



MONASH University

**Older People in Bangladesh:
Extreme Weather Events, Social Protection and Vulnerability**

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MSS in Social Welfare

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Abstract

Extreme weather events such as cyclones and floods adversely affect people by making them vulnerable to socioeconomic conditions. Among age groups, older people are the most vulnerable and have a lower adaptive capacity to cope with severe climate disasters and their impact on their socio-economic conditions. However, there is relatively little research on the vulnerability of older people to extreme weather events in Bangladesh. Some studies address the problems of older people in Bangladesh, but so far there has been no holistic study on their vulnerability to extreme weather events. This study explored the vulnerability of older people to extreme weather events and the role of social protection in addressing their vulnerability. The study adopted a qualitative approach and accordingly conducted fieldwork in a particular coastal area - Patharghata Upazila in Barguna district - in Bangladesh. In-depth interviews among 56 older people were carried out to collect the relevant data between 11-Dec-2019 to 20-Mar-2020. The results of the study revealed that older people in the coastal region of Bangladesh have been highly vulnerable to extreme weather events in the past and they believe that the same or more brutal conditions will recur due to their poor socio-economic condition and lack of proper support system. Every extreme event, especially cyclones and floods due to storm surges, destroyed or significantly damaged their livelihoods and negatively affected their lives, making them vulnerable. The results of the study also showed that social protection programmes (formal and informal) help them to better cope with the impacts of extreme weather events and reduce their vulnerability.

Declaration

This thesis is an original work of my research and does not contain any material accepted for the award of any other degree or diploma at any university or equivalent institution, and to the best of my knowledge and belief, this thesis does not contain any material previously published or written by any other person unless so stated in the text of the thesis.

Signature:

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Date: July 2022

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Sincerely,

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Dedication

To my parents, teachers and family.

Abbreviations and Acronyms

BBS	Bangladesh Bureau of Statistics
BRAC	Bangladesh Rural Advancement Committee
BDT	Bangladeshi Taka (Bangladeshi Currency)
FSP	Formal Social Protection
ISP	Informal Social Protection
HIES	Household Income Expenditure Survey
GOs	Government Organisations
NGOs	Non-governmental Organisations
OAA	Old Age Allowance
UN	United Nations
UNICEF	United Nations International Children's Emergency Fund

UNDP

United Nations Development
Programs

WB

World Bank

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Chapter 1: Background and context of the study

This introductory chapter discusses the background and context of the study that frames the research problem. The chapter includes a brief discussion of extreme weather events in Bangladesh and the socio-economic conditions of older people and social protection programmes. The chapter also covers the rationale, the main objective of the study and the research questions. An outline of the dissertation is also presented in this chapter.

1.1 Background of the study

Bangladesh is a disaster-prone area in South Asia, with nearly 80 per cent of the population exposed to floods and over 70 per cent to cyclones (World Bank, 2018; Saha, 2017; Acaps, 2019). The country is more vulnerable and susceptible to the impacts of extreme weather events due to its geophysical location, poor socioeconomic conditions and weak governance system (Alauddin et al., 2013; Chowdhury et al., 2021). The country is a remarkably flat, low-lying alluvial plain crisscrossed by over 230 rivers and streams, with nearly 580 kilometres of exposed coastline along the Bay of Bengal. People live in the low-lying coastal areas of the Ganges-Brahmaputra-Meghna delta, which covers most of the country and is subject to regular cyclones and floods (Uddin et al., 2019). Bangladesh is one of the top 10 countries that are most affected by climate change-induced natural disasters (Eckstein, Hutfils and Wings, 2019). Referring to the modelling data of Providing Regional Climates for Impact Studies (PRECIS), Bangladesh Economic Review 2019 stated that the annual average rainfall of Bangladesh would increase by about 4 per cent, 2.3 per cent and 6.7 per cent by 2030, 2050 and 2070 respectively. The average temperature in Bangladesh has been rising and will rise even faster in the future (Tanner et al., 2007; Rouf et al., 2011). Since 1971, the average annual temperature increase has been 0.20 degrees Celsius per decade, well above the global rate of 0.130 degrees Celsius per decade (Rahman and Lateh 2015). Another study based on 100 years of data found that the maximum temperature in Bangladesh has increased at a rate of 0.3 to 0.4 degrees Celsius per decade (Khatun et al., 2016). The average annual temperature in the country is expected to rise by about 2.0 degrees Celsius by 2050. A World Bank study found that up to two-thirds of Bangladesh is inundated by floods every three to five years and sixty per cent of the deaths from cyclones worldwide in the last 20 years have occurred in Bangladesh (World Bank and GFDRR, 2011). Besides, low-lying coastal areas are also at a higher

risk of being subject to cyclones and storm surges. Intergovernmental Panel on Climate Change (IPCC) predicts that by 2050, Bangladesh will lose 17 per cent of its land and 30 per cent of its food production because of the adverse impact of extreme events (Ministry of Finance, 2019).

Bangladesh ranks sixth among countries whose population is exposed to multiple extreme hazards such as cyclones, droughts and floods and second in flood risk (Elizabeth et al., 2014). Every year, Bangladesh is hit by one extreme cyclone, 145 severe local convective storms and at least six tornadoes (Alam et al., 2003; Ahammad et al., 2013; 2017; Masum, 2019). Between 1960 and 2007, about 18 major cyclones hit the Bangladesh coast, killing about 718,000 people (Ubydul et al., 2012). The Bhola cyclone of 1970, which killed up to 300,000 people, was the deadliest tropical cyclone in Bangladesh. During the 1991 cyclone, at least 138,000 people were killed and up to 10 million more were displaced. Almost 8.3 million people live in cyclone-prone areas, and this number is expected to increase to 20.3 million by 2050 (Tanner et al., 2007). Cyclones in Bangladesh cause death and destruction of livelihoods, as well as damage to crops, infrastructure, communities and communication networks (Haque and Haque 2016; Shaw 2013). Cyclone SIDR in 2007 hit the southwest coast of Bangladesh with an average wind speed of 223 km/h, caused 3,406 casualties, 55,282 injuries and affected 8.9 million people. It destroyed 0.6 million hectares of farmland, devastated 537,775 homes and flooded 8,075 kilometres of roads. Damage and losses from cyclone SIDR were estimated at US\$ 1.67 billion (GoB, 2008).

Storm surges are another extreme weather event in Bangladesh that occurs every year due to cyclonic events. Bangladesh is hit by two-fifths of all storm surges in the world. By 2050, cyclone-induced storm surges will inundate an additional 15 per cent of Bangladesh's coastal area due to an expected 62 cm rise in sea level (World Bank 2010). According to one study, the sea level in the coastal zone of Bangladesh is rising by 6-21 millimetres every year (Cell, 2016). By 2050 and 2100, a sea level rise of 25 cm and 1.0 m is projected to affect 4 per cent and 17.5 per cent of Bangladesh's total land mass, respectively (World Bank 2000). Almost half of Bangladesh's coastal areas are currently at risk of cyclonic storm surges of more than one metre in height (Sarker and Ahmed 2015). Furthermore, every decade, 60 per cent of the country's total land area is affected by at least one extreme flood event. The low-lying coastal areas of Bangladesh are prone to flooding and strong tidal effects that can spread 200 kilometres upstream from the coast (Dasgupta

et al., 2015; Jisan et al., 2018). Flooding at different times of the year increases the vulnerability of people in the affected regions of the country. In the 1988 flood, 61 per cent of the entire country was flooded; and in the 1998 flood, almost 68 per cent of the country was flooded for days, affecting 45 million people, killing over 2300 people and damaging property worth \$12 billion (Liong et al., 2000; Hofer and Messerli 2006; Younus, 2014).

River bank erosion is considered the most dangerous hazard in Bangladesh (Alam 2017; Penning-Rowsell et al., 2013). Riverbank erosion affects about 20 of the 64 districts in the country and approximately 200,000 people are displaced every year due to riverbank erosion (Aktar, 2012). Erosion of riverbanks has far-reaching consequences both for the affected coastal regions and for the country as a whole. People lose their land and belongings, assets and resources and become homeless due to riverbank erosion resulting in displacement for which the homeless people have difficulty reintegrating into their new community, face social prejudice and suffer a severe lack of family and social ties (Hamide, 2017).

Droughts, heat waves and cold waves are caused by extremely high or low temperatures that put people at risk of health problems in different parts of the country. The frequency of droughts has increased by at least 10 per cent in North Bengal, Bangladesh between 1979 and 2018. Farmers will be forced to grow crops with lower economic yields as a result of which vulnerability to food insecurity may increase in the near future (Cell, 2006). Heat waves in Bangladesh are characterised by a rise in temperature and the absence of the usual pre-monsoon rains. A heat wave develops over Bangladesh when the maximum temperature rises above 36°C. During summer, the maximum temperatures in Bangladesh range between 36 and 40 degrees Celsius (Masum, 2019). Bangladesh experienced 39 heat wave days (13 separate heat waves) in 23 years, from 1989 to 2011. During heat waves in Bangladesh, mortality increases disproportionately among the older people and children (Bhuyan et al., 2018; Burkart et al., 2014). During the winter season, cold waves in Bangladesh are accompanied by a rapid drop in the lowest temperature and constant cold winds from the Himalayas that affects the northern and north western parts of Bangladesh. In the winter of 2013, Bangladesh was hit by a cold wave that affected more than two million households. Homeless people, poor people without adequate winter clothing, the elderly, children and infants suffer the most during a cold wave (Masum, 2019).

The impacts of extreme weather events on the people, environment, ecosystems and infrastructures of affected communities in Bangladesh are devastating. The wider impacts of climate change and extreme weather events on resource systems and the environment can be considered, but ultimately the main impacts are felt on the lives and livelihoods of marginalised groups, particularly older people living in the affected area (Toufique and Yunus, 2013). It has been evident that physical and cognitive factors, such as reduced physical health, mobility problems, cognitive decline and the influence of social factors, such as reduced social networks and socio-economic changes, make older people more vulnerable to extreme weather events (Fernandez et al., 2002). It is argued that there is a link between getting older and the likelihood of developing needs, which increases overall vulnerability. These changes in older people may affect their ability to respond effectively to a disaster, with the required response possibly beyond their coping capability (Pekovic et al., 2007). Disasters caused by severe weather undoubtedly have an enormous impact on older people. They affect their physical and mental health, infrastructure as well as the social cohesion of marginalised communities (Doherty et al., 2011). Thus, older people are one of the most vulnerable groups, who are physically, financially, socially and even emotionally less capable of coping with repeated extreme weather events and socioeconomic crises (Haq et al., 2008).

1.2 Older people and vulnerability in Bangladesh

The world is facing a continuous shift in the age structure of its population due to increasing life expectancy and decreasing fertility. People are living longer, and both the proportion and number of older people in the total population in Bangladesh are increasing significantly. The older population in Bangladesh was around 7.4 per cent in 2010 (HIES, 2010). However, in 2019, about 13 million people in Bangladesh were over 60 years old, which is about eight per cent of the total population. With 36 million people over 60, the proportion of older people is expected to triple to 21.9 per cent by 2050, which means that one in five Bangladeshis will be over 65 (United Nations, 2019; Rahman et al., 2021). Among the older population, a greater percentage are widowed (women 80% and men 39%).

Older people suffer from declining physical and mental abilities, dependency within the household and lack of access to regular income, employment and health care (Seplveda, 2010). In Bangladesh 68 per cent of the population aged over 60 are economically inactive among which 95.14 per cent

are women; whereas 23 per cent are self-employed in the agricultural (16%) and non-agricultural (7%) sectors. It is observed that the elderly who are not economically active may support themselves with the assets they accumulate over their life course (savings, rent from homeownership, land) pensions or in other ways (through family members, relatives and government and non-government agencies) of support and care (Rank et al., 2014, 2007; Plagnol, 2011). Most of the elderly live in single (widowed, divorced, separated as well as never-married living separately) households (89%) and only 11 per cent live in joint family households (living with sons or daughters). Single households generally consist of fewer members than joint family households. As a result, the elderly in single households often get less care than their counterparts who live in joint family households where the possibility of caring for the elderly member is greater because of the presence of more family members (Bangladesh Bureau of Statistics, 2015).

The vulnerability of older people in Bangladesh is manifold. Older people in the country face difficulties in earning a consistent income as it becomes more difficult to find work as they age, especially in typical and physically demanding jobs. As the livelihood support and social security for older people in Bangladesh are inadequate, they are forced to look for work. Older people in the country also suffer from both degenerative and non-communicable diseases. For example, the osteoarthritis prevalence among the participants aged 60 to 69 significantly increased from 45.3% in 2020 to 54.7% in 2022 (Mistry et al., 2022). Again, the overall prevalence of multimorbidity among the elderly was 56.4 per cent and the prevalence was higher among women (64 per cent) than men (54 per cent). The most common conditions were hypertension (33 per cent), diabetes (27 per cent), ischaemic heart disease (12 per cent) and nine per cent were chronic obstructive pulmonary disease (Sara, Chowdhury and Haque, 2018). Another study found that of the sixty-five participants, 87.7 per cent had one or more non-communicable chronic diseases (Taskin et al., 2014). The main non-communicable diseases were hypertension (56.9 per cent), arthritis (44.6 per cent), diabetes mellitus (32.3 per cent), COPD (23.1 per cent), stroke (20 per cent) and 12.3 per cent myocardial infarctions. In sum, older people in Bangladesh face various types of vulnerabilities that include physical vulnerabilities, lack of social dignity, economic crises, housing difficulties, illness, physical assault, mobility problems, family stresses, and food crises (Alam, 2015).

1.3 Social protections in Bangladesh

Though the government's pension scheme was the only financial support program for older people until the late 1990s, 114 programs under 25 ministries are now implemented. These include allowances for the elderly, allowances for widows, allowances for destitute women, and payments for the poor and the disabled. It also includes the Employment Generating Programme for the Poorest, Food for Work, Work for Money, Test Relief and Vulnerable Group Feeding run by the Ministry of Disaster Management and Relief; and education and health incentives for the poor and vulnerable groups. The government pension program covers only five per cent of the workforce and one per cent of older people in Bangladesh (World Bank, 2019; GED, 2019).

The Government of Bangladesh introduced the Old Age Allowance program in 1997 to provide financial assistance for older people who had no access to the formal pension scheme. Through the Old Age Allowances program, 44 million older people are now benefitting, each receiving BDT 500 (US\$ 6) per month (Ministry of Social Welfare, 2019). In addition, about 17 million widows and deserted destitute women are receiving BDT 500 (US\$ 6) per month as cash benefits through the Widow Allowance. The objectives of these programs are to enhance the socio-economic conditions of the beneficiaries, improve their status in the family and society, and provide better nutrition and health in a sustainable way (World Bank, 2019; Ministry of Social Welfare, 2019). Social protection – materials and in-kind assistance – provided by the government and non-government organisations, and the support provided by family members, friends, community and society at large play a significant role in improving the socioeconomic conditions and mitigating vulnerabilities of older people to extreme weather events in coastal Bangladesh.

1.3.1 Old Age Allowance

The Old Age Allowance program was introduced in fiscal year 1997-98 with the aim of providing social security to the country's elderly poor and low-income or income-eligible elderly and enhancing the dignity of the family and society by the Department of Social Services of the Ministry of Social Welfare. Initially, 10 poor elderly people, including five men and five women, in each district of all Union Parishads in the country were provided with a grant of Tk 100 per month. Later, all parishes and municipalities in the country were included in this program. In order to include more women in the program, the age for women was lowered from 65 to 62, local MPs

and other public representatives were included in the selection of beneficiaries, initiatives were taken to establish a database, and the money was disbursed by opening a bank account in the name of all beneficiaries upon payment of Tk 10. Since the 2017-2018 fiscal year, the old-age assistance program has been partially handled through agent banking. Currently, all beneficiaries receive the monthly allowance in G2P (Government to Person) through mobile financial service provider, Nagad and bKash. The purposes of this programme are:

- a. socio-economic development and social security of the elderly;
- b. increasing their status in the family and society;
- c. strengthening their morale through financial grants;
- d. To help increase the supply of treatment and nutrition.

Criteria for selecting candidates:

- a. Citizenship: The candidate must be a permanent citizen of Bangladesh.
- b. Age: Preference should be given to the oldest person.
- c. Health condition: The person who is physically disabled i.e. completely disabled should be given the highest priority.
- d. Socio-economic status:
 - i. In the case of financial conditions: The destitute, the displaced and the landless should be given priority in order.
 - ii. In the case of social conditions: Widows, divorcees, widowers, childless, separated from the family should be given priority in order.
- e. Ownership of land: Priority should be given to the landless person. In this case, if the amount of land of a person other than a house is 0.5 acres or less, then he will be considered landless.

Eligibility and conditions of receipt of allowances

- a. must be a permanent resident of the concerned area;
- b. Must have birth registration / national identity number;
- c. The age should be minimum 65 years for men and minimum 62 years for women¹.
- d. The annual average income of the candidate should be not less than Tk. 10,000 (ten thousand);
- e. Must be elected by the Selection Committee.

¹ In determining the age, national identity card, birth registration certificate, SSC / equivalent examination certificate should be considered. In this case, if there is any dispute, the decision of the concerned committee will be considered final. The age fixed by the government from time to time must be considered.

Ineligibility of receiving allowances

- a. If a government employee is a pensioner;
- b. If the VGD card holder is a poor woman;
- c. If regular government grants/allowances are received in any other way;
- d. If financial grants / allowances are received regularly from any non-governmental organization / social welfare organization.

Table 1: Statistics on old age allowance

Coverage			The budget			Details of service		
Earlier	Start time	Currently	Earlier	Start time	Currently	Earlier	Start time	Currently
4.03 lakh people	1997-98	57.01 lakh people (2022-23)	Tk 12.50 crore	1997-98	Tk 3444.54 crore	3 months experimental at the rate of Tk 100 per month	1997-98	An allowance of Tk 500 per month is given to the person (2022-23).

Sources: Department of Social Services, Ministry of Education, Bangladesh

1.3.2 Allowance for the Widow and Husband Deserted Women

The allowance for widows and women abandoned (a woman whose husband is dead and Husband Deserted means, a woman who is divorced from her husband or does not live with her husband or has no contact for two years or more for any other reason) was introduced in the financial year 1998-99 by the Social Services Department of the Ministry of Social Welfare. At that time, Tk. 4 lakh 3 thousand 110 women were paid Tk. 100 as monthly assistance. The programme was transferred from the Ministry of Social Welfare to the Ministry of Women and Children in the financial year 2003-04. In order to achieve greater adaptability in the implementation of this program, the current government reincorporated this program into the Ministry of Social Welfare in fiscal year 2010-11. This program, initiated by the current government, has been successfully implemented by the Department of Social Services. Since fiscal year 2017-2018, part of the widow and widower allowance for abandoned women has been paid through agent banking. Recently, allowances for all beneficiaries have been disbursed through the Government to Person (G2P) system through the Nagad mobile financial service, Bkash. In 2022-23, 24.75 lakh women will receive tk. 500 as monthly allowance and the total allocation is 1495.40 crore tk. In the last two

years, measures have been taken to make the programme more transparent and accountable, and to make it acceptable to all sections of the population, such as the revision of the implementation manual, the involvement of local MPs and other public representatives in the beneficiary selection process, and the creation of a database. The aims and objectives of this programme are:

1. Socio-economic expansion and social security for widows and husband abandoned women.
2. Heighten their status in family and society;
3. Intensify their morale through monetary contributions;
4. Extend financial aid to reinforce medical supplies and nutrition

Standards of Candidate selection:

- a. Citizenship: The candidate must be a permanent citizen of Bangladesh.
- b. Age: Age should be above 18 (eighteen) years. But, priority should be given to the most senior women.
- c. Health status: The highest priority should be given to the person who is physically disabled or completely non-functioning.
- d. Socio-economic status:
 - i. In case of financial status: The destitute, the refugees and the landless should be given priority in a gradual manner.
 - ii. In the case of social conditions: Those who are childless, unhealthy and isolated from families should be given more priority.
 - iii. Land Ownership: Landless candidate has to give priority. He will be considered landless if he has 0.5 acres or less land except household.

Terms and conditions for beneficiary:

- i. Be a permanent resident of the area concerned;
- ii. Must have birth registration / national ID card;
- iii. Priority shall be given to the elderly helpless and afflicted widow or the women who are deserted by their husband;
- iv. A woman who is poor, helpless, almost landless, widowed or homeless and has two children below the age of 5, will be prioritized in getting the allowance;

- v. Among the impoverished, the needy, the widow, and the abandoned wife, the disabled and the sick will get more importance in getting allowance.
- vi. Annual average income of the candidate must be Tk. less than 12,000/- taka.
- vii. Must be selected by the selection committee.

Table 2: An overview of the allowance for the Widow and Husband Deserted Women programmes

Coverage			Budget			Service details		
Beneficiary at beginning	Beginning Time	At present	At Beginning	Beginning Time	At present	At Beginning	Beginning Time	At present
4.3 lakh people	1998-99	24.75 lakh people (2022-23)	40.31 core Tk.	1998-99	1495.40 core Tk.	100 tk. was monthly allowance.	1998-99	500tk. is monthly allowance (2022-23)

1.4 Significance and rationale of the study

Bangladesh, a developing country in South Asia, is home to 168 million people. With 1,116 people per square kilometre, it is one of the eight most populous countries in the world (World Population Review, 2022). Demographic changes in Bangladesh have resulted in an ageing society with many associated socio-economic and cultural challenges (Islam, 2016; Streatfield and Karar, 2008). The number of people aged 60 and older is increasing faster than the growth of the overall population. According to the Bangladesh Bureau of Statistics (BBS), the number of older people in Bangladesh is expected to reach about 20 per cent (over 40 million) by 2050 (Jahangir, 2019). Though this growth of older people indicates human development and a significant increase in life expectancy, they are one of the vulnerable groups in the country (Hashemi, 2012).

The older population in Bangladesh is facing various social and economic problems including the break-down of the traditional family, change in social norms and values, unemployment and income insecurity, high level of medical cost, absence of a strong social security system and the indifference of implementing the elderly-friendly laws and regulations that increase their vulnerabilities (Barikdar et al., 2016). A study by BBS found that 31.7 per cent of the country's

older people lived below the poverty line, of which 11 per cent lived in extreme poverty (BBS, 2016). Studies showed that about half of the older people in rural Bangladesh suffered from chronic energy deficiency and nearly two-thirds (62 per cent) were at risk of malnutrition (Alam, 2015; Ferdous et al., 2009). It was also found that more than half (56 per cent) of the older people were economically vulnerable and six per cent suffered from food insecurity, while one in four older people were socially neglected (Alam, 2015). Although economic insecurity was one of the major vulnerabilities among older people in the country, most (69 per cent) of the older people in Bangladesh were living without access to a pension or other social security/social protection benefits.

In addition to these socio-economic vulnerabilities, older people are more susceptible to life-threatening hazards caused by extreme weather events such as cyclones, storms, floods and extreme temperatures (Pekovic et al., 2007; Brunkard et al., 2008). Due to its geography and low adaptive capacity, older people of Bangladesh are vulnerable to devastating weather events such as floods, cyclones and storm surge, tornadoes and riverbank erosion (Rahim et al., 2018; Chowdhury et al., 2021; Uddin et al., 2019). These extreme climate events, directly and indirectly, affect the socio-economic conditions of society and the livelihoods of marginalised groups, especially the older people in the country. Compared to other age groups, older people suffer disproportionately from malnutrition during extreme weather events due to food insecurity, loss of household assets, a reduction in livelihood opportunities, social isolation and limited access to services (HelpAge International 2009; 2015). In addition, socio-economic factors such as poverty, lack of neighbourhood support, poor housing conditions limited access to resources and social networks increase their vulnerability to extreme weather events in the country (Haq et al., 2008; 2010; Lindley et al., 2011).

Despite the severe impact of extreme weather events and socio-economic conditions on the livelihoods of older people, only a few studies have been conducted on the vulnerability of older people to extreme weather events and their relationship with socio-economic factors in the coastal region of Bangladesh (Ahsan, 2010). Several studies have been conducted on the negative impact of natural disasters on society as a whole globally, but few with specifics on the vulnerability of older people in developing countries like Bangladesh. Studies conducted in developed countries

have mainly focused on the health impacts of natural disasters and extreme weather events, particularly heat waves and cold waves, on older people and their livelihoods (Abrahamson et al., 2008; Filiberto et al., 2010, 2011; Bei et al., 2013; Bunker et al., 2016; Tillett, 2013; Limaye and Patz, 2015).

There are some studies on the socio-economic problems of the older population in Bangladesh, such as the demographics of older people (Kabir, 1994), the health status of older people (Roy, 2002; Kabir et al., 2013; Probaha, 2014; Munira, 2014; Atiqur, 2012), elderly abuse, financial support to older people (Rahman et al., 2009), begging among older people (Rahman, 2009) and the living and care arrangement of older people (Munsura et al., 2010). Some other studies in Bangladesh examined the health problems of older people in the context of natural disasters (Kabir et al., 2016; Shahid, 2010; Haq and Ahmed, 2017; Kabir et al., 2014, 2016; Rahman, 2008; Ray-Bennett et al., 2010). One recent study examined the vulnerability and adaptation strategies of aged people to cyclones in the coastal region of Bangladesh (Malak, et al., 2020). It found that the vulnerability and capacity of older people depend on their socio-economic conditions, adaptive skills and available services (Schroeder-Butterfill and Marianti, 2006; Adger et al., 2012; Age UK, 2015; Zaidi, 2014; Forbes-Mewett and Nguyen-Trung, 2019).

Although social protection can contribute to reducing the vulnerability of older people to extreme weather events, there has not been any attempt in the literature to study the role of social protection in addressing older people's vulnerability to extreme weather events in Bangladesh. Therefore, researchers, policy experts and government officials in Bangladesh have been looking at how to address these vulnerabilities. Considering the precarious situation of the elderly population, the Government of Bangladesh has implemented some policies and programmes for their socio-economic development.

However, the vulnerability of older people is considered a complex phenomenon and the consequences of extreme weather events and socioeconomic crises interact with biological processes, and behavioural, social, economic and political contexts throughout life (Haq et al., 2008, 2010; Bayraktar and Yilmaz, 2018). It is therefore important to explore their vulnerabilities comprehensively and to examine the socio-governmental support system and its practical application concerning the needs of older people in the aftermath of extreme weather events in

Bangladesh. This study explores the influence of extreme events on the vulnerability of older people in Bangladesh with a view to helping policymakers and researchers in this field to formulate a sustainable future action plan to alleviate the socio-economic susceptibilities of the elderly in developing countries like Bangladesh.

1.5 Research objectives and questions

Given this background, this study aims to explore the vulnerability of older people to extreme weather events in the coastal region of Bangladesh and the role of social protection programmes in addressing these vulnerabilities. Specifically, this study examines the following research questions:

1. Why are older people in coastal Bangladesh vulnerable to extreme weather events?
2. How do extreme weather events exacerbate the vulnerability of older people living in coastal Bangladesh?
3. How do social protection programmes address the vulnerability of older people in the coastal regions of Bangladesh?

1.6 Thesis contribution to knowledge

To achieve the United Nations Sustainable Development Goals and ensure a secure, equitable and sustainable future, two major policy challenges - an ageing population and a changing climate - must be properly addressed (Haq, 2017). This study explores the intersection of three themes related to the vulnerability of older people - 'sources of vulnerability', 'factors exacerbating vulnerability to extreme weather events' and 'the role of social protection' in addressing the vulnerability of older people in coastal regions in coping with the impacts of extreme climate events. The findings have shown that there are strong links between resources, the impacts of extreme weather events and social protection that make older people in the region vulnerable. By considering the three interrelated issues together, this work contributes to the existing body of knowledge on the vulnerability of older Bangladeshis who are exposed to frequent extreme weather events.

The work makes an important contribution to the limited literature on the vulnerability of older people to extreme weather events in poor countries whose socio-economic conditions and livelihoods are similar to those in Bangladesh. This not only provides a deeper understanding of older people's vulnerability to extreme weather events but also evidence-based knowledge on what factors are behind the vulnerability of older people in coastal villages of Bangladesh. This work operationalises the link between vulnerability to extreme weather events and social protection as the capacity to recover from the impacts of extreme weather events in the specific socio-economic and geophysical context of coastal settlements, adding value to the existing body of knowledge in these areas.

There are very few studies that examine the vulnerability of older people to extreme weather events. As far as I am aware, there is only one study on the vulnerability and adaptation strategies of older people in the coastal region of Bangladesh who have been exposed to extreme weather events (Malak et al., 2020). Moreover, there has been few researches in Bangladesh that used qualitative methods to understand the experiences of older people exposed to extreme weather events. As one of the few studies to include social protection in the conceptual framework, this research has addressed the issue of vulnerability more holistically. For these reasons, the findings of this work are an important and unique contribution to our understanding of the nature, causes and experiences of the vulnerability of older people affected by cyclones and floods in coastal Bangladesh.

1.7 Structure of the dissertation

This dissertation comprises nine chapters, which are described below. Chapters one, two, three and four set out the background, the literature review, the conceptual framework and the methods and approaches of the study. Chapters five to eight present the empirical findings of the study. The concluding chapter presents a summary of findings, future research directions and policy recommendations.

Chapter 1: In this chapter, I discuss the background and context of the study. This includes extreme weather events in Bangladesh and the socio-economic conditions of older people in the country, the coastal region and the study area. Social support policies and programmes for older

people in Bangladesh are also presented in this chapter. The chapter presents the main objective of this study and research questions. The contribution of this thesis is also discussed here.

Chapter 2: In this chapter, literature relevant to this study is reviewed. The literature review covers extreme weather events, socio-economic vulnerability and older people's vulnerability to extreme weather events, and the role of social protection to address the vulnerability of older people. This chapter also presents the theoretical and conceptual framework based on which this study is conducted. The chapter introduces the concepts of vulnerability, vulnerability to extreme weather events and the corresponding concepts found in the literature. The conceptual framework including a conceptualisation of the vulnerability of older people to extreme weather events is developed from the relevant literature.

Chapter 3: This chapter presents the methods and approaches used to conduct this study. It provides a description of the study area, the identification of the target population, the sample and sampling procedures, the recruitment of participants, and the methods and approaches used to collect data. The chapter also covers the process of data extraction - transcription - from the interviews, coding and theme formation, data analysis procedures, ethical consideration and limitations and the study.

Chapter 4: This chapter presents the findings of the study on the first research question - factors of vulnerability of older people to extreme weather events in the coastal region of Bangladesh. Geophysical location and settlements, lack of land and resources, precarious employment, poverty and livelihoods are discussed here.

Chapter 5: This chapter presents evidence on how extreme weather events affect the vulnerability of older people in Bangladesh. Socioeconomic vulnerabilities such as loss of employment and income, destruction of dwellings and resources, and loss of land and assets are discussed here.

Chapter 6: This chapter discusses the vulnerability of older people to extreme weather events. Food insecurity, factors of vulnerability and consequences of extreme events are discussed. The deterioration of older people's physical and mental health and the disruption of social networks and mutual aid are also discussed.

Chapter 7: This chapter presents findings on how social protection programmes reduce the vulnerability of older people to extreme weather events in the coastal region of Bangladesh. The contribution of formal social protection programmes – Old Age Allowance and Allowances for the Widow, Deserted and Destitute Women – and informal social protection and mutual help are discussed in this chapter.

Chapter 8: This concluding chapter summarises the main findings of the study about the research aims and questions, explains the value and significance and discusses the limitations. It also makes recommendations for further research and policy initiatives to strengthen the capacity of older people and their households to minimise their vulnerability to extreme weather events in coastal Bangladesh through formal and informal social protections.

Chapter 2: Literature review and conceptual framework

The concept of vulnerability reflects the fact that we all are born, live, and die within a fragile materiality that renders all of us constantly susceptible to destructive external forces and internal disintegration. - Martha Albertson Fineman, 2012

This chapter presents an overview of the literature that is relevant to this study. The literature review covers extreme weather events and their impacts, socio-economic vulnerability, older people's vulnerability to extreme weather events, and the role of social protection to address the vulnerability of older people. It covers the global, regional and Bangladesh perspectives of extreme weather events and vulnerability of older people and the role of social protection. This chapter also presents the theoretical and conceptual framework, which guides this research. The chapter introduces the concepts of vulnerability, vulnerability to extreme weather events and the corresponding concepts found in the literature.

2.1 Concept and definition of vulnerability

The concept of vulnerability has its origins in Latin words, the noun *vulnus* ('to wound'), the verb *vulnerare* ('to wound') and the Late Latin adjective *vulnerabilis*, which was adopted into English in the form of 'vulnerable' in the early 1960s (Timmerman, 19981; Fordet al., 2018; Forbes-Mewett and Nguyen-Trung, 2019). In the 1970s, the concept was dominated by the natural and environmental hazards perspective to analyse the consequences of natural disasters and adopt coping measures (Burton, Kates and White, 1978, 1993; Wisner, 2016; Wisner and Luce, 1993). However, Kelman et al., (2016) argued, while developing the concepts of vulnerability and resilience, that there was a formal overlap of literature on disaster research with ongoing work in international development (for details Ball 1975; O'Keefe et al., 1976; Burton, Kates and White, 1978; Timmerman 1981).

Since the late 1980s, societies have been increasingly exposed to risks and hazards that add a new dimension to the concepts of vulnerability and adaptive capacity to climate change and extreme weather events, even as development studies evolved to explore the impacts of poverty and progress on people and society (Chambers, 1989; Liverman, 1990; Siegel et al., 1999). The increasing risks of natural disasters, technological failure, terrorist attacks, nuclear wars and

environmental degradation suggest that people are becoming more vulnerable to extreme events (Forbes-Mewett and Nguyen-Trung, 2019). Thus, from the beginning of the 21st century the terms 'vulnerability', 'resilience' and 'adaptive capacity' are frequently used, especially when studying disasters through a development lens (IPCC, 2001, 2007, 2012, 2014; UNDP, 2003, 2004; UNISDR, 2004, 2015; Adger, 2006; Kelman et al., 2016).

However, opinions on who is vulnerable and why it varies widely across research fields and literature over time. Children and young people, older people, and ethnic minorities are often considered vulnerable (Virokannas et al., 2020). Some researchers believe that vulnerability should not be considered for a specific person or group, but as a universal human condition (Fineman, 2008, 2010, 2016). Therefore, a clear definition of vulnerability is imperative to avoid misunderstandings (Füssel, 2007).

The definition of the vulnerability of human beings to extreme events varies across disciplines over time and context. Timmerman (1981) defined vulnerability as “the degree to which a system responds adversely to the occurrence of a hazardous event. The degree and quality of the adverse response depend on a system's resilience (a measure of the system's capacity to absorb and recover from the event).” Chambers (1989, p. 1) defines vulnerability as "exposure to contingencies and stress, and difficulty in coping with them.” This definition has an external aspect of hazards and shocks to which individuals or households are exposed, as well as an internal component, namely the lack of resources to cope with the risks, threats or hazards (Crooks, 2009). According to Clark et al. (1998), vulnerability is a product of two properties: exposure (the probability of experiencing a hazardous event) and coping capacity, which can be further subdivided into resilience and resistance (the ability to recover from losses following the impact of an extreme weather event). It refers to vulnerability as a result of intense exposure to hazards and uncertainties combined with limited capacity to protect oneself from these hazards or to cope with their adverse effects (UN, 2003). The vulnerability has dynamic properties and multiple stresses that accelerate threats, reduce coping capacities and bring changes in risk exposure. Vulnerability can be defined as “an internal risk factor of the subject or system that is exposed to a hazard and corresponds to its intrinsic predisposition to be affected or susceptible to damage” (Cardona, 2013).

Further, vulnerability can be defined as the conditions of a group or community determined by physical, social, economic and environmental factors or processes in the places where they live that increase their susceptibility and predisposition to the effects of hazards following an extreme weather event. (Van Western, 2014; Cardona, 2006). Indeed, the presence of vulnerability in the environment or context depends on the areas in which people live and how their settlements, social profile of communities and livelihoods are structured (Cutter, 1996; Brooks 2003; United Nations, 2003). The potential for damage and the complex interaction between risk, mitigation and the social network of a place constitute the social vulnerability to extreme natural hazards (Schmidlin et al., 2009). From the above, it is clear that vulnerability is a complex construct encompassing various elements of environment, settlement, society, culture, economy and government, and its standard or consensus definition is a real challenge due to its components, dynamics and complexity. This is because it results not only from external sources (e.g. extreme weather events) but also from uncertain conditions deeply rooted in social, political and economic systems (Cutter et al., 2003; Forbes-Mewett and Nguyen-Trung, 2019).

Thus, the vulnerability of older people to extreme weather events can be viewed as a cause-effect relationship between extreme weather events and their impact on older people and their households, their economic conditions and socio-ecological systems (Fritzsche et al., 2014). For this study, the vulnerability of older people is defined as a condition resulting from the consequences of the cumulative impact of extreme weather events combined with a lack of capacity to access socio-economic resources and social protection programmes.

2.2 The vulnerability of older people

Human beings are inherently vulnerable when they do not have the capabilities to exercise choice, justice and freedom, capital assets and support systems to deal with threats they face (Sen, 1980; Zaidi, 2014; Fineman, 2012; Samir et al., 2014). The vulnerability may begin from infancy or at any stage of life and influences the rest of the life span. Literature shows that household poverty, livelihood insecurity, and lack of education and employment adversely affect building human ability and socioeconomic capabilities that affect economic achievement and social functioning and influence vulnerability (Burkhauser et al., 1991; McLaughlin and Jensen, 2000; Zaidi and De Vos, 2008; Emmerson and Muriel, 2008; Zaidi et al., 2008; Lloyd-Sherlock et al., 2012; Zaidi,

2014). Moreover, socioeconomic discrimination in earlier life, depending on socioeconomic class, religion, ethnicity, gender, caste, age, employment and income, political involvement, access to rights and opportunities may influence the vulnerability of people in later life and even generations (Zaidi, 2014; Cardona et al., 2012; Singh et al., 2014). According to the linked lives principle of the life course approach, a person's life trajectory is linked to the life trajectories of the people they are connected to, especially within household members (Levy et al., 2016). Therefore, the vulnerability of human beings can be considered as the vicious circle that not only affects a person's life course but also transmits across the life domains of future generations. Thus, the vulnerability of older people is the result of processes that take place throughout their lives (Golaz, Wandera and Rutaremwa, 2017).

Furthermore, studies show that older people become vulnerable when there is an intergenerational transmission of poverty that displaces family members from the family network (due to displacement and migration) and prevents them from offering adequate assistance (Kreager, 2006). People with low-income parents are likely to persist low-income themselves. Similarly, people whose parents are wealthy are likely to remain rich. The main reason for this is that parents who have more resources and opportunities can pass on more resources and opportunities to their children (Rank, 2008). The frequent extreme weather events also impact the organisation of traditional family structure through family members' migration to other places for survival, which increases the socio-economic vulnerabilities among older people (Bates et al., 2012; CIEH, 2008). Besides, displacement and migration of family members are most likely to force older people to live alone at home during extreme weather events, increasing their risk of injury and death compared to others (Feist, 2016). The loss of family members, caregivers, and social networks can also lead to isolation in older people, which can force them to be vulnerable to extreme weather events.

The vulnerability of older people is a multidimensional construct that originates from interrelated sources and contexts — personal, socioeconomic, environmental, political and infrastructural deterioration and the failure of the governance system of the affected region (Cutter et al., 2003; Dwyer et al., 2004). The commonly recognised factors that influence social vulnerability, include

- a lack of access to resources

- limited political power and representation
- social capital such as social networks and connections
- beliefs and customs
- building stock
- age
- frail and physically impaired people, and
- the nature and density of infrastructure and lifelines (Blaikie et al., 1994; Tierney et al., 2001; Cutter, 2001a, 2003).

Again, Schröder-Butterfill and Marianti (2006) argued that the vulnerability of older people is the cumulative result of some different but interrelated risks, namely the risk of being exposed to a threat, the risk of a threat materialising, and the risk of not having the necessary defenses to cope with a threat. They clarified vulnerability in old age as "the interplay between biological and social threats, individual characteristics and resources, social relationships and wider economic, political and cultural structures." Like Schroeder-Butterfill and Marianti, Rhoades and colleagues (2018) identify several personal characteristics (health, economic status, and social considerations) that interact with contextual factors (the adequacy of emergency preparedness, transportation, and coping and recovery resources) to influence older adults' vulnerability to extreme weather events. This risk and threat of older people may be rooted in the social structure, connected to their access to socioeconomic, cultural, political and social resources and factors, which cover a wide variety of interactions among families, peer groups and other social, cultural and political organisations. The interplay of these resources acts as sources of developing coping capacity, or their deterioration can create vulnerability. Thus, the magnitude of the vulnerability of older people can vary because they have to face challenges differently in the aftermath of extreme weather events due to their resources, capacities and availability of support (Heitzmann et al., 2002; Brooks, 2009). Their vulnerability increases when they lack access to these survival resources in need (Hanappi and Bernardi, 2010).

