**Evaluation of Vulnerability Factors for Cyclones: the Case of Patuakhali, Bangladesh**

Abstract

Tropical cyclones are considered as the most severe natural disasters in Bangladesh; they cause extensive damage, create losses in the country’s economy, and affect social settings. The impact of natural disasters has been further intensified due to various vulnerability factors within the Bangladeshi community such as low income; shortages of food; lack of assets such as land and permanent housing; dense population, illiteracy. This study evaluates the vulnerability factors for cyclones in the community based in the Patuakhali region of south western Bangladesh. The bottom-up research approach was adopted for the study, whereby the local community was consulted for their viewpoints by using focus group interviews and semi-structured interviews. Different community groups and social categories including both men and women, from different age groups and livelihoods, participated in the study. The study revealed how the community’s vulnerability to cyclones has been further aggravated by socio-economic factors such as social status, political influences and economic conditions. The majority of the community in Patuakhali has been “knowingly” vulnerable to cyclone disaster as a result of the lack of alternatives especially in terms of their livelihood patterns. The vulnerability of women, due to their lack of authority, domestic work, and fear of exposure within the society was also highlighted. The study revealed how vulnerability factors are interlinked with each other making them further difficult to manage. This calls for multi-faceted disaster risk reduction strategies that targets vulnerability factors deriving from different origins and root causes.

Bangladesh, cyclone, disaster, socio-economic, vulnerability

# INTRODUCTION

Natural disasters have the potential to damage the entire economy of a country, especially when they occur in developing countries. Whilst no country in the world is entirely safe, the lack of capacity within developing countries to limit the impact of hazards after major natural disasters has led to them becoming the countries most vulnerable to natural disasters. The United Nations Development Programme (UNDP) reports that 24 out of 49 low-income, developing countries are subjected to high levels of disaster risk and on average 6 are hit by between two and eight disasters every year (Lloyd-Jones, 2006). Though only 11 per cent of people are exposed to hazards in developing countries, more than half of deaths due to disasters occur in these countries (UNDP, 2004 cited DFID, 2005a; DFID, 2005b). According to Moe et al. (2007), while Europe is recorded as having the lowest number of victims due to natural disasters there is a higher frequency of disaster occurrence in Asia and the number of people who are killed or who are affected by natural disasters is highest in Asia. Proving this fact, Asia and the Pacific region has become the world’s most disaster prone region, accounting for 91 per cent of casualties due to natural disasters in the past century and for 49 per cent of the resulting economic losses (UN/ESCAP, 2006).

Bangladesh is a South Asian developing country that is highly susceptible to natural disasters. Natural disasters such as cyclones and storm surges, floods, riverbank erosions, earthquakes, droughts, arsenic contamination of groundwater, tornados and landslides have caused significant damage to human lives and physical assets whilst creating long lasting effects on social settings, ecosystems and the economic well-being of the country (Khan, 2008; Choudhury, 2002). Amongst the aforementioned natural hazards, tropical cyclones are considered to be the most devastating natural disaster in Bangladesh (Kulatunga et al., 2013; Asgary and Halim, 2011; Shimi et al., 2010). The cyclones of 1970, 1985, 1991 and 1997 are some of the most notable events in the recent past (Khan, 2008). A more recent event, super cyclone SIRD, affected south-west coastal regions of Bangladesh creating wide-scale damage and losses totaling over $1.5 billion (Government of Bangladesh, 2008). The event affected over 2.3million households, resulting in over 3,000 causalities and physical injuries to over 55,000 people (Government of Bangladesh, 2008). The cyclone Aila that hit Bangladesh in year 2009 caused lesser fatalities than cyclone SIDR; however, the economic losses caused by it were much greater than cyclone SIDR (Regional Specialised Meteorological Centre, 2009). According to Alam and Collins (2010) cyclones and tidal surges have caused major devastation to human lives and property in Bangladesh for generations.

