VULNERABILITY ASSESSMENT OF WOMEN & CHILDREN ASSOCIATED WITH CYCLONIC HAZARDS IN THE COASTAL BELT OF BANGLADESH: A CASE STUDY ON ANWARA UPAZILLA, CHITTAGONG

A Thesis Submitted to the University of Chittagong in Partial Fulfillment of the Requirements for the Degree of Master of Science (M.S) in Geography and Environmental Studies.

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Abstract

The study aims to assess the vulnerability of women and children associated with cyclonic hazard. Mixed methods have been utilized to collect data. Primary data are collected from 150 cyclone victim families especially from women through using questionnaire, Focus Group Discussion and Opinion survey technique. Analysis of collected data reveals that women and children are much more vulnerable and major victims of cyclone and storm surge. Secondary data confirms that, in 1991 cyclone, 74% of women and children were killed by cyclones and accompanied by tidal surges among the total deaths. On the other hand, among these women and children, 67% were below 15 years. Even now, women and children continue to be vulnerable to cyclonic hazards. The reasons for the unusual vulnerability of women and children are not only physical and biological factors but also social and economic factors. Some direct causes of their vulnerabilities are identified from this study; these are illiteracy and ignorance of women, lack of knowledge and experience to cope with cyclone, mental immaturity, dependency on adults, dominated social structure, religious tradition, purdah tradition, long hair, fatalistic behavior, mother's protective instinct (being prepared to die trying to save her children) of women, widespread poverty, lack of consciousness and awareness, social norms and cultural restriction. This research also recommended some suggestions for reducing the vulnerability of women and children, such as strengthening GO and NGO activities, ensuring women's participation in disaster management, arranging training programs for their capacity building, motivating women and children to remove the wrong religious and cultural believes, arrange separate shelters for women, and ensure availability of health care and educational facility for all. Findings of this study can be utilized in various government and NGO organizations, educational institutions, and research centers for planning and development of the socio-economic conditions of cyclone-vulnerable women and children, as well as cyclone-affected people. Moreover, findings emphasize the development of a sound disaster preparedness and management program based on women's demands, which will be women friendly.

Keywords: Vulnerability assessment; cyclonic hazards; women; children; coastal belt; Bangladesh

1. Introduction

Bangladesh is one of the most vulnerable countries in the world to natural disasters. The coastal areas' people of Bangladesh are more vulnerable due to the adverse effects of Cyclones and their induced disasters (such as floods, salinity ingress, bank erosion, storm surges, and tidal bores). During April 1991, the cyclone broke all previous records of devastation in recent history (Paul, 2004). And this Cyclone hits the Chittagong coastal belt, causing a huge amount of damage in this area. The 1991 cyclone in Bangladesh killed 138,000 people, many of whom were women and older than 40 years (Cannon, 2002). The super cyclones 'Sidr' and 'Aila' brought long-term suffering to the people of this area. The children and women of Anwara are more vulnerable because of frequent natural disaster. The Tropical cyclones strike this coast at least once a year, bringing rainwater floods, salt-water incursions, and wind damage. Since the 1991 cyclone disaster, numerous cyclones and disasters have occurred along this coast.

Disasters induced vulnerability of women in Bangladesh is much higher than men due to their poverty, social norms, and their marginal position in the social system. Women's mobility is restricted as a result of their responsibility for their children and extreme love of family. Their clothing restricts their mobility in floods, and in addition, women are less likely than men to know how to swim. It is estimated that 90 per cent of the victims of the 1991 cyclone disasters were women and children (Schmuck, 2002).

Poor health and caloric deficiency, Lower levels of education, lack of information, (including early warning mechanisms, awareness building programme) increases children and women vulnerability during Cyclone. Due to the frequency of cyclones, women and children's adaptability is reduced. Their movement, social facility, early preparedness mechanisms are now at challenge. All these extreme events increase the vulnerability of women and children in natural disasters (Nasreen et al., 2001).

Women are the ones who are supposed to ensure wellbeing of the family, even if it is at the cost of their self-wellbeing. The woman (perhaps including the girl child) receives the least amount of food and nutrition in their household. In a common household in rural Bangladesh, she has to maintain hygiene, ensure a water supply, cook for the family, take on the burden of post-harvest processing of all agricultural produce, raise a few poultry, and maintain a courtyard garden to ensure a supply of nutritious food (vegetables) – all happening simultaneously. Yet, when a hazard

strikes, she must safeguard all the belongings and any hint of an asset, send everybody to a safer refuge, and stay behind to ensure that the household is not ransacked while she is away. Under the prevailing social and economic circumstances, Bangladeshi women are lagging far behind than their male counterparts. Women's and men's responses to these crisis, as well as their abilities to cope with them to a very large extent reflect their status, roles and positions in society because of gender based inequalities, girls and women are typically at higher risk than boys and men (UN, 2004; Enarson, 2002; Chew and Ramdas, 2004; SEEDS, 2005). All the reasons are cited as causes of vulnerability of women and children in cyclonic disasters.

2. Aim and objectives

The primary objective of the study is to understand the vulnerability of women and children Associated with Cyclonic Hazards in the coastal belt of Bangladesh. The specific objectives of this study are:

1. To explore the impact of Cyclonic Hazards on women and children in the study area.

2. To assess the vulnerability of women and children in the study area.

3. To know the GO and NGOs activities to mitigate the vulnerability in the study area; and

4. To provide some suggestions for reducing the vulnerabilities in the study area.

3. Methodology

To fulfil the study's objectives, an empirical approach was adopted. Following this approach, data were collected from relevant secondary sources. Geography is concerned with the relationship between man and the environment in a spatial context. Thus, the primary concern of this study is to identify the vulnerability of women and children associated with cyclonic hazards in the coastal belt of Bangladesh. The study was primarily conducted through a field survey. Moreover, secondary data sources, including both published and unpublished sources, such as books, thesis papers, newspapers, articles, magazines, and reports from NGOs, were used to enrich the study. The collected data were analyzed using GIS and SPSS. The various steps of the methodology are described below:

3.1 Site Selection

Anwara Upazila covers an area of 173.53 sq km and is located within the 22˚08´N to 22˚14´N latitude and 91˚48´E to 91˚56´E longitude. Patiya upazila bounds Anwara upazila to the north, Banshkhali upazila to the south, Chandanish upazila to the east, and Chittagong Port Thana to the west. The principal rivers are the Kurnaphuli and Sangu, and the primary forests are Battoli and Baramat. Anwara town consists of one mouza. It has an area of 3.34 sq km. The Upazilla consists of 10 unions, 78 mouzas and 78 villages. Among them, three unions are located in the coastal belt such as Bairag, Barasat and Roypur (Banglapedia, 2003).

Based on a pilot survey, local people's perceptions, and secondary data, this area was selected as the study area. Primarily, three affected unions were chosen, which are located in the coastal belt. These are Bairag, Barasat and Roypur. Among these three unions, the Roypur area is highly affected, according to local people's perception and secondary data. The study was conducted in different locations of Roypur Union, Anwara Upazila, which is considered a more vulnerable area to cyclone hazards (Banglapedia, 2003).

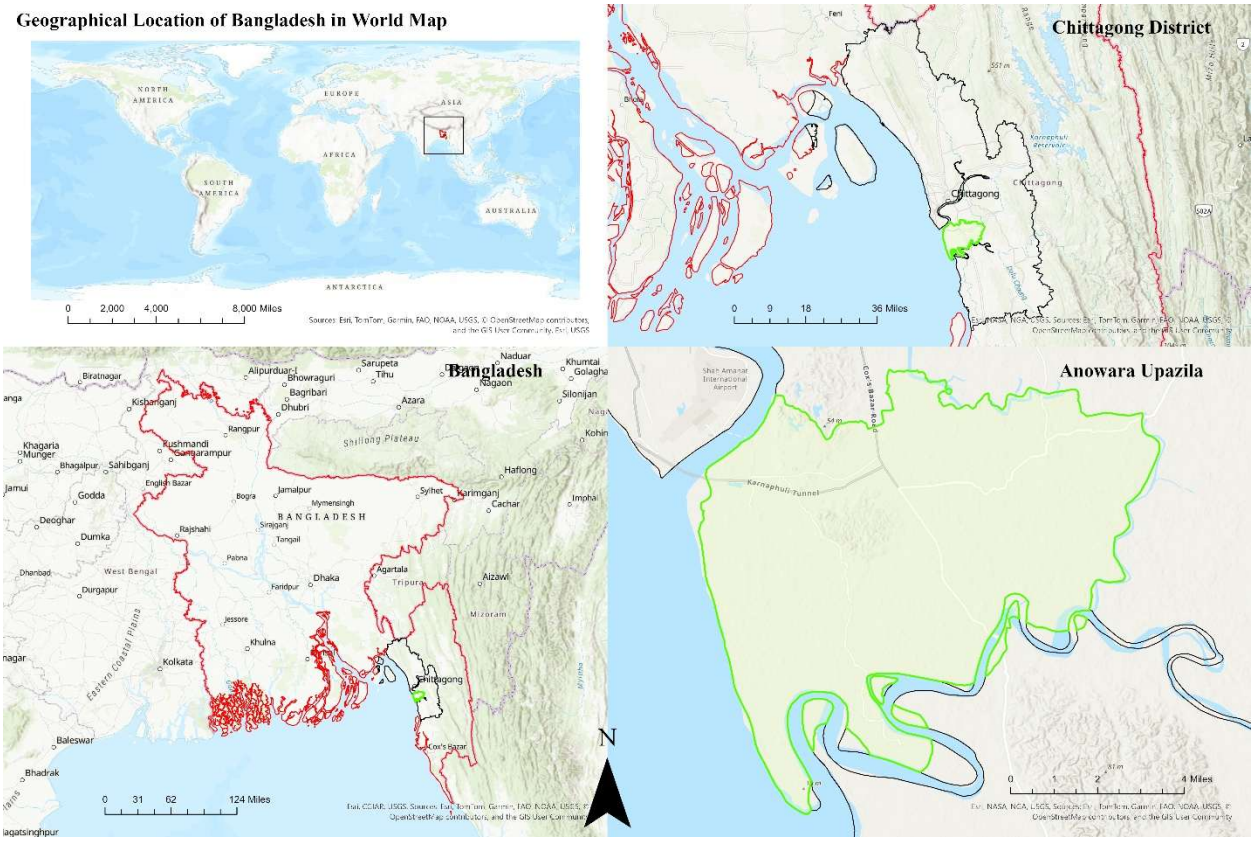


Figure: Map of the study area

A reconnaissance survey was conducted in the study area as the first step of the investigation for this study. From this survey, it is found that different types of disasters frequently occur in the study area, creating a negative impact on the economy, environment, human life, domestic animals, livelihoods of local people, and infrastructure. Every year, two or more natural disasters, mainly cyclonic disasters, hit, which take a heavy toll on the physical and social environment. Historical evidence of cyclonic events was found in different sources, but recently, their frequency and intensity have increased due to climate change. Most people are poor, and their livelihoods are dependent on agriculture and fishing; as a result, they are strongly affected by climatic events. They cannot fully cope with and adapt to cyclone disasters due to a weak infrastructure base, as well as a lack of Government and NGO initiatives in cyclone warning and management at both pre-and post-disaster stages. If public awareness and management activities could be ensured, then the loss will be reduced, and development may be possible.

3.2 Roypur Union description

Roypur Union is located southwest of Anwara Upazila. The Barasat Union bounds this union on the north, the Joidondi River on the east, the Shonkho River on the south, and the Bay of Bengal on the west. This union consists of nine villages, including North Porua Para, South Porua Para, Chuna Para, Proper Roypur, Sharanga, West Roypur, Khudro Gohira, East Gohira, and Baralia South Gohira. This union and its nine villages have been taken as study areas. The total area of this union is 24,511 square kilometres. The total Pacca and Katcha roads in this area are 70km and 40 km. There are four madrasas, twelve primary schools, one high school, one hospital, and one union parishad in this union. Roypur Union has 600 acres of cultivable land, and 120 acres of cultivable land are now at risk. There are two salt fields, one shrimp field, 12 cyclone shelters, four Culverts, a 14 km embankment, and 45 45-deep tubewells in this area (Union Parisad, 2011).