Various studies have found that the vulnerability of older people is a lack of capacity deeply rooted in socio-economic conditions, social structure, historical factors and the socio-governmental support system (Winser et al., 2004; Thomas et al., 2019). For example, Kelly and Adger (2000)

describe social vulnerability as the capacity of an individual or group to respond to, cope with, recover from or adapt to external stresses (extreme events), focusing on socio-economic and institutional restrictions that limit the ability to respond properly. They argue that a long-term solution must address the underlying causes of social vulnerability, such as the unequal distribution of resources. However, the capacity of older people to cope with the impacts of extreme weather events depends on a variety of personal factors, including wealth, education, skills and health, as well as social networks, including family, friends, neighbours and community institutions, and social protection programmes (Van Eeuwijk, 2006; Haq and Gutman, 2020; Barbosa, Oliveira and Fernandes, 2019). Again, chronic health problems, social isolation and limited access to resources and services, which are common among older people, can affect their socioeconomic capacity to cope with the consequences of extreme climatic events.

Grundy (2006), thus, argues that vulnerable older people are those who have reserve capacity below the appropriate level to address the challenges (such as the consequences of extreme weather events) they face effectively. Grundy claims that every person reaches old age with a reserve, which has accumulated over the life course. This "reserve" includes income and material resources, family and social support and health status, which comprise old age security measures. If older people exceed their reserves and resources to minimise the challenges and risks or threats, they fall into vulnerability. Likewise, the economic capacity of older people to cope with the consequences of extreme events also depends on the availability and accessibility of assets and resources. According to Moser (1998), the more resources people have, the less vulnerable they are. However, these resources are diverse and include human capital, psychological capital, social capital, information capital, economic capital, political capital and natural capital (Forbes-Mewett and Nguyen-Trung, 2019; Thomas et al., 2019). Thus, an individual or household may be described as vulnerable or vulnerable to an outcome (of extreme events) if they are incapable of dealing with the disaster with available resources (Alwang et al., 2001). Therefore, the vulnerability of older people in a socio-economic context is a complex and pre-existing condition that depends on both individual characteristics - age, gender, education, health - and social and economic factors such as employment, income, access to credit, social connections and support (Cutter, 2003; Eeuwijk, 2006; Kreager, 2006; Daddoust et al., 2018).

2.3 Vulnerability to extreme weather events

Extreme weather events are occurring with increasing frequency at many local, regional and global levels and have a devastating impact on socio-economic conditions, farms and human lives, food insecurity, and water scarcity (Oven et al., 2019; Gough et al., 2019; Raymond et al., 2020; Obi et al., 2021). Vulnerability to extreme weather events results from a complex interplay of climate events, environmental impacts and socio-economic dynamics in the affected society (Boero et al., 2015). Again, extreme events can disrupt key infrastructures such as public health facilities, transport infrastructure, electricity supply or water treatment, disrupting access and functionality (Bell et al., 2018). The vulnerability depends on the significance, severity and duration of exposure, as well as the characteristics of extreme weather events that make individuals, and physical and social infrastructures vulnerable to the impacts (Oven et al., 2019). It may result in death, injury, and illness, as well as the destruction of property and the environmental ecosystem (Vose et al., 2014). All these losses lead to higher costs and prices, which vary by industry and region throughout the economy through trade relations and capital flows, leading to systemic consequences and structural changes in production, consumption and trade patterns (Calzadilla et al., 2006). However, the social impacts of extreme weather events occur through deteriorating social networks and relationships that could be more severe for the marginalised group like older people (Curtis et al., 2017).

Various extreme weather events make older people vulnerable to the uncertainty of livelihoods, health and wellbeing, resettlement and food security in many countries, in particular developing and poor countries in Latin America, Africa and Asia (Otto and colleagues, 2017). They argued that extreme weather events are likely to exacerbate current vulnerabilities and intergenerational inequalities. For example, early childhood deficits may limit future access to education and income opportunities later in life (Otto et al., 2017). Thus, the vulnerability of older people to extreme weather events generates adverse interactions between co-occurring factors such as poverty, social isolation, limited mobility, poor health and chronic illness, and inadequate or no health insurance and influence their vulnerability to extreme weather events (Haq et al., 2008). Malak and colleagues (2020) conducted a qualitative study in northern coastal Bangladesh on older people's vulnerability and adaptation strategies in the face of cyclones. The results showed that older people were particularly vulnerable when a cyclone hit them due to their lack of assets, dependence on

young adult family members and declining physical strength and mental abilities. Again, their vulnerability was particularly high because of a lack of social awareness, education and limited access to health facilities. Older people often lack adequate sanitation and hygiene facilities, food security and family care and social support from the government.

Extreme weather events have the potential to negatively affect the environment in many ways increasing vulnerability to everyone, but disproportionately affecting the most unprotected populations, such as older people and marginalised groups. Their livelihoods, regions they live in and the rights and opportunity to access available assets (human, social, financial, physical and natural) influence the vulnerability of older people to extreme climatic events. Older people are particularly vulnerable to environmental impacts due to their age, limited mobility, changes in physiology and limited access to resources, which can affect their ability to adapt to environmental degradation following extreme climatic events (Filiberto et al., 2009). For example, the literature review by Zou and colleagues (2010) shows that human conditions - basic human rights, development, macroeconomics, livelihoods, infrastructure, institutions, social culture and behaviour, demography, geography and environment - as well as the disaster risk management system -mitigation, early warning, response and post-disaster recovery - all influence coastal vulnerability.

The health consequences and fatalities of climate change events are multifaceted — psychophysical, vector-water-food and airborne diseases and casualties (Portier et al., 2010; Rosenthal and Jessup, 2009). In some circumstances, the psychological and physical health impact of a disaster is worse for older people than for other groups (HelpAge, 2015; Gamble et al., 2013; Haq et al., 2016). Like the diverse health impacts, evidence shows that climate change also contributes to the increasing gap in livelihood and social inequalities among older people and their households in the affected community (CIEH, 2008; BMA Board of Science, UK; Bates et al., 2012). A US study found that older people are more vulnerable to the negative health effects of climate change because of their physical decline or weakness (McGeehin and Mirabelli, 2001). Studies have shown that extreme climate events have a greater impact on older people, leading to a higher incidence of flood-related morbidity and a higher mortality rate (Ahern et al., 2005). Flooding often results in higher fatality rates among older people than in other age groups, owing

to direct causes such as drowning and secondary health effects such as hypothermia and cardiac difficulties (Ahern et al., 2005; Leyva et al., 2017). For example, Kabir and Khan (2017) found that diarrhoea, skin diseases and mental health problems increased after cyclones. Age, gender, income and education level of household heads, as well as the number of children living in the family, had statistically significant effects on experiencing health problems before and after cyclones SIDR and AILA. They concluded that extreme weather events such as Cyclones SIDR and AILA make life more difficult for coastal dwellers and increase the vulnerability of poor people, the elderly, children and women in society.

2.4 Social protection and vulnerability

The socio-economic resilience and adaptation capacities of older people may reduce their susceptibilities to extreme weather, which is dependent on their capabilities, capital assets and support systems. Therefore, socioeconomic policies and programs such as contributory and non-contributory pensions, cash transfers, social food programs, social protection, and other supports for income-generating activities increase resiliency and reduce the vulnerability of older people to extreme climate events (Zaidi, 2014). A growing number of extreme weather events are impacting the limited resources of older people in the affected country increasing the cost of disaster response, which has led researchers, international agencies and governments and local organisations to explore how social protection can address the consequences of extreme weather events in different countries. Social protection can increase household resilience by facilitating the anticipatory, absorbing, and adapting to covariate shocks of extreme weather events (Hebbar and Shebab, 2020).

Social protections help the poor and vulnerable to cope with crises and shocks, find jobs, improve productivity, invest in their children's health and education, and protect the ageing population. Social protection programmes empower people to be healthy, continue their education and seek opportunities to lift themselves and their families out of poverty (World Bank, 2022). Social protection measures such as safety nets, livelihood promotion, social funds to promote community-based adaptation, microfinance and microinsurance, skills development, supported migration and labour market interventions can help address the consequences of extreme weather events through

prevention, protection and promotion strategies to reduce vulnerability (World Bank, 2012; Kuriakose et al., 2013; Aleksandrova, 2019).

Studies show that the various conditions of older people that affect their ability to respond to extreme hazards include social protections, livelihood and resilience, self-protection, and socio-political and institutional networks, which can exacerbate or influence the extent of older people's vulnerability regardless of the type of hazard (Birkmann, 2006; Cardona et al., 2012). Similarly, Cannon (2008) also mentioned social protection in his vulnerability approach along with other components that capture all aspects of vulnerability to natural hazards: i) livelihoods, their strength and resilience to hazards, which include income-generating activities and access to available resources; ii.) wellbeing and basic statuses such as physical and mental health, nutritional status, morale, sense of security and identity; iii) capacity for self-protection; iv) social protection; and v) governance.

He argued that these five elements are interrelated and the links between them are particularly important in understanding the determinants of vulnerability and designing policies to reduce them. The most important linkages are those that affect livelihood strength and social protection, both of which depend primarily on governance to determine how effective they are. The basic building block for determining a person's vulnerability is how adequate their livelihood is and how resilient they are to risk. The wellbeing and self-protection of a person are strongly determined by the strength of their livelihoods. Again, the distribution of different livelihoods among certain groups of people depends heavily on the type of governance that influences the distribution of income and wealth that is needed to reduce vulnerability (Cannon, 2008). Similarly, the failure of the governance of formal and informal social protection can increase the vulnerability to extreme weather events in the long run. For example, a study by Mallick, Rahaman and Vogt (2011) sought to understand how to manage the complexity of social systems and patterns of vulnerability associated with cyclone SIDR 2007 in Bangladesh. They found that 'dependence on relief and rehabilitation materials' makes older people more vulnerable to further disasters. In the long run, this increases poverty levels and puts them under pressure to remain in a 'vulnerability trap' once a disaster strikes.

Thus, older people are likely to be particularly vulnerable, especially where social protection is limited or non-existent, and they are at high risk from the impacts of climatic events (Brody et al., 2008; Davies, Oswald, and Mitchell, 2009). These programs can ensure and protect their rights (to health and medical facilities, shelter and social security, food and nutrition, clothing, recreation, employment etc.) as senior citizens in the community (Ferdousi, 2020). Hence, social protection is increasingly seen as a means to mitigate the vulnerability, build capacity, and meet the basic needs of older people in coastal regions for adaptation and recovery after extreme weather events.

2.5 Models and approaches of vulnerability

The concept and approach of vulnerability differ across disciplines; however, the fundamental meaning is exposure to threats with a limited adaptive capacity to handle these threats effectively (Siegel et al., 1999). Though the concept of vulnerability was developed in the environmental sciences as an analytical concept related to the impact of natural and economic adversities on human populations, it is commonly used in academic research, policy, health, social care, sociology, geography, economics, food security, and social work (Wisner, 1993; Schröder-Butterfill and Marianti, 2006; Alwang et al., 2001; Brown et al., 2017). However, each community of researchers has developed their own discrete conceptual designs and procedures using distinct languages (Füssel, 2007; Crooks, 2009; Paul, 2014; Aksha et al., 2018). They have used various terms such as susceptibility, adaptive capacity, risk, hazards and threats to conceptualise vulnerability to extreme hazards (Burton et al., 2002; IPCC, 2001; Adger et al., 2002). As an example, while climate scientists often consider vulnerability in terms of the effect of climate change and the impact of extreme weather events, social scientists tend to present it as a set of socioeconomic factors, which determine how people can deal with stress, risk, threats and change (Nicholls et al., 1999; Allen, 2003).

United Nations (2004) also identifies four different groups of vulnerability factors: physical, economic, social and environmental that increase the susceptibility of a community to the impact of extreme weather events (Singh et al., 2014). The physical factors denote the exposure of vulnerable elements of the area. Economic factors describe the financial resources of individuals, groups and communities; social factors such as educational attainment, security, access to basic human rights and good governance determine the well-being of individuals, populations and

communities; and environmental factors provide information about the state of conditions in a region. Instead of external pressures, all these issues show characteristics of the weak system or community (Fuessel, 2007).

Again, the famine vulnerability and food security models have been developed, among others, to explain vulnerability to famine in the absence of food shortages or production losses (Sen, 1981; Watts and Bohle, 1993). Vulnerability is defined in this model as a failure of entitlements and a lack of capabilities. The vulnerability model has also been used to identify and forecast different vulnerable groups and vulnerable regions based on the likelihood and consequences of hazards (Burton et al., 1993; Smith, 1996; Parry and Carter, 1994). The pressure and release model, based on the human ecology model, was developed to link discrete risks to the political economy of resources and normative disaster management and intervention (Pelling, 2003; Wisner, et al., 2012). According to Blaikie and colleagues (1994) and later Wisner and co-authors (2004), physical and biological hazards create pressure and lead to vulnerability, while local geography and social differentiation create additional pressure from causes, leading to a cumulative increase in vulnerability.

Furthermore, the analysis of economic elements and social interactions in the sustainable livelihoods and poverty vulnerability paradigm is used to explain why people become or remain poor over time (Morduch, 1994; Ellis, 2000; Dercon, 2004). However, Watts and Bohle (1993) conceptualised vulnerability in terms of risks: (1) the risk of being exposed to external shocks and hazards, (2) the risk of not being able to mobilise resources quickly enough to respond to hazards, and (3) the risk of experiencing the severe negative effects of shock, hazard and stress. Both environmental threats and the resources that people or groups mobilise to deal with these risks are described in this concept (Spini et al., 2017b).

Cutter (1996) introduced the hazard-of-place model into the discourse of hazard research and offers a helpful insight into how vulnerability is considered under catastrophic conditions. In their hazard-of-place model, Cutter (1996) and later Cutter and colleagues (2003) combined various factors that contribute to the vulnerability of a place. They discovered that various social elements such as socio-economic characteristics, risk perception, resilience and the built environment either mitigate or increase hazard potential. They also found that geographical features such as location,

altitude and proximity influence hazard potential. The combination of biophysical and social vulnerability thus gives the overall vulnerability of a place and serves to represent the overall situation by outlining the various factors that influence the vulnerability of a particular geographical region (Kumpulainen, 2006; Paul, 2014).

Thomas et al. (2018) have found that human vulnerability to natural hazards (extreme weather events) is caused by a variety of social, economic, historical and political factors, all operating at different levels. However, the causes of vulnerability are primarily social and economic, rather than the result of differential exposure to climate and extreme hazards. They have identified several factors, including access to resources, governance, culture and knowledge, that are responsible for local differences in vulnerability to extreme weather events and climate change. Access to resources is a critical factor influencing the ability of communities to plan for and respond to the impacts of climate change, and a lack of resources can double vulnerability. In addressing the impacts of climate change and extreme weather events, a lack of effective governance is both an acute and chronic challenge. Local or regional cultural and historical circumstances may limit possible responses to climate change threats. Furthermore, a lack of research and knowledge can increase vulnerability to disasters caused by extreme weather events (Thomas et al., 2018).

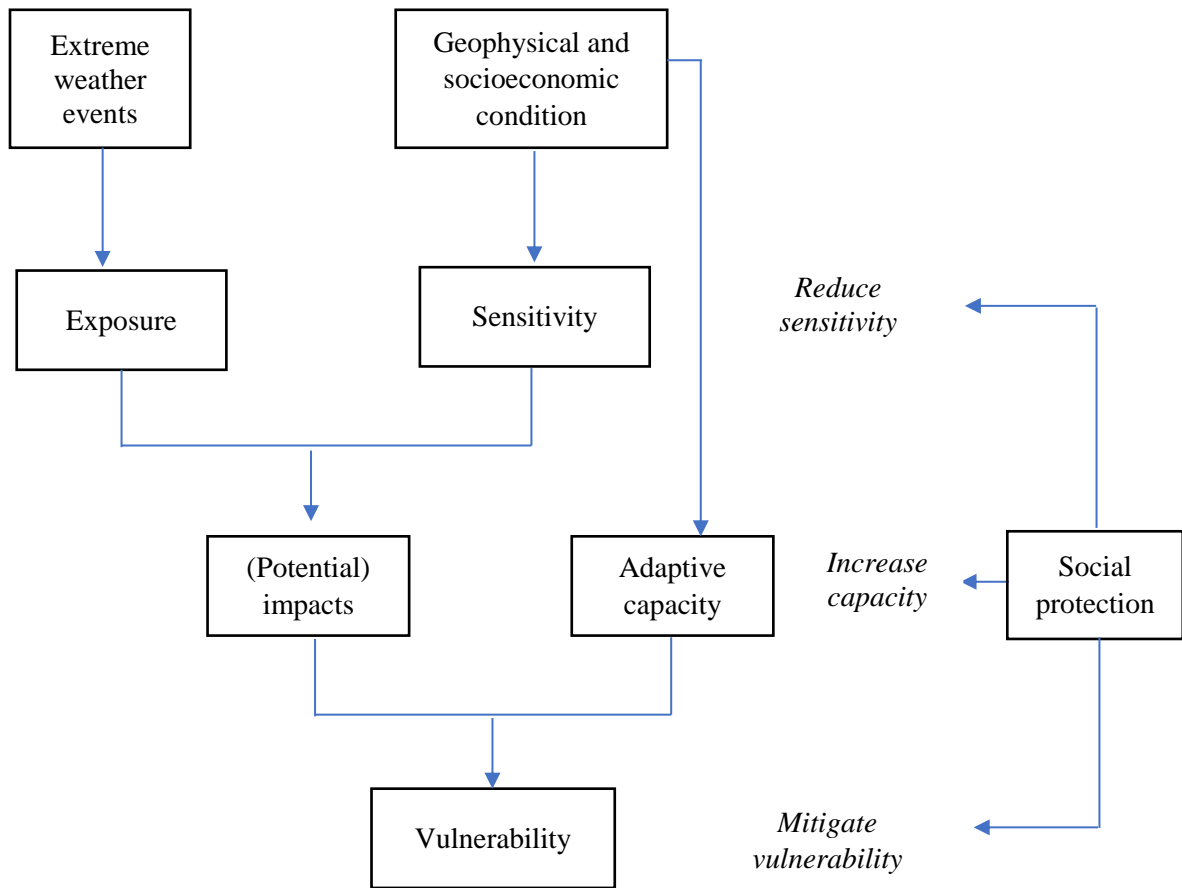
Again, Laila (2013) assessed the social vulnerability of the coastal societies of Bangladesh to understand their social situations based on the limited natural resources through the IPCC components - exposure, sensitivity and adaptive capacity. The geographical location and housing conditions of the communities studied are more vulnerable, with the elderly and disabled among the most vulnerable groups, as indicated by the exposure component. Indicators of her study like sanitation, water quality, livelihood, income and food security are used to assess sensitivity and telecommunication tools such as radio and television are considered as adaptive capacity. The results of her research show that communities in the region are highly dependent on natural resources such as water and have few livelihood options. Communities were found to be poorly prepared for the negative impacts of climate change.

2.6 The conceptual framework

The perspectives in the literature on vulnerability can be broadly divided into biophysical, social and integrated perspectives in climate change and extreme weather events research. (Bruno et al., 2012). In the biophysical approach, vulnerability is an adverse biophysical state that considers the susceptibility and deterioration of the environment that affects the potential consequences for people's lives (Liverman, 1990). The biophysical approach focuses on the distribution of hazardous situations, settlement in unsafe regions, and the extent of losses associated with a particular extreme event (Cutter, 1996). While this view can provide a comprehensive understanding of the physical processes that lead to vulnerability, it is limited because it ignores the socio-economic, cultural and political factors that must be considered when assessing vulnerability (Cardona, 2004). In contrast, vulnerability is viewed from a social perspective as a socially constructed condition that has its origins in particular socio-political structures, historical and economic progress and can affect people in the community, placing them in vulnerable situations (Brooks, 2003; Cutter, 1996). Vulnerability in this perspective is seen as the intrinsic condition of people, communities, social groups or the whole social system). The integrated approach of vulnerability combines the two views by integrating the biophysical and social dimensions of vulnerability (Adger, 2006; Turner et al., 2003; Gallopin, 2006; O'Brien, et al., 2004).

The vulnerability of older people to extreme weather events thus can be determined by the adverse effects of exposure, sensitivity and capacity, which depend on their geographical location, socio-economic conditions and access to assets and resources, social networks and socio-state support system. An integrated framework is, therefore, required to explore their vulnerability, incorporating both physical and social dimensions. In this thesis, the vulnerability of older people to extreme weather events and the role of social protection in Bangladesh is explored using an integrated conceptual framework, the interrelated factors of which are shown in the diagram below:

Figure 1.1: Conceptual framework



Sources: Adapted from Turner et al., 2003; Schröder-Butterfill and Marianti, 2006; Khajuria and Ravindranath, 2012; Fritzsche, 2014; Zebisch et al., 2021

Table 2.1: Domain and components of the vulnerability of older people in this study

Domain in the framework	Components analysed in this study
Exposure	Extreme weather events: <ul style="list-style-type: none"> • Cyclones • Floods due to storm surges
Sensitivity	<ul style="list-style-type: none"> • Geophysical location of settlements • Housing conditions • Conditions of cyclone shelter
(Potential) impacts	<ul style="list-style-type: none"> • Livelihood insecurity • Loss of resources • Damage to dwellings and living • Food insecurity • Deterioration of health
Adaptive capacity	<ul style="list-style-type: none"> • Socioeconomic status • Employment status • Living facilities
Social protection	<ul style="list-style-type: none"> • Formal social protection • Informal social protection

2.6.1 The concepts in the framework

Exposure

Exposure defines the nature, magnitude and rate of change and variation in climate to which a system is exposed. Typically, exposure includes factors such as temperature, precipitation, climatic water balance as well as extreme weather events (Zebisch et al., 2017; 2021). Exposure refers to the exposure of a system of interest to stimuli acting on it. This can be conceptualised as climate variability and/or the various changes in the climate system that often cause concern to stakeholders: Temperature increase, precipitation variability and change (including extremes), or changes in the frequency or intensity of tropical cyclones (IPCC, 2001). Various studies claim that people living in the coastal region are more exposed to extreme weather events. Thus, extreme weather events such as cyclones, and floods were considered as exposure in this study.

Extreme weather events

An extreme weather event can be considered a state of weather that is outside of normal weather patterns (Vose et al., 2014). The IPCC report by Seneviratne et al. (2012) defines an ‘extreme climate or weather event’ or ‘climate extreme’ as “the occurrence of a value of a weather or climate variable above (or below) a threshold value near the upper (or lower) ends of the range of observed values of the variable.” These weather events include heavy rainfall and flooding, cyclones, droughts, heat waves, extreme cold and forest fires. Each of these events can potentially impact the socio-economic conditions of society and the integrity of supply and distribution systems that may increase the vulnerability of any affected community (Khan et al., 2015). Extreme weather events can affect populations and the environment in different ways depending on their sensitivity to extreme situations and their resilience to recover from stress (Radović and Iglesias, 2019). The cyclones and floods that occurred before 2019 in coastal Bangladesh are considered in this study to explore their impacts on the vulnerability of older people.

Cyclones

A cyclone refers to a storm or system of winds that rotates about a centre of low atmospheric pressure, advances at a speed of 20 to 30 miles (about 30 to 50 kilometres) an hour, and often

brings heavy rain (Merriam-Webster, 2022). A tropical cyclone, also called a typhoon or hurricane, is an intense circular storm formed over warm tropical oceans and characterised by low atmospheric pressure, strong winds and heavy rain. It produces winds that exceed 119 km (74 miles) per hour. In extreme cases, winds can exceed 150 miles (240 km) per hour, and gusts can reach 200 miles (320 km) per hour. Accompanying these strong winds are torrential rains and a devastating phenomenon known as storm surge. This is a rise in the sea surface that can be up to 20 feet (6 metres) above normal. Such a combination of strong winds and water makes cyclones a serious threat to coastal areas in tropical and subtropical regions of the world (Britannica, 2022). The cyclones that occurred before 2019 in coastal Bangladesh are considered in this study to explore their impacts on the vulnerability of older people.

Floods

A flood is an overflow of water that inundates normally dry land. In the sense of "flowing water", the word can also be applied to the inflow of the tides. The inundation of a normally dry area by rising water in an existing waterway, such as a river, stream or drainage ditch. The accumulation of water at or near the site where the rain fell. A flood is a longer-term event than a flash flood: it can last for days or weeks. Again, a flash flood is an overflow of water caused by heavy or excessive rainfall within a short period, usually less than six hours. Flash floods are usually characterised by raging torrents after heavy rains that roll through riverbeds, urban streets or mountain gorges, taking everything with them. They can occur within minutes or a few hours after excessive rainfall (Weather.gov, 2022).

Sensitivity

Sensitivity determines the degree to which a system is adversely (or beneficially) affected by a given climate (change) exposure. Sensitivity may be determined by (a) natural/physical factors of a system or related to human land management activities and infrastructure and societal factors (Zebisch et al., 2017; 2021). Sensitivity refers to the responsiveness of a system to extreme climate hazards. This is often conceptualised as a dose-response model - the more sensitive a system is, the greater the rate or magnitude of an adverse response to a particular hazard. Sensitivity can vary greatly from system to system, sector to sector or population to population; for example, how much land could be flooded by sea level rise or how much crop yields could change (IPCC, 2001). The

human–environment conditions of the system determine its sensitivity to any set of exposures. These conditions include both social and biophysical capital that influences the existing coping mechanisms, which take effect as the impacts of the exposure are experienced, as well as those coping mechanisms adjusted or created because of the experience (Turner et al., 2003). In this study, I considered the geophysical location of settlements, housing conditions and conditions of cyclone shelters as sensitivity factors for older people in the regions.

Impacts

The potential impacts of extreme weather events are defined as the positive, harmful or mitigable effects that may disrupt the normal functioning of the system and thus constitute a 'climate threat'. The potential impacts are measured as a function of the exposure and sensitivity of the system (Romero-Ruiz et al., 2014). It is the combined effect of exposure and sensitivity without additional adaptation measures; such as riverbank erosion, and loss of income due to torrential rains (Zebisch et al., 2017; 2021). The impacts depend on access to resources that could help in responding to threats and exposures. Thus, in this study, I assessed livelihood insecurity, loss of resources and damage to dwellings and housing, food insecurity, deterioration of health, disruption of relationships and mutual assistance as impacts of extreme weather events - cyclones and floods.

Adaptive capacity

Adaptive capacity denotes the ability of a system to change so that it is better able to cope with its exposure and/or sensitivity to climatic influences (IPCC, 2001). Adaptive capacity refers to the ability of a human or natural system to adjust to extreme weather events, including climate variability and extremes; prevent or moderate potential damages; take advantage of opportunities; or cope with the consequences (Kuriakose et al., 2013). The adaptive capacity of a household, region, or country depends on its stock of financial and economic resources, access to technology, information and skills, infrastructure assets, institutional assets, and degree of equity (Smit et al., 2001). Adaptive capacity describes the ability of a society, social group or individuals to actively adapt to climate change, climate variability and climate extremes by mitigating potential damages, seizing opportunities or coping with the consequences (Zebisch et al., 2017; 2021). Various studies, theories and models of vulnerability include adaptive capacity as a component that refers to the ability or capacity of a system, person or community to adapt to the impacts of extreme

weather events. Adaptive capacity has a significant impact on the vulnerability of communities and regions exposed to the impacts and hazards of extreme weather events (Kates, 2000; Kelly and Adger, 1999). In this study, I considered socioeconomic status, employment status, social networks and housing and living facilities as the capacity of older people to address their vulnerability to extreme weather events.

Social protections

Social protection policies and programmes are now considered effective tools to protect vulnerable groups from livelihood risks and hazards (World Bank, 2001; Davis et al., 2008). Social protection can be an important strategy by cushioning the impact of shocks and stress through income replacement and building resilience by reducing exposure to extreme weather events, providing incentives/assistance to retrofit homes to withstand tropical cyclones, or implementing public works programmes to restore income to cope with the impact of extreme events (details in section 1.3, 2.4 and chapter seven). The current study looks at formal and informal social protection programmes and assesses how they address older people's vulnerability to extreme weather events. Social protection programmes were first integrated into the vulnerability framework to assess how they mitigate the vulnerability of older people by reducing their sensitivity and/or increasing their capacity of older people (as shown in figure 1.1). During extreme weather events in the research region, a variety of social protection programs helped older people and their families, including the provision of food, clothing, in-kind transfer, housing, household amenities, cash transfers, and employment guarantee schemes in response to the disaster. The current study considers the contribution of social protection to address the vulnerability of older people to extreme weather events. Thus, adapting the definition of Devereux and Sabates-Wheeler (2004), social protection, in this study, has been considered to include all formal and informal initiatives taken by the government and non-government sources to build capacity and access to meet the basic needs of older people to enhance socio-economic conditions and mitigate vulnerability to extreme weather events.

Table 2.2: The social protection programs considered in this study

Categories of Social Protection	Role in Capacity Building	Contribution to access needs
<p>Formal Social Protection:</p> <ul style="list-style-type: none"> • Old Age Allowance • Widow Allowance • Public Works • Relief Programs <p>Informal Social Protection:</p> <ul style="list-style-type: none"> • Assistance from • Volunteer groups and NGOs • Neighbours and friends • Family members and relatives 	<ul style="list-style-type: none"> • Anticipatory capacity • Protective capacity • Preventive capacity • Adaptive capacity • Absorptive and recovery capacity • Rehabilitative capacity 	<ul style="list-style-type: none"> • Food • Self-employment • Medicine • Clothing • Housing • Social Networks

2.7 Positionality statement

The reason I chose this study area was the realisation of my childhood experiences in rural Bangladesh. As a male Bangladeshi born into a poor family in the countryside, I observed rural livelihoods faced with challenges due to natural calamities. I have witnessed peoples' suffering, disease and the need for food and medicine, as well as the love and affection of adults and children. Within this context, I busied myself with chopping wood, cutting grass, grazing cows, and observed the beauty of birds and butterflies flying. The contrasts of these conditions of people and nature (epistemology and ontology) made me realise that my personal experience of childhood would impact my discipline and career by combining these two domains.

It is common consensus that extreme weather events induced by climate change has diverse impacts on humans and the environment. This takes place directly through changing temperatures, precipitation and occurrence of heat waves, floods, droughts, fires and, indirectly, by ecological disruptions that brings crop failures and shifts the patterns of disease vectors, or social responses like displacement of populations. Bangladesh is one of the disaster-prone areas of the world, which is increasingly endangered through climate change that affects the socio-economic conditions and health of different age cluster, especially of the aging group. It is understood that older people are at greater risk from storms, floods, heat waves, and other extreme events. Besides the extreme events and socio-economic vulnerabilities, climate change is also responsible for spreading out various diseases among older people.

As an assistant professor of Social Welfare, I have supportive theoretical knowledge and hands-on experience of climate change vulnerabilities and the utilisation of Social Safety Net program as the adaptive measures of inequality lessening and poverty alleviation in Bangladesh. One of my articles titled “Social Safety Net Programs in Bangladesh: An Empirical Study on the Employment Generation Program for the Poorest (EGPP) Project” (2017) was published in the European Journal of Social Sciences Studies. Besides professional experience, I also had the opportunity to work with older migrants/refugees of coastal regions living in the slums area of Dhaka city at the time of fieldwork practice in BSS and MSS study, be a volunteer of Bangladesh Scout, and was a former field officer of an International NGO ‘InterVida Foundation Bangladesh.’

There was no deliberate bias in the collection and processing of data and information. Elderly people are undoubtedly vulnerable to extreme weather events in the coastal regions of Bangladesh.

2.8 Conclusion

The literature review, which identified the research gap in the theoretical framework of this study, served as the basis for developing the research instruments of this study. The above discussion shows that various extreme weather events have direct and indirect impacts on the vulnerability of older people in Bangladesh as well as in other countries. Some studies examine the vulnerability of people and places to extreme weather events in different ways. However, despite the extensive

research on natural disasters and extreme weather events, there is very few that focus on older people and their vulnerability (Gibson and Hayunga, 2006; Ngo, 2001). The studies found in the existing literature on extreme weather events, climate change and disasters in Bangladesh hardly address the vulnerability of older people and the role of social protection in a comprehensive perspective. It is evident that the vulnerability of older people depends on their place of settlement, socio-economic conditions and access to available assets and resources, socio-personal relationships and socio-governmental supports. Therefore, a unified conceptual framework was used in this study to examine the vulnerability of older people to extreme weather events, cyclones and floods, in the coastal region of Bangladesh, encompassing both biophysical and socio-economic aspects of vulnerability and social protection.

It may be noted that many previous studies underscore the need to better understand the impact of natural disasters and extreme weather events on older people's vulnerability at local, regional and even global levels (Malak et al., 2020; Curtis et al., 2017; Towne et al., 2015; Gamble et al., 2013; Nunes, 2018; Rhoades et al., 2018). They note that more research on this topic should examine the vulnerability and resilience of older people in coping with extreme weather events (Gamble et al., 2013; Haq 2017). In other words, more research on older people's own stories of capability and preparedness in their own social context to understand their vulnerability to extreme weather events (Tuohy et al., 2014). This study has therefore sought to address this knowledge gap in the literature on the vulnerability of older people to extreme weather events in Bangladesh.

Chapter 3: Methodology

This chapter presents the methods and approaches used to conduct this study. Following the context and research questions (chapter one), the literature review and the theoretical and conceptual framework (chapter two), this chapter describes the process of the study, including the description of the study area, the identification of the target population, the sample and sampling procedures, the recruitment of participants, and the methods and approaches used to collect data. The chapter also covers the process of data extraction from the interviews, including the transcription, coding and theme formation. It also covers the data analysis procedures, ethical considerations and limitations of the study.

3.1 Research approach of the study

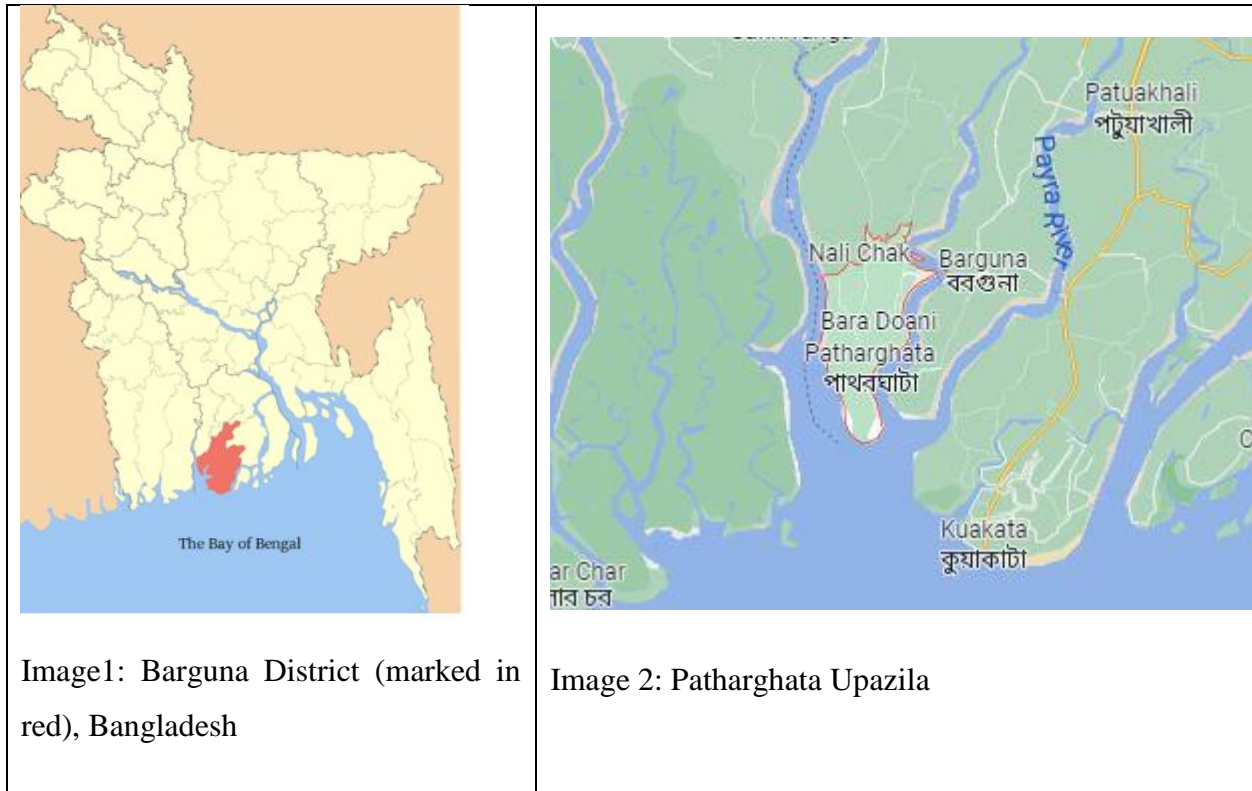
In this study, a qualitative approach was adopted to gain a more complex understanding of the personal, socio-economic and cultural aspects affected by extreme weather events. Qualitative methodology enables a more complex empirical understanding of the personal, socio-economic and cultural information in a research field (Tuohy et al., 2014; Creswell et al., 2017). This approach allows researchers to hear the voices of individuals, particularly the marginalised and disadvantaged, and to understand how people think and experience events in their daily lives (Warren-Findlow, 2013). This approach enabled us to get to know the socio-economic conditions of the marginalised older people and their households in detail and to understand how they experienced various extreme weather events in the past and how they will cope with future events.

Some researchers believe that the research horizon needs to be broadened beyond quantitative methods that have focused on measuring behavioural change and predicting influences on preparedness for extreme weather events, to qualitative methods. Collecting extensive, in-depth research data allows for relational and subjective accounts, as well as the incorporation of personal, social and cultural knowledge into the research field. Qualitative methods are reflexive and innovative, and these characteristics can help develop a more dynamic theoretical understanding of vulnerability and preparedness for extreme weather events (Tuohy et al., 2014). The approach also helps to explore the interactions between older people's vulnerability, skills and social support programmes to address their susceptibility to extreme weather events in coastal Bangladesh (Nunes, 2021; Kabir, 2015).

3.1.1 Study area

The study was conducted in the Patharghata Union of the Pathatrgkata Upazila in Bangladesh, a coastal region that is affected by extreme weather events almost every year. Administratively, Bangladesh is divided into eight divisions, 64 districts, 544 sub-districts known as Upazila, and 4,554 Unions (Bangladesh Bureau of Statistics, 2018). Barguna is a southern district of Bangladesh near the Bay of Bengal. The total area of the district is about 1,831 square kilometres with a population of about one million. The district consists of six administrative upazilas (sub-districts) and 42 Unions. This study was conducted in the Patharghata Union of the Patharghata Upazila of this district, which is one of the most vulnerable coastal areas.

Figure 3.1: Study location



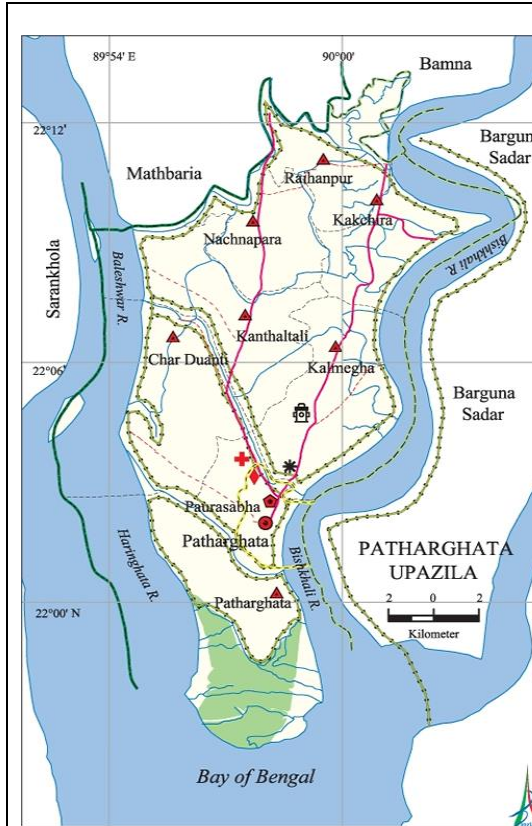


Image 3: Patharghata Union

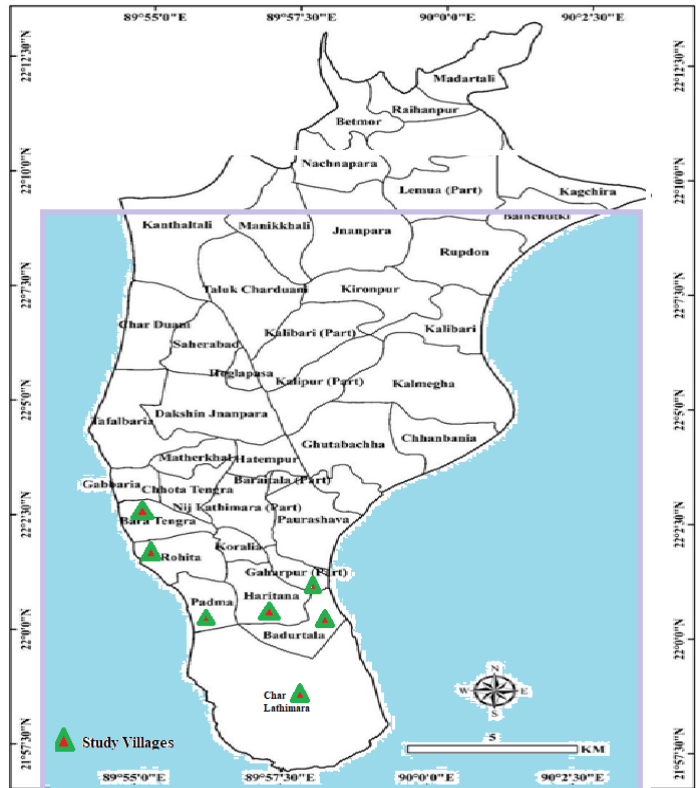


Image 4: Study Villages

Source: https://commons.wikimedia.org/wiki/File:BD_Districts_LOC.svg

Patharghata Upazila was established in the year 1925. There is one Pourashava, nine Wards, nine Mahallas, seven Unions, 42 inhabited Mauzas and 66 villages in the Upazila (BBS, 2011). It has an area of about 387 square kilometres and lies between 22°14' and 22°58' north latitude and 89°53' and 90°05' east longitude. It is bounded on the north by the Mathbaria and Bamna upazilas, on the south by the Bay of Bengal, on the east by the Barguna Sadar Upazila and the Bishkhali River, and on the west by the Sarankhola Upazila and the Haringhata River. The area of Patharghata Union is 29 square kilometres and consists of 12 villages (Banglapedia). The Union is surrounded by three water bodies, the Bishkhali, the Haringhata and the Baleshwari River, which flow directly into the Bay of Bengal.