The severity of natural disasters and their impact has been further intensified due to various vulnerability factors within the Bangladeshi community such as low income; shortages of food; lack of assets such as land and permanent housing; dense population, illiteracy, etc. (Maxwell, 1999 cited in Mclean and Moore, 2005). Accordingly, this study evaluates the community vulnerability factors for the most severe disasters which occur in Bangladesh - cyclones. The Patuakhali region in south western Bangladesh was selected as the area for the case study. The paper is structured as follows: firstly definitions of disasters, their link with vulnerability and other factors that affect community vulnerability are discussed. Secondly, the research method adopted for the study is explained. Thirdly, the findings and discussion section is presented, identifying and categorising the common vulnerability factors of the community in the Patuakhali region. Finally, the paper draws conclusions for the study from two perspectives: community vulnerability factors and the methodology used.

# COMMUNITY VULNERABILITY TO NATURAL DISASTERS

Since the origins and causes for natural disasters vary, the definitions of disasters often address two strands of vulnerabilities: one strand being the components relating to the “natural” {including a trigger (McEntire, 2001); physical event (O’Keefe et al. (1976); agent (Gilbert (1998)} and the other strand being the “socio-economic” component (this includes social, economical and political factors for the clarity of this paper). Alexander’s (1993) definition, for example, defines disasters as some rapid, instantaneous or profound impacts by the “natural environment” on the “socio-economic” system. The aforementioned “socio-economic” component has been considered by many authors as a “deciding factor” that makes humans susceptible to disasters. For instance, Westgate and O’Keefe (1976) view the main cause for disasters to be the “growing vulnerability” of humans to the physical or natural phenomena due to the impact of socio-economic and socio-political factors upon the community’s absorptive capacity. The definition of disasters given by UN-ISDR (2007) further emphasises the socio-economic conditions of the affected community. UN-ISDR (2007) postulates that the disruption caused by a disaster exceeds the ability of the affected community to cope using their own resources which is, in fact, influenced by the socio-economic conditions of the community. McEntire’s (2000) definition of disasters suggests that various forms of “socio-economic” factors could intensify the severity of the disaster. Hence, Eshghi and Larson (2008) postulate that different communities experience different levels of vulnerability to disasters, despite being subjected to hazards of a similar intensity and magnitude.

When synthesising the definitions on disaster vulnerability it can be identified that different schools of thought emerge. During the 1970s the seminal work of O’Keefe et al. (1976) questioned the “naturalness” of disasters. They argue that disasters are neither an “act of god” nor an “act of nature” but are a consequence of vulnerability: the degree to which a community is at risk from the occurrence of extreme physical or natural phenomena (Westgate and O’Keefe, 1976). Hewitt’s (1983) work linked poverty and disasters and suggested that disaster risk reduction policies and practices need to consider the social, political and economic vulnerabilities of the community at risk. The views of Varley (1991), Maskey (1993) and Winsor et al. (2004) also predominantly emphasised the link between social, economic and political factors and the vulnerability of the community subjected to a disaster. Winsor et al. (2004) further explain this by using the “Pressure and Release” model (PAR model) where poverty directly correlates to the root causes of disasters such as the political and economic conditions of the community. However, with the move to exploring the socio-economic factors that lead to disasters, McEntire (2001) argues that “natural attributes” should not downplay the constructs of disasters. He claims that a holistic perspective of disasters that considers multiple causal sources and the interaction between physical, technological, built and social systems is therefore important. Emphasising this further, Alca´ntara-Ayala (2002) identifies that both “natural vulnerability” and “human vulnerability” can be a cause of disasters. When natural vulnerability is the threatening natural hazard or the trigger as stated by McEntire (2001), human vulnerability relates to the socio, economic, political and cultural systems surrounding humans (Alca´ntara-Ayala, 2002).

The study by Cannon (2008) differentiates two categories of people based on the different degrees and types of socio-economic vulnerability factors. In the first category, people live in an area at risk from hazards because of their livelihood but not due to any economic, political or socially differentiated factors that have required them to do so. In the second category, people live in risky areas, but surviving a hazard is constrained by economic, political or social factors. For example, it is highly likely that more affluent people, within category two, are victims of hazards but their likelihood of surviving the hazard is probably high due to their homes being appropriately built. The second category of Cannon (2008) can be identified in McEntire’s (2001) work, with a further addition of nature as the triggering agent. Accordingly, McEntire (2001) claims that some people have little or no influence over the hazards to which they are subjected but which result from decisions and activities made by others or because of the powerful physical environment. Cannon (2008) argues that people in the first category have moved to dangerous locations with the full knowledge that they are at risk from hazards. Similarly, Kulatunga’s (2011) study also revealed that people make themselves susceptible to hazards knowingly due to their cultural beliefs and their “risk perception” regarding the impact of hazard.

