Protection Motivation of Flood Prone Households in North-Central Bangladesh

MSc Minor Thesis
August 2018

Md. Sazzad Ansari
MSc, Sociology of Development and Change,
Development and Rural Innovation,
Wageningen University
Registration Number: 861231015060

Thesis submitted in partial fulfillment of the requirements for the degree of Master of Science in Development and Rural Innovation (MDR) at Wageningen University, Netherlands.

Thesis Supervisor

Dr. Jeroen Warner
Associate Professor,
Disaster Studies, Sociology of Development and Change Chair Group,
Wageningen University, Netherlands

Acknowledgement

First of all, I would like to express my gratitude to the people of the study areas in Tangail and Jamalpur District who were willing to spare valuable time for this research. I had the sad feelings that I went to the affected areas after the flood of 2017 to pursue my need, but could not give anything in return. But, there was such hospitality from the local people that cannot be expressed in words.

My sincere appreciation goes to Dr. Jeroen Warner, Associate Professor, Disaster Studies Group, Wageningen University for patronizing this research project. Moreover, it has been an honor for me to work with him sharing the same office for the last couple of months. He is an amazing person to work with.

I would like to thank the volunteers and the Unit Level Officers of Bangladesh Red Crescent Society at Tangail and Jamalpur District Office for supporting me during the field work and my friend Khalilur Rahman for his generous assistance in designing the survey questionnaire in Bangla and also in data entry process. I would also like to extend my appreciation to the Resilience Brigade project of the Wageningen University, Netherlands for providing financial contribution for the field work of this research.

Besides, I acknowledge the assistance that I received from Farhana Ahmed & CEGIS (Center for Environmental and Geographic Information System) and Kamrul Hasan during arranging the field work and also for stakeholder mapping process for this research.

Finally, I would like to express my gratitude to my Mother for her blessing and encouragement in my whole life.

August, 2018

the Author
Md. Sazzad Ansari

Abstract

The scientific literature on protection motivation of the people suffering from floods is limited. The present thesis entitled 'Protection Motivation of Flood Prone Households in North-Central Bangladesh' conducted to assess how people evaluate the flood risk and their coping capacities to reduce the damage due to flood and also to identify variables that influence protection actions to floods. The objectives and information from the field were framed using the Protection Motivation Theory (PMT) which has two main components i.e. threat appraisal and coping appraisal. The study employed a mixed method approach to answer the research questions at three different locations; area with hard flood risk reduction measure and without any measure (in Tangail District) and area with soft measures (Jamalpur District). The quantitative household survey was designed considering the components of PMT to assess the perception of people on flood risk, existing coping capacities, previous experience, and reliance on public and private flood risk reduction interventions. Besides, the qualitative discussion with the local people helped to understand the causes of de/motivation of the people to take protection actions to floods and also threat and coping appraisal. For the second question, the study analyzed the quantitative status of the respondents to identify the influential variables for protection motivation performing correlation analysis. Due to insufficient sample size, the study could not perform separate correlation analysis of each of the study areas and regression analysis.

The study found higher protection motivation attitude (reflecting on threat and coping appraisal) among the respondents living with soft measures i.e. NGO implemented disaster risk reduction measures compared to people living without any measure and hard flood risk reduction measure. For instance, the people with soft measures were found more capable of assessing hypothetical future threat of floods and potential damage due to that event. They ranked the intensity of hypothetical flood and associated severity of damage as 'High to Very High'. Moreover, the people were found more prepared (i.e. coping capacity) to face the future flood in terms of taking preparedness actions compared to other areas. The study also explored that the soft risk reduction actions led by non-governmental organization contributed towards enriching the people through awareness rising and financial assistance. However, negative coping strategies were also found among the people living with hard measures during the water logging situation. For example, a few respondents mentioned selling of their domestic animals. The people living without any measure showed a few preparedness actions and these capacities were linked to their experience facing flood in the past and gaining knowledge how to deal it. Besides, a few respondents in all areas rejected making efforts to be prepared for flood. More than one third and one third of the respondents living without any measure and hard measure area respectively found to be fatalist as they thing flood is a natural event and they do not have anything to do with it.

The study also identified a few variables which might have influence in protection motivation of the respondents to flood. The correlation analysis found significant positive correlation between threat appraisal and hard flood risk reduction measures including raising the plinth of the house, toilet and tubewell and with a soft measure ‘evacuation plan’. The previous flood experience of the respondents found negatively correlated with hard measures and positive relation with soft measures including storing crop seeds, emergency equipment and family awareness. The reliance of the people on disaster risk reduction project of NGOs found positively correlated with structural improvement. The reason could be the technical and financial assistance provided by the NGOs to the people to make the household structure resilient. Lastly, the socio-economic variables including education, income have found negatively correlated with all the structural variables and soft preparedness actions.

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List of Abbreviations

BDRCS	Bangladesh Red Crescent Society
BWDB	Bangladesh Water Development Board
CBDRR	Community Based Disaster Risk Reduction
CDMC	Community Disaster Management Committee
CDRT	Community Disaster Response Team
FAP	Flood Action Plan
FGD	Focus Group Discussion
IFRC	International Federation of Red Cross and Red Crescent Societies
NGO	Non-governmental Organization
PMT	Protection Motivation Theory
RQ	Research Question
SPSS	Statistical Package on Social Science
SRC	Swedish Red Cross
SRQ	Sub-research Question

Chapter One: Introduction

1.1 Vulnerability and Impact of Flood in Bangladesh

Bangladesh, a low-lying, densely populated South Asian country, is highly flood prone due to its geographical characteristics. Eighty percent of the country consists of floodplains of the Ganges, Brahmaputra, Meghna and several other rivers (Brouwer, 2007). One-third of the country gets severely affected by floods once every ten years, while more than 60% of the country was inundated during the catastrophic floods in 1988, 1998 and 2004 (CEGIS, 2002). The flood history (notably in 1974, 84, 87, 88, 91, 98, 2000, 04, 07) of Bangladesh shows the aggression of restless rivers. Most of the rivers are of foreign origin, which again means less control over the water flow and also subject to trans-boundary political issue with neighboring countries that caused serious destruction of properties and danger to lives and livelihoods of the people (Khalequzzaman et al., 1994; Brammer, 2010). Apart from the deltaic nature of the country, Bangladesh remained another critical place in recent decades due climate variability and its consequences (Younus & Harvey, 2014). For instance, the increased volume of rainfall due to climate variability in the past decades has intensified the flood problems (IPCC, 2001).

The combination of geography and population density makes the population of the entire country vulnerable to various disasters (Parvin et al., 2016). Among the risks and vulnerabilities, flood is the most common and frequent and also considered as one of the main threats towards development (Rayhan, 2010; Paul & Routary, 2010; Younus, Sharna & Rahman, 2014). The flood damage and vulnerability can be seen from three different determinants such as exposure to flood, sensitivity of flooding and adaptation. The first two basically determine the damage caused by flood, but can also overestimate the actual damage. The third factor is adaptation, which means the capacity of the people, through which affected population can escape some of the flood damages (Grothmann & Reusswig, 2006; McCarthy et al., 2001).

The impact from a disaster can be both direct and indirect. The immediate destruction is occurred by natural disasters, called direct damage and it includes mortality, morbidity and destruction of critical assets such as housing, schools, hospitals, transport infrastructure and businesses (UNISDR, 2009). The indirect or longer term impacts are also referred to as ‘losses’. They have macroeconomic and developmental impact and affects the pace and the nature of socioeconomic development (Cavallo & Noy, 2009). As Development for International Development (DFID, 1999) mentioned five capitals while defining ‘development’ in the DFID Sustainable Livelihoods Model and those capitals are human, financial, social, natural and physical. These capitals influence the wellbeing of the people and the risk and resilience status of a community (Keating et al., 2017). The impact of disaster does harm to these capitals, thus affected people became weaker in strength to deal crisis afterwards. For instance, disasters have serious impact on the food security, specifically on economic and physical access to food, availability and also the stability of supply and the utilization. The implications for food security depend mainly on whether a disaster affects primarily people’s physical and economic access to food or the availability of food or, in the worst cases, both. Again, people in remote areas and those for whom physical access has been interrupted through a disaster event often suffer significant shortfalls in food intake (de Haen & Hemrich, 2007).

There are different measures are already being employed to reduce the damage caused by the flood disaster in Bangladesh. Those fall into two categories; structural (also known as control) and non-structural (also known as flood management) (Rahman, 1996; Mirza & Ericksen, 1996). The structural measures mean the development of state led physical interventions including building flood protection embankment. Non-structural measure, on the other hand, represents a careful consideration of the inherent strength of the community including people's wisdom, knowledge and traditional institutions to live with flood (Rahman, 1996; Mirza & Ericksen, 1996; Warner et al., 2002).

1.2 Problem statement

Being a low lying delta, the people of Bangladesh are experiencing floods regardless of types: high frequency low magnitude or low frequency high magnitude flood (Khalequzzaman et al., 1994; Brammer, 1990). The studies which are conducted on flood disaster mostly focus on impact and adaptation of the flood prone people of Bangladesh (Chowdhury, 1988; Khalequzzaman et al., 1994; Schmuck, 2000; Brouwer et al., 2007; Chandra Shimi et al., 2010; Brammer, 2010; Paul & Routray, 2010; Talukder & Shamsuddin, 2012; Parvin & Show, 2013; Younus & Harvey, 2014; Parvin et al., 2016). These studies actually demonstrated how the low frequency and high magnitude flood pose negative impact on the flood vulnerable communities and also how being a local survive the crisis with traditional and externally induced (mostly by non-governmental organizations) coping or adaptive strategies in Bangladesh. However, while searching for papers relating to protection motivation of the flood prone people towards taking private precautionary actions, I did not find any scientific papers focusing on Bangladesh. There are a few scientific studies conducted on protection motivation to flood disasters in Europe (Grothmann & Reusswig, 2006; Koerth et al., 2013) and Asia (Reynaud, Aubest & Nguyen, 2013). These studies applied Protection Motivation Theory (PMT) to explain why some people are better prepared than others in the flood prone areas of Germany, Greece and Vietnam.

It has been found that the people living in disaster prone areas fail or adequately prepared to reduce the damage including lives and property (Peek & Mileti, 2002). However, the research in exploring the reason 'why the people living in the vulnerable aren't or inadequately taking preparedness actions' is limited (Grothmann & Reusswig, 2006). Most of the already conducted research is on earthquake hazards in the United States (Lindell & Perry, 2000). Therefore, the present study has designed to contribute to the understanding of the protection motivation of the flood prone communities towards taking private precautionary actions to reduce the damage due to flood disaster in Bangladesh. The findings of this study would be a policy instrument in terms of designing flood risk reduction and adaptation projects for the flood prone areas of Bangladesh.

1.3 Research Question (RQ)

The research is designed on the protection motivation aspects of the respondents towards private precautionary actions to reduce the potential damage caused by the hypothetical flood. More specifically, the study will investigate ***how households living in the flood prone areas of Bangladesh evaluate their protection motivation for flood disasters based upon the aspects of Protection Motivation Theory?*** This research questions will be encountered via reflecting two different but interlined sub research questions which are as follows.

Sub Research Question (SRQ)

The first sub research question captures the perception of the people on flood risk in the future and their preparedness to encounter that risk to lower the loss of assets and lives. This question is usually designed to collect the data on the PMT components including threat appraisal, threat experience appraisal, coping appraisal, reliance on public risk reduction measures and non-responsive attitude of the households while they do not show any preparedness actions. Here are the sub-research questions.

SRQ1: How do household perceive flood risk and associated private precautionary actions towards reducing the damage due to hypothetical flood disasters in the study areas?

The second sub research question envisaged to identify a few variables that have positive or negative influence on responsive or non-responsive attitude of the people towards private precautionary actions to a hypothetical flood. This part is more on analysis of already collected data on PMT components. Here is the question.

SRQ2: What are the variables that influence responsive and nonresponsive attitudes to private precautionary actions to flood?

The sub research questions are operationalized further into several questions. The following table represents the questions under sub-research questions and also the research method which is used to collect the data to answer these questions.

Table 1.1: *Operationalization of sub-research questions*

SRQ	Operationalization	Method	Chapter
How do households perceive their responsive and non-responsive attitude towards private precautionary actions for flood disasters in the study areas?	What is the current threat appraisal of households?	Household survey, FGD	Five
	How do households appraise their current coping capacity?	Household survey	Five
	How do households appraise their reliance on public flood risk reduction measures?	Household survey	Five
	How do households appraise their threat experience?	Household survey, FGD	Five
	What non-responsive attitudes exist among households?	Household survey	Five
What are the variables that influence responsive and nonresponsive attitude to private precautionary actions to flood?	What is the relationship between threat experience and reliance on risk reduction measures and protection actions?	Correlation analysis of survey data	Six
	What is the relationship between socio-economic variables and protection actions?	Same	Six
	What is the relationship between non-responsive variable and protection actions?	Same	Six

1.4 Outline of the thesis

Chapter One sets out the platform of the whole research work by providing information on flood vulnerability and associated impact in the communities in Bangladesh. The chapter ends up with the research question.

Chapter Two narrates the research methods and instruments to collect the data and information during field work in Bangladesh. The quantitative method is dominant in this research; however I used qualitative information to support some of my results.

Chapter Three describes study locations where I collected the quantitative and qualitative data during my field work. I also incorporated context of these locations.

Chapter Four contains the conceptual framework of the research. I explained the Protection Motivation Theory (PMT) which I used to frame the results of the research. I also provided a brief description on 'Risk' which is closely linked to the PMT and in general to this research.

Chapter Five represents the results on the research objectives following the conceptual framework of the research. I structured the results based on the components of the PMT and research question. The chapter also includes figures and tables.

Chapter Six covers the discussion and conclusion part of this research. I added correlation tables in this chapter and explained the relationship between different variables.

Chapter Two: Conceptual Framework

2.1 Introduction

This section includes the conceptual framework of the research based on what I organize the results and discussion to answer the research questions. I used Protection Motivation Theory (PMT) to see self-protection behavior of the people living in the flood risk areas. The flowing section discusses different components of the PMT.

2.2 Protection Motivation Theory (PMT)

The status of long-term precautionary flood damage prevention actions taken by the private households in the study area will be assessed utilizing Protection Motivation Theory (PMT). This theory is one of the major four theories within the domain of psychological research on health behavior. The protection motivation theory is developed by Rogers (1983) which actually proposed a conceptual understanding why human attitude changes due to several factors. The author developed PMT based on the work of Lazarus (1966) and Leventhal (1970). The PMT can be used to empirically investigate protective and non-protective behaviours of the people living in the disaster prone areas.

The theory was proposed in the context of health threats. However, PMT later on was used beyond the scope of health-related issues like injury prevention, political issues, environmental concerns, and protecting others. Thus, the protection motivation concept involves any threat for which there is an effective recommended response that can be carried out by the individual (Floyd, Prentice-Dunn, & Rogers, 2000; Milne, Sheeran, & Orbell, 2000). However, using PMT in the field of natural hazards and disaster is quite rare so far, even though it has been used in earthquake situation in 1990 (Mulilis & Lippa, 1990). This theory has first been used in the field of flood preparedness in Cologne, Germany to see the behaviors of the private households regarding taking precautionary flood prevention actions. The research explored why some people take precautionary action to prevent damage from flood while others not (Grothmann & Reusswig, 2006). Later on, Reynaud et al. (2013) conducted a study in Vietnam based on the conceptual framework on Protection motivation proposed by Grothmann & Reusswig (2006). They 'empirically investigated the determinants of household flood protective strategies and risk perception using data from a household-level survey. There is another study conducted on household adaptation and intention to adapt to coastal flooding using PMT in Greece in 2013. The authors (Koerth et al., 2013) explored existing adaptation behavior of the coastal households, identified determinants that influence the precautionary behaviors and also assess the intention of adaptation of the households in future.

In this research I used the proposed conceptual framework: Protection Motivation Theory (PMT) by Grothmann & Reusswig (2006). The PMT is represented in the following Figure 2.2. Now, I shall discuss different components of the PMT based on the authors Grothmann & Reusswig (2006) in the following part.

The first component is 'threat appraisal' (also known as risk perception) which describes how a person assesses a threat probability and damage potential to things he or she values, assuming no change in his or her own behavior. The second one is 'coping

appraisal' which means a person evaluates his or her ability to cope with and avert being harmed by the threat, along with the costs of coping. Threat appraisal has three subcomponents. Firstly, the perceived probability is the person's expectation of being exposed to the threat, such as a flood reaching his or her house. Secondly, the perceived severity is the person's estimate of how harmful the consequences of the threat would be to things he or she values if the threat were to actually occur (e.g., the judgment that a flood in the area would harm valued things, such as home or property). Fear, the third component, plays an indirect role in threat appraisal by affecting the estimate of the severity of the danger (Grothmann & Reusswig, 2006).

The coping appraisal takes place in time after the threat appraisal process, and only starts if a specific threshold of threat appraisal is passed. Coping appraisal has three subcomponents. First, it includes a person's perceived protective response efficacy, the belief that protective actions will in fact be effective to protect oneself or others from being harmed by the threat. The second component, perceived self-efficacy is the person's perceived ability actually to perform or carry out these protective responses. The third component, perceived protective response costs, is the assumed cost of taking the preventive response, including not only monetary cost but also time and effort factors (Grothmann & Reusswig, 2006).

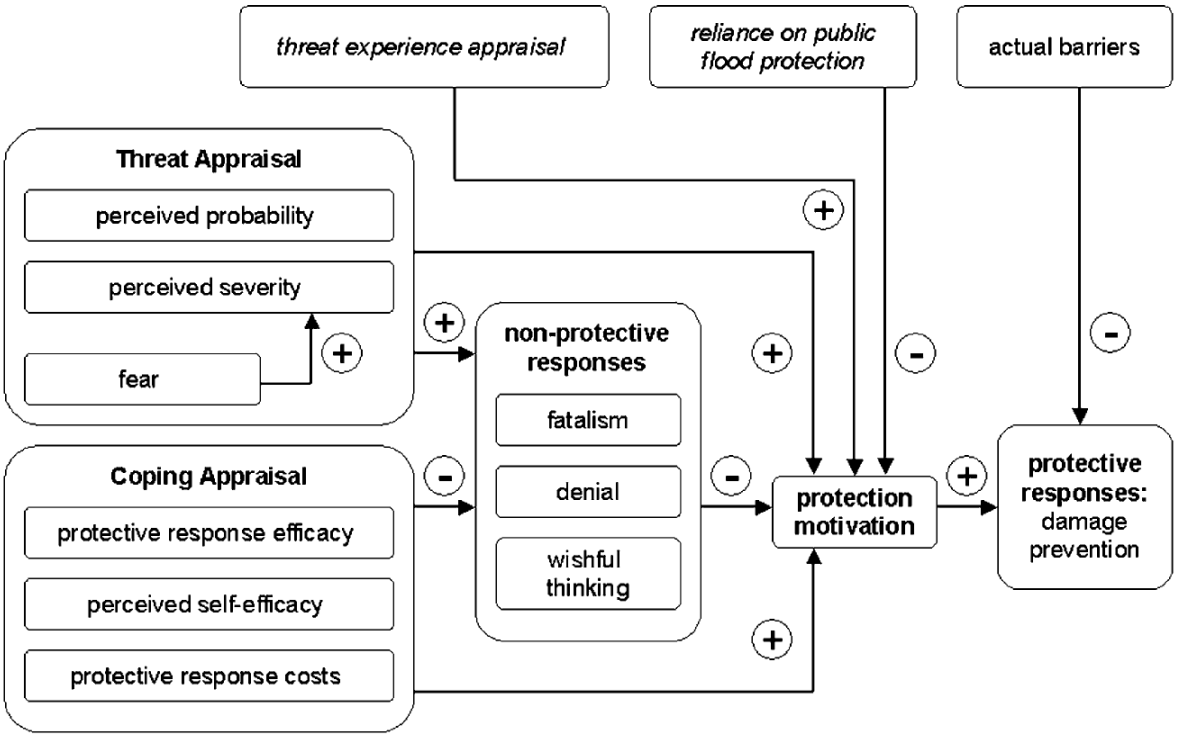


Figure 2.1: *Protection Motivation Theory (PMT). Source: Grothmann & Reusswig (2006) adopted and modified from Rogers and Prentice-Dunn (1997).*

Protective responses are those that prevent monetary or physical damage if an event actually occurs, and are taken if the threat appraisal and the coping appraisal are high. Non-protective responses – including denial of the threat, wishful thinking and fatalism – do not prevent monetary or physical damage, but only the negative emotional

consequences of the perceived risk, such as fear. A person would take non-protective responses if his or her threat appraisal is high, but the coping appraisal is low. If the person chooses a protective response, he or she first forms a decision or intention to take action, labeled protection motivation. Protection motivation does not necessarily lead to actual behavior due to actual barriers, such as a lack of resources like time, money, knowledge or social support, not expected at the time of intention forming. The issue of actual barriers in the theory means circumstances that act as a barrier towards achieving a protective response goal. These are barriers that were not foreseen in the motivational stage of a protection response, and can be either one of the aspects such as costs, knowledge and physical capabilities (Grothmann & Reusswig, 2006).

The authors extend the PMT model by including several additional indicators specific to precautionary flood damage prevention. One is threat experience appraisal which assesses the severity of a threat experience in the past. Threat experience appraisal should motivate people to take precautionary action. The second one is reliance on public flood protection. Private damage prevention by households will be redundant if public agencies successfully build levies to prevent floodwaters reaching people's doorsteps; if the residents at risk rely on the efficacy of the public or administrative flood protection they will probably take less precautionary action themselves (Grothmann & Reusswig, 2006).

2.3 Flood Precautionary Adaptation

Studies related to flood risk management found that the people living in the flood prone areas have flood precautionary measures to protect them and valuable assets from almost none to extensive scale. This private precautionary behavior of the people could have potential implication in reducing the risk of the residents (Grothmann & Reusswig, 2006). They found private precautionary behaviors are negatively influenced by the non-protective responses that include denial, wishful thinking, and fatalism of the people living with flood. They also suggested not only communicating flood risk and its possible consequences but also how preparedness action could potentially reduce the damage in future flood disasters. Besides, the International Commission for the Protection for the Rhine (2002), for example, made an estimation that private precautionary behaviors and adaptation (i.e. installation of protective water barriers) of the households or firms that are at flood risk can reduce monetary damage.

As Schmuck (2000) found the people who are living in the Char (in the river Jamuna) lands in Bangladesh are well aware about their survival strategies that include building platform out of reeds and banana shoots for animals, fixed their wooden bed just below the roof and cooking on potable ovens which made during winter season. The author also found flood affected people lived on stored food from harvesting and switched to income source other than agricultural considering the risk of crop damage due to flood. The people also communicate with their wider network including relatives for assistance and solidarity during crisis moment.

Besides, Koerth et al. (2013) aggregated the findings on anticipatory precautionary actions that can be taken by the people who are prone to coast and river floods. The anticipatory actions could be dissemination of early warning about the flood risk (Grothmann & Reusswig, 2006; Kellens et al., 2012; Thieken et al., 2007), flood prone

households can store equipments at home in case of emergency (Baker, 2011; Cretikos et al., 2008; Mishra et al., 2010), awareness rising about the insurance for flood damage among the households (Botzen et al., 2009). The households could also making furniture flood proof and stop storing furniture which is not flood resistant (Grothmann & Reusswig, 2006; Siegrist & Gutscher, 2008; Botzen et al., 2009) and flood protection barriers which will prevent water entering into the house (Botzen et al., 2009; Grothmann and Reusswig, 2006; Molua, 2009; Siegrist & Gutscher, 2008). A few studies also focused on socio-economic variables including age, education and income (Molua, 2009) and living in a risky zone or type of housing to see how the flood prone households behave towards taking preparedness actions to reduce the damage due to flood (Baker, 2011).

According to Grothmann & Reusswig (2006) many factors can influence the flood probe people to take these private flood precautionary actions which include previous flood experience, lack of trust/reliance on the public flood protection measures. They also mentioned that the precautionary actions could reflect a higher risk perception and sometimes a number of socio-economic variables including age, gender, income and education. The present study emerged from such assumptions.

2.4 Risk Perception

The study is designed considering the risk of flood in Bangladesh and the Protection Motivation Theory (PMT) also developed based on threat and coping appraisal of a disaster event. In this case I talked about the flood as a threat in the flood prone communities and assessed the existing coping appraisal of the people in order to lessen the damage of lives and properties. The analysis of the results dealt with the previous flood experiences of the people which also related to the consequences of flood risk in the communities. The issue risk found prominent in designing the research instruments to collect the data and interpretation of results. Therefore, the concept ‘Risk’ need to be explain briefly for wider understanding of the flood risk.

