

Coping strategies, preparedness and emergency response of char-land peoples in Flood Disaster: A case study in Kurigram, Bangladesh

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ABSTRACT: Buraburi is a rural area of Ulipur upazilla under Kurigram district which is adjacent to a canal of Brahmaputra river. Flood and river bank erosion are common problem here. The main causes of floods here are excessive rainfall during monsoon period and uneven flow of water in Brahmaputra River. Local peoples of Buraburi are aware of flood and riverbank erosion and practice some indigenous knowledge to play against flooding. They raise their house, save money and store food for upcoming flood events. They use portable stoves in their raise bed or table and reserve commonly jute sticks, straws, dry woods for cooking during flood period. As they remain jobless during flood for four to six weeks, they save money before to cope with this problem. If the condition becomes worsen they immediately take shelter in flood shelter center which is safe enough for their women and children but there is not enough space for their livestock. Some of them bound to sell their cattle in order to meet their dire needs but some of them do not sell because of lower price. They collect green leaves and straw from here and there and feed their cattle. Medical facility and sanitation is not up to date in this region. Few NGOs are helping them by providing training, facilities in rescue and shelter, supplying food and health supportive elements and funding for their betterment. The problematic factors affecting the progress of overall emergency preparedness and response are weak transportation, distance from disaster shelter center, absence of communicable technologies, political instability and indifference of community people and local government. Some development in transportation and communication can help the people to cope with these disastrous events.

KEYWORDS: FLOOD PREPAREDNESS, EMERGENCY RESPONSE, AWARENESS RAISING, COPING STRATEGIES, INDIGENOUS KNOWLEDGE, WOMEN VULNERABILITY, NGOs

CHAPTER ONE

INTRODUCTION

Bangladesh is a land of disaster and various types of natural and anthropogenic hazards occur here frequently and make a huge loss of life and damage of properties. Recurrent flooding, drought, cyclones, riverbank erosions, earthquakes etc. are very common in this country [1] but flood is the mostly occurred incidence among them [2]. Flood is one of those catastrophes occurring every year in Bangladesh and so that it is referred as flooding due to being situated on the Ganges delta and its many distributaries are flowing into the Bay of Bengal. This land has more than 230 major rivers and their tributaries and distributaries and each year between 30-70% of the country's total land is flooded [3]. Coastal flooding combined with the bursting of river bank is a common phenomenon and severely affects the landscape and society of Bangladesh [4]. 80% area of Bangladesh is floodplain and it has an extensive coastline which is a perennial problem in Bangladesh and which is prone to rendering the nation very much at risk of periodic widespread damage [5]. Floods accounted for about 30 percent of all natural disasters and 40 percent of the fatalities around the country each year. Almost every year flood submerged the land and make difficult of communicate and make a huge scarcity of food and pure drinking water [6]. The northern part of Bangladesh is most vulnerable for flood, drought, riverbank erosion, storm etc. An effective case study had been done at Buraburi union in the district of Kurigram. This area is mainly vulnerable for flood & riverbank erosion because this village is situated near the Dharla River. Every year flood occurs in this locality. Flood creates devastating phenomena and cause measurable condition for Buraburi union. Flood destroys their standing crops, disrupts communication, creates homelessness and also creates unemployment problem during monsoon. Every year peoples have to face flood with variety of diseases. They have no proper knowledge about flood. They also have no knowledge about floating agriculture. But they have strong adaptation power to cope with disaster. They are mainly depending on agriculture. Most of the families depend on farming work for their livelihood. During dry season, they suffer from scarcity of water for drinking and cultivation purpose. Their transport and communication system are not well. There is no vehicle and for that people have to walk at least 2-3 kilometers for auto rickshaw and other vehicle. Different types of government and non-governmental organizations (NGOs) work on those sites. They provide training, health services for them. Those works minimize their sufferings for little purpose. They think that community based adaptation measure takes bolder aspect for minimize their sufferings.

Every work must have a specific reason for which it is done. For an expected outcome of any work, authenticity of each steps of conducting the task should be highest. In this sense, the selection of the study area is an important step for any quality research. Namanir char of Buraburi Union under Ulipur Thana in Kurigram District has been selected since this area is very much vulnerable to flood as it is situated near a river named the Dharla. Almost every year flood destroys the normal lifestyle of the people and the sufferings of the people is immeasurable. Life becomes panic for them. So it was seemed from environmental point of view that this area is more vulnerable to flood hazard and should be selected for practical visit and observation of the sufferings of the people.

The main objectives of the study are to identify the vulnerability of people by analyzing their adaptive capacity and resilience capacity in response to severe flood.

Specific objectives:

- To find out the preparedness activities of the local people
- To know about the coping strategies of the people
- To find out the causes of disasters on study area
- To distinguish various disastrous peril in that area
- To know the flood emergency response pattern.

CHAPTER TWO

LITERATURE REVIEW

Assessment of related literatures in any research is necessary in the good judgment that allows for an extent for reviewing the collection of knowledge & information appropriate to the future research. This knowledge and information examine the quality and value of study papers. For correlation, comparison and authenticity in a project paper reviewing contextual literature should be checked. A literature review is an account of what has been published on a topic by accredited scholars and researchers [7].

Flood is almost an annual event in Bangladesh. It is the most severe during July and August. Regular river floods affect 20 percent of the country [8]. Floods are not necessarily harmful. Normal floods are rather beneficial to agriculture. Abnormal floods, however, cause adjustment problems to farmers [9]. Bangladesh is but a small part of a large geologic setting which does not acknowledge political boundaries and occupies a much larger territory consisting of many countries in the