Some studies have identified the “capacity of people” to protect themselves from disasters as another vulnerability factor that needs to be considered. In Cannon’s (1993: p97) study this has been well defined wherein he views vulnerability as “characteristic of individuals and groups of people who inhabit a given natural, social and economic space, within which they are differentiated according to their varying position in society into more or less vulnerable individuals and groups”; thereby acknowledging the importance of the “capacity of people” in disaster vulnerability. Wisner et al. (2004) state that weaknesses or the limitations of people should not be used to consider them as passive and incapable people who cannot bring about change. The attitude of being passive recipients of the impact of disasters could hamper the implementation of disaster risk reduction strategies. The studies of De Coster (2002) and Kulatunga (2011) also revealed that religious beliefs have impose a sense of powerlessness on communities which have reduced the proactive involvement of disaster mitigation activities.

Based on the above literature, authors have followed McEntire’s (2001) comprehensive vulnerability categories (Physical, Economic, Social, Cultural, Political and Technological) as it provides due consideration for both “natural” and “socio-economic” components of disaster vulnerability. Having discussed vulnerability categories and factors in detail the next section presents the research design for the study.

# RESEARCH DESIGN

## Study area

Patuakhali is in the south-western region of Bangladesh facing the Bay of Bengal and has a number of rivers connected to the Indian Ocean including the Andharmanik, Agunmukha, Payra, Lohalia, Patuakhali and Tentulia rivers. The constituent districts of the Patuakhali region that are considered for this study are Patuakhali and Borguna. The area is highly vulnerable to a range of natural disasters and the study area was one of the hardest hit by the 2007 super cyclone SIDR ([MoFDM, 2010](#_ENREF_11), [Government of Bangladesh, 2008](#_ENREF_6)). The Patuakhali region was selected for the study due to its significant vulnerability to the most devastating disasters that affect Bangladesh: the cyclones. It was thought that previous experiences of disaster events would allow the local communities to provide useful insights into the issues being investigated, whilst the findings of the study would be of practical importance for policy and practice in disaster risk reduction initiatives in the region. Data were collected from a number of localities within the Patuakhali region such as Taltuli, Amtali and Galachipa.

## Research Methods

The Bangladesh government’s national plan for disaster management ([MoFDM, 2010](#_ENREF_11)) endorses community involvement via strategies such as community-based risk assessment and preparedness planning. Acknowledging community participation towards effective and efficient disaster reduction activities a bottom-up research approach is adopted for the study, whereby the local community was consulted for their viewpoints and these, in turn, were fed back to local policy makers for their consideration. The respondents involved were residents of the coastal or river bank areas at risk from multiple hazards, many of whom had had previous experience of cyclone SIDR. To ensure appropriate coverage of views from different community groups and social categories, both men and women representing different age groups and livelihoods such as farming, fishing, small businessmen, education, clerical staff, religious leaders etc. were selected as respondents. The study was required to investigate the origins and root causes of vulnerability; how vulnerability varies based on external factors such as social status, economic situations, political influences, gender, cultural and religious beliefs etc. Furthermore, the study needed to gather in-depth and free-flowing views from the community regarding disasters and their vulnerabilities based on their past experience. Therefore, a qualitative research strand was selected for this research as it enabled investigation of the phenomenon in a natural setting and attempted to make sense of, or interpret, those views by considering the meanings people brought to them (Denzin and Lincoln, 1994). Within the qualitative research strand, thirty semi-structured interviews (refer to Table ) and three focus group interviews (refer to Table ) were used as the data collection methods.