3.3 Data Collection

When dealing with real-life problems, it is often found that the data at hand is inadequate, and hence, it becomes necessary to collect appropriate data. There are several ways to collect the appropriate data, which differ considerably in terms of money costs, time, and other resources at the researcher's disposal (Kothari, 1996). In this practical research, data were collected in two ways:

- Primary data

- Secondary data

Primary data collection

To conduct efficient research, three different social survey methods have been designed. Each method has been based on a different theme and respondent group. All these methods help determine the outcome of the study, which was established to achieve its objectives.

Questionnaire development and Survey

The questionnaire Survey will be conducted with local people, vulnerable groups, and expert groups from the study area. A structured, semi-structured, and open-ended questionnaire is used for the field survey. The important themes of this questionnaire are;

- Basic demographic and socio-economic characteristics of the sample household members, including family size, age-sex structure, education, occupation, income level, and its sources, etc.
- People's perception of the impacts of Cyclones on Children and Women, their causes, and the sectoral effects on their livelihood.
- A questionnaire was used to determine the causes of vulnerability and to assess the pre-existing and future vulnerability of children and women.

Sampling

It is not easy to survey each household in the study area. Therefore, a simple systematic random sampling method was followed for the questionnaire survey. The sample size was 150. It was conducted in Roypur.

Focus Group Discussion (FGD)

The Focus Group discussion technique is used to collect contradictory and vague information about this problem. Some FGDs were conducted with different groups, including homemakers, farmers, fishermen, local schoolteachers, the union parishad chairman, and members. In every FGD, the number of participants ranged from 5 to 10. Moreover, two special FGDs were held in the presence of the headmaster of Roypur proper primary school and the chairman of Roypur union.

Opinion Survey

An opinion survey was conducted among expert groups. For the opinion survey, we visited some government, Non-Government, and autonomous offices. After the field visit, we contacted the Upazila Nirbahi Officer, the engineer, and some environmentalists regarding the problem. We took opinions from local NGO officials, the Red Crescent office, and school and College teachers.

Secondary data collection

Secondary data were collected from various published and unpublished data sources, including government and non-government organisations, the Department of Environment, the Disaster Management Bureau, the Ministry of Forestry and Environment, the BBS, and the Ministry of Children and Women Affairs, among others. Relevant Secondary information has been collected from various Government and non-governmental offices, such as the Bangladesh Research Centre for Indigenous Knowledge (BRCIK), Oxfam, Young Power for Social Action (YPSA), Barnali, Sonali, Karitas, the Red Crescent Society, and the Disaster Research Training and Management Centre (DRTMC), as well as Dhaka University.

Data are also collected from the seminar libraries of various public universities, such as the seminar library of the Department of Geography and Environment at Dhaka University and Jahangirnagar University. Seminar library of the Department of Geography and Environmental Studies, Chittagong University, BRAC University, Department of Forestry and Environmental Science seminar, of Chittagong University, BUET, Climate change cell, Department of Environment. Central library of Chittagong University, Internet, Various papers, Journals, Reports, Thesis, Department of Sociology and Department of Anthropology, University of Chittagong.

3.4 Data Processing, Analysis, and Presentation

After collecting raw data from fieldwork, the data were transferred to a reference table. Then, the data were processed manually and presented mainly in tabular form. For easy understanding, the data were analysed using percentages. For data analysis, several techniques were used. Collected data from different sources were compiled, tabulated, and analyzed through SPSS and MS Excel. In the graphic method, the results of statistical data were presented using a pie diagram, a bar diagram, a line graph, a histogram, and other visual representations. GIS was applied for mapping. It was also used to indicate hazardous locations.

Base maps of the study area were collected from the LGED, Union Parishad, and CPP office. To display the study area, the collected maps were digitised using GIS software ArcView 3.3.

Firefighting, Mohora, Recovery, Losses, Death, Casualties, and various serious incidents of fire are presented through photographic methods.

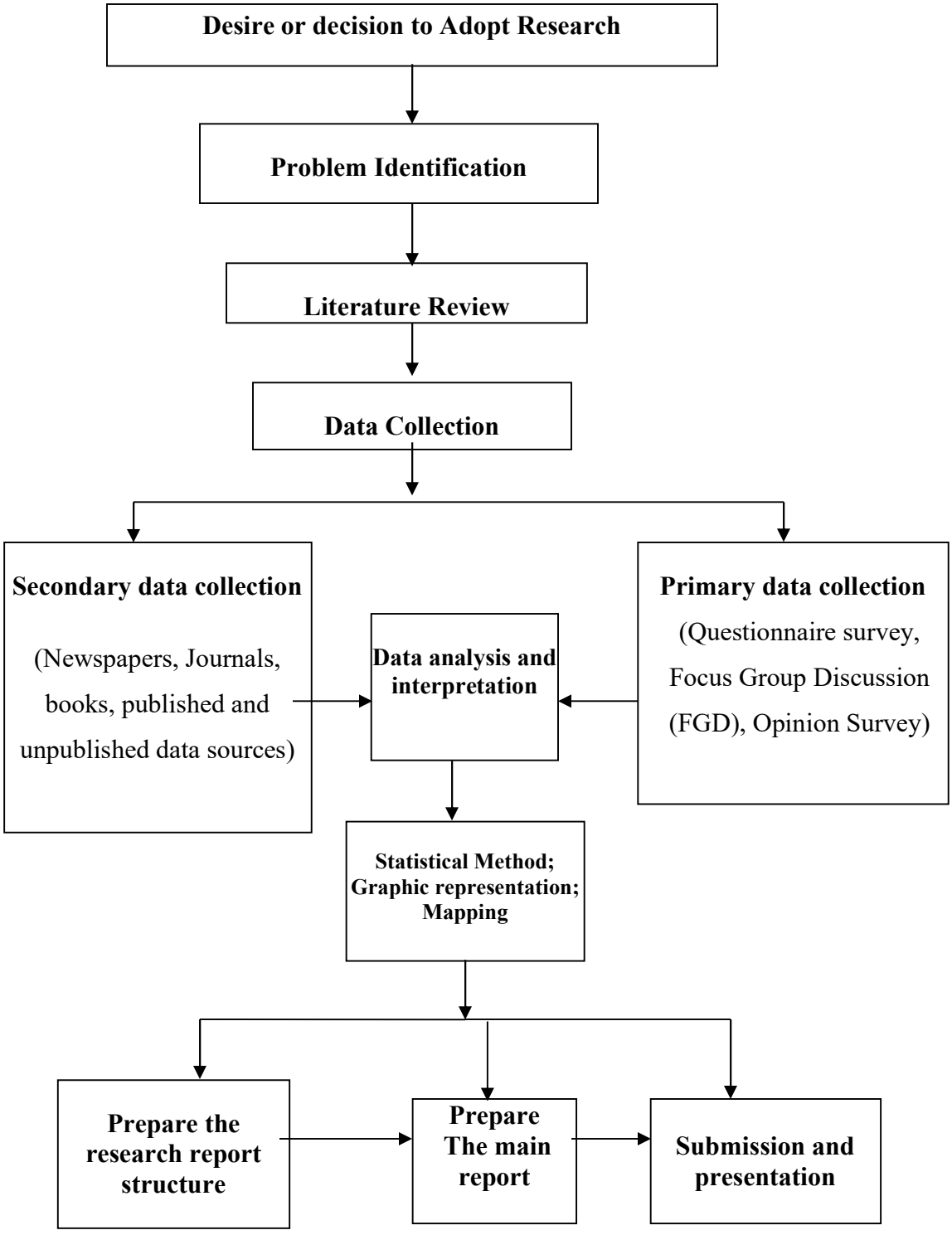


Figure: Flow Chart of the Methodology of the Study

4. Findings

4.1 Socioeconomic Characteristics of the Respondents

Most respondents are poor in this area. The primary occupation of almost all households is fishing. Moreover, some are involved in other activities. Most women in this area are not involved in income-generating activities and are primarily homemakers. The continuous cyclone and its associated hazards made this area more hazardous for all its inhabitants. Moreover, at this time, women and children are more miserable—literacy rate, household pattern, and govt. Initiatives are lacking in this area. As inhabitants of a coastal area, they do not receive any training programs for capacity building and coping with cyclones. However, following the 1991 cyclone, the CPP initiated several measures to enhance its capacity and mitigate the impact of cyclones in the study area. The socio-economic condition of the study area is discussed step by step.

Gender of the Respondents

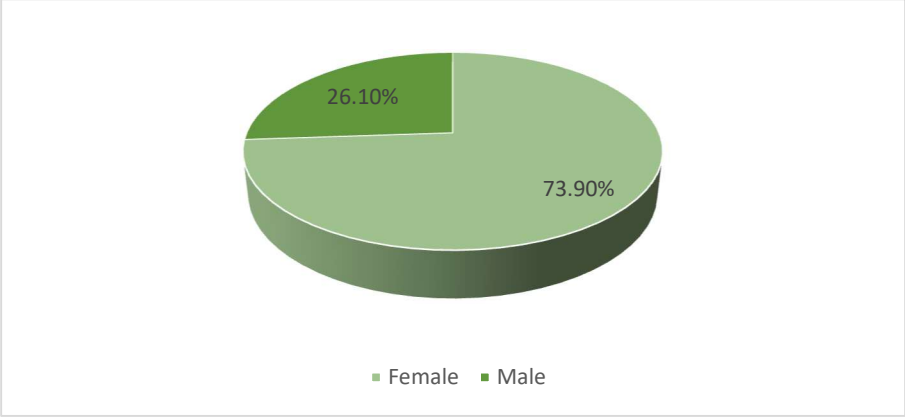


Figure: Gender of the Respondents

Source: Field survey, 2011

From the following diagram, it is evident that most respondents are female, with only a very few being male. Most are in the older age group in this area. The primary reason for selecting women as respondents is that the problem is predominantly women-related, allowing them to explain their issues easily. Some male respondents are also interviewed to gather information about previous cyclones and their adverse effects on their families. For the following reason, the total number of female respondents was 73.9%, and the male respondents were 26.1%.

Age of the Respondents

Age is one of the most important criteria for selecting the respondent. For obtaining accurate information, the adult and older age group is most reliable. For these reasons, 45.2% respondents are 30-45 years old, 30% are 45-60 years old, and only 13.8% are 15-30 years old. On the other hand, 10% respondents were more than 60 years old. The respondents would have a clear understanding of the cause of the cyclone and its effects. They are the victim of continuous cyclones. The women respondents also have a clear idea about the effect of the cyclone. The children's age group respondents are not taken into consideration because they may provide wrong information.

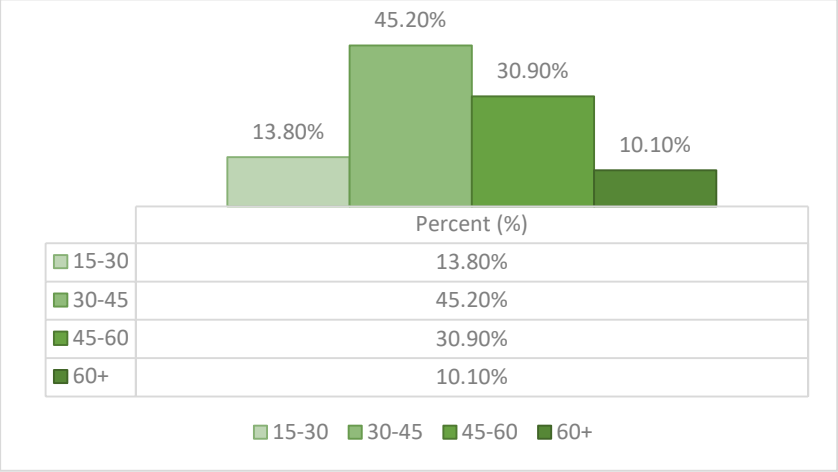


Figure: Age of the Respondents

Source: Field survey, 2011

Education level of the respondents

Education is one of the most important parameters to evaluate the socio-economic condition of a region. However, most of the respondents in this area are illiterate due to poor socio-economic conditions. Most respondents had completed only primary education. Moreover, 30% completed secondary education, 20% completed HSC, and 5% completed higher education and technical education. The following graph shows the educational status of the respondents.