According to the Population Survey 2011, the total population of the Upazila² is 163927, of which 80544 are male and 83383 are female (BBS, 2011). The total population of Patharghata Union is about 28 thousand, of which 14060 are males and 1406 are females (BBS, 2011). The area is densely populated with very poor communities. The total number of older people in the district was about 84 thousand in 2011, which was 9.4 per cent of the total population of the district. The number of older people in the Upazila was 15,410. The number of older people in the Study Union in 2011 was 2,433 (BBS, 2011).

Agriculture, fishing, fish farming, small businesses, casual labour, animal husbandry, teaching and NGOs are the main sources of income for the people of Patharghata. According to a study, the majority of people in the area work in fishing and agriculture and related processing activities. In addition, people in the area often work as day labourers on fishing boats and the roads. A recent study showed that 40 per cent of people's income is earned from fishing, 12 per cent from agriculture and six per cent as casual labourers, while other occupations account for less than six per cent (Rahim et al., 2018).

Due to its geographical location in the coastal regions, Patharghata is frequently exposed to various extreme weather events. It is one of the most vulnerable coastal regions in Bangladesh. Dealing with extreme weather events is a daily concern for the people of Patharghata, as the changing seasons bring a variety of unpredictable threats and stressors to their lives and socio-economic conditions. Evidence shows that extreme weather events such as floods, cyclones, storm surges, salinisation, excessive fog, temperature fluctuations, erosion of river banks, heavy rains, a late rainy season and waterlogging are almost part of everyday life in the region, negatively affecting the lives and livelihoods of older people, their households and neighbours in Patharghata (Rahim et al., 2018).

Heavy rains and tidal surges are the most common causes of flooding in the Patharghata region. About half of the population lives on the outside of the embankment and is therefore most affected by extreme flooding. According to a study, the extent of flooding has increased by 41 per cent in

² An Upazila (Bengali: উপজেলা), formerly called Thana, is an administrative region in Bangladesh that functions as a sub-unit of a district. It can be considered an analogue to a county or municipality in western countries.

recent years and about 86 per cent of the people in the region are affected by frequent flooding. The area is prone to cyclones, which occur almost every year and severely affect the socio-economic conditions of all households in the area. According to the study, cyclones harmed 89 per cent of people's livelihoods in the area (Rahim et al., 2018). Hurricanes cause loss of life, livestock, property and infrastructure, among other things. Fishermen are the occupational group most affected by cyclones and are considered the most vulnerable livelihoods. The negative impacts of cyclones on fisheries include the loss of fishing boats, nets, fishing gear, fish landing sites and supplies in fishing boats, as well as the inability to use nets during cyclones, resulting in fewer fish and ultimately the loss of the target of fish collection. Patharghata was devastated by cyclones SIDR, AILA and MOHASSEN in 2007, 2009 and 2013, respectively, due to its proximity to rivers and the sea (Rahim et al., 2017).

Because of the salinity in this area, a significant percentage of cultivated land lies uncultivated every year. Salinity is a serious problem that not only limits agricultural potential but also affects farmers' livelihood strategies and the durability of their houses, nets and boats. This is one of the reasons for the high cost of agricultural production, the loss of income for farmers and fishermen, and the uncertain supply of drinking water.

In the last few decades, the frequency and density of fog have increased in the Patharghata region, resulting in significant economic losses and considerable hardships in daily life. Fishing and agriculture are the most popular sources of income in the Patharghata Upazila. Normal fog has no negative impact on livelihoods, while excessive fog harms fishing and agriculture. According to the respondents, the excessive fog has 59 per cent, moderate fog at 23 per cent, typical fog at 10 per cent and no fog has an impact on livelihood at 9 per cent. Excessive fog hurts the livelihoods of 56 per cent of people, while foggy weather has a positive impact on 44 per cent (Rahim et al., 2018).

Erosion of the river banks is one of the major problems of Patharghata. The socio-economic consequences of this disaster are enormous. Surrounded by three rivers, a total of 66 per cent of the respondents had been affected by riverbank erosion at least once. Having lost both agricultural and domestic land, bank erosion primarily affects agricultural livelihoods. Riverbank erosion affects public and private infrastructure as well as agricultural land and people.

Natural disasters are a typical occurrence in the Patharghata region. The people of this area have a long history of dealing with negative consequences. The most common and frequent natural events in the area include floods, cyclones, river erosion and salt. As a result of various natural disasters, affected people have lost their livelihoods and have been forced to look for alternative sources of income to cope with the negative impacts of the hazards. Crops, animals, fish, nets, boats, infrastructure, households and sources of income have been affected by the above natural disasters.

3.1.2 Sampling and sample

The study site - the Patharghata Union - was selected purposively due to its susceptibility to extreme weather events. After consultation with the Chairman of the Patharghata Union Council, seven out of 12 villages in the Union - Rohita, Padma, Tengra, Charlathimara, Badurtala, Haritana and Gaharpur - were selected for this study because these villages are located near the sea and rivers and are frequently and severely affected by extreme weather events. The older people aged 60 years and above (as per Bangladesh National Old Age Policy, 2013) of the selected Union were the target population for this study. The unit of analysis consisted of 60 older people aged 60-80 years selected from the target population of the study areas with a random sampling technique. A list of all residents above 18 years of age in the study area, Patharghata Union, was collected from the Union Council office. From this list, elderly people aged 60 years and above were identified and 60 potential participants (30 males and 30 females) were randomly selected, 50 per cent of whom were beneficiaries of formal social protection programmes.

Table 3.1: Distribution of the sample

Participants type	Number of respondents	Beneficiaries of social protection	Non-beneficiaries of social protection
Male	30	15	15
Female	30	15	15

The in-depth interview technique was employed to collect primary data and information from the sampled older people based on a series of open-ended questions on their socioeconomic

conditions, sufferings and experiences of dealing with various extreme weather events. In-depth interviews help gather information and explore how the older people explain their situation before, during and after extreme weather events and how they relate their experiences among different climatic events. The in-depth interview also helps address questions such as, ‘What is the vulnerability of older people to extreme weather events and how different individuals, and communities think and feel about their vulnerability to address and why?’ The use of in-depth interviews, from a theoretical standpoint, can reveal more about phenomena and highlight the diversity of perspectives and experiences of older people to extreme weather events. Extending the research on vulnerability to extreme weather events beyond quantitative data collection techniques would allow for a better understanding of the dynamic relationships between older people, the larger social context, their socioeconomic capacity and social support for preparedness to deal with extreme events. The use of qualitative data collection techniques such as in-depth interviews can be used to investigate vulnerability and preparedness from the perspective of older people to gain an understanding of complex and detailed circumstances and social relationships.

3.1.3 Interview Procedure

The contact details of the respondents were obtained from the Union Council of Patharghata and the Department of Upazila Social Services. Based on the contact details, the respondents were personally invited for the interview with the help of a local guide before the day of the interview. If they agreed to participate in the study, they were given the explanatory statement and their consent was obtained in the consent form. For participants who could not read or write, consent was obtained verbally and their name was written on the consent form by other participants or family members. After signing the consent form, participants were asked to participate in an in-depth interview and answer a series of questions about their experiences and vulnerability to extreme weather events, their socio-economic conditions, health status, social networks and access to social protection measures.

The participants in this study were from the coastal region of Bangladesh and the interviews were conducted in the local language (Bengali). The data collection tools such as questions, interview schedule, consent form and explanations were translated into the Bengali language so that they could understand everything easily.

The data was collected between 11-Dec-2019 to 20-Mar-2020. The interviews lasted approximately 30 to 60 minutes. The interviews were conducted at a convenient time agreed with the participants. The place of the interview was often at the respondent's home or sometimes a public place such as a school. The interview was recorded on an audio recorder with the consent of the participant.

In addition to the in-depth interview, some field notes were taken during and after the interview sessions. It is widely accepted that qualitative researchers should take field notes to record contextual information. With the increased use of data sharing, secondary analysis, and meta-synthesis, field notes help to ensure that rich context is preserved (Phillippi and Lauderdale, 2018). Field notes were taken at the time of interviews and at the time of walking through different villages with the discussion of local guides to collect extra information beyond the interviews in particular for data triangulation.

3.1.4 Data Analysis techniques

The data and information obtained from the in-depth interviews were analysed using the technique of thematic analysis. Thematic analysis is used to examine classifications and identify themes and patterns in the data. It presents the facts in great detail and uses interpretations to cover a wide range of themes (Boyatzis, 1998). Qualitative researchers consider the thematic analysis approach as one of the best methods for qualitative studies that aim to uncover findings through explanations that provide a logical structure to the data analysis. It allows qualitative researchers to combine the study of the repetition of a theme with an examination of the whole content. This improves the overall message of the research by adding precision and complexity. Qualitative research requires a thorough understanding and collection of different components and data related to the research fields (Ecija and Sagales, 2021). Thematic analysis enables researchers to understand the situation comprehensively. According to Namey et al., 2008; p.138

Thematic moves beyond counting explicit words or phrases and focuses on identifying and describing both implicit and explicit ideas. Codes developed for ideas or themes are then applied or linked to raw data as summary markers for later analysis, which may include comparing the relative frequencies of themes or topics within a data set, looking for code co-occurrence, or graphically displaying code relationships.

Thematic analysis allows the researcher to connect the many concepts, thoughts and opinions of the participants and compare them with facts collected in different places and at different times during the study (Ecija and Sagales, 2021). It is possible to interpret the text as they wish (Alhojailan, 2012). Thematic analysis can be seen as a bridge between qualitative and quantitative research languages (Boyatzis, 1998; Maguire and Delahunt, 2017). The approach helps to detect, analyse and report data patterns and themes, and organises and explains different data sets in great detail (Braun and Clarke, 2006). Researchers can use this strategy to easily uncover themes or important or interesting patterns in the data and then use these themes to answer research questions or present study problems (Maguire and Delahunt, 2017). Thematic analysis has been approached by researchers in a variety of ways (e.g. Boyatzis, 1998; Javadi and Zarea; 2016; Alhojailan, 2012). The six-step framework proposed by Braun and Clarke (2006) is used in this study because it is arguably the most influential technique in the social sciences due to its simplicity and practicality in conducting thematic analysis, as follows:

Step 1: Become familiar with the data,

Step 2: Generate initial codes,

Step 3: Search for themes,

Step 4: Review themes,

Step 5: Define themes,

Step 6: Write-up.

The first step in thematic qualitative analysis is to transcribe the data, read and re-read the transcripts, and jot down initial ideas. Before proceeding, one should familiarise with the entire corpus of data, i.e. all interviews and other data used. It is useful to take notes and jot down first impressions at this stage (Maguire and Delahunt, 2017). Although coding is still being developed and defined during the analysis, researchers should begin taking notes and marking coding ideas at this stage so that they can refer back to these ideas later. First, I transcribed each participant's interview in Bengali language and translated it into English, then read the transcripts to identify

patterns and meanings, and took notes as I wanted to ensure that I could complete this stage of analysis and dive into the data and information (Braun and Clarke, 2006).

Researchers begin to organise the data in a more meaningful and structured way before generating initial codes. They systematically code data features of interest across the dataset and assign them to individual codes (Braun and Clarke 2006). Large amounts of data are broken down into more manageable units of information through coding. The formation of themes, the earliest and most basic level of analysis used as a thematic organisation tool, was the focus at this point (Braun and Clarke, 2006). In this study, the initial codes were: location and settlement, family, education, employment, living with family, food intake during disasters, income during disasters, assets and resources, health status, housing conditions, social networks and support during extreme weather events.

A theme defines a particular level of response patterns or meanings within the data set and summarises an essential component of the data in relation to the research question (Braun and Clarke 2006). A theme is a type of agreement that is more concise, accurate, simple and shorter than the main text from which the theme is extracted (Javadi and Zarea, 2016). There are no fixed rules for what a theme, or how it is explained. The meaning of a theme defines it. At this stage, the researchers looked at the codes and found that some of them matched the potential theme. At this stage, the codes were categorised into general themes that seemed to represent something specific to the research questions of this study (Maguire and Delahunt, 2017). I then analysed and organised the codes to find multiple themes (Braun and Clarke, 2006). The theme development and placement of the codes were designed in this phase.

I then reviewed the initial themes. In this phase, the researchers review, modify and further develop the initial themes found in step 3. They examine the data associated with each theme to see if they are logical and support the theme in some way. The following step is to see if the themes are applicable to the whole data set. I then moved to the next level of analysis after identifying a consistent pattern of data. If the codes did not match, I had to determine whether the problem was with the theme itself or with the codes and data for that specific theme. Before completing the second level of analysis, I went through the entire data set to ensure that the themes matched the

data. This allowed me to determine if I needed to code additional information (Braun and Clarke, 2006).

The next step is to see if the themes are applicable to the whole data set. After identifying a consistent pattern in the data, I moved to the next level of analysis. I determined whether the problem was related to the theme itself or to the codes and data for that particular themes if the codes did not match. Before completing the second level of analysis, I went through the entire data set to ensure that the themes matched the data. This allowed me to determine if I needed to code additional information (Braun and Clarke, 2006).

The continuous analysis helps to clarify the specific details of each theme and the general narrative revealed by the analysis, as well as providing each theme with a precise definition and name. The aim is to determine the 'essence' of each theme (Braun and Clarke, 2006). This stage should help you identify better themes by "... clearly defining what your themes are and are not" (Braun and Clarke, 2006, p. 92). To this end, I focused on defining each theme, determining what it means, and identifying what part of the data and research questions it relates to (Braun and Clarke, 2006).

Examples of some themes are:

Geophysical location and settlements

Low-quality housing and lack of living amenities

Informal and precarious work of older people

Lack of land and resources

Dependence on children

Limited access to food and nutrition

Increase livelihood vulnerability

Loss of land and assets

Loss of dwellings and living vulnerability

Suffering on the way to the cyclone shelter

Once the researcher has found a good set of themes, they can move on to the sixth stage of writing up and reporting their findings. It is important to note that the story of the themes is told accurately, consistently, logically, without repetition and with a sense of the attraction that comes from or is created by the themes (Javadi and Zarea, 2016). This is the final opportunity for analysis where we need to select strong and convincing extract examples, analyse the selected excerpts, draw from the research question and literature, and write a report on the interpretation to achieve the goal (Braun and Clarke, 2006). In this study, the data was analysed thematically using these six steps. Finally, the themes are explained with the main findings showing how the analysis answered the research question, followed by recommendations.

3.2 Ethical considerations

This study followed all required protocols approved by the Monash University Human Research Ethics Committee (MUHREC) (reference number 22524). The participants in this study were older people and of the most vulnerable and marginalised groups in the society of the coastal region of Bangladesh. Participants were asked about their experiences and views on their vulnerability to extreme weather events and their capacity of dealing with the possibility of accessing social protection measures to reduce those vulnerabilities. In general, there was no significant risk to the participants or the interviewer when conducting this research. However, some participants were distressed when recalling or talking about the negative effects of extreme weather events, which gave them unpleasant memories.

3.3 Challenges in the field

A list of all residents above 18 years of age from the study area, Patharghata Union, was collected from the Union Council office. From this list, elderly people aged 60 years and above were identified and 60 potential participants (30 men and 30 women) were randomly selected. One participant, a farmer, declined the invitation to be interviewed because he was very busy due to the wet weather at that time. Three other women declined for religious and cultural reasons - because of the practice of hijab or purdah. The data collection was a difficult and exciting task for

me as I was not familiar with the study area and the people. There were some other constraints I faced in the region at the time of the interview, as outlined below:

1. The study area was far from the Upazila headquarters and the Union Council, which hindered frequent communication and close contact with the participants. The roads and tracks were not easily accessible in the wet weather during my stay. I used motorbikes and local vehicles to get from one place to another.
2. I had some problems understanding some local language terms, so I had to take the help of my local guide to translate them into the standard national version.
3. Respondents were asked about the socio-economic circumstances of their parents and grandparents, their childhood, their schooling and their experiences of dealing with the effects of extreme weather events in their lives. The answers to these types of questions depended entirely on their memories and sometimes they could not the information correctly. The answers to these types of questions were verified in conversations with their family members and during interviews with peers and neighbours.
4. Some participants were very emotional during the interview and recalled the brutality of past extreme weather events that destroyed their resources and home. With the help of family members and peers, I was able to calm them down and end the interview after a short break.

3.4 Conclusion

There are many research methods used by researchers in different fields. In-depth interviews are a common method used in qualitative research. Since the data cannot be generalised, there are arguments against using interviews as a good data collection technique. However, the aim of this study is not to make sociological generalisations that apply to all people. Instead, the use of field-based interviews to obtain content-rich data and information on the vulnerability of older people to extreme weather events through in-depth interviews, which will add new insight and resources to the vulnerability literature and resources for policymakers and next researchers.

Chapter 4: Geographic and socio-economic vulnerabilities of older people

This chapter analyses the vulnerabilities of older people in the coastal region of Bangladesh. These vulnerabilities may be due to various natural sources such as the geophysical location of the residential settlement, or they may be socio-economic in nature, such as lack of employment and income, poverty, poor housing conditions and dependence on others. The geological location and settlement pattern of the older people in the region make them more vulnerable to extreme weather events than those living on the higher plains. In the past, there have been numerous cyclones and tropical storms that have directly threatened the study area. This chapter interprets and discusses various external and internal factors such as settlement location and housing structure, poverty, employment, available resources, dependency, food insecurity and deteriorating health status. The analysis shows that older people in coastal Bangladesh have been severely affected by extreme weather events and they believe that the same or more brutal conditions will be repeated due to their poor socio-economic condition, location of their housing area and lack of proper support system. Every extreme event, especially cyclones and floods due to storm surges, destroyed or significantly damaged their livelihoods and negatively affected their lives, making them vulnerable.

4.1 Geophysical location and settlements

Geophysical vulnerability considers geographical location and settlement patterns, as well as physical structures including infrastructure in hazardous areas or with insufficient resilience or vulnerability to the impacts of extreme weather events (UNISDR, 2004; Cardona et al., 2012). Studies have shown that the geographical locations where older people and their families live, as well as their housing structures, are highly vulnerable to various extreme weather events, especially cyclones and floods. In addition, older people are more vulnerable to poor geophysical and site-specific infrastructures due to their limited mobility, poor health, and limited access to key resources such as transport, medicine, water and food (HelpAge, 2003; Filiberto et al., 2009). Extreme weather events are predictable and their impacts are entrenched in the coastal region of Bangladesh, pushing older people and their households into socio-economic vulnerability (Alauddin and Rahman, 2013).

The vulnerability of older people in the area is to some extent due to the uneven geographical environment and location of settlements. Three sides of the study area are surrounded by deep water bodies: the Bishkhali, Haringhata and Baleshwar rivers are directly connected to the sea – the Bay of Bengal. Since most of their houses are close to the rivers and on the embankment, they may find it difficult to walk during extreme weather events due to uneven surfaces. Most of the older people said that their ancestors established the settlement in the area about 150 to 200 years ago after getting some land from the government of the time. One of the participants said:

[My] grandfather's household was in the Mathbaria area [an Upazila of Pirojpur district in Bangladesh]. My father and uncle came here [Patharghata - the study area] with him. Grandfather had a small amount of land, but he had six sons. We lived here after getting some land from the government. We [our family] came here more than 150 years ago (75-year-old small farmer, Ismail, Padma village).

It seems that 200 years ago there were no settlements in the area, so the ancestors of the current residents probably founded this vulnerable settlement. Their grandparents came to this area from different parts of the country and from nearby districts to escape poverty and hunger. According to some interviewees, their grandparents had enough land properties in their homeland before coming here, but due to poverty and natural events such as floods, it was difficult for them to properly cultivate these landholdings and pay taxes on them. Thus, they fell into extreme poverty, which forced them to sell their land to survive, and moved to this coastal region. An 80-year-old Rashidul from Haritana village said:

My parents lived in the Mathbaria Upazila of the Pirojpur district. His parents were farmers. They had got enough farmland [from their parents]. My grandparents once owned a lot of cultivable lands, which had to be sold in an auction because they had not paid the land tax. Later they moved from there to this area.

These statements were also corroborated by other respondents who stated that most of the people living here were from the Mathbaria and Pirojpur regions. They approached the government authority who gave them a piece of land that made them settle in this disaster-prone area. A 62-year-old man, Alamgir Hossain of Badurtala village, explained:

My father came to Patharghata because he was allotted land here [by the government]. He came here because there was a severe [economic] crisis in Mathbaria at that time; rice was hardly grown there.

They had difficulty growing crops because the Patharghata region was part of the Sundarban mangroves. Most participants said that the area was covered with forests and jungles as it was adjacent to the Sundarbans on the Bay of Bengal. People who came to this region first had to clear the jungle to open up a suitable area for living and cultivation. Some participants said that the price of land was comparatively cheaper than that of flat land in nearby districts as the area was covered by deep jungles and forests with wetlands. Ahammed, an 80-year-old widower, told the story of his grandfather who settled in the area:

My grandfather's house is in the north in Mathbaria near the Jhalakathi district. [...] Grandfather settled in this area because he got some land here at a cheaper price. However, my grandfather did not have much land.

A similar statement was made by Debnath, a casual carpenter from Haritan village. He mentioned that though he and his father were born here, his grandfather was from another district, Jhalakathi, in the country.

Debnath commented that places, which are more easily damaged are particularly vulnerable to extreme weather events such as sea level rise, storm surges, floods, cyclones, etc. Older people are particularly vulnerable to changes in the frequency or severity of cyclones and floods (HelpAge, 2015). We found that most houses are located near rivers that flow into the sea. The river banks are weak and can be destroyed at the first hit of a cyclone without any protection. As most of the elderly and their households and neighbours live on the coast, they are vulnerable to cyclones and floods. Enam, an 80-year-old widower, lives in a house that is "on the bank of the river; only half a kilometre away from the sea." Some of the houses of elderly people were located outside the embankment and very close to the rivers that are directly connected to the Bay of Bengal. Their houses are also highly exposed to the initial impact of the cyclone, making them even more vulnerable to extreme weather events. Asadul, a small farmer and casual labourer from Ruhita village, said:

From my house, it is not far from the Ganga [river]. It takes me two to three minutes to reach the Ganga. My house is right next to the river. Our area is exposed to flooding even when there is a slight breeze. Whenever it is cloudy, I panic and the premonition of disaster comes to my mind. I was one of the sufferers of SIDR in 2007.

The entire research areas and surrounding regions are prone to extreme weather events due to their location. The villages of Charlathimara and Padma are located on the banks of the Haringhata River, one of the major coastal rivers of the Ganges-Padma system, which flows into the Bay of Bengal. Ruhita village is the boundary between the Haringhata and Bishkhali rivers. The dam near Charlathimara, Padma and Ruhita collapsed in 2007 due to the strong flood waves of cyclone SIDR and has not been properly rebuilt to date. Most of the elderly people in the area said that the dam is not strong enough to protect against the onslaught of water during cyclones and tidal waves. Some of the identified places were likely to face challenges as their physical infrastructure, including roads and embankments, was inadequate to protect against floods and the settlements were vulnerable to future extreme weather events (Kabir, 2009). Some respondents said that the dam was built from different types of sand and that no standard was maintained so that the dam could collapse again if it is hit by cyclones. If this happens, flooding may occur, threatening the socio-economic livelihood of the elderly in the affected area. An older resident, Amena, said:

They [the construction authority] built the roads [embankment]. But would it exist? No, it would not. When the water comes, everything will be damaged. [...] When the month of Baishakh [the first month of the Bangla New Year and the season of the cyclone, Kalbaishakhi] comes, I am afraid and cannot sleep. In the name of Allah, I think of when the wind will come and drive everything away.

As participants made clear in their responses, the underlying geophysical characteristics and location of the region near a large body of water increase the vulnerability of the region from the beginning of its settlement. As a result, older people and their households are frightened when they see cyclonic clouds in the sky or feel the light breeze over the rivers and the sea. Various testimonies suggest that geophysical and residential location are some of the major factors that contribute to increasing the vulnerability of older people and their households in the region. The location of the house is important in protecting the house from certain extreme events. However,

in this study, it was found that most of the houses in the region are located very close to rivers where they have khas land [government wasteland where no one has ownership rights], which makes the houses vulnerable to extreme weather events. The extent to which older people are vulnerable to extreme weather events may thus depend on where they live and how they are settled (Alam, et al., 2010).

4.2 Low-quality housing and lack of living amenities

The vulnerability of older people in the coastal region is also related to their housing quality and available living facilities. A sturdy house can protect them from the strong wind during cyclones and floods. In this study, it was found that most of them live in houses made of corrugated iron and wooden pillars or bamboo posts. The houses are nearly all closed and congested with each other. Almost all respondents said that they could not build their houses with bricks or other sturdy materials due to financial constraints. Older people often live in unhealthy, unsafe and unsuitable shelters because they cannot afford them. Chandresh, a 77-year-old widower, lives in Haritana village. When asked if his house is made of bricks, he replied:

Bricks? How can I build my house with bricks? It is made of tin, which OXFAM – an NGO – provided after cyclone SIDR in 2007. It was low-quality tin that had many holes and defects. It could fall in the next cyclones. The rainwater comes through the tin sheets when it rains (Chandresh, a 77 years old widower of Haritana village).

It was found that the structure and foundation of the houses are very weak as the materials are not strong, making the elderly and their households increasingly vulnerable to extreme weather events. Shuvasm from Haritana village reported on the condition of his house:

Tin and wood are the main materials in my house. The government gave it to me after cyclone SIDR. However, it is rusted, has small holes and has been damaged [over time]. During the rainy season, rainwater enters the house. It is a normal house. It is not safe to protect us from cyclones and floods.

Most of the houses were donated by non-governmental organisations (NGOs) or local governments in response to cyclone SIDR in 2007 or later when the houses collapsed. The material

of most of the houses is galvanised tinplate. Most of the houses are located close to the river where they own some khas of land. This puts the house in a vulnerable position. Abul, a 70-year-old casual boatman from Padma village, said:

The house is made of corrugated metal sheets. I got this tin sheet as a relief after cyclone SIDR in 2007; Songram [an NGO] provided it. Now it is not in a good condition. It has become rusty.

He also said that he has no bed or cot. They have some Kantha (a type of embroidery used in eastern South Asia, especially in Bangladesh and the neighbouring Indian states of West Bengal and Odisha, as an alternative to bed sheets and quilts), but necessary clothing is scarce. The toilet he used to have collapsed during cyclones, so he rebuilt it on his own. Even though the house is usually safe, he believes it could collapse again if there was another cyclone. Most of the respondents do not have beds. Chandresh, one of the oldest male respondents, said of his housing situation and amenities:

... No. Where will I get the bed from? I do not have a bed or bedding. I lie down on a sheet made of my son's wife's discarded clothes. I do not have enough winter clothes. I have a thin blanket and a coat that I got from the government as a relief. It is now torn because of overuse. It is very difficult to bear the cold winds of winter. I stay close to my grandchildren at night so we can keep each other warm.

Most older people have a small cot (locally called khat), which is usually homemade from local wooden materials, such as wood from old boats. Rizeeya, a widow from Badurtala village, said:

I have a broken bed frame. I have tied it tightly. I have no quilt and no Kantha. I have a toilet. It was provided by an NGO after cyclone SIDR. ... My house is not safe during cyclones and floods. It is still broken.

However, the majority of respondents said that they do have toilets that were provided by NGOs after cyclone SIDR in 2007 and after, but their condition is not good for use. Chandresh said, "I have a toilet, but it is almost ruined. I got it from a sanitation programme after SIDR in 2007 and it is only the toilet for his family members".

Some of the respondents have access to electricity but cannot pay the bill regularly. One of the male respondents from Haritana village said:

... Yes. My house is connected to the electricity grid, but I cannot pay the bill. The bill has been due for six months. The electricity company told me last week that they would cut the electricity supply if I cannot pay the bill (Chandresh).

Similar comments were made by Rashidul, who said, "... [although] electricity is available in my house; it costs me more. [...] I used to use a lamp and lantern." However, some of the older people, for example, Fakir Shah, reported that they [his family] did not have access to electricity. Some of them depend on the solar system they have installed and pay the cost in monthly instalments. Afzal Hossain has not yet received electricity. He said he has got the light from his children who have installed a solar system with a total of nearly 30 thousand Taka in instalments. Some of the interviewees, for example, Motaleb from Charlathimara village, live in a house provided by the government, which is particularly vulnerable to extreme weather events due to its location near the river, its age and its building structure. It is evident that poor housing quality and lack of housing facilities can contribute to the vulnerability of residents, especially older ones, to extreme weather events.

4.3 Poverty

Poverty is probably the most important factor in making older people vulnerable to extreme weather in coastal areas. There is evidence that poverty is linked to a lack of access to resources (land, houses, water, food, animals) and opportunities (employment, social support, health care) that affect the lives of older people. Another universal aspect of poverty that makes it particularly painful and difficult to overcome is vulnerability. The frequent extreme weather events in the region have a greater impact on older people due to their poorer financial situation compared to the general population. Older people are more vulnerable than others after a natural disaster due to a lack of financial resources (Chau et al., 2014; Fees et al., 1999; Healy, 2003; Healy, 2003). Most of the study participants lived below the poverty line. Some of them had no income, while others made a living by begging and with the help of informal support (details in chapter seven). Liakat, an 80-year-old who claimed that he was a freedom fighter, lived by begging. He did not

have enough strength to work. He said, "I cannot do anything anymore. I live by begging. I eat what I get from people - rice and money."

Again, the ability of older people to earn an income depends on their ability and access to and availability of regular work. But most participants and their households do not have a regular source of income. For example, the income of Palkey Begum, a widow from Ruhita village, is not secured through her daily work. She said that she could earn one hundred and 50 takas a day if she has work, but she does not get regular work. Alfaz can earn 200 to 500 BDT per day if he can work. However, he was not always able to find work to earn an income. Then it becomes very difficult for him to meet his daily needs. They are therefore vulnerable to problems in meeting the daily expenses of the family because they have no or only irregular work. Abdullah, an 80-year-old man said:

I do not have regular work anymore. I earn 10 to 30 Taka from some odd jobs I do every day. And I get five hundred Taka per month as Old Age Allowance [from the government]. [...] It is difficult to maintain my family. I take the necessary food from the shopkeepers in debit. I have not yet managed to pay the money due from last year. Three ducks lay eggs and I sell them for 40 Taka per Haley (four pieces).

This study also highlighted the vulnerability of older people to poverty because they are not paid enough for their work due to age and limited ability. Some participants said that because of their old age and physical inability to do certain jobs, they are paid too little compared to young people. They believe that this is one of the factors that is gradually pushing them into poverty. A 70-year-old from Padma village, who lives with his son, said "Sometimes I earn some money [when I can work]. But the young workers get five hundred Taka as wages, I as an old man get two or three hundred Taka for my work."

Thus, joblessness and sometimes underpayment often drive them into poverty, which makes them financially vulnerable. The financial crisis sometimes makes older people in the region vulnerable to borrowing. Older people who are in financial difficulties and have no close family members or friends have to borrow from others. Shuvasm from Haritana village, 60 years old and a small vendor, cannot support his family of four with his daily income. He said that sometimes he borrows

something from people when he needs it and pays it back later. Momina, a poor widow who lives with her younger son and daughter at the dam near Padma village, however, can neither get help from others nor borrow anything. She said: “My income is sometimes a hundred BDT and then again only 50 takas. [...] What will I do if it is not maintained [my family with the money]? Who am I going to tell? “

Older people cannot afford to eat nutritious food in the area because of their poverty. They have to wait for someone to give them this kind of food or they visit a relative's house. An 80-year-old man, Rashidul, explained:

Sometimes a glass of milk is out of the question for me. Fruits are not usually eaten. When I walk in the market, I look at the fruits but cannot afford to buy them. If I go to someone's house or if someone gives me something, I can eat. For the last five years, I have not been able to buy any fruit. I have some fruit trees, but they have been damaged by cyclones at different times. I do not see the fruits; how can I eat them?

It is clear from these accounts that the elderly living in the area have little access to adequate food and nutrients due to their poverty, which makes them vulnerable to poor health and various diseases. The older people in the area most likely suffered from chronic income poverty in their childhood because their parents were also poor and worked irregularly in their later life. One of the participants shared his experience of poverty:

I have had a bitter experience of scarcity. When we were very young, I used to pick paddy from Char [Island] with my younger sister. We boiled the paddy, dried it in the sun and husked it with demki [local wooden bowls for rice preparation] to make rice. Then we cooked the rice to eat. (Alamgir, 62-years of age, male, carpenter from Badurtala village).

Despite his efforts, Alamgir still remained in a state of chronic poverty, living in precarious socio-economic conditions as a casual carpenter. Naima, a 68-year-old widow from Padma village, also said she had suffered from poverty since childhood. Due to her father's inability to pay for schooling, she had to work from a young age. She said that her father did not give them enough to eat. To eat rice, they had to pick the fallen rice from the field. Despite the hard work she did in the past, she cannot change her fate. She lived in almost the same socio-economic conditions as she

was in her childhood. To survive, she has to work every single day. Her son cannot help her either. She said that her son lives separately from her. He has two children. So, he has huge expenses to support his family. She described:

... Sir, my family cannot be fed with the income I earn. I have to buy oil, salt, pepper, rice and some betel leaves. I have to buy some shells for my goats. I also have a daughter who needs soap. With the two hundred Taka I earn, I cannot cover [my expenses].

Poverty is a major risk factor when facing an extreme weather event or disaster (Yoon, 2012). As poverty is very high among the older people in the region, it is reasonable to assume that they were particularly vulnerable to disasters due to financial difficulties. Chau et al. (2014) argued that poverty limits the ability of older people to acquire the resources necessary to maintain their wellbeing. For example, older people living in poverty cannot afford adequate food and may not have access to basic disaster recovery resources and services such as shelter, clothing, transport and food, making them vulnerable to extreme events (Chau et al., 2014).

4.3 Informal and precarious work of older people

Older people are most affected by unemployment following natural disasters like cyclones and floods. Older people tend to be unemployed for longer and spend more time looking for work than young people in the region. They also often face discrimination when it comes to wages and employment (Weller, 2021). Most of the older people in the region are engaged in traditional occupations farmers and fishermen. However, some older people have been forced to change the nature of their employment year after year due to the impact of extreme climatic weather events. Most older people work as casual day labourers in small-scale enterprises, fishing or marginal farming, where they do not earn a regular income. Shuvasm explained:

I sell betel leaves. I buy the betel leaves from the wholesale market and sell them door-to-door in the village. I do this from morning till evening. I have been doing this work for more than 15 years. Before I joined this business, I worked as a labourer in others' houses or land, doing farm work, tree planting and other work.

Since the study area is a coastal region, most of the older people and their households in the different villages make their living from fishing. They catch fish in the river and sell the fish to wholesalers and vendors in the market. They also work as casual workers on fishing boats. Shamiul is one of the fishermen who has been catching fish in the river from a young age and selling it in the bazaar to earn a living. He said:

I catch fish and sell it. I go to the river and the sea, catch fish and sell it [in the market]. I have been doing this since I was a child. But I also work as a labourer and sometimes go fishing with others.

Haulader from Padma village used to do a similar job, catching fish in the river, but now he does not have enough ability to do this work. Some of the older people run small fishing businesses in the village markets. For example, Fakir Shah from Padma village has been involved in fishing since childhood to support his family. He used to catch fish himself in the river and the sea. Now he buys and sells fish in the market after suffering huge losses in his fishing business due to cyclone SIDR in 2007. He explained, "Now I buy and sell fish in the market and sometimes in the village. I buy two or three kilos of fish and sell them in the market." Although fishing is their main occupation, most of them have to do other work if necessary after extreme weather events and economic crises. Abdul, a 70-year-old man from Padma village, is now a boatman. Although he was poor, he worked very hard since childhood to make a living. He said:

Now I sail a boat in the sea to catch fish and prawns with a net. I do not do anything anymore. If I do not work and catch fish in the sea, I cannot maintain my family [expenses]. If I pull a net into the sea, I get some earnings to feed my family, otherwise, I have to endure a lot of suffering.

Some of the respondents were marginal farmers who are particularly vulnerable to extreme weather events. They grow various crops on their farmland. They also do odd jobs in other fields to earn extra money to support their families. Chandra, a 73-year-old man from Charlathimara village, is one of them. He also does various odd jobs apart from his regular farm work. He said:

I am a farmer and I do farming - I plough, harvest paddy and other things. [...] Sometimes I also work as a labourer [casual worker]. I have worked in people's houses with a salary from the beginning [in my childhood]. I also pulled the net in the sea to catch fish.

Some of the older people in the area work as irregular casual workers, whose earnings depend on their daily work. These older people are more vulnerable than those who have regular jobs and businesses. Some of them work in other people's houses in the village, and others work in the fields and help the owners with managing their lands and agricultural activities. Some older fishermen have been catching fish in the sea and rivers for years, but it takes more energy to pull a fishing net, so they sometimes give up. Alfaz Hossain works as a day labourer. Occasionally he pulls nets in the sea and river and works for people in their houses or fields. However, he cannot stay in the river for long because he feels dizzy after a while due to some physical weakness.

Alamgir now works as a carpenter, although he used to pull nets and catch fish in the sea with trawls and drag boats in the middle of his working life. He recounted a sad experience from his fishing days:

Once pirates captured my boatmen and demanded three lakh Taka as ransom. I paid and released them. Then I bought crab nets for Taka one and a half lakh [150k]. The coast guard set them on fire. Now I work as a carpenter. I practised that with my father.

These kinds of experiences - assault and robbery of fishing boats in the deep sea and seizure and burning of fishing nets by the relevant authorities for illegal fishing - are not uncommon for older people and their households in the fishing community, forcing them into financial hardship. In some cases, once older workers leave formal employment, they find it difficult to choose another employment for the rest of their lives. For example, Muhibul, a 79-year-old uncertified freedom fighter and retired police officer, runs a tea stall on the riverbank near his home in Badurtala Clustered Village.

It is even more difficult for older women, especially widows, to find work. Most of the older women interviewed said that sometimes they have to work as casual workers in other houses or catch fish in the river as a helping hand with their fellow men. Sometimes they participate in the 'Food or Cash for Work' programmes run by the government through local authorities to repair

roads and dams. Momina, a 60-year-old widow from Padma village, also works as a day labourer [casual labourer] like Hossain. She said:

... I occasionally catch fish in the [wetland] of Char [Island] and sell them. [...] I sell them to earn a living. Before, I worked in the local police camp; I dug earth to fill up roads [repair roads].

Some older women were small shopkeepers or tea sellers. They sell tea throughout the day to earn some money that helps them pay for daily expenses for their family. Rajina from Ruhita village works with her husband as a tea seller in Ruhita Bazar at the dam. Naima, a 68-year-old widow from Padma village, worked as a casual labourer, sometimes as a fish dryer and at other times as a fish catcher. She said:

Sir, now I work daily as a fish dryer [work of drying fish] in another people's fish factory. People dry the fish there where I work as a labourer. I go there in the morning and come back just before dusk.