The purposive sampling technique was adopted for selecting participants for the semi-structured interviews and focus group discussions. According to Saunders et al. (2009), purposive sampling enables researchers to use their own judgment in selecting participants in a way that best enables answering of the research questions and accomplishing the research objectives. Yin (2011) recognised that purposive sampling is likely to be used in qualitative research where samples are selected in a deliberate manner. Yin (2011) further commented that the reasoning behind the use of purposive sampling is to select the cases that could provide the most relevant and rich data. Accordingly, participants were selected to suit the research questions at hand and to achieve the objectives of the study, whilst representing the major stakeholders within the local communities studied (including vulnerable groups such as women and the elderly and different age groups). The purposive sampling technique adopted enabled the researchers to capture the perspectives of different stakeholder groups present within a local community in the study area.

Table 1: Profile of the semi-structured interview participants

|  |  |
| --- | --- |
| Participants | Number of participants |
| Farmers | 8 |
| Small Businessmen | 6 |
| Teachers | 5 |
| Fishermen | 7 |
| Housewives | 4 |

Table 2: Details of the focus group interviews

|  |  |  |  |
| --- | --- | --- | --- |
| Focus group | Participants | Locality | Number of participants |
| FC1 | Local community leaders | Taltuli | 8 |
| FC2 | Local community leaders | Amtali | 7 |
| FC3 | Local community leaders | Galachipa | 9 |

The focus of the semi-structured interviews was placed on “community members” in the Patuakhali region including both men and women. One-to-one interviews with community members facilitated the development of a good rapport between the interviewer and the respondent and much information was gathered from the free-flow of ideas relating to their personal experience of disasters and vulnerability factors. As stated by De Laine (1997), descriptive questioning techniques encourage respondents to describe their experience; hence, the use of semi-structured interviews provided rich data from different perspectives. The majority of women respondents in the semi-structured interviews responded to the questions by staying behind a curtain due to their social and cultural reservations. This was also noted as a valuable observation in the study which is further discussed within the findings section.

For the second data collection method, focus group interviews were used to collect data from the “community leaders” of the Patuakhali region. The community leaders involved in the focus group discussions included those appointed to village disaster management committees and other influential members within the local communities such as village headmen, local religious leaders and senior residents. Members of the village disaster management committees perform a significant role in rural communities in Bangladesh including the maintenance of cyclone shelters, disseminating early warnings among residents and assisting in evacuation procedures. Due to their involvement in such activities and their experience of acting as a middle layer between government officials and local community members, participants involved in the focus group discussions were able to recount these experiences and provide rich data. Powell et al. (1996, p499) define a focus group as a “group of individuals selected and assembled by researchers to discuss and comment on, from personal experience, the topic that is the subject of the research”. Confirming this view, the focus group discussions carried out with the community leaders created active interaction between the participants and enabled them to build upon the views from other participants in the group. Kitzinger (1994, 1995) views the interaction between focus group members as a method for questioning each other, re-evaluating and reconsidering their own understanding regarding the subject matter. Re-evaluation, reconsideration and understanding disasters and their vulnerability factors engendered the emergence of “different perspectives” regarding the “same phenomenon” due to the involvement of a diverse group of community leaders. Furthermore, the women participants of the focus group interviews (community leaders) expressed their opinion openly and proactively as opposed to some of the women participants gathered from the general public for the semi-structured interviews. This could be due to the generational gap of the women participants involved in the study, as the former comprised “mature” participants with traditional views; whereas the latter comprised relatively “young” participants who were more open regarding their views. The focus group interviews also assisted with the collection of more data within a shorter period of time.

Most of the interviews and focus group discussions were carried out in the native language of Bangladesh. Facilitators of the focus group interviews were academic members of a university who were involved in this study.

## Presentation of the findings

To improve the reliability of the study, direct quotations of the respondents were presented within the findings and discussion section. Furthermore, the primary data gathered from the study were compared and contrasted with the literature where possible, which also improved the validity of the study. The vulnerability factors elicited from the study were grouped into the categories established from the literature review such as Physical, Economic, Social, Cultural, Political and Technological factors (refer to the literature review section). A graphical presentation of the vulnerability factors identified in the study is given in Figure 1. Vulnerability Factors (VF) identified from the study were assigned a code such as VF1, VF2 etc. and this has been utilized in Figure 1 to ensure clarity of work and to demonstrate how they are derived from the study.