The risk perception can be defined as subjective judgments of the people anticipate for an event and associated consequences (Smith, 2004). This specific event is considered a risk which can be defined according to Rosa (2003) ‘a situation or an event where something of human value (including humans themselves) is at stake and where the outcome is uncertain’. This uncertainty which evolved from the risk perception has influential role in attributing human behaviour in uncertain situation (Sjöberg, Moen and Rundmo, 2004). Therefore, the perception of risk has plurality which means different people will perceive risk in their own way and thus the action in response to that risk taken by the people would generally be different (Schmidt, 2004). Besides, there are various types and degrees in perceiving risk by the people. There are two types of risks (Smith, 2004). First one is ‘Involuntary Risk’ which represents the risk that is not taken willingly by the people and relates to low frequency potential for devastating consequences that are now know to risk barriers. The later one is ‘Voluntary Risk’ which means the risk that is willingly accepted and do not have the potential for causing devastating impact that is also manageable for the risk takers.

Another contributor to conceptualizing risk domain is Paul Slovic and he see risk as natural (Slovic, 1999). He said ‘Risk assessment is inherently subjective and represents a blending of science and judgment with important psychological, social,

cultural, and political factors'. According to Slovic (1999) the public view on risk is not irrational, but there is influence of emotion, worldviews, ideologies and values on their judgment about risk and this also holds true for the scientists.

According to Brook (2003) a particular type of hazard which is the combination the severity and probability of occurrence of that hazard, pose a risk to the human system and the consequences of the hazards are likely to be mediated by the social vulnerability of the human system in question. Now, the possibilities that have that capacity to moderate the consequences of the hazards are adaptive capacity. 'The adaptive capacity of a human system represents the potential of the system to reduce its social vulnerability and thus to minimize the risk associated with a given hazard' (Brooks, 2003).

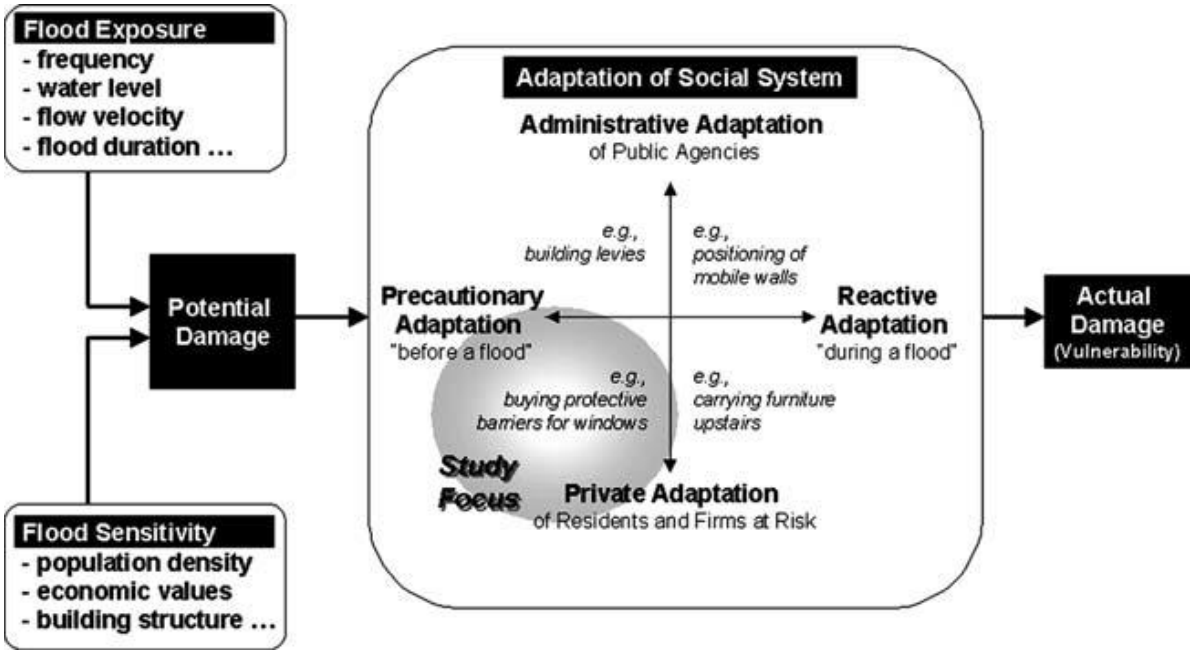


Figure 2.2: *The determinants of potential and actual flood damage. Source: Grothmann & Reusswig, 2006.*

The study conducted by Grothmann & Reusswig (2006) also used a risk framework where they represented four different components under human adaptive system (Figure 2.2). They defined three main determinants of flood damage and vulnerability.

- 'The first is exposure to floods, measurable by indicators like flood frequency, water level, flow velocity and flood duration in a given region'.
- 'The second is sensitivity to flooding, measurable by indicators like population density, economic values and building structure in the exposed regions. Together, exposure and sensitivity determine potential damage, but normally overestimate the actual damage'.
- The third factor, 'adaptation, captures the ability of people to avoid some of the potential damages, through adjustments in ecological, social, or economic systems in response to actual or expected floods and their effects or impacts' (McCarthy et al., 2001, as sited in Grothmann & Reusswig, 2006). There are four components in the

human adaptive system: precautionary, private, reactive and administrative adaptation. These appear as the key considerations that define the actual damages caused by a hazards/risk. It also means that these components have the capacity to mediate the damage from potential damage; better adaptation may contribute to lesser actual damage.

The present research is focusing on the private and precautionary adaptation to flood disasters in Bangladesh. The PMT talked about threat/risk which is a subjective judgment of the people and researcher. Therefore, I needed to be very careful while designing the household survey questionnaire to minimize the influence of researcher. I tried to put the answer into yes/no which were really straight forward for the respondents to respond to those. However, there were a few questions where the respondents needed to rate the status of his/her response in a Likert Scale whet they found a wide range of opportunities to respond thus I tried not to influence their responses.

Chapter Three: Methodology

3.1 Introduction

The study employed a mixed-method approach in order to collect the data and information to answer the research questions. I conducted a quantitative survey applying semi-structured questionnaire with the household representatives in the study areas. The research technique is developed on the components mentioned in the Protection Motivation Theory (PMT) which includes threat appraisal, coping appraisal, threat experience appraisal, reliance and non-responsive attitude (Grothmann & Reusswig, 2006). Besides, I employed qualitative methods that include focus group discussion with the local people living in the flood prone areas. Also I talked with the representatives of the government and non-governmental organization dealing disaster management and resilience project in Bangladesh.

3.2 Quantitative methods: Survey

The field work started with a survey at the household level in the study area. I chose single member of each household as survey respondents in this research. The objective of the survey was to assess the perception of the community people on the present and further flood risk and also existing preparedness of the community to face a flood disaster. I used a semi-structured questionnaire to conduct the survey (Annex 1.1). The questionnaire was designed based on the components of the Protection Motivation Theory (PMT) which includes threat appraisal, coping capacity, precautionary and non-precautionary measure (also explained in the theoretical framework section). The questionnaire was pre-tested in the field to check whether the questions are contextualized enough to get the required data from the respondents. Based on the responses from the people I revised it afterwards.

A total of 90 households including 58 male and 32 female respondents have been surveyed (face to face) in all three study villages during September-November of 2017. The survey started with the permission from the respondents, I did not have any refusal from any respondents whom I choose to talk to in the field. The sample size was equal for each village; 30 respondents. I employed a simple random sampling procedure under the probability sampling technique to select the households in the villages. Even though the earlier plan was to collect a full list of the residents from the local Union Parishad, however I decided not to go for it, because I thought collecting a list after the flood disaster (as there was a flood in August 2017) would raise expectations among the people of getting some assistance from me. This quantitative survey actually allowed me to know the inherent vulnerabilities and capacity of the people to face the shock.

3.2.1 Description of the questionnaire

The survey questionnaire consists of seven sections. First, a general overview on the exposure of the respondents in terms of flood risk in all three villages. There were five multiple choice questions addressing the distance of the household from a nearby river and flood protection embankment and possibility of inundation house with flood water.

The second part is about threat experience appraisal. There were ten binary and multiple choice questions focusing previous experience of flood disaster in the area. These questions were designed to capture information about sectoral damage including

small scale household structures, agriculture and family health due to flood in the past. There were a few questions on how the affected people have been assisted by government and nongovernmental organizations during and after the flood in the area.

The third part is about threat appraisal considering hypothetical flood disasters. There are seventeen binary and multiple choice questions in this section. Linking to the previous section of question, the respondents were asked about possible intensity of flood and severity of damage caused by the hypothetical flood. Further, the damage perception includes the sectoral approach where I considered damage of small scale household structures, agricultural crops, fisheries, family health, domestic animals and impact on livelihood of the people. The respondents were also asked about possibility of getting assistance from different stakeholder after the flood. This included managing a temporary shelter during flood in case respondents need to relocate the family to a safer place. Lastly I asked about the level of fear of flood where I used a Likert Scale ranging from very high fear to very low level of fear.

The fourth section is about coping appraisal of the respondents living in the flood prone areas. A total of twenty one questions on preparedness actions have been brought into account to assess the coping status of the respondents in the study area. These questions are grouped into three clusters; hard/structural measures, soft measures and institutional network. The structural flood protection actions measures include raising plinth/basement of houses, tube wells and toilets of the respondents. The soft measures include awareness rising on the flood disaster, developing an evacuation plan and a disaster management plan in the area. The institutional networking perspective covers the issues of having connection and communication with different stakeholders including government and NGOs so that people can manage some assistance during and after the crisis. The last question was to observe non-responsive attitude of the respondents and I asked them the reason of not taking any flood protection actions. It was a multiple choice question and I accept one answer among these options - It's a natural events I do not have anything to do, It will not harm me, I will get support from others and I am not motivated to take any preparedness action.

The fifth part represents the reliance/belief of the respondents on flood risk reduction measures that can reduce the damage due to hypothetical flood. The flood protection embankment and the disaster risk reduction/resilience project implemented by the nongovernmental organizations have been considered in this section.

The sixth section of the questionnaire was about the expectation of the respondents from different stakeholders regarding receiving assistance before, during and after the flood disasters. The survey captured a wide range of expectation through accepting multiple responses from the respondents in the study areas.

The last part includes the socio-economic information of the respondents which covered gender, education, monthly income and source of income. One question is about alternative income generating source of the respondents.

3.3 Qualitative method: Focus Group Discussion (FGD)

A total of three focus group discussions with the community people have been conducted in three villages. I developed a checklist to guide the discussion, although I could not properly follow the order of the questions (Annex 1.3). I tried to be semi-formal while arranging and conducting the discussion with the people of varied age groups including the young and the old. Most of the discussions held in the village tea stalls where people gather for having tea and carry on informal conversation on various topics together. As a researcher I took that chance to talk with them while having tea with them. Being a researcher I have just played the facilitation role where the community people discussed and debated themselves on how the flood disaster is affecting them, the coping strategies and also what type of assistances they are receiving from different stakeholders before, during and after the event. There was a heated debate about how the flood protection embankment has created a social tension among farmers' groups living inside of the embankment. Of course I discussed probing questions to the group, however it does not mean that the researcher controlled the discussion by imposing his own research objectives. I talked about political interference and power in the field of disaster management. In the NGO intervention area, I managed to talk with the Community Disaster Management Committee (CDMC) and Community Disaster Response Team (CDRT) formed by the NGOs. Unfortunately I could not manage time to arrange a meeting with the community committee responsible for the maintenance of the flood protection embankment formed by the Water Development Board of Bangladesh government.

The explanations on various research issues during the focus group discussions were helpful in getting the insights about flood risk management approaches in relation to flood preparedness. I did not record the conversations as there were some culturally sensitive issues to talk about including the political aspect of disaster.

3.4 Recording, organizing, and analyzing data

I used both quantitative and qualitative methods to collect my data in the study area. The quantitative data has obtained though a question paper. I used the Statistical Package on Social Science (SPSS) to design the data entry template though which I entered the raw data and made a database for all 90 households. I acknowledge that the respondents were not interested in answering certain questions during the survey, for instance monthly income of the family. In that case I have a few missing data. Besides, I did cross check, the data that were already entered into the SPSS and the hard copy of the filled-up question papers, to avoid errors made during data entry.

After validating the data, I carried out simple frequency analysis and prepared some graphs to represent the status in the variables according to Protection Motivation Theory (PMT). While I did analyze the quantitative data, I used correlation among different variables where I found significant positive and negative correlation with different variables. Spearman correlation has been employed due to asymmetrical distribution of the variables the values of variables occur at irregular frequencies and the mean, median and mode occur at different points. I tried to find correlations between the variables under different components of PMT and the flood protection actions of the respondents in the study areas. I defined seventeen protection or preparedness actions considering floods disasters. These actions are defined and selected from relevant literatures and also via expert consultation in Bangladesh. The following table shows the variables under each of

the PMT components that I selected to perform the correlation analysis. The correlation tables are attached in the analysis of the results section. Although I planned to go for binary regression to make sure the relationship among the variables which showed significant relationship with flood protection action, non-responsive and other variables, the small sample size (N=90) did not allow to go for regression at the end.

Table 3.1: *Variables selected for correlation analysis in the thesis.*

Components	Variables used in correlation analysis
Threat appraisal	Perceived probability of threat: Hypothetical flood, Inundation of household, Intensity of flood, Severity of damage
	Perceived severity of threat: Household damage, crop damage, death of domestic animal, Family health, Income struggle, Impact on livelihood
	Fear
Coping appraisal	Flood early warning, Store dry food, Raise house plinth, Raise tubewell plinth, Raised toilet plinth, Stored crop seed, Stored money, Emergency equipments, Family awareness, Evacuation plan, Save valuable asset, Family relocation place, Connection with NGOs, Possibility to take loan, Damage insurance, Community DM plan, Connection with local government.
Flood experience	Previous flood experience, Suffered from household damage, Suffered from crop damage
Reliance	Flood protection embankment, NGO led resilience project
Socio-economic	Gender, Education, Monthly income, Distance of household from river and embankment.

Besides, this quantitative data is used along with the qualitative explanation to have a clear picture on protection motivation of the respondents. For instance, the quantitative status of motivation of taking preparedness actions is combined with qualitative discussion on motivation of the respondents. Therefore, qualitative and quantitative data and information proceed together where applicable in the thesis report.

Chapter Four: Study area

4.1 Introduction

The study areas were defined based on the research objectives. I communicated with the expert community in Bangladesh and my supervisor to select the areas besides the river Jamuna which has a flood protection embankment and NGO interventions on Disaster Risk Reduction and resilience projects. I selected Tangail District – the Central North part of Bangladesh has been formed by faulting and tilting. The area is very flat, between 18 and 4 m above sea level (except the Madhupur Tract), thus as soon as the flood stage is reached, enormous tracts of land are flooded (Banglapedia, 2012). In this area, the Bangladesh government with the help of donor countries implemented the Flood Action Plan (FAP 20) which is also known as Compartmentalization Pilot Project (CPP). Under this project, a long embankment has been built to protect the Sadar Upazila of Tangail District from Jamuna river flooding and also to promote agricultural production. More specifically, I selected two villages within the Daynna Union under Sadar Upazila of Tangail District. The first one is called Fatepur which is protected by the flood protective embankment since 1995. So, Fatepur village will be considered as the area with flood control measures from the Water Development Board of the Bangladesh government.

The second area is Char Fatepur – which is situated outside of the embankment and exposed to river flooding of mighty Jamuna. This village is surrounded by the tributaries of river Jamuna and people usually experience flood in each year. Here a few national nongovernmental organizations are implementing credit projects in this village. They usually provide loans with interest to the people. No disaster risk reduction intervention has been implemented so far, however the people received emergency relief assistance during and after flood event.

The third village I selected from Islampur Upazila under Jamalpur District is also situated beside the river Jamuna. Thus area was purposefully selected to see the impact of NGO led disaster risk reduction and resilience interventions towards enhancing the capacity of the community to face a flood disaster. The communities of Jamalpur district are located in distant char lands bordered by the mountains of Meghalaya (India) in the north-east and experience regular flood and northwest. The Kulkandi village is exposed to the mighty river Jamuna and people in this village usually experience flood disaster each year.

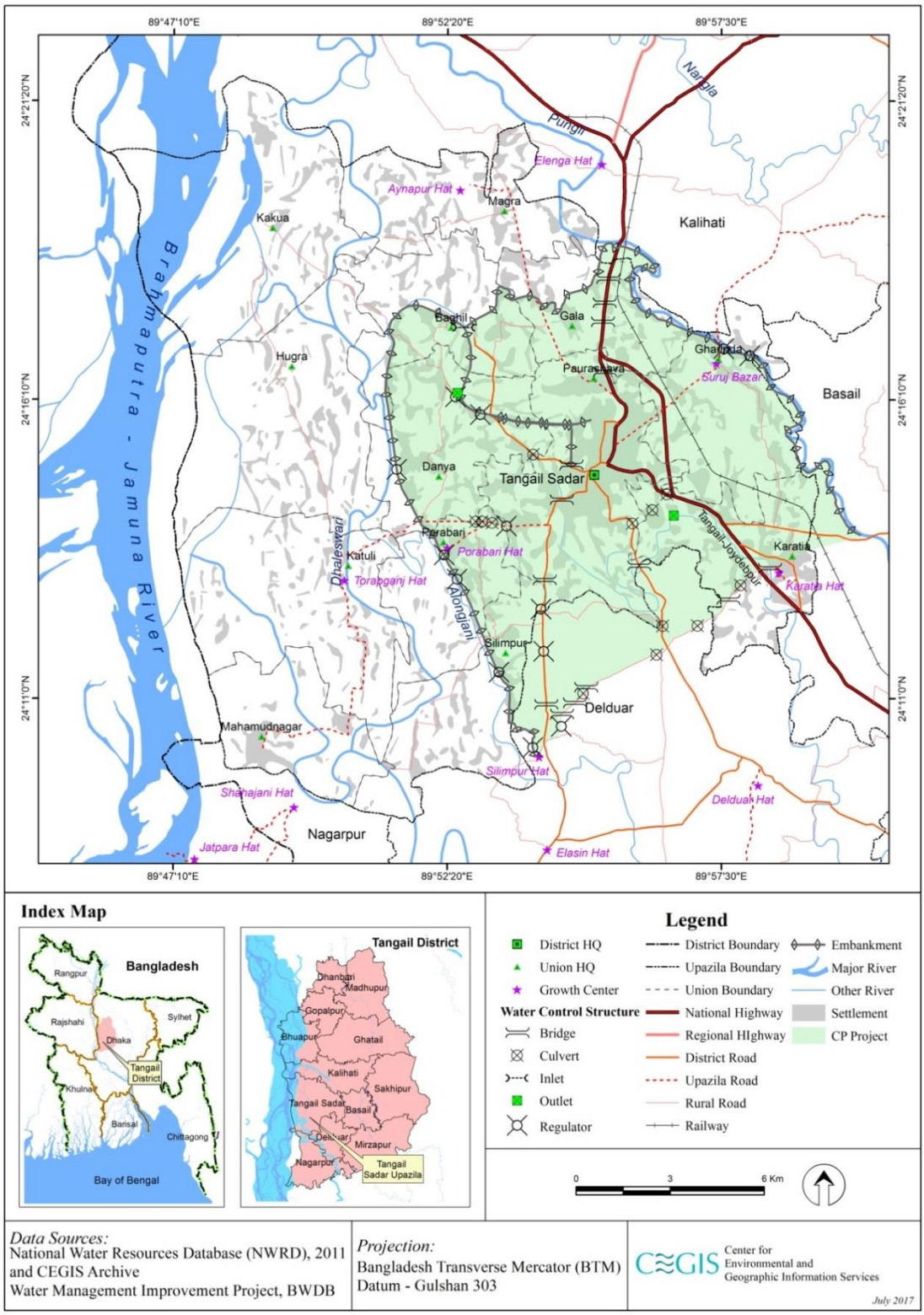


***Figure 4.1**: The map shows Danya Union under Tangail sadar Upazila of Tangail District. I selected two villages named Fatepur (inside of the embankment) and Char Fatepur (outside of the embankment) village for this study (CEGIS, 2018[1]).*

[1] A Public Trust and centre of excellence established by the Government of Bangladesh under the Ministry of Water Resources (MoWR); A "Not-for-Profit" organisation guided by a Board of Trustee headed by the Secretary of the MoWR. http://www.cegisbd.com/

The Bangladesh Water Development Board (BWDB) took measures for protecting river bank erosion, but it does not much help for flood management. While communities are greatly dependent on farm lands, they are poorly equipped with coping mechanisms to save livelihood and living in the chars during disasters. Many National and International organizations worked on disaster risk reduction and resilience in this village (Banglapedia, 2012).

For instance, CARE Bangladesh with financial support from USAID implemented the SHOUHARDO (Strengthening Household Ability to Respond to Development Opportunities) II program through a local organization named Unnayan Shongho at Kulkandi Union under Jamalpur District. One of the goals of this program was building resilient livelihoods for the most vulnerable communities prone to disasters and environmental (climate) change[2]. Moreover, the Bangladesh Red Crescent Society (BDRCS) with the help of Swedish Red Cross (SRC) and IFRCs (International Federation of Red Cross and Red Crescent Societies) implemented a project entitled Community Based Disaster Risk Reduction (CBDRR) program[3]. In fact, BDRCS has recently completed their project. This area will be referred to as 'NGO intervention area'.

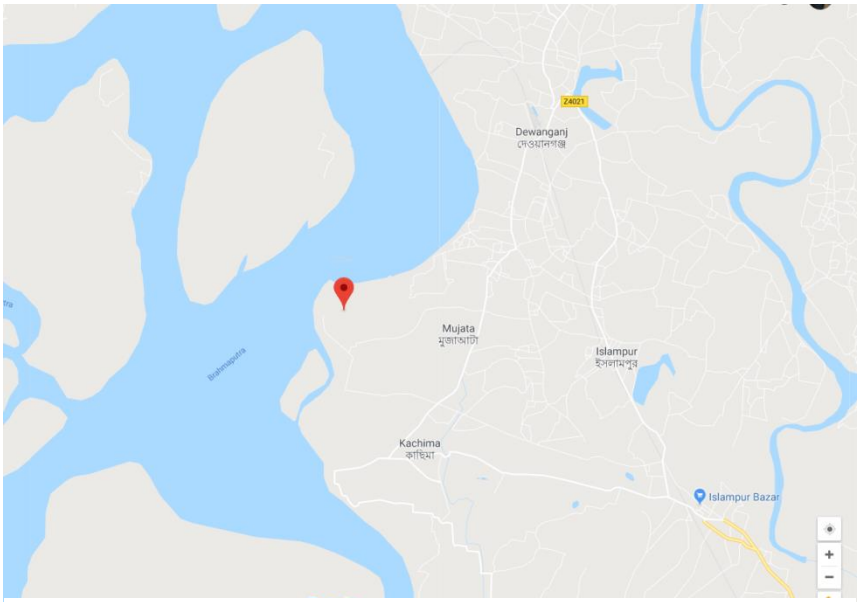


***Figure 4.2**: The map shows the Kulkandi village under Islampur Upazila of Jamalpur District (Google Map, 2018)*

The three villages are different but homogenous in terms of vulnerability, geographic and socioeconomic structure. Both of the areas have similarities in producing cash crops, therefore this research will allow us to see the food security issues.

4.2 Context of the study area

This section contains detailed information about the study areas. People in the study areas and also representatives from the Water Development Board shared from their experiences about flood situation. They also talked about various flood protective interventions implemented by the government and NGOs in the study areas.

[2] Mid-Term Review of SHOUHARDO II program of CARE Bangladesh. http://www.carebangladesh.org/publication/Publication_4938322.pdf

[3] CBDRR project overview. BDRCS.org

4.2.1 Inside of the embankment

The Tangail District is geographically vulnerable to floodings as there are 18 small, medium and big Rivers running through various parts of this district. The Tangail Sadar Upazila under this District is geographically lower than other surrounding Upazilas of this district. This Upazila is considered the main town where the key infrastructures are established; therefore local administration is concerned to protect this town from flood disaster. To safeguard the town and also promote agricultural production, a flood protection embankment has been built under the Compartmentalization Pilot Project (CPP) during 1990-1995 (Water Development Board, 1994). The people living inside the flood protective embankment haven't seen flooding since 1995. However, people suffered from water logging in the past years which was severe in 2017 compared to previous years. When heavy rainfall occurs, the deposited water from inside the embankment cannot drain out through the sluice gates and water pass way (pipelines at different locations) installed under the flood protective embankment. In 2017, there was heavy rainfall compared to previous years and rain water stood inside of the embankment for 15 days.