In addition, many older respondents believe that their lack of physical strength prevents them from receiving the same employment and wage opportunities as other members of society. They are also underpaid. In most cases, employers do not hire them because of their age, as they cannot do certain jobs well. Some employers believe that older people cannot do the work assigned to them quickly, punctually and properly. Employers, in turn, want to offer lower wages because of older workers' reduced ability to work. Rashidul, an 80-year-old participant from West Haritana village, expressed his views on physical strength and getting work and wages. He said:

Yes. People do not want to give me a job because I am very old. They say that such an old man like me is not able to do the work. They also give me fewer wages than others."

Over time, these diminished work abilities and underpayment led older people in the community to believe that they were no longer needed in the community.

4.4 Lack of land and resources

Land and other resources can help reduce the vulnerability of older people and their households during and after extreme weather events. Stocks of assets and resources help reduce vulnerability as they can be converted into income, food or other basic needs (Moser, 1998). However, scarcity of land and resources is one of the most important determinants of vulnerability among older people in the region. In most cases, respondents indicated that they did not have cultivable or residential land and other assets. In this study, it was found that ownership of ancestral land and assets among descendants has decreased over time. This is due to the continued sale, losses from natural disasters such as erosion of riverbanks, and subdivision among descendants over time, gradually making them vulnerable to extreme weather events. They report that their grandparents or parents owned some farmland but sold it in the past to support their family. They even had to sell what they had received from their parents and grandparents, especially after extreme weather events in the past, to raise their children. One of the male participants, Chandresh from Haritana village, said he did not have enough land. The land he had received from his parents had to be sold at different times due to socio-economic circumstances and extreme weather events. Chandresh has three sons and a daughter. He also said that he sold some of his lands. He gave away some of his lands to his sons and sold some when his daughter got married.

I do not have any cultivable land. I sold all the cultivable land I got from my father to support the family's livelihood. However, I have ten decimals of residential land which I have left for my three sons to live on. My grandfather owned about 14 acres of land, of which my father got about 4.5 acres, but he sold most of his cultivated land. I have no other resources. [...] My son, with whom I live, also has no other resources.

This region often experiences economic crises due to extreme weather events, which force farmers to sell their land, leaving them even more vulnerable to the next extreme event. Some of the respondents said that they did not own any land, either residential or agricultural. Despite the illegality of their housing situation, they live on government land or a dam. Shamiul, an 80-year-old man from West Haritana village, is one of them who lives with his family on government khas land. He said:

I do not have a single piece of land, no residence. I live on khas land [unproductive land owned by the government]. My father had some land. He survived by selling it. [...] We could survive by cultivation if there was some land. [...] I have no assets. I have no trees, no business, nothing.

Landlessness means loss of livelihood, sometimes homelessness or inadequate shelter, loss of identity and displacement of family, which increases their vulnerability (Reale and Handmer, 2011). Raizuddin, a 69-year-old respondent from Ruhita village, said he does not own much land. He said he owns six kathas (15 decimals) of land that he got from his father. He bought some land which he distributed to his three sons and two daughters.

In the rural coastal area, many older people live with their family members, especially with their sons. In this study, it was found that most of the participants live with their sons even in old age and bequeath most of their land holdings to them. Rashidul from Haritana village said that his parents had received some land from his grandparents, which his parents later passed on to his brothers. He was given some of the land, which he in turn distributed to his sons. Now he only owns the residence where he lives with his wife. Some of the participants said that they only own the plot where they live. They have no cultivable land. Shuvasm from Haritana village is one of them who said that he has no land to cultivate. He has only eight decimals of land that he got from his parents, where he now lives with his family. Apart from four ducks, he has no other assets. Chandra lives in Charlathiara village with his wife and two sons and their spouses and children in a single residential house. He says he does not have enough land. He has about an acre of land for cultivation and this residential plot. He said:

My grandfather has 6/7 acres of land. My father got almost one acre as his share. I do not have anything [other assets], sir. I have no cows or goats. No poultry. I used to have some. I sold everything to pay for the treatment of my younger son who is suffering from a liver problem.

Most of the respondents said that they received little or no land assets from their parents. Alamgir Hossain and Fakir Shah are among those who also have no land. Alamgir Hossain said he has no land at all. His mother has ten kathas [about 33 decimals] of land and his two brothers live there.

His father had two kuras [1 kura = 66 decimal] of land. He lost his land after his second marriage. His father did not get land from his grandfather. He got the land from one of his uncles who had a lot of lands and he gave his father two kuras of land. He said if I had land, I would manage my annual food grains. Similarly, Fakir Shah said:

I have no land and no residence of my own. I live next to the dam of the Water and Power Development Authority (WAPDA). My father had no land. My grandfather had some land, but it was sold by him. My father got a little of it. He got 35/40 decimal (12/13 Katha) land from my grandfather, which he sold and fed us. I have two goats.

As presented above, older people are more vulnerable to the effects of cyclones and floods because they have less land and resources. It is said that older people who own land derive power from it, which puts them in a better position than others without similar power resources. They are then unable to maintain themselves, and become more dependent and vulnerable, which reduces their status in the family and community (Salamon and Lockhart, 1980). Access to land and property, which is also cited as an indicator of vulnerability in numerous studies on vulnerability, can enable older people and their households to respond quickly to the consequences of extreme weather events through leasing and mortgaging. However, the main concern of the landless is about their livelihood strategies. Older people who have cultivable land can take precautionary measures for the next extreme event, while the landless elderly and their families are less able to do so. Their study found that landowners have key assets to withstand extreme events, which is not possible for the landless, thereby increasing their vulnerability (Paul and Routray, 2011). Older landowners also have more social connections than the landless. The consequences for the landless group are thus devastating. This process is accompanied by sociocultural deprivation and dislocation, which play an important role in determining the intensity of indirect disaster impacts and the vulnerability of older people in the area (Haque, 1997).

4.5 Dependence on children

The dependency of older people on children is on an upward trend and is expected to triple in the next few decades due to limited access to social protection programmes and financial insecurity in old age (HelpAge International 2019; BBS, 2015). In this study, it was found that older people

depend on others in their family or community to meet their basic needs during and after extreme weather events. Dependence on family members, especially sons or daughters, is one of the vulnerable conditions for older people in the region. Most older people reported that they need to depend on their sons or daughters in some way for their daily needs. Chandresh, 77 years old man, recently lost his wife. He feels lonely and needs the help of other family members to make a living. The elder sons of Chandresh are not much better off. Therefore, he has to depend on his younger son. He said:

I lost my spouse a few months ago and now live alone. My three sons and three daughters live separately. [...] I live with my younger son who has two children - a son and a daughter - and his wife.

He further said that he faces some problems living with his son's family. He depends on his son for meals and other things. Sometimes he has to bear the rude behaviour of his son's wife. He expresses regret, “[...] Yes. I have had some difficulties living with my son [and his family], but I am afraid to say anything because if I do they will throw me out of the house. If I say something, they tell me to go live with others”.

Other respondents living with their children also reported the same conditions. Amena Begum, 80 years old, said that she cannot work. It is hard for her to live alone. She shares her house with one of her daughters who suffers from some disability. She depends almost entirely on her daughter, who lives with her, for her household and personal needs. Her daughter does all her work as she cannot work for herself. She said:

[...] My son's family, who live in another place, lacks money. He cannot feed his own family. What will he do for me? [My] daughters help me in the crisis. My five daughters give me clothes, money and meals when I need them.

Debnath lives with his wife, two sons and their wives, and grandchildren. His daughters and sons have married. Although he is a casual carpenter, he sometimes has to depend on his sons when he cannot go to work to earn money due to his vulnerable health condition or unfavourable weather. Debnath said he cannot go to work as he used to be able to, so he is no longer able to provide adequately for his family. As for contributing to family expenses, he cannot tolerate his sons'

uncooperative behaviour. He sometimes feels bad and does not bother to go to his sons' shops to fetch money. He realises that his sons consider him a burden:

Family members, I think my sons consider me a burden in the family. I cannot take up any more work. Therefore, I have no income. I cannot support myself. Therefore, many consider me a burden. My sons do not ask me before going to do any work.

Almost all older respondents feel that they are burdened by their family members, their children or grandchildren with whom they live. They believe that every son or daughter has to take care of their children/family members. However, they find that their sons' or daughters' income is not enough to support their parents after taking care of their children and family members. Therefore, their parents and older relatives living with them are considered a burden. A 79-year-old Muhibul from Badurtala village said:

They [sons/daughters] also see us [parents] as a burden. Every son/daughter has a family of their own. After solving their family problems, they consider it a burden to take care of their parents.

Sakimun, a widow from Haritana village, had an almost similar experience. When asked if her life was a burden for her or her family members, she remained silent with tears in her eyes. She said that her sons and daughters sometimes asked her how she was coping with the basic necessities, but whenever she wanted something from them, they said they were in crisis. Then they would say, "We are in trouble, how can we give you anything?" Ismail Hossain, a 75-year-old poor farmer, lives with his wife in Haritana village in the Unions. Although he has some land, he cannot farm it regularly. It seems that he is suffering from various diseases. However, his daughters and sons do not take care of them. He expressed it thus:

My sons and daughters do not provide meals. I am considered a burden by them. These all are hazardous [for me] at this moment. They [my sons and daughters] do not want to ask us if we have eaten if we need to drink tea, if we need to eat warm rice or if we need to wash our clothes. They think it would be better for them if we died. What will you do if I tell you about my suffering?

He claimed that many people are of a similar age to him but their sons do everything to please their parents. There are others who do not take care of their parents. He claimed that his sons and their wives did not help him with everyday needs such as washing clothes. But when it hurts their interests, they use swear words and reprimand us, he said.

Despite the problems in their relationships with their adult children, older people in the area still maintain some relationships with them because they have no other means of making a living. It appears that older women are more vulnerable than their male counterparts due to local cultural and religious issues. They face some problems but they sort them out and live together. When asked if she has problems living with her daughter, Rizeeya, a widow from Badurtala village, replied:

Sometimes I have problems living together with my daughter. My daughter is unemployed. She cannot support herself. How is she supposed to support me? My daughter's house is right next to mine. My daughter would give me food if I could not cook. Sometimes there are disagreements with my daughter. But she would call me later. I do not keep it in mind later.

Naima, a widow over 60, lives with her daughter and son-in-law near her son's house. She does not live with her sons because of various family problems. She said that she had some problems with her son and daughter-in-law when it came to taking care of themselves. Naima believes that her family members, her sons, daughter-in-law and grandchildren should take care of her when she is old. They should cook for her and serve her food. They should buy the things that she needs. But she has to work to survive in old age. This is unacceptable to her. Some respondents have no respect for their life because of their socioeconomic problems, and the unwelcome behaviour of their family members. In their opinion, it is better to die than to live dishonoured and with constant problems. Momina, for instance, lost her husband many years ago and had to endure a lot of suffering while raising her children. She said, "I pray to Allah to take me to the hereafter while keeping my body strong and free from pain." This is very similar to Fakir Shah's quote: "Many times, I have prayed to Allah in sorrow, asking Him to grant me death so that I am not in these circumstances." This happens especially when there is economic insolvency. Various statements

indicate that the older people in the area continue to live in inadequate living conditions and are unable to make a living because they do not receive adequate family support and self-sufficiency.

4.6 Limited access to food and nutrition

Limited access to food and nutrition has detrimental effects on the health and wellbeing of older people, which in turn can limit their ability to work, engage in daily activities and live independently, which can limit their capacity to endure and cope with the impacts of extreme weather events (FRAC, 2019). The lack of cultivable land and resources affects the availability of food and nutrition for older people in the region, as they have less food available due to lower production capacity. Most of the older people were found to suffer from malnutrition because they did not have the necessary food. Some of them find it difficult to get food. Chandresh, a 77-year-old widower from Haritana village claimed:

[...] I have to face various problems to get food. There is no other way but to bear these difficulties. There are some problems that I cannot tell people about. My son's wife does not give me enough food. She keeps the food at a safe distance so that I cannot reach it. When they cook fish, they eat most of it and give me a small piece from the tail side. I never get the head of the fish. They eat it [the head of the fish] keeping for days. They bring other food like biscuits from the market and eat them; I just watch but do not eat.

The statement suggests that older people depend on their family members, especially their children, for their daily food and drink, as they are unable to earn and manage their food before and after extreme events. The food intake of older people depends on the availability and accessibility of food in the family. For some older people in the region, it is difficult to obtain their daily food. Older people living in their sons' or daughters' families with more members get less food and nutritious items. This is because their sons and daughters first think about their children than their parents. Most of the respondents in the area said they have little or no access to nutritious food such as meat, milk, fish, eggs and fruits. Chandresh said again:

I eat some of it [nutritious food], but it is rare. Where shall I get money to buy these foods? The price of a dozen eggs is BDT 100 and a KG of milk costs BDT 60. The price of meat is high for us; it is BDT 500 to 700 per KG. [...] Most of the time I cannot eat nutritious

food. If I buy this kind of food, I cannot buy rich or curry dishes. I usually eat meat once a month when we can earn more. We cannot eat fruits, but I have some coconut trees from which I can eat coconuts.

Fakir Shah from Padma village and Shuvasm from Haritana village in the Union reported similarly to Chandresh that they can hardly get nutritious food because of their financial incapacity. They said that they have to wait for months or even years to get certain nutrients like meat, milk or fruits. Most of the older people said that they usually eat rice, curries, potatoes, vegetables, dal, and bread. Rashidul from Haritana village eats a small amount of food at different times of the day. He eats rice only at night. During the day, he takes some tea, biscuits and parched rice. However, due to his lack of financial resources, he cannot get nutritious food. 80-year-old Abdullah has meals twice a day - at noon and in the afternoon. In the morning, he drinks water and has a little tea. Sometimes he also eats rice and bread with curry in the morning. "Two or four eggs are eaten a month, fruit and meat are not eaten. How can I eat and with what?" - he said. He eats fish when someone gives him a few pieces or when he can catch fish. Alfaz believes he needs nutritious food for his body, but he cannot buy fish, milk, meat and eggs.

Studies have found that older people who are vulnerable to dietary stress have a lower physical reserve, which limits their ability to recover vigorously in the face of an acute health threat or stressor from extreme events (Porter et al., 2015). Some respondents reported that older women who have lost their spouses are more unable to manage food and nutrients. "I do not remember eating any fruits after my husband died," said Palkey, a widow from Ruhita village. She said she does not get milk, eggs and other nutritious food. Momina, a widow from Padma village, has to struggle to meet the daily food needs of her children, a son and a daughter, with whom she lives. She said:

[...] Sir, I do not even see this food [nutritious food] with my own eyes. I think it has been a year since I ate meat. Fish is eaten a little when my son brings it. Milk, eggs and fruits are not eaten. Where would I get them from, sir? Did not I need money to buy them?

Most of the older women said they eat normal food during the day - potatoes, dals, rice and vegetables. Fish, meat, eggs and fruits are beyond their expectations. Some respondents said they

only eat eggs from their chickens or ducks. When asked how many times a day do you eat, Rejima, a 65-year-old woman from Padma village, replied:

How often will I eat? I must suffer a lot from eating only once a day. I cannot eat now. Fish I can eat if it is brought by someone, otherwise not. Meat, especially beef, is not eaten except at sacrificial feasts. [...] People sacrifice cattle. They give me some meat and I eat it.

What about milk and eggs? She was asked and replied, "I can eat a little egg. Milk I cannot take at all. I cannot buy any other food if I take milk." Naima, a 68-year-old woman from Padma village, said she did not cook today because she was under pressure at work. When asked, "When did you last eat meat?" she replied:

I cannot say exactly when I ate meat; I cannot remember, but it has been many years. I cannot eat milk or fruit. Where am I supposed to get these foods?

The statements of the older people provide a holistic insight into the issue of access to food and nutrition in the region. Most of the respondents said that they eat rice once to three times a day, sometimes a piece of bread, biscuits and others. They cannot eat nutritious food because they do not have money. In addition, it can be more difficult for older people to eat healthy food because of their age and financial difficulties. This can reduce their physical reserves and limit their ability to recover in the face of a serious health problem or stressor. The physiological and sociocultural factors that affect food intake and behaviour are also important, and older men may be more vulnerable to malnutrition (Porter et al., 2015; Thompson et al., 2017). Food insecurity harms the ability of older people and their family members to cope with natural hazards and crises. Hunger and food insecurity have an adverse impact on disaster risk because they significantly increase the vulnerability of the elderly population to extreme natural hazards (Garschagen et al., 2015)

4.7 Health and illness

The most common diseases affecting older people in Bangladesh include cardiovascular dysfunction, diabetes, arthritis, osteoporosis, skeletal deformities, obesity, behavioural changes, sleep disorders and dementia. People over 50 often suffer from cancers such as prostate, lung,

stomach, colon, breast and cervical cancers. More than 50 per cent of people over 65 suffer from arthritis, which can cause pain and lower quality of life in rural and coastal areas (Islam and Rahman, 2017; WHO, 2018). Therefore, it is difficult for them to be strong both physically and mentally to struggle in the various vulnerable socio-economic and extreme weather conditions. The older people in the study area find it difficult to move from one place to another and stay at home. Some of the respondents said that they could not go to a nearby tea stall or shop. One of the participants told about his daily activities:

I used to walk to the shop near my house once in the morning and once in the evening and have tea there.' [...] I used to participate in various cultural activities but now I cannot go because I cannot move in winter and summer. (77 years old widower, Chandresh, Haritana village).

Physical weakness is one of the vulnerabilities of older people living in the region. Some of the respondents stated that due to the decline in their physical strength, they are no longer able to perform daily activities such as bathing, washing clothes, etc. without the help of other family members. They also no longer have the capability to participate in various social programmes as they used to. For example, Rashidul from Haritana village can no longer do his daily activities without the help of others. He said:

Normally I can go about my work, but when I take a bath, I have problems; I cannot bathe in the pond. I cannot wash my clothes. My wife helps me to get water for a bath and to wash my clothes.

He also said that now he cannot participate as actively in social life as he used to. Sometimes he goes to religious ceremonies, but not to cultural activities or programmes. Again, chronic health problems are one of the most vulnerable conditions for older people in the region. Most of the respondents said that they suffer from various critical health conditions such as cardiovascular diseases, kidney diseases, digestive disorders, stomach problems and chronic pain. Most of them said that their adult children cannot afford to buy the medicines prescribed by the doctor to cure their diseases. Alfaz, a 66-year-old man suffering from pain, said, "I have many problems in my

body now. I have pain all over my body now. I cannot do any work. I cannot carry the load. I do not have money, so I cannot take medicine.”

Arthritis and pain are common health problems among older people, hindering daily physical activities and increasing psychological distress. Raizuddin, a 69-year-old man, also reported that chronic pain in various parts of his body is the main enemy of their vulnerability. Raizuddin said:

I am no longer hale and hearty. I am suffering from various diseases. I have been suffering from acute headaches for about two to three years. I have to take tablets [medicines] daily - one red and one white. These two tablets cost me six Taka.

Older women, especially widows who have to work longer hours to support their families, are more likely to suffer from physical and mental problems. Palkey Begum, a widow from Ruhita village, has been suffering from various diseases for a long time because she was not treated properly after an accident. She said:

Sir, there is a problem with my body. I am suffering from many diseases. One day, trees fell on my head and wrist while I was picking brinjal in the vegetable garden behind the bamboo bushes. Some people who were cutting trees did not notice me. They cut the trees and dropped them on the land. ... One branch of the tree fell on my head and another on my wrist. I was seriously injured. I have acute pain in my wrist now. I cannot do much work. Again, I was injured during cyclone SIDR in 2007. I have to take medicines.

Rajina, a 63-year-old tea vendor from Ruhita Battala Bazar, like Raizuddin of Ruhita village in the Union, suffers from poor health with pain in various parts of her body. She said, "I am in poor health. I have pain in my waist, knees, wrists and chest. I also have a bone problem." Sakimun, a 64-year-old woman from Haritana village, also suffers from chronic pain in her wrists and waist. Her physical problems make it impossible for her to do any kind of work. She said:

... [Oh] my son, I am burdened with so many diseases. I am on the verge of fainting because I have pain in my waist. My stomach feels like it is going to intertwine with my waist. Then I could not hold still anymore. My neighbour's housewife used to take me to the talim [in-house religious gathering] by holding my hand and helping me return home.

Researchers have found that deteriorating physical and mental health, frequent falls and limited care can make older people vulnerable (Brocklehurst and Laurenson, 2008; Sarvimaeki and Stenbock-Hult, 2016; Barbosa et al., 2019). To build adaptive capacity to cope with socioeconomic hardship and extreme climate change, older adults need to have the physical and mental strength and understand their limitations. However, the current findings show that poor physical strength and reduced mental capacity of older people increase their vulnerability to various extreme events. Their health status may lead to the need for evacuation in emergencies during extreme weather events. The lack of basic health services and limited access to health facilities also increase the vulnerability of older people in the region (Malak et al., 2020).

4.8 Deteriorated relationships and social network

Social networks foster interpersonal relationships between individuals and groups in the community. People can access social support, material resources and various forms of capital (cultural, economic and social) through social networks and support (Bourdieu, 2018; Andrew, 2010). The extent of older people's vulnerability to extreme weather events sometimes depends on their social networks, relationships, which help them through the crisis, and their adaptive capacity. However, in coastal Bangladesh, people have suffered significant losses of crops and livestock over the years, leading to a loss of traditions and a weakening of social cohesion and family ties (Khan et al., 2014). Some of the participants indicated that although they have good relationships with their neighbours and family members, they are less able to maintain social networks due to physical incapacity.

Some participants said that they sometimes participate in religious activities and programmes when possible. They said that they cannot participate in all social and cultural programmes in the community. However, they try to maintain some close relationships and regular communication with their children who live outside their local community. Abdullah, an 80-year-old resident of Charlathimara village, said:

If there is a programme in our village, I usually do not go. I only go if there is a special religious occasion. I communicate with my younger son who comes once a year and I often

talk to him. My relatives are no better off than I am. None of them has land and they live very close to me.

Studies have found that social networks and other support systems reduce vulnerability among older people by providing material and in-kind support and advocacy (Kreager 2003; Schröder-Butterfill and Marianti 2006). However, weak social networks can increase the vulnerability of older people and their households if their support system is not strong. Economic insolvency has been found to have some social connectivity among older people and their households, but support systems are not strong enough to reduce vulnerability during socio-economic crises and natural disasters. Some respondents like Razeeya, a 70-year-old widow from Purbo Badurltala village in the Union, shared their experiences:

Relatives are poor. No one can give me anything. They cannot take care of themselves. [...] The neighbours cannot help each other. If I can do something for them [for other people], they give me a little, and if I cannot do anything, they give me nothing.

Nevertheless, some older people do not participate in sociocultural activities during the day because of their workload. They work all day and rest at night. Shuvasm, a participant from Haritana village, stated:

I do not participate in any social programmes, but sometimes I participate in religious activities. I go to work in the morning and sleep in the evening when I come back from work. I came here because you called me, otherwise, I would not have come. Normally I do not go out. After work, I have my dinner and go to bed.

Fakir Shah, a small fish seller from Padma village, lives in the same conditions as Shuvasm. He is one of the most cyclone-affected participants in the community and lost everything in the last natural disaster. He is busy buying and selling fish in the market all day. He said:

When I get up early, I have to catch fish from the nets. After I buy fish, I go to the bazaar. When I return, I go to catch fish again. I spend a little time with others in the bazaar. I cannot take a rest. If I take a break, I have to starve the next day. I have no one to help me with my work.

The constant threats of extreme weather events throughout the year make them vulnerable to poverty. As a result, they have to spend much of their time each day looking for work and food, which affects their social connection. Some respondents said they do not have many friends or relatives in their community because most of them have died of old age.

Because of their involvement in various households and odd jobs for livelihood, some older people, especially widows, do not have much time to participate in local programmes. Their social relationships are also relatively weak. Momina, a widow, does not have time to participate in social events in the area because of her daily work for livelihood and household chores. She focuses more on work than on social events. Having lived in poverty for many years, she knows the links between socio-economic status and family ties. She thought:

The relationship with kinship largely depends on economic solvency. ... Brothers help their sisters if they are solvent, otherwise, it is not possible. [My] brothers live on [nearby] Char-[Island]. Twelve years have passed since I last visited them. I meet them on the street, but they do not come to [my] house. Nor do they ask about my weal and woe.

Older people like Shuvasm, Momina and Fakir Shah, for example, may lose their social network due to their business and may not be able to maintain regular relationships with other members of their community. It is evident that having a good network of family and friends and living in a good neighbourhood can increase older people's standard of living and reduce their vulnerability (as described in chapter seven). In general, respondents in this study found that they have some good relationships with their children and family, but not as good as they would like with their neighbours and support organisations. Older people with low confidence in social networks, knowledge sharing, solidarity and cooperation were more vulnerable than those with high levels of social capital, as evidenced by, for example, participation in mutual aid, social cohesion or other collective activities. Older people who had not established social networks and bonding relationships in their earlier lives were likely to be excluded or exempt from informal vertical and horizontal social networks that provide for the family, extended kin, neighbourhood, community groups or peer groups. The interaction between low social capital and the resulting need for care is illustrated by older people who are dependent on care and assistance and have 'no carer' (Eeuwijk, 2006).

4.9 Discussion and conclusion

The vulnerability of older people can be considered a multifaceted construct where environmental influences such as culture, economics and politics interact with biological mechanisms throughout their life (Barbosa et al., 2019). This chapter discusses the sources of vulnerability of older people in coastal Bangladesh. The vulnerability of older people is due to some factors, including poverty, poor health, inadequate housing, nutrition and support, and insufficient employment and income opportunities (HelpAge International, 2013; Islam and Khan, 2018). The present study found that the vulnerability of older people begins with their settlement in the vulnerable area. Older people in the area have been vulnerable for more than 150 years since their grandparents or forefathers started clearing the jungle in the wetlands and settled here. Their ancestors had to fight against nature and extreme natural calamities from the beginning of their settlement in this area. This vulnerability was passed down from generation to generation without any permanent solutions. In this study, it was found that most older people's settlements were located near the river and sea, which made them more vulnerable to extreme weather events.

The vulnerability of their settlements to extreme weather events, especially cyclones and floods, was related to three mutually reinforcing factors: location, the likelihood of an extreme climatic event occurring, and the extent to which their structures can be damaged. Their houses were considered vulnerable because they are built with cheap and poor building materials such as mud, corrugated iron sheets and ridged tins. Many of these houses were light, typically wooden frame structures, which made them particularly vulnerable to cyclones. Building houses that were resistant to cyclones was very difficult for older people - the disaster victims - due to acute poverty and lack of resources. They could not afford the materials such as sand, bricks and cement needed to build cyclone-resistant houses. They also had limited access to local engineers who can build cyclone-resistant houses (Islam et al., 2018). The findings of this study have shown that many of the houses in which older people and their households live were of very poor quality. Most of the houses were provided by NGOs or local government organisations after various extreme weather events. In some cases, the houses are built by older people themselves with their hard-earned money or with loans. However, most of the respondents said that it was very difficult to build houses that could withstand extreme weather events such as cyclones.

Older people living in absolute poverty lacked the means to deal with extreme weather events, which further increases their vulnerability. Poverty and disempowerment were linked to a lack of access to necessary resources. In addition, poor older people may be more vulnerable to extreme weather events due to their dependence on family and community resources (Neil Adger, 1999). The present study found that older people suffered from a lack of necessary amenities in their homes. They did not have enough warm clothes for the cold weather and they had limited access to toilets. In addition, there are no mobility aids for them; some of them rely on family members or other people to get around or do their daily activities. In addition, the livelihoods of older people from low-income families in coastal areas are associated with endemic poverty and their vulnerability to extreme weather events may increase due to lower savings habits or economic difficulties (Islam, 2018). Vulnerability in old age also appeared to be strongly associated with low material resources and poverty (Crooks, 2009). In general, poverty was associated with a lack of resources or assets, making it more difficult for older people and their households to address threats when they occurred (World Bank 2001).

The current study found that older people in the region had fewer employment opportunities. Some jobs are not accessible to older people because of their physical strength and limited mobility. Therefore, many older people, especially older women, preferred to stay at home and do household chores. The physical limitations of older people may have prevented them from moving around independently due to age-related problems such as frailty or disability. In addition, their mobility was further limited by the lack of sufficient financial resources. Their deteriorated physical and financial circumstances led them to become increasingly dependent on their family members for daily needs in old age (Malak et al., 2020).

Land tenure was the most valuable asset for rural older people to survive with dignity in the community and there was a link between asset availability and vulnerability of later generations. The study found that grandparents and parents of older people owned some properties, some of which they lost due to extreme weather events or other social or family crises. Some older people who had inherited property from their grandparents or parents were less vulnerable for a few years but had to sell it to survive various extreme weather events, which pushed them into asset vulnerability. The parents of the majority of the elderly were themselves poor and owned little or

no property and land, which hindered their better upbringing, education and greater job opportunities, which is one of the causes of their vulnerability in old age. Moser's (1998) approach to asset vulnerability is based on the premise that the more assets people own, the less vulnerable they are, and the more their assets decrease, the greater their vulnerability becomes. Since vulnerability was largely related to a household or individual's assets and insurance strategies relative to risk, the poor are less resilient to shocks and therefore more likely to become vulnerable (Crooks, 2009).

According to a study by the BBS, the old-age dependency ratio in Bangladesh was eight per cent (BBS 2015). The study found that the increasing dependency of the elderly was more than offset by the decreasing dependency of children, creating the problem of economic support for the elderly in the country. Most of the elderly in the study area were socio-economically dependent to some extent on their family members and the social support system, as they were vulnerable to extreme events due to their economic incapacity and lack of resources. Before and after extreme weather events, when the social support system was inadequate, they depended on their children for daily necessities such as food, clothing and medicines. The results of another study also showed that older people were particularly vulnerable during a cyclone due to their lower assets and dependence on young adult family members. In addition, the vulnerability of people living in the coastal belt was higher due to factors such as low income or dependence on their son or daughter, which limits their ability to cope with such events. Researchers believed that older people living in coastal Bangladesh were particularly vulnerable due to their lower mobility and economic and cultural dependence on their children (Malak et al., 2020).

Focusing on climate change and seasonality, Shams and Shohel (2016) analysed the existing threat to food security and livelihoods in coastal Bangladesh. Their study revealed that food shortages occur repeatedly during the sowing and harvesting seasons. While the food deficit remains high (68-95 per cent) from mid-August to end-October, it reaches its lowest level (21 per cent) in December. The present study thus finds that food insecurity or vulnerability is a common scenario among the elderly population in the region. The food intake of older people in the study area was influenced by their ability to buy food or the availability and accessibility of food within the family. What they got one to three times a day was what they eat, which means nothing special was

prepared for them. There were days when they do not get anything to eat. In contrast, nutritious food such as meat, fish, eggs and fruits are only taken when they are given by a close relative, a neighbour or at a sacrificial festival of the Islamic religion during the year. They could not afford to buy the goods themselves because they could not afford them. Another study found that rice, wheat, pulses and vegetables were the most commonly consumed foods, while fruits and sweets were the least consumed by older people. In the study, a quarter of the elderly ate fish, while two-thirds of them ate meat for less than a week. The researchers found that food insecurity was inversely related to the household income of the elderly and positively related to the number of family members (Quddus and Bauer, 2014). In addition, research has shown that older people could not feed themselves regularly and their families essentially lived on subsistence. Several studies have found that the majority of older people have incurred debt for subsistence.

Many of the respondents in the present study suffered from various chronic diseases, although health was their most important asset as it affected their ability to work and maintain a satisfactory standard of living (HelpAge 2002). Most of the older people in the study area were vulnerable to diseases and infirmities. They are unable to get healthy and nutritious food and adequate medicines due to their financial inability. They also depended on the local pharmacy to take medicines in case of illness, as health services in the area are inadequate. In addition, the health status of older people was consistently associated with their vulnerability, as it was generally associated with lower earning capacity (Dwyer et al., 2004). In another study in Bangladesh (Malak et al., 2020), their reduced physical strength and declining mental capacity were found to make them vulnerable to diseases (Malak et al., 2020). In the absence of proper basic initiatives - lack of social awareness, lack of education, limited access to health facilities - vulnerability borders on the extreme. Often, older people lack adequate sanitation and hygiene facilities, food security and family care and support, making them vulnerable to disease (Malak et al., 2020).

From a conceptual perspective, older people's vulnerability was the outcome of complex interactions of individual risks, namely being exposed to a threat, realising a threat and not having the defences or resources to deal with a threat (Schroeder-Butterfill and Marianti, 2006). The vulnerability of older people was to some extent rooted in the geophysical location of the area, the housing structure and the location of their housing and livelihoods. Dependence on family

members, especially sons and daughters, due to the fewer job and income opportunities makes them more vulnerable in terms of basic needs. Poverty is one of the most important factors in the vulnerability of older people living in the region. It is often the result of cumulative disadvantages over a lifetime, as well as gender disparities and structural problems. Older people were often financially vulnerable, as their care and living costs could sometimes exceed their income and support. In addition, poor quality construction materials used in their houses, inadequate nutrition and a lack of social networks make them more vulnerable to extreme weather events.

Chapter 5: Vulnerabilities of older people to extreme weather events: livelihood, land and housing

If there was a cyclone, I had to leave everything behind and move to the cyclone shelter to save my life. Everyone had to leave their house. When I returned from the shelter after a cyclone, I found nothing. I had to start from scratch again.

- An eighty-year-old participant from Padma village.

This chapter analyses how extreme weather events have increased the vulnerability of older people in the study villages. The coastal region of Bangladesh is vulnerable to extreme weather events - cyclones, floods, tidal waves and soil erosion. The coastal population of Bangladesh also faces various forms of extreme weather events simultaneously, which cause heightened vulnerability (Paul, 2015). The major extreme weather events in the study area include strong cyclones, floods, erosion of river banks, hot summers, bitter winters and tidal surges. Some respondents said that bitter winter weather was worse now than in the past. Others observed that summer was getting hotter by the day. Extreme weather events have a negative impact on the vulnerability of older people in coastal areas of Bangladesh. Strong winds and floods have destroyed their houses, roads, bridges and other facilities. Electricity and communication links were disrupted, and highways and rivers were impassable. Drinking water was contaminated by waste and salty water from the floods. In 2007, for example, cyclone SIDR caused significant damage to infrastructure and assets, as well as lost production worth BDT 30.2 billion (US\$ 438 million), 95 per cent of which occurred in the affected coastal areas of Bangladesh (GoB, 2008).

Older people faced complications, suffering and damage after extreme weather events, especially after a cyclone. They were often unable to cope with the aftermath as there appeared to be insufficient resources and relief services. Concerned government officials, local and national humanitarian organisations and NGOs helped and provided support in the aftermath of the cyclone, but the capacity, resources and steps required for emergency relief were unevenly distributed. Political and social rank and power imbalance also played a crucial role in exacerbating the vulnerability of older people following various extreme weather events (Mallick et al., 2017). This chapter analyses how extreme weather events increased older people's vulnerability by affecting

their employment conditions, income and expenditure, housing and living conditions, land and assets.

5.1 Livelihood vulnerability

Extreme weather events negatively affect the livelihoods of older people in coastal regions, making them financially vulnerable. Studies by the government of Bangladesh (2008) have shown that older people do not have formal or regular jobs. Agriculture and fishing were the main sources of employment, followed by some small businesses in the region, which had consistently been affected by almost every extreme weather event in the past. Household members of older people engaged in fishing in the sea and coastal rivers and collecting wood and honey from the mangrove forest - Sundarbans. Older people who could engage in these activities with their sons, brothers or nephews, could earn some income. A study by the government in 2008 after cyclone SIDR in 2007 found that about 2.3 million households suffered some degree of damage, of which about 1 million lost their livelihoods. As many of the households had overlapping livelihood activities, they were simultaneously affected by losses in crops, livestock, fisheries, trade, industry and employment (GoB, 2008).

5.1.1 Loss of employment and income

All the participants said that extreme weather events damaged their employment opportunities. Most of them said that they had no or limited opportunity to engage in paid work, yet they had to do something to survive. Being a coastal region, most of the available jobs were related to fishing or irregular casual work. As they did not have regular jobs, they suffered immediately after extreme weather events. Most of the respondents reported that they were unemployed immediately after the cyclone because the hazards were too great after the cyclone. Chandresh, a 77-year-old widower from Haritana village, explained:

After cyclones and floods, we have to remain unemployed. There is water everywhere, and trees have fallen on the roads here and there. Dead bodies of people, animals and birds – cows, goats, poultry – were found everywhere [in cyclone SIDR]. It was difficult to move around and find work.

After each extreme weather event, older people in the area became either unemployed or underemployed. After the events, it was difficult to move from one place to another and communicate with people and job providers. This was because the extreme cyclones destroyed all infrastructure – roads, dams, homes and communication systems. Trees were uprooted on the roads and streets, hindering people's daily movement to or from work. The tidal surge and cyclones inundated the entire area, causing days of flooding and forcing elderly people to stay at home without work. One of the participants, Chandra, a 73-year-old farmer and casual labourer from Charlathimara village, said:

I lost my work after the extreme events – cyclones – in the past. During cyclone SIDR in 2007, I could not do any work for 8 to 10 days. All [roads, paddy fields, farms and fishing infrastructure] were under water [due to storm surge and flooding].

An 80-year-old Rashidul from Haritana village said he too was jobless. "In the last cyclone in 2019, the water in my courtyard was up to my waist and it took two to three weeks to dry. How could I work under those conditions?" he said. Most of them said it was not possible to work. The same happened during cyclone SIDR and other cyclones in the past. After the cyclones and floods, participants often said they were unemployed due to limited employment opportunities. There were no employment opportunities after the cyclones. Those who were self-employed said they had to stop working for days because of the destruction of workplaces:

I could not do any work at the time of [the] cyclones. I had no work at that time. At the time of cyclone SIDR, work was stopped for many days. Probably even for two months (a 62-year-old man, Biddut, a casual labourer from Padma village).

Work opportunities also declined sharply immediately after the cyclone, leaving them without work for weeks and even months. Elderly people who sometimes worked as regular casual labourers lost their employment after the extreme events as their workplaces collapsed. Some participants said that the bitterly cold weather after the extreme weather events prevented older people from working because they were physically unable to cope with the adverse temperatures. As older people did not have enough strength to beat the harsh cold wind after the events, some employers did not want to hire them for work. One of the participants from Haritana village,

Rashidul, claimed, "... no one gave me work in the cool weather [after the extreme event]. They said this old man could not work in this bitter cold".

Community life also came to a standstill after any extreme weather event, especially after a cyclone. The waterlogging after the cyclone prevented agricultural activities for months and sometimes even years as the soil was contaminated by the inundation of sea water. Many participants were out of work in labour-intensive sectors such as agriculture and fishing in the region due to the damage. The loss of boats and equipment further limited the fishing capacity of those who were engaged in fishing, which dramatically affected the job prospects and earnings of older day labourers. Shamiul, an 80-year-old man from West Haritana village described:

At that time [after the cyclones and floods] everything [work and activities] almost came to a standstill. I did not go anywhere. Where was I supposed to go? All the places were flooded. Rivers and canals overflowed their banks. I could not work then. This always happened when there were cyclones and floods.

The participant mentioned above had a small fishing business. He had a fishing boat and nets that were washed away; after cyclone SIDR in 2007, there was nothing left for him to work with. Older people who were marginal farmers in some way lost their farm implements – ploughs and animals, which also prevented them from going to the fields, reducing job opportunities. However, the duration of unemployment depended on the strength and severity of the cyclone and floods. One of the participants, Sabdar, from Padma village said:

[...] Work remains on hold during cyclones and floods, but it depends on the magnitude of the cyclone and the extent of the floods. If the weather events are less sustained, work will stop for a short time. On the other hand, if the cyclone was severe and the floods were of longer duration, work stopped for a long time.

Increased unemployment after cyclones and floods dramatically reduced the income and wages of older people and their households. Since most older people had limited capacity to work, they had no or inadequate income to survive. A 77-year-old participant, Chandresh, said:

I had no income [after the cyclone]. [...] my sons who could earn some money if he had work. He used to cut trees on the roadsides as a casual labourer. After one or two days of work, he remained unemployed most of the time because there was no work [which was the only source of income for the household].

The older participants said that they had lost their regular daily income due to the unavailability of work after serious events in the past. They could only earn some money when they were able to pursue a job. One of the participants, Chandra, a 73-year-old man from Charlathimara village, said: “There was no regular income [during the last cyclone]. There was no certain income per day. If I could do some work, I would get some money”. Depending on the availability of work and their capacity to do the work, their income ranged from BDT 10 to BDT 500 per day. However, they could not receive wages for some time after the disaster. As employment opportunities decreased drastically after an extreme event, this affected their income. Most of them said that their post-disaster income was not enough to meet their basic daily needs, which increased their suffering for days. Older women who were divorced, widowed or separated had even fewer income-generating opportunities after an extreme weather event and were one of the hardest hit groups in the community.