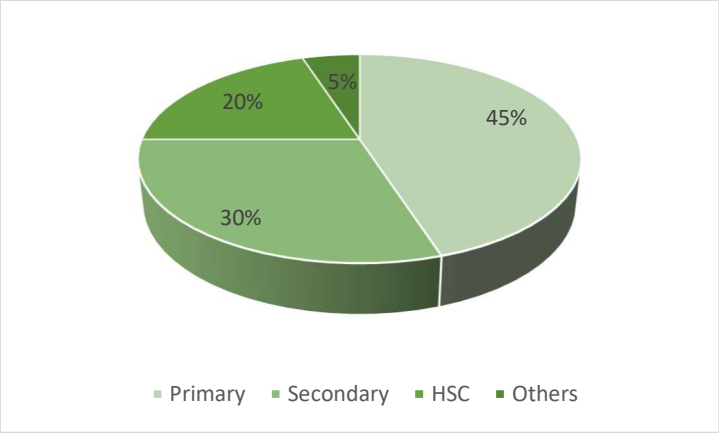


Figure: Education level of the respondents

Source: Field survey, 2011

Income source of the respondents

Most people in the study area are impoverished and engaged in primary economic activities. The women are less involved in income-generating activities. For these reasons, the husband's income is considered the primary source of income for the respondents. In this sense, the graph illustrates most of the family's income sources. 40% family's income comes from fishing and its related activities. 30% of families depend on agriculture. 10% are businessmen and day labourers. Moreover, very few are involved in other activities.

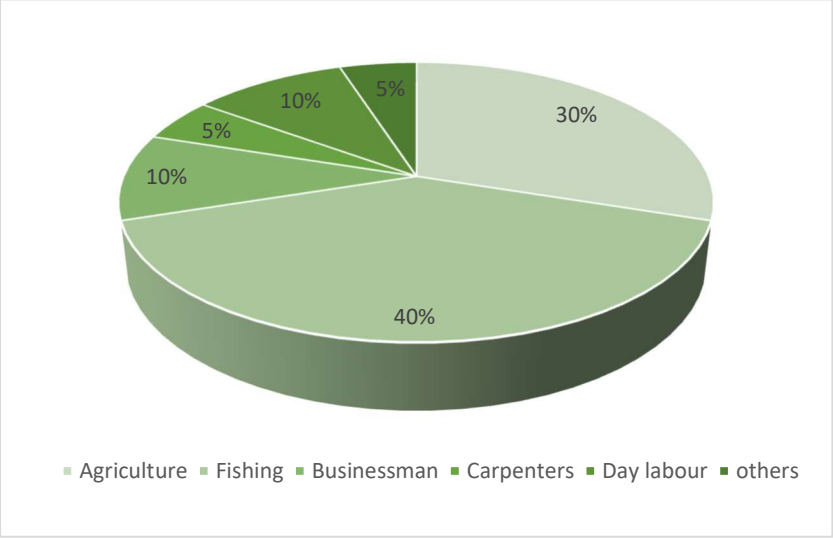


Figure: Income source of the respondents

Source: Field survey, 2011

Monthly Income of the respondents

Most of the family's monthly Income is very low. They lived in this area below the poverty line. The continuous cyclone and poor working opportunities are the leading causes of low Income. The following graph shows the monthly incomes of the respondents.

Most people's monthly Income is very low. Approximately 40% of people have a monthly income of $5,000 or less. 27% of people's Income is $5,000-$10,000, and 24% of Income is $10,000-$15,000. Moreover, very few people have an income level exceeding $15,000.

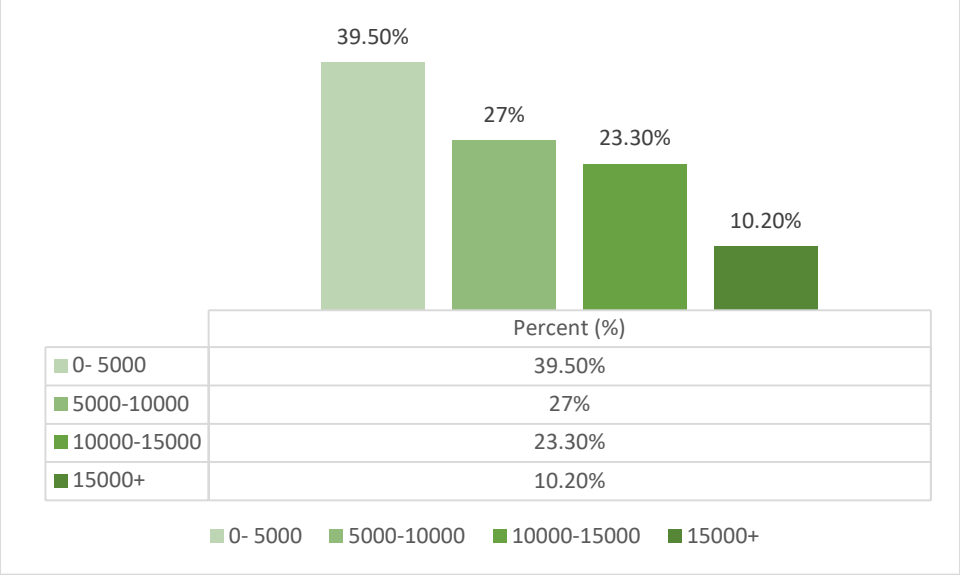


Figure: Monthly Income of the respondents

Source: Field survey, 2011

Family size of the Respondents

The average family size of the coastal people is bigger than that of other parts of Bangladesh. The large family size and low income are the standard features of the coastal area. Most families are large. The illiterate people do not know how to control family size. For these reasons, they suffer from unusual poverty and other socio-economic problems.

The distribution of family size in this area is illustrated in the following figure.

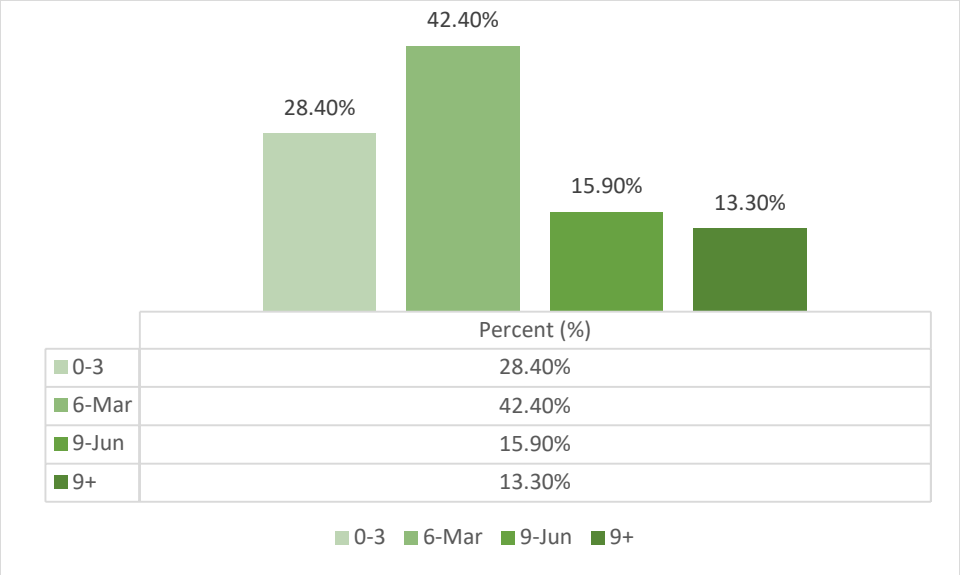


Figure: Family size of the Respondents

Source: Field survey, 2011

From the above figure, it is clear that the families with 3 to 6 members are more prevalent in this area. The reason for this large family is a lack of family planning and recreational facilities.

Housing Pattern of the Respondents

Most of the houses in the study area are made of tin. Houses made of tin and wood, tin and straw, and mud and straw are also found. Most of the houses are made of tin. Fifty-five per cent of the respondents live in tin-made houses. 20% live in the semi-pucca house, 15% live in the mud house, and 4% live in the pucca house. Moreover, only very few live in the other types of houses. The following graph shows the housing patterns of the study area.

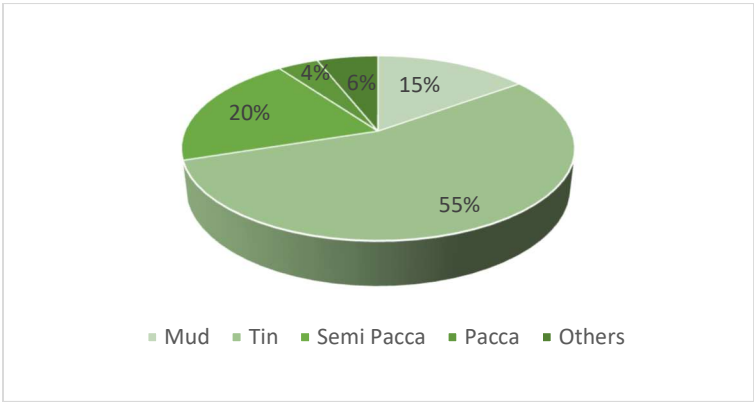


Figure: Housing Pattern of the respondent

Source: Field survey, 2011

4.2 Impacts of cyclonic Hazards on women and children

A significant number of respondents from Roypur opined that cyclone intensity has increased significantly over the last few decades. Approximately 61% respondents opined that cyclones and storm surges are the main disasters in this area. However, other disasters have also occurred in this area, such as waterlogging, salinity intrusion, and floods.

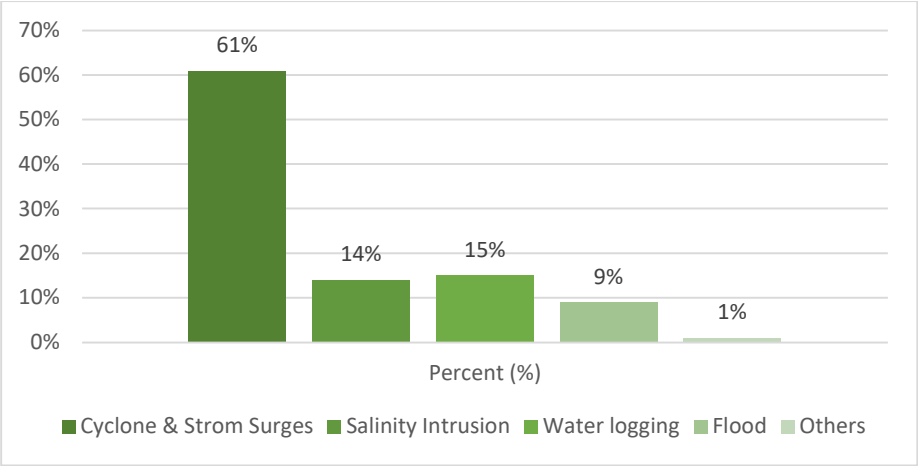


Figure: Pattern of Disaster in this area

Source: Field survey, 2011

Cyclone Experience of the respondent

Most of the respondents have experienced cyclones 3-5 times in their lives. About 37% respondents have experienced 1-3 times in their lives. Only a few respondents have faced cyclones more than 6 times. This information indicates that most people have experience with cyclones. Moreover, they have still not been able to overcome the devastating effects of cyclones.

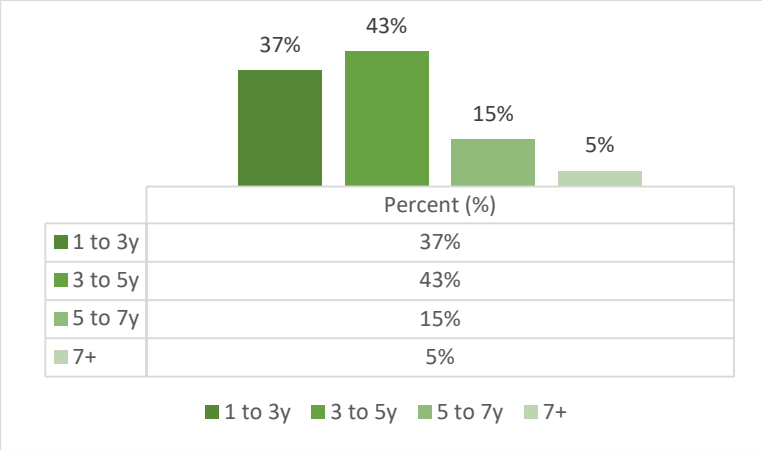


Figure: Cyclone Experience of the respondent

Source: Field survey, 2011.