Obviously, there are numbers of pipelines and sluice gates at different places of the embankment, so what is the reason for the water being stacked inside of the embankment? According to the community people and WDB, the blockage of water pass ways is mostly manmade. When people started constructing houses nearby the water passing pipeline or sluice gates, due to rain mud drained down and deposited in front of the water ways and bloke the passage. Moreover, these pipelines were installed on private land and when the land owner started utilizing and cultivating the land, mud entered into the pipeline and blocked the space. However, many land owners mentioned that they forecast the worst case scenario and informed local government and WDB representatives to install bigger pipelines. But previously no one realized the need for doing that. Now, people of this area realized the need of putting bigger pipeline os that the water can be moved out quickly. They think that monitoring of the water passage in a regular basis could resolve this problem in the area. The responsibility could not be solely on the embankment management committee members at the local level. However, someone either the committee members or local people need to take the responsibility to make the pipelines and sluice gates functional again.

There is another reason why the people suffered from water logging: breach of flood protection embankment at some points. This allows the flood water to come into the community and deposited in the lower areas. The respondents' mentioned different years when the embankment breach happened and people suffered due to that. In 2004, around 200 feet of embankment was breached at Alishakanda village under Fatepur Union. The damage was enormous as there was a big flood going on outside of the embankment at that time. The water stood for 15-20 days inside of the embankment. The broken part of the embankment was repaired by the Water Development Board later.

In 2016, during monsoon periods (in July), some parts of the embankment within the Fatepur area had breached and water entered into the community. The water stood for around two months and caused damage of agricultural crops production and many fish ponds were inundated, causing loss of the fishery business in this area.

In 2017, due to heavy rainfall and the flood, the water level outside of the embankment raised 12 inches more compared to inside. Due to this significant water level difference the embankment became more vulnerable to breaching at many points. However, local people continuously monitored the water level and also risky places of the embankment and they put additional protection materials including putting extra mud, plastic bags at risky place etc. Besides, local people communicated with the representatives of Water Development Board (WDB) in the Tangail Sadar Upazila to share the risky situation to the embankment. However, people claimed that local staff of WDB did not respond quickly even though they were informed before.

4.2.2 Outside of the embankment

The area is called Char Fatepur – an area that lies on the other side of a branch of river Jamuna. While the monsoon came, this area became an isolated area from the main land and the boat was the only way to visit the village. This is situated outside of the flood protective embankment of Tangail Sadar Upazila. People of this area are experiencing flood with varied intensity and severity each year. People mentioned the big flood disasters that happened in 1988, 1998, 2004, 2007 and 2017 in this area.

People living in this exposed area suffered more flood damage in 2017 compared to previous years. The heavy rainfall combined together with monsoon flood made the situation worse as the water level went much higher this year.

The economic situation of the families in this area is weak. Most of the families (around 85%) are dependent on agricultural farming to run their livelihood. Apart from farmers, there are other occupations like business, day labor and government and nongovernment workers in this area.

4.2.3 NGO intervention area

Photo: *The NGO intervention area is located on the bank of river Jamuna. Source: Researcher.*

The Kulkandi village under Islampur Upazila of Jasmalpur District is situated beside the river Jamuna. The people are experiencing flooding each year with varied intensity and severity of damage. According to local people, the 2017 flood was more dangerous than the 2016 and previous floods. The water level was much higher in 2017, caused sufferings of the vulnerable people. Someone at the Kulkandi community was saying that -

'*The flood of 2016 was good as it was not severe and we did not lose our assets and the flood water brought nutrients for the cultivable lands, but the flood in 2017 was devastating as it damaged agricultural crops and family infrastructures (toilet, mud made cooking stove) for us'*.

Chapter Five: Field Findings

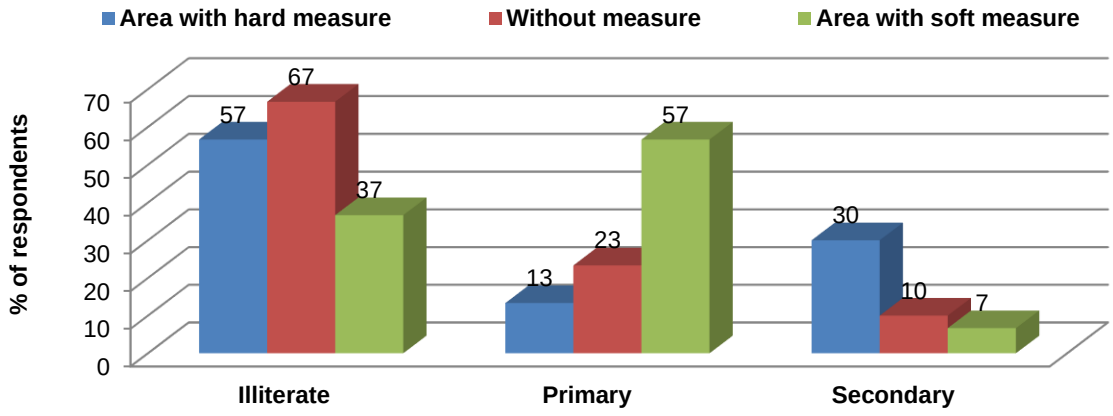
5.1 Introduction

The chapter describes the findings of the study drawn from the survey conducted in the study areas. First location is with hard flood risk reduction measure (i.e. inside the flood protection embankment), second one is without any measure (i.e. outside of the embankment) and te last one is with soft measure (i.e. area with DRR or resilience interventions implemented by the NGOs and government). The people who are living inside and outside of the embankment are located within the Tangail Sadar Upazila and the area with soft measure belongs to Ismalpur Upazila of an adjacent District called Jamalpur. In the result, I presented the status of different components of the Protection Motivation Theory (PMT). These include Threat Appraisal, Coping Appraisal, Threat Experience, Reliance on Flood Risk Reduction Measures, Non-protective Responses of the respondents in all three areas. This chapter starts with giving a socio-demographic and economic status of the respondents that have been studied in this research. Immediately after that, I cover the exposure of the three communities regarding flood disasters.

5.2 Socio-demographic information of the respondents

The survey has been taken place at three different but homogeneous (from a geographic and vulnerability point of view) location in the central North part of Bangladesh. The respondents were taken randomly and one third of them were female. The age range of the respondents was between 26-65 years. Therefore the data represents a varied scale of experience of the people living in the flood risk areas. The educational status in the area with hard measures and without any measure is almost the same, as more than half of the respondents did not finish primary school (class one to five). These people are illiterate, but many of them can write their name only. More than half the respondents living in the area with soft flood risk reduction measure have primary education which means these people can write but not so well.

Figure 5.1: *Educational status of the respondents (N=90).*



The monthly family income was found to be 32.86 Euros in both the area with hard measures and without any measure. Only two third of the respondents living in soft

measures area have the monthly income of 65 Euros. One third of the respondents did not want to mention their monthly income for which there could be two explanations; either these families have way higher earnings compared to other people in the community or they have way less income. Therefore these people do not want to be exposed to the research.

The study also explored the sources of income of the respondents. More than half of the respondents living in area with soft and without having any measures are dependent on agriculture for their living, so farming is the most prominent source of income. The study found diverse sources of income apart from farming (35%) among the respondents living with hard risk reduction measures. The survey found that respondents also involved rickshaw pulling, fishing and NGO workers. The study also looked for second earning source among the respondents and two respondents mentioned that they have secondary earning options.

5.3 General information on flood exposure

The household survey started by asking general questions to the household representatives about flood disaster and their exposure to the event. The exposure to flood disaster has been assessed through calculating the distance between the mighty River Jamuna and the households of the respondents. I also wanted to the see where the nearby embankment located, so that people can go there to take temporary shelter.

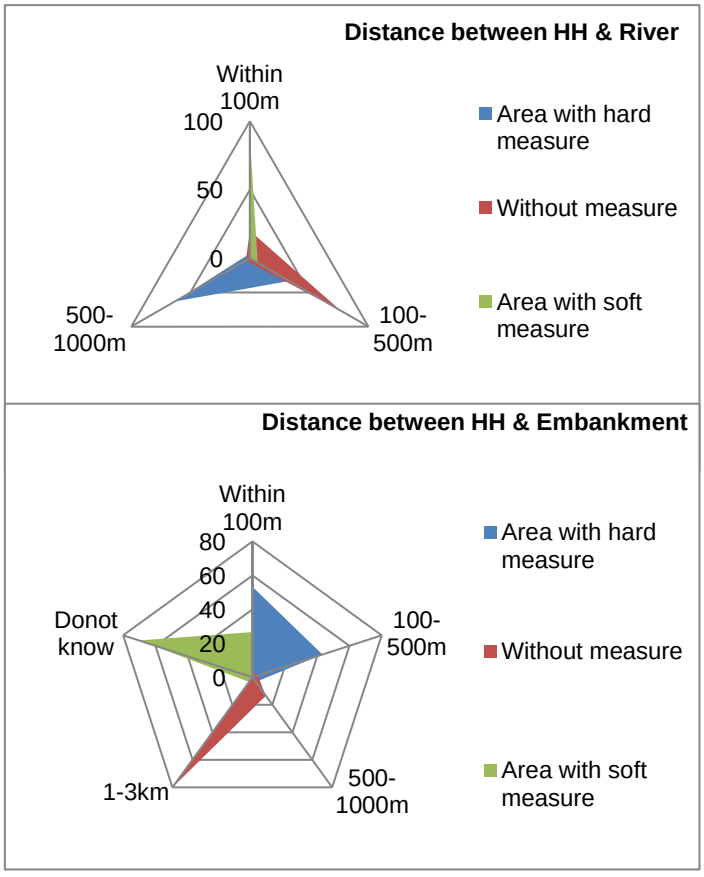


Figure 5.2: *Distance of household of the respondents from nearby river and flood protection* embankment.

The study found that almost all the households of the respondents living in the soft measure areas (NGO intervention areas) and outside of the flood embankment areas are located within 100-500 meters from the river Jamuna. Therefore, these people are vulnerable to flood disaster as these areas can easily been flooded. Moreover, the distance of the nearby embankment from the area without any measure is about 1-3 kilometers; therefore it is difficult for these people to move quickly to take shelter. However, the majority of the respondents were confused while I asked the question about the embankment and more than two third replied with 'I donot know' responses. But a few respondents mentioned that the village road has acted as an embankment for them since long. They reported that during the last flood event in 2017, many families took shelter on this

village road which is one of the reasons why many elderly village people considered this as an embankment. So, people living in the areas with soft measures and without any measure do not have any infrastructural interventions to protect them from the flood disasters. The households of the respondents living with hard measures also nearby the river; however they are protected by a flood protection embankment. Therefore, the people living inside of the embankment are not vulnerable to flood disasters, even though they suffered from water logging situation during the monsoon season of 2017.

I talked to the people about the status of inundation of the houses by the flood water. The majority of the respondents who are living outside of the embankment mentioned the flood water might rise to a maximum of knee to waist height. However, we found quite diverse responses from the people living in the NGO intervention area. The majority said knee to waist height, but a significant number of respondents mentioned that flood water might rise upto chest height and even higher than that 1st floor of the house.

5.4 Threat Experience Appraisal

This section entails the perception of the previous disasters that the community people faced in the previous years and how stress and shock events impacted on their livelihood and resources. The majority of the people mentioned about the flood of 2017 as an immediate event, however middle aged and elderly respondents of all three areas talked about the devastating flood of 1998 and also 1988. According to them the recent flood are not catastrophes like the previous flood where they lost literally everything that they had for survival. The people living inside the flood protection embankment mentioned water nuisance i.e. the water logging situation since 2016.

This part complies with one of the assumptions of the PMT where it says people having experience of flood disasters are motivated to be prepared for the next flood event to reduce the damage caused by the disaster.

5.4.1 Damages caused by the floods and water logging

The people living with ‘hard’ disaster risk reduction measures inside the flood protection embankment shared that 2017 was the first time that the water logging situation became severe for the whole community, even though experiencing this situation is not new to them. A few respondents reported the loss of Jute products due to water logging inside of the embankment. In the focus group, the participants shared that in Ditpur (a village under Fatepur Union), a total of 15-20 households were inundated due to water logging. Besides, a few toilets were inundated and partially damages and people needed to go to their neighbor’s house or otherwise for open defecation. Loss in the fishery business was quite significant as many ponds were inundated in this area and the pond fish became open water fishing. The flood protection embankment promoted fish cultivation in the area. People who have resources including land inside of the embankment and financial solvency became entrepreneurs and started fish cultivation along with agricultural practices. The respondents also mentioned that the water logging situation brought water-related diseases for both children and adults. Cold, cold with fever and skin diseases were common diseases. However, people with health complications did not need to go outside of the area for medical consultation. They received basic treatment locally from the community clinic and individual philanthropic doctors in the area. In respect to flood disaster, people in this area mentioned about flooding outside in 2004 and

2007 where they also experienced breach of embankment of 200 feet at Alishakanda village under Fatepur Union. Even though, people are living nearby the breaching area suffered, it was not severe compared to families living outside of the flood protection embankment.

People living 'without any disaster risk reduction measures' meaning outside of the flood protection embankment said the flood water entered into the house yard and in some cases into the house and remained for 15-20 days. Even though this situation is not new to these people, but they suffered more in terms of damage of family assets compared to inside of the embankment. The fishery resources, agricultural crops – especially *Aman*[4] rice, and household yard vegetable gardens went under the flood water and damaged the crop. According to the locals, the day laborers were the worst sufferers as they did not have any job to do during the water logged situation in the area. The houses with lower plinth or basements - meaning the house which plinth/basement hadn't been raised enough - are usually inundated by flood water during flood time. Most of the cooking stoves are fully or partially damaged. These stoves are made of mud and are kept outside of the households. The fuel wood that was deposited outside of the house also washed away with the flood water. This situation created the challenge for housewives to cook for the while family members during and after the flood event. People in this area lost domestic animals during the flood. The people who had domestic animals including cows, goats and chickens faced a hard time to manage food for them. Most of the sanitary latrines were inundated by the flood water and partially damaged due to high velocity of flood water. The latrines are made of concrete rings and bamboo walls so that the wall of the structure damaged within a short time. This situation created a critical complication for the female members of the families as they could not manage to go to the toilet during the day. The female participants said they used the darkness to go to the toilet and used open spaces nearby. As for safe drinking water, most of the tubewells were good (although tubewells contain varied levels of Iron) as flood water did not enter into the tubewell. Therefore, the affected people can use those as and when needed. A small number of people mentioned health challenges like colds, fever in children and adults suffered from itching in the leg and hand as well as fever. Due to having a community clinic (CC) around three kilometers away, people used to go to the nearly market place to consult the doctor at their own cost. The local high school was closed for at least 10 days due to the inundation.

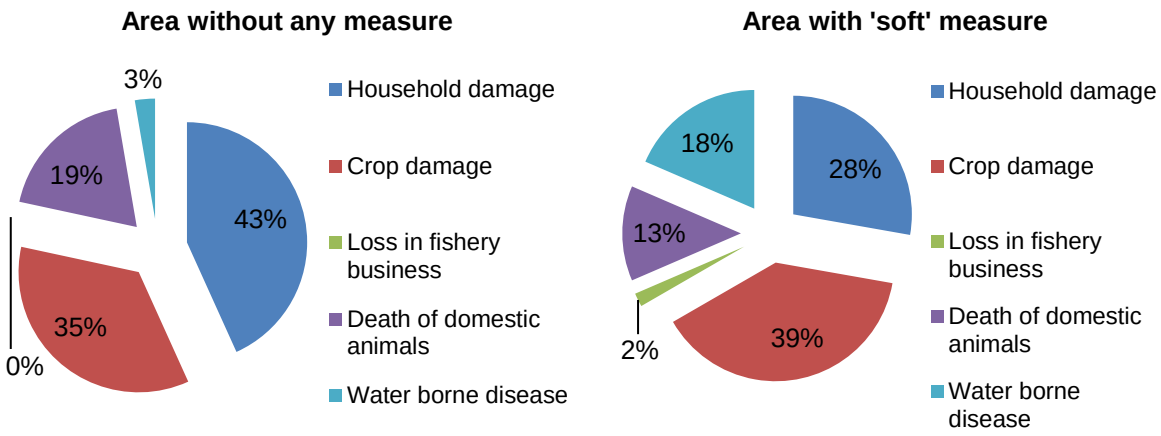
The damage caused in the area with 'soft flood risk reduction measures due to the flood of 2017 are associated with assets, agriculture and livelihoods of the vulnerable people of the area. The 2017 flood caused agricultural damage to crops. Cultivation of Jute during the monsoon season and afterwards cultivation of *IRRI* rice is very common in the area. This flood happened during the harvesting season of the Jute crop. Most of the farmers preserved the Jute in a traditional way[5], thus sudden flood water with high speed washed away the preserved Jute. Besides, a few farmers were processing rice cultivation

[4] *Aman* paddy, a tropical monsoon rain dependent crop is harvested in the month of November and December, is one of the major cereal crops of Bangladesh.
https://agricultureandfarming.wordpress.com/2013/10/14/about-aman-rice-in-bangladesh/

[5]The traditional way of Jute decomposition is to put the whole bunch of Jute under the water. Farmers usually use heavy things on the top of the Jute so that they always remain under the water. After some days the Jute fiber becomes soft, thus farmers can easily remove the fiber form the Jute stick.

and as a part of that they were preparing the seed field. This flood also washed away those seedbeds. Besides, a few people were culturing fish in a pond in this area. A total of 8-10 ponds with varied size were inundated during the flood of 2017 in Kulkandi village.

***Figure 5.3**: Damage caused by the flood of 2017 in the area 'without any flood risk reduction measure' and with the 'soft' measures. The damage question accepted multiple answers from the respondents. The study entails 90 respondents in three areas with equal sample size (n=30).*



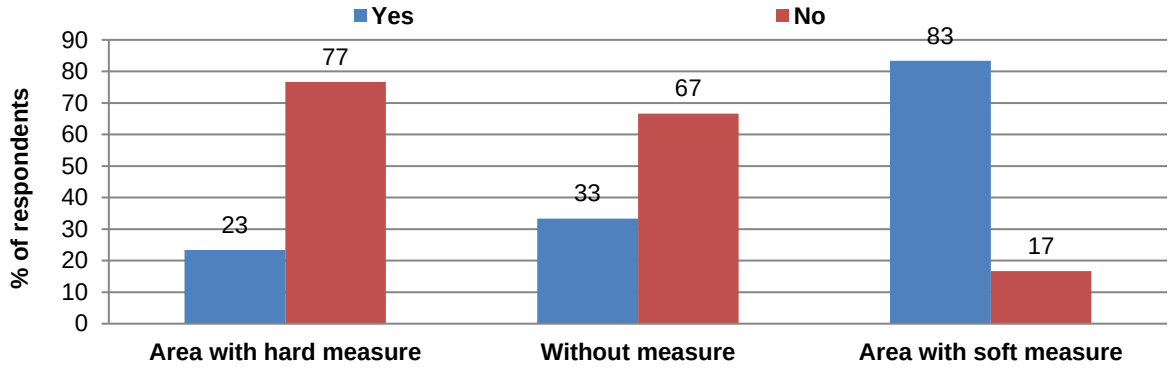
Besides, most of the houses are made of stainless tin and mud. Flood water caused partial damage of the households through washing away the mud of the basement of the households. So, the owners need to repair the damage of the house now and they need to collect mud to fill-in the damaged part of the house. This task is costly for the marginalized house owners for two reasons; mud is not for free (one might need to buy from others) and hiring one or two people to support by carrying that mud into house requires money as well. Similarly, the sanitary latrines are made of stainless tin with mud and according to respondent; about two thirds of the toilets were inundated and partially damaged during the flood of 2017. The flood water height was such that it inundated the tubewells in the lower part of the community and only three remained safe in the village. A few respondents mentioned missing chickens and ducks during this flood. Health-related complications were not much observed, however many children suffered from cold, fever and diarrhea during and after the flood. The female respondents mentioned that they could not cook during the flood as the cooking stove was inundated and damaged. They survived on dry food items. Sometimes, neighbors supplied some food to others. Some people ate half cooked food due to not having cooking stoves as well. According to the people the day laborers were the worst sufferers. Due to inundation of the road and transportation system, these people could not move to other locations for searching work and also they could not work in local agricultural field due to inundation. Thus, the flood of 2017 affected the income opportunities for them, which obviously affected their livelihood.

5.4.2 Temporary relocation status of the people

The status of relocation of the population could be one of the indicators to see how the entire families of the communities are being affected by the flood and water nuisance. Temporary relocation means to shift the whole family to a different place where they can be safe. The survey found that more than 85% and 30% of the families living in the area with soft flood risk management and without any measures respectively needed to relocate to other places to survive form the flood of 2017. Around 20% living inside the

flood protection area had to leave their own home due to entering water into their houses during water logging event. Therefore the situation was not that severe compared to other areas, however the people mentioned unexpected height of the water and they were not ready to face that in 2017.

***Figure 5.4**: Temporary relocation status of the respondents during flood and water nuisance. The study entails 90 respondents in three areas with equal sample size (n=30).*



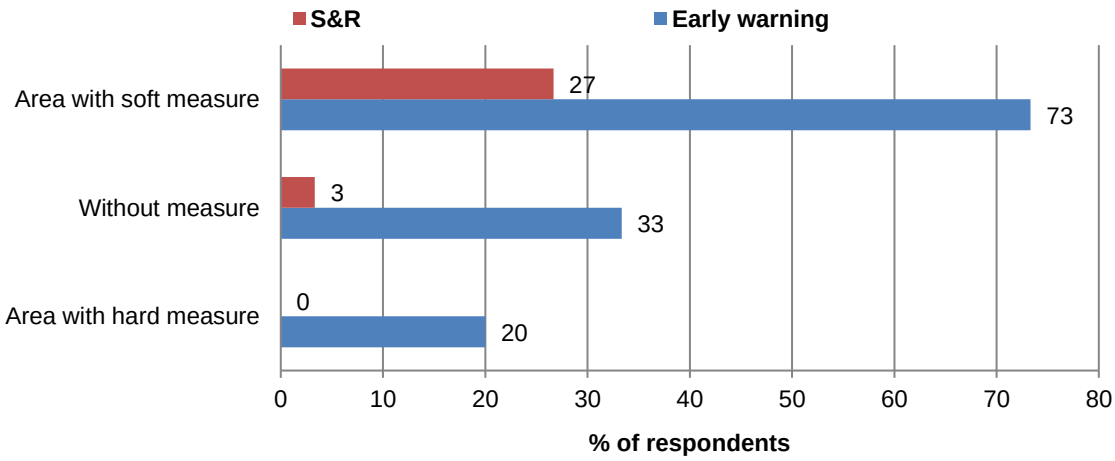
As a follow up question to the people who said they shifted to other locations, I asked where they took shelter before or during flood or water nuisance. About 70% of the respondents from the area with soft measures mentioned high road/embankment where they took shelter during the flood of 2017. There is no flood protection embankment in this area; however the road that passes through the village is quite high which local people consider as the embankment. The road saves lives of the people living in this flood vulnerable community during each flood event. Less than 10% of the respondents in all three areas mentioned relative's house as a shelter during the crisis moment and usually these groups of people shared that during the flood warning time they usually decide to move out to their relatives' places. The study also found the people living without any flood risk reduction measures are not interested to leave their own house. Although these people have been living with flood disaster since their childhood and they are quite well aware how to survive the flood disaster which could be one of the reason why they did not want to relocate. However, they (15%) also mentioned their neighbor's house as a safe place to stay although they have the similar situation regarding handling flood disaster, but still they preferred facing the suffering together.