5.1.2 Increase in family expenses

Due to the decline in employment and income, the extreme weather events affected the expenditure of older people and their households in the region. Maintaining household expenditure was a critical issue for older people in coastal areas after the disaster. Although their expenses were limited, it was difficult to manage their inadequate income and support. Most of the respondents reported that their expenses exceeded their income after extreme weather events in the past. They could not buy the daily necessities. Rashidul from West Haritana village said, "Daily expenses were higher than my income. With BDT 100, I could buy five kilogrammes of rice. I was struggling to manage my [other] daily expenses". Chandresh from Haritana village said:

My expenses are very low. I drink some tea every day. However, my household expenditure is BDT 150 to 200 per day, with an average of BDT 4000 to 5000 per month. Income is not enough to cover household expenses. Sometimes it is difficult to arrange oil

for cooking. Again, it is very difficult to manage household expenses during a time of disaster. If we do not get help from GO /NGO, the expenses become too great to manage.

Some of the participants said that the cost of living gradually increased due to higher prices that follow any extreme event. A 72-year-old Shamiul, a fisherman from West Haritana village, said that expenses had increased significantly during the disaster. Older people who lived in an extended family said their income was not enough to meet daily expenses. One of the participants, 73-year-old Chandra from Charlathimara village, claimed:

The expenses were increasing every day. There were almost ten of us in the family, including grandchildren. Expenditure was very high at the time of the disaster as basic commodities became more expensive.

The older people struggled to make a living in the past during various weather extremes. They said that most of their income went towards repairing their houses and buying food and clothes after an extreme weather event. They also had to pay for health costs, including the cost of medicines and medical care, and sometimes the costs associated with funeral activities after the death of family members in the cyclones. Most of the older people said that they would not have been able to meet their living expenses after the extreme events if they had not received assistance. Sometimes they could not buy food and cooking utensils if they could not find work. They said that it was very difficult for them to manage household expenses at the time of the disaster. Elderly participant, Chandresh, a 77-year-old widower from Haritana village, said, "... managing household expenses during times of extreme weather events was challenging." A 67-year-old Hossain, marginal farmer and casual labourer from Badurtala village, said, "the daily expenses increased after the disaster because everything was washed away; [almost] nothing could be bought [near us]. Only the brick-built houses existed here."

There were several reasons why the daily expenses of older people and their households increased. The older people said that during cyclone SIDR almost everything was destroyed in the area, houses, shops, and roads. Most areas were flooded, trees were uprooted on the roads and streets and the supply of goods was disrupted for days. They said that expenses have increased after the cyclones and floods, and they sometimes had to take loans to cover their daily expenses.

5.1.3 Increase in debt

Another financial vulnerability of older people and their households after an extreme weather event was debt. As older people and their households were forced to borrow to meet their immediate needs and livelihoods due to the cyclone, they were heavily indebted. Many households took loans from landlords or from other people to replace lost livelihoods assets such as chickens and goods to restock shops (GoB, 2008). It was noted that older people and their families found it difficult to cope with increased household expenses with the limited income they had and the support they received, which pushed them into borrowing. Most of them said that they had to take loans from various banks, NGOs and moneylenders. One of the participants, Fakirshah from Padma village, said that he took loans from NGOs, fishmongers, moneylenders and banks. He reported that he borrowed nearly BDT 0.4 million from moneylenders and BDT 30 thousand from the Agriculture Bank and the rest of the loans were taken from different NGOs – ASA, Sankolpo and Sangram. He also said that he is facing difficulties in repaying the loan instalments. The interest on his loan is still increasing as he has not been able to repay the loan. Some participants said they had to take a loan to start their business from scratch after the cyclone, and some others reported taking loans to repair their houses. Fakirshah said again:

I took the loan before and after cyclone SIDR. I spent it on buying nets and trollers [motor-driven fishing boats] for the fishing business. I did not have a big business anymore. I ran a small business by taking a loan.

Some of the participants said that they took loans to build a new house or repair their destroyed house after the disaster. An older participant, Shamiul, a fisherman from West Haritana village, described:

I took a loan after the SIDR. And another loan from the Agricultural Bank before the SIDR. I repaired my house with the loan. I bought the tins (corrugated sheets). Sangram NGO built a house for me after SIDR. They gave me 20 pieces of tin after the SIDR. I bore all the other expenses myself.

Some of the elderly took a loan to start a new business or rearrange their business activities and for medical expenses, while others borrowed money for food and daily needs. Some of the older

people took loans for fish farming in their ponds. One participant, 66-year-old fisherman Sabdar from Padma village, said:

I took a loan of BDT 0.13 million to raise fish in my pond. After a cyclone, I again took BDT 10,000 from an NGO. I have not been able to repay the loan yet. The interest on this loan has increased to double the principal amount.

However, the participant said that all the fish in his pond had been washed away during the SIDR cyclone. There was nothing left to repay the loan. Most of them did not pay the dues on time due to their financial incapacity and increased unemployment or their inability to engage in income-generating activities. Some of the older participants said they were in debt and had been sued for repayment. One mentioned that he had spent nearly BDT 40,000 on the construction of his house, including corridors on all sides. He had taken the money as a loan from Sangkalpo and Songram (NGOs) but could not repay it. He said that a court case is pending against him for not being able to repay the loan taken from the providers. Similar comments were made by a senior male participant, Chandresh, from Haritan village:

... Yes, I had a loan from Polly Schanchy Bank (Village Savings Bank) – [a government project]. I got BDT 7,000 but could not repay the dues. I had repaid only two dues. I had no income to repay the loan. If I could not pay off the load, they might send me to prison. I would go to prison, but I could not repay the loan. [...] no bank or NGO would approve a loan for me because I could not repay it. I had bought some tin and the necessary materials to repair my house; some money I spent on healthy food and clothes.

Generally, older people had limited access to the credit market due to their limited income, assets, employment and physical condition. Most older people reported that they were unable to repay the loans they had taken at different times – before or after the cyclones – for different purposes and from different sources. A 60-year-old widow, Raima, from Western Badurtala Cluster Village said, "I had borrowed some money. I took 40 thousand BDT from the NGO Sangram. With the loan, I built this house and bought this tin [material to repair the house].

She also owed nearly BDT 7000 to two shopkeepers in the local market. She said, "I am in debt of about BDT 10,000 to shops and other people." Borrowing from various sources was seen as one

of the coping mechanisms after the extreme events to address the losses and damages, although the government, national NGOs and foreign donor agencies provided some assistance throughout the recovery process. However, the recovery efforts were not enough for most of the older people to recover from their losses. As a result, the poor older people and their households had to borrow money from formal and informal institutions such as microcredit providers, banks, moneylenders or other sources (Subhani and Ahmad, 2019). But when the time came for repayment, there were problems for the elderly. Most of them were not able to repay the borrowed money. Moreover, most of the older people and their families shared that when they borrow money from private businessmen (Aratdah), they have to sell their fish catch back to them below the market price. They reported that they were under financial pressure from the money lenders to continue repaying their loans. They often ignored cyclone warnings and stayed at sea in extreme weather conditions, keeping them vulnerable to death (Government of Bangladesh, 2008).

5.2 Loss of land and assets

The extreme weather events destroyed various assets of the older people and their households almost every year. Following a catastrophic event, damages included the loss of fishing boats and equipment, production facilities and tools for self-employed people. Some older people said that the cyclones and floods destroyed their fishing ponds and fishing gheras (enclaves or fencing) and that they lost their family's livestock and birds. Public infrastructure such as roads, dams and power grids were also destroyed. The cyclone and floods destroyed their cowsheds and other agricultural infrastructure. Siltation of land, soil erosion, loss of inventory, destruction of shops or business premises and loss of stored food were other consequences of each extreme weather event in the region. According to the Joint Damage, Loss and Needs Assessment (JDNLA), the total damage and losses caused by cyclone SIDR in 2007 were estimated at (US\$ 1.7 billion) BDT 115.6 billion (GoB, 2008; Islam, 2018).

5.2.1 Loss of land

Patharghata – the study area– was surrounded by rivers, along the banks of which older people and their households faced various extreme weather events every year. Due to the negative impact of these extreme events, they lost their farmland and residential land. Most of the older people had

no land – neither farmland nor residential land. Some of them owned small pieces of farmland or residential plots. Some of the older people in the area were living on the state khas land or the embankment. Others in these poor areas had inherited some land from their parents or grandparents, but most said the land was lost or damaged due to soil erosion caused by storm surges and floods, forcing them to become landless. A 60-year-old widow, Shakima, from Padma village said in tears: “I did not have a single piece of land. After my husband died in 1988, I lived with my father. My father had two acres of land, which we lost due to the erosion of the river bank”.

The destruction of the riverbank was one of the most drastic consequences of the cyclone's wave surge and flooding in the region. The socio-economic impact of this calamity on the elderly and their households was extreme. Three rivers surround the study area – Bishkhali, Boleshwar and Horinghata. Some of the older people and their families have been affected by riverbank erosion of these rivers several times in the past. The erosion of the riverbanks has mainly affected the livelihood of the farmers as both their agricultural and residential land had been lost. Amena, an 80-year-old widow from Padma village, reported:

My father was a rich man. After my marriage, I found that my father-in-law was also very wealthy. My husband owned five acres of land, all of which has been lost due to erosion of the river banks. Most of my father's land was also lost to soil erosion.

The 60-year-old widow Palkey lives with her son in Ruhita village in the Union near the dam, but the house is not hers. She lost her house in cyclone SIDR in 2007. She recounted her horrific experience, “My house was on the bank of the river near the dam. It was destroyed by the erosion of the river bank at the time of SIDR in 2007. We now live on each other's land.” Some older people said they had to move to nearby roadsides, embankments and surrounding towns when they lost their land and residence. Rajina, a 63-year-old tea seller, lives with her husband in the same village of Palkey on the embankment. She said:

I do not have land anymore. The land I had was lost to the Ganga [river] due to erosion of the river. I had ten kathas of land in the field. The land yielded some paddy. I had a house. There were many coconut trees in my house. All of them were eroded by the river.

Lailunnahar, a sixty-year-old woman from Padma village, said she had no land as she had not received anything from her father or husband. She said she had just got two kathas of land from her mother where she lives now. "My husband had only 60 decimal lands. But it was eroded in the river five/six years ago," she added. Eighty-year-old Abdullah of Charlathimara village said his father used to cultivate some land. But the river had grasped all their land in the past. He claimed:

The river has also grabbed our house and our home. I do not have a house anymore. I live in a government-provided house. The Bangladesh Navy built it. But that will also collapse soon. The place where I live is not safe and secure. It could fall into the river at any time.

Some of the respondents said they had to lose their land to meet their family expenses in the aftermath of the financial crisis. Enam, an 80-year-old widower from Padma village in the Union, said he was a farmer and made a living from cultivating his land. But he too lost his land. Now he is landless. He stated:

[...] But after the disasters there was an acute food shortage problem, there was no food left at home. What were we supposed to eat? The food provided by the government was taken only by the powerful people. We could not manage with what they distributed to us. It was only enough for two days or one day [what we get]. Then we had to meet the expenses ourselves, otherwise, we had to sell our land properties.

By losing their farmland and residential land, they are at risk of becoming homeless. They then have to move their house to government-owned land or to their neighbour's land temporarily, which greatly affects their socio-economic life and livelihood. Sometimes they or their households have to migrate to a nearby town or big city to compensate for the losses that make the older people vulnerable to living alone.

5.2.2 Loss of resources

Although farming and fishing were the main sources of income, livestock rearing was also an important source of income for the older people and their households in the region. They generated daily or monthly income from the sale of milk, eggs, poultry and goats. However, the extreme storm surge from the cyclones drowned their animals and birds and destroyed the livestock shed

or uprooted trees, causing them to lose their livelihoods. One of the participants, Biddut, from Padma village said:

I had 100 feet of the fishing net but everything was damaged, my fishing boat was destroyed. Did not I tell you that I had only one piece of cloth – which I was wearing – left? ... I had cows and goats; I lost them all.

The elderly fishermen and their household members had been affected by the extreme cyclone several times in the past. Some participants said that the cyclones also destroyed their fishing infrastructures - ponds, fishing gheras (enclave or fencing) and equipment. Their fishing boats and trollers (motorised fishing boats) and fishing nets were destroyed or washed away; the fish from their ponds were washed away by the overflow of water from the storm surge. An elderly participant, Sabdar – a small farmer – from Padma village reported:

The fish in my pond (worth about BDT 0.1 million), a shop and a troller have washed away during cyclone SIDR. I had six bags of fishing nets to catch Hilsa fish and many other items – all were gone, and nothing was found after the cyclone.

The participant said that during the cyclone, every one of the fishermen lost their fishing boat, nets, fishing gear, the undercarriage of the boats and other materials in fishing boats. As a result, they could not go out to sea to fish after the cyclones. A fisherman from Padma village said he had been involved in fishing since his youth and lost all his fishing equipment due to the SIDR cyclone. An older person also said that he had bought all his fishing equipment with loans from various sources. He was upset when he talked about his loss at the interview. Most of the older people said that during the cyclone, various animals and birds such as goats, cows, chickens and ducks were washed away or died. About 80 per cent of animals and 76 per cent of birds died in the four worst affected districts in the coastal regions during cyclone SIDR in 2007. Animal and poultry farms, livestock, food, fodder and grazing land were also lost during this cyclone (GoB, 2008). It also destroyed crops in the fields of some older people. A 67-year-old marginal farmer, Hossain, from Badurtala village described:

... In the SIDR, there was nothing but us – the members of our family. During cyclone SIDR, it was found that everything – houses, farms, paddies, livestock and poultry – had been blown away and washed away. Everything in my house had been destroyed.

The older people who were small retailers in the affected areas had lost almost everything. The small factories (rice mills, saw mills, potteries), shops (blacksmith shops, barber shops, repair shops of various kinds), some wholesale shops, several repair shops for tricycles and rickshaws, sewing machines of tailoring shops, sewing machines in private houses and vegetable shops were destroyed. Most of the older participants said that retailers in the areas affected by the recent extreme events witnessed the destruction of their business premises and the loss of inventory of their shops. A small shopkeeper, Kamal, from Badurtala village, said:

I lost all my inventory; all the goods in the shop were destroyed and washed away, and my shop collapsed in cyclone SIDR. My shop was right next to my house. All [shops and houses] collapsed. I had no place to live. [...] I was selling clay pots and groceries, but all of them were washed away with other goods. My oil drums and containers were also washed away.

Older people in coastal areas have had bitter experiences of cyclones and floods. Some participants said that almost everyone lost their belongings in the last extreme cyclone. Older people shared their stories of suffering that were due to the loss of various material goods such as food, bedding, toilets and other possessions of older people and their household. Those older people who had some cultivable land had lost their crops. An older woman participant, Shakima, a widow from Padma village, reported: “[...] During cyclone SIDR, I was with my daughter. All my clothes, fishing nets of my son-in-law – everything – even the pot I kept rice in was washed away”.

In addition to the losses from the severe cyclones and floods, the older people often had to sell their belongings to survive after the disaster. They claimed that if there was anything left after the cyclone, sometimes, they had to sell their bare necessities like land, livestock, building materials and other personal belongings to cope in the aftermath of the extreme weather events, making them even more vulnerable.

5.3 Loss of dwellings

The vast majority of coastal residents in Bangladesh were impoverished and living in poorly constructed houses. Older people in the study area lived in houses made of corrugated iron sheets (tin) and wooden or bamboo posts and straws. Participants said their houses were inadequate and did not protect them from the strong winds of the cyclone and storm surge. Although most of the houses in the region were donated by the government and NGOs after the severe cyclone SIDR in 2007, some older people said they did not receive any support from the government or NGOs to rebuild their houses after the extreme weather events. Rather, they rebuilt and repaired their houses on their own and with the help of loans. The older people complained that the roofs of their houses, donated by the government and NGOs, were defective and leaking due to rust. In the rainy seasons, rainwater could enter their houses through holes in the roof. Some of the older people and their families lived outside the embankment and thus they became the first victims of the extreme weather events.

5.3.1 Loss of houses

Cyclones caused damage to houses in three ways: storm surge, flooding and wind. Brick-built houses were much more wind-resistant and often served very well as local ad hoc shelters, but were still destroyed by flooding and storm surges. Storm surge was by far the strongest destructive factor in some areas, leading to the destruction of houses and non-engineered structures. The wind caused some direct destruction, which was generally quickly repaired, as well as a significant number of fallen trees – one of the main causes of the destruction of houses by the wind (GoB, 2008). Most of the older people shared their experiences of losing their houses after the cyclone. Some of them said that their houses were destroyed; some houses had collapsed, and others were blown away or washed away. One participant, Fakirshah, reported:

Yes, my house was destroyed. There was a big loss during the SIDR. I could not identify the place where my house was. The items in the house were also washed away. The foundation of my house collapsed. It also collapsed during the last cyclone Bulbul in 2019. I have not [re]built it yet. Bulbul blew off the roof of my house. The trees nearby fell and crushed [my] toilet.

The older people of the area believed that extreme weather events such as cyclones, storms and floods have increased over time. Some said that they had experienced more than one cyclone and flood in their lifetime and that their houses had been destroyed more than once by past cyclones. Rashidul, a marginal farmer from West Haritana village, described his situation:

... My house has been destroyed six times by cyclones and floods at different times [in the past], most recently by Bulbul in 2019, when trees fell on my house. I have not been able to rebuild it yet, no [other]way to put beds and bedding [in the rooms of my house].

Similar statements were made by some older people from other villages. Most participants reported that their houses had been hit by cyclones three or four times. Since most of the older people and their families were not able to build a house with bricks, they tended to use wood and thatch. Many respondents reported that only the foundation walls of their houses were left. Some said that the houses still stood after the cyclones but were not habitable because of the damp and muddy floors. Older people used dry materials when possible to make them usable for themselves. An 80-year-old Enam, widower, from Padma village, described:

There was a living problem after floods and cyclones. The house floor becomes after the houses are flooded. There was a sleeping problem. So, the foundation of the house was flooded in the last cyclone. Then we spread ashes on the damp ground, especially ashes of cinders. We had to spend several nights in this condition until we could repair it.

The extremely precarious situation older people found themselves in after the cyclones often meant they had nowhere to live. Some reported that they had to stay out in the open under the trees for days until they found their accommodation or received help from aid organisations. Many told how they had temporarily repaired their shelter with uprooted trees and plastic sheets after the cyclone and stayed there until they managed to build a permanent frame. One 70-year-old participant, Abul, from Padma village, explained:

My house was swept away during cyclone SIDR in 2007. After the cyclone, I stayed here and built polythene shed. After three months, I got some corrugated sheets. After a few months, my house was [re]built with this sheet [corrugated metal] and wooden posts.

70-year-old Rizeeya, a widow from Purbo Badurtala village, experienced similar conditions. She explained:

The house is made of wood and corrugated iron. The sheet metal has been badly damaged by cyclones and floods. I am living makeshift under polythene shed. I still cannot repair the door and put it up. I have no way to repair it. That is why I cannot do it.

Participants from the affected villages reported that it was very difficult for them to rebuild their houses after the cyclone. Some of the participants said that they received some material and non-material help from various sources (details in chapter seven). Others, however, claimed that they did not receive any assistance at all after the cyclone. A 69-year-old respondent, Raizuddin, from Ruhita village in the Union said:

Cyclone SIDR caused a lot of damage. My house had collapsed. There was no shed on top of the roof anymore. It had been blown away. Later I rebuilt and repaired it with wood and corrugated iron. I had not received any support. It cost me BDT 20,000. I used my earnings to cover this.

Some elderly people reported that some parts of their house – verandah, roof, or wall – were damaged in the past cyclones. Some respondents said that they did not receive the necessary assistance due to problems with the management and implementation of relief programmes, including the programmes' association with certain political and social ideologies. Elderly people who did not receive assistance from the government and non-governmental organisations had to borrow money from the bank, NGOs and moneylenders. A 60-year-old widow, Raima from Western Badurtala Cluster Village, pointed to a nearby place during an interview and said:

... Here was [my] house, which was destroyed [by the cyclone]. I had no place to live. I did not get a house as compensation. Maybe it had been two years; since I had repaired my house. Before that, I had lived in a broken house for 11 years [repairing the house]. It cost nearly BDTs 0.2 million to repair and build that house. My son borrowed money from a bank and got some [financial] help from his father-in-law.

It was estimated that 34 per cent of households with destroyed houses and 17 per cent with partially destroyed houses live in the area affected by cyclone SIDR (GoB, 2008). The destruction of houses and loss of housing affect the living conditions of older people in the region.

5.3.2 Suffering on the way to the cyclone shelter

Reaching and staying in shelters was one of the vulnerabilities faced by older people during extreme weather events in the past. Older people in the region said their houses were not strong enough to protect them from the devastating cyclone. Therefore, they had to find a safe place to shelter and usually went to the cyclone shelter, although the number of cyclone shelters was not enough to protect them all. But they faced many dangers on their way to the shelters. Older women, especially older widows, were more vulnerable to self-evacuation than their peers. One older widow recounted how she and her daughters were evacuated on their way to the shelter during a past cyclone. Raima, a sixty-year-old widow from West Badurtala village, narrated:

My house was no longer safe. I did not dare to stay at home when I heard the news of the cyclone. [...] I climbed a tree near my house with my three daughters and tied them up. But I was not able to protect all of them from the strong onslaught of the water. I left my disabled daughter in the water. Although it was very sad to lose a daughter, there were no alternatives for me. With tears in her eyes, she said again, I thought one of them would let go. After a while, the daughter came back to me swimming and said: Ma [mother], I have come back.

But when she came home after the cyclone, she found that they had nothing left. This kind of suffering was common for older people and their households during extreme weather events. The government's disaster management office, with the help of members of the Bangladesh International Red Crescent Society and local volunteers, made efforts to announce the signal strength and severity of the cyclone over loudspeakers. They said most people did not want to go to the shelter until the cyclone hit the community. In their collective experience, women were more vulnerable to self-evacuation. The 67-year-old Kariman from Western Badurtala Clustered Village described:

During cyclone SIDR, there was extreme destruction. My mother and I were in my house at the beginning of the cyclone. But when it was no longer possible to stay here, we wanted to go to the shelter. On the way to the shelter, the storm surge emerged suddenly. The roar of the water made us fall into a pond. There was a coconut tree on the bank of the pond. We held on to the coconut tree in distress. [...] I cannot remember how I climbed up and down and reached the centre. When I returned from the shelter the next day, I saw nothing but the destroyed foundation of my house.

Older people staying in the remote area of the village were particularly vulnerable. Since most of them lived in high-risk areas, there were hardly any good roads and communication facilities. A 60-year-old widow, Palkey, from Ruhita village recounted her horrific experience:

As I thought we could get into trouble, I was holding my elderly mother's hand and taking my baby on my lap during the cyclone. I came by holding my mother's hand. At that time, a cotton tree was uprooted over the road. My mother went out of my hand. It was quite dark and I could not locate my mother. Then I returned to the embankment with my children and took refuge in a shop. After that, I noticed a man brought my mother from the other side of the embankment half an hour later. If he could not help, my mother might be dead. We spent the whole night in the shop. In the morning, after the cyclone ended, I saw the foundation of my house level with the ground of the flat land.

Most of the time, older people have to go to the cyclone shelter alone or with the help of others. Sometimes older people were injured by the cyclone during the evacuation. A female participant, Shakima from Padma village, described her situation during the cyclone: "During cyclone SIDR, my house collapsed on the road next to Tofazzal's (a neighbour) house. I was injured by a falling pole when I went to the shelter. It still hurts me." It was extremely difficult for older people in the area to go to the shelter or any other safe place during the cyclone. Many of the older people said that the water deluge and wind prevented them from going to another safe place. The surfaces outside their homes also made it difficult to go to another place. Walking around the village, it was noticeable that the pavements, paths and nearby surfaces were far from ideal for the mobility of older people. There were also ponds in front of their houses, which made things even more difficult. There were several houses in remote areas that could not be walked through. In addition

to the environmental hazards, limited mobility could cause significant problems for older people during cyclones and floods. If they were left behind or unable to reach vital facilities, they faced enormous difficulties.

Although the cyclone shelters were the safest place during the cyclone, their number and accommodation capacity was not sufficient. Most of the cyclone shelters were located within half a kilometre to three kilometres from the participants' houses, but the roads and communication routes were not easily accessible for the elderly. The conditions in many of the shelters did not meet the needs and requirements of older people. An elderly male participant, Chandresh, from Haritana village provided the following extract reflecting the views of many participants:

The living conditions in the cyclone shelter were not good. All the people – children, youth, women, men and elderly – had to stay in one place. We go there as soon as possible when a cyclone comes, with one or two sets of clothes. There were no special arrangements for the elderly. There were two toilets, one for men and one for women. ... this was not enough for the number of people in the shelter. There were no provisions for drinking water. We had to fetch drinking water from outside the shelter, but the quality of the water was not good. The condition of the building was also not safe enough. In some areas, it was no longer safe to stay there. It was also not possible to have privacy there.

Most believed that they would be protected from severe cyclones and floods if they went to the shelters. However, others felt that some cyclone shelters were risky as most were outdated and defective. Again, most shelters were stretched beyond their capacity during the cyclone. A senior participant, Fakirshah, said:

I used to go to the cyclone shelter during cyclones Bulbul and SIDR. But now I think it is risky. It [the shelter] could collapse if it is loaded with too many people. It was unnecessary. There were many more people here than it could accommodate.

Due to the poor condition of the public cyclone shelters, inadequate warnings and individual perceptions and beliefs, some elderly people and their households refused to evacuate, believing that their houses could withstand a cyclone. Some of the elderly went to strong homes nearby or took shelter during the cyclone in the nearby school, shops, on the embankment or under a huge

tree. For example, the participant mentioned above said, "After the cyclone shelter was filled, we had to stand in the shops and [sometimes] on the embankment." An elderly person from West Haritana village added: "I went to my brother-in-law's brick house and was there every time during the cyclone". Another elderly person from Charlathimara village said that he did not go to the shelter but if necessary, he went under a strong tree and held on until the cyclone passed.

The cyclone shelters were open to all affected people at the time of cyclones and floods. Some of the older people stated that there was a lack of shelter and privacy. There were no separate rooms with beds and bedding, food, water and mobility for the elderly. There were also no medical facilities and high noise levels. The shelters were overcrowded with young and old men and women. However, volunteers often helped. One participant, Fakirshah, explained:

[...] The volunteers first took the elderly people in the shelter and put them in a corner, but the food was the same for everyone. Everyone got help and everything they distributed. Pure water was not available there. There were two toilets. A tube well [with water] was also available. But the water was not very healthy. The conditions in the cyclone shelters were not adequate to allow older people to stay comfortably. Some older people felt that the cyclone shelter was not built with the demand and needs of older people in mind, but was rather seen as a socio-political asset of the community.

The experiences of the participants indicate the various losses and vulnerability of older people and their households to extreme weather events in the coastal areas.

5.4 Discussion and conclusion

Bangladesh experiences various extreme weather events such as cyclones, floods, extreme temperatures, flood and storm surges, tornadoes, thunderstorms, riverbank erosion, salinisation and coastal erosion every year (Paul, 2015; Burkart and Kinney 2017; Masum, 2019). The current study found that extreme weather events increased the vulnerability of older people by affecting their employment and working conditions, their income and expenditure, their ability to borrow, and their homes and assets. Similar results have been found in other studies on the impacts of climate change and extreme weather events on humans and the environment in the region (Saha, 2015; Islam et al., 2020).

This study found that extreme weather events, directly and indirectly, affect the employment and income, credit liabilities and expenditure of older people in coastal regions. As a result, this group tends to be particularly vulnerable. First, the availability of work was found to decrease sharply after the extreme events due to the destruction of sources of employment such as agriculture, fishing and forestry work. Older people and their household members had little or no work after the cyclones and floods. Secondly, access to work was reduced by various environmental and structural hazards such as damage to bridges, roads, houses, factories and communication networks, as well as loss of equipment for self-employed people. A study on 'Disaster Response and Risk Management in the Fisheries Sector' (Westlund, 2007) found that natural disasters that occur suddenly and without warning can lead to significant losses and damage. These include the loss of boats, equipment, fish cages, aquaculture, farmed stocks and other productive assets, the destruction of working infrastructure such as landings and fish processing facilities, and production losses such as the escape of fish from fish ponds (Westlund, et al., 2007, p. 18). World Bank research shows that the average industrial firm ceased operations after the cyclone for 41 days, resulting in a loss of \$3.65 million and 1.2 million working days.

The results of this study showed that increased unemployment significantly reduced the incomes of older people and their families. Post-cyclone environmental hazards limited their access to work, which affected their income. In addition, their lack of physical strength and capacity meant that they were sometimes underpaid in the aftermath conditions. These factors contributed to the financial vulnerability of older people in coastal Bangladesh. Previous studies have shown that extreme weather events reduced agricultural productivity and employment, so households needed external assistance to cope with the loss of income (Mallick, 2013; Subhani and Ahmad, 2019). Their studies found that cyclone AILA in 2009 directly threatened the income-generating capacity of coastal communities for several years, and many people from affected households went in search of income-generating opportunities to alleviate their hardship. This economic vulnerability was more severe among older women and widows compared to men. For example, one study found that poor older women were more vulnerable to inadequate care and support because they had limited financial and material resources and lived in generally impoverished environments (Eeuwijk, 2006).

The extreme weather events had an adverse impact on the family expenditure of older people in the region as it affected their jobs, income and production. The current study found that older people in the region experienced great financial difficulties in managing their daily expenses immediately after severe weather events. The results show that the expenditure of the households of older people exceeded their income. A study by Jahan and Haque (2016) found that cyclone-triggered production, wages and employment were insufficient to cope with simultaneous commodity price and expenditure trends. As the elderly and their households had no savings and reserves, they were unable to meet their basic daily needs without financial and material support from other sources. The findings of this study indicate that prices increase steadily during cyclones and floods compared to the non-cyclone period. There are several reasons why the daily expenses of older people and their families have increased. In the context of vulnerability and resilience to disasters, it is found that resource and financial losses due to disasters were negatively associated with income levels.

The study found that some older people, despite having limited access to credit markets, borrowed money from various sources such as banks, NGOs and moneylenders to restore their destroyed houses or build a new one, cover medical expenses, buy food, clothing, agricultural and fishing equipment and produce crops and fish. The older people and their households received both material and non-material support from various sources, but it was not enough to cover their living expenses. Similar observations were made in previous studies on the impact of cyclone AILA in 2009 when relief efforts proved insufficient to absorb the setbacks. In particular, poor households had to borrow money from formal and informal institutions such as microfinance institutions, moneylenders or through other channels (Mallick, 2014; Subhani, and Ahmad, 2019). The loss of employment and income, the rise in prices and the loss of purchasing power and credit liabilities have left the older people of the area in a state of vulnerability.

In addition to the loss of employment and income, older people and their households lost land, fishing boats, nets and machinery, production facilities, small business stocks and self-employment resources. The severe cyclones and floods damaged their fishing ponds and fishing grounds, and they lost their family's livestock and birds. Similar results were found in previous studies in Bangladesh (Shamsuddoha and Chowdhury, 2007; GoB, 2008).

This study finds that the dwellings of older people collapsed due to cyclones and floods in the coastal region. These dwellings were usually made of wooden and bamboo poles and corrugated iron sheets, which were not strong enough to protect them from the cyclone. Extreme weather events destroyed the houses of older people and their households, worsening their already vulnerable condition. As argued by Alam and Collins (2010), weak house structures and scattered settlements along the river lead to housing-related vulnerability among older people and their households in the region.

As the dwellings of the elderly could not withstand the cyclone, they had to seek safety in cyclone shelters. The journey to the shelter was hard for the older people; particularly for those who lived in remote areas as they needed physical strength to negotiate the uneven roads and paths. A study by the World Health Organisation (WHO) reports that older people with arthritic knees and limited vision who do not have supportive people nearby become more vulnerable, unable to obtain food or water or feel at risk and are sometimes overlooked by volunteers and neighbours (WHO, 2008). The current study also found that older people need the help of other people to get to the cyclone shelter and that they are sometimes injured by the strong winds and water. Another study found that despite having access to information about cyclones, older people were more vulnerable than other adults because their limited mobility often prevents them from going to cyclone shelters or other safe places, making them dependent on the help of others (Malak et al., 2020). The current study also found that cyclone shelters were not big enough to hold all people living in the area and that most shelters were far from the homes of older people. The structural conditions, atmosphere and facilities of the cyclone shelters were not suitable or adequate for older people.

It was evident that the most vulnerable group in society was older people. They were considered more at risk of death and disability and had less access to reconstruction assistance during and after the storm events (Gutman and Yon 2014; Kwan and Walsh 2017; Haq, 2020). They usually needed special care and shared daily activities. They needed more care and higher priority during and after extreme weather events to secure their lives and reduce casualties. The findings of the current study were in line with existing studies on disaster risk, hazards and vulnerability and show that extreme weather events had huge negative impacts on the lives and livelihoods of older people in the coastal region of Bangladesh. The climate events, directly and indirectly, affected the

income, employment, expenditure and credit liabilities in housing, assets, food and nutrition, water and sanitation, production and health of older people and their households. Extreme weather events were found to continuously reduce the adaptive capacity of older people and their households, affecting their capital assets (physical, natural, financial, human and social capital) each year, which was exacerbated by existing socio-economic factors (Mian et al., 2019).

Chapter 6: Vulnerability of older people to extreme weather events: food security and health

The vulnerability of older people to extreme weather events is multidimensional – geophysical, personal, socio-economic – that they face each year due to their particular individual and socio-economic conditions and needs. The interactions between extreme climatic events and exposure, impact, socio-economic conditions and capacities collectively influence the extent of their vulnerability. They suffered from the loss of life and property, poor health and disease, unemployment and lack of income (as described in chapter five), which increased their vulnerability. The devastating impact of extreme weather events on the health and socio-economic conditions of older people a result in deaths, injuries and a range of losses (Bayraktar and Dal, 2018). In this chapter, I have discussed food insecurity and deterioration of health and wellbeing as the vulnerability of older people in the area which they experienced before, during and after the extreme weather events. The findings showed that older people in the region were vulnerable to food insecurity. They had more limited access to family food and nutrients than their younger counterparts due to the continuous impact of extreme weather events on their socio-economic conditions. Their testimonies suggested that they suffer from various illnesses - physical and mental - resulting from extreme natural disasters. The extreme events were also found to affect their interpersonal and social relationships and mutual support, increasing their vulnerability.

6.1 Vulnerability to food insecurity

Extreme weather events increase the likelihood that older people and their households will go hungry and exacerbate the underlying causes of food insecurity. The impact of extreme events on food and nutrition varies among older people and their households in terms of socio-economic conditions, production capacity, availability of food, access to food and usability of food. Loss of food and livestock production and financial incapacity negatively affect food access and dietary diversity. The impact of extreme weather also affects the stability of the food supply during and after the disaster. Understanding the specific impacts of extreme weather events on food security is challenging because food vulnerabilities are widespread and highly contextual (Krishnamurthy et al., 2015). These vulnerabilities also depend on the capabilities of older people and their households, as well as the socio-economic support available in the region.

6.1.1 Inadequate access to nutritious food

Inadequate access to food and nutrition has a harmful impact on the lives, livelihoods and wellbeing of older people, limiting their ability to work, engage in daily activities and live independently. Food vulnerability limits their capacity to endure and cope with the impacts of extreme weather events (FRAC, 2019). The lack of cultivable land and resources affects the availability of food and nutrition for older people in the region, as they have less food available due to lower production capacity. The extreme weather events that occur every year limit their socio-economic capacity to manage daily food. It has been noted that most of the elderly suffer from malnutrition due to a lack of food in the family. The food intake of older people depends on the availability and accessibility of food in the family. Some older people in the region find it difficult to obtain their daily food. Older people living in their sons' or daughters' families with more members receive less food and nutritious products. This is because their sons and daughters first think more about their children than their parents. Most of the respondents in the area said they have little or no access to nutritious food such as meat, milk, fish, eggs and fruits. Chandresh again said:

I eat some of it [nutritious food], but it is rare. Where am I going to get money to buy these foods? The price of a dozen eggs is BDT 100 and a litre of milk costs BDT 60. The price of meat is high for us; it is BDT 500 to 700 per kilo. [...] Most of the time I cannot eat nutritious food. When I buy this kind of food, I cannot buy rich or curry dishes. I usually eat meat once a month when we earn more. We cannot eat fruits, but I have some coconut trees from which I can eat coconuts.

Fakir Shah from Padma village and Shuvasm from Haritana village in the Union similarly reported like Chandresh that they hardly get nutritious food because of their financial incapacity. They said that they have to wait for months or even years to get meat, milk or fruits. Most of the older people said they usually eat rice, curries, potatoes, vegetables, dal, and bread. Rashidul from Haritana village eats a small amount of food at different times of the day. He eats rice only at night. During the day, he takes some tea, biscuits and dried rice. However, as he lacks financial resources, he cannot get nutritious food. 80-year-old Abdullah gets a meal twice a day - at noon and in the afternoon. In the morning he drinks water and has little tea. Sometimes he also eats rice and bread

with curry in the morning. "Two or four eggs are eaten a month, there is no fruit or meat. How can I eat and with what?" - he said. He eats fish when someone gives him a few pieces or when he can catch fish. Alfaz believes he needs nutritious food for his body, but he cannot buy fish, milk, meat and eggs.

Studies have found that older people who are vulnerable to nutritional stress have a lower physical reserve, which limits their ability to recover powerfully in the face of an acute health threat or stressor from extreme events (Porter et al., 2015). Some respondents in our study reported that older women who had lost their spouses were unable to manage food and nutrients. "I do not remember eating any fruits after my husband died," said Palkey, a widow from Ruhita village. She said she does not get milk, eggs and other nutritious food.

In another study, it was found that the majority of the elderly had an insufficiently varied diet (four or fewer out of ten food groups). They were found to be undernourished and at risk of malnutrition (Mridha et al., 2021). The same is true for Amena, who said that she does not eat as much as she used to. She eats the usual food like rice or bread once or twice a day. She does not have anything to spend on nutritious food. She added:

How then am I to eat [nutritious food], O father? Does not it take the money [to buy nutritious food]? It costs money. My daughter sometimes sends me fruit and biscuits through my grandson. I eat fish, but I do not buy it. I can only eat fish if my daughter can catch it. I cannot buy and eat meat. I ate meat many days ago, but I did not buy it. I ate some beef at one of my brothers' houses and chicken at another.

The statements of the older people provide insight into the issue of access to food and nutrition in the region. Most of the respondents said that they eat rice once to three times a day, sometimes a piece of bread, biscuits and others. They cannot eat nutritious food because they do not have money. In addition, it may be more difficult for older people to eat healthy food because of their age. This can reduce their physical reserves and limit their ability to recover in the face of a serious health problem or stressor. The physiological and sociocultural factors that affect food intake and behaviour are also important, and older men may be more vulnerable to malnutrition (Porter et al., 2015; Thompson et al., 2017).

6.1.2 Scarcity of food

Most of the older people in the study area reported that they had suffered from food shortages in the past after extreme weather events. Through the loss of crops and gardens, household stocks of food, properties, livelihoods and purchasing power for food, extreme events weaken households' potential for adequate food supply and access to nutrients (GoB, 2008). Many participants shared their experiences of food scarcity after the cyclone and floods. Many older people and their family members (girls, young children and pregnant and lactating women) were vulnerable to malnutrition and micronutrient deficiencies during the extreme weather events. Although they needed comparatively nutrient-rich food, they could not share their food equitably among themselves and sometimes went without food. An elderly person, Rashidul of Western Haritana village, aged 80, shared the following:

During the past disasters, I had problems managing food for the family. During the last cyclones, I was without food for two to three days. At that time, I bought the bread, which cost BDT five in the shop, in twos and kept myself alive by eating it with water.

The participants said that they had little or no food to eat after the cyclones. The older people claimed that they only had water and a piece of bread or a biscuit for the whole day after the disaster. An elderly fisherman, Shamiul, from West Hatitana village described his miserable experience when I asked him about the post-cyclone food crisis:

Do not say that sir, I did not eat for many days. For days I ate only water from *panta bhat* [a dish traditionally made from leftover cooked rice soaked overnight in water, usually served in the morning with salt, onions and chilli], which I had brought for me from their home. [...] I had been drinking only water for days.