Patterns of Impact

Cyclone disasters cause strong storm surges at various levels, which enter the study area from surrounding rivers and shorelines. The duration of water stagnation depends on the drainage pattern and the landform. The prolonged duration of water stagnation affects crops, fisheries, and the transportation network, and damages land and property. Cyclones have a highly detrimental effect on women's and children's lives. Most of the women are seriously injured by the cyclone. The primary impact of cyclones on women and children is a shift in livelihood patterns, food and nutritional deficiencies, increased disease prevalence, inadequate educational facilities, and limited access to social services. Women are already in a miserable position, but disaster and its associated problems are increasing women's vulnerability day by day.

Distribution of Death and Injuries

Women and children in this area are now in a vulnerable position due to their low income, social position and low working opportunities. However, the frequent cyclones and natural disasters pushed women into a more miserable position. When one cyclone struck an area, they lost everything, and then they tried to rebuild. However, the attackers attacked and destroyed their structure. Moreover, it is a continuous cyclic matter in this area. The natural disaster cannot be controlled, but its destruction can be recovered from through economic and mental resilience. However, every year, a frequent cyclone destroys their entire strength of life. The worldwide vulnerable group is highly affected in this situation.

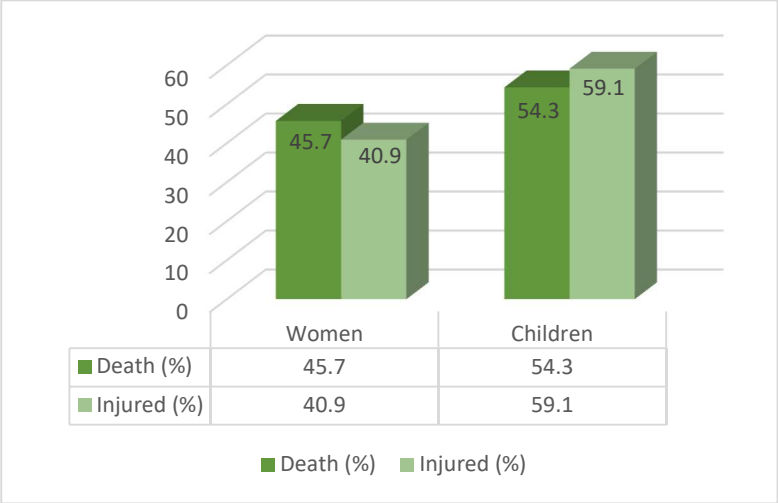


Figure: The Pattern of Women and Children death and injury (During Cyclone)

Source: Field survey, 2011

The death rate among women and children in the largest cyclones is so high. The average death rate of women is higher than that of men. According to local people's perception, out of the total casualties in the study area, more than 55% are women and children. In the previous cyclone, during the disaster period, 54% children and 45% women died. On the other hand, during this time, approximately 40.9% women and 59.1% children are injured. The leading cause of children's death was dependency on their parents. The following graph shows the death and injury rates of women and children during the cyclonic period.

The number of deaths is very low in the post-cyclone period compared to the cyclone period. However, the respondents who are affected in the post-cyclonic period are mainly due to improper cyclone management. The total number of deaths and injuries resulting from the cyclone is shown in the above figure.

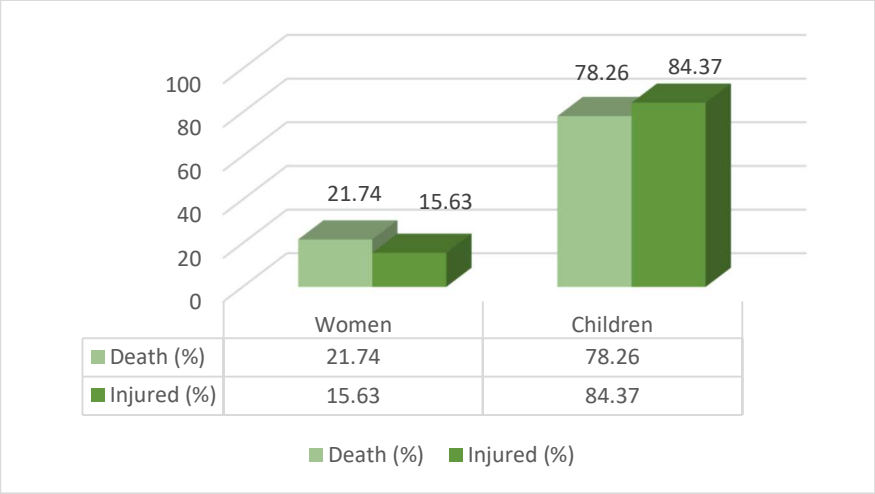


Figure: The Pattern of Women and Children death and injury (Post Cyclone)

Source: Field survey, 2011

Impacts of cyclones on livelihood

Cyclones have a far-reaching adverse impact on the livelihoods of children and women. A story tells of Ali Ahamed, 52 years old. *'Just after the cyclone, he found himself in a hospital in Chittagong Medical. He was found in a Patanga area. After his recovery, he returned home and found out that all of his family members, including his mother, wife and his five sons and daughter, were dead, and his house had been destroyed.'*

Not only have deaths and injuries occurred due to the cyclone, but also, the frequent cyclone disasters have significantly affected their livelihood patterns. Due to the cyclone, most of the family's income levels have been reduced; for this reason, they face more problems than males. The problem occurred due to cyclones, which resulted in poor clothing and inadequate cooking items for low-income individuals, loss of shelter and settlement, and loss of domestic animals due to the landfall of the cyclone. Among them, most respondents indicated that the destruction of their shelter and settlement has highly affected their lives. Moreover, all these events make them beggars and homeless.

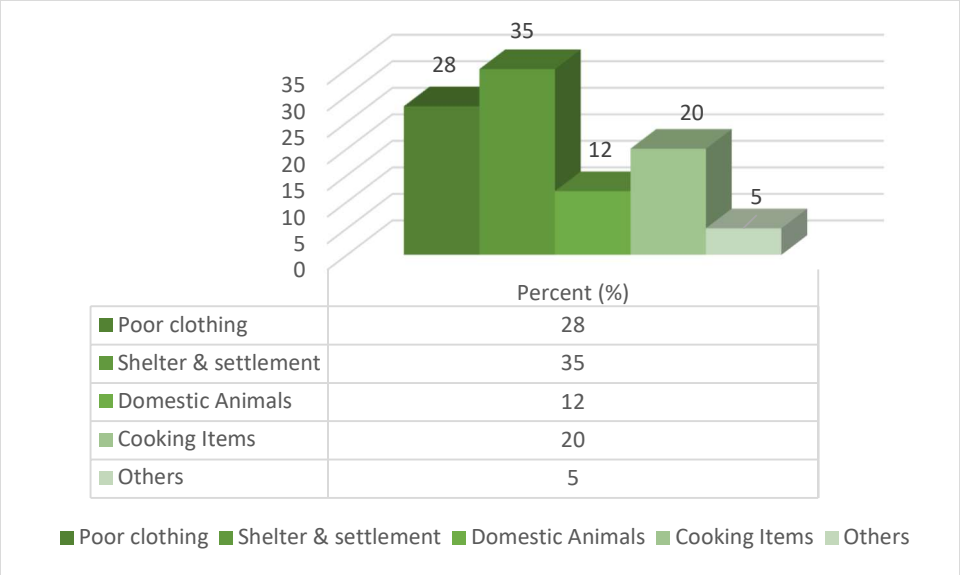


Figure: Patterns of Impacts of cyclonic on livelihood

Source: Field survey, 2011

Impacts of cyclone on food and nutrition

In this area, most people are living below the poverty line. Most respondents' monthly income is below 10,000. In this situation, they cannot provide their families with adequate food and nutrition. Moreover, women and children are the primary victims in this circumstance. They have no job or working opportunity through which they can meet their demands and those of their family. In this case, they depend on their husband, father, or older brother. For these reasons, they do not think about themselves; they only think about their family members ' well-being and demands. These reasons are primarily responsible for their low-calorie intake. Almost 70% of respondents reported being highly affected by poor food and nutritional facilities. Moreover, it is said that very few have not suffered from this problem.

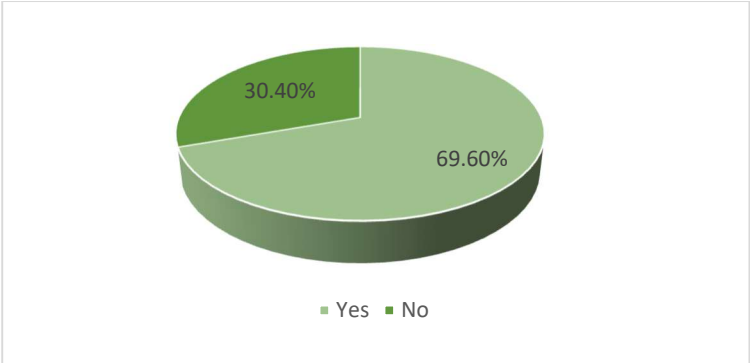


Figure: Patterns of Impacts of cyclonic on Food and nutrition

Source: Field survey, 2011

These 70% respondents said that they faced these problems at different times. Some faced this problem before the cyclone due to unemployment and other issues. Approximately 20.4% respondents have suffered from this problem due to their location and the long-term impact of the cyclone. On the other hand, large numbers of people suffer from this problem during the disaster period. On average, 49.5% of respondents suffered from these problems during the disaster period due to the adverse effects of the disaster. On the other hand, 30.1% of respondents reported a lack of food and nutritional facilities. These events occurred due to their economic conditions, government irresponsibility, and the unequal distribution of food relief.

The respondent's opinion about the period of lacking food and nutritional facilities is given below.

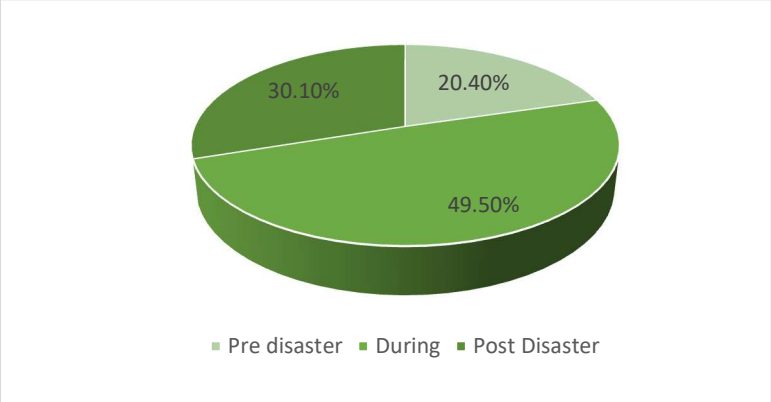


Figure: Period of sufferings

Source: Field survey, 2011

Impacts of cyclone on health

Cyclone has a significant impact on the health of women and children. Health is the root of all happiness. Physical, socio-economic and environmental factors determine the health status. A natural disaster is an event that directly impacts the health status of humans and the environment. A large number of people face various health problems in this area. Among the women and children, the situation is so miserable. Most respondents face numerous health problems after a disaster, primarily due to a lack of female doctors. Approximately 40.7% of respondents are affected by a lack of women doctors. Moreover, there are healthcare centres for a large number of people.

On the other hand, others indicate that there are no specific healthcare facilities for women and children in this area. Moreover, after a disaster, women and children do not get any extra medical facilities besides relief. The respondents identified some problems in this area that cause health issues during disaster periods.

Table: Causes of the health problem of the Respondent

Problem	Percent (%)
Lack of Hospital	35
Lack of Women Doctor	40
Lack of medicine	4
Lack of other health care facility	19
Others	2

Source: Field survey, 2011

Disease Pattern of Women

The impacts of cyclonic disasters on humans are very complex. It impacts human physical and mental attitude by creating fear and various diseases. Diseases are common in the aftermath of a cyclonic disaster. The people in the study are mostly affected by various diseases. Different types of diseases mainly affect women. Among them, the most common diseases of women are fever, diarrhoea, dysentery, Typhoid, malaria, skin diseases, etc. The feminine type disease which attacked most of the women in this area is diarrhoea, dysentery, Typhoid, and emotional Distress. Most of the women are very much helpless in this situation because they do not get family support for their recovery from this problem.

On the other hand, there are no proper healthcare facilities in this remote area. In this case, most women visit their village doctor and utilize the local healthcare facility. However, sometimes these unskilled, illiterate doctors provide wrong treatment, which results in death in many places. However, poor women cannot get better treatment because of their economic and social position.