5.4.3 Before, during and after assistance received by the people

The assistance status is divided into three categories and the respondents were asked multiple queries regarding receiving any kind of assistance before, during and after the flood disaster and water nuisance in all three areas. Dissemination of flood early warning messages in the communities before the flood event had been considered as a preparedness action. The study found people living with soft risk reduction measures have more accessibility and are more aware about flood early warning compared to other two areas and around 85% of the total people of this area were informed earlier about the upcoming flood disaster. The possible solution here could be creating Community Disaster Management Committee (CDMC) and Community Disaster Response Team (CDRT) involving local people by the NGOs worked in this area though resilience projects. The member of these committees took the responsibility as volunteers and received training related to disaster management from the organization. They usually keep the update on

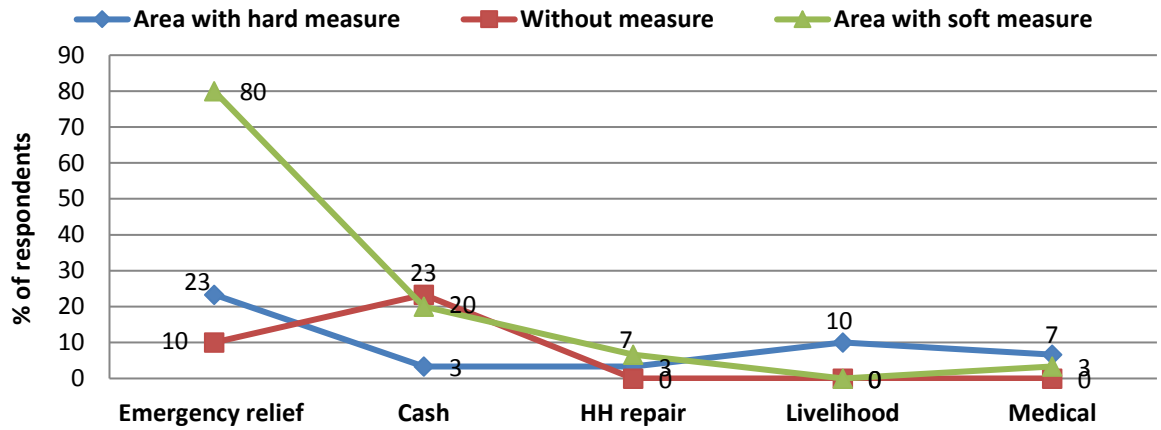
coming disaster and communicate with the entire community via personal network and also using the microphone of the local mosque to make the people well informed beforehand. About 10% of the respondents living outside of the flood protection embankment (without any measures) were informed about the flood of 2017. The study also revealed that the electronic media (television and radio) played an effective role in terms of informing people in all three areas. However, I noticed that the respondents in the area with soft measures mentioned receiving information from their neighbors (30%) and relatives (18%) apart from the media. This example could be an implication of social cohesion where people are communicating the risk information so that they can jointly face the crisis. A few respondents (15%) also mentioned about the organization called Red Crescent Society which have volunteers who are assigned to disseminate early warning message to the vulnerable people and before flood 2017, the volunteers communicated with the members of local CDMC and CDRT to aware them.

***Figure 5.5**: Status of receiving early warning message before the flood and S&R during the flood disaster. Here, few respondents in the area with hard measure mentioned getting early warning of flood but not for the severity of water logging in 2017. The study entails 90 respondents in three areas with equal sample size (n=30).*



The status of receiving Search & Rescue (S&R) supports was considered as the indicator for the 'during flood' assistance for the communities. The survey found that only 25% respondents in the area with soft measure uttered that they received S&R assistance during the flood disaster in 2017. This assistance came from the CDMC and CDRT members who were trained for S&R by the organization. While talking to the members of the committees, they mentioned conducting a small scale S&R operation in the community during the flood of 2017 and then mentioned that a few members joined in the operation as they had to save their own families first.

***Figure 5.6**: Line graph showing the status of receiving short and longer term assistance by the respondents in study areas. We allow multiple answers from the respondents here. The study entails 90 respondents in three areas with equal sample size (n=30).*



In the third category, I considered quite a number of indicators to reflect on the status of assistance after the flood or water nuisance (in the following figure) event in the study areas. The survey found that respondents in all three areas mentioned about getting emergency relief after the flood disaster to varied extent. More than 80% of the respondents living in the area with soft measures reported that they received relief assistance from different stakeholders including government, NGOs and personal efforts after the flood of 2017. The relief mostly includes the dry food items so that people can survive immediate after the flood, however the study did not find any efforts from the stakeholders regarding long term disaster risk reduction or resilience building initiative in these area. There are two points that I would like to notice here. Firstly, the people living without any flood risk reduction measures did not get much assistance and only 20% replied that they received relief after the flood of 2017. Second, the people living inside the embankment also reported receiving relief and cash which was quite contradictory as there were not relief distribution for water logging in 2017. So how did this people manage to get the relief which was not for them? The question may be related to misappropriation or politicizing the relief efforts in flood vulnerable communities. Again the people who need much assistance got less compared to others.

5.4.4 Stakeholder's involvement in the flood and water nuisance event

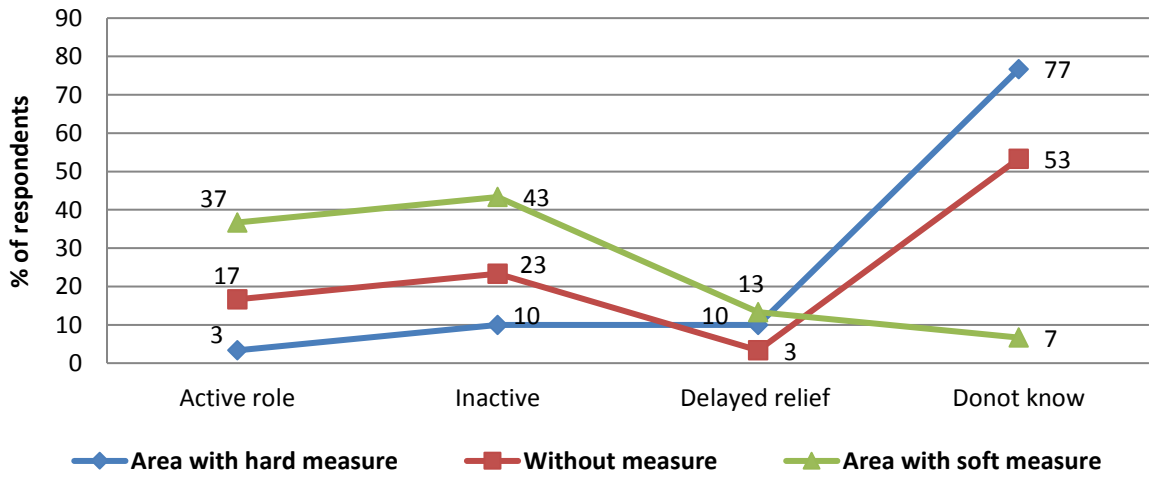
The study also looked into the stakeholders that put efforts to make the lives easy of the flood affected people after the disaster. The respondents mentioned of local government, NGOs and personal donors as a source of getting assistance after the flood event in 2017. About 55% of the respondents from the soft measures area reported that they received emergency relief from the local government; however people living in outside of the embankment without any flood risk reduction measures did not mention government as a source of receiving assistance whereas they mentioned NGOs and private donors[6]. Even though when I talked with the local agricultural officer she said the Upazila Agricultural Office distributed seed to the farmers after the flood event in 2017. It seems a paradox to conclude the status at the end where two different groups are going in opposite directions; however the study understands the social-cultural context and

[6] The community could not remember the name of the persons, but think this the risk and people with humanity came after the flood and supported them.

realized that the assistance against the total affected families was really minimal and people were not happy within the local government that they elected for their development. Again the political context immediately after the crisis moment was also not in favor of the most affected people as the disaster relief interventions from the NGOs and government got politicized by the locally elected Ward Members[7] and their relatives. Therefore there is a trust issue between local people and government bodies responsible for assisting affected people after the flood disaster. There is lower expectation of the people living without any risk reduction measure of receiving assistance for the disaster from the external sources.

However, the study found people are receiving some financial assistance from the national credit organizations providing loan to the poor with monthly interest. In response to the question whether they took loans after the flood 2017, about 65% and 33% of the respondents in the area with soft and without any measure respectively said they had to take out a loan after the flood to manage their livelihood. Many farmers mentioned that they usually need to take out loan once per year from the credits organizations to facilitate the crop production. When the study found people living inside the embankment, although they faced water nuisance also took out loan (30%) in 2017. The interpretation of the result could be more general as the status of taking out loan might be related to poverty and when these people lost some assets they became more vulnerable as they do not have the capacity to recover without having any external assistance and the credit organization sometimes acted as the survivor to those poor people although they realized that the interests rate is more and they need to pay much more at the end of the reimbursement period.

***Figure 5.7**: The line graph shows the respondents' perception on the functionality of the local government to the flood and water logging event in Tangail and Jamalpur District. The study entails 90 respondents in three areas with equal sample size (n=30).*



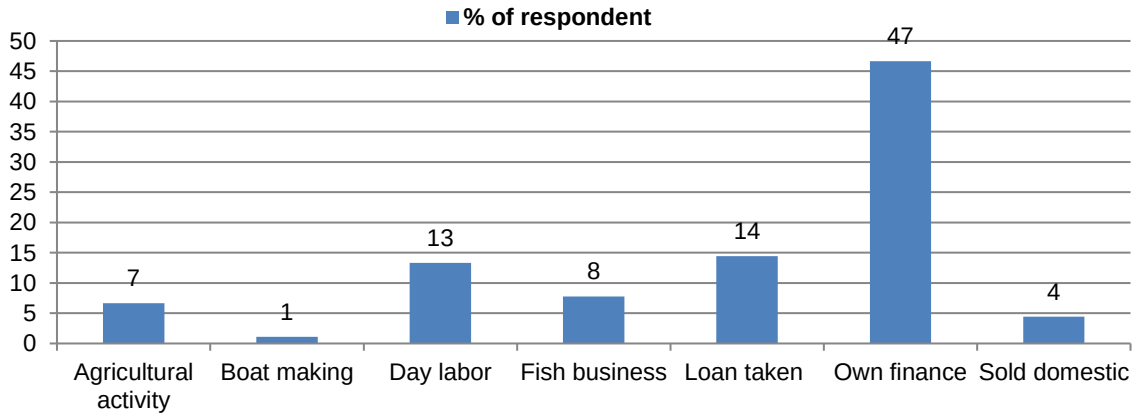
The study specifically asked the respondents how they felt about the functionality of the local government regarding the flood disaster and water logging event. About 40% of the respondents living in the soft measure area reported that the local government was active to support them and a few (15%) said the relief assistance from the local

[7] In each Union Council/Parishad – which is a local administrative unit of Bangladesh Government composes nine Wards where there are nine elected male Member and three female members are to facilitate the development along with one Chairman.

government was delayed in reaching to the affected people. However the majority of the respondents living in the area with hard (about 80%) and without any measures (more than half) seems confused and did not chose any option mention in the survey instrument.

Whoever received various assistances from NGOs or government, I asked them whether they faced any challenges to get those. About 33% of the respondents living in the area with soft measures replied positively and they mentioned corruption, nepotism in connection with local political interferences in the disaster relief operation in the area. However, the political influence was also reported by the respondent living without any risk reduction measures. The respondents shared that beneficially selection was done by the local Ward Member of behalf of the local government and a few politically influential persons who had a relation with the organization without having proper communication with the affected people of the community. Thus in many cases the beneficiary list is filled up with the names of the people who have good connection with those people.

Figure 5.8: *The survival strategy of the affected people after the flood 2017 in the area with soft and without any measure. The survey instrument accepted multiple answers of the respondents (n=30).*



As my last query, I asked how they the affected people manage to start over again after the flood disaster. The highest responses that I found was ‘own finance’ meaning the respondent manage the aftermath by themselves. This response could be combined with loan talking by the respondents from the local credit organizations, neighbors and relatives to manage financial requirement to start over the agricultural process again after the flood disaster. The study also found few people run their livelihood by working as daily basis and became a rickshaw and van puller at other places. In that case those people needed to move out to find a temporary job to earn money for their families. Besides negative coping strategies have also been reported by the respondents and that includes selling domestic animals including chickens, ducks into the market to get some money to survive.

5.5 Threat Appraisal

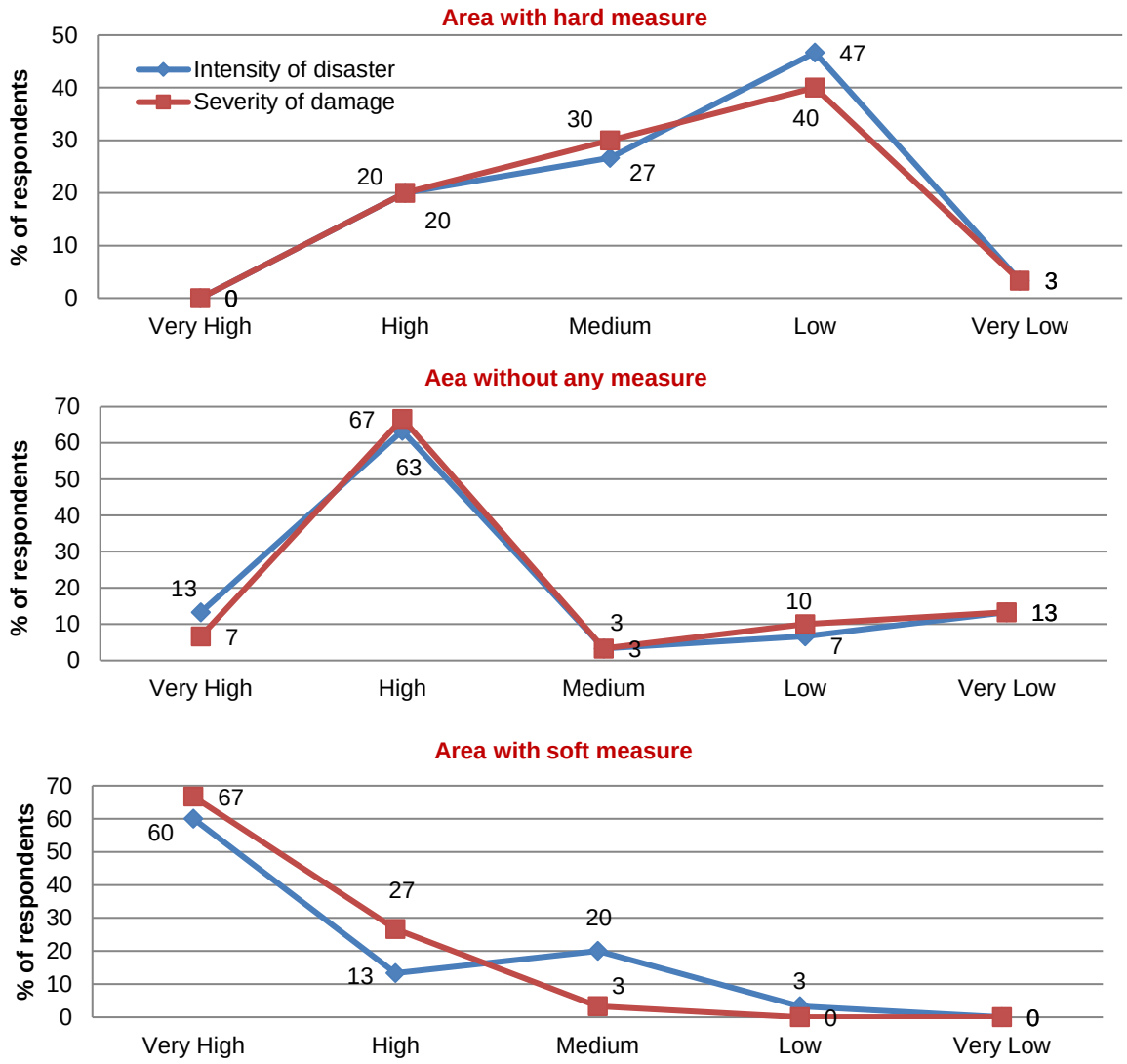
This part of the findings represents the ability and perception of the respondents in assessing the probable future flood risk and associated damage or loss caused by the flood in the study area. The research instrument also covered the possibilities of receiving external and internal assistance during and after flood by the respondents to assess institutional threats. Therefore I tried to explore the foreseeable connection between the respondents loving in the study areas and potential stakeholders inducing NGOs and local government who can support them.

5.5.1 Intensity and severity of future crisis

The majority of the respondents living with soft measure (97%) and without having any flood risk reduction measures (93%) are foreseeing major flood in coming years. Half the respondents living within the flood protection embankment could not response to the question and they seemed confused to be sure.

The respondents were asked to mark the intensity of the future flood disaster and water nuisance also projecting the potential damage caused by these events. The data shows that the majority of the respondents living with soft measures and no measure marked the intensity of the flood disaster and severity of the damage as high to very high status. This perception is obviously linked to the recent flood and also experience of previous flood in the areas. Whereas the majority of the respondents in the hard measure area marked the potential for future flooding as low intensity and severity and this status might be shaped by the existence of flood protection embankment in the areas and also the previous experience of the people. The respondents in this area did not face floods since 1995 even though they have experienced small scale embankment breaches and water logging in the past but did not cause them loss of valuable assets. The survey found a few people who are actually felt confusion towards making decisions towards future flood intensity and severity of damage due to not facing flood before. Asking about flood sometimes seems a paradox to the respondents as on the one side there is a flood protection embankment and on the other side the recurrent water logging situation in the area for the last few years during monsoon season. They realized themselves that they are not experiencing flood and associated consequences like the people living outside the embankment anymore, but water logging turned out as another form of flood in the area'. Around 20% of respondents replied with a high possibility of flood and they highlighted the breach of the embankment and mismanagement of the overall structure by the designated authorities including the Bangladesh Water Development Board and local Water Management Committee formed by the Board.

***Figure 5.9**: The perception of the respondents in all three areas on intensity of disaster and severity of damage due to future water logging and flood disaster. The study entails 90 respondents in three areas with equal sample size (N=30). The respondents were asked to make a judgment about the future flood through a five point Likert Scale ranging from Very Low to Very High status.*

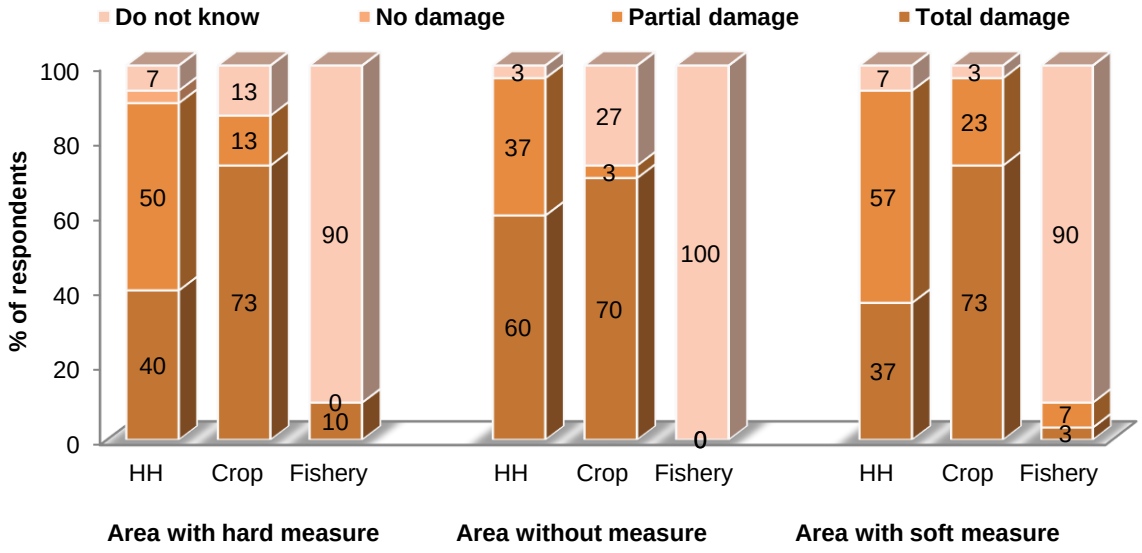


5.5.2 Evaluation of potential damage caused by future flood and water logging

The quantitative survey employed a five point Likert scale, ranging from 'I do not know' towards total damage of the asset, to explore the perception of the respondents about the possible damage caused by the future flood and water logging event in all three locations. The figure below shows variations in risk evaluation by the respondents for different sectors including household, crop production and fishery business. According to the quantitative survey, the majority of the respondents in all three areas mentioned about partial to total damage of the households due to future flood event. The respondents in the soft and without measure areas reported that the severity of the flood has gradually increased as the water level and velocity during flood in 2017 were higher compared to flood in 2016. This is why the respondents in these areas are optimistic about experiencing severe flood disaster in the coming days as well. However the people living inside the flood protection embankment were more optimistic about experiencing water

logging in the coming monsoon season. We understand that the responses are overestimated as the velocity of water during logging situation would not be such as flood so that there would be less possibility of being total damage of the houses inside of the embankment. But we realized that there might be partial damage to the plinth/basement of the house and toilets as these are made of mud and stainless tin.

***Figure 5.10**: The damage perception of the respondents on households, crop and fishery business due to future flood and water logging event in Tangail and Jamalpur District. The study entails 90 respondents in three areas with equal sample size (n=30).*



The survey found the similar status on the crop damage status in the study areas. On average, more than 70% of the respondents in the three areas mentioned total damage of the agricultural crop during flood and even water logging situation. They mentioned losing crops especially Jute in the flood and water logging event in 2017. It was clear that the respondents were influenced by the previous section where they shared previous fold and water logging experience. Despite the overestimated status, it would be interesting to see how these people who rated the damage as high are motivated towards preparing themselves towards future flood event.

In the case of the fishery business, we did not find many respondents cultivating fish in the pond. Only 10% of the respondents in the hard measure area mentioned damage to fishery during future water loggings. They said with the high water level the pond is being flooded and fish got out and the ponds became open water resources which case loss of capital for them. Here we found 'do not know' answers and it is logical that people are not involved in fishery business in all three areas, so they cannot predict future loss.

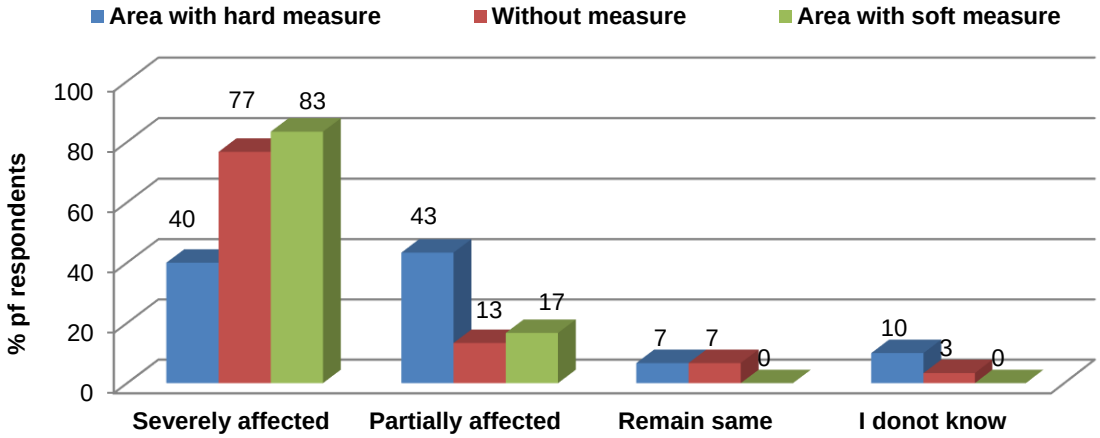
The survey questionnaire also covered the damage status of domestic animal and health of the members of the families. On average 30% of the respondents in the soft and without any measure areas mentioned a few chickens and ducks might die during the flood and the majority of the respondents did not have specific answer to this question. However I asked question about health issue, the majority of the respondents living area with soft (75%) and without (95%) having any flood risk reduction measure mentioned possibility of family members suffering from disease during and after the flood event. The

respondents in the hard measure area were confused while answering the question as the majority could not come up with a specific answer.

5.5.3 Impact on livelihood of respondents

The study assessed the possible implication of future flood and water logging event on the livelihood of the respondents through a four point Likert scale ranging from 'Severely affected' to 'I donot know'. The survey found the majority of the respondents living in the areas with soft (85%) and without any measure (80%) reported that their daily life would be severely affected if severe flood situation happen in future. Only one third of the respondents in the hard measure area mentioned that if flood happen their livelihood would severely be affected. The research found the situation a bit complex while asking about floodings as the people living in this area are not fully aware about future flood but water logging. These variations regarding projecting the future impact on livelihood by the respondents also tell us about the experience that they have from flood event since long back.

***Figure 5.11**: the graph shows the perception of the respondents on the overall impact of flood and water logging on their livelihood in three locations. The study entails 90 respondents in three areas with equal sample size (n=30).*



The possible impact on livelihood also supported by status that the majority of the respondents in all three location they do not have that capacity to start earning money immediate after the flood disaster. Thus there would be hardship in running the family well as before for the people affected by the flood.

