible to take preparedness for tornado because it is a sudden event. But she said during disaster period everyone should go to shelter center or a safe building. Locally many volunteers take responsibility on their shoulder like arrangement of first aid treatment, burial of dead members and road cleaning. Besides, reconstruction of damaged houses, safe drinking water and foods were also arranged by the volunteers.

She said"my houseand trees was blow away by strong wind force in front of my eyes". The communication system were also damaged she said. She also said that she became poor and the work for day labor in the area also decreased after the tornado. Women were more affected than man. There were crisis of food, water and shelter after the tornado. But Nisa said "I moderately reconstructed my house immediately after the tornado and managed our shelter". She said that she adapted the situation by taking loan from the relatives and taking help from government and non-government organizations.

Nisa said that they did not get any warning for last tornado. Initially they got supports from the community. She described tent and dry foods was arranged for the survivors, reparation of roads and economical supports also provided by Government. Army medical team provided free treatment and medicine. NGOs also helped them a lot. They provided relief box, house reconstruction materials etc. Nisa said that it would be better for us if the Government provides warning message and safe shelter.

**Case Study -13**

Shafi Khatun, 30 years old Day labor, lives in Chinair, Sadar, Brahmanbaria. She reads up to primary level education. She mentioned that the main disasters in this area are flood, northwester. She said that she did not get disaster related information and warning from anywhere. Normally after the disaster they about it and sometimes can estimate about upcoming disasters on the basis of previous experiences.

According to her, tornado is a strong twisted wind with fire like smokes which mainly attempted to destroy the human lives and property. She has never experienced such an awful incident in his life. She thinks that it is not possible to describe the reasons and time for tornado occurrence. Therefore the people also have nothing to do regarding tornado.

In the time of tornado, shafi was out of home and looking the violence she rushed to house. Her house including household resource was destroyed and her father in law was died due to tornado. She said "we had almost nothing after the tornado. We just became like street people and beggar. We became poor and there was also no work for us in the area in that time." She also said that food and shelter was the main demand of affected people in that time. After that, financial crisis created in a big amount by which they are suffering till now.

Community people helped them a lot where they rescued the affected and transferred the injured people to hospital. They also provided food, water and helped them in making shelter by tenting. She said that after the tornado, The Government and Non-government officials started to come with reliefs. But they did not work in rehabilitation. Shafi said that they got only one bundle tin, a relief box and 6000 taka.

Shafi said that only Allah can save us from this disaster. But preparedness and more help after the tornado can reduce the risk of future.

**Case Study -14**

Amena Begum, 34 years old female, lives in Chandi, Sadar, Brahmanbaria. She is a housewife. She said that flood for heavy rain and seasonal storm are the main disaster of their area. She also said that she did not get any disaster related information and warning, they can assume about the upcoming disaster on the basis of experience. But the last tornado was the exception.

She views tornado as a curse from Allah which is also outcome of their sins. She also did not know why and when the tornado occurred. According to her tornado is the most strong disaster and so sudden that she ever faced. Therefore, it is essential to be prepared for tornado before and after the tornado people should help more.

She was affected by the last tornado of their area. Her house partially damaged by tornado and one cow also was died. She told that their poverty and economic crisis increased than before due to the tornado. They reconstruct their house by their own endeavor. But the crisis of food and resource was acute during tornado.

Amena said that local people at first came to help the affected households. They rescued the people and help to take injured people in hospital. Even CNG/auto driver and rickshaw puller transferred the injured without money. She also said that they reconstruct their household by the utilization of savings and taking loan from the relatives. Amena said “during tornado, we had nothing to do just eyeing.”

Nobody provided any warning for last tornado said by Amena. But after the tornado Government and NGOs provided relief among them. Union Parishad chairman, member and other local leaders were monitoring the relief distribution process. An army team was also sent from the government. She said “we did not get anything just without a relief box.”

“Only warning message can reduce the risk of our life from tornado. Besides we should build strong houses and concerning organization should help us to inform how the future risk of tornado can be reduced” amena was saying.

**Case study-15**

Shamima Banu is a 40 years old housewife and She reads up to primary level education. She lives in Fulbaria, Chinair, Sadar, Brahmanbaria.

She losses her house, crops and paddies; and so sadly her family members were injured during tornado. She said, "People here know flood is the most frequent disaster in this area and I also noted flood as a main disaster which affects the living standard of our area. But after experiencing the tornado, I frighten if it occurs every year, it will be the most devastating disaster in our area and I also hope that it will not happen again". Usually they do not concentrate on disaster related information. But generally they get information regarding disasters from television, radio and bazar (local market). She said "we did not get any warning before tornado from anywhere. But after tornado government, NGOs and local peoples came forward with some necessary help".

Shamima Banu identifies tornado as the most powerful and fatal disaster and said "I have experienced tornado and it is a powerful twisted wind which is speedier in pace". She has very poor knowledge on tornado and exactly does not know why it occurs. But she considered that it is a punishment from Allah and a warning to follow the rules of Islam. She also doesn't know much about what should be done before, during and after the tornado. She said "I suppose we have nothing to do before tornado but during tornado we can take shelter in a secure and safe place and after the tornado various kinds of helps and relief is needed".

Her house, crops and paddies were totally damaged by tornado. Her husband and son were injured. She and her daughter took shelter in a neighbor's house as there was no shelter center in their area. She said during tornado there was no mentionable social problem in their area because people realize that their death was very near. The tornado has caused him economic and food crises.

During tornado most of the people of this area became perplexed and frustrated for its horrific nature. But immediately after the tornado, local people and neighbors helped each other a lot. They helped the affected to make shelters and provided food, water and financial support. Local people also helped voluntarily to transfer the injured and dead people to hospital. Shamima Banu recovered from the situation by borrowing money from local NGOs and relatives. She also took

relief and other support from Govt. and NGOs. A committee was also formed by the Chairman of Union Parishad which helped the severely affected and injured people.

She said they did not get any warning about the tornado and there is no warning system in their area. Army medical team was sent by the government to hospitalize the injured people and different organizations of government also distributed relief and support among the affected people. NGOs helped them by providing relief, financial support, house reconstruction materials and technical support. Besides these, domestic animal, seeds and loan were also provided to the greatly affected people from both Govt. and NGOs.

She thinks that this type of disaster risk should be reduced, help and support should be provided from both Govt. and NGOs and the people should pray to Allah to save them from these disasters.

## Annexure 2: Key Informants Interviews

**KII-1**

AKM Shibli, 43 years old Male, is the Vice Principle of Chinair degree college. He has completed his Masters in Applied Physics from University of Rajshahi.

Mr. Shibli defined Flood and storms are common disaster and draught as a rare event in this area. But few months ago, a massive tornado occurred and damaged largely. Mr. Shibli throws a question: Is there any possibility of getting pre alert system in regard of tornado? There is no disaster information centre in this area. Radio, television, newspaper and internet are the only source of getting disaster warning. Electricity connection has been disrupted in case of serious disaster,we could unable to get alteration.

According to Mr. Shibli, "It is unspeakable and inexpressible that, how near villagers get together and expands their helping hands towards affected people. They cooked khicuri to feed affected people. They were doing well as their ability. But many of them had not get government relief, because of political mismanagement".All the villagers collectively played an important role in after response period.

Mr. Shibli defines tornado as a twisted wind which proceed on and on and becomes more devastating than other disaster. Healso thinks that tornado isthe result of excess heat in the air.He said that tornado is not a schedule event but early preparation would be beneficial. It is evident that houses made by Tin are more dangerous than other during tornado. So, it should be avoided. During tornado, people must have to go to the shelter center for their safety and for this, it is necessary to build up strong wind resistant shelter center. In the aftermath of tornado, we have rescued affected people and ensured about their shelter. Overall, government policy and terms can improve the present condition.