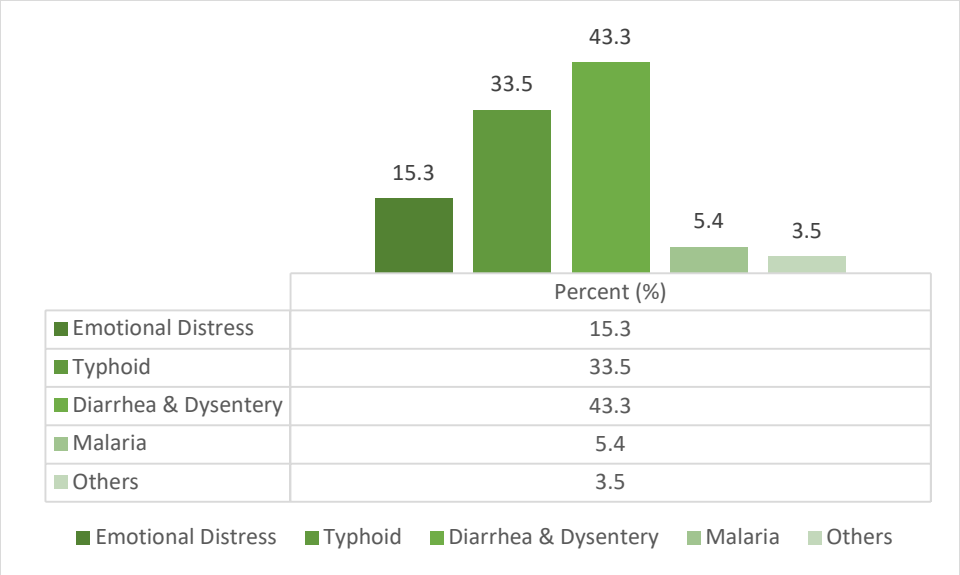


Figure: Disease pattern of Women

Source: Field survey, 2011

Disease Pattern of Children

Children in this area also suffer from various types of problems. The children's adaptability to this extreme environmental condition is very low. For these reasons, they are prone to various types of diseases. The most common diseases of children of women are fever, diarrhoea, dysentery, Typhoid, malaria, cough and some other infectious and vector-borne diseases.

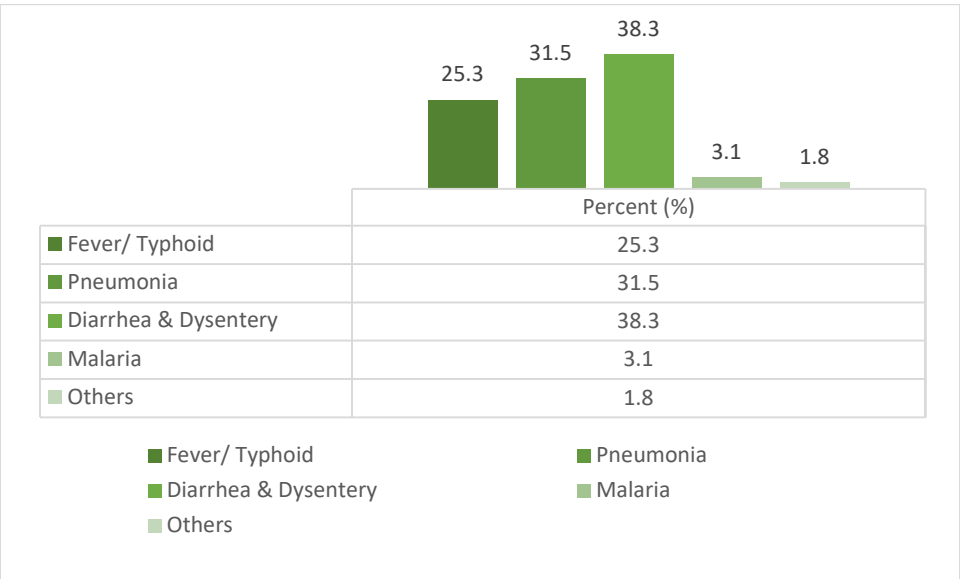


Figure: Disease Patterns of Children

Source: Field survey, 2011

In the disadvantaged areas, people have suffered long-term malnutrition, skin infections, ARI, Diarrhea diseases and an extremely low level of immunization prior to the disaster. Most of the health problems prevalent in the Anwara upazila became more acute after the cyclone. The number of cases of diarrhea, shigellosis, and amoebic dysentery increased in the aftermath.

Treatment patterns in diseases

Most of the village women and their families depend on the village doctor for treatment. They do not get a proper treatment facility in their village. The following graph shows the treatment pattern of the respondents.

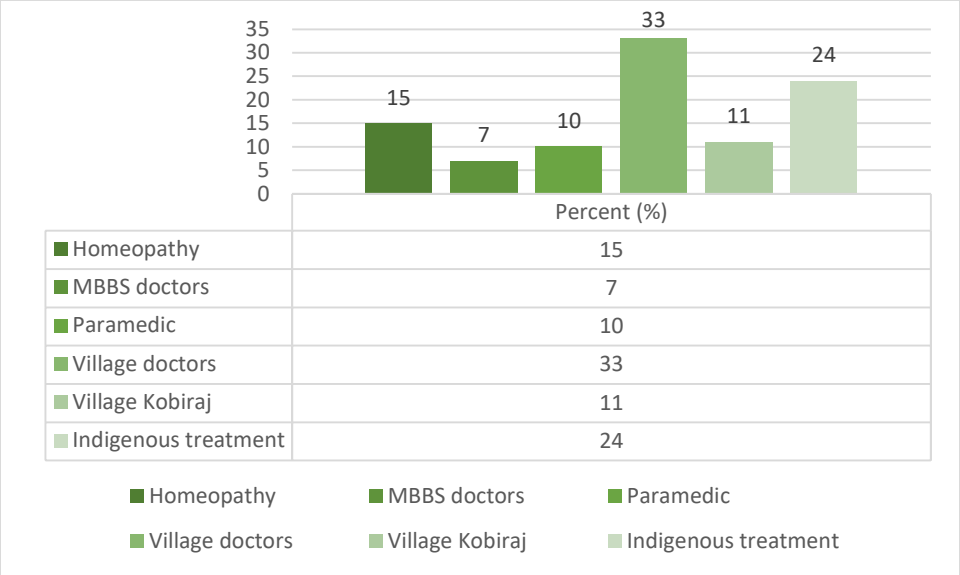


Figure: Treatment patterns in diseases

Source: Field survey, 2011

The graph presents the information about the treatment patterns of women and children with various diseases in the study area. According to the graph, village doctors and indigenous treatment are the most popular treatment patterns compared to other treatment patterns. The combined contributions of these treatments are 56.3 per cent. Homoeopathy and village Kabiraj treatment facilities are also common treatment patterns. Paramedic and MBBS Doctors' treatment is scarce in this area. In the summary, it will be stated that the treatment facilities are insufficient in this area. Most treatment facilities are not scientifically based. As a result, when they receive treatment

from local doctors and indigenous treatment, they suffer greatly and sometimes die. Moreover, in this event, women and children suffer more than men.

Impacts of cyclone on educational facilities

Education is the backbone of the nation. Without education, no country can prosper. In this area, most people are illiterate. The rate of women's education is abysmally low. Almost 20% women are literate in this area. Most of the women have only completed primary and secondary education, and the education rate for others is very low. Almost all women may complete higher education. The table shows the pattern of literacy.

Table: Education level of the respondents

Education level	Percent (%)
Primary	45%
Secondary	30%
HSC	20%
Others	5%

Source: Field survey, 2011.

Problem in educational Facility

Most respondents said that the education facilities in this area are inferior. Due to frequent cyclones, school teachers are not interested in staying here. For these reasons, most of the time, the posts of school teachers are vacant. On the other hand, the water from the storm surge blocks the road, making it unusable for everyone. For these reasons, most women are unable to attend school. The maximum respondent said that due to the cyclone and its associated storm surges, it is the main obstacle that hampers their education. Moreover, very few respondents said that the cyclone did not affect their education.

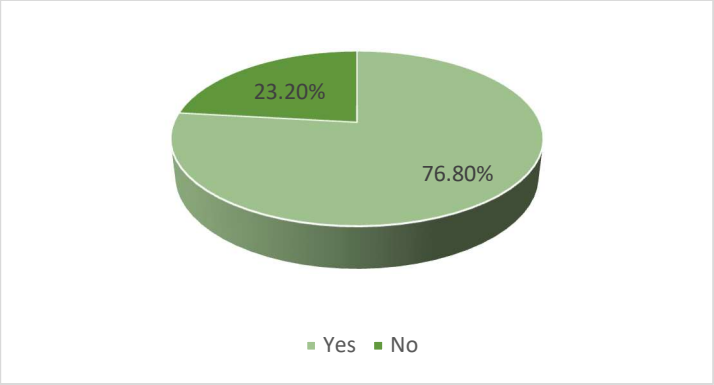


Figure: Problem in an educational Facility

Source: Field survey, 2011.

Effect on Children's Schooling

Children's education is essential. However, due to continuous cyclones, children in this area cannot go outside and cannot go to school. This hinders the children's schooling. Most parents said that this problem highly hampers their children's schooling. Almost 80% respondents said that this situation highly hampers their children's schooling. Moreover, it is also one of the leading causes of the low literacy rate in this area.

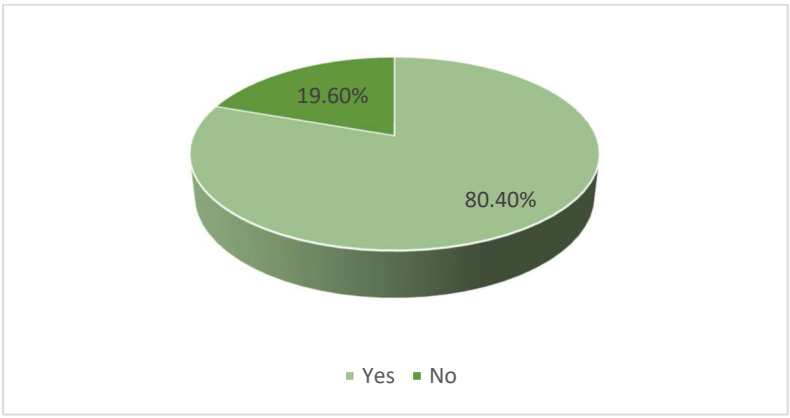


Figure: Effect on Children's Schooling

Source: Field survey, 2011.

Pattern of Impact on children's schooling

These frequent cyclones give rise to various problems in children's education. Due to poor roads and transportation systems, many educational institutions have been severely affected, and storm

surge water has significantly disrupted their operations. On average, 39.7% children drop out of School, and 21.2% are now out of schooling due to the above problem. Moreover, 25.8% do not attend school due to road blockages and poverty caused by the storm surge.

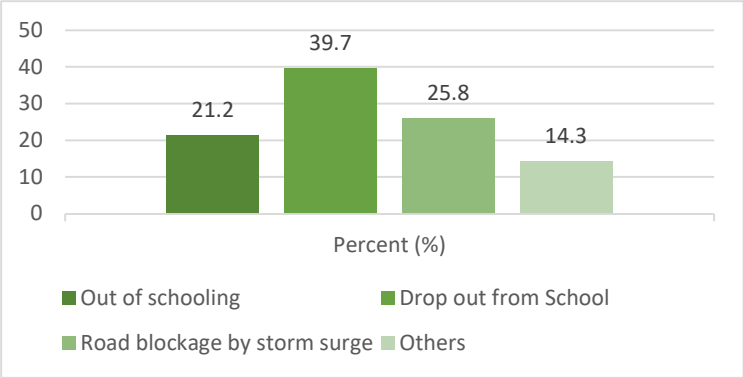


Figure: Pattern of Impact on children's schooling

Source: Field survey, 2011.

Impacts of cyclone on Employment status

Women faced various forms of discrimination in their work environment. In standard time, women's daily activities follow a pattern.