# FINDINGS AND DISCUSSION

This section discusses the vulnerability factors for cyclones as revealed by the semi-structured interviews and the focus group discussions. The identified vulnerability factors are compared and contrasted with the literature where possible. The geographical location of Bangladesh was identified as a vulnerable factor by most of the respondents (VF1). The respondents’ view was that the environmental changes within the Bay of Bengal (VF1.1) and the presence of a large number of massive rivers within the country often cause natural disasters in Bangladesh (VF1.2). Due to its geographical setting and to environmental reasons Bangladesh is currently ranked as one of the world’s most disaster-prone countries (Choudhury, 2002; Shimi et al., 2010; World Bank, 2005).

A lack of infrastructure facilities such as sufficient numbers and standards of cyclone shelters was pointed out by the respondents. In line with this, a farmer responded that “…people are afraid of cyclone hazards because of the devastating damage. …we have no strong houses to protect against cyclones”. Similarly, a lack of cyclone shelters has also been identified in previous studies ([Hossain et al., 2008](#_ENREF_8), [Karim and Mimura, 2008](#_ENREF_10" \o "Karim, 2008 #1442)). The government have estimated that about 2,000 new shelters need to be built in coastal areas in addition to the nearly 3,000 that are already available ([MoFDM, 2010](#_ENREF_11)). Furthermore, respondents claimed that the location of the cyclone centres are hugely influenced by politicians without giving adequate consideration to the needs of the general public and the critical areas that are subject to cyclones (VF3). Linked to the issue of the cyclone shelters’ availability, another concern of the respondents was the poor road network system leading to protective shelters and the distance they had to travel to reach them (VF4). A community leader commented that “…travelling to a distant cyclone shelter with children, elderly and women during the short time period available after cyclone warnings is extremely difficult”.

Another factor identified by the study is that of the vulnerability of less able people and women during cyclones (VF5 and VF6). According to the Bangladesh Disaster Management Information Centre (2007), around 3,243 human lives were lost in cyclone SIDR, of which the majority of victims were reported to be women and children. Islam (2011) has revealed that women are a highly vulnerable group in the event of disasters in Bangladesh. A housewife participating in the study commented that “…most of the time, we do not go to the town centre due to domestic roles and responsibilities such as looking after the elderly people, cooking etc., therefore, we do not get the early warnings issued” (VF6.1 and VF6.2). Similarly, Islam’s (2011) study states that women in the coastal areas of Bangladesh are occupied with crop production, livestock management, food preservation, firewood collection etc. and that it is difficult to leave such work. Furthermore, a community leader identified women’s lack of authority and decision-making power in the Bangladeshi community as a factor that increases their vulnerability to disasters (VF6.3). He commented “…they (women) cannot take the decision on their own to leave the house and live-stock behind and go to the protective shelter. They (women) need to wait until they get the consent from their husband to do that”.

A lack of proper management and maintenance of the cyclone shelters was identified by respondents as a factor that makes them vulnerable to cyclones (VF7). Due to the lack of maintenance, one respondent commented that it was difficult to live inside the centre during the emergency. Furthermore, it was noted that some of the shelters are completely closed during non-emergency periods and were used only in an emergency (VF8). A fisherman participating in the study responded that “…during the SIDR, even though we managed to go to the evacuation centre, we had to wait at the shelter for a long time due to the absence of a person to open it” and a farmer commented that “…cyclone shelter was not properly managed due to a number of reasons such as absence of medical and nursing facilities; lack of space and caring for woman, children and disabled people; food and other maintenance was not in a hygienic condition; poor management of safety and sanitation”. The study of Akter et al. (2010) also confirms that, during the cyclone SIDR, a high numbers of deaths were reported while using the shelters due to their unsuitability and also when people were moving towards them.