region. Bangladesh is drained by 300 major rivers and channels most of which originate outside the country and can be one of the reasons for the increase in flood intensity in recent years in Bangladesh [10]. Additionally rising of sea level day by day is going to be a threat for the country and the only way for land to counter the effects of a rising sea is accumulation of sediment at a rate that is sufficient to keep pace with the rate of sea level rise. Limited data show that the average sediment accumulation rate for the last few hundred years in the coastal areas of Bangladesh is 5-6 mm/year, which is not enough to keep pace with the rising sea level [11]. In addition, an increased amount of precipitation is one of the cause of flooding. An above normal monsoon downpour in the Ganges-Brahmaputra-Meghna drainage system is thought to be the primary cause of the 1988 flood in Bangladesh "[12], [4]". While the annual floods are essential and desirable for overall growth of the Bangladesh delta and the economy, the low frequency floods such as those that occurred in 1974, 1984, 1987, 1988, and 1991 are destructive and cause serious danger to lives "[13], [4]". The Intergovernmental Panel on Climate Change warned that the mega deltas in South Asia (e.g. the Ganges-Dhoro-la-Meghna River Basin) will be at great risk due to increased flooding, and the region's poverty would reduce the capacity of the inhabitants to adapt to change [14]. It is said that the accumulated knowledge and perceptions of communities 'at risk' are key elements in managing disaster risk at the local level [15]. A credit system in one char area that led to debt servitude for many peoples and diminished the capacity of marginal farmers to profit from their crops [16]. Flood doesn't come alone, brings enormous damaging effects and sufferings including several diseases like as diarrhea, malaria, typhoid, gastro entities etc. Rainfall over a long period may cause a gradual rise in river levels that can result in the overflow of rivers and inundation of surrounding areas. On the contrary, intense rainfall from storms and cyclones may cause rapid runoff and sudden flash floods across river basins. Floods can also be caused by tidal and wave extremes such as storm surges, the thawing of ice or structural failures such as breaches of dams or sea defenses [2]. Despite the waters flooding their shacks and rising almost as high as their beds, many families in the slums were reluctant to move, but felt compelled to do so only because of the stench of stagnating dirty water and the nuisance of mosquito bites. Moreover, people shared their fears of seeing snakes, leeches and rats floating in the water. Many poor families had to move from their slums. Many feared being bitten by snakes or rats. Parents worried that their babies may fall from the roof and drown in the water, or they may be electrocuted because of loose electrical lines lying near floodwaters. Commonly narratives were shared of mothers losing their babies in the waters, of men being bitten by rats and of people dying from electrocution "[17], [18]". Opportunities for alternative income is very limited during the floods for both men and women, but more so for women. Some of the men tried to earn an income from alternative occupations like ferrying people on boat, catching fishes where possible, ferrying people in the inundated roads in small boats or rickshaws in urban areas [17].

The Kurigram Districts are located in the Teesta and Brahmaputra river basin. Beside their chronic poverty and hunger, frequent natural disasters particularly flood and river bank erosion further add to the uncertainties in their life. Yet, the people have developed their local knowledge to predict flood and mechanisms to cope with exceptional circumstances caused by the floods [19]. The IPC analysis of current acute food insecurity situation of September 2014 covered four riverine districts in the northern part of Bangladesh, namely Kurigram, Gaibandha, Sirajganj and Jamalpur, as they were the most adversely affected by the river flooding occurred in August 2014 [20].

Usually it is women who do all post-harvest processing and look after livestock, poultry and kitchen gardening. Men generally own and manage family land and income. Therefore, her contributions remains overlooked. In rural society women are classified as "dependent" of her husband's family rather than an active and equal partner in the process of production [21]. Dead animals and human waste flowing in flooded rivers also drastically decrease access to safe drinking water. Hence, women have to spend more time to access, carry and purify water [22]. When women's access to water is limited, the whole household is affected because it depends on women to provide water for drinking, cooking, cleaning, livestock rearing and subsistence agriculture [23]. In flooded areas of Bangladesh, women are often the last people to receive assistance, as some men push them out of the way in the rush for supplies. Women who have lost clothing in the flood are unable to enter

public areas to access aid because they cannot cover themselves sufficiently [24]. Gendered cultural codes of dress may inhibit their mobility during crises, resulting in higher disproportionate mortality during many disasters. During such events, women and girls are frequently subjected to intimidation, gender-based violence, sexual harassment and rape. Women and girls also face an even more serious risk with the onslaught of climate-induced disasters: organized trafficking. The literature on gender differentiated impacts of natural disasters suggests that the impacts of climate change will also be gender differentiated. As with natural disasters, climate change is likely to exacerbate previously existing patterns of discrimination that, on average, render women more vulnerable to fatalities and reduce their life expectancy, especially for economically poor women, more than men [25].

CHAPTER THREE

METHODOLOGY

3.1. Study area

For this study, the flood prone area of Ulipur Upazila in Kurigram district was selected. Ulipur is situated at 25°39.8'N 89°38'E. Ulipur is an Upazila of Kurigram District in Rangpur Division, Bangladesh. It has 63216 households and total area 504.19 km². As of the 1991 Bangladesh census, Ulipur has a population of 345205. Males constitute 50% of the population, and females 50% [26]. Ulipur has an average literacy rate of 23.9% (7+ years), and the national average of 32.4% literate. Ulipur has 14 Unions/Wards, 147 Mauzas/Mahallas, and 418 villages [27].

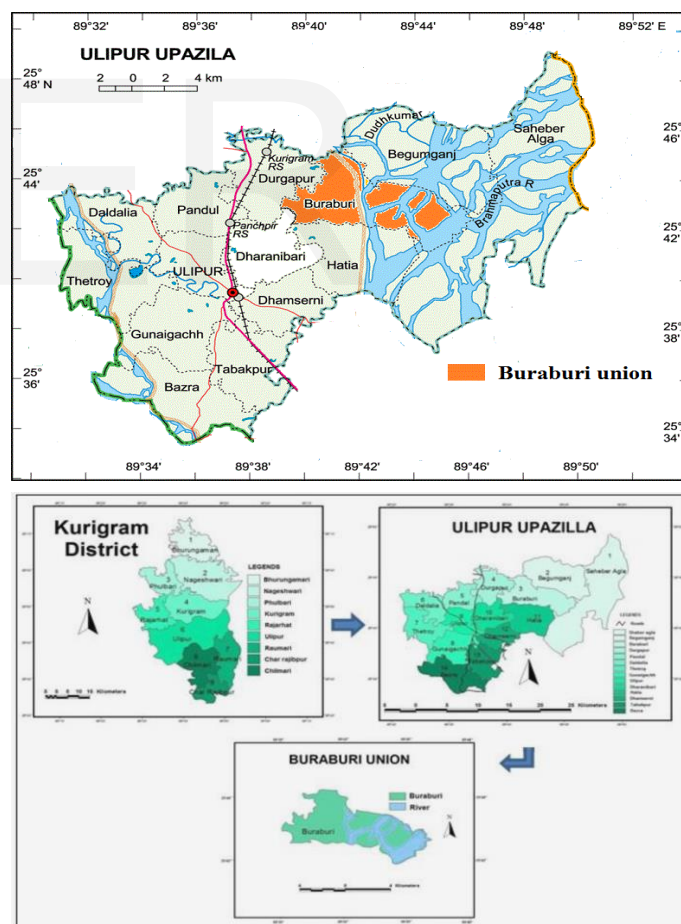


Fig 1: Location of the Buraburi Union of Ulipur Thana under Kurigram District, Bangladesh (25°39.8'N 89°38'E).

3.2 Site selection and preparation

Site selection is very important for a field work. An appropriate location is necessary to survey the required information for preparing a report. The Namanir char was an ideal place for observing peoples settlements

along with physiographic and geologic variability which are responsible for flood and its impact in the area. For that Namanir char was selected as an ideal place in order to evaluate all the required parameters for study purpose along with for public interview and questioner survey.