Most of the older people said that the availability of food was inadequate after the cyclones. They also said that they were unable to buy food due to lack of money, loss of livelihood, destruction of food shops and increased food prices. As a result, they sometimes had to look for wild food from the forest to survive after extreme climatic events. An older respondent described his experience of food problems after the cyclone:

We had problems getting food during the disaster. If we did not get relief, sometimes we had nothing to eat for days. Two years ago [after a cyclone], it was very difficult to deal with food during a disaster. There was no more cooking. Then life depended completely on aid. If we did not get food aid, we had to rely on nature. We collected lilies, taro leaves and various wild plants. In one disaster, I had nothing to eat for two days, nothing – salt, rice, fire, water, curry – was available. The cyclone destroyed everything. No one gave anything away to others. (Chandresh, a male participant of Haritana village)

Some of the respondents said that they had to wait for supplies from relief agencies because of the lack of food. Respondents said that most of the food provided by the government and NGOs was dried goods. It was very difficult to get cooked food immediately after the cyclone. Some older people living in remote areas said they were starving because they did not receive food in time. The following report is representative:

During the disaster, we ate puffed rice or flattened rice. Then we had to eat once a day [or] we had to go without food for one or two days. When the cyclone started, it was not possible to eat anything until [the end of the cyclone was reached and] relief was given. For example, I took shelter at the hospital of Upazila headquarters [before] the cyclone AILA; the Upazila Nirbahi Officer gave us some biscuits during the last cyclone. (Hossain, 67 years old, Badurtala village).

Some respondents said that people were generally unable to get food from the onset of the cyclone. They had to wait for food deliveries or somehow fend for themselves. Some participants reported that their hunger started at the beginning of the cyclone and that they only received food after the cyclone ended. Fakirshah described, "I was starving at the time of the disaster. I had eaten at noon on the day of the cyclone and ate again in the evening of the next day [when the cyclone ended]."

Most of the interviewees reported that they had experienced in the past that relief goods provided by the government and NGOs could not be delivered directly to the victims after the cyclone because various hazards, such as uprooted trees on the roads and paths, brought the delivery system to a standstill. As a result, the elderly had to rely on what was nearby. One of the participants, Sabdar 66 from Padma village, narrated:

First, when there was a disaster, there was a problem getting water. Second, vegetables, fish and meat were not available. At that time, mainly pulses and potatoes were eaten. [...] Aid could not come with vehicles on the roads because the cyclone had uprooted many trees.

Participants also said that it sometimes took a day or two to get food after the event, and then non-affected residents or NGOs distributed relief goods. However, the relief goods were insufficient. Some elderly people said that a small amount of rice was also provided by government organisations. They had to manage in these conditions for almost 15 days before they could buy food with their earnings or with borrowed money from banks or NGOs. An 80-year-old participant, Enam, from Padma village explained:

At that time there was no food at home, what were we supposed to eat? We had to go hungry during [and sometimes after] the floods and cyclones. Let us say I went hungry for two days during cyclone SIDR. After that situation, the NGOs provided food and then we ate. Both the government and the NGOs provided food. [...] The food I got was not enough; we could not manage what they distributed for us. It was only enough for two days or one day. Then we had to meet the expenses [for buying food] through our work. Otherwise, we [sometimes] had to sell our properties.

However, they said that during and after the extreme weather events, there was another problem with food supply. It was common for elderly people to wait for days for food, as the delivery and distribution of relief goods was a lengthy process. The following report explains the situation:

It was getting late to get aid. People did not get it on the first go. It took time to organise it. It took almost 15 days for the officials to get the necessary papers. Within those 15 days, we got into trouble. We did not get food aid immediately after the cyclone subsided. The boat with the aid came, it was unloaded, and then [our] name was registered. Then the guard called the members and the chairperson. This process took almost 15 days. (Abul, 70, Padma village)

For most of the elderly, work was the only way to support themselves or buy food after supplies from various sources ran out. However, this depended on whether there was work for the older

people in the area. Some of them expressed the need to take temporary casual jobs for money or food at substandard wages. He told about the situation:

At that time there was great suffering for food. Work was not available at that time. [...] No one gave to others because they were also poor. No one gave even if they begged. How could they give? They had nothing else! So, we had to work as casual labourers for food. Suppose after the cyclone, dirt had piled up in people's houses. If I could clean it up for someone, they would give me BDT 100 with which to buy some food.

Again, food was not sent to the houses of the elderly, but they had to go to the distribution centres or cyclone shelters to get food. This was very difficult for some older people because of their physical condition. Elderly people who had sought shelter earlier and stayed at the cyclone centre only received some dry food as emergency assistance during the cyclone at night. Participants who had not gone to the shelter during the cyclone said that they did not receive any food as they stayed at home. This was because the food was not distributed door-to-door but at specific locations. Some of the respondents in the study said that food shortages were a common outcome after any extreme weather event and that almost every one suffered from these circumstances. An elderly person, Muhibul, from Badurtala village said: "If there was a cyclone, there were food problems in the area. Not only me but everyone was affected by this problem". He also said that in the past he had nothing to eat during a cyclone. "... It was about three/four days during and after the cyclone, and then I still managed to eat!"

Based on the perceptions of the interview participants, it was clear that the unavailability and inaccessibility of food was a common situation after any extreme weather event in the region. Most narratives of suffering during the cyclone were intensive. Some of the participants were reluctant to disclose their suffering. They believed that it was not appropriate to tell their story. One elderly woman tearfully recounted her experience:

[...] I had not been fed many times. Would it be beneficial if I told you? There was a feeling of great sadness in my life. During and after the immense cyclone and floods, I stayed three/four times. Together with my daughters, I sought shelter on the embankment by swimming during a cyclone. I cannot tell you how much I suffered.

It was observed that people in the coastal zone were affected by food insecurity after the natural disaster, as the availability of food, accessibility to it and their consumption patterns were severely reduced. In addition to food shortages, there was also a shortage of pure drinking water after the cyclone. Extreme weather events significantly alter the salinity of water, especially in the southwestern coastal region of Bangladesh, leading to drinking water shortages (Ismail, 2016). Lack of pure drinking water was a common problem among older people, especially those who lived alone after the cyclones and floods. Most families of older people did not have their tube wells. They had to fetch water from remote ponds, from others' tube wells or from the public water filtration system. One respondent commented:

For drinking water, a public filter had been set up on the bank of the pond half a kilometre away from my house. I drank the water by fetching it from the pond. Sometimes, when the filter was damaged, we had to drink the pond water by mixing it with alum [Aluminum Sulfate]. (Fakirshah, Padma village).

Each cyclone and flood exacerbated the water shortage in the region. Ponds overflowed with salt water carried by the storm surge. Cyclones destroyed the public filtration system and tube well, sometimes leaving the elderly to rely on alternative sources of water. An elderly farmer, Hossain, 67, from Charlathimara village explained:

We could not even drink water because it was salty and polluted. We drank water from green coconuts or bought water from the Upazila headquarter, Patharghata or had to wait for volunteer help. We could eat only after getting help. Till then, one had to stay under the tree.

The shortage of food, water and other resources after extreme weather events forced those affected into a competitive and discriminatory environment. Some of the older people felt that they were the victims of discrimination in the distribution of relief and assistance by the government and NGOs. Sometimes they received no assistance at all and sometimes only by bribing the providers. One of the participants, Haulader, 70, a casual labourer from Padma village, said:

I never got any help. I was selected for help and I thought I would get along with the others. But one person bribed a member and got it; I have not gotten it to date. It was distributed

to others through bribery. I could not give money as a bribe; I could not get relief; without a bribe I got nothing.

The acute food problems continued and there was little or no food left in the homes of older people and their families. They believed that discrimination against them continued even after the extreme weather events. One of the participants, Enam, 80, a widower from Padma village, expressed similar sentiments: “What would we eat? Only the powerful took the food that the government distributed. The persuaders took the food that was allocated on behalf of others”.

Various testimonies suggest that older people and their households suffer greatly from food insecurity before, during and after extreme weather events because food availability and accessibility are affected by the loss of production and disruption of proper supply and distribution. Studies have shown that cyclone SIDR, which hit Bangladesh in 2007, destroyed nearly 95 per cent of crops in coastal districts (ADB, 2013). According to the World Risk Index, disaster vulnerability and the risk of damage from extreme weather events such as floods and cyclones are determined by the spatial and temporal exposure to natural hazards, vulnerability, coping capacities and adaptive capacity of older people (Garschagen et al., 2015). Food insecurity negatively affects the ability of older people to cope with natural hazards and crises. There is an interaction between food insecurity and older people's vulnerability to extreme weather events and disaster risks. The report clearly shows that hunger and food insecurity have an adverse impact on disaster risk because they significantly increase the vulnerability of the elderly population to extreme natural hazards (Garschagen et al., 2015).

6.2 Deterioration of health and wellbeing

Studies have shown that the most common diseases affecting older people in Bangladesh include cardiovascular disorders, diabetes, arthritis, osteoporosis, skeletal deformities, obesity, behavioural changes, sleep disorders and dementia (Islam and Rahman, 2017). People aged over 50 often suffer from cancers such as prostate, lung, stomach, colon, breast and cervical cancers. More than 50 per cent of people over 65 suffer from arthritis, which can cause pain and lower quality of life in rural and coastal areas (Islam and Rahman, 2017; WHO, 2018). Therefore, it is

difficult for them to be strong both physically and mentally to struggle under the various vulnerable socio-economic and extreme weather conditions.

6.2.1 Physical health vulnerability

The older people in the study area find it difficult to move from one place to another and stay at home. They suffer from a lack of physical strength and are unable to move for long distances due to various health complications. Some of the respondents said that they could somehow walk to a nearby tea stall or shop. One of the participants shared his daily activities:

I used to walk to the shop near my house once in the morning and once in the evening and drink tea there.' [...] I used to participate in various cultural activities, but now I cannot go because I cannot move in winter and summer [in extreme weather]. (77 years old widower, Chandresh, Haritana village).

Physical weakness is one of the health vulnerabilities of older people in the region. Some of the respondents said that due to the decline in their physical strength, they are no longer able to perform daily activities such as bathing, washing clothes, etc. without the help of other family members. They are also no longer able to participate in various social programmes as they used to. For example, Rashidul from Haritana village can no longer do his daily activities without the help of others. He said:

Normally I can go about my work, but when I take a bath I have problems; I cannot bathe in the pond. I cannot wash my clothes. My wife helps me to get water for a bath and wash my clothes.

He also said that now he cannot participate as actively in social life as he used to. Sometimes he goes to religious ceremonies but not to cultural activities or programmes. Again, chronic health problems are one of the most vulnerable conditions for older people in the region. Most of the respondents said that they suffer from various critical health conditions such as cardiovascular disease, kidney disease, digestive disorders, stomach problems and chronic pain. Further, they or their adult children cannot afford to buy the medicines prescribed by the doctor to cure their diseases. Alfaz, a 66-year-old man suffering from pain, said: "I have many problems in my body

now. I have pain all over my body now. I cannot do any work. I cannot carry the load. I do not have money, so I cannot take medicine”.

Arthritis and pain are common health problems in older people that hinder daily physical activities and increase dependence on others. Raizuddin, a 69-year-old man, also reported that chronic pain in various parts of his body is the main enemy of his inability to move. He narrated:

I am no longer hale and hearty. I am suffering from various diseases. I have been suffering from acute headaches for about two to three years. I have to take tablets [medicines] every day - one red and one white. These two tablets cost me six Taka.

Older women, especially widows who have to work longer hours to support their families, are more likely to suffer from physical problems. Rajina, a 63-year-old tea vendor from Ruhita Battala Bazar, like Raizuddin of Ruhita village in the Union, suffers from poor health and has pain in various parts of her body. She said, "I am in poor health condition. I have pain in my waist, knees, wrists and chest. I also have a bone problem." Sakimun, a 64-year-old woman from Haritana village, also suffers from chronic pain in her wrists and waist. Her physical problems make it impossible for her to do any kind of work. She said:

... [Oh] my son, I am burdened with so many diseases. I am on the verge of fainting because I have pain in my waist. My stomach feels like it is intertwining with my waist. Then I could not hold still.

Some respondents said that various diseases like diarrhoea, respiratory infections, eye infections, various skin diseases and fever are increasing among the older people in the area. One of the male respondents, Chandresh, described his health condition during the cyclone:

My health condition was very bad during the cyclone. I could not move around. The wind was cool, which caused breathing problems. I got a cold and cough [during the past cyclone].

Almost every older person suffered from health problems depending on how well they could bear the adverse conditions during and after the events. Some of the older people said that the cool wind that blew across the area during the cyclones caused colds, flu and fever after the events. For

example, one participant said, "I caught cold after the cyclone because there was a cool wind then. I could not go to work". Some older people suffered from chronic illnesses such as flu and cough, heart disease and skin problems, which increased during the cyclone. To make matters worse, the extreme weather events destroyed medical facilities, especially local pharmacies in the area. As a result, older people had to wait for someone to attend to them or help them buy medicines at the Upazila headquarters, which was five to 10 kilometres away from the study area

Every year millions of people suffer from diarrhoea, skin diseases, mental disorders, malaria and dengue fever (World Bank, 2000). People in the coastal regions suffered from various chronic diseases such as heart problems, diabetes, arthritis, etc., which can worsen during and after extreme weather events, leading to complications and even death.

6.2.2 Psychological trauma

Mental health problems were found to be another health vulnerability alongside physical health problems among older people in the region. The losses and destruction caused by extreme weather events make them fearful of losses, injuries and even death every year. Most of the participants suffered from distressing incidents that occurred during the past cyclones. Rashidul from Western Haritana village said, "At the time of the cyclone, I got scared. There was such panic of floods and collapse of the dam." Another participant said:

... [my] body became weak during the disaster because I was afraid of cyclones [in the past]. Because in the last disasters, it was observed that everything was washed away; only the foundation of my house was left standing. We fell into fear [when we heard the news of the cyclone]. (Hossain, 67, Badurtala village)

Mental health problems were common among older people and could cause worse symptoms during extreme weather events due to feelings of hopelessness and little or no support. They get scared when they hear the news about extreme weather events like cyclones and floods and remember their sufferings and worries from previous experiences. They reported tying down everything - beds, belongings - after hearing that a cyclone was brewing. As soon as the water reached the dam, people started crying. They went on to say that the bitter wind during the cyclone

made their hands and feet numb; they struggled to grasp anything to react quickly and move. One of the participants explained:

I was scared and upset. Everything had been broken and destroyed. I did not know where to go or what to do. It was shocking and puzzling. I tied everything together with a rope when I heard there was going to be a cyclone. I did not know which side to go to. As soon as the water reached the dam, the crying started. (Shamiul, 72, western village of Haritana)

Many of the older people were afraid and frustrated when they remembered their past experiences. They had witnessed the devastation caused by the cyclones and the floods. After hearing the news of the cyclones, they did not know where to go for safety and what to do. They said it was terrifying and confusing. Raizuddin, a 69-year-old man from Ruhita village, commented, "I was scared during the cyclone. I called on the name of Allah and prepared to go to the shelter centre". Other elderly people also shared their feelings:

I am scared of cyclones and floods. I go to the shelter centre. The place where the river has eroded is very close to my house. It is an eight-foot high embankment that can be eroded at any time by the striking force of the water. I live there in fear. I have not lived at home because it was flooded during the last cyclone SIDR. I took shelter on the embankment and held on to the trees. (Alfaz, 60, Padma)

Rizeeya, 70, from Purbo Badurtala village, said he was scared during the cyclone and flooding and was thinking about where to go. He said many people drowned on the road (with a water grave) on the way to the shelter centre. Panicking during cyclones and floods was a serious problem among older people in the region. Most of the older people lived outside the dam, and some lived near the weak point of the dam and near the focal point of riverbank erosion, which caused greater anxiety. They had no choice but to live in fear as there was no other safe place to go to. Most did not stay at home after hearing the news about the cyclones because the dam was full during the last SIDR cyclone. They often left their house and took shelter at the dam by clinging to trees, believing that they would survive even if the house blew up.

Participants also recalled the past loss of their assets and circumstances. Based on their past experiences, they knew that their property and house would be lost forever, which made the

situation even more worrying. An elderly person from Western Haritana village recalled an event from the past:

During the last cyclone, trees had fallen on my house. When I noticed this after the cyclone, I fainted. I got scared when people announced that the cyclones would come again. [...] I did not stay in [my] house. I could not stay standing at the time of the cyclones. [...] When I hear the signal of the cyclone, I immediately go to my brother-in-law's house, which is made of bricks. (Rasidul, 80, West Haritana village)

The older people and their households believed that similar destruction could occur, which increased their fears. For example, "It [house and dam] would collapse if there were cyclones and floods again. I was totally scared about that [cyclone]. Everything [house, dam, crops] would be destroyed if the water from the sea hit again". The health problems related to the disaster were a growing concern and a direct consequence of the extreme weather events. In addition, there was the destruction or forced relocation of familiar, emotionally or culturally valued habitats, as well as indirect consequences, e.g. physical health problems and/or social and economic disruption to families (Berry et al., 2010).

Studies have found that deteriorating physical and mental health, frequent falls and limited care can make older people vulnerable (Brocklehurst and Laurenson, 2008; Sarvimaeki and Stenbock-Hult, 2016; Barbosa et al., 2019). To build adaptive capacity to cope with socioeconomic hardships and extreme climate change, older adults need to be physically and mentally strong and know their limits. However, the current findings show that the lower physical strength and reduced mental capacity of older people increase their vulnerability to various extreme events. Their health condition may lead to the need to evacuate them in emergencies during extreme weather events. The lack of primary health care and limited access to health facilities also increase the vulnerability of older people in the region (Malak et al., 2020).

6.3 Discussion and conclusion

Older people and their households in coastal Bangladesh face different types of vulnerabilities because of extreme weather conditions every year. Focusing on climate change and seasonality, Shams and Shohel (2016) analysed the existing threat to food security and livelihoods in the coastal

region of Bangladesh. Their study showed that there were recurrent food shortages during the sowing and harvesting seasons. While the food deficit remained high (68-95 per cent) from mid-August to the end of October, it reaches its lowest level (21 per cent) in December. The current study shows that food insecurity or vulnerability is common among the elderly population in the region following extreme weather events. The food intake of older people in the study area is influenced by their ability to buy food or by the availability and accessibility of food within the family. What they get one to three times a day is what they eat, i.e. nothing special is prepared for them. There are days when they get nothing to eat at all. Nutritious food such as meat, fish, eggs and fruits are only taken when they are given by a close relative, a neighbour or at a sacrificial festival of the Islamic religion during the year. They cannot afford to buy them themselves because they cannot afford them. It was found in another study that rice, wheat, pulses and vegetables were the most commonly consumed foods, while fruits and sweets were the least consumed by older people (Quddus and Bauer, 2014). In the study, a quarter of the elderly ate fish, while two-thirds of them ate meat for less than a week. The researchers found that food insecurity was inversely related to household income and education of the elderly and positively related to the number of family members. In addition, research has shown that older people are unable to feed themselves regularly and their families essentially live on subsistence. Several studies have found that the majority of older people have incurred debt for subsistence.

This study found that food and nutritional shortages increased following extreme weather events, especially cyclones and floods, which exacerbated food insecurity among older people. Another study reported a similar impact of cyclones on food shortages, affecting food prices and increasing food expenditure. It has also been reported that disasters were so extreme that affected households often had to sell their labour in advance at a very low price and mortgage their remaining assets at undervalued prices to buy food (Roy et al., 2009; Subhani and Ahmad, 2019). The current study identifies several causes of food insecurity following extreme events, such as unavailability of food because supply was affected by the destruction of communication infrastructures, loss of local production and access to food due to lack of income and savings, and price increases. Again, household cultural norms determine who has priority access to food. As shown in this study in households where food is scarce, older women and men often suffer from a shortage because they forgo food so that younger family members have enough to eat (HelpAge International, 2015). In

addition, access to food can be further affected because food distribution points are located in places that are difficult for older people to reach. These conditions mean that older people may not be cared for after cyclones and floods. A study of cyclone AILA in 2009 in the coastal region found that around 90 per cent of affected people had reduced food intake; for example, those affected had skipped meals once or twice a day (Subhani and Ahmad, 2019). In addition to food shortages, this study also found a severe shortage of pure drinking water immediately after the cyclone devastated the region. The saline water contaminates surface water and damages tube wells, resulting in water vulnerability for older people and their households. Various studies have found similar results in the region (for example, Mehedi et al., 2010; Islam and Hasan, 2016).

Many of the respondents in the present study suffer from various chronic diseases, although health is their most important asset: it affects their ability to work and maintain a satisfactory standard of living (HelpAge 2002). The present study shows that most of the older people in the study area are vulnerable to diseases and infirmities. The findings show that they are unable to get healthy and nutritious food and adequate medicines due to their financial inability. They also depend on the local pharmacy to get medicines in case of illness, as health services in the area are inadequate. In another study, their reduced physical strength and declining mental capacity were found to make them vulnerable to disease. Often, older people lack adequate sanitation and hygiene facilities, food security and family care and support, making them vulnerable to disease (Malak et al., 2020).

Deterioration of health and wellbeing was another vulnerability of older people identified in this study. The findings of the studies show that older people experience different physical and psychological problems during and after extreme weather events. They suffer from illnesses such as cold fever and flu, cough, skin irritation, diarrhoea, mental illness, malaria, abdominal disorders and dengue disease in addition to their existing illnesses. Similar findings from various previous studies suggest that extreme weather events severely affect the health of older people, causing numerous diseases (Kabir, 2014; Kabir et al., 2016; Mian et al., 2019). Older people also suffered from water-borne diseases because they used contaminated, salty water from various sources. This study also shows that the severe weather events destroyed medical care facilities, including local pharmacies and dispensaries, which exacerbated health vulnerabilities. Older people found it

difficult to access health care due to mobility problems, distance from central medical services, lack of regional health networks and the disaster-related absence of health facilities for daily needs.

In addition to physical health problems, this study also reported mental health problems among older people in the region. Older people and their households were found to be frightened when they recalled the suffering and grief they had experienced during previous extreme weather events. They were reported to have lost family members, jobs, homes, assets, farmland and livestock in the past, leading to mental illness among older coastal residents (Kabir and Khan, 2017). Older people were also at significantly higher risk of physical and mental illness following disasters. The reasons for this vulnerability are complex and vary depending on the type of disaster, the magnitude, the personal sense of loss and pre-existing negative factors such as comorbidity.

Chapter 7: Social protection and the vulnerability of older people

It shall be a fundamental responsibility of the State to attain, through planned economic growth, a constant increase of productive forces and a steady improvement in the material and cultural standard of living of the people, with a view to securing to its citizens [...] the right to social security, that is to say, to public assistance in cases of undeserved want arising from unemployment, illness or disablement, or suffered by widows or orphans or in old age, or in other such cases.

– Article 15(d), The Constitution of the People’s Republic of Bangladesh

Extreme weather events induced by climate change have recently increased in frequency and intensity in the coastal region of Bangladesh (Karim and Mimura, 2008; Hossain et al., 2012; Kabir et al., 2016). In addition, changing weather patterns will continue to, directly and indirectly, affect the lives and livelihoods of millions of people, as will changes in average temperatures, rainfall and other weather conditions. These extreme events are more likely to affect developing countries like Bangladesh because they are most exposed to climate-sensitive sectors such as agriculture, which account for a substantial portion of their economies and the livelihoods of the poor and vulnerable. Older people, like other vulnerable groups, are most affected in these countries as they are more exposed to extreme events and have lower adaptive capacities (Béné, et al., 2014). The social protection system offers significant potential to protect poor and older people from their disaster risk and vulnerability and to facilitate future adaptation to extreme weather events (Devies et al., 2008).

This chapter presents and discusses the role of social protection programmes in addressing the vulnerability of older people to the impacts of extreme weather events in the coastal region of Bangladesh. The extent to which social protection programmes help to reduce older people's vulnerability to extreme weather events depends on the availability and accessibility of these programmes in each community. In many cases, there is a gap between the scale and reach of formal social protection systems, and certain segments of the population are necessarily excluded despite their needs. Thus, traditional community-based forms of social protection programmes can reduce risk and vulnerability within a community and fill some of the gaps left by formal measures

(Norton et al., 2001). Because of this, all social protection systems, both formal and informal, are discussed in this chapter.

7.1 The contribution of formal social protection programmes

Social protection programmes play a crucial role in reducing the vulnerability of older people to extreme weather events. Social protection can help to better address the structural causes of poverty and vulnerability to weather extremes to strengthen and transform the productive livelihoods of the poor and vulnerable (Tenzing, 2020). Participants interviewed discussed both formal and informal social protection programmes available and implemented in the region. Formal social protection refers to policies and programmes implemented by the state alone, with or without the help of other parties such as NGOs and donors, as well as organisations within or outside the state (Kasseeah et al., 2011). Almost all participants reported that they were able to cope with different situations after extreme weather events due to various social protection programmes provided by government agencies and NGOs. However, they felt that the government and its associated local bodies helped them more than NGOs. Nevertheless, they received help, more or less, from all kinds of organisations. One participant, Fakir Shah, from Padma village said, "... both the government agencies and NGOs are doing their best to help the vulnerable older people and their households. NGOs are trying to provide a fairly equal share for all." He further elaborated:

After the cyclone, government officials and NGOs distributed chira [flat rice] and muri [puffed rice]. This went back and forth for two days. After that, the people or the NGOs distributed some relief goods. The government had given a small amount of rice. We spent almost 14 days in this way. Then we repaired [our] houses by taking loans from NGOs.

This study considered the role of Old Age Allowance, Widows Allowance, and other types of social protection programmes to assess how they mitigate the vulnerability of older people in the region during and after the weather extremes. Some older people were eligible for these types of formal social protection programmes, while others were not due to the means-testing of these programmes. In addition to the formal social protection programmes, some informal social programmes helped older people and their families to cope with the consequences of various

extreme weather events. All participants - beneficiaries and non-beneficiaries of social protection programmes - appreciated these programmes for providing better livelihoods for older people in the region.

7.1.1 Improvement of living standard

Social protection beneficiaries can improve their standard of living by buying more food, medicine and other daily necessities. One study found that a social protection system that provides low benefits to a large number of beneficiaries can reduce poverty more effectively than one that offers high benefits to a small number of beneficiaries (Begum, 2012). Social protection programmes can transform the lives of people in a community compared to those who do not receive such kinds of benefits. In most cases, beneficiaries report that their standard of living has improved significantly after receiving the allowance. 80-year-old Rashidul has been receiving the Old Age Allowance since the programme began in 1998. He receives the money from the bank on the scheduled day and uses it as needed. He said he does not share it with his wife, sons or daughters. In addition to rice, he buys medicines, curry and other items. He said that he also bought clothes - a saree - for his wife and gave some [money] to his grandchildren. He also saved BDT 50 from his allowance. He commented on the benefits of these programmes:

I am a little better off now than before I received the allowance. If I do not receive it, the entire amount [the allowance he receives] is in deficit and I get into trouble. I can buy almost 30 kilograms of rice with the money. How am I supposed to buy this rice if I do not get the allowance?

Participants indicated that they were almost entirely dependent on the allowance for their survival. Without the allowance, it would be almost impossible for them to support themselves and their families. Many of the respondents also think like Chandresh, who states that without the Old Age Allowance, he would not be able to manage the necessities of his life and living. For example, Rashudul says:

I will face problems if the government decides to cancel my Old Age Allowance. If I do not get any money, I will face difficulties. If I did not get an allowance, I would not be able to buy rice.

Moreover, even those who were not recipients of those benefits believed that the social protection programmes were beneficial to older people. They think that the allowance would enable them to meet their daily needs and help them to live more independently. Although Asadul is 80 years old, he does not receive the Old Age Allowance. However, he is aware of the value of the allowance and says, "If I got the Old Age Allowance, I could eat and live in peace." Razeeya expressed similar sentiments, saying that she does not receive any allowance because of her unknown face in the community. When she went to see the chairperson and members of the Union Council, they only told her that she would receive the allowance. However, she has not yet received it. Nevertheless, she realised the benefits of the allowance and said:

If I got this allowance, I could take [some] medicines; I could also buy necessary food at the market. In a sense, I would be able to eat some healthy food. I want to stay here at home as long as I live. If I could fix it [the house], it would be better for me [to reside in].

Shuvasm, a village vendor from Haritana village, is 60 years old and does not receive Old Age Allowance; however, his mother is entitled to it. He said:

My mother gets this allowance. It is very helpful. She can buy medicine and food with the money. But it is not enough for her to survive. We take care of my mother. She lives with us by rotation. [...] If I could get the Old Age Allowance, that would be helpful for me. In my old age, it will help me to reduce my workload. Although I cannot provide for my family's entire living expenses, it comes in handy when I am unemployed for various reasons. I would use it at a disastrous time when I do not get any work. It helps me then to buy food and other things.

Fakir Shah, a 61-year-old small-scale fisherman, also does not receive Old Age Allowance or other support because he has not reached the eligible age for any programmes yet. But one of his sons is disabled and receives a disability allowance. According to him, this allowance is useful in that he can buy clothes for his family with the money his disabled son receives every year. "Without the allowance, I would have faced a severe shortage of money throughout the year to buy clothes for my family," he recalls. Similarly, Ismail, a 75-year-old marginal farmer, does not get the Old Age Allowance yet. In his opinion, it would be beneficial for his family if he received Taka 3000

as an allowance every six months. He said, "I am hard up now. That is why I cannot buy anything. [If I get the allowance], I can buy everything and eat something." Like Ismail, Rahimon, a 65-year-old widow, said that it would have been beneficial for her if she had received the allowance: "My sons feed me. If I got an allowance, I would stay healthy by taking medicines. That would have been beneficial." Her statement suggests that older people who do not receive any form of support need to rely on others in the family.

Social protection programmes have a significant impact on the capacity of older people and their households to cope effectively with a variety of covariate extreme events. Such programmes may also have helped to cushion the impact of rising food prices following extreme climatic events and protect them from hunger. Public works or government job creation programmes have significantly reduced the impact of the financial crisis during various events. In a study of the self-perceived impact of the government's 100-day employment guarantee programme, more than three-quarters of participants said the programme had improved their overall economic situation, food consumption and standard of living (Fiorillo and Matin, 2009). Various social protection programmes also helped older people and their households to avoid forced migration and provided them with alternative employment opportunities (Fiorillo and Matin, 2009; Grosh et al., 2011; Bastagi and Holmes, 2014).

7.1.2 Acceptance and trust in the family and community

Older people may feel safe in economic emergencies following extreme weather events if they are treated with respect when they turn to their family or community for emergency assistance. Many researchers have found that various social protection programs, particularly the Old Age Allowance and Widow Allowance, improve the dignity of older people in their families by making them more attached to their family members. Family members cared more for older people when they received certain allowances. Many respondents in the present study indicated that social protection programs gave them greater opportunities to actively participate in family decision-making. The majority of participants in the region also felt that receiving an allowance increased the acceptance of beneficiaries by their families. A similar sentiment was expressed by Fakir Shah:

My family members would take care of me a bit more if I received the Old Age Allowance.

The children knew that their father would get some money at the end of the month and that

he would give us some money. Then they told their wives that they should respect our father. They also told their daughters that they should behave well towards their grandfather. Your grandfather gets an allowance of money.

The statement suggests that sons and daughters and other household members of benefit recipients behave well when they receive an allowance. Raima Begum, a widow of Western Badurtala Cluster Village, had similar views:

[...] That is for sure. Now I have something, so everyone takes care of me. Otherwise, they would not take care of me. They would not allow me to stay here either. Rather, they would say, "Go away because your husband died". I get allowance money and my disabled daughter also gets it. For this reason, everybody behaves well with me. I see that other widows in the village do not receive Old Age Allowance; their sons and daughters do not ask them for anything. Like them, it might have happened to my lot as well.

She again said that her sons also ask her for everything as she has some money. Raima Begum lives with her elder son and gives him money. She has realised how important the allowance is and says sadly:

If the allowance stops, I will have to beg; I have no way without begging. I shall get some rice as alms from people. I shall take it in my bag and have to cook it to eat. There is no other way without it.

Some respondents said that the various social protection programs have helped to increase the confidence of people in the community toward older people. Most of the respondents said that most people trust older people to borrow money and get necessary goods as they assume that these people will pay back the dues and loans after they get their allowance. This was confirmed by Rashidul: "The shopkeepers give me food and other things trusting that I will be able to pay back the money after getting an allowance". The shopkeepers also stated that they give necessary goods to older people on credit in the hope that they will pay when they receive the allowance money. A 60-year-old participant, Kamal, a shopkeeper from Badurtala Bazar, added:

I have some customers who take their needed goods in due and say they will pay back when they get the allowance money. Since I believe that, I give them products in advance without any money. They repay it after they receive their allowance. So, there is a firm faith in them [older people].

Lailunahar is a 60-year-old widow from Padma Cluster Village, who offers services such as sewing Kantha [kantha is a type of fabric used in Southeast Asia, especially in Bangladesh and the Indian states of West Bengal and Odisha, as an alternative to bed sheets and quilts] to people at home. This is an advantage for her as she receives the Widow Allowance. She says, "Shopkeepers give me goods without money because they know I will get the allowance and pay them back. Suppose, if the pharmacy gave me medicine without money when I asked for it." After she receives the allowance, she pays it back. This is how she describes the benefit of the allowance in her daily life:

Ah! I must die if the government does this [stops the allowance]. ... Even if it is paid off after six months, we have the hope and assurance that I will pay back the debt from anywhere. How will we live if it is stopped now? What will we eat?

Social protection like Old Age Allowances in Bangladesh goes a long way in improving the social relations of the elderly beneficiaries. The relationship of recipients with their sons, daughter, relatives and neighbours improved significantly after receiving the allowance compared to before. In all cases, older people who had good social relationships before receiving the allowance were able to maintain them and those who had not good social relationships were able to improve them significantly. It appears that the Old Age Allowance scheme has a positive effect on the social relationships of older people in two ways: first, it prevents the deterioration of social relationships of those who used to have good social relationships, and second, it helps to improve the social relationships of those who had not good social relationships (Karim and Hossain, 2013). It is clear from the evidence that the beneficiaries who receive Old Age Allowances are treated well by local grocers. During an emergency, grocery stores provide essentials to older people on credit. Therefore, older people feel secure believing that regardless of their financial situation, they will still be able to get emergency food and medicine at the drugstore or grocery store because they have some kind of money (Hasan, 2012).

7.1.3 Saving, investment and loan repayment

Extreme weather events have a profound impact on the savings and investment behaviour of older people and their poorer households, thereby increasing poverty and vulnerability. Some resilient households tend to have access to savings in the form of cash and assets that can provide a buffer after a shock of climatic events. Social protection in the form of cash transfers, for example, provides recipients with an additional source of income that can facilitate precautionary measures such as savings and investments following extreme events and support their adaptation (Bowen et al., 2020). In most cases, older people use their social protection benefits for food and medicines. However, some beneficiaries reported that they could save and invest some of their allowances that generated income. Some respondents reported spending a little money to buy chickens, ducks, and cattle, and that caring for these animals would help them after climatic events. They can sell these animals and birds in the economic crisis after extreme weather events. Apart from their low earnings, some participants believe that the allowance is beneficial for them. They have invested the allowance money so that they can deal with future extreme events better. Muhibul from Padma village was one of them who said:

It is beneficial for me. I used to work by myself. I saved what I got [as allowance]. I bought a goat and two ducklings [with the allowance] and raised them. I was able to take medicine and buy food.

This shows that the Old Age Allowance helped the beneficiary, Muhibul, to save and invest for future uncertainties. Some beneficiaries said they used some of their money to restore their house or repair the house's amenities following the cyclone. Fakir Shah stated, "... [my] house was repaired a little bit after I received the grant at the time of a cyclone and flooding." Some other beneficiaries mentioned that they bought materials to repair their house after the extreme weather events. Rashidul said, "I [once] bought some tin with the money I got as allowance." Sakimun, a 64-year-old widow from Ruhita village, also said she repaired her damaged veranda after a cyclone with the allowance money she first received along with some additional money from her daughters. These testimonies suggest that different allowance programs help older people and their families to prepare for extreme weather events.

Alamgir Hossain is not eligible yet for the Old Age Allowance, but his wife receives another benefit - 30 kilogrammes of rice per month. Alamgir believes that the pressure of his work will decrease when he receives the Old Age Allowance. He said that with this money [the allowance] he could do something for himself and his family members if need be. Debnath, a 67-year-old carpenter, receives the Old Age Allowance but cannot keep it with him for several months. He said:

How can I keep it when I am in debt? I cannot be free of debt. When I had no income, I used to purchase things in shops on dues. I buy groceries and daily necessities in the shop account and tell them that I will pay off my debts after receiving the Old Age Allowance. The shopkeepers trust me and give me the products on the account.

Some of the respondents said that the allowance they receive helps them repay loans they borrowed from their neighbours or relatives during various economic crises. Kabiruddin, a 70-year-old resident of Padma village, said he had been receiving the allowance since 2007 before cyclone SIDR hit. The money was withdrawn from the bank at the scheduled time and spent on various purposes. He said it had happened many times that he had run into debt. As a result, he had to pay the debt with the allowance. He said, "... after bringing the allowance it is spent sometimes on the spot. How many days does this go on? It is spent in one day. I had to pay back the shopkeepers' debt". Again, he added:

We have reached old age. Sometimes the owner did not pay the wages after mowing the earth all day without bathing and eating, and I was in a rage. Three thousand Taka [the allowance] is paid by the government as Old Age Allowance after six months. In these six months, I borrowed a lot of money from others. I am paying back the borrowed money. My son cannot maintain it on his own. [...] The shopkeepers give me dues for receiving the Old Age Allowance. They said you would pay back the dues when you receive the allowance.

The various forms of social protection help many older people, most of whom are either self-employed or in the informal economy and do not have access to savings and loans, which affects their ability to invest in and diversify their livelihoods (Hartog, 2014). Social protection can

promote financial inclusion among older people, which can be critical to improving their ability to cope with, prepare for and adapt to extreme weather events. Access to financial services can help older people and their households reduce their vulnerability to shocks by facilitating saving to support preparedness; enhancing opportunities for income generation, asset accumulation and consequently adaptation (Cull et al., 2014; Bowen et al., 2020; ISPA 2017; Barrientos, 2011).

7.1.4 Health care and food security

Older people are vulnerable to significant health problems - both physically and mentally - during extreme weather events. In addition, extreme weather events affect their food security by destroying production and livelihood opportunities. Social protection programs help older people and their families to reduce health vulnerability and food insecurity during and after extreme weather events. Most participants reported that they had previously obtained some of their needed medicines with the help of family members, friends, and relatives. However, after receiving the allowance, most respondents purchased their medicines at their own expense. One of the male beneficiaries - Chandresh from Haritana village - has been receiving the Old Age Allowance for almost 15 years. He is receiving BDT 500 per month but every six months. He feels that the Old Age Allowance is contributing quite positively to his life. He said:

I can buy food, clothes and medicines for myself and sometimes something for my grandchildren and other family members. Sometimes I spend some money to fix my house. [...] it [the allowance] helps me to live a little better than before. Before, I could not afford to buy milk, but now I can. At least once a month I can afford milk. I can buy medicine for myself and some food for my grandchildren. [...]it is very difficult for me to live without an allowance. If the government does not give this money, I have to beg [from other people].

Various studies have shown that social protection, especially cash transfers, affects the level of poverty and vulnerability of recipient households, improves access to essential health services, and improves relationships within households (Lloyd-Sherlock, 2006). The statement suggests that social protection such as Old Age Allowance has an impact not only on beneficiaries but also on members of older people's households. It is also believed that Old Age Allowance has a positive

impact on health-related quality of life as it enables beneficiaries to contribute financially to their households (Rana and Ahmed, 2010).

In addition, recipients of the Old Age Allowance said that their daily dietary habits had changed and they were able to eat a bit more than before. They also said that the number of foods they ate at each meal had increased after receiving the allowance. That is, they could eat nutritious foods and have some freedom to buy necessities. Raima Begum shared the following:

I receive the Widow Allowance. I receive it every six months. I draw my allowance and keep it for myself. My sons do not take it. They take it when I give it to them. I use the allowance money to buy clothes or something to eat [buy food]. When I get the allowance money, I can eat what I want, maybe some chicken and fish.

It was found in a study that most (60 per cent) of the allowance received was spent on food, followed by health care (19 per cent) (Haider and Mahamud, 2017). Some participants reported being able to afford other food items in addition to regular meals, including biscuits, cakes, tea and puffed rice. Abdullah from Chaelathimara Village has been receiving Old Age Allowance since the year after SIDR in 2007. Every six months, he says, he receives 3000 Taka (500 Taka per month). He spends the money he receives from the bank as an allowance on rice, flour, chira, fried rice and medicine. He stated that he had to buy medicine frequently, especially for fever, pain and arthritis. However, he finds it difficult to meet his basic needs with this small amount of money. He said, "I have to pay the shopkeepers after I receive the allowance; I have repaid the dues. With the rest of the money, I can manage only a few days." Raizuddin was 69 years old and frequently suffered from various diseases. He received the Old Age Allowance which enabled him to buy his medicine. He said:

I spend everything [my allowance] on medicines and there is nothing left to buy rice and pulses [daal]. Sometimes we suffer from fever. Whenever I go to work, I feel pain in my body. When I feel pain in my body, I have to take medicine from this money [allowance]. [...] but it does not last more than a month.