As the consequences of tornado, many structural and non-structural infrastructures including households, trees, roads and bridges, electric pole, tube wells, educational and religious institutions, domestic animal and agricultural land were damaged of this area. Some people died while many were injured. Ponds water also becomes polluted. Social imbalance appeared because of the damages. Most of the affected people became poor and many of them lost their

occupation. Communication systems were destroyed. According to Mr. Shibli, after tornado, there was a crisis of purified water and food. Poverty and unemployment increased in the society.

Mr. Shibli mentioned that, most of the people of this area got stunned and feared to see the sudden violence. They did go onwards religious faithbut after the tornado, they waited for relief. Mr. Shibli emphasizes that it is almost impossible for the affected people toadapt this situation without the help of government and non-government organizations. People were totally unaware that how would they adapt.Immediate responses to help the affected people werefrom the local elites and rich people of the society.

Regarding last tornado, there was no warning system from anywhere.Mr. Shibli firmly said that, neither government nor NGOs responses were immediate. He accused the whole bureaucratic system for that.After the tornado, some government officials and NGO's worker were started to come with reliefand aids.An Army medical team was sent from the government. They provided free treatment and medicine.Mr. Shibli said that, government and NGO's did not work collaboratively. They only provide relief partially but did not rehabilitate those affected peoples.

Mr. Shiblirecommended that, to face such kind of disaster, we have to build tornado enduring houses and take shelter into safe place during tornado. After tornado, we have to take measures to minimize the damages and rehabilitatethe affected people.

**KII-2**

Mrs. Taslima is a, 43 years old female, primary school teacher. She obtained up to Higher Secondary level education.

According to Taslima Begum, main disaster of this area includes:

- Storm
- Flood
- Drought
- Earthquake, and
- Tornado

She emphasizes mostly newspaper, internet and television as sources of knowledge and information on disaster.

She firmly believes that, there has been no possible warning system in the case of tornado but of flood.

Taslima Begum defines tornado as a more worsen and powerful natural disaster.

To inquire her: why and when it occurs? She said "Carbon dioxide on the earth surface" and it's increasing tendency as a major factors behind tornado and other natural disasters.

She suggested that, taking shelter in a strong building would be wiser during the tornado. Her husband and father in law were outside from home, and unfortunately her father in law died beat by tin during tornado.

She mentioned that several steps must be taken after tornado such as:

- To arrange purified water
- To arrange dry food
- To make shelter for affected people

She repeatedly told about the damages by tornado. And according to her commentary damages includes:

- Physical injuries of both humans and domestic animals
- Damages of roads, culverts, bridges and other infrastructures
- Damages of trees and agricultural lands

She said that, in terms of society, many social problems have been arises by tornado. Mostly she mentioned:

- Social anarchy
- Majority of people who are homeless

Her commentary talks less about the crisis. But she mentioned the crises which are mainly economic and social.

Taslima Begum said that: a vast majority of people were injured. It was as like as the day of Karbala. Nobody could spoke. Journalists were come and help them. People were come from far distance and take injured people to hospital for treatment. Affected people turn back to normal life with the assistance of government, NGO's and most notably local neighbors.

There is no warning system in Bangladesh regarding tornado. Because it occurred suddenly, and within a few minutes, turn into a devastated mood. After tornado, Chairman and member were come immediately and started working to rescue affected people. They had sent injured people to the local hospital for better treatment. In that case, local rickshaw puller and CNG driver came

forward to take injured people towards hospital. Also local rich people provided house construction materials such as: bamboo, tin, wood etc. for the affected people. Although a lot of aids and reliefs provided by the government and non-government organizations, it was influenced and biased by the invisible hands of the local elites/leaders.

Taslima said that to reduce future risk of tornado like disaster we need some important things. Such as:

- People need to be more educated should aware about disaster
- Construction of shelter center
- Government should pay more attention in disaster risk reduction

**KII-3**

Identity of the participants:

Mizanur Rahman, 43 years old Male, is the Project Implementation Officer of SadarUpazila office, Brahmanbaria. He has completed B.Sc in Engineering.

Knowledge on disater:

Mr. Mizanur said that, Flood and storms are common disaster in this area. There is no information Centre related to disaster except the Upazila office and Union Parishad, we try to inform the people about any upcoming disaster. And if situation required also try to help them. Generally disaster related information announced through Television, Newspaper, internet etc. Few days ago, a serious tornado occurred in this area. It was so sudden that immediate warning was not possible.

Knowledge on tornado:

Mizanur said tornado is a strong storm caused by atmospheric pressure and created for the gap of air in ascertains area. He also thinks that tornado is the result of rapid increasing of Carbon-di-oxide in air and it generally occurs in hot weather. He said that people should always be careful and prepare for this type of disaster of the community should work together to rescue the affected. Overall, government policy and project is needed to improve the situation.

Vulnerabilities due to tornado:

In this area many households, trees, roads and bridges, electric pole, tube wells, educational and religious institutions, domestic animal and agricultural lands were damaged due to tornado. Some people died and many were injured. Social disorder appeared because of this damages. Poverty and unemployment rises in the society. The people who lost their houses became shelter less. Education system and social order was also interrupted. After tornado, there was a crisis of purified water, food and shelter. The Brahmanbaria Sadar Upazila office gives a list of the damages in the area.

Table: Description of Damages Given by Upazila Office of the Area

| **Extent of damage** | **Number/amount** |
|---|---|
| Depreciated Household | 1515 |
| Number of Death of people | 36 |
| Number of injured | 692 |
| Seriously injured | 184 |
| Agricultural land (totally) | 173 Acre |
| Agricultural land (partially) | 1112 Acre |
| Educational institution (totally) | 2 |
| Educational institution (partially) | 8 |
| Religious Institution | 5 |
| Roads (*Pucca*) | 2.25 Km |
| Deaths of Domestic Animal | 250 |
| Deaths of Chicken and Ducks | 1100 |
| Village roads (*Kacha*) | 10.95 Km |
| Damaged Tube-well | 30 |

Community response to tornado:

Mizanursaid that, people were perplexed and feared to see the ferocious nature of this disaster. Therefore, they could not decide what they should do. Most of them were just remembering the name of Allah. Government and non-government organizations helped affected people to adapt the situation. Some people also take other strategies to adapt the situation such as: taking loan, selling resources etc. Local people also helped a lot according to their ability. The villagers

played an important role in the case of instant response during tornado. They cooked *khicuri* to feed affected people and made shelter for them.

Govt. and NGO response regarding tornado:

He mentioned that warning was not possible to provide for the last tornado because it was a totally sudden incident. After tornado, government officials and NGO's worker were started to come with relief and aids. He said both Government and NGOs equally played an important role to help the affected people and to lessen the damages. Several medical teams both Govt. and non-government were also provided treatment and medicine among the injured people. An important thing he mentioned that there was no collaboration among government and non-government organizations. An example of support and relief list by both government and non-government was given by the Upazila office also.