The resistance of a community to move into protective shelters during cyclones was revealed as another factor that affects the vulnerability of people in the Patuakhali region (VF9). Respondents identified a number of reasons for their refusal to move to protective shelters, the first of which was their reluctance to leave behind property and livestock during the time of disaster. Similarly, Kulatunga’s (2011) study revealed that Bangladeshi communities are hesitant to leave their ancestors’ lands and property, even when a disaster strikes, due to their strong attachment to their material culture such as home, land and environment (VF9.1). The second factor mentioned by the community is the fear of vandalism if they leave their property and livestock behind (VF9.2). A small businessman participating in the study commented “…I prefer to stay at home because I have a fear of burglary of my belongings”. As the community have so little they are strongly attached to the property and livestock that they do have and it would be difficult for them to recover any losses after a disaster. This highlights the economic pressure that the people undergo even during a disaster. Furthermore, fear of leaving behind land and property is also linked to a lack of risk transferring methods (such as insurance) that most developed countries rely upon. Thirdly, the majority of respondents view hazards as part of their day- to-day hardships; therefore, they tend to consider them to be “common events” (VF9.3). Fourthly, one of the observations made during the data collection, especially during the interview stage, was the “reserved nature” of Bangladeshi women (refer to the research design section) and their general lack of exposure, especially to the opposite gender (VF6.4). During semi-structured interviews, the majority of the women respondents answered questions from behind a curtain. This clearly highlights their hesitance to move to a “common” protective shelter during disasters and thus increases their vulnerability to the impacts of disasters. Furthermore, factors such as the distance to a protective shelter, the poor road network to them, insufficient capacity and a lack of sufficient and adequate standards and facilities at the evacuation centres have prevented communities from moving to the protective shelters. Another small businessman commented that “...I believe that my house is strong enough to withstand the cyclone” relying on the house in which he lives (VF9.4). Renn and Rohrmann (2000) suggest that people often tend to under-estimate the predicted or probabilistic risk from a hazard. The reasons for this could be over-reliance on technology, under-estimating the magnitude of the hazard and previous experience that supports their decisions.

Another factor discussed by the community is poverty (VF10) which, in effect, makes them vulnerable to cyclones. A farmer responded that “…we get daily wages for the work that we do. Hence, even during a cyclone, we do not want to miss going to the farm. If we lose our wages, it’s difficult for us to survive…” (VF10.1). As discussed previously, the poor economic situation has prevented some of the community from going to protective shelters. As a result of poverty, most of the community in the Patuakhali region suffers from a shortage of resources that can be consumed during difficult times such as a disaster (VF12). For example, respondents highlighted that a lack of food stocks, medical facilities and money make them more vulnerable during the aftermath of the disaster and is further compounded by the remoteness of the village settlements from the main administrative and economic centres which makes them especially vulnerable (VF13). “…the town centre is far away from this village…if we run out of food during the cyclone, it is difficult to go there (town centre) and collect food and get medical treatment” commented a community leader participating in the study. “The existing roads are further damaged during cyclones, which make it very difficult to go to the town centre” commented a teacher participating in the study.

The location in which the community’s settlements are based is also revealed as another vulnerability factor. Some of the respondents commented that their houses and agricultural land are located in areas subjected to cyclones (VF14) and are very close to river embankments (VF15). Furthermore, the majority of the community’s income source is based on fishing making them vulnerable to cyclones and subsequent storm surges (VF16). Despite being vulnerable, due to their location and livelihood patterns, the participants showed a strong attachment to the land on which they live. A farmer commented: “…we were born here, not only us but our father, grand-father …our family live here from the ancient British period”. Some respondents commented “…if we migrate to another land, we will be unable to survive” indicating how closely their livelihood patterns are linked with the environment where they have lived for generations (VF16). The environment, the farm land and the sea, has basically provided the community with choices and opportunities for income generation and survival. Over a period of time the community has engaged with the environment and strived to make a living. Thus, leaving the land behind them is not an alternative and the community fear that it could negatively affect their survival. Therefore, some respondents mentioned that they can temporarily move out of the village but that permanent relocation was not considered to be an alternative.