Table 4.3: Daily Activity of Women

TIME	**Women Daily Activity**
5:0-6:0	Get up, wash oneself, then pray, sweep the home, and take care of domestic animals.
7:0-8:0	Washing dishes, preparation for making breakfast
9:0-10:0	Give breakfast to others, take breakfast or wet rice, prepare children to go to school, and send them to school
11:0-12:0	Collects water, fuel wood, arranges for cooking meals, crop processing and drying.
01:0-02:0	Cooking, crop processing and drying.
03:0-04:0	Gave meal to male and children and took meal

05:0-06:0	Washing dishes, feeding domestic animals, collecting water and fuel, taking domestic animals to their home.
07:0-08:0	Ordered the children to go study, observe the child's study, and guide them, and cook dinner
09:0-10:0	Serve dinner for other members of the family, took dinner, visited the domestic animals, then went to sleep

Source: Field survey, 2011.

A male-dominated society thinks about everything in their favour but does not think about the women's perspective. After a disaster, these problems take an acute form. Most respondents have experienced numerous problems both during and after the cyclone. After the cyclone, women's workloads increased compared to those of previous times. Most of the time, they spend their time repairing their home and rebuilding everything.

On the other hand, after the cyclone, the family's maintenance work also increased. Most of the women said that the main impact of the cyclone is that it increases the working load and creates a triple burden. Almost 43.5% women are the victims of the triple burden. The triple burden refers to the process by which women manage their household activities, care for their children, and engage in outside activities, including income-generating activities. Moreover, males are spending their time only on income-generating activities. Moreover, during this time, they also faced disparities, poor income, and other problems. The respondents' perceptions about the impact of cyclones on the employment status of women are given below.

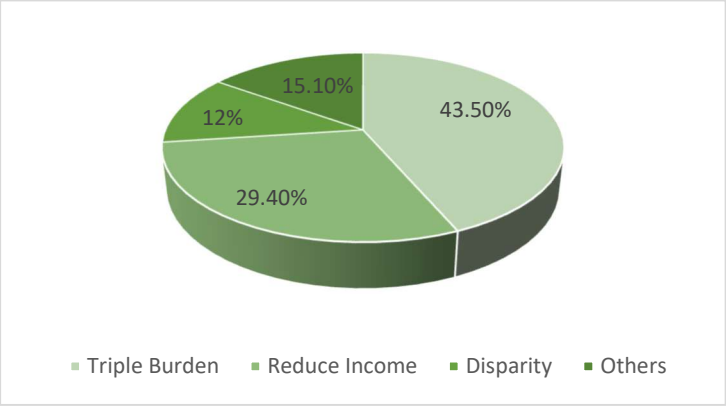


Figure: Pattern of impact on employment status

Source: Field survey, 2011.

Pattern of Occupational Hazard

Cyclones change the occupational patterns of women in this area. Women are less likely to engage in income-generating activities outside the home. For this reason, most women work from home, engaging in various activities, such as tailoring, animal rearing, vegetable gardening, and shopkeeping. However, due to the water from storm surges, women are unable to rear animals and maintain a vegetable garden. All these events are lowering women's income during and after the cyclone period. Some occupational problems are indicated by the respondents in the study area, as shown in the following graph.

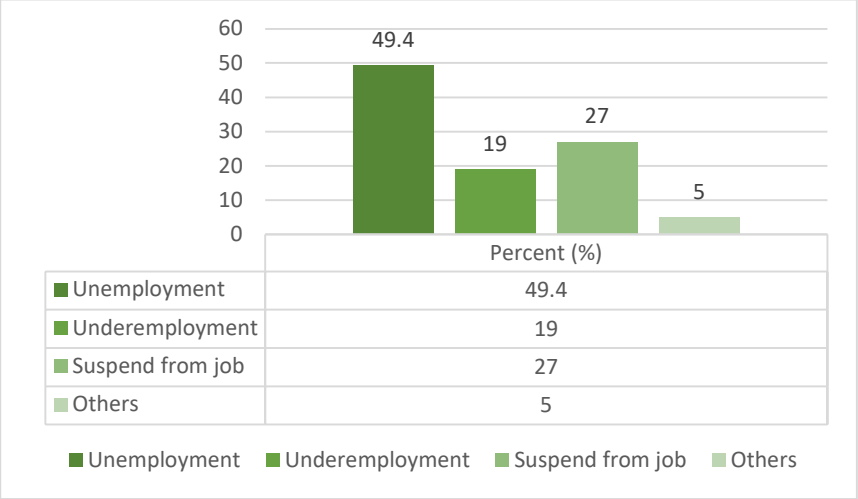


Figure: Pattern of occupational Hazard

Source: Field survey, 2011.

This event is a recurring phenomenon in the study area. Respondents in these areas cannot escape the trap of this problem. Due to the continuous cyclones, the residents of this area cannot escape these events. This cycle is a main responsible factor for poverty in this area. Almost 80% of people live below the poverty line, and almost 90% respondents have suffered from this problem. 54% respondents spend workless time after the. On the other hand, 22% of respondents are suspended from their jobs, and 19% are underemployed in this area. Almost all of them indicate that the responsible factor for every situation is the cyclone and its associated impact.

Impacts of cyclone on Social services

The frequent and continuous cyclones reduce various types of social services in the study area. The women and children do not have access to proper healthcare facilities, education, food, and nutrition. The cyclone has hampered all social service-related activities. The extreme poverty and gender disparity are the result of the cyclone.

Pattern of Social Security

Almost the entire respondent said that they do not get proper social security and services. Approximately 61.3% of respondents said that they do not receive proper social security, and very few respondents reported receiving very low social security and services.

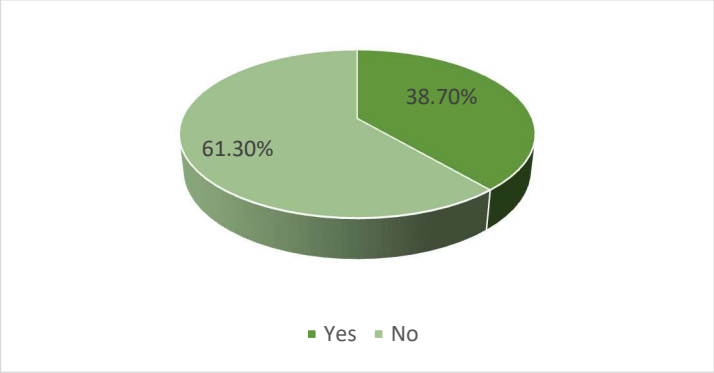


Figure: Pattern of Social Security

Source: Field survey, 2011.

Family torture & harassment

Many women faced family torture and harassment during and after the cyclone. After the cyclone, families put pressure on their wives to take care of their father-in-law. At this time, they are oppressed by their husband and their family. Many respondents said that they faced family torture and harassment during the cyclone and the post-cyclone period.

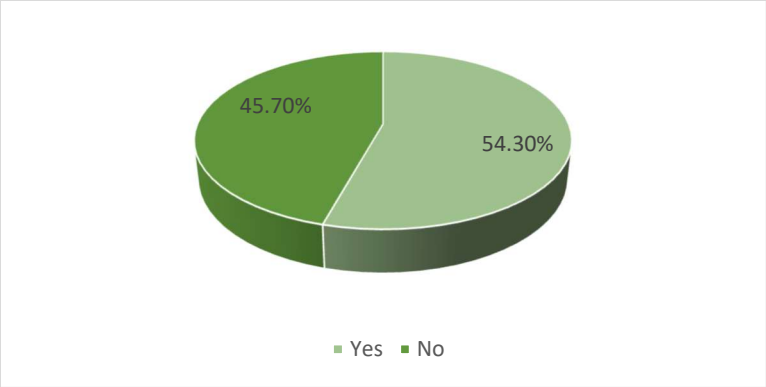


Figure: Family torture & harassment

Source: Field survey, 2011.

Loss of Children in Cyclone

Many families lost their children during the cyclone. From 1991 to the present, many children have died from cyclones. Almost every family loses one or two children in a cyclone. Sixty-five per cent of respondents said that they lost their children in a cyclone. On the other hand, it is said that very few people lost their children in the cyclone.

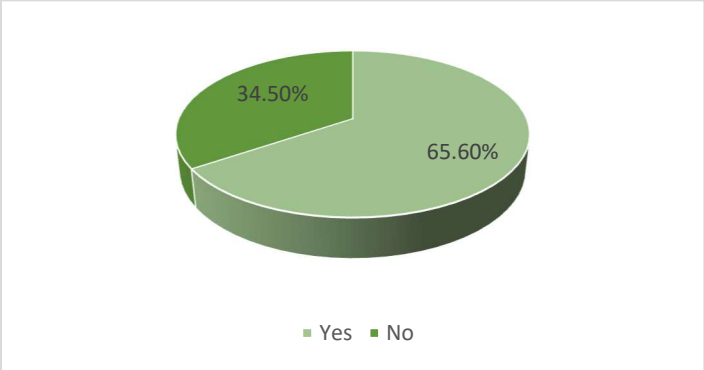


Figure: Loss of Children in Cyclone

Source: Field survey, 2011.

Many children have died during and after the cyclone. Most of them died from drowning, some died from diseases, and some died from a lack of family care. The following table shows the respondents' opinions about the impact of the cyclone on their children.

Table: Cause of death of children in cyclone

Affected Children	Percent (%)
Drowning	62.1
Diseases	23.7
Lack of Family care	10.2
Other	4
Total	100

Source: Field survey, 2011.

4.3 Vulnerability assessment of women and children

Nature of Vulnerability of women and children

Women and children are vulnerable because in the previous cyclone women and children are largely affected then others. In 1991, the majority of cyclone victims were women. And this cyclone affected women's access to food and nutrition, health, education, social security, and their entire livelihood pattern. Currently, women and their families cannot access this facility in this area. So, again, if the cyclone hits this area, women and children will be affected more, just as they were in the previous time. Some respondents are indicated that their main risks are their location and socio-economic condition.

On the other hand, some respondents think that certain types of vulnerability increase their risk in the future. These include physical vulnerability, Socio-Economic Vulnerability, and attitudinal vulnerability. 55% of respondents think that physical location is the main responsible factor for their future vulnerability. On the other hand, 20% said social position and 15% said that economical condition is the main cause of their vulnerability.

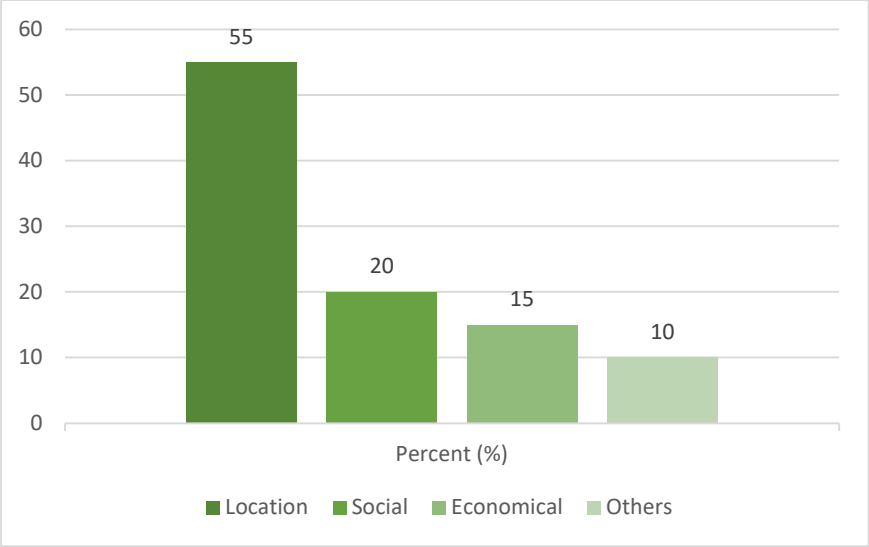


Figure: Causes of Vulnerability of women and children

Source: Field survey, 2011

Women Vulnerability Analysis

Women have different types of vulnerability. Most of the respondents are affected by almost all types of vulnerability, Such as physical vulnerability, Socio-economic vulnerability and attitudinal vulnerability. According to respondents' perceptions, physical vulnerability affects women more than other vulnerabilities.