Table 26: type of emergency support to the tornado affected household by government and non-government organization

| **Government** | **Type of support given to the households** |
|---|---|
| Ministry of Agriculture | Seeds and saplings |
| Fisheries Division | Loan and financial support |
| Livestock Division | Cow, goat and loan |
| Ministry of Disaster Management and Relief | 30 kg rice, Tk 5000 per household |
| Ministry of Social Welfare | Tin and money |
| Youth Development Division | Treatment and relief |
| **NGOs** | |
| Dutch-Bangla Bank ltd. | Tin and money |
| Bangladesh Development Bank ltd. | Tin |
| BRAC Bank | Tin |
| Sonali Bank | Money |
| BRAC | Relief box |
| ProthomAlo (daily newspaper) | Tin |

| | |
|---|---|
| Islami Bank | Tin and money |
| Bashundhara Group | Tk 5000 and tin |
| Grameenphone | Tin |

Suggestions to solve the problem:

As a PIO, Mr. Mizanur thinks that an emergency shelter should be build for future risk. Warning system should be developed and proper rehabilitation of the affected is also a matter of concern.

**KII-4**

MoshiurRahmanSelim, 45 years old Male, is the Chairman of Ramrail Union Parishad,Sadar, Brahmanbaria and also a businessman as his occupation.He is a Bachelor of Arts.

Flood, storms, water logging and drought are main disaster of this area said by Moshiur. He said that we have got some disaster related information from television, newspaper and Upazila office. Besides this Upazila Parishad also provides some information to the people. The chairman said that because of not being affected by serious disaster near past, the warning and emergency help system was not developed in this area. But the last tornado make us concern to think about it.

Mr. Moshiur defines tornado as a strong circled wind coming forward quickly to a particular area which is created for sudden gap of air in that particular area. He also thinks that tornado is the result of rapid increasing of carbon-di-oxide in the air. In case of tornado preparedness, at first we have to know about this disaster and also know what we should do. During tornado, people should take shelter in a safe place. After the tornado, we should manage the rehabilitation of the affected people and minimize the damages as soon as possible.

There is a heavy damage caused in this area due to tornado and this damage includes death and injury of human and animal and also damage of households, trees, transportation, tube well, religious and educational institution, electric pole, bridge and culverts, crops, pond water pollution etc. Poverty and unemployment appears as the main social problems after the tornado. Besides this financial crisis, food and water crisis and crisis of shelter also aroused among the

affected people. Because of communication system being disrupted, it was also difficult to help the affected and transfer the injured people in hospital.

Mr. Moshiur mentioned that, this was the first time tornado in this area and there was no warning message for this disaster. Therefore, the people did not understand what should do in the time of tornado. They were just remembering the name of Allah and few people took shelter in their neighbors building. The affected people adapted the situation by taking help of Local elites, government and non-government organizations. Local elites or leaders especially Union Parishad member and chairman tried to help them a lot by providing food, water, transferring injured people to hospital and making shelter by tenting for them as immediate response. Union Parishad also was monitoring the whole relief distribution process and rehabilitation of the homeless.

Moshiur said that Government organizations helped the people a lot to minimize their losses. They distributed relief, domestic animal, money, loan, seeds etc. An army medical team was also sent from government to provide free treatment and medicine among the injured people. Some Non-governmental organizations also provided relief, house reconstruction materials, treatment etc. He also said that there was no collaboration between Government and NGOs.

As a chairman Moshiur said that, people need to be more aware about disaster knowledge to reduce the risk of tornado. Government and NGOs should also work together to develop the present condition and to face further future risks.

**KII-5**

Mrs. Hosneara is a 32 years old female. She obtained up to Higher Secondary level education. She is serving in BRAC NGO as a field officer.

According to Hosneara Begum, main disaster of this area are:

- Storm
- Flood
- Drought

She said this area never faces such devastating tornado before this. She emphasizes mostly newspaper, internet and television as sources of knowledge and information on disaster. She also said that there is no warning system for disaster because very few severe disasters occur in this area. But the last tornado has changed the scenario.

Hosneara claimed tornado as the most powerful natural disaster. She claimed the reason for the occurrence of the tornado is rapid increasing of Carbon dioxide on the earth surface as well as rapid environmental pollution is also responsible. She said before disaster people can be prepared if they get warning message, during disaster they should be in a safe place and after the tornado the affected should be rescued and injured people be transferred in hospital as soon as possible.

The participant said that the major damages include:

- Death andcasualties of both humans and domestic animals
- Damages of roads, culverts, bridges and other infrastructures
- Damages of trees and crop lands
- Damages of educational and religious institution
- Damages of houses and loss of household resources

She said tornado resulted poverty and unemployment which increased Social anarchy. Food, water and shelter were the main demand of people during tornado. People surmounted the damages and losses with the assistance of government, NGO's and most notably local neighbors.

Most of the people of this area got feared to see such violent nature of tornado. But immediately after the tornado local people who were not affected and from far areas came to rescue them. They transferred the dead bodies and injured people to hospital. They also provided food and water for the affected households and also help them to make shelter.

Hosneara informed that there is no warning system in Bangladesh for tornado. After the tornado, some government officials and NGO's worker were started to come with relief and aids. They provided house construction materials, money, relief box, food etc. An Army medical team was sent from the government. They provided free treatment and medicine.

As a NGO worker suggests that emergency shelter should be constructed for the future risk. Disaster warning system also should be developed specially for tornado.

## Annexure 3: Focus Group Discussions

**FGD-1**

**Identity of the Participants:**

| Name | Age | Sex | Occupation | Education |
|---|---|---|---|---|
| Md. Azizul Islam | 35 | Male | Farmer | Primary |
| Rahima begum | 32 | Female | Housewife | Primary |
| Md. Nazim Ali | 29 | Male | Day labor | Class Eight |
| Md. Rokibul Islam | 30 | Male | Farmer | Class Nine |
| Md. Toslem Mia | 45 | Male | Rickshaw puller | Class Two |
| Md. Rustom Ali | 55 | Male | Labor | Literate |
| Md. HabiburRahman | 40 | Male | Farmer | Primary |
| Rima Begum | 25 | Female | Housewife | Primary |

**Knowledge on Disaster:**

The FGD participants considered flood, storm and water logging as the main disasters of their area. But the last tornado was the first experience for all of them. They said this was the most devastating rather than other disasters they have ever faced. They generally got disaster related information from Television, Radio, and Newspaper and by local people from Bazar (local people). They did not get any emergency warning before any disaster. They depend on their previous experience to estimate about any disaster specially storms. But in last tornado, local people could not understand anything because it was so sudden incident that nobody could imagine.

**Knowledge on Tornado:**

Most of the FGD Participants have defined tornado in different ways. Such as:

- A twisted and powerful wind containing smoke like dust and feels hot like fire.
- A pipe like wind goes ahead with roaring
- A curse from Almighty
- A miraculous incident.

They also said the reasons for tornado may be:

- Presence of dust and smoke in the air
- Consequences of our sins almighty Allah shows
- Atmospheric pressure
- Hot weather

However, all of the participants agreed on the point that it is a terrific and powerful disaster. "It was a frightening incident I have ever faced. I thought that it is our last day in the world. It was destroying everything" a participant was saying. All of them did not know when and where tornado can be occurred. They also did not know what they should do before or after tornado. But they think during tornado everybody should take shelter in a safer place and after tornado should try to rehabilitate by the help of Government and others.

**Vulnerabilities due to tornado:**

The FGD participants said that tornado caused a huge damage in their area. It also caused some social problems and crisis at that time. These are:

- Death and injury of both human and animal.
- Destructionof households, tube-well, trees, crops and agricultural land
- Disruptionoftransportation and communication system
- Damages in electric pole and thus absence of electricity

There was a severe crisis of food, water and accommodation after the tornado. Financial crisis also faced by affected households. The participants also mentioned some social problems such as: Increase of poverty and unemployment, Problems in education system, corruption in relief distribution etc.