It is clear that the beneficiaries of the social protection program can meet their minimum daily needs (food, clothing and others) and necessary medicines when they are sick. It can be said that

the standard of life of older people has improved after receiving the Old Age Allowance (Uddin, 2013; Rana and Ahmed, 2010). Other participants received the widows' allowance which helped them to support their families in economic crises. For example, Momina Begum had been receiving the Widow Allowance for 10 years. Initially, she received 125 Taka per month. Now she gets five hundred a month. She commented:

I get a Widow Allowance. I draw my allowance and keep it for myself. I buy clothes for my daughters and sons and myself. I also buy daily necessities - rice and vegetables. I spend almost all my money on food.

Momina went on to say that her elder daughter used to work in a garment factory in Dhaka before she got the allowance. At that time, she [her daughter] used to give her a bag of rice and one thousand cash per month. Now she [her daughter] could not give her any money because she got married. She explained in frustration, "[...] I will die if the authority stops giving the allowance. Without that money, I would not be able to buy clothes anymore." Amena Begum, a widow of Padma village, exclaimed, "Is there any other way than begging if the government stops paying the allowance?" Her statement shows how important allowance money is to the survival of older people in the area. Lailunahar, a 60-year-old widow, has been receiving the allowance since the program began. She spends the allowance on buying her necessary goods. "I can buy clothes when I have nothing to wear. If there is no rice at home, I can buy it. I buy goods and medicines to take home," she said.

It was noted that women who have been abandoned by their husbands or widowed can benefit from the Widow Allowance Scheme. They come out of severe food insecurity, receive better medical care, and can dress relatively well (Islam, 2007). In a study, beneficiaries of various allowances were found to have more access and control over household assets, their mobility and decision-making within the household and community. They also have time and opportunity to participate in various sociocultural events that deal with political activities, media use and information. They were able to make decisions about their health care and economic activities using their resources (Chandra et al., 2017).

7.2 Contribution of informal social protection

Informal social arrangements to provide socioeconomic support are considered when formal social protection structures do not exist or are inadequate to provide adequate support to older people and their households (Oduro, 2010). Informal social protection is mainly non-governmental in nature. Informal social protection (ISP) is structured through social relationships. Social networks and relationships and mutual help play a significant role for older people and their households in reducing vulnerability under various extreme socio-economic conditions and following extreme weather events (Islam and Walkerden, 2014; Nguyen-Trung, Forbes-Mewett, and Arunachalam, 2020; Malak et al., 2020). Care and support for family, community and group members are provided through social structures and social networks (Calder, Tanhchareun and Crescent, 2014). The assistance - financial or material - was often provided by neighbours, friends and relatives who were not affected and their ability. Usually, informal transfers are made by community members, relatives, private philanthropists, religious organisations and other NGOs to the poor and vulnerable groups in the form of informal cash, goods, food and in-kind transfers. It is said that the bonding and bridging relationship between the donor and the recipient is essential for informal social protection (Kasseeah et al., 2011). This type of support helps older people to predict, cope and deal with extreme weather events. They could be ex-ante mitigation and prevention tools and ex-post complementary coping measures to formal social protection programs for older people. The following sections explore the role of informal social protection programmes from different sources in addressing the vulnerability of older people in the community to extreme weather events.

7.2.1 Volunteer groups and NGOs

Like government organisations, voluntary groups, organisations and NGOs could also play an effective role in preparing older people and their households to deal with extreme weather events (Hossain, 2020). These services help older people and their households to prepare for extreme weather events by providing information about the magnitude of the events and their impact on the community. Most of the participants indicated that they receive news about extreme weather events from the voluntary organisation. This type of support gives older people access to

information and builds their anticipatory skills so that they can reduce damage and loss during extreme circumstances. Rashidul said:

We learn from volunteers. When the weather forecast is broadcast on TV and radio, the volunteers of Red Crescent Bangladesh announce it through loudspeakers along the road. They said that the signal confirmed that there will be cyclones, heavy rains and floods and we are heading to the shelter.

Some NGOs played a relatively better role in providing food, water, clothes, medicines, etc. to the elderly and other people in the community. They also prepared shelters with the help of GOs, communicated with vulnerable groups and made them aware of the impact of the extreme events. Shuvasm said:

... NGOs help in disasters. They provide rice, flour, a firebox, flatten rice, water, clothes and sometimes money. For example, I got clothes, a tin to repair my house, and food. An international NGO called CARITAS gave me tin.

Getting the house and home repair materials from NGOs provided significant assistance to the older people and their households in the study area after extreme weather events. Chandresh, a widower from Haritana village, said that after cyclone SIDR in 2007, his house was constructed from tin provided to him by OXFAM - an NGO. Shamiul, a 72-year-old fisherman from West Haritana village, said, "... The NGO named Sangram built a house for me after SIDR. Abdullah, an 80-year-old casual labourer from Charlathimara village, said, "I get relief food. It is provided by NGOs." Like other participants, Fakir Shah received aid from NGOs after cyclone SIDR in 2007. He said, "... My house is made of corrugated iron sheets. Sangram, an NGO, provided this corrugated iron sheet and built this small house after SIDR. I live here." Enam Munshi, an 80-year-old widower from Padma village, said, "The NGO provided me with a house. I still live there." Rizeeya, a 70-year-old widow from East Badurtala village, said, "I have a toilet. It was provided by an NGO after cyclone SIDR [in 2007]"

Although older people have limited access to the formal credit market, microfinance institutions and non-profit organisations offer financial services to them and their households. This type of support enabled them to cope with their financial vulnerability after the extreme weather events.

Access to financial services in the form of social protection, savings and loans can help older people get through hard times. "I had once received a loan from an NGO," explained Shuvasm, a small vendor from Haitana Village in the Union. Rashidul from the same village said he received a loan of BDT 20,000 from Palli Sanchay Bank. Shamiul, a 72-year-old fisherman from West Haritana village, said, "BRAC [an NGO] gave me a cow as a loan. I am paying back the amount in instalments. Though it belongs to my daughter, I take care of it."

Some participants reported that NGOs initiated employment programmes such as 'food or cash for work' for unemployed older people and their household members after extreme weather events. Shakima Begum, a 60-year-old widow from Padma village, said, "After the cyclone, I worked for [road repair] Sushilon, an NGO, digging the earth." Some of the participants said that various NGOs help them develop saving habits to cope with future economic crises. Hussain, a 67-year-old farmer and casual labourer, said:

I have some savings. I save BDT 50 per week with an NGO called Sangram. When it reaches BDT 1000/2000, I can withdraw it. I could use it in case of a disaster or when a relative comes to visit. I have no investment plan other than buying a cow.

Most organisations focus on food relief. However, some organisations generally separate their relief efforts into food and non-food categories. For example, in a 2017 flood study, it was found that government and non-government organisations provided rice, pulses, cooking oil, salt, sugar, baby cereal, etc. as food items, which were packed into different food packages. The main relief items, non-food, were corrugated iron sheets, blankets, sarees, lungis, mosquito nets, ropes, family kits, kitchen kits, ORS packages, buckets, mugs, soap, sanitary napkins and washing powder. It is clear that the GOs played a comparatively larger role in providing cash and corrugated iron sheets. In contrast, NGOs were more effective at providing food, water, cloth, and medicine (Hossain, 2020).

7.2.2 Neighbours and friends

During extreme weather events, when family members and relatives are unable or unwilling to provide financial support to older people, they turn to their neighbours. When neighbours notice that someone is missing breakfast and lunch, they bring them dinner so that they do not go hungry

(Erb, 2011). Informal support from friends and neighbours, who are the main carers of older people, is evident during socio-economic crises (Nocon and Pearson, 2000). Participants in the present study indicated that they received help from their neighbours and relatives before, during and after extreme weather events. Some older respondents said that they could find shelter in their neighbours' or relatives' houses during extreme weather events. Rashidul from West Haritana village said:

My neighbours helped me when I had a problem after the cyclone. For example, they helped me remove trees that had fallen on my house during the last cyclone. I had a friendly relationship with them. When I was sick one day, they all came to help me.

Some of the interviewees feel that mutual help is naturally beneficial in times of extreme weather events when most of them feel hopeless. A 73-year-old farmer and casual worker, Chandra from Charlathimara village, said that they received mutual help from their neighbours and relatives during and after the cyclones. He said, "People ask each other for food and where to stay during the disaster." Amena, an 80-year-old widow from Padma village, commented, "Neighbours and relatives help each other after extreme weather events like cyclones. For example, one of my brothers-in-law gave me clothes after the cyclone."

Some participants said they received informal loans that helped them to mitigate vulnerability to extreme weather events at different times. [...] If possible, they lend me money or goods that I have to pay back later, said Shuvasm, a betel leaf vendor from Haritana village. Kamal, a shopkeeper from Badurtala Bazar, said people who were solvent and less affected distributed cooked food to them for a week after cyclone SIDR in 2007. Some elderly people said that they lived in the area with help from their neighbours. Some neighbours allowed landless people to live on their unused land in the area. Palkey Begum, for example, lives with her young son on a khas land given to her by her neighbour. She has no land to cultivate or live on. She said:

... I do not have any land. [My] husband also had no land or property. My husband's home was Mathbaria [a nearby Upazila in Pirojpur district]. And their ancestral home was Patarghata. After my husband's death, I came here with my child. [...] Here I lead my life by working hard. I live on the khas land [land belonging to the state].

Older people, and women and children, were more vulnerable than others in the community. They face many obstacles during the evacuation, on the way to safe places such as shelters, and after extreme weather events. Some participants said that other young people in the community help them reach a safe place when they find us helpless on the way to the shelter centres. Chandresh, a 77-year-old widower from Hariana Village said:

... [though] everyone thinks about themselves at that time [during cyclones], if anyone watches them, they try to help [older people] to take with them [to safe places]. People try to save them [older people] first.

Fakir Shah, 61 years old and a fisherman from Padma village, said he has good relations with his neighbours. There is no quarrel there; he has no chaos or confusion with his neighbours. Whenever possible, neighbours try to help each other and work together in times of extreme events and danger. This is what he did. He said:

Young people arrange the necessary actions to bring the old people to the shelter. Volunteers first bring the old people to the shelter and keep them in a separate place.

Lack of pure drinking water was a common problem for older people, their families, and the community at large. Almost all participants stated that they had to use pond water. The government had provided a filtration system to treat the pond water and store it in a tank. They had to fetch the water from the tank and use it for drinking and cooking. Sometimes neighbours helped them to collect water from their tube well. Older people were not physically strong enough to carry the water from the pond because it was very far away. Some participants said that their neighbours, relatives and even family members sometimes helped them to fetch water for them.

Generally, older people rely primarily on their extended families and their communities for their livelihoods. Older people who need outside help to build sustainable livelihoods often turn to moneylenders or pawnbrokers, as well as microfinance institutions and NGOs. Research has shown that older people face discrimination in accessing savings and loans offered by local microfinance institutions due to their age. However, they are not excluded from banks because of their age, but rather because of a lack of economic resources. Whenever necessary and when they are able, friends, neighbours and the community provide emergency assistance (Erb, 2011).

7.2.3 Family members and relatives

Family members and relatives are seen as a great source of support before, during and after an extreme weather event. The majority of the participants said that they received cash, materials, food and in-kind support from their family members and relatives after the past storms. Rashidul said that he had difficulty meeting his living expenses. His sons sometimes help him raise money. He said, "If I say I do not have clothes, they buy them [clothes] for me. They give me some cash. I then use that to buy food and goods." He also mentioned that he cannot wash his clothes. His wife helps him get water to bathe and wash his clothes.

Some participants explained that although their relatives sometimes help them during and after cyclones, their family members - sons and daughters - support them the most. A 72-year-old Shamiul, a casual fisherman, said, "I am helpless and poor. [...] I am supported by my children [after the extreme events]." Biddut Hossain, a 62-year-old fisherman, said that while fishing in the river, fish jumped at him and injured his eyes. Nearly BDT 200,000 was spent on treating his eyes. "My relatives helped me during the cyclone. [...] One of my daughters-in-law came with some rice," he added. Kamal, a 60-year-old shopkeeper from Badurtala village, said he lost everything in his shop during a previous cyclone. His relatives who were in Dhaka sent him clothes, candles, etc. He said, "My maternal uncle-in-law from Dhaka and a relative from Comilla helped me [during the past cyclone]."

It is argued that families, friends, neighbours and the community provide older people with only a shaky economic safety net that is hardly regular, reliable and consistent (Erb, 2011). Another study, however, found that informal social protection through friends and family was seen by most people as a more reliable source of socio-economic security than formal social protection (Heltberg et al., 2013). Most safety nets available to older people were family, friends and mutual solidarity groups, which weakened as the crisis progressed (Browne, 2015). In the context of individual shocks and events, informal and kinship-based social protection such as neighbourhood credit and family support tended to work well (Hebbar and Shebab, 2020).

7.3 Discussion and conclusion

A well-designed and efficiently managed social protection system for the older population can not only promote age equality but also transform old people into productive members of society (Farid, 2019). Evidence shows that building capacity and resilience for older people and their vulnerable families depends on investing in a more comprehensive social protection system that includes both individual and community programs with formal and informal measures. There is a need to take stock of a country's social protection system to strengthen the resilience of the poor and vulnerable to covariate extreme weather events (Bowen et al., 2020). Social protection programs have been shown to improve a household's capacity to cope with extreme events by providing support after the shock occurs in three ways: Supporting coping capacity, supporting consumption and reducing food insecurity (Ulrichs and Slater, 2016). The present study showed how social protection programs improve the level of socioeconomic life, health, and food supply of older people during and after extreme weather events to address their capacity and vulnerability.

Extreme weather events have many adverse impacts on the vulnerability of older people and their families in coastal Bangladesh because of limited access to support measures and tools to address their vulnerability. The present study has found that various social protection programmes help older people to mitigate their vulnerability to extreme weather events. Social protection programmes that respond to shocks can strengthen resilience by enhancing households' capacity to anticipate, absorb, and adapt to covariate shocks (Hebbar and Shebab, 2020). Protective measures of social protection can help older people reduce their exposure to extreme weather events, improving their ability to withstand the impacts of a climatic disaster. Conversely, social protection coping mechanisms enable older people to adapt to the consequences of extreme weather events (Vakis, 2006). Evidence shows that social protection programmes, both formal and informal, can improve the status and honour of beneficiaries over time. Despite its relatively small allocation, social protection has shown some positive outcomes in various studies (Khan, 2012; Hasan, 2012; Uddin, 2013; Choudhury, 2013).

The findings of the present study suggest that various social protection programs have played a significant role for older people and their families in the aftermath of past extreme weather events in the region. It is clear that old age and widow allowances make a significant difference in the

lives of beneficiaries by providing them with access to food, medical care, and clothing, and overall strengthening family ties and enhancing the quality of life. These allowances enable respondents to meet their minimum basic needs. Most of the allowance is spent on food consumption, clothing and medicines for older people and their family members. The allowance enables many elderly recipients to increase their food consumption in the household. In this study, it has been found that older people who are getting an allowance can consume more protein in the form of fish, milk, meat and nutritious food than households not receiving the allowance. Uddin (2013) found that most of the beneficiaries of the Old Age Allowance spend on food and clothing as well as their daily consumption habits change dramatically after receiving Old Age Allowance. He further found that 90 per cent of beneficiaries eat food three times a day thanks to receiving the Old Age Allowance. It was also found that the food consumed by respondents at each meal had increased since they started receiving the allowance. There is evidence that nearly 43 per cent of the respondents consumed rice, lentils, fish and rice, lentils and vegetables after receiving the allowance.

Health care facilities and medications were essential during their illness and when older people were vulnerable to the disease before and after the extreme weather. The present study has shown that the recipients of Old Age Allowance and Widow Allowance spend on necessary medicines and health needs. It is not uncommon for allowance recipients to spend more on health care than those who do not receive allowances, as found in the current study. The same findings have been reported in some other studies of the effects of the Old Age Allowance. The researchers found that nearly 90 per cent of beneficiaries could afford to pay for necessary emergency medications and had some access to visit doctors. They also found that older people were able to receive care from family members in case of complications in old age and illness (Hasan, 2012; Uddin, 2013). In another study, Old Age Allowance was found to have a positive effect on health-related quality of life (Rana and Ahmed, 2010).

An important finding of the present study is that Old Age Allowance and Widow Allowance contribute to improving the dignity of older people in their families and their communities by strengthening the bond with their family members and community members. In most cases, older people receive better food from their family members and more care from their social network due

to receiving allowances. Since they can support themselves financially, in some cases they can be financially independent and help other family members when they are in need. As a result of the program, they gain more self-esteem and a greater sense of honour and importance in the eyes of family members, friends, local politicians, and society in general. In addition, the negative attitude of the community, peers and local elites towards them that they are a burden to society decreases (Hasan, 2012). In another study, it was found that social protection such as Old Age Allowance in Bangladesh significantly improves the social relations of elderly beneficiaries (Karim and Hossain, 2013). After receiving the Old Age Allowance, recipients' relationships with their son, daughter, relatives and neighbours improved significantly compared to the time before receiving the allowance. It seems that social protection prevents the deterioration of social relations of those who previously had good social relations and it helps to improve the social relations of those who did not have such good social relations (Karim and Hossain, 2013).

Again, access to cash through getting an allowance has been found to significantly boost their self-esteem, especially in times of crisis. It is found that they can now participate in family decision-making. In addition, the Old Age Allowance creates trust among neighbours and shopkeepers. As a result, people in the community trust them to provide them with the goods they need in an emergency, in the hope that they will be able to recoup the costs once they receive the allowance. In a study conducted by Uddin in 2013, nearly 97 per cent of respondents reported that their dignity within the family had increased as a result of this program. In addition, 60 per cent of respondents reported that their family members now care more about them than before, and 30 per cent are now able to actively participate in decision-making processes within their family. Another study found that social protection programs protect beneficiaries and their families from shocks and extreme situations. The study found that 24 per cent of respondents had a positive experience with store owners in an emergency. In addition, the study revealed that the acceptance of welfare beneficiaries by officials and local people had increased.

The present study has found that social protection programs have improved the living conditions of older people in the area. The older people who receive Old Age Allowance or other types of financial services live better than those without these benefits. Many statements of the beneficiaries suggest that their standard of life improved as a result of receiving the allowance.

They can now meet their basic needs and can live with family under one roof. Similar results were found in two other studies (Uddin, 2013; BRAC, 2008) study. The allowance program has been found in our study as one of the most effective ways to help older people to save some money that they can invest in various income-generating activities. Researchers found that these people invest their savings in raising cattle, chickens or ducks or in small businesses (Hasan, 2012).

The present study has also found NGOs, neighbours, relatives and family members provide informal social protection. In order to receive help in an emergency, whether material or financial, a reliable social network is crucial. It has been found in the present study that most help is provided by family members and relatives, followed by friends and neighbours. These types of social protection help older people to recover immediately from the effects of extreme weather events. Although the range of sources of support available to them may vary, they are helpful after extreme weather events. A study conducted to compare the positions of governmental and NGOs found that nearly half of the respondents received food items, about one-fourth received clothing, 37 per cent received cash and 8 per cent received other types of assistance from government organisations; and, from the NGOs, about three-fourth of them received food, 52 per cent received pure drinking water, 40 per cent received clothes, and one-fourth had access to other facilities (Hossain, 2020). Another study found that most older people receive some form of support from their families, including those who have migrated to other parts of Bangladesh or abroad (Khondker et al., 2013). Another finding from this study is that mutual support through social capital helps older people cope with adverse situations after a cyclone disaster. Social networks include not only family members (bonding social capital), but also friends, neighbours and community groups including religious and charitable associations (bridging social capital), as well as mutual aid and charity agreements (Islam and Walkerden, 2014; Nguyen-Trung, Forbes-Mewett and Arunachalam, 2020; Malak et al., 2020).

The findings of this study suggest that mutual social support helps older people cope with crises after a cyclone. For example, they provided food to neighbours immediately after a cyclone when institutional help was not available and helped each other rebuild their homes. Similar findings are found in other studies (e.g. Paul, 2012, 2015). Other studies in coastal Bangladesh and Vietnam have shown that mutual support through bonding and bridging social networks played a crucial

role throughout the short- and long-term recovery process after extreme weather events (Islam and Walkerden, 2014; Nguyen-Trung, Forbes-Mewett, and Arunachalam, 2020).

Nevertheless, the amount of Old Age Allowance benefits plays an important role in the wellbeing of the beneficiaries. Older people who think the current amount is sufficient will have a strong sense of security, but if they think it is insufficient or insignificant, the sense of security will be weaker. In this study, it was also found that the amount of money given as an allowance was not enough to cover the total family expenses for older people who have extended families. Although the amount they received was small, it was still useful for them and they would likely face many difficulties when they no longer received the allowance. In a previous study, it was also found that the amount was insufficient for the recipients. Half of the respondents said that the current amount of allowance was insignificant. Thirty-eight per cent said it was insignificant. Only 12 per cent thought it was moderate. None of the respondents considered it very significant or significant (Hasan, 2012). Older people in coastal Bangladesh face a variety of risks and vulnerabilities. However, their impacts are sometimes more severe than those of the general community. The negative impacts of extreme weather events are more detrimental to them than to those who are better off financially, physically, psychologically, and in terms of long-term human development capacity. A social protection program can therefore play an important role in helping older people and their families to address their vulnerability and cope with losses following extreme weather events (Hasan, 2012).

The vulnerability of older people is theorized to be a combination of the cumulative effects of extreme events and processes that have taken place during their lifetime. There is a constant and contradictory interaction between resources, risks, threats and socio-economic conditions, extreme weather events, social networks and the support system available in the community. The vulnerability of older people is a dynamic process rooted in both internal and external livelihood and geological factors. Besides their efforts, a range of social protection programmes, both formal and informal, can therefore help to address their vulnerability by strengthening their capacities. The three main contributions of social protection identified in this study are: it improves the socio-economic conditions of older people and their households, mitigates their vulnerability and increases their capacity. Providing housing opportunities, improving relationships with family,

friends and relatives, and facilitating income-generating activities improve the socioeconomic status, consumption and food security of older people and enable them to adapt to extreme weather events in the coastal region of Bangladesh.

Chapter 8: Conclusion and policy recommendations

This concluding chapter summarises the main findings of the study in relation to the research aims and questions, explains the value and significance and discusses the limitations. It also makes recommendations for further research and policy initiatives to strengthen the capacity of older people and their households to reduce their vulnerability to extreme weather events in coastal Bangladesh through formal and informal social protections.

The main objectives of the thesis were to investigate "the vulnerability of older people to extreme weather events and the role of social protection in addressing this vulnerability". Extreme weather events adversely affect people by making them vulnerable to socio-economic conditions. Among age groups, older people were the most vulnerable and had a lower adaptive capacity to cope with severe climate disasters and their impact on their socio-economic conditions. This study has examined the impact of extreme weather events on the vulnerability of older people and explored how social protection programmes respond to their vulnerability. The study has attempted to address the following questions: a) why are older people in coastal Bangladesh vulnerable to extreme weather events?; b) how do extreme weather events exacerbate the vulnerability of older people in coastal Bangladesh?; and c) how do social protection programmes address the vulnerability of older people in coastal Bangladesh? Field work among the elderly was carried out in a coastal region - Patharghata Upazila in Barguna district - in Bangladesh. The relevant data and information to address the research questions were collected through in-depth interviews using a semi-structured questionnaire.

The literature review illustrated different aspects of the vulnerability of older people to extreme weather events, their causes and how they can be mitigated through social protection. The concept of vulnerability varies across disciplines, but simply put it means being exposed to threats and having the limited adaptive capacity to deal with these threats effectively (Siegel et al., 1999). Chambers (1989, p. 1) defines vulnerability as "exposure to contingencies and stress, and difficulty in coping with them". The contingencies of older people here include unexpected extreme weather events causing the 'irreversible loss or sale of assets' (Chambers, 1983, pp. 103-104), loss of employment and deterioration of health. This means that the vulnerability of older people is the lack of capacity to cope with the consequences of extreme weather events. As a result, they would

suffer the loss of property or assets, which could put them in vulnerable conditions (Forbes-Mewett and Nguyen-Trung, 2019). The definition has an external aspect of hazards and shocks to which individuals or households are exposed, and an internal component, namely the lack of resources to cope with the risks, threats or hazards (Crooks, 2009).

According to Moser (1998), the more resources people have, the less vulnerable they are. These resources are diverse and include human capital, psychological capital, social capital, information capital, economic capital, political capital and natural capital (Forbes-Mewett and Nguyen-Trung, 2019). When older people lack the reserves and resources or the resilience and capacity to minimise challenges and risks or threats, they become vulnerable to extreme (weather) events. As vulnerability is multidimensional, coming from different sources and varying according to context, it is a challenge to find a common or consensual definition of the vulnerability of older people. Vulnerability is not only due to external sources (e.g. extreme weather events) but also to insecure conditions that are deeply rooted in social, political and economic systems (Forbes-Mewett and Nguyen-Trung, 2019).

The vulnerability of older people to extreme weather events consists of the negative effects of exposure, sensitivity and ability. Grundy (2006) argues that vulnerable older people are those whose reserve capacity is below the appropriate level to cope with the challenges (such as the consequences of extreme weather events) they face. This 'reserve' includes income and material resources, family and social support, and health status. Therefore, the vulnerability of older people in a socio-economic context is a complex, dynamic, challenging, multidimensional and pre-existing condition that depends on both individual characteristics - age, gender, education, health - and social and economic factors such as employment, income, access to credit, social connections and support (Daddoust et al., 2018). The vulnerability of older people thus refers to the functionality of older people and their conditions due to their ability to respond to risks or shock in an unstable situation during extreme weather events. These functions include primary wellbeing, livelihood and resilience, self-protection, social protection and socio-political and institutional networks (Birkmann, 2006). Social protection can be an important strategy to cushion the impact of shocks and stress through income replacement and strengthening resilience by reducing exposure to extreme weather events, providing incentives/assistance to retrofit homes to withstand

tropical cyclones, or implementing public works programmes to restore income to cope with the impact of extreme events. Social protection is commonly understood as all public and private initiatives that provide income or consumption transfers to the poor, protect the vulnerable from livelihood risks and improve the social status and rights of the marginalised, with the overall aim of reducing the economic and social vulnerability of poor, vulnerable and marginalised groups (Devereux and Sabates-Wheeler, 2004).

The study presented a theoretical discussion of the vulnerability of older people [to extreme weather events] and developed a conceptual framework based on some existing frameworks to show the link between extreme weather events, the vulnerability of older people and the role of social protection in reducing this vulnerability. Based on the literature, this study defined the vulnerability of older people to extreme weather events as "a condition resulting from the consequences of the cumulative impact of extreme weather events combined with a lack of capacity to access socio-economic resources and social protection programmes."

8.1 Summary of findings

The findings of the study show that older people in coastal areas of Bangladesh have been highly vulnerable to extreme weather events in the past and they believe that the same or more brutal conditions will recur due to their poor socio-economic condition and lack of adequate support system. The study found that every extreme event, especially cyclones and floods due to storm surges, destroyed or significantly damaged the livelihoods of older people and negatively affected their lives, making them vulnerable. However, the findings of the study also show that social protection programmes (formal and informal) help them cope better with the impacts of extreme weather events.

8.1.1 Sources of existing vulnerability

The vulnerability of older people is multidimensional and shaped by a variety of factors, from extreme weather events to socio-economic conditions of older people. The study found that climate events, directly and indirectly, affect the income, employment, expenditure and credit liabilities in housing, assets, food and nutrition, water and sanitation, and health of older people and their households. The origin of older people's vulnerability dates back to about 150 years ago when their

grandparents or ancestors started clearing the jungle in the wetlands and settled here to forage, live and grow crops. Their vulnerability was passed down from generation to generation with no permanent solution. Being close to the river and the sea, these settlements have become more vulnerable to extreme weather events. The vulnerability of their settlements to extreme weather events, especially cyclones and floods, is related to three mutually reinforcing factors: location, the likelihood of an extreme climate event occurring, and the extent to which their structures can be damaged. Their houses are one of the main causes of vulnerability because they are built of cheap and poor building materials such as mud, corrugated iron and tin. Many of these houses are light, typically wooden frame structures, which makes them particularly vulnerable to cyclones.

Older people living in absolute poverty lacked the means to cope with extreme weather events, increasing their vulnerability. In addition, the livelihoods of older people from low-income families in coastal areas were associated with endemic poverty, and their vulnerability to extreme weather events may have increased due to lower savings or economic difficulties. Again, older people in the region were found to have fewer employment opportunities. Some jobs were not accessible to older people due to their physical strength and limited mobility. The study found that grandparents and parents of older people owned some properties, some of which they lost due to extreme weather events or other social or family crises. Some older people who inherited property from their grandparents or parents were less vulnerable for a few years but had to sell it to survive various extreme weather events, which pushed them into asset vulnerability. This background hindered their upbringing, education and greater job opportunities, thus making them vulnerable in old age.

In general, most in the study area were socio-economically dependent to some extent on their family members and the social support system, as their economic incapacity and lack of resources made them vulnerable to extreme events. Before and after extreme weather events, when the social support system was inadequate, they depended on the children for daily needs such as food, clothing and medicines.

8.1.2 Factors that exacerbate vulnerability

The findings of this study have shown that increased unemployment and underemployment significantly reduce the income of older people and their families. Post-cyclone environmental

hazards restricted their access to work, which negatively affected their income and expenditure. The availability of work was found to decrease sharply after the extreme events due to the destruction of sources of employment such as agriculture, fishing and informal work in the forests. Older people and their household members had little or no work after the cyclones and floods. Again, access to work was limited by various environmental and structural hazards such as damage to bridges, roads, houses, factories and communication networks, and loss of equipment for self-employed workers. In addition, as they were physically weak they were sometimes underpaid in the aftermath conditions. These factors contributed to the financial vulnerability of older people in coastal Bangladesh.

Despite their limited access to credit markets, some older people borrowed money from various sources such as banks, NGOs and moneylenders to rebuild their destroyed houses or build a new one, cover medical expenses, buy food, clothes, agricultural and fishing equipment, grow crops and catch fish. The loss of employment and income, the increase in commodity prices and the loss of purchasing power and credit liabilities had left the older people of the region in vulnerable circumstances.

In addition to the loss of employment and income, extreme weather events destroyed various assets, properties and the land of older people and their families in the coastal region almost every year. This study shows that older people and their households lost land, houses, fishing boats, nets and machinery, production facilities, stocks of small businesses and resources for self-reliance. The severe cyclones and floods damaged their fish ponds and fishing grounds, and they lost their family's livestock and birds. The study also found that the shelters for the cyclones were not sufficient to serve all the people living in the area and that most of the shelters were far from the homes of older people. It was also found that the structural conditions, atmosphere and facilities of the cyclone shelters were not suitable or adequate for older people.

Among other vulnerabilities, elderly people in the area were also found to suffer from food insecurity. Following the extreme weather events, particularly the cyclone and floods, food and nutrient shortages had worsened, exacerbating food insecurity among older people. The study identified several causes of food insecurity after the extreme events, such as the unavailability of food because supply systems were affected by the destruction of communication infrastructures,

the loss of local production and access to food due to lack of income and savings, and price increases. The food intake of older people in the study area was affected by extreme weather events and their ability to buy food or the availability and accessibility of food within the family. There were days when they had nothing to eat. Many older people had no access to food such as meat, fish, eggs and fruits except when provided by a close relative, a neighbour or at a religious festival during the year.

Most of the older people in the study area were vulnerable to diseases and ailments after extreme weather events. They were unable to obtain healthy and nutritious food and adequate medicines due to their financial inability. They were also dependent on the local pharmacy to obtain medicines in case of illness, as health services in the area were inadequate. In addition to physical health problems, this study also found mental health problems among older people in the coastal region. Older people and their households were shocked when they recalled the suffering and grief they had experienced during previous extreme weather events. They reported the loss of family members, jobs, houses, assets, farmland and livestock in the past, leading to mental health problems among coastal elders.

8.1.3 The role of social protection in addressing vulnerability

Extreme weather events have many adverse impacts on the vulnerability of older people and their families in coastal Bangladesh, as they have limited access to support and tools to address their vulnerability. This study found that the social protection programmes (SP) like Old Age Allowance and Allowances for the Widowed, Deserted and Destitute Women help older people to minimise their vulnerability to extreme weather events. Social protection programmes that respond to shocks can strengthen resilience by improving households' ability to anticipate, absorb and adapt to covariate shocks. Social Protection programmes make a significant difference in the lives of beneficiaries by providing access to food, medical care and clothing, and overall strengthening family ties and improving quality of life. After receiving the allowances, most respondents were able to meet their minimum basic needs. Most of the allowance was spent on food, clothing and medicines for themselves and their family members. The allowance enabled many elderly recipients to increase their food consumption in the household. Older people who received the allowance were able to consume more protein-rich foods such as fish, milk, meat and nutritious

foods than those who did not receive the allowance. The programmes helped to improve the dignity of older people in their families and their communities by strengthening their bonds with their family members and community members. In most cases, older people received better food from their family members and more care from their social network because of the allowances. Since they were able to support themselves financially, in some cases they were financially independent and helped other family members when they were in need. Again, access to cash through social protection has been shown to increase participation in family decision-making. In addition, the Old Age Allowance created faith among neighbours and shopkeepers. As a result, people in the community trusted them to provide the goods they needed in an emergency in the hope that they would be able to recoup the costs once they received the allowance. Many beneficiaries' statements indicated that their standard of living had improved as a result of receiving the allowance. They could now meet their basic needs and live with their family under one roof.

The study thus found that social protection - formal and informal - can play an important role in reducing older peoples' vulnerability to the effects of extreme weather events and socio-economic crises. Beneficiaries of formal social protection programmes were found to receive long-term benefits, while informal social protection programmes responded to shocks and provide short-term benefits.

8.2 Significance and contribution of the study

This thesis explored the intersection of three aspects of the vulnerability of older people - sources of vulnerability, factors that exacerbate vulnerability to extreme weather events, and the role of social protection in addressing older people's vulnerability in coastal regions in coping with the impacts of extreme climate events. The results have shown that there are strong links between resources, impacts and social protection that make older people in the region vulnerable to extreme weather events. By considering the three interrelated issues together, this work contributes to the existing body of knowledge on the vulnerability of older people to frequent extreme weather events.

First, the work makes an important contribution to the limited literature on the vulnerability of older people to extreme weather events in poor countries whose socio-economic conditions and

livelihoods are similar to those in Bangladesh. This work explicitly contributes to the wider research community by providing a deeper understanding of why and how older people are vulnerable to extreme weather events. The current study also helps researchers and practitioners by providing evidence-based knowledge on what factors are actually behind the vulnerability of older people in coastal villages of Bangladesh. This work operationalises the relationship between vulnerability to extreme weather events and the ability to recover from the impacts of extreme weather events in the specific socio-economic and geophysical context of coastal settlements, adding value to the existing body of knowledge.

Second, there are very few studies that have investigated the vulnerability of older people to extreme weather events. To the researcher's knowledge, there is only one study on the vulnerability and adaptation strategies of older people in Bangladesh (Malak et al., 2020). Moreover, there is only one study so far in Bangladesh that uses qualitative methods to understand the experiences of older people exposed to extreme weather events. As one of the few studies to include social protection in the conceptual framework, this research has addressed the issue of vulnerability more holistically. For these reasons, the findings of this work are an important and unique contribution to understanding the nature, causes and experiences of older people affected by cyclones and flooding in coastal Bangladesh.

Finally, Bangladesh has initiated various short- and long-term actions and plans to mitigate the vulnerability of older people and excluded groups under the "leave no one behind" theme of the Sustainable Development Goals (SDGs). The findings could help policymakers and researchers better understand the impacts of extreme weather events in the future and the policy responses needed to address the consequences of similar climate disasters. The research findings could be useful in developing and refining policies to address the vulnerability of older people and marginalised groups to extreme weather events in coastal regions. This study will help refine and expand the applicability of social protection programmes to address the vulnerability of older people and other vulnerable groups in coping with extreme weather events.

8.3 Limitations of the study

This thesis explores the vulnerability of older people to extreme weather events and the contribution of social protection to reducing this vulnerability; however, the study had some drawbacks. The following outlines the current research gaps and potential areas of study that may be considered in future research.

In this study, only older people were interviewed to obtain data and information about their experiences and needs before, during and after the extreme weather events. The household members of the older people and other community members in different age groups were not included in the study. Therefore, the results presented in this dissertation do not include detailed information about other household members' needs and experiences of the extreme weather events in the region. This gap may be addressed in future research about older people's vulnerability to extreme weather events by including participants from different age and occupational groups.

The present study was conducted only in a particular Union of the coastal region of Bangladesh. It does not cover all coastal communities and other parts of the country that are affected by extreme weather events and may increase the vulnerability of older people. This limitation of the study could be considered in future investigations on the vulnerability of older people in Bangladesh.

In-depth interviews and field notes were used in this study only to collect qualitative data and information from a specific age group of older people. This study did not use a mixed methodological approach and the interviews were manually transcribed in Bengali and then translated into English, which may limit the comprehensive assessment of older people's vulnerability in the coastal community. In future research, attention could be paid to broader data collection approaches.

8.4 Policy recommendations

This study explored the sources and socio-economic conditions of the vulnerability of older people to extreme weather events in coastal Bangladesh. It also highlighted the contribution that social protection programmes can make to effectively address these vulnerabilities. The study also

showed the older people's limited access to family and local resources and social networks, which hindered the effective mitigation of their vulnerabilities. Therefore, the identified problems and constraints of older people need to be incorporated into the individual and comprehensive policy reform frameworks and future planning - coastal planning, disaster programmes and infrastructure development. Adaptation measures that can be taken to reduce older people's vulnerability to extreme weather events include:

- Non-governmental organisations staff can reduce the negative impact of extreme weather events by informing older people about their vulnerability of in the region.
- Vulnerability directories based on the socio-economic and demographic data of older people, as well as vulnerability mapping, can help policy makers, emergency supervisors and technical assistance organisations to identify vulnerable older people during extreme weather events.
- All stakeholders, including the public and private sectors, communities, civil society and non-governmental organisations, must take responsibility and work together to strengthen the resilience of people and infrastructure.
- Governments can allocate resources to long-term and systemic resilience strategies and strategic actions for older people, balancing national and local priorities.
- National and international authority should allocate necessary resources to resilience-building initiatives in areas most vulnerable for the older people to extreme weather events.

The competent authority of Bangladesh may consider the following recommendations to strengthen the capacity of older people and their households to mitigate their vulnerability to extreme weather events.

Infrastructure development and maintenance

The construction and management of buildings, roads, power and telecommunication lines, drainage and sewerage, and waste disposal are very difficult and vulnerable to climate change-related disasters. Cyclones in combination with floods have serious impacts on infrastructures and

thus on livelihoods (Rahman et al., 2015). Thus, timely development and proper maintenance of infrastructure are one of the first necessities in the community to mitigate the vulnerability of older people to extreme weather events. As the study area was highly vulnerable to extreme weather events, the policy authority may consider the following infrastructural developments immediately and maintain them properly before the extreme weather seasons.

Construction and repair of the dam

The dam is the first line of protection for the elderly and their households from extreme cyclones and floods. The construction of earthen dams for flood control, irrigation and drainage has always been known in Bangladesh, but these cannot solve the flood problem effectively and permanently as they are easily vulnerable to rain splash and flow of flood water. The sluice gates as well as the dams are often in poor condition and lack proper maintenance. It is, therefore, necessary to repair the dam immediately when it is damaged or broken due to extreme cyclones and floods and to monitor its proper maintenance.

Roads and paths

The vulnerability of older people to extreme weather events may be exacerbated by the lack of proper road networks and transport infrastructure. During the rainy season, they are destroyed and the mud makes it difficult to move around. Roads and pathways are essential for the evacuation of older people during extreme weather events. The relevant local government and Union Council may take appropriate measures to construct and repair roads and pathways for the remote older villagers to move safely in the shelters and a safe place during cyclones and floods.

Cyclone and flood shelters

Cyclone shelters are considered comparatively safe for older people during extreme weather events. However, their capacity is less than what is needed in the community and the shelters are not safe for them. It is evident that the shelter condition and distances, the lack of infrastructure facilities and their deterioration pose a problem for nearby households when deciding whether or not to seek cyclone shelters. With the help of donor agencies and local elites, the relevant

authorities should construct more cyclone shelters so that older victims of extreme weather events can seek shelter in a safe place during extreme weather events.

Housing

To reduce the vulnerability of older people and their households, it is essential to support the construction of more robust houses in coastal villages. Most houses on the coast are semi-pucca and kutcha³, which are not strong against cyclones and storm surges. In addition, many elderly people cannot afford to build sturdy houses to protect them from strong cyclones and storm surges, and many of them do not seek shelter in cyclone centres. This is due to inadequate shelter centres, the lack of age- and gender-appropriate environments in the centres, and inappropriate communication systems (both roads and vehicles) between residents and shelter centres. In addition, some locals believe that they should not leave their homes during a disaster for fear of misfortune. Therefore, stable shelters are needed for the elderly in coastal households, which would help minimise damage and losses. The government, in collaboration with domestic and foreign NGOs and donors, can provide better shelter to the locals through long-term, interest-free loans.