3.3 Essential materials and tools

During the study tour questioner survey were used in Namanir char and later Microsoft Word were used in the preparation of this report. Maps were generated using ArcGIS 3.3 and photographs were taken with digital camera.

3.4 Research approach

A qualitative study was performed on the Namanir char area to collect primary data about the natural calamities such as flood by carrying out questionnaire survey and focus group discussion among the locals in the study area. It also includes the people's preparedness and emergency response to the flood disaster and their coping approach to it. Aside from random questioner survey of the people a focused group discussion was performed with the locals in the study area.

3.5 Data collection and analysis method

For the purpose of the study primary data were collected conducting questioner survey and Focused Group Discussion. Collected data were analyzed and presented in graphical form in this report to give clear insight and understanding of the situation in the study area which includes the people's preparedness of flood and emergency response of it. The following method were followed during the preparation of this report-

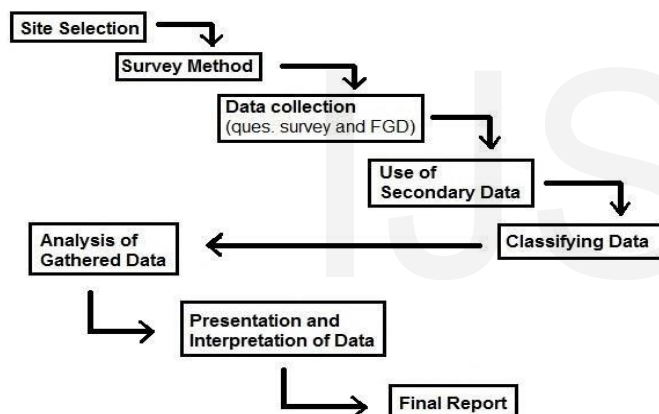


Fig 2: Flow chart of the step by step procedure and methods used to prepare this report.

CHAPTER FOUR

RESULT AND DISCUSSION

4.1. Introduction

To evaluate the flood hygienic scenario of the study area effective judgment on respondents' demographic as well as socio-economic characteristics are indispensable parameters, more specifically in knowledge sharing capacity. The sample respondents were classified into several categories, so that findings can easily be gathered.

4.2 Demographic information

Valuable relevant demographic information was collected those had been asked to the respondent. Demographic information like age, sex, education, family member, profession, income, earning member of family etc. were included in this survey owing to significant relation with health and the vulnerability along with flood hygiene. These information helped to analysis the knowledge related to flood hygiene of the respondents thus comparison can be made. Therefore, the demographic information is mentioned in below table-1 at a glance.

Table-1 Demographic information.

Socio-economic categories	Criteria	Percentage of respondent
Respondents	Total	100%
	Male	44%
	Female	56%
People who get help from NGOs		89%
People who don't get help from NGOs		11%
Ages	10 to 20 years	5%
	21 to 30 years	14%
	31 to 40 years	31%
	41 to 50 years	24%
	51 to 60 years	21%
	More than 60 years	5%
Origin	Local	74%
	Migrated	26%
Marital status	Married	84%
	Single	7%
	Widowed	9%
	Divorced	0%
Household size	Small	54%
	Medium	27%
	Large	19%
Earning member	Single	70%
	Multiple	30%
Monthly income	Less than 4000 TK	30%
	4000 TK to 500 0TK	25%
	5000 TK to 6000 TK	26%
	6000 TK to 7000TK	14%
	More than 7000 TK	5%
Occupation	Agriculture (Male)	51%
	Day labor (Male)	35%
	Teacher (Male)	3%
	Veterinary doctor (Male)	2%
	Garment worker (Male)	2%
	Rickshaw puller (Male)	3%
	Catching fish (Male)	4%
	House wife (Female)	89%
	Making basket (Female)	11%
Educational status	Illiterate	34%
	Can sign	36%
	Primary	19%
	SSC	6%
	HSC	3%
	Higher education	2%

4.2.1 Age group

Respondents were found of different ages, and provided different thoughts. Maximum respondent's age range is in between <20years->60years.

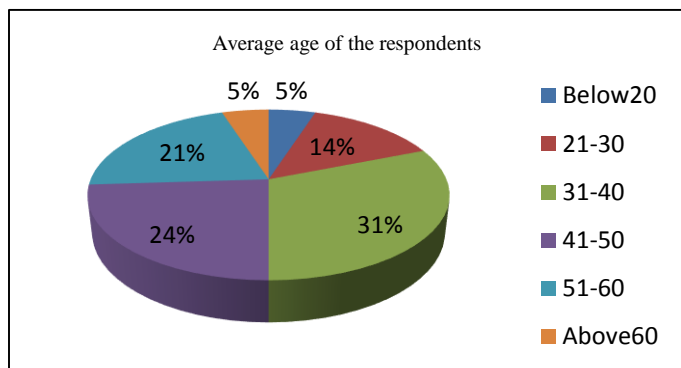


Fig 3: Age group

From the pie diagram it is found that 5% of the respondent's age is below 20, 14% of the respondent's age is 21 to 30, 31% of the respondent's age is 31 to 40, 24% of the respondent's age is 41 to 50, 21% of the respondent's age is 51 to 60 and another 5% respondent's age is above 60.

4.2.2 Origin of respondents

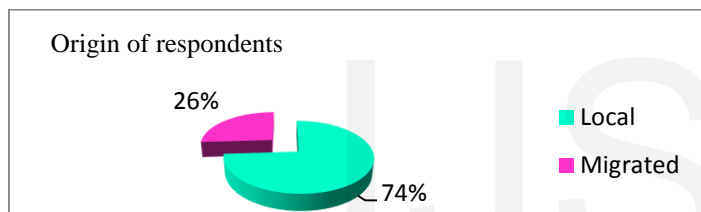


Fig 4: Origin of respondents

Most of the respondents are local here. 74% of the respondent is local and 26% people are migrated due to river bank erosion, flood effect and better life spending.

4.2.3 Marital status

Almost all of the respondents in Buraburi union were married.

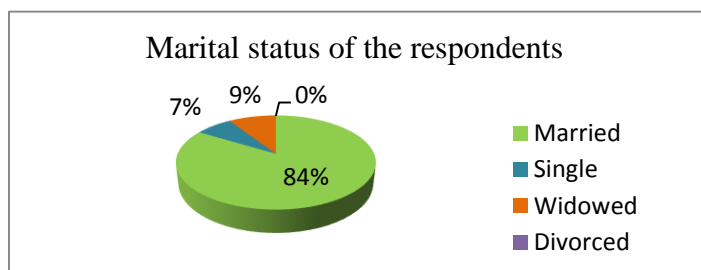


Fig 5: Marital status

Among 100 respondents 84% respondents were married, 7% single, 9% widowed and no divorced person are not found there.