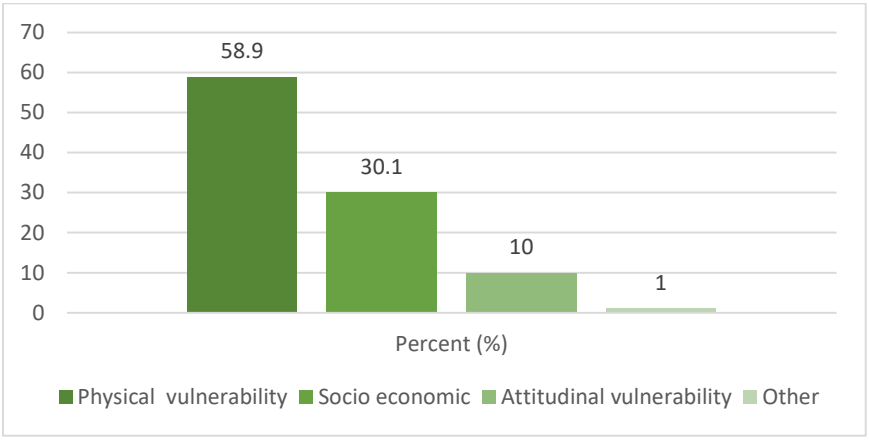


Figure: Pattern of women Vulnerability

Source: Field survey, 2011

Causes of physical vulnerability

There are lots of causes of physical vulnerability of women. Women cannot easily move one place to another place, cannot go outside without her husband and permission is taken for going outside these are also the causes of their future vulnerability. On the other hand, some respondents identify reasons for their physical vulnerability. These are location, insufficient shelter, and poor building materials. Among them, 40% of respondents said that location is one of the main causes of their vulnerability. For staying in this place, they may be affected mostly in the future, as this zone is known for being cyclone-vulnerable.

On the other hand, 25% of the respondents stated that poor building materials are also a significant factor. And 20% blame is attributed to insufficient cyclone shelters. It is said that poor water and sanitation facilities in the post-cyclone period will increase the sufferings of women and may lead to different types of diseases. The respondents' opinions about their physical vulnerability are illustrated in the graph.

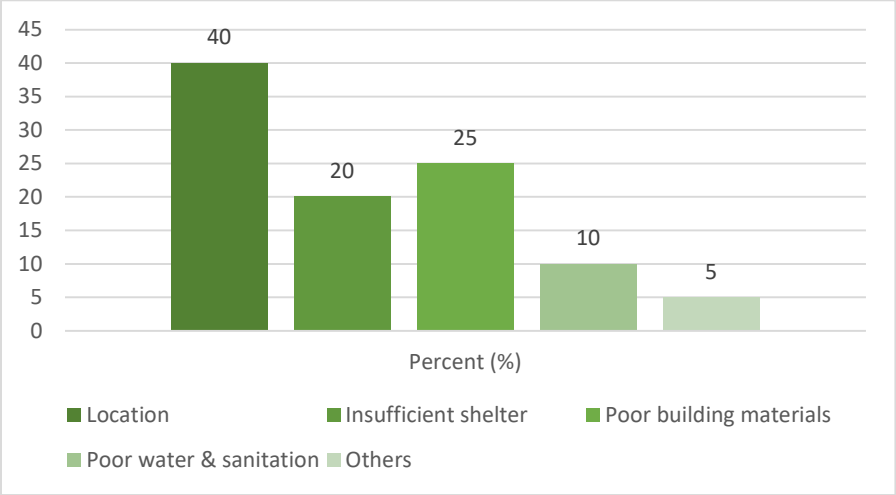


Figure: Causes of Women Physical Vulnerability

Source: Field survey, 2011

The reasons for the widespread vulnerability of women are not only related to the above factors, but also to some other factors. Some respondents indicated that physical weakness and biological factors contribute to their physical vulnerability.

Causes of socio-economic vulnerability

The socio-economic conditions in this area create socioeconomic vulnerability in the study area. Most women in this area are illiterate. They do not about signal system. They have no idea about how to save themselves in this crisis moment. The lack of food and nutrition is a common issue in this area. For these reasons, they will suffer from numerous health problems after the cyclone. And due to a lack of proper healthcare facilities, they do not receive adequate healthcare. All these associated events may increase future sufferings of women in cyclones in this area. Most of respondent's income is very low in this area. For these reasons, they have no economic ability to face the cyclone. And for every reason woman may suffer due to cyclonic hazards. The respondent's perception about the cause of socio –economic vulnerability is given below.

Table: Causes of socio-economic vulnerability

Cause	Percent (%)
Lack of food & nutritional facility	25.2
Poor health care facility	30.7
Lack of education	32.1
Poor income	9.3
Lack of child protection	2
Others	0.7
Total	**100**

Source: Field survey, 2011

Some of the respondents also indicated some other cause of their vulnerability. These are traditional dress codes for women, including long hair, dependency on husbands and elderly, and the Porda tradition. Another reason is mental immaturity of women and lack of coping knowledge with cyclone. Many of women believe that they will never die if the death is not written. This will affect women the most. Another reason is that many women lack swimming skills. The social insecurity, mismanagement in cyclone centre, improper cyclone centre and lack of other utility services in cyclone shelter and lack of social services are also the cause of women vulnerability. And all the reasons increased women vulnerability in cyclone.

Causes of Attitudinal Vulnerability

Most respondents have experienced cyclones 2 or 3 times. However, many times, cyclone warning and forecasting-related organizations, such as the Red Crescent Society, announce cyclone signals, but often the cyclone does not make landfall at this intensity. For this reason, most people did not believe the warning and failed to take shelter in high buildings or cyclone shelters, which are insufficient in number and not properly maintained. For these reasons, they are often affected by severe cyclones; the 1991 cyclone is one example. On the other hand, rumours and religious beliefs are also responsible factors for this condition. Most of rural Muslim women cannot go outside from home, do not go to shelter and they also not agree to stay shelter with male. And for this veil tradition, women are affected in this area in the past and they also affected in this area in future for the same reason. Fatalistic behavior of women is also the cause of their vulnerability.

On the other hand, women in this area are less involved in the volunteer organisation. For this reason, they are less aware of the warning, forecasting, and preparedness measures for cyclones. Generally, women's clothing, such as shalwar and borka, and their long hair were the main obstacles to the survival of women's lives during cyclones. The decision-making processes of women are, on the other hand, and this dependency itself is a cause of their vulnerability. And underdeveloped transport and communication system is also responsible factor for it. Still, very few families use mobile phones for exchanging information. And all are the reasons of socio-economic vulnerability of women and children in this area. And most respondents do not believe in cyclone warnings and lack knowledge about them. Respondents have identified some causes of vulnerability that are related to attitudinal vulnerability.

Table: Causes of Attitudinal Vulnerability

Cause	Percent (%)
Rumor & religious cause	14.3
Negative believes	21.7
Fatalistic behavior	2.1
Lack of awareness & consciousness	35
Poor community participation	15
Self-cause	9

Others	1
Total	100

Source: Field survey, 2011

Children Vulnerability analysis

Like women children are also more vulnerable in this area. In this area family size are so large. And no family takes any extra care to protect their child. In the previous cyclone children were mostly affected. Currently, the Red Crescent Society and other volunteer groups do not offer any programs for children. Other organisations, such as schools and community-based organisations, also do not provide them with any training or motivation-based programs about signalling systems, warning systems, and coping strategies for cyclones. For these reasons, women and children are more vulnerable to future cyclonic hazards.

4.4 GO and NGOs initiatives for vulnerability reduction

The government and major NGOs try to develop procedures to manage cyclone disasters and their associated hazards. During the pre-, during, and post-cyclone period, some government and NGOs have tried to provide their support to mitigate the sufferings of the local people. Most respondents receive help from various types of organisations. The government provides help through the Ministry of Relief and Rehabilitation. On the other hand, some national and international NGOs help the victim community. These NGOs include the Red Crescent, BRAC, ADAB, CARE, OXFAM, and CARITAS, among others.

Pattern of Initiatives

78.9% of respondents receive different types of aid from different organisations. On the other hand, only 21.1% are not dependent on the help of others. According to a field survey, it was found that the performance of National, international, and local NGOs was much better than that of the local administration. Most of the support is provided by NGOs; 58% of respondents said this is a fact. On the other hand, government and political leaders provide only 20% and 12% incentives for cyclone management. Other organisations provide very few, and help is scarce. The following figure illustrates the respondents' perceptions of cyclone management.

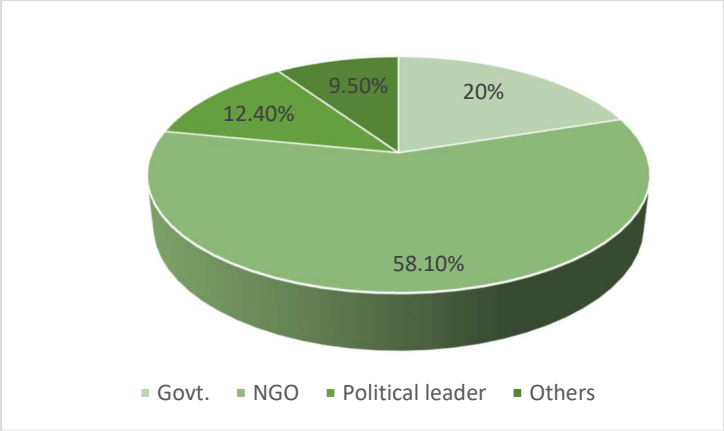


Figure: Pattern of Initiatives for vulnerability mitigation

Source: Field Survey, 2011

Major initiatives of GO and NGOs are discussed below-

1. Relief operation of the Red Crescent Society was remarkably effective, according to local people. The Red Crescent had 12 cyclone shelters in this area. They provide the following types of relief, including rice, lentils, oil, utensils, and clothing, to the most severely affected. It has 100 centres along the coast of Bangladesh to help affected people.
2. The Gonoshasthya Kendra focused on health and sanitation. They also offered free medical treatment to the affected people.
3. CCDB, Caritas, and other organisations provided clothes, food, water, shelter, medical facilities, and other essential items.
4. Oxfam provides cooked food (Khichuri) to the affected families. They also provide dry food, water purify tablets, deep tube wells, clothes and old garments.
5. CARE provides the largest disaster response program. Its activities include distributing rations, deep tube wells, rice seeds, vegetable seeds, and fish nets, etc.
6. BRAC also implemented a relief and rehabilitation programme in this area.
7. The Ministry of Relief and Rehabilitation implemented some necessary programs for disaster management.
8. The Disaster Management Bureau also provides disaster management assistance, food aid, and other relief facilities.

Pre Cyclone Mitigation Program

A pre-cyclone mitigation program is a very necessary step in disaster mitigation. To mitigate the impact of cyclones on the inhabitants of these areas, this program is necessary. This program is correlated with some other programs. Such as

- Disaster preparedness
- Early warning and forecasting
- Evacuation after disaster

Disaster Preparedness

Cyclone disaster preparedness program is taken both GO and NGO. The government of Bangladesh implements both types of programs, such as structural and non-structural programs. As part of its structural measures, the government, with its resources and external assistance, has constructed cyclone shelters and flood shelters in this area. In addition to the government of Bangladesh, it has also built a coastal embankment to protect this area from storm surges. The NGO also conducts awareness and consciousness development programs for disaster preparedness.

The concept of cyclone preparedness activities originated in 1965 with the National Red Crescent Society. In 1973, the government of Bangladesh and the Bangladesh Red Crescent Society jointly created a new program management structure, known as the Cyclone Preparedness Programme (CPP).

Two committees were created to jointly administer and implement the program. One is policy committee is constituted as follows-

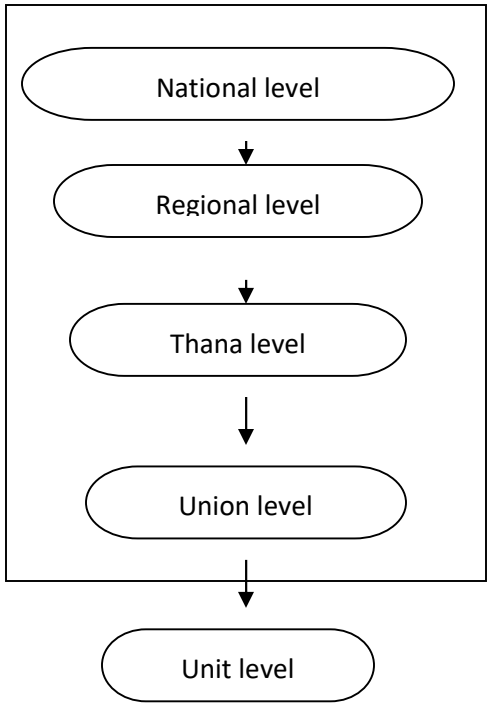
1. Minister for Disaster Management and Relief……Chairmen
2. Minister for Local Government……...Vice Chairmen
3. Chairmen, Bangladesh Red Crescent Society……Vice Chairmen.