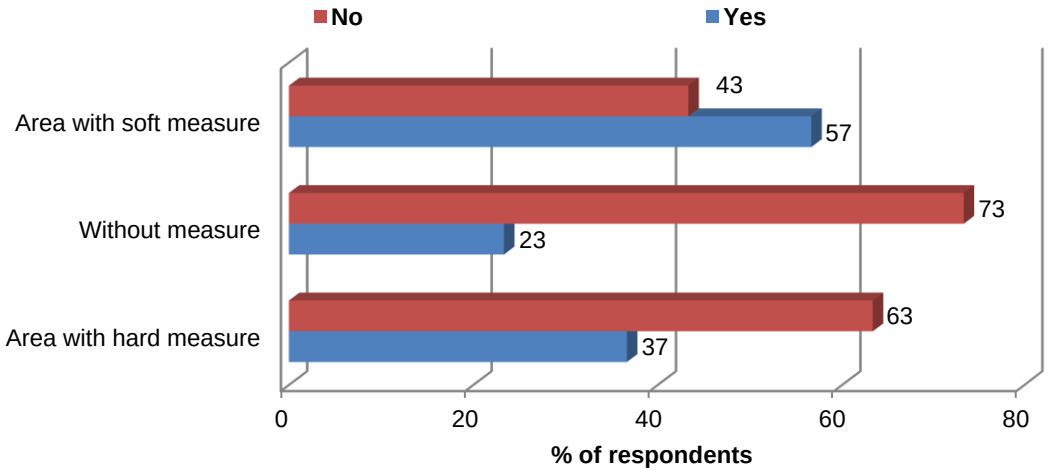
However when we asked whether the respondents could take shelter in other places during floods and stay until the flood water gets down returning to the house. The majority of the respondents replied that they could manage a place to stay with the family. Further we asked about the places that the respondents would expect to travel to take shelter during the crisis moment. Around 66% of the respondents living in the soft measure motioned a high road where they will take shelter along with their families. The study found this is one of the feasible options for these people as there is no flood protection embankment and flood shelter nearby this community. Half of the respondents in the area without any measure did not want to move to other places. The reason could be their attachment to the place since childhood where all the economic and socio-cultural assets belongs to and they do not want to lose them. The second reason could be their previous experience in coping with flood and surviving lives by themselves. However those who said they will move somewhere mentioned taking shelter on the high road and

in the relative's house for a few days. One third of the respondents living in the hard measure area also said relative's house where they expect to stay few days until the situation relates to normal.

5.5.4 Future possibility of receiving assistance from stakeholders

Average recovery time for the basic livelihood mentioned by the respondents is 76 days (two and a half months). The process includes going back to regular earning scheme and repairs the damaged household's infrastructures by the respondents after the flood disaster. Considering the time requirement, we asked whether there is any possibility to receive assistance from external sources that might help to recover soon. The majority of the respondent's (60%) living in the area with soft measure were optimistic about getting supports from the external sources after the flood.

Figure 5.12: *Perception of the respondent in receiving assistance from the external sources after the future flood and water logging situation. The study entails 90 respondents in three areas with equal sample size (n=30).*



The respondents motioned the government as the source of receiving assistance after the flood in the first place, even though these people have been involved with NGO interventions since long. The status was found different in the hard measure area where around 65% of respondents are not expecting any assistance after the flood as they did not get any during the water logging in 2017. However those who were optimistic mentioned NGOs as a source of support. The two third of the respondents living without any measure area do not think they will receive any assistance in the future and those who still have hope mentioned relatives as the source of help after the future flood.

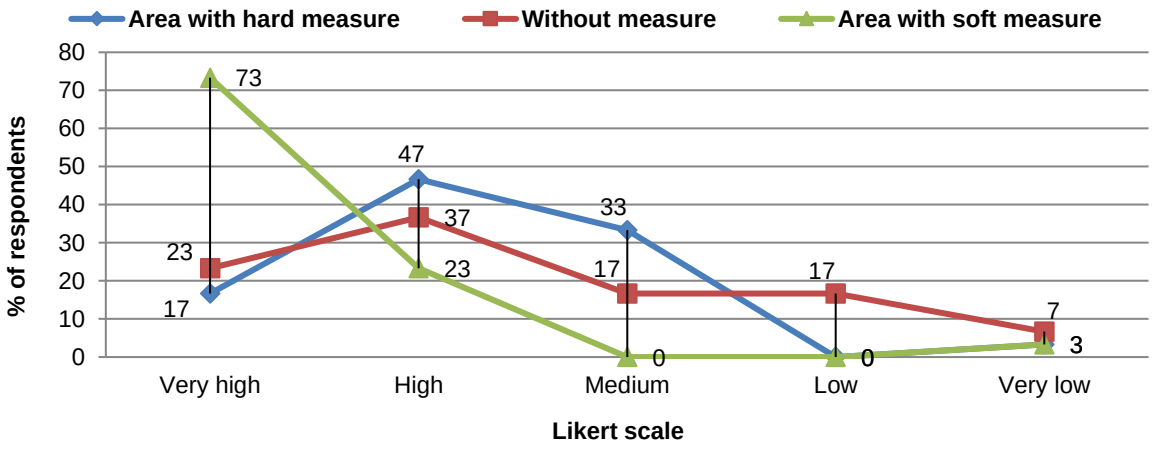
5.5.5 Fear of the respondents

The level of fear of future flood disaster among the respondents varied with places and experiences. The study found that the respondents who have soft measures in place are more scared than the other two areas. Around 70% of the mentioned a 'very high' level of fear of future floods and they scared about losing their valuable assets and lives. According to respondents the water height and velocity of water during the flood of 2017 was more compared to previous years and they considered this flood with the devastating flood happened in 1998 (apart from the death toll). Therefore these respondents are expecting more severe flooding in future. The fear has evolved from recent experience because the flood 2017 created the difference in assuming the damage scenarios by the people in this area. Another issue could be an emerging dependency of the entire

population to soft measures implemented by the organizations and government in this area. So the NGOs with their disaster risk reduction interventions implements flood resilient household infrastructures that includes rising the plinth of house, toilet, tubewell, creating livelihood opportunity and so on. This dependency might be one of the hindrances of getting them prepared by themselves for the upcoming disaster and developed more fear among the people.

The majority of the respondents living with hard measures (47%) and without any measure (37%) see their fear as high, even though a few respondents mentioned very high level of fear considering future floods. The people who are living inside the embankment have experienced several breaches at various points of flood protection embankment and this might be the reason why people are scared about bigger breaches of the embankment and expecting heavy loss of lives and assets in the area. Another reason could be the severe water logging situation happened in 2017 that damaged agricultural crops and assets.

***Figure 5.13**: the status of fear of the respondents* considering future flood event in the study areas. *The study entails 90 respondents in three areas with equal sample size (n=30).*



The people living without having any flood risk reduction measures have valid reason why they are scared of future flooding. The area is detached from the main land and if something happens they could not move to other locations unless they have a plan and associated arrangements including a boat to move out during flood. Therefore fear exists among the respondents, however the survey found 24% respondents mentioned about low fear status. The reason mentioned is that the flood is a regular event for this community and they are facing this since childhood. Therefore they know what to do and how to survive the flood and they do not fear flooding anymore.

5.6 Coping Appraisal: preparedness for future disasters

After assessing previous flood experience and future flood risk evaluation from the respondents, now we wanted to know how the people in these three areas have considered the preparing themselves for future flood or even water logging event. The research considered a few indicators to assess the level of preparedness of the flood vulnerable people and detail of operationalization of flood preparedness is in the methodology section.

5.6.1 Individual and family level preparedness

Now, this section of the survey started with a general question whether respondents have preparedness for flood. In reply, more than 80% and about 65% of the respondents living with soft flood risk reduction measures and without having any measure respectively mentioned having preparedness for future flood disaster. Besides, less than half of respondents living with hard measures reported having flood preparedness. However, while we broke the term preparedness down and asked several sub questions, we found variation in terms of preparedness to future flood event in the area.

We started asking the status of receiving early warning message for upcoming flood in the area. The survey found that the majority of the respondents in all three areas reported that are prepared to receive flood early warning. Almost one third of the respondents in both areas with soft measures and without having any measure were confused about getting any messages for flood disaster and they came up with 'donot know' answers. We also asked about the source of early warning messages for the disaster and most respondents mentioned electronic media including radio and television where the flood update is regularly disseminated for the people. Apart from this, the respondents living in soft area mentioned about close connection of the local disaster management committee with Bangladesh Red Crescent[8] Office located in Jamalpur District. Therefore the members of the committee are usually well aware about the latest information about flood and they communicate with the local people afterward.

The majority of the respondents (on average 74%) in all three areas mentioned having dry food in their house. I acknowledged that stocking dry food is not primarily considering the flood situation in all areas, rather respondents living in the hard measure area reported that these dry food items if also facilitate the need of the children's of the family. Sometimes little children became hungry and they were happy to have cookies. Also many respondents uttered that the dry food arrangement also serves the purpose of entertainment of the guests sometimes. The most common dry food items that we found are puffed rice[9] (the local name is *Muri*), molasses, flattened rice (the local name is *Chira*) and biscuits. So that keeping dry food at the house by the respondents is serving several purposes along with meeting the immediate need of the people after the flood event. The respondents who relied on not having any dry food stored in the house were seems reluctant considering flood disaster and also due to low financial status.

One widely used measure of protecting flood water entering the house, toilet and tubewell is to raise the plinth or basement of these structures considering the flood water height of the previous years. We asked this while conducting the quantitative survey in the communities. The survey found that on average 72% of the respondents living in the soft measure area replied with yes answer to having raised plinth of the above mentioned structures. The key reasons for having this status are the respondents had the information to raise the plinth of the structures to protect those from high velocity of flood water. They received relevant information and required cost from the organizations who implemented

[8] A National disaster relief organization and a part of Red Cross Red Crescent (RCRC) Movement. http://www.bdrcs.org/

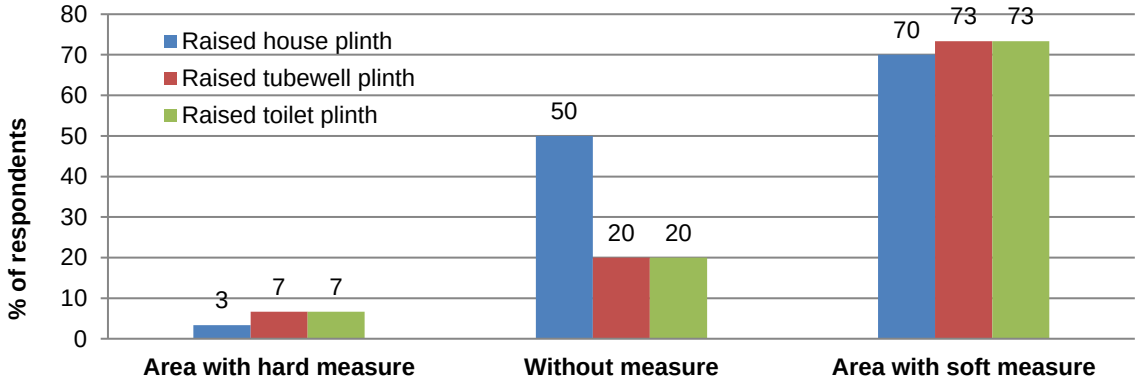
[9] Puffed rice is a type of puffed grain from the Indian subcontinent, made from rice, commonly used in breakfast cereal or snack foods, and served as a popular street food in India, Bangladesh and Nepal. https://en.wikipedia.org/wiki/Puffed_rice

disaster risk reduction operations in the community. Under these operations the poor people received cash to build flood resilient structures, although the number of cash or material support to the people was limited. However, the structural improvement considering flood disaster has greatly supported by the nongovernmental organizations in this area. On average 25% of the respondents said they did not raise the plinth of the house and toilet and there might be several reasons.

In the area without any flood risk reduction measures, half of the respondents raised the plinth of the houses to avoid the flood water entering to the houses. Besides, through the physical observation of the houses during interview and transect walk in the village, it has been clear to the researcher that almost all the house are built quite high from the normal village road and again 20% of the respondents further raised the plinth of toilet and tubewell to be more secure. However half of the respondents did not raise the plinth of the houses and 70% did not raise the plinth of toilet and tubewell basement. The reason can be linked to an 'Act of God' as the people experiencing flood since their childhood and became habituated with the damage caused by the flood event and they might think it's a natural event so human beings could not change of happening this event. Therefore, it does not make any sense to them to be prepared beforehand and invest money for that. More insight on de-motivation of the respondents is discussed in the later part of the result and also in the discussion section.

In the area with hard flood protection measures, the survey found 6% of respondents replying 'yes' to the question of having raised the plinth of the house, toilet and tubewell. It's a different situation compared to other two areas regarding small scale infrastructural preparedness. More than two thirds of the respondents said they did not build their houses, toilets and tubewells considering flood events in future. The argument was the community did not face any flood since last 20 years due to having flood protection embankment built by the government of Bangladesh. Thus they did not feel the requirement to take any structural preparation at household level.

***Figure 5.14**: The graph represents the status of the respondents with only 'YES' in response to question of having raised the plinth of the house, toilet and tubewell basement in the study areas. The status for tubewell includes both the respondents who had personal tubewells and also who collect drinking water from other wells. We asked about did the tubewell they use to collect water have raised basement/plinth or not? The study entails 90 respondents in three areas with equal sample size (n=30).*



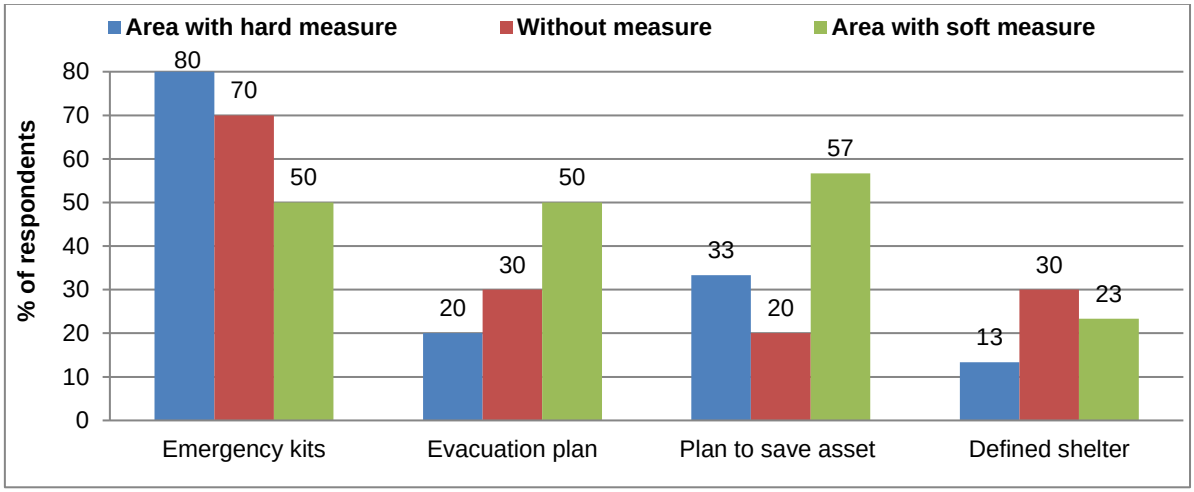
Besides, the majority of the respondents in all three locations are involved in agriculture as an occupation; I asked whether they store seeds considering flood events. One third of the respondents living in the hard measures area motioned of keeping seeds for the next season. The reason behind this lies with the initiative of the Upazila Agricultural Office which usually organize annual agricultural exhibition among the local farmers. In these events the local government officials motivate local farmers to store seeds which has been provided by the Agricultural Office and also asked to share the seeds with other farmers in the area. Now the paradox is that the farmers who are living inside of the hard measure (i.e. flood protection embankment) are given priority by the local government as the agricultural lands are securer compare to the outside. In an average 15% of the respondents in both the area with soft and without any measures said that they store some seeds to use after the flood event or any other situation.

The survey also covered the status of financial capital of the respondents in a way that having stored money has been considered as a preparedness indicator. The preparedness in the sense that if the people have some money deposited in the bank or any other place, they can use that money to recover from the damage that happened due to disaster. Very few respondents reported to have deposited of some money in the study areas. Almost all (87%) respondents living in the area without having any measure and on average 65% of the respondents in both hard and soft measures areas did not have any savings in the bank or any other institution considering uncertainty or future crisis including flood and water logging situations. This status is also related to the average monthly income of the respondents in the study areas. The average monthly income of the responders in the soft measures (65 Euros) area is high compared to other two areas (32 Euros) One third of the respondents did not answer their monthly income. The survey found a bit difficult towards exploring income status of the respondents.

I asked the respondents about family level preparedness for flood event. First, on emergency kit that includes a radio (to listen to news updates), a torch light/candle, fire matches (to make fire immediately after the flood) and first aid kit box. The majority of the respondents in all three areas mentioned having all the above mentioned except first aid kit box at home. More than two thirds of the respondents living with hard measure reported to have emergency kits at home which eventually do not mean that these people are expecting flood event to happen in near future. Rather these items except first aid seem a regular instrument in the house. The respondents who did not have these items also does not necessary mean that these people never had those in the house. They said these kits are of household need and but at this moment they do not have those.

The second issue I asked about whether they have any evacuation plan considering future flood disasters. Here I mean if the family has any idea on how to relocate the family to a safer place which is important to avoid harm to family members during the flood event. Half and one third of the respondents living in the soft and without having any flood risk reduction measure areas, respectively, mentioned having a chat with their neighbors about what to do and how to save the whole family including children during flood. The discussion covers managing a transport including boat to relocate the family members to other places. According to them the number of boats is limited compared to the entire population, therefore they usually help each during crisis. Besides, one fifth of the respondents living with hard measures said they are now thinking to relocate the family to other place considering severe water logging events in future.

***Figure 5.15**: The status of family level preparedness of the respondents in the study areas. The study entails 90 respondents in three areas with equal sample size (n=30).*



The third issue we asked about having a plan to save valuable assets including domestic animals, ornaments (mostly for females). More than half and one third of the respondents living in the soft and hard measure area respectively mentioned they thought about saving assets specially domestic animals which need to be carried with them during flood or water logging. The respondents living with soft measures reported that there is no flood shelter in and around this area so that they are used to taking shelter on the high road along with their families and domestic animals. Besides respondents living with hard measure explained that during high water (due to water logging) they need to keep domestic animals in the high areas or on the road.

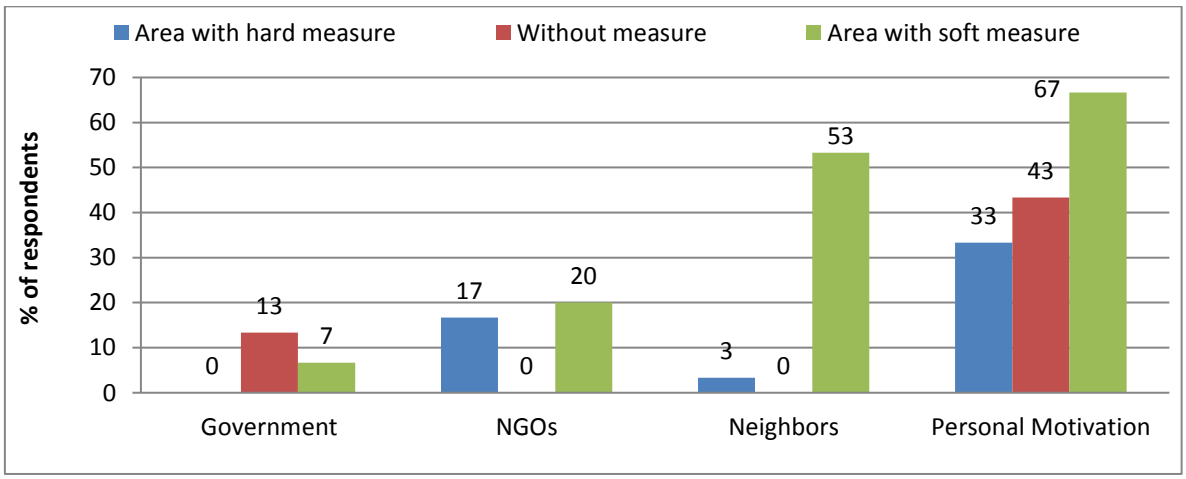
Lastly we talked about arrangements for temporary shelter to stay a few days during flood or water logging situation. One third of the respondents living without any measure and one fifth living with soft measures said they will take shelter on the flood protection embankment and high road respectively. The people living with soft measure treat the local village road as the embankment made by the local government, therefore this road is serving both of the purposes; local transportation to go to other villages and flood shelter for the people.

I also asked about having a 'community plan' for managing disaster locally by the community people. The survey data shows that people living with hard measures and without having any flood protective measure responded with 'No' and 'I do not know' while asked about having a disaster management plan at the community level. However, more than half of the respondents from area with soft measures said they have a disaster management plan considering the flood for the community. The organization named Bangladesh Red Crescent Society formed a community disaster management committee (CDMC) and implemented the Community Based Disaster Risk Reduction (CBDRR) project in this community. The CDMC members along with the community people and with the help of project developed a disaster management plan for the community focusing on future flood disaster. This plan actually outlined the responsibility of the committee members, local community leaders and general people of the community during flood situation. While discussed the effectiveness of that Plan in the 2017 flood to the respondents, the study found the people could not do exactly the same activity mentioned

in the plan due to inadequate skills and resources. However, they said they conducted some of the activities to save people and assets. For instance, the members of committee conducted a small scale Search & Rescue operation during the flood of 2017 in the area with soft risk reduction measures.

Whatever the status of preparedness that had been found conducting the survey in the communities, we inquired out the sources from where the people came to know about preparedness messages or instructions. Among the categorization of sources, the majority of the respondents in all three areas replied with personal motivation to get to know how to make them prepared to save lives and assets during flood disaster. The personal motivation also means that the respondents are willing to explore or know flood related preparedness information from different sources. The study found that more than half of the respondents living in the area with soft measures mentioned neighbors as a source of getting preparedness information. Further investigation explored that the different nongovernmental organizations have conducted court yard meetings with the local people during implementing the disaster risk reduction interventions. The trained personnel from the organizations shared information about disaster preparedness through these meetings and the people who could not join the meetings heard the messages from who attended. Therefore second loop learning has happened in this community where people shared the information to others and they were also interested to learn. Around one fifth of the respondents living in areas with soft and hard measures mentioned that nongovernmental organizations helped them to obtain preparedness information. The NGOs worked on disaster risk reduction and organizations who are involved in credit business are both contributed towards raising awareness on flood disasters and its preparedness. The study also found that local government acted as information provider as a few respondents mentioned they received flood related information from the representatives of the local Union Parishad. The communication between local people and local government usually happens via mobile phone and face to face, it is not that local government conducts early warning message dissemination through official or volunteers before the flood disaster in the vulnerable areas.

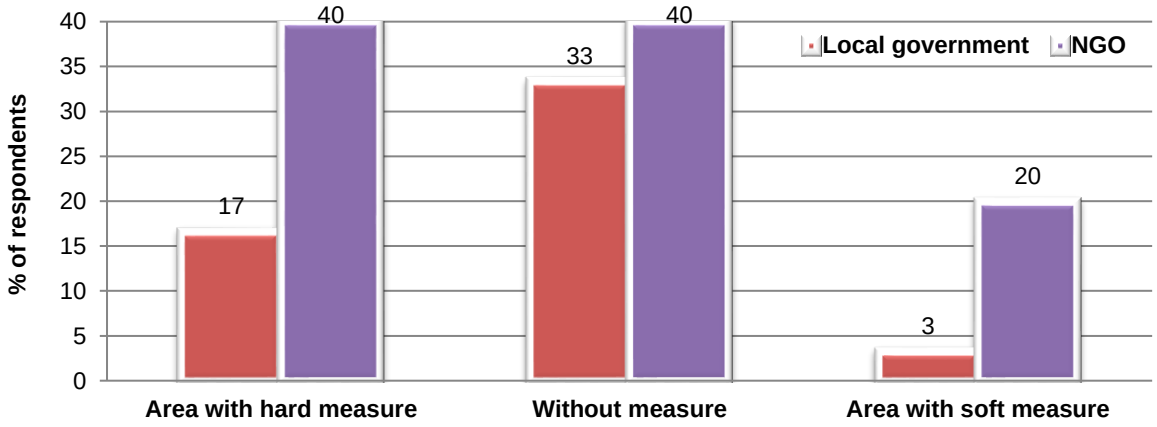
Figure 5.16*: The source of preparedness information received by the respondents. The survey accepted multiple responses from the respondents taking into account that the source of information can be various. The study entails 90 respondents in three areas with equal sample sizes (n =30).*



5.6.2 External network as preparedness for crisis

The study looked into external linkages of the respondents with local government and NGOs from where they might manage some sort emergency and longer terms assistance before, during or after the crisis. In this study we considered two stakeholders that includes different department of local government (i.e. Union Parishad, and Upazila Agriculture, Fishery and Livestock Office) and nongovernmental organizations working on community development or disaster risk reduction or microfinance.