**Community response to tornado:**

The FGD participants said that they were too afraid to do anything because they were shocked to see the sudden violence. But other local people, who were not affected, helped them a lot. They came forward to rescue the affected people as immediate responses. Other responses of local people were:

- Food and water was supplied to the affected people.
- Local elites/leaders instantly came forward for emergency help.
- Local people came to help with their own endeavor.
- They also made shelter by tenting for homeless.
- Medical team came from far areas to provide treatment among the injured people.
- Union parishad Chairman and members also came to look after the affected people.

All of the FGD participants said that they adapted the situation by taking loan from neighbors and relatives and also receiving support or relief from government and non-government organizations.

**Government and NGO responses regarding tornado:**

"We did not get any warning before last tornado" said by the participants. Therefore, they were totally unprepared to do anything. After the tornado Govt. and NGO officials came forward to

help the victims. They provided relief to rehabilitate them and helped to resource mobilization. These organizations distributed relief including:

- Money
- Dry food
- Household reconstruction materials
- Domestic animals
- Loan
- Seeds and saplings
- rice and wheat
- relief box
- Treatment and medicine

**Suggestions and expectations to face this type of disaster in future:**

The FGD participants said that first of all we should pray to Allah to save us from this disaster and make us better. Government and non-government organizations also should increase supporting and helping them.

**FGD-2**

**Identity of the Participants:**

| Name | Age | Sex | Occupation | Education |
|---|---|---|---|---|
| Bojlulhaque | 45 | Male | Tea stall owner | Primary |
| AlomMiah | 42 | Male | Farmer | Primary |
| JoynalAbedin | 50 | Male | Farmer | Primary |
| Samchu Mia | 38 | Male | Day labor | Illiterate |
| Mohammad Machim | 26 | Male | Farmer | class five |
| RotonBiswas | 28 | Male | Day labor | Literate |
| Karimunnesa | 48 | Female | Farmer | Literate |

**Knowledge on Disaster:**

The disasters, which are usually seen in this area, are storm flood and drought in rare case. Sometimes flood are created for heavy rainfall. FGD participants said that in the time of tornado occurrence, weather was very hot. From radio and television, they get disaster related information. Most of them concurred that, there are no warning systems in this area. The village market is a place where all villagers amalgamated and shared information with each other including disaster related information.

**Knowledge on Tornado:**

To ask them: What is tornado? They tell in unison it is a blowing hot wind as like as pipe. They seem that it occurred for the sin of human. In their language, it is a punishment from Allah. To inquire them: Why tornado occurred? They mentioned only hot weather causes tornado. Out of 7, 4 said: we have nothing to do but only rely on Allah. Rest of them said that some steps have to be taken after tornado. Such as:

- To rescue affected people
- To make shelter for affected people
- To feed affected people
- To rehabilitate affected people

**Vulnerabilities due to Tornado:**

They tell in unison that: their roads, houses, domestic animals, tube well, and ponds are mostly damaged by tornado. They almost agreed that; tornado creates many social problems. Many people transformed into destitute. They have no cloth; furniture and mostly lacking of necessary household affairs. Moreover, summarizations of social problems include:

- Social anarchy
- Unemployment
- Poverty
- Homeless peoples

To ask about crisis: they said mostly about economic crisis and accommodation crisis. Most of them denotes to the relaxation of economic activities.

**Community Response to tornado:**

Out of the 7, 1 participant expresses their thought that during tornado there was nothing to do but eying. Actually they became stunned and feared to see the sudden incident and violence of tornado. They firmly said that they have no way to adapt the situation and became helpless. But local people help them as their ability. Regarding immediate response, they mentioned that, union chairman and word members came just after the tornado. They used to looking after the affected people and reciting the verses of condolence without taking proper initiative.

**Government and NGO Response regarding to Tornado:**

The FGD participants said that neither government nor NGOs warned them for last tornado. Regarding last tornado, leaders of the ruling parties were coming with the government reliefs and aids. Local leaders distributed it to the affected people. They all even heard that, NGO's also distributed many things to the affected people. But among them, only few people were getting and most of them deprived from that reliefs and aids.

They all also acknowledged the coming of Army men just after tornado who made many tent as per as necessity and provide medical treatment for affected injured people with free medicine.Most of the participant of FGD claimed that, government and NGO's both do not work in the rehabilitation of affected people. They asserted that, bamboo and tin provided by local neighbors in the rebuilding of the damage houses of affected people.

**Suggestions and expectations to face this type of disaster in future:**

To face such kind of disaster, we need to work in collaboration" said by one of the participants of FGD and others highly appreciated his statement. In additionally, they added some more points to cope with such kind of disaster.

- Mental preparedness
- Reduce environmental pollution
- Strengthen the capabilities of rescue team

**FGD-3**

**Identity of the Participants:**

| Name | Age | Sex | Occupation | Education |
|---|---|---|---|---|
| NazmaAkter | 40 | Female | Housewife | Primary |
| Shafia Begum | 34 | Female | Housewife | Primary |
| Md. Abdullah | 24 | Male | Day labor | Illiterate |
| Md. Harun Mia | 35 | Male | Farmer | S.S.C |
| RiktaKhatun | 26 | Female | Day labor | Class Two |
| Shahida Begum | 52 | Female | Housewife | Literate |
| Md. MotiurRahman | 35 | Male | Petty business | S.S.C |

**Knowledge on Disaster:**

The FGD participants said that Flood, Storm and Nor'wester as the main disasters of their area. Sometimes draught are also seen. They generally have got disaster related information from the Television, Radio and Bazar (local people). Besides Union Parishad and NGO worker also give them some information related to disaster. But there is no specific disaster related information center in this area and they also did not get warning for disaster. They usually estimate about upcoming disaster on the basis of experience. But in last tornado, very few people could imagine about it.

**Knowledge on Tornado:**

All of the respondents in FGD said that tornado is the most devastating tornado they have ever experienced and this was also for the first time in this area. They have defined tornado in different ways. Such as:

- A twisted and powerful wind containing smoke like dust and feels hot like fire.
- A type of wind coming forward with roaring like aero-plane
- A curse from Almighty Allah as outcome of our sins
- A miraculous incident.
- A powerful storm

They also said that the reasons behind tornado may be for hot weather, a curse from Allah, the collision of wind etc. The participants have no knowledge on why, how and when can the tornado be occurred. The last tornado was so sudden that nobody got the opportunity to be prepared for this. But they think in the case of further occurrence, they must have to take shelter in a safe place. Government also should help them more.

**Vulnerabilities due to tornado:**

The FGD participants said that tornado caused a huge damage in their area. It also caused for some social problems and crisis at that time. These are:

- Death and injury of both human and animal.
- Damage in households, tube-well, trees, crops and agricultural land
- Damages in transport and communication
- Damages in electric pole and thus absence of electricity

There was a strong crisis of food, water and accommodation after the tornado. Financial crisis also faced by affected households. The participants also mentioned some social problems such as: Increase of poverty and unemployment, Problems in education system, corruption in relief distribution etc.

**Community response to tornado:**

Because of being first time disaster and no warning message in the last tornado, people became stunned to see the instant violence due to tornado. But immediately after the tornado, the local people including local elites/leaders came forward to help the affected people. The major helps were:

- Food and water was supplied to the affected people.
- Local people came to help with their own endeavor.
- They make shelter by tenting for the affected people.
- They also help the injured people to transfer in hospital.