Another committee, comprising 15 members, has been constituted as an implementation board, responsible for effective implementation and administration.

Early warning and forecasting

The CPP Dhaka office, situated in the BDRCS National Headquarters compound, receives special weather bulletins containing cyclone warning signals from the Bangladesh Meteorological Department as soon as a depression forms in the Bay of Bengal. The information is transmitted to the 6 zonal offices and 30 Thana-level offices over HF radio. The Thana offices pass it to union office through VHF radio. The Union team leaders then contact the unit team leaders immediately. The unit team leaders, along with their volunteers, spread out in the villages and disseminate the cyclone warning almost door to door using megaphones, hand series, and public address systems.

Activities of CPP



Almost 80% of the respondents reported receiving early warning messages during the pre-cyclone period. On the other hand, very few did not get this type of information. The respondents indicated different types of sources about cyclone warning and forecasting. Most respondents reported receiving information from CPP; some mentioned that they had received information from community leaders, while others received information from the government. officials. The respondent's opinion on cyclone warnings and forecasting is illustrated in the following graph.

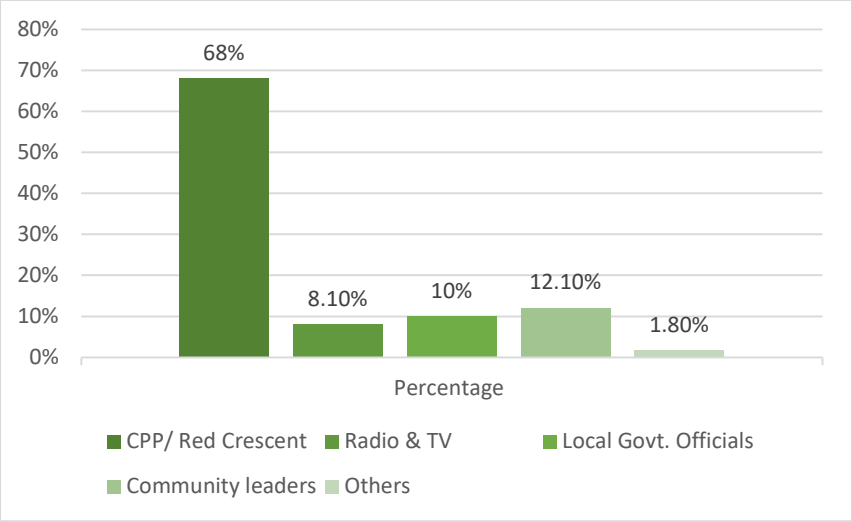


Figure: Sources for Warning System

Source: Field Survey, 2011

During Cyclone Mitigation Program

During a cyclone disaster, most national and international organisations implement evacuation programs and rescue operations. Some other organisations also offer these types of programs. During this time people take shelter in different places. If they receive this information early, they take shelter to a relative's home. On the other hand, if they receive information at the eleventh hour, they take shelter in their own homes, High buildings, or cyclone shelters. The respondents' perceptions about the cyclone shelter are shown by the following graph.

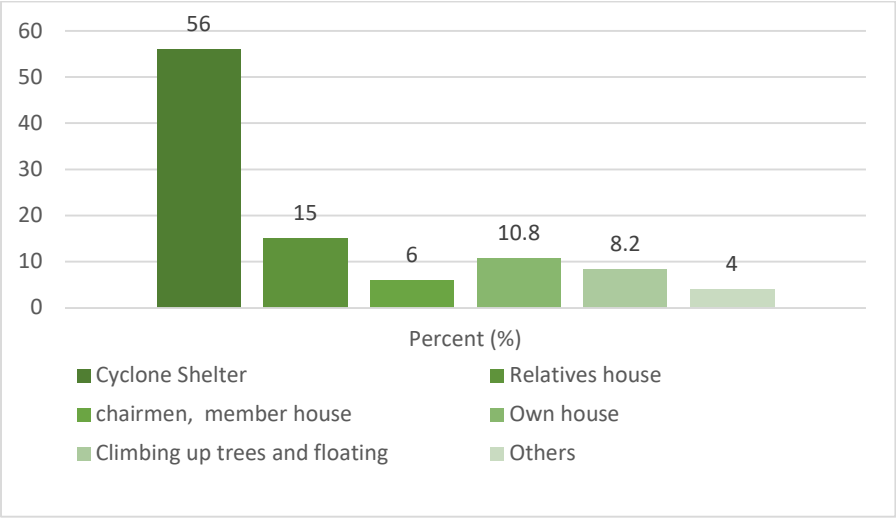


Figure: Pattern of Cyclone Mitigation Program during cyclone

Source: Field Survey, 2011

Post Cyclone Mitigation Program

Post-cyclone mitigation programs are very necessary for reducing the effects of cyclones. The government of Bangladesh and other organization takes different types of programs. These include the Relief and Rehabilitation program, a free medical facility, and vulnerable group feeding, among others.

Relief Providing Organization

Different government and non-government organizations provide different types of relief. Most of the relief comes from NGOs, with very few contributions from government organizations, local communities, and political leaders.

Table: Source of relief

Source of Relief	Percentage (%)
Government Organizations (GOs)	29
Non-Governmental Organizations (NGOs)	19
Political Leaders	9
Local Community Leaders	5
Other Donor Agencies/Nonprofits	10

Source: Field Survey, 2011

Approximately 19% of relief is provided by NGOs, and GO organisations provide 29% of relief. On the other hand, 9% relief is provided by political leaders, and 5% is provided by local community leaders in this area. Other donor agencies and nonprofit organisations provide and 10% relief.

Pattern of relief

The donor organisation provides different types of relief. Most of the relief is food relief, which includes rice, fried rice, pulses, oils, biscuits, wheat, etc. Some provide money to help rebuild their home. The table shows the relief pattern of the affected area.

Table: Pattern of relief

Pattern of relief	Percent (%)
Food aid	40
First aid services	6
Resettlement	21
loan	13.8
house building materials	10.2
other	9
Total	100

Source: Field Survey, 2011

Performance of GO and NGO for reducing the vulnerabilities

Most respondents are not satisfied with the performance of the government and NGOs. Many of the victim's family members did not receive relief during the post-cyclone period. There are no extra relief facilities for women and children. Most of the women did not go outside for taking relief with male. On the other hand, govt. Relief was not available to every person, but the NGO relief was distributed equally. Many of the respondents said that NGO activities for disaster mitigation are much better than those of government organisations.

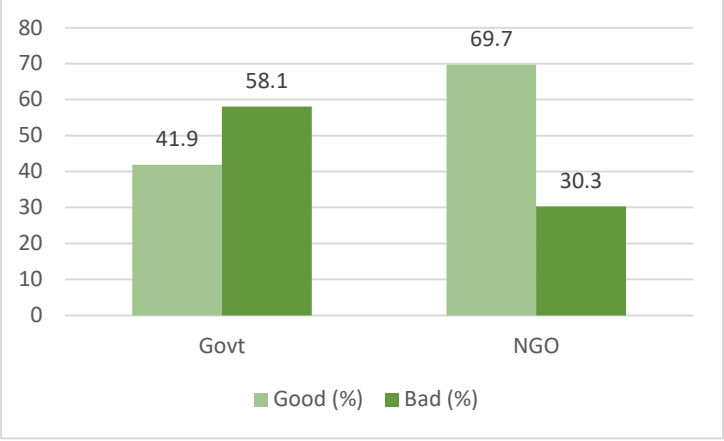


Figure: Performance of GO and NGO for reducing the vulnerabilities

Source: Field Survey, 2011

5. Recommendations

There is no way to stop a cyclone. The geographical location of Bangladesh is mainly responsible for frequent cyclone disaster. However, the risk of cyclones can be reduced, and their impact on women and children can also be mitigated through proper management.

Recommendations from the local People

Local people in the study area provide some recommendations for reducing their vulnerability to cyclone disasters. These recommendations are discussed in the following.

- Cyclone Shelter should be developed with improved utility services,
- Separate section will be built for women in cyclone shelter,
- Cyclone shelter should be build up in the village,
- Many cyclone shelters will be built than the present number,
- Road network in this area will be developed,
- Medical care facility will be arranged in the cyclone shelter,
- Women doctor in this center must be insure,
- Build up embankment with block and bolder,
- Tree plantation along the coastline,
- Ensure educational facility for all,
- Multi-purpose cyclone shelter should be built in the study area.
- Build up more educational center,
- Ensure available doctor with proper hospital facility,
- Ensure food and nutritional facility,
- Ensure available job facility after cyclone,
- Ensure water and sanitation facility in this area,
- Ensure equal distribution of relief between women,
- Expand volunteer team,
- Improved warning and forecasting system,
- Relief and rehabilitation facility will be increased
- And arrange separate service center relief center for women only.

Recommendation of Expert group

- Proper management of cyclone center with active participation of women and children in the cyclone shelter,
- Social services and security in the cyclone shelter should be ensured,
- Improved local administration system,
- Increase capacity building training among the women and children,
- Provide training about cyclone and cyclone preparedness, early warning and forecasting,
- Ensure involvement of women in disaster management activities.
- Creation of awareness and consciousness of women and children. Motivate women and children about importance of saving life.
- Traditional dress should be replaced by suitable dress and hair should be tied up for easy movement and swimming.
- Practice swimming and climbing trees.
- Ensure the participation of women in the decision-making process.
- Women, children, the elderly, and the disabled are to be evacuated first.
- Planting strong trees as alternatives of shelter.
- Separate arrangement in shelters for women and children.
- Separate arrangements for post-disaster relief for women.
- Rights of women and children must be established.
- Take Rapid action for violence against women and children.
- The negative religious believe of women should be removed through motivational work.
- Ensure women empowerment in this area.
- Gender equality should be removed from all sectors.
- Women and children volunteer should be utilized in community awareness programs.
- Dissemination of disaster management concept to women and children.
- Institutionalize disaster management-related activities among community women and children.
- Women and children will be institutionally trained through formal and informal education about disaster management.

- Prevention, mitigation, preparedness and response aspects related to women and children may be taken care of by women and children themselves.
- Simplification of the warning signals and broadcasting in the dialect of threatened region.
- Construction of strong houses.

Others activates-

- Improving disaster management activities.
- Close cooperation among disaster management partners.
- Commitment of decision makers.
- Building up local capabilities.
- Adopting an integrated approach
- Linking disaster with development.
- Encouraging investment and research in disaster management.
- Capitalizing on existing technology.
- Focusing on vulnerable group.

Forms above recommendation are not enough for reducing the vulnerability of women and children. However, most of them may be highly effective in reducing the vulnerability of women and children in this area.

6. Conclusion

Bangladesh, due to its geographical location, cannot avoid natural disasters. The people of this land have faced disasters, and they will have to face more in the future. Post-disaster relief operations can help cyclone-affected people with food, medicines, and other essential goods for a short period and may aid in rehabilitation. However, given the actual needs, this help is very negligible but important in protecting them from further loss of life. However, relief fails to mitigate the loss of life and property during disasters. An effective disaster management system is necessary in the country, with participation from government and non-government organisations, donor agencies, international agencies, business communities, public representatives, media, and the community as a whole, to mitigate the loss of life, property, and environmental damage in the risk zone.

From the previous experience we find that women and children are the weakest in our society for various socio-economic factors, illiteracy, superstition and many other reasons. As a result, they are more vulnerable than adult male and they become the major victim in natural disaster. The reasons of such extra-ordinary vulnerability of women and children are not only physical and biological factors, but also, social and economic factors are responsible So, if we want to prevent the loss of disaster and to mitigate the loss of life and property effectively, we must improve the vulnerability of women and children and also create appropriate environment for their active participation in disaster management.

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Appendices

PHOTOGRAPHS



Picture-1: Water of storm surge.



Picture-2: Strom Surge water hinders Movement of women.





Picture -3: Dead bodies of women and children





Picture-4: Cyclone Affected Women



Picture-5: Cyclone Victim Families.











Picture-6: Aftermath of Cyclone.

Picture-7: Cyclone Management procedure.



Cyclone Shelter.



Rehabilitation and reconstruction activities.