***Figure 5.17**: The status of having linkage/communication of the respondents with different departments of local government and NGOs. The graph only represents the percentage of respondents who said 'YES' in response to having linkage with the stakeholder. The study entails 90 respondents in three areas with equal sample size (n=30).*



The survey found only one third of the respondents living without any measure have communication or know the person working in the department of agriculture, fishery and livestock at the Upazila Level. These respondents reported that they talked to these officials during various occasions. They mentioned that they do not have any personal relation with them but they can ask assistance when they need it. However, while talking about locally elected Chairman and Ward member at the Union Parishad, the respondents said they know these people.

The status of having connection of the respondents with nongovernmental organization was found to be slightly better compared to local government in the study areas. In both areas with hard measures and without any flood risk reduction measure, 40% of the respondents mentioned that they know NGOs and have connection with the representatives working there. During the informal discussion with local people, the study found that existence of microcredit organizations is profound in these areas as people take out a loan at least once per year. Around 50% of the respondents in all three areas believed that they will get loan from these credit organizations with interest after any crisis. Now, taking out loan does not only mean that these respondents needed the money after the flood or water logging to recover from loss; rather they use the money for preparing and cultivating land. The study found only 20% of the respondents in the soft measures area mentioned having connections with NGOs. However, this people were continuously assisted by different organizations in recent past; therefore it might be an issue of effectiveness of the NGO interventions towards strengthening the connection between people and the stakeholders.

5.7 Non-protective Response

The study found a few respondents in each of the survey location who did not make them prepared for future flood disaster (the following table). More than half of the respondents (57%) living behind the flood protection embankment and one third of the (35%) living without having any flood protection measures mentioned that they do not preparedness for future flood disasters.

The survey found that the majority of the respondents with non-protective responses eventually recognized the flood as a natural event, so they argued not to do anything. Therefore, believing in an act of God by the people can be seen as a hindrance towards being prepared for the flood. Schmuck (2000) found that even though flood prone people in Bangladesh are informed about the coming flood, they are reluctant to be prepared and thus accept their fate as helpless flood victims. Besides, one third of the unprepared respondents living behind the embankment also mentioned the flood will not harm them. The logic is that since 1995 they did not have any flood disaster even though there were several breaches of the embankment at various points and that did not do harm to them. This could be also linked with the response of 'I am not interested' to be prepared for a flood which might not happen in this area. The survey also found the dependency of the people living in the soft risk reduction measure area on others which might includes the external stakeholders or even the neighbors. Many NGOs worked in this community with disaster risk reduction and resilience projects and these people always received some assistance from them. This could be a reason why the respondents are quite sure that someone will come and save them.

Table 5.1*: The following table represents the percentage of respondents with their non-protective responses in all three study areas. The sample number represents the respondents who said they do not have any preparedness measures considering the future flood disaster.*

Responses of the respondents	Area with hard measure (n=17)	Without measure (n=11)	Area with soft measure (n=5)
Natural event, so I cannot do anything	59	82	80
It wouldn't harm me	29	9	0
I shall get support from others	0	9	20
I am not interested	12	0	0

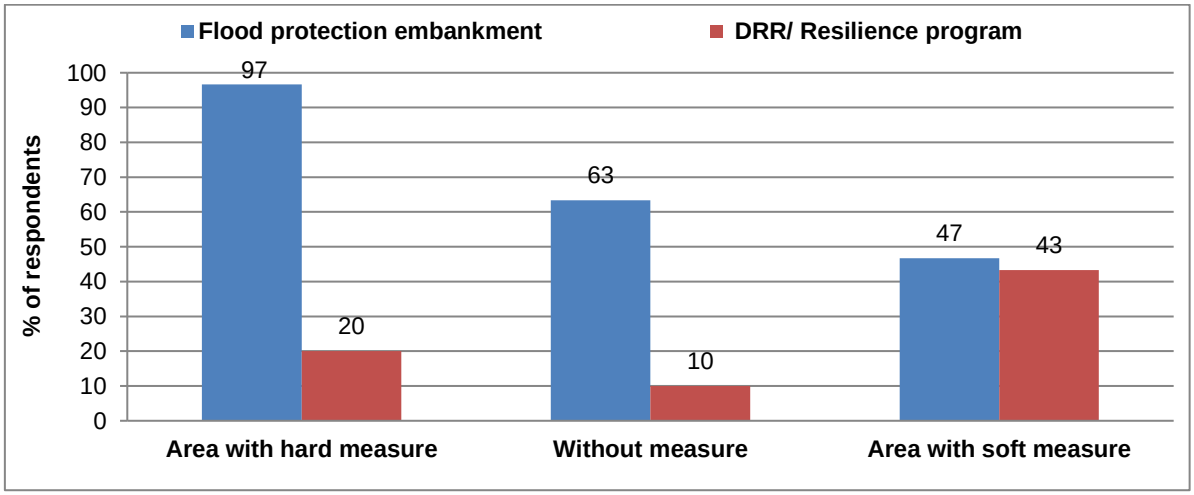
5.8 Reliance and expectation of the community

According to the PMT reliance of the people on the flood protective infrastructures or disaster risk reduction interventions could have impact on individual or family level preparedness for flood disaster. In this section I shall recount how the people living in all three locations perceived their reliability on the embankment and disaster risk reduction (DRR) or resilience intervention by the government and NGOs respectively. I also asked people what they expect from the government and NGOs considering flood disaster.

The quantitative survey data shows that the majority of the respondents in all three locations relies on the flood protection embankment and believes that this hard flood risk reduction measure can reduce the damage of the flood disaster in the vulnerable community. Almost all the respondents living with a hard measure/embankment are completely reliant on the existing embankment for protective the flood disaster as these people did not experience any flood after constructing the embankment around the

community in 1995. Around two thirds of the respondents living without any flood protection measure (outside of the flood protection embankment) mentioned that the embankment can protect damage in their community. This reliance actually came through watching how their neighbors are protected from the flood disaster at the same time they are severely suffering from flood disaster. Besides, while a big flood comes, these people are usually dependent on this embankment to take shelter for few days. Therefore it is really visible to them how effective is the embankment in terms of protecting the lives and assets of the vulnerable people.

Figure 5.18: *Reliance status of the respondents (N=90) on flood risk management. Here the number only shows the status of positive responses on flood protective embankment of government and DRR/resilience interventions of NGOs.*



Next question was about the reliance of the people on the NGO led disaster risk reduction or resilience interventions in terms of reducing damage or protect people from flood disaster. On average more than two thirds of respondents living in the areas with hard flood risk reduction and without having any measure replied that they do not rely on soft disaster risk reduction measures implemented by the NGOs and governments. They said the awareness is helpful to make them prepared what to do and how to do it, however flood water reaches to their yard and even into the house anyway and it obviously causes damage to various extents. Besides, half of the respondents living in the area with soft measures which includes the disaster risk reduction or resilience interventions implemented by the nongovernmental organizations, shared that these projects could help to make them prepared and thus can save lives and assets from flood disaster. These soft measures actually provided information and knowledge on awareness on the flood disasters and also livelihood assistance so that the affected people could have resources to cope the crisis situation after the event. The positive responses of the respondents towards soft measures can also be linked to pro-development attitude due to experiencing development aid/project since long. However those who do not believe that soft measures can reduce the damage cost is also closely connected with their previous and current flood experience where they also lost assets even though they had preparedness information and knowledge from the resilience and disaster risk reduction (DRR) interventions.

5.9 Expectation of the community

Apart from the status of reliance of the community on different flood control (hard measure) and management approaches (soft measures), I asked about the general expectation of the community considering the situation before, during and after the flood disaster in the area. The study found diverse expectations from the people considering the timeframe of the disaster and stakeholders. Apart from a wide range of needs, three frequently mentioned expectations from the government and various departments are constructing a flood shelter, strengthening the early warning system, repair of village roads and safe water & sanitation. The half of the respondents in the study areas demanded a flood shelter. Even though the people, who are living inside the flood protection embankment, realized that there is a need for a shelter for the people living outside and suffering form flood each year. Besides, a few respondents living outside and in soft measures area reported that the shelter needs to be bigger so that they could bring their domestic animals with them. The second is strengthening early warning system for flood disaster. More than one third of the respondents mentioned the importance of receiving flood early warning messages properly which includes the projected water level during the flood, the variation of water height at different places, when to relocate family and so on. The respondents also mentioned the need of updating and disseminating the early warning message with flood duration in the vulnerable communalities. The third priority was on reconstructing the village road before the flood seasons, so that it can act as a temporary shelter for the flood affected people. The study found similar status in the area with soft measures and many people stayed on the high village road during flood in 2017. The fourth priority was to deliver safe water and sanitation to the flood affected community. People were also mentioned constructing flood resistant water and sanitation structures in the community so that they can use them during or immediate after the flood.

***Table 5.2**: The status of expectations of the respondents before and immediate after the flood disaster from the government and nongovernment organizations. The study entails 90 respondents in three areas with equal sample sizes (n=30). I accepted multiple answers here. The number represents the percentage of the respondents in the study areas.*

Expectation	Government (%)	NGOs (%)
(1) Establishing flood shelter	50	19
(2)Stronger search & rescue operation	3	1
(3)Stronger early warning system	36	23
(4) Enhanced evacuation of residents	8	10
(5) More care about physically unable people	12	8
(6) Safe water & sanitation	23	44
(7) Distribution of emergency relief	19	23
(8) Medical support	6	7
(9) Repair roads	24	4

However the priority of the expectation from the community from NGOs found diverse. Almost half of the respondents expect the NGO will deliver safe water and sanitation facilities to the flood affected communities immediate after the flood. The second priority was distribution of emergency relief assistance to the affected families. The respondents mentioned that they saw NGOs come faster than other stakeholders including local government to support them immediate after the flood disaster. The third was providing safe water and sanitation facility to the people.

However, the expectation of the community from different stakeholders varies with the situation. After the flood disaster, the majority of the people want to receive livelihood support programs and cash for work assistance from both the government and NGOs. This expectation is associated with the recovery from the damage caused by the flood and they need livelihood opportunities to earn and run families. People also asked for medical assistance after the flood disaster from the NGOs which also denotes the insufficient public medical services in the flood affected areas after the disaster. Besides, there was a pressing expectation from the communities, (living inside the embankment) to repair embankment. This expectation rose due to having several breaches in parts of the flood protection embankment in the Tangail area, therefore it's urgent to repair those places before another monsoon season arrives. The respondents also mentioned that in each monsoon season several parts of the embankment became risky due to water level differences between inside and outside of the flood protection embankment.

Table 5.3: *The status of expectations of the respondents after (six month or longer term assistance) the flood disaster from the government and nongovernment organizations. The study entails 90 respondents in three areas with equal sample size (n=30). I accepted multiple answers here. The number represents the percentage of the respondents in the study areas.*

Expectation	Government (%)	NGOs (%)
(1) Cash for work	33	26
(2) Livelihood support program	47	38
(3) Shelter support	16	11
(4) Embankment repair	33	9
(5) Special program for disabled persons	14	10
(6) Medical support	11	37
(7) Repair roads	18	0
(8) Safe water & sanitation	10	1

Chapter Six: Analysis of the Results

6.1 Introduction

This chapter demonstrates analysis of the survey data by performing correlation matrix analysis where I investigated the relationship between different variables on PMT components and flood precautionary actions of the people. I did not look for causality among the variables but only positive and negative relations to identify variables that might have potential influence on flood protection attitudes of the people.

6.2 Analysis of the Results

This part of the discussion represents deeper analysis of the results through conducting correlation matrix among different variables. The variables have been selected according to the subcomponents proposed under main components of the Protection Motivation Theory (PMT) and those are Threat Appraisal, Coping Appraisal, Threat Experience Appraisal and Reliance on different public and NGOs intervention. In making the correlation easy and effective, subcomponents of the PMT have been operationalized again with various variables (detail is in the methodology chapter). I selected seventeen preparedness actions related to flood disaster and these include both structural/hard and soft/awareness raising actions considering flood, so that people who are vulnerable can reduce the damage caused by flood. These preparedness variables also fall under the coping appraisal of the PMT which denotes existing capacity of the flood vulnerable people to face a hypothetical flood in future. Afterwards I produced a few correlation tables including these variables. The correlations among the variables are explained through qualitative findings from Focus Group Discussion conducted with the people in the study areas.

6.2.1 Threat Appraisal and Preparedness Action

According to PMT, Threat Appraisal is operationalized as perceived probability of threat, perceived severity of threat and fear. In this research I further break these three aspects down into several variables for easy understanding and efficient measurement. The perceived probability of threat (also means flood exposure) is been represented with probability of future flood event, possibility of inundation of house, intensity of flood and severity of damages caused by the flood. The expectation of hypothetical flood in future has significant positive correlation with structural improvement including raising plinth of house (r = .321, p <0.01), tubewell (r = .277, p <0.01), toilet (r = .277, p <0.01). This means the respondent who expect a flood in future are more into strengthening the household structures to save them from flood. Besides, the expectation of flood also shows increasing tendency to store dry food at home (r = .237, p <0.05) and evacuation plan (r = .334, p <0.01). Here the evacuation is does not only means formal plan to go somewhere before flood but also an informal discussion with the neighbors regarding how to save the family assets, defining a place to go and how to reach etc. That means the evaluation plan represents the social cohesion among the households living in the flood prone areas.

The inundation of the household has significant positive correlation with family awareness (r = .222, p <0.05) and negative correlation with community disaster management plan (r = -.240, p <0.05). Therefore, the respondents who assume that their

house might be flooded stressed in raising awareness among the family members on flood disasters, so that everyone can survive from negative consequences of flood. On the other hand, same respondents were less willing to develop a disaster management plan for the whole vulnerable community. It might be due to having lack of technical skill to develop a disaster management plan and also having inadequate financial and other resources in the community.

The intensity of the hypothetical flood has significant positive correlation with structural preparedness actins including raising plinth of house (r = .275, p <0.01), tubewell (r = .331, p <0.01) and toilet (r = .331, p <0.01). These results mean the respondents who assumed higher intensity of flood in future are more motivated towards investing and working on improving the households structures to save them from damage. Besides, the respondents are also motivated to develop an evacuation plan (r = .347, p <0.01) (both formal and informal) and taking loan (r = .358, p <0.01) to recover from the flood damage. Even though taking loan means that the people need to pay interest along with the loan, however at least they have this source to get some cash to do things that are necessary for them. The correlation matrix shows the similar results between severity of damage and preparedness action of the respondents. The severity of damage from a hypothetical flood has significant positive correlation with all ten structural improvement actions including rising plinth of the house (r = .365, p <0.01), tubewell (r = .421, p <0.01) and toilet (r = .421, p <0.01) and with nonstructural measure include developing an evacuation plan (r = .302, p <0.01) considering flood.

The perceived severity of future threat again has been operationalized considering possible damage of household, agricultural crop, death of domestic animal, family health status and the impact on overall livelihood of the people due to hypothetical flood. The following table represents the correlation matrix among these variables and preparedness action variables. The household damage has significant negative correlation with early warning (r = -.269, p <0.05), having emergency equipments (r = -.252, p <0.05), possibility of taking loan (r = -.239, p <0.05) and developing community disaster management plan (r = -.281, p <0.01). These results mean that the respondents, who are expecting minor to severe damage of the households due to hypothetical flood in future, are less motivated towards taking soft preparedness measures mentioned just before. Moreover, these respondents might not have confidence in taking soft measures that can reduce the household damage due to having previous flood experiences. However the agricultural crop damage has significant positive correlation with storing cash money (r = .218, p <0.05), having emergency equipment (r = .222, p <0.05), family awareness (r = .226, p <0.05) and defining a place to relocate family during flood (r = .239, p <0.05). The results means the respondents who expected losing of agricultural crops due to flood in future and more into taking soft measures to reduce the damage and also recover them from loss after the event.

The death of domestic animals has significant positive correlation with raising plinth of tubewell (r = .221, p <0.05), toilet (r = .255, p <0.05) and evacuation plan (r = .247, p <0.05). The study did not find any qualitative information to explain the relationship between death of animals and raising the basement of tubewell and toilet and may be they are correlation by random choice. However, the evacuation plan is important to move out the domestic animals along with the local people to escape the flood. The common challenge in doing so is the flood shelter does not have the arrangement of sheltering

those animals and people also suffers from providing proper places for the animals. Therefore death of domestic animals is quite common during flood in Bangladesh and motivation towards thinking how to evacuate the animals beforehand could be one of the ways to save them.

The status of family health has significant positive correlation with structural improvement variables including rising the plinth of the house (r = .214, p <0.05), tubewell (r = .333, p <0.01) and toilet (r = .333, p <0.01). The flood usually brings water borne diseases including dysentery, diarrhea and itching, therefore motivation of the respondents towards maintaining the quality of drinking water from the tubewell by raising its basement higher to avoid entering the flood water into the tubewell is logical. Besides, raising the plinth of the toilet to keep it functional during flood and it is necessary to ensure proper sanitation for the family. Moreover, structural improvement of the household plinth is also a way to avoid entering flood water in the house, so that the family members will have some dry places and avoid always be in the dirty flood water. However, the correlation matrix also found significant negative association between family health status and a few soft preparedness actions including stored crop at home (r = -.269, p <0.05), stored money (r = -.239, p <0.05), keeping emergency equipments at home (r = -.214, p <0.05) and family awareness on flood (r = -.265, p <0.05). The family health status should have some positive correlation with family awareness about flood event so that members could be aware about the possible diseases and also with storing money to facilitate the healing process if someone in the family got sick.

Table 6.1: *Correlation between threat perceived probability and preparedness actions variables*

Variables of Threat Appraisal	**Flood preparedness actions**																
	Flood early warning	Store dry food	Raise house plinth	Raise tubewell plinth	Raised toilet plinth	Stored crop seed	Stored money	E emergency equipments	Family awareness	Evacuation plan	Save valuable asset	Family relocation place	Connection with NGOs	Possibility to take loan	Damage insurance	Community DM plan	Connection with local government
Threat Appraisal: Perceived probability of Threat																	
Hypothetical/future flood	-.054	**.237***	**.321****	**.377****	**.377****	-.071	.064	-.101	-.153	**.334****	.170	.145	-.098	.101	-.022	.083	-.133
Inundation of HH	-.079	.019	-.019	-.085	-.029	.028	-.105	-.104	**.222***	.122	-.054	.114	-.021	-.031	.092	**-.240***	-.070
Intensity of flood	-.147	.095	**.275****	**.331****	**.331****	-.058	.071	-.068	.081	**.347****	.005	.134	.086	**.358****	-.096	.032	.179
Severity of damage	-.121	.165	**.365****	**.421****	**.421****	-.197	.099	-.145	-.064	**.302****	.022	.084	-.022	.252*	-.110	.196	.041
Threat Appraisal: Perceived severity of Threat																	
Household damage	**-.269***	-.128	-.055	-.047	-.047	.055	-.158	**-.252***	-.050	-.172	-.142	-.072	-.168	**-.239***	-.016	**-.281****	-.002
Agricultural crop damage	.159	.082	-.083	.003	-.057	.138	**.218***	**.222***	**.226***	.115	-.063	**.239***	.023	.069	.025	.034	.041
Death of domestic animal	.077	.185	.111	**.221***	**.255***	-.137	-.096	-.092	.045	**.247***	.125	.010	.012	.252*	-.047	.174	-.206
Family health status?	-.120	-.172	**.214***	**.333****	**.333****	**-.269***	**-.239***	**-.214***	**-.265***	.057	-.084	.108	-.164	-.111	-.090	-.025	-.052
Income struggle	.093	**.218***	-.152	-.119	-.119	**.215***	**.353****	**.325****	**.254***	**.242***	.145	**.218***	.185	**.313****	.167	.056	**.251***
Livelihood impact	-.119	.008	**.350****	**.268***	**.223***	-.061	-.104	-.145	-.012	.176	.037	.078	.052	.054	**-.233***	.012	.094
Threat Appraisal: Fear of Threat																	
Fear of flood	-.108	-.009	.067	**.325****	**.302****	-.132	.170	**-.218***	-.057	.183	-.103	-.159	**-.258***	.009	-.026	**.217***	-.053

****. Correlation is significant at the 0.01 level (2-tailed).**
***. Correlation is significant at the 0.05 level (2-tailed).**

Table 6.2: *Correlation between flood experience and preparedness actions variables*

Variables	Flood early warning	Store dry food	Raise house plinth	Raise tubewell plinth	Raised toilet plinth	Stored crop seed	Stored money	E emergency equipments	Family awareness	Evacuation plan	Save valuable asset	Family relocation place	Connection with NGOs	Possibility to take loan	Damage insurance	Community DM plan	Connection with local government
Experienced flood in past	.165	-.156	**-.549****	**-.591****	**-.631****	**.284****	.006	**.276****	**.350****	**-.276****	-.141	-.062	.064	.066	-.152	**.273***	-.188
Suffer from HH damage	.227	-.168	-.276	**-.387****	**-.406****	**-.654****	-.236	-.185	-.052	-.177	-.045	-.257	**-.368****	.171	.149	.035	.269
Suffer from crop damage	**.353****	-.076	-.194	-.228	-.237	-.264	-.256	-.133	-.186	-.181	.156	-.256	**-.338***	.132	.147	.055	.209

****. Correlation is significant at the 0.01 level (2-tailed).**
***. Correlation is significant at the 0.05 level (2-tailed).**

The income struggle variable has significant positive correlation with several soft preparedness actions including storing dry food (r = .218, p <0.05), money (r = .353, p <0.01), emergency equipments (r = .325, p <0.01) and agricultural seeds at home (r = .215, p <0.05), family awareness on flood disasters (r = .254, p <0.05), developing an evacuation plan (r = .242, p <0.05), taking out loan (r = .313, p <0.01) and making connection with government (r = .251, p <0.05). The interpretation could be the respondents who are assuming they will not be able to earn immediate after the hypothetical flood and will be struggling to run the family are more into making themselves prepared preferring soft actions which do not require large investment. All the structural preparedness actions are negatively associated with the income struggle which also means the financial status of these families who eventually are not in a position to put money of strengthening household structures for hypothetical flood in future.

Livelihood impact has significant positive correlation with structural improvement variables including rising plinth of house (r = .350, p <0.01), tubewell (r = .268, p <0.05), toilet (r = .223, p <0.05) and negative correlation with a soft preparedness action; damage insurance (r = -.233, p <0.01). The results mean the respondents who expect higher impact (positive or negative) on their livelihood due to hypothetical flood in future are motivated to taking action to strengthen their household structures to avoid the damage. Besides, the negative correlation tells us that people are de-motivated to take damage insurance regardless of the impact of flood. The reason might be the poor financial situation of the people living in the areas who are not capable of paying the insurance installment. Another reason could be lack of institutions who promote disaster damage insurance.

The last variable of threat appraisal is fear. The correlation matrix shows significant positive correlation with structural preparedness action including raising plain of the tubewell (r = .325, p <0.01) and toilet (r = .302, p <0.01) which means the respondents who showed lower to high fear of hypothetical flood are motivated towards structural improvement of tubewell and toilet to protect water and sanitation over others. The matrix also shows significant negative correlation with having emergency equipment at home (r = -.218, p <0.05), connection with NGOs (r = -.258, p <0.05) and developing community disaster management plan (r = -.217, p <0.05). These results mean that with the increase of fear factor, the level of motivation or interest of the respondents towards making soft preparedness action decreased. The analysis also interprets that fear factors has contributed towards structural improvement rather soft actions.