All of the FGD participants said that they adapted the situation by taking loan from neighbors and relatives and also receiving support or relief from government and non-government organizations.

**Government and NGO response regarding tornado:**

The FGD participants said that they did not get any warning message regarding last tornado from anywhere. After the tornado Government and Non-government organizations came to support the affected people. They provided relief including relief box,money, dry food,household reconstruction materials,domestic animals,loan,seeds and saplings, rice and wheat,treatment and medicine etc. They especially help to rehabilitate them and to resource mobilization.

**Suggestions and expectations to face this type of disaster in future:**

The participants think that the emergency shelter center and warning before the disaster are the key elements to reduce tornado like disaster risk. They also think that they should achieve the grace of almighty Allah to be safe from this type of disaster.

**FGD-4**

**Identity of the Respondents:**

| Name | Age | Sex | Occupation | Education |
|---|---|---|---|---|
| Md. Alomgir | 37 | Male | Emigrant | Class 8 |
| Abdul Barek | 39 | Male | Service | SSC |
| JoynalMian | 45 | Male | Farmer | Illiterate |
| Selim Reza | 32 | Male | Emigrant | S.S.C |
| MasumMollah | 31 | Male | Service | Class 9 |
| Nilufa begum | 29 | Female | Housewife | Class 9 |
| George Mian | 45 | Male | farmer | Literate |
| AmzadMian | 55 | Male | Emigrant | SSC |
| Soleman | 38 | Male | Unemployed | Literate |
| Rita begum | 33 | Female | Day labor | Literate |
| Jorina | 30 | Female | Housewife | Class 8 |

**Knowledge on Disaster:**

According to the participants, storm, nor'wester and flood are the main disasters of this area. But these disasters are not too dangerous. Draught and water logging are also seen sometimes. They generally assume about upcoming disasters on the basis of their previous experiences and also have got some disaster related information from Radio, Television and Newspaper. They did not get any warning ever regarding disaster. Generally the Upazila Parishad and Union Parishad provide help regarding disaster if necessary.

**Knowledge on Tornado:**

The FGD participants said that the last tornado was such a terrible event that we never seen before. It was a strong twisted wind which was rapidly came forward our area and destroyed everything on its way within few minutes. They don't know why and when tornado occurs. But most of the participants think that it was a curse from the almighty Allah. It was also his warning to us about our misdeeds.

The participants said that "we don't know about the preparedness of tornado". But they think that during tornado it is necessary to take shelter in safe place and after tornado rich people, Government and international organization should provide enough aid and relief and help the affected people.

**Vulnerabilities due to Tornado:**

All of the participants in FGD lost their household resources such as: houses, stored crops, furniture, domestic animals etc. Some of them also lost agricultural crops, trees, tube-well etc. most of the participant and their family member got injury where one of them two member of his family. The main problem during tornado was the damages in communication and transportation system of the area. Because of this reason, it was difficult to transfer the injured people into hospital and the other people who were not affected could not come to help us immediately.

The main crises due to tornado were lack of food, water and shelter. Number of poor and unemployed people raised in the society. Most of the affected people became helpless after losing everything.

**Community response to tornado:**

The participants said that at first the local people who were not affected came to help us. They rescued the affected and took the injured people to the hospital. They also provided food and water to them. Local rich people including Union Parishad chairman and member provided us house construction materials such as: bamboo, tin, wood etc.After the tornado, Local leaders and elites including Chairman, MP and businessman also helped the affected people. But the affected people had nothing to do only remembering the name of Allah because they became stunned to see the violence of tornado.

**Government and NGOs response to tornado:**

The participant mentioned that they didn't get any warning message from both government and NGOs. They also said that it is not possible to alert people before tornado because it is a sudden event. Government organizations helped them by providing relief including cash, loan, domestic animal, rice and wheat etc. An army team also sent from the government to help in monitoring and to provide treatment among the injured. Non-government organizations distributed relief box, cash, house reconstruction materials, tin, dry food and water.

**Suggestions and expectations to face this type of disaster in future:**

To face such kind of disaster, we need to know about preparedness said by the participants of FGD. In additionally, they added some more points to cope with such kind of disaster.

- Construction of shelter center
- Reduce environmental pollution
- Government and NGO need to help us more, and
- Need to achieve the grace of Allah because he only can stop this disasters

**FGD-5**

**Identity of the participant:**

| Name | Age | Sex | Occupation | Education |
|---|---|---|---|---|
| Neyamat Ali | 54 | Male | Farmer | class two |
| Marzina Akter | 43 | Female | Housewife | Primary |
| Parvej Ahmed | 33 | Male | Petty business | Class four |
| MostafijMiah | 56 | Male | labor | Literate |
| MirajUddin | 62 | Male | Farmer | Literate |
| ShamimMiah | 46 | Male | Labor | Primary |
| Rahim Miah | 48 | Male | Farmer | Primary |
| RunaKhatun | 30 | Female | Housewife | Class eight |

**Knowledge on disaster:**

They mainly talk about storm, heavy rainfall, earthquake and tornado as most frequently occurred disaster in their area. They consider local market place as a main point of getting any information. They all agreed that, there was warning system regarding disaster.

**Knowledge on tornado:**

They seem tornado as a more devastating and terrific event. They consider hot weather as a prime cause of tornado. And according to them hot season is more prone to tornado. According to their viewpoint, although it is impossible to figure out the specific time of tornado, it is wiser to prepare for tornado, and during tornado must moves into safer places. After tornado, we have to work together collaboratively.

**Vulnerabilities during tornado**

They mentioned damages, social problems and many crises as vulnerabilities after tornado

includes:

- Losses of infrastructures
- Losses of trees, crops and paddies
- Losses in communication

Social problems include:

- Increases in crime rate
- Increases in price of the commodities
- Unemployment
- Poverty etc.

Crisis includes:

- Socio-economic and
- Cultural

**Community response to tornado**

They asserted that, affected people were getting help from near neighbors. Neighbor cooked *Khicuri* to feed affected people. Also, they provide construction raw materials to homeless people. Participant of the FGD said that they did not adapt their situation yet.

**Govt. and NGO response regarding tornado**

They heard that, a lot of aids and reliefs were allocated from national and international level. But mismanagement of local authorities make this distribution processes hampered and biased. According to their commentary, after tornado army men were come with aids. They provide tent and medical treatment for affected people.

**Measures to reduce the future risk:**

They mentioned mainly

- The knowledge of proper management of disaster
- Early preparedness etc.

## Annexure 4: Semi Structured Interview Questionnaire

Dear participants,

We are currently conducting an interview-survey on the heading of **"People's Perception and Response to Tornado Of 2013: A Study at Sadar and Akhaura Upazila in Brahmanbaria"** For this, we are going to interview among Tornado affected people in Brah Bangladesh in partial fulfillment of M.S.S. degree in the Department of Sociology, University of Dhaka. For the present survey, we need to collect data related to socio-economic, disaster response and perception of the affected peoples. The collected data from the participants would entirely be used only for the above mentioned academic purpose. Personal identity and relevant issues of the respondents would be kept strictly **confidential.** If you don't like to participate in this survey, you can do it. But we request you to participate in this survey for the considering our academic purpose. It will take 35-40 minutes to answer the questions here in interview schedule. You have full right to stop answering at any stage of the interview session; even you may leave any particular question if you wish.