4.2.4 Household Size

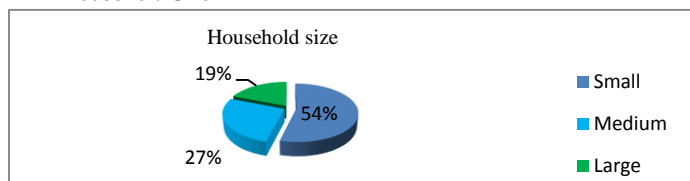


Fig 6: Household Size

Most of the families are small. 54% of the families are small, 27% of the families are medium and 19% of the families are large.

4.2.5 Monthly Income

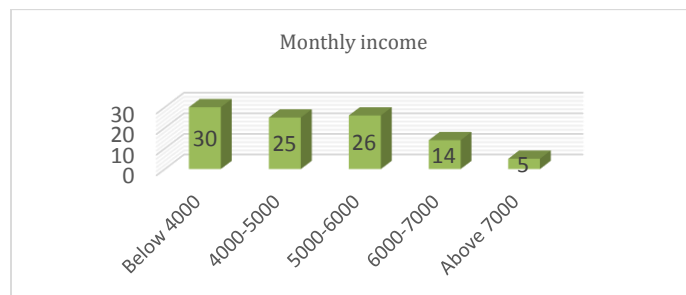


Fig 7: Monthly Income

Maximum people in Buraburi union are living under the poverty line. 30% respondents monthly income range in below 4000, 25% respondents monthly income range in 4000-5000, 26% respondents monthly income range in 5000-6000, 14% respondents monthly income range in 6000-7000 and another 5% respondents monthly income range above 7000.

4.2.6 Educational status

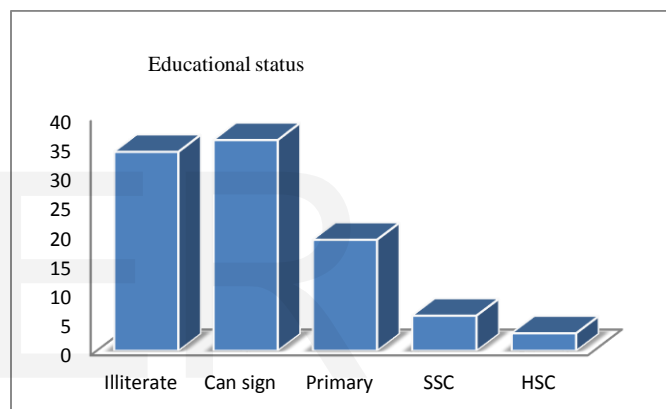


Fig 8: Educational status

From the diagram, it is said that maximum people in this area are illiterate. Few people can only know how to sign. 34% people are illiterate, 36% people are can sign only, 19% people have primary education. Another 6% and 3% people passed SSC and HSC, respectively. A few people (2%) achieved higher education.

4.2.7 Occupation

In the case of occupation of man, 51%, 35% and 4% are Farmer, Day Labor and Fisherman, respectively. Additionally, Teacher, Rickshaw puller (in Dhaka city), Veterinary doctor and Garment worker are 3%, 3%, 2% and 2%, respectively. In the case of occupation of woman, 89% and 11% woman are Busket maker and House wife, respectively.

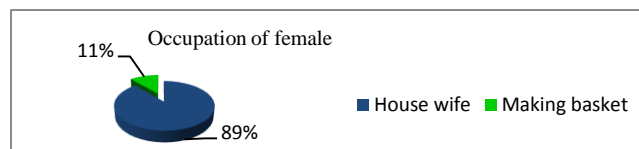
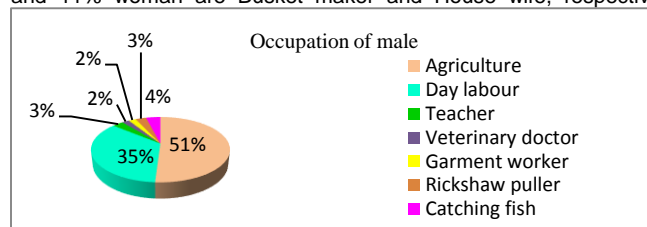


Fig 9: Occupation of male and female

4.3 Flood and Rainfall Information Analysis

Rainfall mainly occurs from the month of June to September. The duration of rainy season is approximately three to five months. The intensity and duration of rainfall is more than previous and more rainfall occurs in the locality and the temperature is also higher than the past. Every year flood and riverbank erosion occur in most part of this area. The area is near to river channel and river flood mostly occurs in this area. Flood takes place because of rainfall and overflow of river. Flood affects many sectors of community. The most vulnerable sectors are transport and cooking sector. Fig 10 showed that transport and cooking sector are affected at about 25% in this area during flood. The residential sector is injured about 20% and sanitation sector is injured about 15%. We also find that the agricultural, health and livelihood sector are affected at about 5% in this area during flood. Flood causes many people jobless or unemployed. There are various types of flood and local people say us that 65% areas are inundated by river flood, about 23% area are inundated by rainfall flood and about 12% area are inundated by monsoon flood, but flash flood is not occurred in this area (Fig 11). The weather is changing day by day. Most of the local people i. e. 83% peoples believe that the present duration and frequency of flood is longer than ancient and on the other hand, about 17% peoples think that the duration frequency of flood is shorter than ancient (Fig 12). Flood extremely occurs from the month of July to August. In the locality, the duration of flood is approximately 20-30 days.

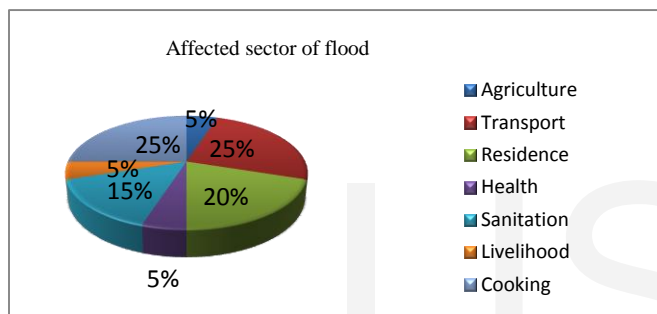


Fig 10: Affected sector of flood

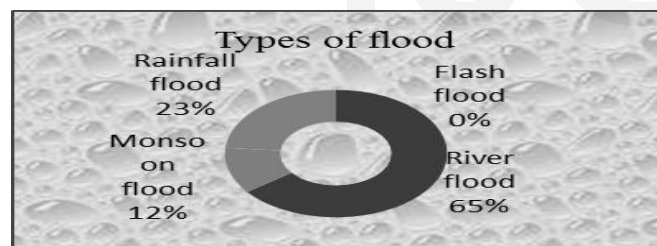


Fig 11: Types of flood

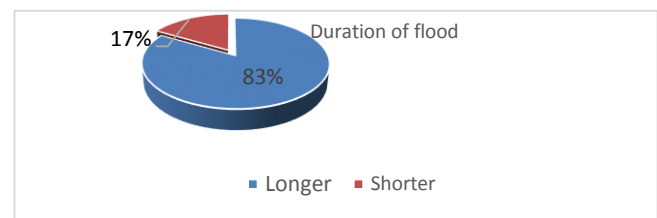


Fig 12: Duration of flood

The study area is more vulnerable for disaster. Every year this area is suffer much for various occurrences. The Table-2 showed the common disasters of this area are flood, drought, riverbank erosion etc. The area is affected by flood in the month of April to September but the extreme level is July and August. Another disaster is riverbank erosion. The area is affected by riverbank erosion in the month of June to September but the extreme level is July and August. Another disaster is drought. The area is affected by drought in the month of January to April but the extreme level is February and March. All of these disasters create huge damages for people.