Creating employment opportunities for older people and their households

Creating employment opportunities for older people and their households is important to generate income and improve their ability to recover from the loss and damage following extreme weather events. Most older people living in coastal communities have limited access to employment opportunities due to their strength and the lack of age-appropriate jobs. The government can therefore create employment-intensive facilities such as fish processing factories, expand tourism

³ A **pucca** house is made of solid, resistant materials such as stones, bricks and concrete. Pucca houses, including flats and buildings, are designed to last a long time.

A **semi-pucca** house is made of solid walls of solid material, but the roof is of a different material from that used for pucca houses. This type of house is built from a combination of pucca (strong, high-quality) and kutcha (low-quality) material.

A **kutcha** houses are built from readily available raw materials such as stone, wood, clay or straw.

and promote other income-generating activities such as tailoring, sewing for older women, poultry farms and small handicrafts in coastal areas.

Give preference to older people in the distribution of relief

Evidence suggests that older people are often overlooked by emergency response systems during extreme weather events, exacerbating their vulnerability and limiting their ability to respond and adapt. All phases of emergency management and response need to consider the specific needs and challenges faced by older people in extreme weather events. Older people are more vulnerable than any other age group. Older people have little physical and mental strength to move to the central relief distribution points. Therefore, the relevant ministries and local governments could take appropriate measures to distribute relief goods in such a way that the elderly can receive sufficient help and support. A special group could be formed to distribute relief goods for the elderly in the cyclone shelters and from door to door.

A community centre for the elderly

A community centre for older people could facilitate gatherings where they can share their views and experiences on the impact and vulnerability to extreme weather events and interact with local authorities. However, there was no such community centre for older people in the coastal region. The local government could play the role of initiating this programme with the help of NGOs and local youth.

Include all older people in formal social protection programmes

In Bangladesh, formal social protection for older people included both contributory and non-contributory schemes. The findings showed that not all older people who were eligible for formal social protection received benefits. As a result, they were more vulnerable than those who received social protection. To address this, the government can include all eligible older people who are

poor and vulnerable in the formal social protection programmes, which will help them somehow cope with their financial crisis after extreme weather events.

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Appendices

Appendix-1: Socio-economic Profiles of participants

Pseudonym	Age	Gender	Marital Status	Literacy Level	Occupation	Living Arrangement	Social Protection Status
Abdullah	80	Male	Married	Class one	Casual worker/small business	Living with wife	Old Age Allowance
Abul Majhi	70	Male	Married	No Schooling	Boatman in fishing boat	Joint family	Non-beneficiary of Social Protection
Ahammed	80	Male	Married	No schooling	Not work/casual work	Living with divorced daughter	Non-beneficiary of Social Protection
Alamgir	62	Male	Married	Class Five	Carpenter	Joint family	Non-beneficiary of Social Protection
Alfaz Hossain	66	Male	Married	Class two	Casual worker		Old Age Allowance
Ali Jabbar	80	Male	Married	Class Two	Not work	Living with Sons	Old Age Allowance
Amena	80	Female	Widow	No Schooling	Not work	Living along with disabled daughter	Old Age Allowance
Amila	65	Female	Widow	No schooling	No paid work	Living with daughter	Widow Allowance
Aminiya	63	Female	Widow	No schooling	No paid work	Living with Grandchild	Non-beneficiary of Social Protection
Asadul	80	Male	Widower	Class One	Marginal farmer/Casual worker	Joint family	Non-beneficiary of Social Protection
Asima	75	Female	Widow	Class three	Casual work	Living with sons	Old age allowance
Azijul	67	Male	Married	Literate	Not work	Living with son	Old Age Allowance
Baruya	65	Female	Widow	No schooling	No paid work	Living alone	Old Age Allowance
Biddut	62	Male	Married	No Schooling	Casual worker/No work		Non-beneficiary of Social Protection
Chandra	73	Male	Married	Literate	Farmer/Casual Worker	Joint Family	Old Age Allowance
Chandresh	77	Male	Widower	Class 10	Not work	Living with son	Old Age Allowance

Debnath	67	Male	Married	Class Seven	Casual carpenter	Joint family	Old Age Allowance
Enam	80	Male	Widower	No Schooling	Not work	Living with sons	Old Age Allowance
Fakir Shah	61	Male	Married	Class three	Fish vendor	Joint Family	Non-beneficiary of Social Protection
Halimunnesa	60	Female	Widow	No Schooling	Not work	Living with Grandchild	Non-beneficiary of Social Protection
Haulader	78	Male	Married	Class one	Casual worker	Joint family	Non-beneficiary of Social Protection
Hossain	67	Male	Married	Class five	Farmer/Casual worker	Living with wife	Old Age Allowance
Ismail Hossain	75	Male	Married	No schooling	Marginal farmer	Living with wife	Non-beneficiary of Social Protection
Jahana	78	Female	Widow	Class two	No paid work	Living with Son	Old Age Allowance
Jamina	70	Female	Widow	No Schooling	Casual work	Living with daughter and grandchild	Old Age Allowance
Kabiruddin	70	Male	Married	No Schooling	Not work	Living with sons	Old Age Allowance
Kamal	60	Male	Married	BA Pass	Shopkeeper	Joint family	Non-beneficiary of Social Protection
Karimon	67	Female	Married	No schooling	Nott work	Living with Husband	Non-beneficiary of Social Protection
Lailunnahar	60	Female	Married	No schooling	Casual work at home	Joint family	Widow Allowance
Liakat	80	Male	Married	Class one	Not work/casual beggar	Joint family	Old Age Allowance
Minaron	63	Female	Widow	Class three	Casual Work	Living with son	Non-beneficiary of Social Protection
Momina	62	Female	Widow	No schooling	Casual Worker	Joint family	Widow Allowance
Muhibul	79	Male	Married	Class ten	Farmer/shopkeeper	Joint family	Old Age Allowance
Naima	68	Female	Widow	No Schooling	Casual Worker	Joint family (Living with daughter)	Non-beneficiary of Social Protection

Omduddin	70	Male	Married	SSC (Secondary School Certificate) Pass	Casual Work	Living with son	Non-beneficiary of Social Protection
Palkey	60	Female	Widow	No schooling	Casual worker	Living with Son	Non-beneficiary of Social Protection
Rahimon	65	Female	Widow	No schooling	Not work	Living with sons	Non-beneficiary of Social Protection
Rahiya	62	Female	Widow	Class eight	No Paid Work	living alone	Widow Allowance
Raima	60	Female	Widow	No schooling	Not work	Joint family	Widow Allowance
Raizuddin	69	Male	Married	No Schooling	Marginal farmer/casual worker	Joint family	Old Age Allowance
Rajina	63	Female	Married	Class one	Tea seller	Joint Family	Non-beneficiary of Social Protection
Rashidul	80	Male	Married	No schooling	Casual worker	Joint Family	Old Age Allowance
Regoriya	70	Female	Widow	No schooling	No paid work	Living with sons	Non-beneficiary of Social Protection
Rejima	65	Female	Married	No schooling	Not work	Joint family (Living with son)	Non-beneficiary of Social Protection
Rizeeya	70	Female	Widow	No schooling	Casual worker	Single	Non-beneficiary of Social Protection
Sabdar	66	Male	Married	No schooling	Fisherman	Joint family	Non-beneficiary of Social Protection
Sakimun	64	Female	Widow	Class Five	Not work/Casual Work	Joint family (Living with daughter)	Old Age Allowance
Satika Begum	60	Female	Married	No schooling	Fishing	Living with Husband	Non-beneficiary of Social Protection
Setoriya	62	Female	Widow	Literate Can signature only	No Paid work	Living with son and older mother	Widow Allowance
Shafika	70	Female	Widow	No schooling	No paid work	Living with Elder son	Non-beneficiary of Social Protection

Shahanaz	62	Female	Widow	Class Seven	Casual Work	Living alone	Widow Allowance
Shakima Begum	60	Female	Widow	No Schooling	Casual worker	Joint family (living with son)	Old Age Allowance
Shamiul	72	Male	Married	Class three	Fisherman	Living with wife	Old Age Allowance
Shamoli	62	Female	Widow	class five	Casual work	living with grandchild	Widow Allowance
Shuvashm	60	Male	Married	No Schooling	Small vendor	Joint Family	Non-beneficiary of Social Protection
Ziaul	80	Male	Married	No schooling	Casual worker	Living with wife	Non-beneficiary of Social Protection

Annex-2: Consent form

Project title: Older people in Bangladesh: Extreme weather events, social protection and vulnerability

Project ID: 22524

Chief Investigator: Professor Dharma Arunachalam

Phone: (03) 990 52357

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Co- Investigator: Associate Professor Helen Forbes-Mewett

T: +61 3 9905 5243

Email: helen.forbesmewett@monash.edu

Student Investigator: Md Isahaque Ali

Email: Md.Ali1@monash.edu

I have been asked to take part in the Monash University research project specified above. I have read and understood the Explanatory Statement, and I hereby consent to participate in this project.

I consent to the following:	Yes	No
To participate in an interview	<input type="checkbox"/>	<input type="checkbox"/>
Audio recording during the interview	<input type="checkbox"/>	<input type="checkbox"/>
To take notes during the interview	<input type="checkbox"/>	<input type="checkbox"/>
The information that I provide during this research may be used in the creation of academic papers to be published and may be part of a Research Report.	<input type="checkbox"/>	<input type="checkbox"/>

Name of participant _____

Participant Signature _____ Date _____

Annex-3: Explanatory statement

EXPLANATORY STATEMENT

Older people in Bangladesh: Extreme weather events, social protection and vulnerability

Project ID: 22524

Chief Investigator:

Professor Dharma Arunachalam
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Student Investigator:

Md Isahaque Ali
Email: Md.Ali1@monash.edu

You are invited to take part in this study. Please read this Explanatory Statement in full before deciding whether or not to participate in this research. If you would like further information regarding any aspect of this project, you are encouraged to contact the researchers via the phone numbers or email addresses listed above.

What does the research involve?

This research aims to explore the influence of extreme events of climate change, socioeconomic conditions and social protection on the vulnerability and resilience of older people in Bangladesh.

What the participants will be asked to do, and how much time it will take?

If you agree to participate in the study, you will be asked to take part in an in-depth interview to answer a series of questions regarding your experiences and views about extreme weather events, your socioeconomic conditions, health status, access to social services and programs and your vulnerability and wellbeing. You will also be asked about your living arrangements, daily activities and the interaction of family members and neighbours. The interview will last for about 60 minutes and the session will be recorded on an audio recorder with your permission. The interview will be conducted at a time agreed on by you.

Why are you invited for this research?

You are invited to participate in this study because you are living in this community that has had vast experience with extreme events of climate change. Older people tend to be more vulnerable than other age groups in terms of health and well-being, socioeconomic conditions, income and livelihoods and social support. Therefore, your experiences are important to understand the vulnerability and resilience of older people in coastal Bangladesh. Your contact details were collected with the help of the Union Council and the Department of Upazila Social Services of Patharghata.

Consenting to participate in the project and withdrawing from the research

Participation in this study is for research purposes only, and your responses will not be shared or used for any other purpose. You will be asked to give your consent to participate in the study by signing and returning the consent form before starting the interview. Your participation is voluntary, and you are free to withdraw from part or all of the research project any time without explanation or prejudice and to withdraw any unprocessed data you have provided by request with the project investigators.

Possible benefits and risks to participants

The participants of this study will be the older people, who are one of the most vulnerable and marginalised groups in the society of coastal Bangladesh. This study will investigate the effect of the extreme climatic events on socioeconomic conditions and the vulnerability of older people in the area. Though everyone who participates in this study will not benefit personally, their participation will be of benefit to society by helping researchers to learn more about vulnerable conditions and resilience of older people in Bangladesh. We hope that the findings from this current study will help inform future policies relating to older people's wellbeing in Bangladesh. The study will not involve any risk or questions that may cause discomfort. However, recalling experiences of past extreme events may make you feel emotional. If any discomfort occurs, the researcher will stop the interview and resume later if you agree. Further, participants can choose not to answer some questions or withdraw from the interview at any time.

Confidentiality

The information about you collected for the study will be kept strictly confidential. Participants may provide their names on the consent form, and this can only be used for the researcher's records. Names will be coded or provided with an alias for de-identification of participants. You will not be identifiable in any documents published from the study. Your contact details will not be used for any other purposes.

Storage of data

The data and information collected will be stored in locked filing cabinets or password-protected computer, hard drives or online drives that are only accessible by the researchers. Data will be stored for a minimum of five years and will be destroyed securely as regulated by Monash University.

Results

The data collected for this study will be used to prepare a PhD thesis. The results may be published as journal articles or conference presentations. Data summary reports can, however, be sent to any respondent who expresses an interest at the time of the interview or by contacting the researchers (see the contact details above).

Complaints

This research will be conducted in Bangladesh. If you have any concerns or complaints about the conduct of the research project, you are welcome to contact with the following person who is a faculty of a Public University in Bangladesh.

Dr Mohammad Hafiz Uddin Bhuiyan

Professor

Institute of Social Welfare and Research

University of Dhaka, Bangladesh

Email: hafizubn@yahoo.com

Phone : +88-02-58616662

Thank you,

Professor Dharma Arunachalam – Chief Investigator

Associate Professor Helen Forbes-Mewett – Co-Investigator

Annex-4: Interview Schedule (English version)

School of Social Sciences, Faculty of Arts, Monash University, Australia

(This is a study on ‘**Older people in Bangladesh: Extreme weather events, social protection and vulnerability.**’ Information and data will be used for PhD thesis, articles and conference; details of respondents and interviews will be processed confidentially.)

Project ID: 22524

1. Would you please tell me more about yourself and your family members?

- a. Name of informant (optional)
- b. Age:
- c. Current marital status:
- d. Gender
- e. Ward No:
- f. Village:

2. How many members are in your family? Tell me about your family

- a. Are they educated? if not, why?
- b. What do your children do?

3. What level of education do you have? (If you are illiterate or have a low level of education, why?)

- a. Did your education affect by natural disasters in your childhood?
- b. Have you received training to deal with cyclones/floods or tidal waves? If yes, how?

4. What is your current employment status?

- a. If you are employed, what are they? If not, why?
- b. What type of work did you do before?
- c. Have you ever lost your works/job due to extreme events? - If yes, please explain how this happened?

5. What is your income (daily/monthly)?

- a. What are your daily expenses?
- b. How much do your expenses increase during natural disasters?
- c. Do you have difficulties meeting your basic needs? If yes, how do you manage your expenses? Please explain.
- d. How much do costs rise in the event of natural disasters?

6. Do you have any savings or investments?

- a. Do you think savings or investments are good for coping with disasters and how?

- b. How do extreme events affect your savings and investments? Do you have an example in your life?

7. Have you taken out a loan? If yes,

- a. Where did you get the loan from, bank, NGO, friends, relatives or other sources?
- b. What did you do with the money from the loan?
- c. Have you ever taken a loan due to natural disasters? Yes, what did you do with the loan?
- d. How do you repay the instalments? Do you face any problem to repay the loan?

8. Would you please tell me about the resources of your household?

- a. Your land/resources ownership
- b. Other assets such as poultry, cows, and fish farming
- c. Do you have any other assets?

9. Please tell me about your housing/living arrangement. How far is your house from the sea?

- a. Who do you live with, alone or with someone?
- b. Have you had any problems living with your son/daughter? If yes, what are they and how do you minimise the difficulties?
- c. Is your house built of bricks or other materials?
- d. Have you ever lost your house or had it destroyed by a cyclone?
- e. How much money was spent to repair the damaged house? Where did you get this money from?
- f. Can you tell me what kind of facilities you have at your residence?
(e.g. electricity, furniture, winter or summer clothes, toilets, pure drinking water, etc.)

10. Please tell me about your daily food intake. I mean, how often do you have a meal every day?

- a. What food do you eat every day?
- b. Do you eat nutritious foods such as fish, meat, eggs and fruit?
- c. Are there any effects of natural disasters or bad weather on the amount of food consumed?
- d. What happened in getting of food during the disaster?
- e. What was the food supply arrangement during the last disaster?

11. How are you doing? I mean, how is your health condition?

- a. Are you taking any medicines?
- b. How are you coping with the cost of medication?
- c. How have extreme events affected your health?
- d. How was your health during the last disaster?

12. Please tell me about your daily activities. I mean, what do you do every day?

- a. How do you do your daily activities? Can you do it yourself or do you need help from others?
- b. Please tell me about your participation in cultural and religious activities.

13. Please tell me about your social networks. I mean your relationships with family members, friends and relatives.

- a. What about your relationships with relatives and neighbours?

- c. How often do your family members/friends/relatives contact you?
- d. How do you communicate with family members, friends and relatives when you need help in a disaster?
- e. Do you think social relationships help you adapt to the impact of extreme events? If yes, how? Please give me an example from your life
- f. What kind of help do you receive from family members, friends and relatives in disaster situations?
- g. Do you receive financial/other support from your family members, relatives and neighbours?
- h. Have any of your relatives, neighbours or friends moved to another city due to the disaster? why? Have you been separated from them?
- i. Has the disaster had any impact on social relations?

14. Please tell me about extreme weather events in your region. I mean, what are the extreme weather events in your region?

- a. What was the last disaster in your region?
- b. What was the last disaster in your life?
- c. Have you ever migrated because of a cyclone/disaster?

15. Would you please tell me what impact the disaster has had on your life?

- a. What problems do you have with disasters? Are you afraid? And why?
- b. What damage was caused to you in the last disaster?
- c. Have you ever lost a family member or relative to a natural disaster?
- d. Were your assets (land, house, crops, poultry, cows, goats, fish, houses, etc.) ever damaged?
If the answer is yes, please tell me about it in detail
- e. Have you ever been away from home due to a disaster? Why, when and how were you there?
Tell me the details

16. Would you please tell me how you dealt with the last disaster?

- a. How did you know there was going to be a disaster?
- b. What do you do when you hear that a cyclone is coming?
- c. How did you prepare yourself after you knew this?
- d. Where were you staying when a disaster occurred?
- e. How do you communicate with others?
- f. How do you deal with the damage after the disaster? Give an example
- g. What are the biggest obstacles at the time of the disaster? e.g. income security, food security, secure housing, maintaining a social network, receiving aid, etc.)
- h. Do you have plans for dealing with the next disaster?

17. What about shelters for cyclones? Is there a cyclone shelter/centre in your area?

- a. Have you ever been to a cyclone shelter? How did you get there, if applicable?
- b. What are the living conditions like in the shelters?
- c. Are there any special arrangements for the elderly?
- d. What facilities are there, e.g. sleeping facilities, bathroom and toilet, food supply, medical care, clean drinking water, security and privacy?

**Social support system including social protection in Vulnerability
(Interview schedule for beneficiaries)**

- 1. Who plays an important role in disasters (government, NGO, local leader, family members, relatives, neighbours)?**
 - a. What kind of help does the government provide? Do you get any help?
 - b. What kind of aid do NGOs provide?
 - c. Is this aid sufficient to repair the damage caused by the disaster?

 - 2. Which of the government social protection programmes do you receive, old age allowance or widow's allowance?**
 - a. For how many years have you been receiving it?
 - b. How much money do you receive?
 - c. Who withdraws the money you receive?
 - d. Who has it and who spends it?
 - e. Can you spend the money at your own discretion?

 - 3. What are the benefits of the old age/widow allowance?**
 - a. What did you do with the last money you received? Tell me the details
 - b. Do you think you can meet all your basic needs with the allowance? If not, why; and if so, how?
 - c. Do people trust you to borrow money or pay the rest because you get pocket money? d. Can you save some of the allowance you get?
 - d. If so, what do you do with your savings?
 - e. Have you ever invested your money? Where?
 - f. Do family members treat you well because of getting allowances or do they listen to your opinion when making a family decision? Tell me the details

 - 4. How did you manage your spending before you got the allowance?**
 - a. How did it help you during the last disaster?

 - 5. Do you think social security programs play a role in improving social relations? In what ways?**
 - a. What will happen if the government closes the OAA programs?

 6. Did you have any problems to enlist for the allowance?

 7. Are there currently any problems in withdrawing allowances? What are the problems with this (administration, withdrawal fees)?
-

**Social support system including social protection in Vulnerability
(Interview schedule for Non-beneficiaries)**

1. The common question

- a. Who plays an important role during disasters (Government, NGO, local leader, family members, relatives, neighbours)?
- b. What kind of assistance does the government provide? Do you get help?
- c. What kind of help do NGOs provide?
- d. Is this help enough to help you overcome the damage caused by the disaster?

2. Information about social protection programs

- a. What do you know about the government's social protection programs?
- b. Do you know anything about the old age allowance or the widow's allowance?
- c. Does anyone of your family get any allowance?
- d. Have you noticed the benefits of this allowance? If yes, tell me the details.
- e. Do you think that if you had received this allowance, your socio-economic condition would have improved and it would have been easier to meet your basic needs? Yes, how?
- f. What would be the benefit to you if you got an allowance? On what purpose did you spend the money?
- g. Do you think family members would have treated you well when you received an allowance or would have taken your opinion when making a family decision? Tell me the details.
- h. How does social security programs would have helped you deal with disasters? How?
- i. Do you think social security programs play a role in improving social relations? How?

3. Information about problems in receiving allowances

- a. Why don't you get this allowance?
- b. Do you know anything about the problems you have to overcome to get this allowance?
- c. How do these problems can be solved?
- d. Do you have any idea about all the problems that are currently faced in withdrawing allowances?
- e. What are the problems (administrative issues, withdrawal fees)?
- f. How do you solve these problems?

Note: Additional follow-up questions was asked, as appropriate, with each participant.

Annex-5: Interview Schedule (Bengali version)

১. পারিবারিক তথ্য

- ক. নামঃ
- খ. বয়সঃ
- গ. বৈবাহিক অবস্থাঃ
- ঘ. ওয়ার্ড নংঃ
- ঙ. গ্রামঃ

২. আপনার পরিবারের সদস্যদের সম্পর্কে বিস্তারিত বলুন, যেমন-

- ক. আপনারা কয় ভাই-বোন
- খ. আপনার কয়টি সন্তান
- গ. ছেলে-মেয়েরা লেখাপড়া জানে? না জানলে কেন; জানলে কিভাবে খরচ চালিয়েছেন?

৩. শিক্ষা সম্পর্কিত তথ্য

- ক. আপনার শিক্ষাগত যোগ্যতা কী? - নিরক্ষর বা কম শিক্ষিত হলে কারণ কী?
- খ. প্রাকৃতিক দুর্যোগের কারণে আপনার লেখাপড়ায় কোন ক্ষতি হয়েছে কিনা?
- গ. আপনি ঘূণিঝড়/বন্যা বা জলোচ্ছ্বাস মোকাবেলার উপর কোন প্রশিক্ষণ নিয়েছেন/পেয়েছেন কিনা, পেয়ে থাকলে কিভাবে?

৪. কর্মসংস্থান সম্পর্কিত তথ্য

- ক. আপনার বর্তমান পেশা কী? কাজ না থাকলে কেন নেই?
- খ. আগে কি কাজ করতেন?
- গ. প্রাকৃতিক দুর্যোগের কারণে কখনো কাজ হারাতে হয়েছে কিনা, যদি হয়ে থাকে, তাহলে কিভাবে? বিস্তারিত বলেন।

৫. আয়-ব্যয় সম্পর্কিত তথ্য

- ক. আপনি প্রতিদিন/প্রতি সপ্তাহে বা মাসে কত টাকা আয় করেন?
- খ. আপনি যা আয় করেন তা দিয়ে আপনার সংসার চালাতে কতটা কষ্ট হয়?
- যদি না চলে, তাহলে অতিরিক্ত খরচের টাকা কিভাবে ব্যবস্থা করেন?
- গ. আপনার মাসিক খরচ কত? (খাদ্য, বস্ত্র, বাসস্থান, স্বাস্থ্য ও ঔষুধ, অন্যান্য)।
- ঘ. প্রাকৃতিক দুর্যোগের সময় খরচ কতটা বৃদ্ধি পায়?

৬. সঞ্চয় ও বিনিয়োগ সম্পর্কিত তথ্য

- ক. ভবিষ্যতের দুর্যোগ মোকাবেলার জন্য আপনার কোন সঞ্চয় আছে কিনা;
- খ. সঞ্চয় কি প্রাকৃতিক দুর্যোগের সময় কাজে লাগে? কিভাবে?
- গ. আপনার কোন বিনিয়োগ আছে কিনা; থাকলে কোথায়/কিসে বিনিয়োগ? না থাকলে কেন?
- ঘ. প্রাকৃতিক দুর্যোগ সঞ্চয় ও বিনিয়োগে কিভাবে প্রভাব ফেলে?

৭. ঋণ সম্পর্কিত তথ্য

- ক. আপনি কি কোন ব্যাংক বা এনজিও থেকে লোন পেয়ে থাকেন?
- যদি পান, তাহলে কোথা থেকে এবং কি কাজ করেন/করেছেন; না পেলে কেন পান না?
- খ. কিভাবে লোনের কিস্তি দেন?
- গ. অন্য কোন ব্যক্তি বা প্রতিষ্ঠান থেকে লোন পান/নেন কিনা (দাদন ব্যবসায়ী, আত্মীয়, বন্ধু, প্রতিবেশি)
- ঘ. লোন পরিশোধে কখনো কোন সমস্যার সম্মুখীন হয়েছেন কিনা বিস্তারিত বলেন।
- ঙ. প্রাকৃতিক দুর্যোগের কারণে কখনো কি ঋণ নিয়েছেন? হ্যাঁ হলে ঋণ নিয়ে কি কাজ করেছেন?

৮. সম্পদ এবং উৎপাদন সম্পর্কিত তথ্য

- ক. আপনার জমির পরিমাণ কত? (বসত বাড়ি ও চাষযোগ্য);
- অন্যান্য আর কী কী সম্পদ আছে যেমন-পশু-পাখি, মাছের খামার)

৯. বসবাসের অবস্থা/ব্যবস্থা সম্পর্কিত তথ্য

- ক. আপনার বসবাসের স্থান থেকে সমুদ্রের দূরত্ব কত?
- খ. আপনি কি একা থাকেন না অন্য কারো সাথে থাকেন? কেন?
- গ. এভাবে ছেলে/মেয়ের সাথে থাকতে আপনার কী কী সমস্যা হয়? এসব সমস্যার সমাধান করেন কিভাবে?
- ঘ. আপনার বাড়ি কিসের তৈরী, ইট না অন্য উপাদানে?
- আপনার বাড়িঘর কি কখনো প্রাকৃতিক দুর্যোগে ক্ষতিগ্রস্ত হয়েছে? কতবার বিস্তারিত বলেন।
- ঙ. ক্ষতিগ্রস্ত বাড়ি মেরামতের সময় কত টাকা খরচ হয়েছিল? এই টাকা কোথায় পেয়েছিলেন?
- চ. আপনার থাকার/বসবাসের জায়গায় কি ধরনের সুযোগ-সুবিধা আছে বলবেন কি?
(যেমন-বিদ্যুৎ, আসবাব, শীত বা গরমের কাপড়, টয়লেট, বিশুদ্ধ খাবার পানি ইত্যাদি)

৯. খাবার গ্রহণ সম্পর্কিত তথ্য

- ক. দিনে কতবার খাবার খেতে পারেন? কোন বেলা কী খান?
- খ. মাছ, মাংস, দুধ, ডিম, ফলমূল কি নিয়মিত খেতে পান কিনা; সপ্তাহে বা মাসে কতবার এসব খাবার খান?
- গ. প্রাকৃতিক দুর্যোগ বা খারাপ আবহাওয়ার কারণে খাবার গ্রহণের পরিমাণে কোন প্রভাব পড়ে কিনা।
- ঘ. সর্বশেষ দুর্যোগের সময় কিভাবে খাবারের ব্যবস্থা হয়েছিল/করেছিলেন?

১০. স্বাস্থ্য সম্পর্কিত তথ্য

- ক. আপনার কোন স্বাস্থ্য সমস্যা আছে কিনা? যদি থাকে সেটা কী?
- খ. চিকিৎসা খরচের ব্যবস্থা কিভাবে করেন?
- গ. দুর্যোগের সময় কি ধরনের স্বাস্থ্য সমস্যা হয়?
- ঘ. সর্বশেষ দুর্যোগে আপনার কি ধরনের স্বাস্থ্য সমস্যা হয়েছিল?

১১. প্রতিদিনের কর্মকান্ড সম্পর্কিত তথ্য

- ক. আপনি প্রতিদিন সকাল থেকে রাত পর্যন্ত কী কী করেন, কিভাবে করেন? বিস্তারিত বলেন।
- খ. আপনার প্রতিদিনের কাজে কি কি সমস্যা হয়? -গোসল, কাপড় পরিবর্তন, দোকানে যাওয়া, খাবার তৈরী করা, নিজে নিজে খাওয়া, টয়লেট ব্যবহার করা, যাতায়াত, ঘর গোছানো, ওষুধ খাওয়া, অন্যের বাড়ি যাওয়া, গল্প করা ইত্যাদি
- গ. এসব কাজ করতে আপনাকে কে সাহায্য করে?
- ঘ. আপনি কোন সামাজিক, রাজনৈতিক, সাংস্কৃতিক ও ধর্মীয় কাজে অংশগ্রহণ করেন কিনা

১২. সামাজিক বন্ধন সম্পর্কিত তথ্য

- ক. আপনার পরিবারের সদস্য, বন্ধু-বান্ধব ও আত্মীয়-স্বজনের সাথে আপনার সম্পর্ক কেমন বিস্তারিত বলেন।
- খ. তাদের সাথে কতদিন পরপর দেখা সাক্ষাৎ ও যোগাযোগ হয়?
- আপনি প্রাকৃতিক দুর্যোগের সময় কিভাবে তাদের সাথে যোগাযোগ করেন ?
- গ. দুর্যোগের আগে, দুর্যোগের সময় ও দুর্যোগের পর তারা আপনাকে কিভাবে সাহায্য করে, বিস্তারিত বলুন।
- ঘ. প্রতিবেশির সাথে আপনার সম্পর্ক কেমন? - আপনার প্রতিবেশির সাথে সম্পর্ক কিভাবে হয়?
- পরিবারের সদস্য, বন্ধু-বান্ধব ও আত্মীয়-স্বজন, প্রতিবেশির সাথে আপনার বিপদের সময় কিভাবে/কি ধরনের সাহায্য করে, বিস্তারিত বলুন।
- ঙ. আপনি কি মনে করে সামাজিক সম্পর্ক ভালো হলে দুর্যোগের সময় সাহায্য সহযোগিতা পাওয়া যায়? কিভাবে? আপনার জীবনে এমন কোন উদাহরণ আছে?
- চ. দুর্যোগের কারণে আপনার আত্মীয়-স্বজন, প্রতিবেশী বা বন্ধু-বান্ধব কেউ কি অন্য শহরে চলে গেছে? গেলে, কেন? আপনি কি তাদের থেকে বিচ্ছিন্ন হয়ে গেছেন?
- ছ. দুর্যোগের কারণে কি সামাজিক সম্পর্কে কোন প্রভাব পড়ে, মানে সম্পর্ক খারাপ খারাপ হয়?

১৩. আপনার এলাকার বিভিন্ন দুর্যোগের বিস্তারিত বলেন।

- আপনি জীবনে কোন কোন দুর্যোগের সম্মুখীন হয়েছেন?
- আপনার জীবনে সর্বশেষ দুর্যোগ কোনটি?

১৪. দুর্যোগের প্রভাব সম্পর্কিত তথ্য

- ক. দুর্যোগের সময় আপনার কী কী সমস্যা হয়? ভয় লাগে? কেন?
- খ. সর্বশেষ দুর্যোগে আপনার কী কী ক্ষতি হয়েছে?
- গ. প্রাকৃতিক দুর্যোগের কারণে আপনি কি কখনো আপনার পরিবারের কোন সদস্য বা আত্মীয় স্বজনকে হারিয়েছেন?
- ঘ. কখনো কি কোন সম্পদের (lands, house, crops, poultries, cows, goats, fishes, houses etc.) ক্ষতি হয়েছে? উত্তর হ্যাঁ হলে বিস্তারিত বলুন।
- ঙ. আপনি কি কখনো দুর্যোগের কারণে বাড়ি ছাড়া হয়েছেন? কেন, কখন, কিভাবে কোথায় ছিলেন? বিস্তারিত বলেন।

১৫. দুর্যোগ মোকাবেলা সম্পর্কিত তথ্য

- ক. দুর্যোগ হবে এটা আপনি কিভাবে জানতে পারেন?
- এটা জানার পর কিভাবে প্রস্তুতি নেন?
- খ. যখন দুর্যোগ হয় তখন কোথায় অবস্থান করেন?
- এসময় কিভাবে অন্যদের সাথে যোগাযোগ করেন?
- গ. দুর্যোগ পরবর্তী ক্ষয়ক্ষতি কিভাবে মোকাবেলা করেন? উদাহরণ দিন।
- এ সময় সবচেয়ে বড় বাঁধা কী কী? e.g. income security, food security, secured housing, maintain a social network, getting assistance etc.)
- ঘ. সর্বশেষ দুর্যোগ কিভাবে মোকাবেলা করেছেন? বিস্তারিত বলেন।
- ঙ. পরবর্তি দুর্যোগ মোকাবেলার জন্য কি কোন পরিকল্পনা করেছেন?

১৬. সাইক্লোন সেন্টার সম্পর্কিত তথ্য

- ক. আপনার এলাকায় কি সাইক্লোন সেন্টার আছে?
- খ. আপনাকে কি কখনো সাইক্লোন সেন্টারে যেতে হয়েছে? কেন ?
- গ. সাইক্লোন সেন্টারের অবস্থা কেমন? সেখানে কি বয়স্কদের জন্য বিশেষ সুযোগ সুবিধা আছে? (যেমন-ঘুমনোর জায়গা, গোসল, টয়লেট, খাবার, ওষুধ, বিশুদ্ধ খাবার পানি, নিরাপত্ত ও গোপনীয়তা)
- ঘ. সেখানে বয়স্ক লোকদের জন্য কি আলাদা কোন ব্যবস্থা আছে?

Social support system including social protection in Vulnerability (Interview schedule for beneficiaries)

১. সাধারণ প্রশ্ন

- ক. দুর্যোগের সময় কে গুরুত্বপূর্ণ ভূমিকা পালন করে (Government, NGO, local leader, family members, relatives, neighbours)?
- খ. সরকার কি ধরনের সাহায্য দেয়? আপনি কি সাহায্য পেয়েছিলেন?
- গ. এনজিও কি ধরনের সাহায্য করে?
- ঘ. দুর্যোগের কারণে আপনার যে ক্ষতি হয়েছিল তা কাটিয়ে উঠতে এসব সাহায্য কি যথেষ্ট?

২. সামাজিক সুরক্ষা কর্মসূচি সম্পর্কিত তথ্য

- ক. সরকারের সামাজিক সুরক্ষা কর্মসূচির মধ্যে আপনি কোনটি পান?
কত বছর হলো আপনি এটা পাচ্ছেন?
কত টাকা পান?
- খ. আপনি যে টাকা পান তা কে উত্তোলন করেন?
কার কাছে থাকে এবং কে কে খরচ করেন?
- গ. ভাতার টাকা কি নিজের ইচ্ছামত খরচ করতে পারেন?

৩. ভাতার প্রাপ্তির উপকারিতা সম্পর্কে বলুন

- ক. আপনি ভাতার টাকা কোন কোন খাতে খরচ করেন?
- সর্বশেষ প্রাপ্ত টাকা দিয়ে কী কী করেছেন? বিস্তারিত বলেন।
- খ. আপনি কি মনে করেন যে ভাতার টাকা দিয়ে আপনি আপনার সকল মৌলিক চাহিদা পূরণ করতে পারেন? উত্তর না হলে কেন; এবং হ্যাঁ হলে কিভাবে?
- ভাতা পাওয়ার কারণে মানুষ আপনাকে ধার দিতে বা বাকি দিতে বিশ্বাস করে কিনা
- গ. প্রাপ্ত ভাতার কোন অংশ কি আপনি সঞ্চয় করতে পারেন?
- উত্তর হ্যাঁ হলে জমানো টাক দিয়ে কি করেন?
- ঘ. ভাতার টাকা কি কখনো বিনিয়োগ করেন? কোথায়?
- ঙ. ভাতা পাওয়ার কারণে কি পরিবারের সদস্যরা আপনার সাথে ভালো ব্যবহার করে বা পরিবারের কোন সিদ্ধান্ত নেয়ার সময় আপনার মতামত নেয়? বিস্তারিত বলেন।

৪. ভাতা পাওয়ার আগে কিভাবে আপনি আপনার খরচ চালাতেন?

- ক. দুর্যোগের সময় ভাতার টাকা কোন খাতে খরচ করেন?

- সৰ্বশেষ দুৰ্যোগে এটা কিভাবে সাহায্য কৰেছিল?

৫. আপনি কি মনে কৰেন সামাজিক সুরক্ষা কৰ্মসূচি সামাজিক সম্পর্ক উন্নয়নে ভূমিকা রাখে? কিভাবে?

- কোন কারণে ভাতার টাকা পাওয়া বন্ধ হয়ে গেলে কি কি সমস্যা হবে?

৩. ভাতা প্রাপ্তিতে সমস্যা সম্পর্কিত তথ্য

ক. এই ভাতা পেতে আপনার কী কী সমস্যা অতিক্রম করতে হয়েছে? কী কী?

- কিভাবে এসব সমস্যা সমাধান কৰেছেন?

খ. বর্তমানে ভাতা উত্তোলনে কি কোন সমস্যা হয়? কী কী সমস্যা (প্রশাসনিক, উত্তোলন ফি)?

- কিভাবে এসব সমস্যার সমাধান কৰেন?

Social support system including social protection in Vulnerability (Interview schedule for Non-beneficiaries)

১. সাধারণ প্রশ্ন

ক. দুর্যোগের সময় কে গুরুত্বপূর্ণ ভূমিকা পালন করে (Government, NGO, local leader, family members, relatives, neighbours)?

খ. সরকার কি ধরনের সাহায্য দেয়? আপনি কি সাহায্য পান?

গ. এনজিও কি ধরনের সাহায্য করে?

ঘ. দুর্যোগের কারণে আপনার যে ক্ষতি হয়েছিল তা কাটিয়ে উঠতে এসব সাহায্য কি যথেষ্ট?

২. সামাজিক সুরক্ষা কর্মসূচি সম্পর্কিত তথ্য

ক. সরকারের সামাজিক সুরক্ষা কর্মসূচি সম্পর্কে আপনি কি জানেন?

- বয়স্ক ভাতা বা বিধবা ভাতা সম্পর্কে কিছু জানেন কি?

খ. আপনার পরিচিত কেউ কি এই ভাতা পায়?

- আপনি কি এই ভাতার উপকারিতা লক্ষ্য করেছেন? হ্যাঁ হলে বিস্তারিত বলুন।

গ. আপনি মনে করেন যদি এই ভাতা পেতেন তাহলে আপনার আর্থ-সামাজিক অবস্থার উন্নতি হতো এবং আপনার মৌলিক চাহিদা পূরণ সহজ হতো? হ্যাঁ হলে কিভাবে?

- ভাতা পেলে আপনার কী কী উপকার হতো? কোন কোন কাজে ভাতার টাকা খরচ করতেন?

ঘ. আপনি কি মনে করেন ভাতা পেলে পরিবারের সদস্যরা আপনার সাথে ভালো ব্যবহার করতো বা পরিবারের কোন সিদ্ধান্ত নেয়ার সময় আপনার মতামত নিতো? বিস্তারিত বলেন।

ঙ. আপনি কি মনে করেন সামাজিক সুরক্ষা কর্মসূচি দুর্যোগ মোকাবেলায় আপনাকে সাহায্য করতো? কিভাবে?

চ. আপনি কি মনে করেন সামাজিক সুরক্ষা কর্মসূচি সামাজিক সম্পর্ক উন্নয়নে ভূমিকা রাখে? কিভাবে?

৩. ভাতা প্রাপ্তিতে সমস্যা সম্পর্কিত তথ্য

ক. আপনি কেন এই ভাতা পান না?

- এই ভাতা পেতে কী কী সমস্যা অতিক্রম করতে হয় সে সম্পর্কে আপনি কিছু জানেন? কী কী?

- কিভাবে এসব সমস্যা সমাধান ক রা যায়?

খ. বর্তমানে ভাতা উত্তোলনে যে সকল সমস্যা হয় সম্পর্কে আপনার কোন ধারণা আছে?

- কী কী সমস্যা (প্রশাসনিক সমস্যা, উত্তোলন ফি)?

- কিভাবে এসব সমস্যার সমাধান করেন?

Note: Additional follow-up questions will be asked, as appropriate, with each participant.