(If the respondent agrees, please start interview)

**Study Location:**

A) Village:

B) Word No.:

C) Union:

D )Upazilla:

E) District:

Interview Date:

Interview start time:Interview end time:

**Identity of the respondents**

Name of the respondent:

Name of household head (HHH):

**Section A: Socio-Economic information of the respondent's household**

| Member | Name | Relationship with HHH (code) | Sex (code) | Age | | Marital Status (code) | Education (code) | Occupation (code) | | Monthly Cost of HH (in taka) | Monthly Income of HH (in taka) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Year | Month | | | 1st | 2nd | | |
| 1 | | | | | | | | | | | |
| 2 | | | | | | | | | | | |
| 3 | | | | | | | | | | | |
| 4 | | | | | | | | | | | |
| 5 | | | | | | | | | | | |
| 6 | | | | | | | | | | | |
| 7 | | | | | | | | | | | |
| 8 | | | | | | | | | | | |
| 9 | | | | | | | | | | | |

| Relationship code | Sex code | Marital status code | Education code | Occupation code |
|---|---|---|---|---|
| 1. Self<br>2. Husband/Wife<br>3 .Son/Daughter<br>4. Brother/Sister<br>5. Father/Mother<br>6. Son in law/Daughter in law<br>7. Other (specify) | 1. Male<br>2. Female<br>3. Transgender | 1. Married<br>2. Unmarried<br>3. Divorced<br>4. Separated<br>5. Widow/Widower | 1. Illiterate<br>2. Primary<br>3. High school<br>4. SSC<br>5. HSC<br>6. B.S.S<br>7. M.S.S<br>8. Other (specify) | 1. Agriculture 2. Labour<br>3. Fisherman<br>4. Petty business<br>5. Big business<br>6. Teacher<br>7. Govt. service<br>8. Non-govt. service<br>9. Housewife<br>10. Rickshaw/van pulling<br>11. Student<br>12. Unemployed<br>13. Village doctor<br>13. other (specify) |

11. House structure: 1=concrete 2=semi concrete3= tin shed 4=thached

**Section B: Disaster Related Information**

12. What are the main disasters of your area?

1=Flood 2=Storm 3=Tornado 4=Drought 5=Water logging 6=River bank erosion 7=Other (specify)……

13. Did you face any disaster since last 5 year?

1=Yes 2=No

13(a).If yes, Then what kind of disaster?

1=Flood 2=Storm 3=Tornado 4=Drought 5=Water logging 6=River bank erosion 7=Other (specify)…….

14. Where you can get disaster related information?

1=Radio 2=Television 3=Mobile 4=Local administration 5=Union Prisahad 6=BAZAR (market)/from local people 7=Volunteer 8=Others (Specify)…….

**Section C: Perception on Tornado**

15. Have you ever faced Tornado?

1=Yes 2=No

15(a). If yes, define tornado?

……

……

16. In your opinion what are the reasons for Tornado?

1=Collision of two masses of wind 2=Cyclone 3=Unstable atmosphere 4=Roar of the wind 5=Curse of 'Allah' 6=Outcome of our sin 7=Don't know 8=Others……

17. Is there any difference among Storm, Cyclone and Tornado?

1=Yes 2=No 3=Don't know

17(a). If yes, specify the difference?

……

……

……

……..

**Section D: Impacts of Tornado**

18. Were you affected by the Tornado occurred in March, 2013 at your area?

1=Yes 2=No

18(a).(If yes) what type of damages you faced?

1=Death of the household member2=Injury 3=Total damage of the household 4=Partial damage of the household 5=Loss of domestic animal 6=Loss of household resource 7=Health problem 8=Loss of crops 9=Damages in agricultural land10=Damages in agricultural land 11=Other(specify)…….

19. What types of strategies did you take to survive from the damages?

1=Received the help of relatives and neighbors 2=Received the Govt. and NGO support 3=Take loan 4=Alternative income 5=Personal initiatives 6=Others (Specify)…….

20. What kind of preparedness should be taken to face this kind of disaster risk?

1=Necessary deposit 2=Primary concept to face disaster 3=Disaster enduring infrastructure 4=Collect necessary disaster facing instruments 5=Have knowledge on local shelter centre and infrastructure 6=Making relationship with disaster assistance organization & person working on disaster 7=Have knowledge on source and information of disaster 8=Knowledge on disaster warning 9=Don't know 10=Others (Specify)……..

**Section E: Response to Tornado**

21. Have you received any warning for last tornado?

1=Yes 2=No

22. What were you doing while Tornado hit?

1=Left the house 2=Stay in house 3=Remembering the name of *Allah* 4=Taking shelter 5=Instant communication with someone for help 6=Protection of valuable things 7=Others (Specify)……..

23. Have you taken shelter in any place during Tornado?

1=Yes 2=No

23(a).If yes, Where?

1=Cyclone/flood shelter centre 2=Neighbor's building 3=Union Parishad building 4=High road/dam 5=school 6=Others (Specify)……

24. Is there any Union Disaster Management committee (UDMC) in your Union Parishad (UP)?

1=Yes 2=No 3=Don't know

25. Did you get any emergency support during Tornado?

1=Yes 2=No

26. If yes, from where?

1=UDMC 2=UP 3=Local elites/local leaders 4=NGO 5=Govt. 6=Others (Specify)……

27. What kind of support you received during Tornado?

1=Looking after affected people 2=Providing necessary information and suggestion
3=Transferring the affected in safe place 4=Taking measures in reducing damages
4=Transferring dead bodies 5=Continuous communication 6=Health and food aid 7=Other (Specify)…….

28. Were there any NGOs involved in the response to Tornado in your locality?

1=Yes 2=No

28(a). (If yes) then mention the name of the NGOs?

1.

2.

3.

4.

5.

29. Were there any responses the Govt. adopts?

1=Yes 2=No

30. Were there Local elites/local leaders adopt any responses?

1=Yes 2=No

31. What were the responses from govt. NGOs and local elites/leaders?

| Sources | | |
|---|---|---|
| Govt. (code) | NGO (code) | Local elites/ Local leaders (code) |
| | | |
| | | |
| | | |
| | | |
| | | |

1. Make shelter 2. House reconstruction 3. Maintenance 4. Provide construction materials 5. Create awareness 6. Provide relief 7. Provide domestic animal 8. Financial help 9. Provide loan 10. Provide information 11. Make volunteer 12. Provide training 13. Health treatment 14. Agricultural accessories 15. Other (Specify)

32. In your opinion, what measures should take in facing this type of disaster?

1.

2.

3.

4.

Thank you for participating in this survey

## Annexure 5: Checklist for FGD, Case Study, KII

Checklist

1. Identity of the participants (name, age, sex, occupation, education)
2. Knowledge on disaster
    a) Main disaster of the area
    b) Sources of knowledge and information on disaster
    c) Warning and necessary help
3. Knowledge on tornado
    a) What is tornado?
    b) Why and when it occurs?
    c) What should do before, during and after tornado
4. Vulnerabilities during tornado
    a) Damages
    b) Social problems
    c) crisis
5. Community response to tornado
    a) Peoples activities during and after tornado
    b) Adaptation strategies
    c) Immediate response
6. Govt. and Ngo response regarding tornado
    a) Warning system
    b) Immediate response
    c) Response after tornado
    d) Response to resource mobilization
7. In your opinion, what measures should be taken to reduce future risk.