Table-2: Calendar of common disasters

MONTH	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
FLOOD				←	←	←	←	←	←			
RIVERBANK EROSION						←	←	←	←			
DROUGHT	←	←	←	←	←							

4.4 Flood Preparedness Emergency Response

Flood preparedness refers to the essential steps or activities taken by a community which are very important to survive in the flood situation. As the area is near to the river and river flood occurs every year, local people know the cause of their vulnerability very well. Causes of flood vulnerability are as follows: geographical location of this area, close contact to river, river bed siltation, current of water, low lying area of river side, heavy rainfall upstream to downstream, deforestation, cut in the sand in road side, failure of embankment and the area is situated in the Himalayan ranges; as a result monsoon flood is the general form for occurring in the area. The economies of local people are generally based on agriculture. They cultivate rice, jute and some vegetables. Flood damages their crops every year. This results in severe pressure in their financial state. They must starve or live on one day meal and this fatality continues a long period of time. But they perform homestead gardening and make various bamboo mats called "chatai". They also collect timber to sell them in market as fuels.

Local peoples make their family and community members aware of flood condition and tend to store food and get ready to carry their necessary materials like portable stoves, food for their livestock, water purifying chemical tablets. Women and young peoples are good swimmers to cross the river channel. Peoples have to cook foods in boats and other safe places as whole area is submerged in water during flood. We found that some peoples keep these fuel materials during a long period of time before flood and 75% people use portable stoves at that time and 25% people do not have portable stove (Fig 13). Local people mainly use wood, dry leaves and straw as fuel in cooking purpose. There is another fuel called Dhoinchha which is mainly a fabric material used by local people. There is no specific place to save these fuels in their home stead. But they keep those fuel materials on the roof in the corner of the room or reserve fuel on matcha (shelf) (Fig 14). Livestock refers to the pet animals profitable to their masters. In the locality, most people have livestock which are mainly cows, goats, hens, chickens and ducks. Local peoples store some food for their livestock before flood occurrence. Besides grass and straw, they feed banana-leaf to their cows and jackfruit-leaf to their goats and rice, khud etc. to their hens and ducks. There is a specific shelter for cows and goats but hens and ducks do not have any specific place to stay. Peoples use mosquitoes protected

house for livestock and reserve their food on Matcha (Fig 15). Some people do not have any livestock home. Then they transfer livestock in the open place in the river side. The livestock foods are mainly grass, straw etc.

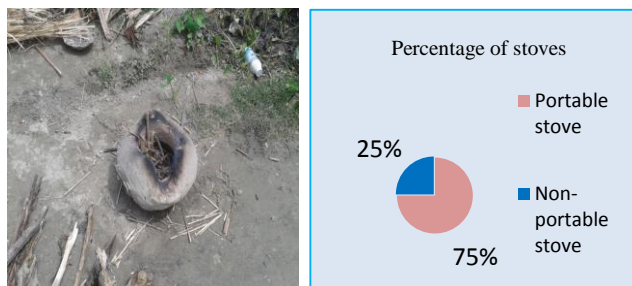


Fig 13: Portable stoves and their Percentage



Fig-14: Reserve fuel using Matcha



15 (a)



15 (b)

Fig-15: Mosquitoes protected house for livestock (a) and their food Reservation on Matcha (shelf) (b)

The tube wells of the study area are submerged in water for a long time during flood. Some peoples have raised their tube well to protect from flood water and some peoples have not. We found that 83% tube wells are unprotected and only 17% tube wells are protected (Fig 16). So peoples have to suffer much for collecting water from the protected tube wells. Flood contaminates local water source and at a time causes scarcity of pure water and increase the probability of many water-borne diseases like cholera, typhoid, dysentery etc. So, local people need to purify the contaminated water for their drinking purpose. There are various chemical tablets served by local NGOs or sold by some remote shops. These tablets kill micro-organisms in contaminated water and prevent water-borne diseases. Most of the local people are poor and they cannot afford water purifying chemical tablets. Some peoples boil river water to purify for drinking and cooking purpose and some villagers carry water from remote places and store them before flood in buckets or jars. Local people do not perform the activity of rainwater harvesting and cannot store drinking water during flood emergency.

We found that 33% people's houses are protected but the rest 67% houses are not protected during flood (Fig 17). So people go to the shelter for their security. This shelter may be safe or unsafe. Some people say that it is safe; some people say that it is not safe. We found that 25% peoples say that shelter is not safe and 75% peoples say that it is safe (Fig 18). So this 75% peoples go to the shelter with their wives, children and older person. On the other hand, instead of go to shelter

rest 25% peoples take their position on bed, shelf (matcha) and roof of their houses if possible, otherwise take shelter on dry high land, open field and roads during flood. But those places (dry high land, open field and roads) are not safe for women and children during extreme situation occurred by flood. But this can be same for flood shelter also, Fig 19 showed that 58% people think women are safe in shelter and about 42% people think women are unsafe in shelter in case of extreme condition.