A lack of proper governance and administrative systems to regulate policy and practices relating to disaster management was also evident from the study (VF17). It was revealed that a rapid spread of unprotected settlements have emerged in hazardous areas because they provide a good opportunity for income generation (VF18). For example, areas along river embankments, close to rivers and the sea (and thus areas highly prone to cyclones) have been selected by the community for settlement, by giving priority to earnings as opposed to safety. The vulnerability factors identified in this study are grouped and presented in the Figure 1. The figure further elaborates how the vulnerability factors are interlinked with different root causes and origins. For instance how “political vulnerability” (lack of governance) has led to an increase in the “physical vulnerability” (spread of unprotected shelters in hazard prone areas); “cultural vulnerability” (strong devotion to land and property) leading to “physical vulnerability” (not leaving the land behind) etc.



Figure 1: Cyclone vulnerability factors of the community in the Patuakhali region

# CONCLUSION

The vulnerability factors revealed by the study highlighted the significant influence of humans and their actions that make the impact of disasters more destructive. The study revealed how the community is vulnerable due to the dual characteristics of disasters: natural factors and socio-economic factors. The Patuakhali community’s vulnerability to natural factors has been further aggravated by socio-economic factors such as social status, political influences and economic conditions. The majority of the community in Patuakhali has been “knowingly” vulnerable to disasters as a result of a lack of alternatives, particularly in terms of their livelihood patterns. Poverty, the opportunities provided by the environment, and the economic processes that the community is capable of (and which pass from generation to generation) have made the community more attached to the environment despite being the unfortunate recipients of changes to the environment (that they rely on).

It was also revealed that some individuals have been “knowingly” vulnerable due to their cultural beliefs. The vulnerability factors identified in the study indicate how the poorly managed interactions between environment and society, especially the political factors, has significantly increased the vulnerability of the Patuakhali community to disasters. The vulnerability of women due to their lack of authority, domestic work, and fear of exposure within the society was also highlighted. A lack of capacity in terms of economy and polity has made the community’s ability to recover during and after a disaster difficult. The study identified how vulnerability factors are interlinked with each other making it difficult to isolate them and, as a result of this, community vulnerability has increased. The inter-linked vulnerability factors call for multi-faceted disaster risk reduction strategies. A disaster risk reduction strategy targeting a particular vulnerability category would not reduce the susceptibility of a community to disasters because the vulnerability factor could have different origins and root causes. Therefore, successful disaster risk reduction strategies need to address key vulnerability factors as a whole by taking a holistic perspective. One of the main observations of the study’s findings is a lack of reference to technological vulnerability when compared to McEntire’s (2001) classification which the authors followed for this paper.

In terms of the research methodological aspects, the mixed method research design (interviews with community members and focus group interviews with community leaders) complemented each other and initiated new knowledge. For instance, the focus group interviews mitigated the barrier to the active engagement of women which was visible during the interview stage. Focus group interviews enabled further exploration of the findings from the interview stage (individual perceptions) and gathered community perceptions. The sample selected for semi-structured interviews was limited to 30 respondents. This limitation was overcome by getting access to a rich data set through “purposively selecting” the respondents to represent major stakeholder groups present within the area. This enabled capturing the perspectives of the local community adequately. Furthermore, the focus group interviews allowed findings to be triangulated and therefore strengthened the construct validity of the study. The findings gathered from the qualitative study were cross-validated with the extant literature to improve the rigour of the study.

Furthermore, the ‘bottom-up’ research design adopted acted as a means of community engagement and community empowerment as the views gathered from the interview and focus group interview processes were communicated to policy makers at regional level in the next stage of the research. Knowledge and the capacities of local communities are considered vital in policy making aimed at disaster preparedness and, therefore, engaging local communities and linking their concerns with government priorities is a key role expected to be played by local authorities. The study sought to make a positive contribution towards this overarching agenda whilst achieving its research objectives. This was achieved by conducting a day-long workshop for policy makers involved in disaster risk reduction activities in the region. Participants who attended included local council members, government officials and non-governmental organisations actively involved in disaster risk reduction initiatives (see Wedawatta et al. (2014) for a discussion on this aspect of the study). The findings were also fed into the local knowledge base through the partner university involved in the study, by conducting a number of workshops for the staff and students of the recently established Faculty of Disaster Management. Although the study was focused on the Patuakhali region, the issues identified and the lessons learned can inform policy making on disaster risk reduction measures concerning the wider coastal and river bank communities in Bangladesh.

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