**Annexure 6: Reports of different national and international newspapers on Tornado of 22 March, 2013 in Brahmanbaria, Bangladesh.**

The Daily Star

Saturday, March 23, 2013

## Brahmanbaria tornado toll reaches 22

**Star Online Report**

*People sift through the debris a day after a twister ravaged 20 villages of Brahmanbaria. Photo: Star*

"Many of a few thousand people of tornado-ravaged villages of Brahmanbaria moved to school buildings Saturday when the body of a 35-year-old woman was recovered and an injured baby succumbed to her injuries, pushing the death toll to 22. While Yasmin Begum's body was recovered 250 yards off her house in Chinair Uttarpara at 5:30am, nine-month-old Sabiha from Chinair Chowdhurybari died at Dhaka Medical College Hospital at 8:20 last night. Another man was electrocuted while trying to see the damage from his rooftop as the locals waited for government assistance to start rebuilding their houses.

Besides asking people to move six school buildings, the local administration started setting up tents in 20 villages of three upazilas of the district—Brahmanbaria Sadar, Bijoynagar and Akhaura upazilas. Hours after the 15-minute twister's massive destruction that befell on the area at 5:30pm Friday, the shell-shocked locals were seen sitting beside the debris Saturday.

Cutting the debris marched some processions as the affected people arranged burial for the dead victims. The road and rail communications which were closed after the tornado were opened early Saturday after uprooted trees and wrecked vehicles were removed. Almost 20 hours after the disaster, the tornado-hit people found something to eat Saturday thanks to the local

administration which started to distribute 15 kilograms of rice, four bundles of corrugated iron and Tk 9,000 for each of the affected families.

Rescue operation, conducted by army, Border Guard Bangladesh, Fire Brigade, Rapid Action Battalion and police was wrapped up in the noon as locals failed to say whether anyone was missing. According to local lawmaker Rabiul Moktadir Chowdhury, 1000 families were affected by the Friday afternoon twister, which also pulled out around 3,500 trees besides damaging crops and killing at least 21 people.

In the morning, some of the victims were seen trying to pull out plastic sheets to put up tents in the most affected villages—Patirhata, Urshiura, Chandi, Chinair, Kodda, Radhika, Bashudev, Badshala in Sadar upazila; Azampur in Akhaura and Merashine in Bijoynagar upazila.As the district disaster management committee had yet to complete assessment of the damage, many locals from surrounding areas of the tornado-ravaged 20 villages turned up to feed their neighbours.

"While some brought puffed rice, *chira* and buns, some brought cooked food," said M Nazmul, 70, a freedom fighter, who was seen distributing the same in Urshiura, Chinair and Patiasar village.The local administration also started to distribute rice and cooked food after the noon.

Anwar Hossain, 52, whose nephew Lila Begum and sister-in-laws Rkeya Begum and Amena Begum were killed in the twister, said he received half a sack of rice from the local administration.

"While we distributed Tk 6,000 and 2 bundles of corrugated iron from government fund, Dutch Bangla Bank donated Tk 3,000 and 2 bundles of corrugated iron for each of the affected families," Brahmanbaria Deputy Commissioner Noor Mohammad Majumder told The Daily Star.Each of the dead victim's families was given Tk 20,000, he added.Besides killing people and cattle and ravaging houses, trees and electric poles, the twister damaged all crops on its 8-kilometre trail.Saying that the government relief is not enough for them, locals urged the authorities to think about their future.

"How can I survive once that I have lost my only cow? They are giving us only today's food. What about tomorrow, the day after?" said Milon Mia, 30, a farmer of Chinair village."We want to stand on our own feet. Please arrange employment for us," appealed Sentu, 36, a farmer of Chandi village said.Meanwhile, State Minister for Law Kamrul Islam who hails from the area, told reporters that Prime Minister Sheikh Hasina will visit the tornado-ravaged villages in a day or two"

bdnews24.com
Bangladesh's First Online Newspaper

## Tornado death toll rises to 24

Sun, Mar 24th, 2013 6:03 pm

Death toll rises to 24 in tornado-hit B'baria. Prime Minister Sheikh Hasina is scheduled to visit the area on Monday; (Brahmanbaria Correspondent)

"Three more people, who were injured in Friday's tornado that ripped through several villages in Brahmanbaria district, succumbed to their injuries on Sunday. With the latest casualties, the death toll rose to 24, District Civil Surgeon Sarfaraj Khan told bdnews24.com on Sunday noon. Khan said they died in a hospital where they were being treated for injuries.

The violent storm lashed the villages on Friday afternoon, leaving 20 people dead and hundreds of others injured. A critically injured child died on Saturday. Deputy Commissioner Nur Mohammad Majumder said authorities assigned four teams to provide relief and other support to the affected people. They have a list of some 1,500 'affected' people, he said. But many victims said they did not get any relief from the government. Meanwhile, Jatiya Party Chairman HM Ershad visited some of the affected villages on Sunday. Prime Minister Sheikh Hasina is scheduled to visit Brahmanbaria on Monday

theindependent

FRIDAY, 22 MARCH 2013

**Tornado flattens Brahmanbaria villages killing 10, hurting 500**

DHAKA: "At least ten people, including two women, were killed and over 500 others injured in a Tornado that ravagedten villages and flattened hundreds of homes in Brahmanbaria district Friday afternoon. Two of the deceased were identified as Doly Rani Dey, 30, and Lovely Begum, 30, of Urshiura village in Sadar upazila.Of the deceased, five were killed in Sadar upazila and three in Akhaura.

Witnesses said the violent storm swept through six villages, including Urshiura, Tinai and Sultanpur, in Sadar and Bijoynagar upazillas about 5pm.Vehicular movement on Comilla-Sylhet highway remained suspended for about two hours as roadside trees being uprooted fell on it during the tornado.
A bus also fell into the roadside ditch, leaving several passengers injured.The injured were rushed to Sadar Hospital and different nearby clinics.Confirming the season's first storm, Sadar UNO Ripon Chakma said they went to visit the affected areas."

NEW AGE | Online Edition
THE OUTSPOKEN DAILY

Saturday, March 23, 2013

## 20 dead as tornado rips through Brahmanbaria

**Mohiuddin Alamgir and Kazi Hannan Khadem**

A tornado-injured woman along with her child comes to a hospital at Brahmanbaria for treatment on Friday. â• • New Age photo

"At least 20 people were killed as a tornado ripped through 15 villages at Akhaura, Bijoynagar and in the Brahmanbaria district headquarters on Friday afternoon. More than 300 houses were damaged. The death figure could be rising as several hundred people were injured, officials said. The injured, sent to Brahmanbaria General Hospital and the upazila health complex at Akhaura, meanwhile, faced problems of treatment because of inadequate manpower and lack of seats in the hospitals, witnesses said.

The tornado whipped up roofs of more than 300 houses and blew over a large number of trees and electric poles. The jail house in the district was also partly damaged. Standing crops were also damaged. The tornado lasted several minutes. Some said that they had felt a wave of heat when the tornado swept over the area about 5:00pm. Families were frantically looking for their members who went missing and survivors were shocked at what they saw around them.
The acting president Abdul Hamid and the prime minister, Sheikh Hasina, expressed shock at the loss of lives and property. They both asked the officials concerned to take necessary steps for rescue operation.

'We felt a wave of heat sweeping over. I cannot explain what happened,' said Abdur Rashid, who survived the tornado at Akhaura. The deputy commissioner, Nur Mohammad Majumder, told New Age about 11:50pm that at least 20 people had died as tornado had swept over Akhaura, Bijoynagar and the district headquarters for about 15 minutes. He said that they were trying to get details. He said that all the deceased were inhabitants of Akhaura and the Brahmanbaria district headquarters. The local administration decided to deploy Border Guard Bangladesh personnel in conducting rescue operation and keeping law and order.