6.2.2 Flood Experience and Preparedness Action

The following Table 6.2 represents the correlation matrix among the flood experience and preparedness actions of the respondents in the study area. The data shows that previous flood experience of the respondents has significant and strong negative correlation with the structural preparedness actions including raising plinth of the house (r = -.549, p <0.01), tubewell (r = -.591, p <0.01) and toilet (r = -.631, p <0.01). This relationship means that with the increase of flood experience of the respondents the preparedness action towards rising plinth of the house, tube well and toilets decreased. The possible explanation could be the respondents who are experienced in facing flood in life have seen the damage caused by the flood anyway including with or without making improvement on the household structures. They are not confident that structural improvement could lower the flood damage. The status complies with the result of this research as the respondents living with soft measures from the NGOs mentioned the damage of the flood resilient households'

structures during flood of 2017. According to the people living in hard measure area, flood resilient structures including raised plinth of house, tubewell and toilets were functioning well until flood 2017 and due to unexpected height and velocity of the flood water the structures are partially or fully damaged. Therefore it is also an issue of unpredictability and uncertainty of the flood which varied with time. Similarly they are not interested to make an evacuation plan (r = -.276, p <0.01) for hypothetical flood disaster. However the flood experiences has significant positive correlation with soft measures including storing seeds of the crop (r = .248, p <0.01), having emergency equipments (r = .276, p <0.01), flood awareness in the family (r = .350 p <0.01) and developing disaster management plan for the vulnerable community (r = .273, p <0.05). These results mean that the people with previous flood experience motivated them to raise awareness among them and also to develop a plan to face the flood disaster better in future.

Similarly, the respondents who suffered from damage to their houses are less motivated towards working in improving the household structures including rising plinth of tubewell (r = -.387, p <0.01) and toilet (r = -.406, p <0.01). This also means that suffering of the people from flood decreased the interest of investing physical labor and money to raise the plinth of the tubewell and toilet. Besides the correlation matrix found significant and strong negative correlation between the respondents who suffered from household damage and storing crop seeds at home (r = -.654, p <0.01) and negative correlation with making connection with NGOs (r = -.368, p <0.01) for future support. These negative correlations do not comply with the assumption made for this research as the sufferings from flood would motivate and raise interest of the people to work on future safety.

Moreover, the respondents who suffered from crop damage due to flood are interested to get early warning (r = .353, p <0.01) of flood so that they can be prepared to save the crop that they cultivated in the agricultural land and also take the stored food at home to other safe place. However, these respondents are not motivated to make a connection with NGOs. The reason could be the priority of the NGOs are basically in conducting awareness rising and households structural improvement to flood disaster, not to provide agricultural seed to the affected farmers. Therefore the respondents know that they will not get any assistance for crop or seed.

6.2.3 Reliance Preparedness Action

The following Table 6.3 represents the relationship between different types of reliance variables with preparedness actions. I am starting here with the overall reliance results which mean people are reliable on any kinds of flood risk reduction measures. The existence of any flood risk reduction measures on which people rely on in the communities has both positive and negative significant relation with flood preparedness action variables. Reliance of respondents on any kinds of risk reduction measure has significant negative correlation with raising plinth of house (r = -.461, p <0.01), tubewell (r = -.305, p <0.01) and toilet (r = -.305, p <0.01). This relation means existence of any kinds of flood risk reduction measures in the communities decrease their wiliness to work on structural improvement of the toilet, house and tubewell to make them flood proof. The explanation could be while government and NGOs implement any project on disaster risk reduction or resilience in the flood vulnerable communities, people expect to have some assistance for structural improvement from the stakeholders rather stop doing themselves. The study found that where NGOs implemented DRR or resilience project supported the flood vulnerable people

with money and construction materials towards making the structure flood resilient. Besides, correlation matrix also found significant positive relation between existing risk reduction measures and early warning (r = .276, p <0.01), stored money at home (r = .239, p <0.05) and awareness of the family (r = .287, p <0.05) about flood disaster. This correlation means that people learn from the flood risk reduction interventions through the awareness raising activities in the communities.

Now, if we take the option 'reliance on flood protection embankment', then the correlation matrix shows significant negative relation with early warning message (r = -.225, p <0.05), evacuation plan (r = -.425, p <0.01), taking loan from the credit organizations (r = -.338, p <0.01) and damage insurance (r = -.333, p <0.01). Even though there is not such insurance for flood in the study location, but I wanted to check whether they are positive towards taking insurance. The interpretation of this result relies on the functionality of the structural safety from the river flooding; especially the people who are living inside of the flood protection embankment did not feel the urge to take any flood preparedness action. While I asked people the reason they mentioned there had been no flood disaster in the areas since 1995 when the embankment was constructed, under the Compartmentalization Pilot Project (CPP) of the Bangladesh Water Development Board (BWDB), to save the area.

The reliance of the respondents on disaster risk reduction/resilience project implemented by the nongovernmental organizations has significant positive correlation with several preparedness actions including structural and flood awareness rising soft measures. The positive correlation with raising the plinth of the house (r = .245, p <0.05), tubewell (r = .298, p <0.01), toilet (r = .220, p <0.05) means more the disaster risk reduction/ resilience project in the community more structural improvement. This also indicates the assistance (both cash and skill) of the NGOs on flood resilience structures in the community. Besides the positive correlation with storing dry food (r = .208, p <0.05), evacuation plan (r = .232, p <0.05) and saving valuable assets of the family (r = .340, p <0.01) means more the NGOs interventions more awareness on flood disasters at the household and community label. While discussing with the communities, they mentioned court yard meetings with the community where the facilitators from NGOs talked about what to do before, during and after flood disasters.

Table 6.3: *Correlation between reliance/belief in flood risk reduction measures and preparedness action variables.*

Reliance of flood risk reduction measures	Flood early warning	Store dry food	Raise house plinth	Raise tubewell plinth	Raised toilet plinth	Stored crop seed	Stored money	E emergency equipments	Family awareness	Evacuation plan	Save valuable asset	Family relocation place	Connection with NGOs	Possibility to take loan	Damage insurance	Community DM plan	Connection with local government
Existence of risk reduction measures	**.276****	.075	**-.461****	**-.305****	**-.305****	.031	**.239***	.118	**.287****	-.043	-.042	-.004	-.106	.140	.031	.194	.080
Flood embankment	**-.225***	-.092	-.150	-.094	-.094	.146	-.184	.019	-.176	**-.425****	-.040	-.110	.027	**-.338****	**-.333****	-.092	-.190
NGO's Resilience program	.116	**.208***	**.245***	**.298****	**.220***	**.245***	.083	-.010	.079	**.232***	**.340****	.095	.100	-.066	.055	**-.217***	.134

****. Correlation is significant at the 0.01 level (2-tailed).**
***. Correlation is significant at the 0.05 level (2-tailed).**

Table 6.4: *Correlation between social-economic variables and preparedness action variables*

Variables	Flood early warning	Store dry food	Raise house plinth	Raise tubewell plinth	Raised toilet plinth	Stored crop seed	Stored money	E emergency equipments	Family awareness	Evacuation plan	Save valuable asset	Family relocation place	Connection with NGOs	Possibility to take loan	Damage insurance	Community DM plan	Connection with local government
Gender	.093	-.071	**.210***	.082	.082	.148	.086	.115	.033	**.290****	.183	**.278****	.098	-.086	.182	.049	**-.231***
Educational status	-.075	**-.300****	**-.219***	**-.270****	**-.232***	**-.234***	**-.298****	-.137	-.167	**-.273****	**-.394****	-.198	.007	-.056	-.090	-.075	-.086
Monthly income	.150	**-.387****	**-.385****	**-.464****	**-.522****	.086	.053	.053	.101	**-.252***	-.085	-.098	-.046	.092	-.132	.163	-.174
Distance of HH from River	-.047	.155	**.474****	**.435****	**.462****	**-.215***	.093	**-.219***	**-.305****	.179	.176	.015	**-.251***	-.102	-.002	.087	.173
Distance of HH from embankment	.172	-.035	**-.548****	**-.425****	**-.443****	.158	**.245***	.112	**.334****	-.172	-.184	.057	-.012	-.035	-.035	.136	-.184

****. Correlation is significant at the 0.01 level (2-tailed).**
***. Correlation is significant at the 0.05 level (2-tailed).**

Table 6.5: *Correlation between nonresponsive attitude and preparedness action variables*

Variable	Gender	Educational status	Monthly income	Distance of HH from River	Distance of HH from embankment	Intensity of future flood	Severity of damage	Existing risk reduction measure	Level of fear considering the flood?	Experienced flood in the past
Nonresponsive/unprepared attitude	.102	-.084	-.184	**.305***	-.269	.171	.202	-.189	.099	**-.286***

****. Correlation is significant at the 0.01 level (2-tailed).**
***. Correlation is significant at the 0.05 level (2-tailed).**

6.2.4 Socio-economic Preparedness Action

The following Table 6.4 represents the correlation matrix among the variables of socio-economic characteristics of the respondents and their attitude towards flood preparedness actions in the study area. Gender has positive and significant correlation with raising the plinth of the house (r =0.210, p <0.05), having evacuation plan (r =0.290, p <0.01) and defining a place for relocation of the family (r =0.278, p <0.01) before the flood event. Here the decision making comes into consideration where males and females of the family jointly decide where to go and how to go. Even though, males are the key decision makers of the family, there has usually been a discussion with the counterpart to select a place to make the family move to and also investing time and money for conducting preparedness actions including raising plinth of the house. The study also found a negative significant relation between gender and having connection with local government. The usual explanation could be making a relation with the representatives of the local government is highly male dominant and females have limited access to them even though there are female representatives.

The education status of the respondents is negatively correlated with several preparedness actions including storing dry food at home (r = - .300, p <0.01), raising plinth of house (r = - 0.219, p <0.05), toilet (r = - 0.270, p <0.01), tubewell (r = - .232, p <0.05), stored crop seeds for future (r = - 0.234, p <0.05), stored money (r = - .298, p <0.01), evacuation plan (r = - .273, p <0.01) and saving valuable assets (r = - .394, p <0.01). The status is quite different that expectation as the assumption was education promotes preparedness actions of the respondents; however the correlation matrix shows that the increase of educational qualification of the respondents actually decreased motivation of the respondents for preparedness actions in the study areas. However, the survey found two third of the respondents living inside and outside of the embankment and one third living with soft flood risk reduction measures are illiterate and only few respondents passed their primary and secondary education. Therefore, the lower level of education made the correlation status ambiguous which require further research with large sample size to be fully sure the association between education and preparedness action.

The third variable is monthly income which has negative significant relationship with storing dry food at home (r = - .387, p <0.01), raising plinth of the house (r = -.385, p <0.01), toilet (r = -.522, p <0.01), tubewell (r = -.464, p <0.01) and evacuation plan (r = -.252, p <0.05). The relationship tells us that with the increase of monthly income investment on preparedness action decreased among the households living in the flood prone areas. This status does not comply with the assumption of this research which is with the increase of income of the family they will invest more on making them secure through conducing preparedness actions. The interpretation lies on the average monthly income (40 Euros) status of the families which is very low considering the living standard and also the national average income status. Thus, it has been ambitious to think the people living in extreme poverty has a choice to invest money to raise the plinth of the house, toilet, tubewell and contribute to making a boat as a part of evacuation plan.

The distance from the nearby river is positivity correlated with the preparedness variables including raising plinth of house (r = .474, p <0.01), tubewell (r = .435, p <0.01) and toilet (r = .462, p <0.01). This means the respondents who are living nearby the river are more motivated to raise the basement of their houses, tube well and toilet, so that flood

water from the river could not make any damage and the structures could still be functional to use after flood. Besides the distance variable has significant negative correlation with some preparedness variables, for instance storing seeds for future (r = -.215, p <0.05), having emergency equipments (r = -.219, p <0.05), family awareness (r = -.305, p <0.01) and making connection with NGOs (r = -.251, p <0.05). This means the closer the distance of households to the river, people are more reluctant to store crop seeds for the cultivating after the flood, keeping emergency equipments (including lights, candle etc.) at home, providing awareness to the family members what to do before during and after the flood and willingness to connect with NGOs to get some help after the flood. This negative correlation status can be liked with nonresponsive attitude of the people who are suffering from flood disaster since long and became reluctant to make any effort to make them prepared for the flood. This also can be associated with 'Act of God' (Schmuck, 2000) where people are living very near by the river and they accepted that flood will come once year and there will be some damage.

The correlation matrix found opposite status when it comes to the distance of households from the embankment. The matrix shows a strong and significant negative relation between distance of households from the embankment and structural preparedness of the household to flood. The interpretation could be the households living close to the flood protection embankment are less willing to make efforts to raise the plinth of the house (r = -.548, p <0.01), tubewell (r = -.425, p <0.01) and toilet (r = -.443, p <0.01). The explanation could be the people who are living nearby the embankment can easily take shelter there thus are less motivated to invest their physical labor or money to make the structural improvement. Besides, the people who are living already inside of the embankment feel safe and not interested to take any structural preparedness actions. However, these households are motivated to store money (r = .245, p <0.05) and making their family members aware (r = .334, p <0.01) about what to do before during and after the flood disasters.

6.2.5 Non-responsive attitude and socio-economic & flood risk

In case of non-preparedness responses, I wanted to see is there any correlation between the reason of not being prepared for the flood and socio-economic, risk and fear variables in this study. The correlation matrix shows significant positive and negative correlation with distance of household from the embankment (r = .305, p <0.05) and experience of flood (r = -.286, p <0.05) respectively. The possible explanation could be with the increase of distance of household from river increase the de-motivation of nonresponsive attitude of the respondents. People assume there would be no harm to them and no damage of the valuable assets if they are far away from the river. Besides, the analysis found significant negative correlation between nonresponsive attitude and flood experience means that the respondents with less or even no previous experience of flood disaster showed more non responsive attitude toward preparing themselves for hypothetical flood in future. Lastly the correlation matrix did not show any significant relation with gender, education, income and flood risk perception.

Chapter Seven: Discussion and Conclusion

7.1 Introduction

This chapter demonstrates critical perspectives of protection motivation of the people living in flood prone areas towards positive and negative coping strategies for flood protection. At the beginning, I reflect on the Protection Motivation Theory (PMT) explaining how the 'theory' helped me find out the protection motivation of the people towards flood disasters. The second part represents the similarities and dissimilarities of findings among the studies conducted on flood protection using PMT in Asia and Europe. The third section discusses the status of de-motivation of the people for flood preparedness and qualitative reasoning of the status. I also included a section about why people living in flood vulnerable areas are not relocating to other places. The conclusion part of this chapter summarizes the findings answering the research questions.

7.2 Reflection on PMT and results

In this section I will discuss how the PMT being a theoretical framework for this research helped in collecting the information and structuring the field findings in a way to effectively reflect on the research questions. The application of Protection Motivation Theory (PMT) in disaster domain is still a new intervention which requires more research to capture different dimensions of protection motivation of the people living with disaster risk.

The results of the thesis has been structured according to the components of Protection Motivation Theory (PMT) which are threat appraisal, coping appraisal, previous flood experience, reliance on flood risk reduction measures. According to the survey data, almost all the respondents living with soft measures and without any measure expected high to very high intensity of flood and severity of damage in future. Especially respondents mentioned severe interruption of livelihoods in terms of earning money to run the families after flood. Besides, less than half of the respondents living inside the flood protection embankment projected flood in future. However regardless of the areas the respondents mentioned the impact of flood on damage of house, crops and health diseases. Therefore, the study found flood risk assessment was done better by the people living with soft measures and without any risk reduction measure, rather than people surrounded by the embankment. Besides, the correlation analysis found significant positive correlation between perceived probability of threat and few preparedness actions. The respondents who expect a flood in future were more concerned about structural improvement that includes raising the plinth or basement of the house, toilet and tubewell rather than taking more soft measures except developing an evaluation plan. Therefore, the private structural protection to flood disaster is prominent in the study area which is obviously time consuming and costly. However, the question is whether the respondents in these areas could make a structural improvement with their low average monthly income (40 Euros). Many respondents talked about collective actions towards structural improvements including collecting mud to raise the plinth of houses, tubewells and toilets. However, the question remains on how to manage that mud and whether that mud will be free or not.

Those who expected difficulties to earn money after the flood were more interested to soft protection actions including storing cash money, crop seeds and emergency equipment at home and also developing an evacuation plan (formal and informal). The possible reason could be these soft measures do not require any immediate cash investment so that the people who are already struggling to maintain their livelihood due to inadequate earning after the flood choose cheap options for protection actions. However, the study found significant positive correlation between impact of livelihood and structural improvement, whereas the expectation was to find significant positive correlation with connection with NGOs and government. So that, the affected people would be able to materialize their connection to knock to proper person and place to received assistance. Besides, the correlation matrix found significant positive relation between death of domestic animal during flood and structural improvement of tubewell and toilet which seems strange as after losing some assets people must look for support from the government or NGOs. Moreover, the household damage variable is negatively correlated with few soft preparedness actions including early warning, possibility of taking loan and developing community disaster management plan which is also difficult to explain in this research. The assumption was to find correlation with structural improvements more than the soft actions. Again a significant negative correlation denotes the de-motivation of the respondents on the whole system that can prevent the damage. A reason could be the previous flood experience of the people living in the flood prone areas and they are witnessing damage of households' structures every time even though there were some sorts of preparation.

The present study also found that fear of future flood has significant positive correlation with structural improvement including rising the plinth of the tubewell and toilet which will obviously contribute towards flood protection. However, the previous studies did not find significant positive association between fear and precautionary behaviors of the people.

A set of questions related to flood preparedness actions were asked to assess the coping strategies of the respondents in the study area. The families living in NGO interventions were found more prepared for flood disaster compared to other two locations. For instance, the majority of the respondents living with soft measures are found aware about what to do during and after the floods and they also shows structural preparedness including raised plinth of house, toilet and tubewell. The study found the contribution of DRR and resilience building interventions implemented by the NGOs on the flood preparedness pf the people. On the contrary, people living outside of the embankment showed preparedness to a few indicators without having any assistance from the NGOs and government through resilience or DRR project. This level of preparedness can be treated as the outcome of experiencing flood disaster via utilizing traditional knowledge to live with flood. In the both areas, the study found an informal evacuation discussion and plan among the families living with flood vulnerabilities, but it usually happens just before the event which is obviously risky as they do not know how severe (including height and velocity of flood water) the flood would be in future. Lastly, people living inside the embankment found to be less prepared to flood as they did not experience the event since long.

Reliance on flood protection embankment has significant negative correlation with soft measures including early warning, evacuation plan, damage insurance and possibility of taking loan. Besides, the study found significant positive correlation between reliance on

NGOs resilience intervention and both hard and soft measures. This means the disaster risk reduction or resilience projects implemented by the non-governmental organizations make people motivated to take protection actions for floods. The underlying reason might the assistance that NGOs usually provide to the people could have positive implications towards protection motivation, Now there might be a question of financial gain by the people, yes of course there are some. Because the projects are designed to raise awareness among the flood vulnerable people through regular court yard meetings, provision of financial assistance for livelihood improvement and construction of flood resistant house, toilet and tubewell.

In the present study the threat experience appraisal is negatively correlated with structural actions and also with evacuation plan. This means that the previous flood experience don't have contribution towards motivating people to take structural improvement actions. However, the respondents found motivated towards taking soft preparedness actions including rising family level awareness and developing a community disaster management plan which also suggest the explanation of lower financial capacity of the people made them de-motivated to work on hard measure which requires investment.

In this study I also tried to find correlation between flood preparedness actions and socio-economic variables of the respondents. The correlation analysis found significant negative relation between education and both had and soft flood protection measures, which means the level of education does not have influence in motivating people to tale protection actions. However, the research assumption was to find significant positive correlation among education and protection actions. The monthly family income showed signification negative correlation with all structural improvement measures and a few soft measures. The findings seemed logical as structural improvement requires investment of money and physical labor that the respondents could not provide due to low average income and also their involvement in other work respectively. The study also found correlation between preparedness actions taken by the respondents and location of household, river and flood protection embankment. The correlation analysis found that, the smaller the distance between houses and the river, more the structural preparedness actions taken by the respondents However, small the distance of households from nearby flood protection embankment, lower the structural preparedness action taken by the families. Qualitative interview with local people found that the people who are living nearby the embankment are more into taking shelter there rather than preparing themselves and their household structures to protect from flood. Another explanation could be people became de-motivated to work on the structural protection as they assumed the households structures will break down anyway during flood disasters. In this case the previous flood experience and associated damaged observed by flood could have played a role in decision making not to take protection measures.

The study explored the reasons why some of the respondents are not motivated to take flood protection actions. The survey found that the majority of the respondents with non-protective responses eventually recognized the flood as a natural event like 'Act of Allah' (2000), they are reluctant to be prepared and thus accept their fate as helpless flood victims. Besides, one third of the unprepared respondents living behind the embankment mentioned the 'flood will not harm them'. The survey also found the dependency of the people living in

the soft risk reduction measure area on others which might includes the external stakeholders or even the neighbors. Many NGOs worked in this community with disaster risk reduction and resilience projects and these people always received some assistance from them. This could be a reason why the respondents are quite sure that someone will come and save them.

Therefore, the study found the PMT as an effective theoretical adoption towards explaining protection motivation behavior of the people living in the flood vulnerable areas of Bangladesh. This study also identified significant variables that explain the reason why people are motivated to take preparedness actions and also why some are not interested to employ safety measure to flood disaster. Similarly, the studies conducted by Grothmann & Reusswig (2006), Reynaud, Aubest & Nguyen (2013) acknowledged the applicability of Protection Motivation Theory (PMT) as a potential conceptual framework in describing protection motivation of the people towards flood preparedness.

7.3 Comparison between relevant literatures and this research

This section will provide comparisons of findings between this research and few similar published scientific articles conducted to investigate flood protection attitudes using Protection Motivation Theory (PMT) in Asia and Europe. As this research did not carry out regression analysis, the comparison will only consider the correlations among the variables relevant to protection motivation of the people living in flood risk areas.

The PMT has been adopted from the health science and started using in disaster field, there was only one study conducted to examine earthquake preparedness in the USA using PMT (Mulilis & Lippa, 1990) in 20th Century. The study conducted by Grothmann & Reusswig (2006) in Germany was the first focusing on private (households) preparedness behaviors of the people to a flood situation. They discussed 'why some residents take precautionary action while others do not' in Germany. They wanted to test the applicability of the PMT and identify the determinants of the private flood protection behaviors of the residents. A recent study on the flood disaster using PMT has been conducted in Vietnam (Reynaud, Aubest & Nguyen, 2013) where the variables of households' protection behaviors have been assessed through conducting a survey. In the same year, another study conducted on coastal flooding and adaptation behavior of the people living in Greece (Koerth et al., 2013). The above mentioned three published scientific articles will be used to compare the findings with the present thesis conducted in Bangladesh.

The study found significant positive correlation between 'threat appraisal' and structural/hard flood preparedness/protective actions including raising the plinth of the house, toilet and tubewell. Besides, a few soft preparedness actions including storing crop seeds, money, emergency equipments, evacuation plan and family awareness are correlated with 'threat appraisal' in both directions. The study conducted by Grothmann & Reusswig (2006) in Germany found positive correlation between 'threat appraisal' and protective responses of the respondents. Reynaud, Aubest & Nguyen (2013) explained in their study conducted in Vietnam that 'threat appraisal' has significant contribution to take self-protection decisions including elevating the flood of the house and relocation to a safer place. They also found negative relation between 'threat appraisal' and preparedness actions like pumping set to pump out the water and farmers strategies to cope with the adverse situation. The study in Greece on adaptation to coastal flooding conducted by

Koerth et al. (2013) found that the people adopt flood risk reduction measures if they perceive potentials of severity of flood and associated negative consequences.

The correlation analysis in the present study found that fear of flood is positively correlated with structural/hard flood preparedness/protective actions. However, the previous study done by Grothmann & Reusswig (2006) did not find significant relationship between fear of flood in future and preparedness actions taken by the people living with flood risk. In Vietnam case (Reynaud, Aubest & Nguyen, 2013), the authors explained that the fear of dam collapse might be a reason of implementing self-preparedness strategies by the farmers.

According to Grothmann & Reusswig (2006) the 'threat experience appraisal' of the people is positively correlated with protective responses. However, the correlation matrix performed in this study showed that 'threat experience appraisal' is negatively correlated with hard/structural flood protection actions and with evacuation plan. People who experienced flood in their lifetime do not trust on structural measures that can reduce damage but interested to make their lives safe through temporary relocation. The study conducted in Greece (Koerth et al., 2013) found significant positive correlation between 'threat experience' and adaptation measures of the people. Also the study in Vietnam found mixed evidence between 'threat experience appraisal' and protection behavior of the people (Reynaud, Aubest & Nguyen, 2013).

The present study found significant negative correlation between reliance of people on flood risk reduction measure and hard/structural and soft protection actions. The authors also found negative correlation between reliance on public flood protection measures (i.e. embankment, dikes) and protective response of the people in Germany. The study in Vietnam found that protection of communities with sea dikes increases the probability of having a pumping set and the presence of dam increases the self-protection strategies of the farmers. The authors assumed that the fear of dam collapse is one of reasons of such positive correlation between these variables. The study in Greece also found that that people who are protected by the public flood risk reduction measures are talking safety measures, excluding those who are unsure whether public safety measures exists in their area.