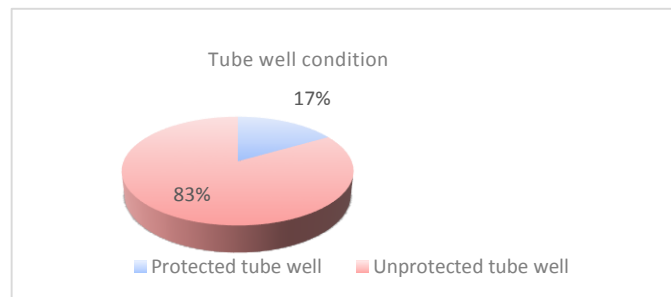


Fig 16: Tube well condition

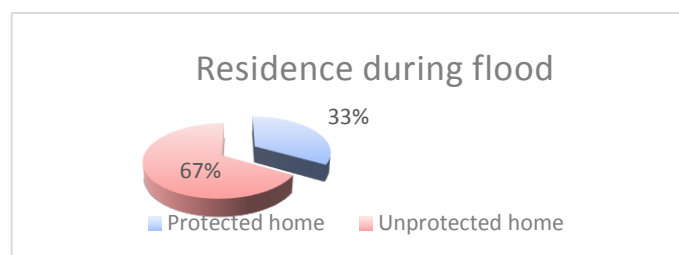


Fig 17: Residence during flood

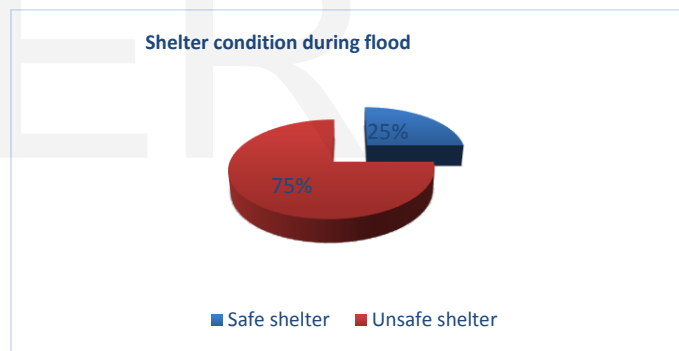


Fig 18: Shelter condition during flood

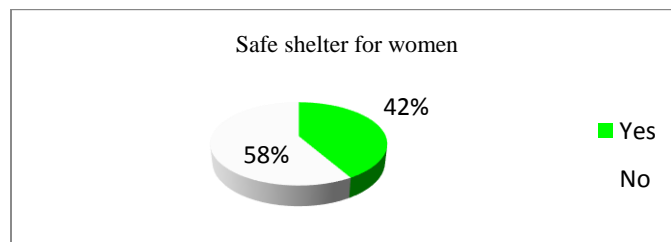


Fig 19: Safe shelter for women

However either go to the flood shelter or other places (dry high land, open field and roads), peoples have to evacuate in emergency case. Evacuation refers to the movement activity of affected people to any safer place during a disaster emergency. This is the concept of our contemplation that van, rickshaw, auto-rickshaw is available in areas few kilometers remote from this flood prone study area. Those vehicle drivers hardly have the intention to go to flood prone areas to carry passengers or any affected victim. Villagers must pay a lot if they want to afford these types of vehicle. The difficulty of transportation increases when affected people have to move on boat to cross the river. Some can move on vessel made of banana-leaf. During emergency, affected local people face more financial problem to move away as the demand of

local boatman may be high. In the case of evacuation, some coping strategies taken by peoples are described in Table-4.

Table-4 Coping Strategies of the People during flood along with activities for emergency response

If it is not needed to evacuate	<ol style="list-style-type: none"> 1. Use banana tree for making boat (locally known as kolar vela) - the indigenous practice for transportation. 2. Generally takes only rice and dry foods for meal. These dry foods are mainly Chira (flattened rice), Muri (puffed rice), Khoi (parched rice), gur (molasses) etc. During miserable period, they eat one time meal as they cannot afford three times meal during that period. People have financial problem at that time to buy food from remote market. 3. Keep livestock and poultry with themselves and feed them buying fodder at high rate. 4. Purification of drinking water is mainly done by boiling or by using chemical tablets or fitkiri. 5. For family hygiene, wash every food and vegetables and pots before taking. 6. For health problem, mainly depend upon the Almighty, but if there is urgent cases, doctors are called on by phone or the patient is carried out by boat or vela to the doctors. Preferred medicine is allopath 7. The sanitation maintaining becomes challenge and mostly is disposed at open places in water. 8. Some takes loan from different organizations and mostly from their neighbors and relatives. 9. Some migrates to other places temporarily due to livelihood and income. 10. In case of disposal of dead bodies of animals, either dead bodies are earthen or are made free to water. The water current carries out the dead body to unknown destination. 11. Generally no steps have been taken to remove or drain out water from house. Water goes down own naturally but it may takes long times in some cases.
If it is needed to evacuate	<ol style="list-style-type: none"> 1. Goes to nearby shelter (a primary school or the high raised road or nearby high raised market place) 2. Move their disable family members by themselves 3. Have to manage own transportation for reaching the shelter 4. Have to keep valuable thing to safe place 5. Dry foods, rice, bread, water purification tablets, medicines, etc. are managed by themselves or supplied by the government or by different organizations or groups or volunteer 6. Sanitation is poorly maintained 7. Have to be aware about own and family safety

Before flooding period majority percentage of people in this region preserve food for emergency situation, store pure drinking water before flooding period, reserve fuel for cooking in the flooding period, save money in the weekly, daily and monthly for every emergency situation, collect medicine for human and livestock in the pre-flooding period, reserve personal hygiene and safety kits for emergency situation and make homemade saline. We found that 90% people can make homemade saline. In emergency situation the government and NGOs inspire peoples in community based activities as though community peoples can take various activities. The peoples of Buraburi union take various activities with community based preparation to reduce flood risk are given below:

- ☐ Making dams and barriers to protect river bank erosion
- ☐ Using sand bags to protect the effect of damaging phenomena
- ☐ Establishing flood shelter to save the affected people
- ☐ Rising awareness among the community people

- ☐ Increasing tree plantation for reducing catastrophic events

- ☐ Raising house, tube wells, and low-lying roads saving from floods.

Flood mitigation is very essential activity to survive in near future. Mitigation may be structural and non-structural. Among these two types, structural mitigation is very effective and long lasting. Structural mitigation includes construction of dam, barriers, flood embankments etc. Fig 20 showed that 45% peoples are trying to make sand bags to resist flood effect on the bank of the river, 33% peoples are trying to make flood shelter, 11% peoples are trying to make barriers and 11% peoples are involving themselves in awareness rising programmed as community based activities. Unfortunately, there is no well-constructed dams or embankments i.e. peoples are not involved in building dams or embankments. We found that at about 58% peoples are aware for upcoming flood and the rest (42%) of them are not prepared for upcoming flood (Fig 21). We also found that 92% peoples are not untrained up about first aid and only 8% peoples are trained up and carry some first aid like band aid, savlone etc. during flood (Fig 22), so it is a great problem of this study area. Sanitation problem is another great problem during flood. The study area is submerged in water for a long time and for that houses and sanitation systems are not protected and poor. We found that 83% sanitation is unprotected in this area and 17% sanitation is protected (Fig 23). Some of the peoples use toilet and some use open place. The peoples who have not flood protected sanitation, they use open place. As a result, many water borne and vector borne diseases are come out during flooding period. These diseases are cholera, diarrhea, cough and fever, malnutrition, stress, panic etc.