Local people said that several others had still been missing but alleged about 8:30pm that no rescue operation had been initiated till then. Almost all areas of Bijoynagar and the district headquarters plunged into darkness as the power supply system broke down. Railway communications on the Dhaka–Sylhet and Dhaka–Chittagong were snapped as the Bhatshal railway station was damaged. Bus service halted on Dhaka–Agartala Highway as the tornado blew over trees on the road stretch from Ramrail to Chinar.

The civil surgeon, Sarfaraj Khan, told New Age that physicians in the emergency ward in Brahmanbaria General Hospital pronounced at least five people dead after they had been taken there. Three of them could be identified — Lovely Begum, 35, and Dolly De, 27, of Pattan of Bijoynagar, and the district jail keeper, Masudur Rahman, 25. The identity of the two others could not be immediately established. The Akhaura upazila health officer, Shah Alam, told New Age that five people died in and on their way to upazila health complex after being wounded wounded in the tornado. Two of them could be identified — Sumi Akhter, 10, and Joynal Mia, 32, of Jarambal in the upazila."

THE BANGLADESH™ CHRONICLE

Tornado kills 9 in Brahmanbaria
March 22, 2013 | Filed under: Latest,News | Posted by: bdchronicle

"At least nine people, including a child, were killed and more than 300 others injured when a tornado ripped through scores of villages at the Sadar, Bijoynagar and Akhaura Upazilas of Brahmanbaria district on Friday afternoon.

Of the deceased, seven were identified as jail keeper of the district jail, Masudur Rahman, 25, Abu Taher Mia, 60, of Mohammadpu, and Jhanu Chowdhury, 52, of Chinair at Sadar Upazila, Lovely Begum, 35, and Dolly Dey, 27, of Pattan of Bijoynagar Upazila, Joynal Mia, 32, and Sumi Begum, 10, of Jaruitala of Akhaura Upazila. The two others could not be immediately named.

The district's Deputy Commissioner Nur Mohammad Majumder told bdnews24.com jailkeeper Masudur Rahman died on the spot after a portion of the boundary wall of the jail collapsed due to the violent storm. Akhaura Police Station Sub-Inspector Zakir Hossain confirmed the deaths of Joynal and Sumi during the storm. Mashiur Rahman Selim, Chairman of Ramrail Union Parishad of the Sadar Upazila, said Taher Mia was killed in wall collapse during the storm. One Atul Mia confirmed that his maternal uncle Jhanu Chowdhury died on the spot after a tree fell on him during the storm.

Residential Medical Officer at Brahmanbaria Sadar Hospital Dr Abu Syed told bdnews24.com that physicians at the hospital's Emergency Department pronounced four, including Lovely and Dolly, dead after they had been taken there. He said of the two unidentified men, one was aged about 22 while another about 45.

DC Majumder said many houses and standing crops on a huge swathe of land were badly damaged by the tornado. The storm uprooted scores of trees and electric poles as it swept through Urshiura and its surrounding villages of the Sadar Upazila at around 5pm, he added.

Health officials said that many injured in the tornado had been admitted to hospital and many of them were reported to be in a critical condition. Witnesses said that many of the injured suffered for lack of accommodation in hospitals.

The deputy commissioner said that the government had already announced that families would be given Tk 20,000 against each of the deceased and Tk 5,000 and corrugated iron sheets against each of the people injured in the incident. At least 20 people were, meanwhile, injured in Lalmonirhat as a tornado swept over 25 villages of five upazilas of the district on Thursday night. About a thousand non-brick and half-brick houses were damaged. Trees, hoardings and electric poles were blown over on roads. Crops were also damaged. The injured were admitted to health complexes and Lalmonirhat General Hospital."

Australia Network News

# Tornado kills at least 20 in Bangladesh

Updated Sat 23 Mar 2013, 6:33am AEDT

**A powerful tornado has ripped through more than a dozen rural villages in eastern Bangladesh, killing at least 20 people and injuring more than 100.**

"The tornado wrecked havoc in Brahmanbaria district over a 15-minute period, authorities said, uprooting thousands of trees and flattened hundreds of tin and mud-built houses in the area, and snapping road and rail communication with affected villages.

"The death toll is now 20, including women and children. At least 100 people are injured," government district administrator Nur Mohammad told AFP. He said local authorities have launched relief and rescue operations in the region.

"It was so powerful that it overturned dozens of motor vehicles and big trucks," he added, saying those who died were mostly hit by fallen trees or collapsed walls.

District police chief M. Moniruzzaman said of the 100 people hospitalised, up to 12 people were in a critical condition.

"Many of the injured were rushed to hospitals in cities including the capital Dhaka," he told AFP.

Bangladesh is hit by powerful storms and tornadoes from March to mid-May just ahead of the four-month-long wet monsoon season, often killing scores and in some years hundreds of people in rural villages."

**AFP**

Saturday, March 23, 2013

# Tornado in Bangladesh kills 20, more than 200 injured

Zeenews Bureau Dhaka: "A tornado on Saturday ripped through Bangladesh's eastern Brahmanbaria district leaving 20 people dead and injuring 200 other.The tornado flattened hundreds of houses, trees and electric poles while damaging crops onfarmland in four sub-districts, reported Xinhua citing Nur Mahmud Mozumder, chief executiveofficer of the district.

The tornado, with a speed of over 70 km, was accompanied by hail storm and lasted for a fewminutes, the official said, adding the victims were killed by collapsed houses and fallen trees. The toll might go up as reports from remote villages were yet to be collected, he said."

## Bangladesh: Brahmanbaria tornado rips through 20 villages, leaves 20 dead, at least 100 (some rpts say 500) injured –

MARCH 22, 2013 BY GOATY'S NEWS

**A tornado ripped through 20 villages in eastern Bangladesh on Friday, killing 10 people and injuring about 500 others, a report said.**

The Prothom Alo newspaper said the 15-minute storm destroyed many homes and shops and uprooted large numbers of trees in Brahmanbaria district. It quoted officials as saying one child was among the dead. The storm cut train service in the area, it said. Villagers and emergency personnel took many of the injured to hospitals, news reports said. Officials could not be reached immediately for comment.

Friday, 22 March, 2013 at 17:57 (05:57 PM) UTC RSOE

**Other reports**

"**At least 10 people were killed and some 500 injured in a tornado that ripped through eastern Bangladesh.**
The storm destroyed many homes and shops and uprooted large numbers of trees, local media said." – Voice of Russia, RIA

**Tornado kills at least 20 in Bangladesh**

**Map:** Bangladesh
"A powerful tornado has ripped through more than a dozen rural villages in eastern Bangladesh, killing at least 20 people and injuring more than 100.The tornado wreaked havoc in Brahmanbaria district over a 15-minute period, authorities said, uprooting thousands of trees and flattened hundreds of tin and mud-built houses in the area, and snapping road and rail communication with affected villages.

"The death toll is now 20, including women and children. At least 100 people are injured," government district administrator Nur Mohammad told AFP. He said local authorities have launched relief and rescue operations in the region."It was so powerful that it overturned dozens of motor vehicles and big trucks," he added, saying those who died were mostly hit by fallen trees or collapsed walls. District police chief M. Moniruzzaman said of the 100 people hospitalised, up to 12 people were in a critical condition. "Many of the injured were rushed to hospitals in cities including the capital Dhaka," he told AFP.Bangladesh is hit by powerful storms and tornadoes from March to mid-May just ahead of the four-month-long wet monsoon season, often killing scores and in some years hundreds of people in rural villages." – **AFP**

**Annexure 7: Pictures of the scenario of damages in locality due to Tornado of 22 March, 2013 in Brahmanbaria, Bangladesh.**