The thesis found significant negative correlation between socio-economic variables including education and monthly income and hard/structural flood protection actions. However, the previous study conducted in Greece found that resident with a higher education are taking more preparedness measures compared to less educated people. In the Vietnam research, the authors found limited role of socio-economic variables in protection behavior, but specifically the elderly people are found motivated to have a pumping set and live in a elevated house. The study in Germany found significant correlation between protection responses and socio-economic variables including age, income.

***Table 7.1**: Comparative correlation status among variables between resent thesis and studies conducted previously using PMT to explain protection motivation of the people to floods in Asia and Europe.*

Correlation among variables	Correlation status found in previous and present studies			
	Grothmann & Reusswig (2006)	Reynaud, Aubest & Nguyen (2013)	Koerth et al. (2013)	Present Thesis
Threat appraisal & protection actions	+	+ & -	+	+ & -
Fear of flood & protection actions	No significant correlation	+	No information	+
Threat experience appraisal & protection actions	+	+ & -	+	+ & -
Reliance on risk reduction measures & protection actions	-	+	+	-
Socioeconomic characteristics & protection actions	+	+	+	-

The comparative correlation table (7.1) produced from different studies, represents both similarities and dissimilarities in terms of representing relationship among variables related to protection motivation of the flood prone people in different studies. The present thesis conducted in Bangladesh has also found both positive and negative correlation among different variables similar to the studies conducted previously on floods using PMT. Even through, the locations of these studies are at different places, but the correlation status indicates the applicability of Protection Motivation Theory to investigate protection motivation of the people living in flood risk areas. For the Bangladesh case, the small sample size which also created obstacle to perform regression analysis, imposed a challenge to see further diversity in the responses from the people, but it provided insights on the attitude of the people towards flood protection.

7.4 Motivation and responsibility of the community

Apart from the statistical analysis and survey data, I gathered qualitative information to encounter the question why people did not take or motivated to take flood protection actions. Despite flood protection and management interventions of the government and NGO interventions, people who are living in flood-exposed areas are surviving disasters in Bangladesh, may be the level of preparedness actions are different. That preparedness is mostly materialized from traditional knowledge of the vulnerable community.

7.4.1 Qualitative reasoning of de-motivation for preparedness

Studies conducted on flood disaster have found that while people experience flood disaster with varied extent and severity, they learn from the situation and make them prepared to face the future disaster to reduce the damage (Kreibich et al., 2005; Kreibich et al., 2011). Based on this, I held a discussion with the community and NGO representatives on the question why the preparedness of the households in the flood vulnerable area isn't at maximum level. The study found several reasons and those are as follows.

The people living in the flood exposed areas haven't adequate financial capacity to invest in flood protective initiatives by themselves to make them prepared for flood disaster (Brouwer, et al., 2007; IPCC, 2001). Both the community people and NGO representatives

mentioned that the monthly income of the flood vulnerable people is not enough to run households expenditures and besides, the daily wage earning is not the same round the year. Thus, it is not feasible for them to invest money on self-preparedness. According to local people, about two and three months (especially during monsoon reasons) of each year they cannot find proper work due to having floods or simply due to heavy rainfall. At that time, people take out loans with interest from the local organizations that run microcredit schemes. Families need to pay a weekly installment with interest, which is again a burden for the poor people. Thus the poor people fall into a cycle where they never get rid of poverty. Besides, the flood preparedness initiatives also require money. Raising the plinth of the house, sanitary latrines and tubewells, strengthening the walls of the houses, arrange some sort of transport to go somewhere else with the whole family and domestic animals, deposit some money to survive after the flood disaster etc. are all required financial investment to accomplish. However, the economic situation of the vulnerable ultra-poor families does not allow them to use their daily wage for flood preparedness. Thus, they are not motivated enough to invest time and resource to make them prepared to reduce the damage of flood disaster.

Secondly, the people living in the flood exposed areas usually face recurrent flood disasters and they do not have required time to be prepared to face the flood disasters. Thus, people suffer severely again and again and cannot improve their economic status. This recurrent disaster may also be one of the causes why people are not willing to prepare for flood disaster.

Thirdly, there is also the challenge of access to various services offered by the government and nongovernmental sector for the vulnerable poor people. Besides, the way the services are channeled to local level is complicated and bureaucratic which also hinders the functionality of the services. For instance, the Union Parishad cannot take any decision without informing the Upazila and District office due to a very centralized decision making culture in Bangladesh. Besides, people need to have location specific information about flood disaster including flood intensity, severity, continuous update status, estimation of damage etc. They also need to know the sources where they can get some support from the government, NGOs or private sector. Here, the issue of accountability of relevant stakeholders/service providers comes into consideration. Easy accessibility of relevant information is required to make them people encouraged to prepare for flood.

Fourthly, the changing pattern of flood makes it harder for the vulnerable community to be prepared for flood disaster. For instance, some farmers took away the Jute and placed in a safe place to save those from flood water. However, the high velocity during flood 2017 and the height of water were much higher compared to the previous year (in 2016: 2 feet and in 2017: 4 feet from the ground), thus all the stored Jute was washed away this year. Therefore the damage is happening anyway due to uncertainty of the flood which can also be a reason of not taking preparedness actions.

7.4.2 Relocation of vulnerable people to safer place

The people living outside of the embankment and NGO intervention area are vulnerable to flood disaster. The most suitable way to escape the damage due to flood disaster is to relocate to other areas (Hooijer et al., 2004). As complete protection from flood disaster is impossible, the flood vulnerable areas will always remain risky for the people and

their valuable asset (Kreibich et al., 2011). However, why aren't the people of flood exposed areas in Tangail and Jamalpur reallocating or shifting to other safer areas? The study explored a few reasons and those are as follows.

The economic status of the people living in flood prone areas of Tangail and Jamalpur District of Bangladesh is poor. They don't have any other place to relocate, like the well off/ upper middle class who can shift their location to another place for survival. Here, the key barrier for these poor people is financial status for which they simply cannot investment to organize things to stay elsewhere.

The study found the notion of attachment of place is strong in the study areas. People are not motivated and confident enough to leave the place which belonged to their ancestors. The mental attachment to the house and surrounding are so strong which does not let them to think to leave place even though they are suffering from flood damage again and again.

Then, social bonding among the neighbors living in the same area is another reason people do not want to move out. The people living in the vulnerable areas have already developed ways of surviving along with their neighbors and they together face any crisis in the community.

Lastly, the access to natural resources to survive livelihood of the people living in the flood affected areas. For instance, the open water sources are the possibility of catching fish and also selling into the local market. Thus the poor people can manage to get nutrition and also can earn money by selling fish in nearby market place. Besides, the agricultural lands are fertile in these flood prone areas due to regular monsoon flooding, so that people can cultivate and produce crop.

7.5 Limitation of the study

The field work for this research took place after the flood of 2017, thus people in the affected areas were still recovering from the damage and expecting some support making the recovery process quickly. In one sense it was beneficial for the research that people in the areas can recall their recent memories very well while sharing their stories. However, people were busy in re-arranging their own staff, so it was quite difficult to ask for an interview where the research does not provide anything to them. Thus being a researcher I only envisioned taking information from them during their crisis situation without helping them. Moreover, only asking question in assessing the perception of the respondents about flood risk and preparedness behaviors could raise an explanatory sign about assessing actual/real perception (Grothmann & Reusswig, 2006; Bunting and Guelke, 1979 as cited by Grothmann & Reusswig, 2006). For this reason, this study employed a mixed method approach in the field and quantitative status and correlations have been explained with the help of qualitative information.

The study found variables which are positively or negatively correlated and I explained those relationships through the lens of motivation for protection actions for flood, however it does not tell us the strength of the relationship among the variables. For instance, I found significant correlation between perceived probability of threat and structural improvement variables including raising the plinth of the house, tubewell and toilet; however

I cannot say that due to having high expectation of flood people are motivated for structural improvement**s**. It is because correlation does not mean casual relation.

The quantitative household survey covered only 90 households in the study areas. Even though, I followed a simple random sampling procedure to select households, it could have been better approach more households in terms of representativeness and generalization of the survey findings. This smaller sample size created obstacles to conducting more statistical analysis including regression analysis among the variables to see the strength of the relationship towards assessing protection motivation to flood.

7.6 Conclusion

The study is conducted to investigate protection motivation of the flood vulnerable people using Protection Motivation Theory (PMT) in central Bangladesh. The research is carried out in two folds; first question was how people evaluate the flood risk and associated precautionary actions, secondly, the research identified variables that influence precautionary action. The following part of the conclusion will summarize the key findings on the questions mentioned above. I shall first summarize the findings on the components of the PMT.

The study found a higher protection motivation attitude (reflecting on threat and coping appraisal) among the respondents living with soft measures i.e. NGO implemented disaster risk reduction measures compared to people living without any measure and hard flood risk reduction measure. The risk perception for hypothetical flood of the respondents living without any flood risk reduction measure and soft risk reduction measures areas are found more compared to the people living inside the hard measure area of Tangail District of Bangladesh. The majority of the respondents living in areas without any measure and soft measures areas expected to experience flood with associated damage in future. They ranked the intensity of hypothetical flood and associated severity of damage as ‘High to Very High’. However, people living inside the flood protective embankment ranked the flood probability in future as ‘Medium to Very Low’ which denotes that dependency and assumption of the people over enablement as flood protector is high here. In case of flood damage evaluation, the majority of the respondents mentioned that the household will be partially or fully damaged due to high velocity of flood water and almost all the respondents in all three locations expected total loss of agricultural crop due to severe flood. In case of impact of the flood and its damage on the livelihood of the people, more than two thirds living without and soft risk reduction measures said there will be severe challenges to carrying out their regular livelihood after the severe hypothetical flood. The majority of the respondents living without and soft measures area expected health complication for the family member during and after the flood event. However, the majority of the people living inside the flood protection embankment replied ‘Do not know’ regarding health status during or after flood in future and the reason could be these people do not have experience of flood and its health related consequences. The struggle of livelihood would be due to due to inadequate income opportunities for the people as almost of the respondents in all three areas agreed that they could start over earning immediate after the flood. The fear of the hypothetical flood, the study found around two thirds of the respondents living with hard measures and without any measures and almost all living with soft measure ranked their fear for flood ‘High to Very High’. One third of the respondent living without having any measures ranked their fear from

‘Medium to Very Low’. The qualitative discussion found that some people stop caring about flood and associated damage due their previous experiences of facing and managing floods.

Coping strategies/preparedness actions of the respondents has been assessed based on seventeen variables mentioned in the methodology section. The families living with soft risk reduction measures led by non-governmental organization have found more prepared for flood disaster compared to people living inside and outside of the flood protected embankment. In both soft and hard preparedness actions have been taken by these families, even though the financial and awareness supports came from external stakeholders. People are more aware and achieved better understanding about what to do before, during and after the flood disaster (Islam & Walkerden, 2015). Moreover, people know whose door to knock on to get some assistance after the flood as NGOs made connection between the people and local government institutions including agriculture, livestock department of Upazila Parishad. These linkages (both NGO and government) gave the flood vulnerable people necessary knowledge and logistics towards enhancing their self-preparedness (Grothmann & Reusswig, 2006) compared to people without any connection or external supports (Islam & Walkerden, 2015). Besides, the people living inside of the embankment did not think much about flood disasters and preparing for that due to high reliability on embankment but they became concerned about water logging situation which happen in 2017. The study found negative coping strategies of the people during the water logging situation as a few respondents mentioned selling of their domestic animal due to fear that animals might die. On the contrary, households living outside of the embankment are showed preparedness to a few indicators. As these people were not involved in any DRR or resilience project before, this level of preparedness can be treated as the outcome of experiencing flood disaster via utilizing traditional knowledge to live with flood. Besides, a few respondents in all areas rejected to be prepared for flood. More than one third and one third of the respondents living without any measure and hard measure area respectively found to be fatalist as they thing flood is a natural event and they do not have anything to do with it.

In response to previous experience of flood, people living with soft and without having any risk reduction measures mentioned flood in 2017. People living with hard measure (inside of the embankment) experienced severe water logging foe few days, but they also realized and mentioned that the severity was not that serious like the flood. The respondents in all areas reported damage of household and crops due to flood and water logging. These people only received early warning for flood (not for the water logging situation) and the majority of the respondent living with soft measures reported receiving flood relief after the flood of 2017.

Now, I shall identify the variables that have significant positive or negative relation to protection actions of the respondents living in the study areas. As I did not perform the correlation analysis separately for different areas due to small sample size, the variables identified here would be applicable for overall protection motivation status of the respondents. Threat appraisal (perceived probability of threats, perceived severity of threat, Fear) has a significant positive correlation with the hard flood risk reduction measures/preparedness actions including raising the plinth of the house, toilet and tubewell and with a soft measure: ‘develop an evacuation plan’. The people expecting the

hypothetical flood threat are motivated to make improvements on the household structural and planning how to move out the family and kids to a safer place. The variable 'income struggle' under perceived severity of threat has significant positive correlation with several soft preparedness actions variables including storing crop seeds, money, emergency equipment at home, family awareness and developing an evacuation plan for flood disasters. These people with lower monthly incomes chose the soft measures over the hard ones, so that they do not need to invest for preparedness action.

The previous flood experience of the respondents is negatively correlated with hard measures including rising the plinth of the house, toilet, tubewell, evacuation plan and positive relation with soft measures including storing crop seeds, emergency equipment and family awareness. So, previous experience of the people in facing flood has an influence on the propensity to adopt preparedness actions.

The reliance of the people on any kinds of flood risk reduction measures has significant negative relation to household structural improvements including rising plinth of house, toilet and tubewell. However, reliance of NGOs project has significant positive relation with structural improvement (as mentioned above) and the reason could be the organizations usually provide technical and financial assistance to the vulnerable poor to make the resilient households structures. Lastly, the socio-economic variables including education, income have found negatively correlated with all the structural variables and soft preparedness actions.

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Annex – 01: Household Survey Questionnaire

Stakeholder: Community People in Tangail and Jamalpur Area.

This questionnaire will be used for the purpose of master's research under the Development and Rural Innovation program at the Wageningen University, Netherlands. The data and information will be used to produce a master's thesis report. The confidentiality of the interviewed person will be preserved under the research code of conduct of the University.

Serial Number: ……..…… **Village:** ……. **Upazila:** ……

A. General information

1. How far your house is from a river? (1) Within 100 meters (2) 100-500 meters (3) 500-1000 meters (4) 1-3 kilometers (5) More than 3 kilometers (99) I do not know

2. How far your house is from embankment? (1) Within 100 meters (2) 100-500 meters (3) 500-1000 meters (4) 1-3 kilometers (5) More than 3 kilometers (99) I do not know

3. If flood comes, to what extent do you think that the maximum water level at your house rises during flood?

(1) Maximum to knee height (2) Knee to waist height (3) Waist to chest height (4) Chest to 1 floor high (4) More than 1 floors high (99) I do not know

4. How long does the flood water take to be completely dropped down after a big flood?

(1) Days (2) Weeks (3) Months (4) years (99) I do not know

5. Do you have flood protection embankment in your area? (1) Yes (2) No (99) I do not know

B. Threat Experience Appraisal

1. When did you experience flood in the past? ……..

2. How did you suffer from those devastating events in the past? (1) Damage of house (2) Damage of crops (3) damage of fishery (4) Death of domestic animals (5) Suffered from diseases (6) Others……..

3. Did you need to leave your house or migrate somewhere else during flood? (1) Yes (2) No

3.1 If yes where did you need to take shelter? (1) Flood shelter (2) Local schools (3) High roads (4) Relative's house (5) Neighbors house

3.2 How many days you had to stay there? ……

4. Did you receive early warning message before flood? (1) Yes (2) No

4.1 If yes, mention the source? (1) Radio/TV (2) Red Crescent (3) Neighbors (4) relatives

5. Did you receive any evacuation support during flood? (1) Yes (2) No

5.1 If yes, how supported you? (1) Local government (2) Red Crescent (3) Neighbors (4) relatives

6. What type of support did you receive during and after flood? (1) Emergency Relief (2) Cash for work (3) Cash for training (4) Cash money (5) Shelter repair support (6) Shelter material support (7) Livelihood support (8) Agricultural seed support (9) Medical support (10) Others ……..

6.1 What was the source of getting support? (1) Government (2) NGOs (3) Individual donor (4) Others ……..

7. Did you need to take loan during crisis? (1) Yes (2) No

8. How did you see the role of local government during and after flood disaster? (1) Active role (2) Inactive (3) Delayed response (99) I do not know

9. Did you face problem in getting supports form for government and NGOs after flood? (1) Yes (2) No

9.1 If yes, please ask what are those?

9.2 How did you manage to run your livelihood after flood disaster?

C. Threat appraisal (Expected flood event in future)

1. Do you think you will face floods in future (5-10 years)? (1) Yes (2) No (99) I do not know

2. Do you think flood water will inundate your house? (1) Yes (2) No (99) I do not know

3. How you will mark the intensity of expected floods and severity of damage due to flood?

Items	Very High	High	Not high/low	Low	Very Low
Intensity of flood	1	2	3	4	5
Severity of damage	1	2	3	4	5

4. What is the construction material of the house (observe by surveyor)? (1) Pacca with concrete (2) Wooden made (3) Mud made (4) Bamboo/straw made (5) Other (specify)……..

5. What would the condition of your house if flood hit in future? (1) Total damage (2) Partial damage (3) No damage (99) I do not know

6. What would the situation of your agricultural production if flood hit in future? (1) Total damage (2) Partial damage (3) No damage (99) I do not know

7. What would be the situation of fishery? (1) Total inundated (2) Partial inundated (3) No inundation (99) I do not know

8. What would the situation of your domestic animal if flood hit in future? (1) Total death (2) A few death (3) No death (99) I do not know

9. What would the condition of your family health status if flood hit in future? (1) Waterborne diseases (2) No disease (99) I cannot remember

10. How do you think your livelihood will be impacted due to flood? (1) Severely affected (2) Partially affected (3) Remains the same (99) I do not know

11. Do you think you can start earning after the flood damage? (1) Yes (2) No

12. Do you think you can manage to go somewhere else during flood? (1) Yes (2) No

13. If yes, what would be the place? (1) Flood shelter (2) Relatives house (3) Neighbors house (4) Schools

14. Do you think you will receive assistance during and after flood? (1) Yes (2) No

15. If yes, what would be the source? (1) Government (2) NGOs (3) Relatives (4) Neighbors

16. How much time do you need to recover from a flood? …….. days

17. How you will rank your fear considering the flood in your area? (1) Very high (2) High (3) Not high, not low (4) Low (5) Very low

D. Coping Appraisal

1. Do you have any flood preparedness measures? (1) Yes (2) No

1.1 If yes, what type of flood precautionary measures do you have?

1. Do you have access to early warning message? (1) Yes (2) No (99) I do not know
2. Storing dry food at your house? (1) Yes (2) No (99) I do not know
3. Raised plinth of the house? (1) Yes (2) No (99) I do not know
4. Raised the basement of tubewell? (1) Yes (2) No (99) I do not know
5. Raising plinth of the toilet? (1) Yes (2) No (99) I do not know
6. Stored of agricultural seed at home? (1) Yes (2) No (99) I do not know
7. Save some cash money to support family after flood? (1) Yes (2) No (99) I do not know
8. Do you have emergency kits at home (radio/light/first aid/medicine)? (1) Yes (2) No (99) I donot know
9. Family members know what to do during flood situation (shutdown electricity, gas lines, saving livestock)? (1) Yes (2) No (99) I donot know
10. Do you have evacuation plan for your family? (1) Yes (2) No (99) I donot know
11. Do you know how to preserve valuable asset? (1) Yes (2) No (99) I donot know
12. Did you define any place to move during flood? (1) Yes (2) No (99) I haven't decided

12.1 How you managed to learn all these flood preparedness measures? (1) Government organizations (2) NGOs (3) Learnt from neighbors (4) Individual motivation

2. Do you have network and access to local government institutions like Union Parishad, agricultural, livestock office to manage some assistance after flood event? (1) Yes (2) No (99) I do not know

3. Do you have linkage and access to any NGO that supports to vulnerable people? (1) Yes (2) No (99) I do not know

4. Do you have access to take microcredit loan after flood event? (1) Yes (2) No (99) I do not know

4.1 What would be the source of taking loan? (1) Bank (2) Community Based Organization (3) Neighbors (4) Relatives

5. Do you have any insurance on damage? (1) Health insurance (2) Life insurance (3) Property insurance

6. Do you have disaster management plan in your community? (1) Yes (2) No (99) I do not know

7. Did you have similar preparedness in the previous flood event? (1) Yes (2) No,

1.2 If no, what is the reason of not preparing for flood disaster? (1) It's a natural events we do not have anything to do (2) It will not harm me (3) I will get support from others (4) I am not motivated

1.3 If answer is (3), then what would be the source of getting support? (1) Neighbors (2) NGOs (3) Government

E. Reliance

1. What type of flood damage prevention measures exists in your area? (1) Embankment (2) NGOs program (99) I donot know

2. Do you believe that embankment is protecting you from flood damage? (1) Yes (2) No

3. Do you believe NGOs activities contribute to reducing damage due to flood? (1) Yes (2) No

F. General expectation

1. What do you expect from government before and during an extreme flood event?

(1) Establishing flood shelter (2)Stronger search & rescue operation (3)Stronger early warning system (4) Enhanced evacuation of residents (5)More care about physically unable people (6) Safe water & sanitation (7) Distribution of emergency aids (8) Medical support (9) Repair roads (10) Otherwise, namely:……

2. What you expect from the government after flood events? (1) Cash for work (2) Livelihood support program (3) Shelter support (4) Embankment repair (5) Special program for disabled persons (6) Medical support (7) Repair roads (8) Safe water & sanitation (9) Other …..

3. What do you expect from non-governmental organizations before and during an extreme flood?

(1) Establishing flood shelter (2)Stronger search & rescue operation (3)Stronger early warning system (4) Enhanced evacuation of residents (5)More care about physically unable people (6) Safe water & sanitation (7) Distribution of emergency aids (8) Medical support (9) Repair roads (10) Otherwise, namely:……

4. What do you expect form nongovernmental organization after flood event? (1) Cash for work (2) Livelihood support program (3) Shelter support (4) Embankment repair (5) Special program for disabled persons (6) Medical support (7) Repair roads (8) Safe water & sanitation (9) Other

5. What information do you expect from government and nongovernmental actors before and during an extreme flood? (1) Water heights (2) What to do (3) Tips to increase survival opportunities (4) Location of shelters (5) Evacuation routes (6) Otherwise: ……....

G. Demography and Socioeconomic Information

1. Gender status? (1) Male (2) Female (3) Transgender

2. Education status? (1) Illiterate (2) Primary school (3) Secondary (4) B.Sc (5) M.Sc (6) Above

1. Monthly income (BDT)? ……

3. Primary source of income? (1) Agriculture (2) Fishing business (3) Govt. job (4) NGO worker (5) Rickshaw/van puller (6) Teacher (7) Fisherman (8) Others (specify): ……..

4. Alternative source of income? (1) Agriculture (2) Fishing business (3) Govt. job (4) NGO worker (5) Rickshaw/van puller (6) Teacher (7) Fisherman (8) Others (specify): ……

Annex 02: Checklist for Focus Group Discussion

Stakeholder: Community People in Tangail and Jamalpur Area.

Village: …… Union: …….
Upazila: ……

No. of Participants: Male: …… Female: ……. Average age: ……..

1. ***Experience of flood disaster in the past***?

2. ***Damage due to flood 2017 or water logging 2017***?

- Household loss
- Water & Sanitation loss
- Domestic animal loss
- Agricultural crop & vegetable loss
- Fishery/ fishery business loss
- Health complications
- Economic loss in this area

3. ***Coping mechanism by the households before, during and after flood event*** (including community disaster management committee, disaster mgt. plan, community based organizations, awareness on disaster)***:***

4. ***Assistance received before, during and after flood*** (type of support, who provided, equity in delivering assistance, dealing marginalized group etc.):

5. ***Role of local government and local power holders in disaster*** (early warning, response of Union Parishad, govt. support distribution, covering marginalized people, access to government institution, influence of community leaders, role of **UDMC, standing order on disaster (SoD)** etc.):

6. ***Role of NGOs in disaster*** (early warning, DRR intervention, support distribution, covering disabled, women, livelihood options, access to NGOs, microcredit, etc.).

7. ***Role of flood protective embankment in disaster, agriculture and fishery sector*** (inside and outside of embankment):

8. ***Recommendations for effective disaster response in future***?