Fig 24 showed that in this remote area, 22% peoples are collecting weather news from television; 7% peoples are collecting news from radio and 3% peoples are collecting news from newspaper. Local government can also play a great role and it is about 5%. People can also get 13% information from school meetings and 5% information from public meetings. Neighbors and NGOs can also play a great role for providing weather updates. People can get 20% information from neighbors and 25% news from training of NGOs. Internet and government provide limited news in this area. People in Ulipur union get treatment and aid from local doctors, community, different NGOs, government and volunteer groups. For emotional attachment local peoples take personal initiatives when their family members get sick. Villagers apply herbal materials for their treatment such as Durba grass (*Vilfa stellata*) is used in little scratches and wound. Also they buy tablets and Band-Aid, savlon antiseptic cream in case of little wound or scratches from nearby shops. We found that 67% peoples take allopath; 25% peoples take homeopathy and 8% peoples take herbal medicine (Fig 25). They also make saline water to get rid of sickness during flood. People cannot go to doctors because the lack of transportation during flood occurrences. Also the health center is very far from the village. It is very difficult to move on boat and there is the probability of falling on the river water from the boat because boat management is not so good.

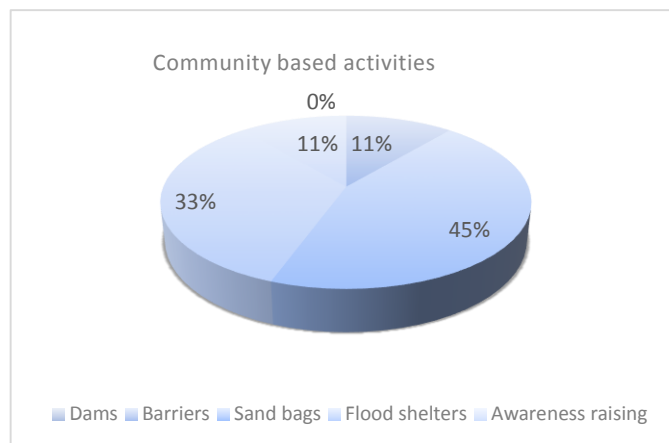


Fig 20: Community based activities

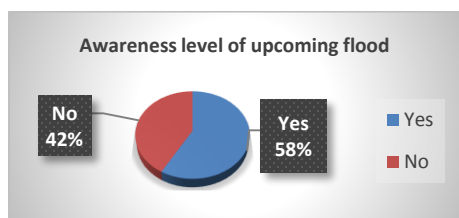


Fig 21: Awareness level of upcoming flood



Fig 22: People with first aid of disaster

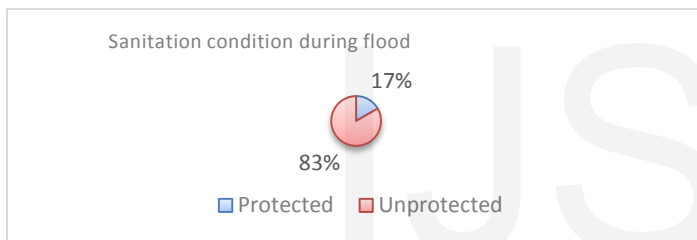


Fig 23: Sanitation condition during flood

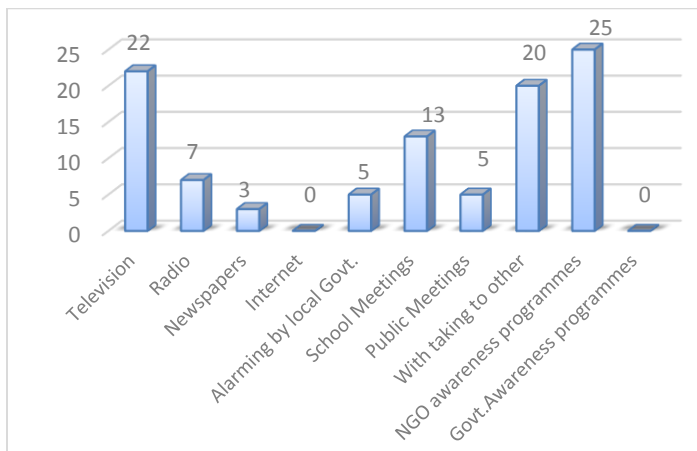


Fig 24: Source of flood information

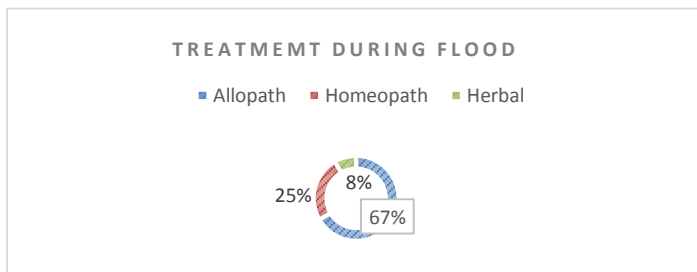


Fig 25: Treatment during flood

The local people use various indigenous knowledge for flood prediction. They mainly observe animal behavior and weather (Table 3). Fig 26 showed that 50% peoples observe the presence of red ants, millipedes. Besides 42% peoples predict the upcoming flood by observing lightning in the northern sky and the sound of thunder and also monitoring the trend of major flood. And the other sector is about 8%.

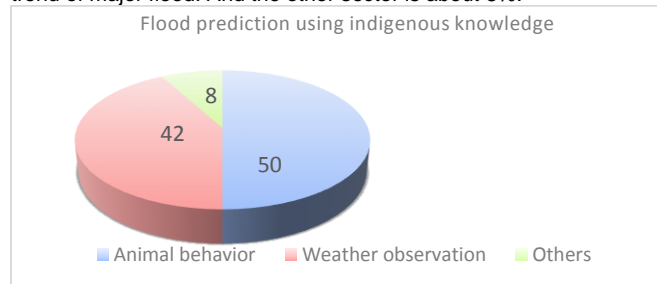


Fig 26: Indigenous knowledge about flood

Table 3: Predict rainfall of near future and floods by using indigenous knowledge

Animal behavior	Weather observation
<ul style="list-style-type: none"> Horizontal movement of ants Standing poultry in the top of the roof Hungui birds (local name) warns about flood Home coming of crab as a sign of flood Red ant with eggs when comes up in the high place domestic animals becomes very unsteady before occurrence of flood number of mosquitoes, flies increases while a flood occurs chirping of Dove birds symbolize the appearance of flood 	<ul style="list-style-type: none"> Roaring of cloud as a sign of flood Warmth temperature of water increasing water level Cloudy sky as a sign of flood Lightening in the northern sky that results increasing water level sun is covered by floating cloud and the moon at night is surrounded by cloud indicates continuous rainfall Before flood the soil becomes softer If there is rainbow in the eastern sky, it seems that there will be heavy rainfall The height of water in river indicates flood

Role of GO, NGO, Community and Volunteer Groups for Flood Prevention in Buraburi Union:

Community, NGO, Govt. and Volunteer groups help peoples to cope with disaster by providing training, rescue, shelter, food and health service. Fig 27 showed that NGOs, GO, Community and Volunteer group trained up 50% peoples, 25% peoples, 17% peoples and 8% peoples, respectively to cope with flood. Besides, they also contribute to rescue operation. We found that Community, Volunteer group, NGOs and GO rescued 33% peoples, 33% peoples, 24% peoples and 10% peoples, respectively. Moreover, they also help people to make shelter. We found that GO, NGOs and Community provide shelter to 50% peoples, 33% peoples and 17% peoples, respectively. Additionally, they contribute to giving food. We found that NGOs, GO, Community and Volunteer group supply food for 50% peoples, 25% peoples, 13% peoples and 12% peoples, respectively. They also contribute to health service. We found that NGOs, Volunteer group, GO and Community give health service to 10% people, NGOs give health service to 50% peoples, 25% peoples, 15% peoples and 10% peoples, respectively. The above contributions help people to cope with flood.

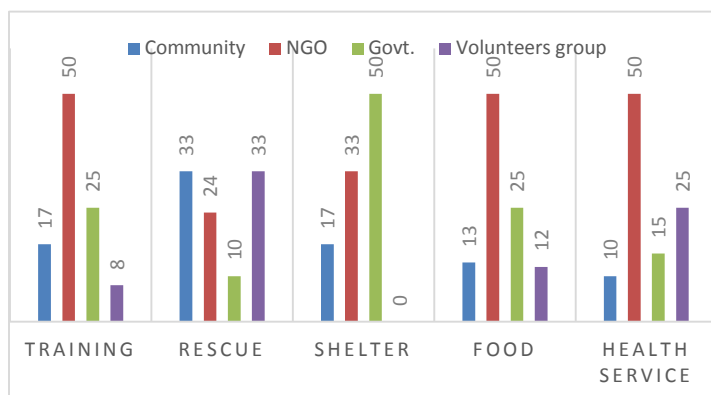


Fig 27: Types of services

NGOs play vital role for flood prevention in the study area. They establish livestock's house as creating Matcha for reducing damage from upcoming flood. It was implemented by RDRS Bangladesh which was funded by Community Climate Change Project (CCCP). They also establish healthy sanitary Latrine with the help of RDRS and funding from CCCP. Community Climate Change Project also funds to create safety cemented tube well and raising homestead. The NGO Grameen Shakti provides them solar panel that uses as electricity supply for the community people. RDRS helps them to make Vermi Compost which is useful for High Yield Vegetated (HYV) crops. All activities are showed in Fig 28.



Fig 28: Activities of different NGOs

According to them, they get enormous help from those organizations where NGO's is rank 1, community is rank 2, volunteer groups is rank 3 and GO is rank 4. Above service providers provide following tasks-

NGO's provide the following tasks -

- Helping and rescue of affected people during flood
- Provide livestock
- Flood water protected tube-well
- Awareness rising among flood affected community's people.
- Providing loan for improving livelihood in the post disaster phase
- Raising houses for protecting from flood hazard
- Developing ecofriendly sanitation system
- Providing seeds for homestead gardening
- Raising tube well for pure drinking water
- Providing Bondhu (ecofriendly) Chula
- Providing solar panel for proper electrification

Community peoples provide such facilities-

- Rescue vulnerable peoples during flood
- Repairing their shelter system
- Expand helping hand at the time of crisis.
- Awareness rising among flood prone peoples

GO provides the following facilities-

- Dry food
- Rice
- Warm Cloth during winter season
- Providing relief in the post disaster period
- Establishing disaster shelter to save the affected people
- Providing medicine from the community health center
- Disseminating warning signals during disaster period
- Forming disaster management team in the union level for reducing vulnerability and disaster risk
- Constructing dams, culvert and embankments for protecting river bank erosion

Volunteer groups provide-

- Helping to rescue flood affected people
- Helping to repair their shelter

An interesting findings is that some peoples of Kolakata village have primitive traditional mentality and are not attracted to take any loan or help from NGO as they think it as a prestige issue, and thus development of the people do not proceed. They are agreed to lose their every wealth but cannot compromise their egocentric mentality. It is very individual to prepare for flood. People generally does what is traditionally have been done by their former generation in different sectors.

Table 6- Activities of people who don't get help from NGOs during flooding condition

Food and Cooking	People use portable stoves are mainly earthen founded on basket or made up of cement and preserve dry fuels mainly tree branches, shrubs, jute tree, etc. They preserve food like rice, dry rice, dal (pulse) etc. for flood.
Livestock	They buy their livestock fodder like straw, leaves, grass of Kashful (catkin) etc. before flood, the price of fodder increases during flood.
Drinking Water Supply	All the people depend on tube well in the case of emergency situation in flood. Nobody stores water for flood events. They did not get water purification tablet from any NGOs.
Residence sector	Houses of the area are generally made up of mud, tin, bamboo, or jute sticks. Some houses are raised by themselves and rests are low lying since they did not get any financial assistance from NGOs to raise their house.
Personal and Family Preparation	The family members can swim. People is not taken hepatitis vaccination. They know to make homemade saline.
Agriculture and livelihood	Aman rice (deep water rice) can be grown properly. Post Monsoon Rabi crops are grown in the post monsoon season. Most of the people depend on the agriculture and related activities for their livelihood. But when flood occurs, they become jobless temporary.
Awareness Rising	There are no awareness raising or preparedness oriented training provided by any organizations. People generally become warned about upcoming flood by observing animal behavior and weather changes.

Emergency Preparedness and Response Affecting Factors:

Flood is natural phenomenon. There are various preparedness and response impeded factors indicated by the local peoples are weak transportation, distance from disaster shelter or health care, absence of communicable technology as mobile, indifference of community people, indifference to local govt. officers and spreading of panic, mental shocking, physical injuries (Table 6). These factors slowed down the emergency response. Peoples suffer much to get relief during flood.

Table 6: Preparedness and response impeded factors indicated by the local peoples

Responsible factors	Yes (%)	No (%)
Weak transportation	100	0
Distance from disaster shelter or health care	90.90	9.09
Absence of communicable technology as mobile	45.45	54.54
Indifference of community people	27.27	72.72
Indifference of local govt. officers	45.45	54.54
Spreading of panic, mental shocking, physical injuries	100	0

CHAPTER FIVE

CONCLUSION AND RECOMMENDATION

5.1 Conclusion

Buraburi union under the Ulipur upazila in Kurigram district is flood prone area because of its geographic location. The study area is situated on the bank of three rivers including Dharala, Teesta and Brahmaputra. These rivers carry huge amount of rain water outside from the country. The economic condition of that char people is not good. For this reason, they are more vulnerable to flood. Although different NGO's work there, they have lack of efficient fund to mitigate flood in the area. Besides, government helps the people servicing food and medicine during flood, it is not sufficient for resilience their life. To improve their life, community shelter and health center is emergency needed. For these reason NGOs, GOs, community and voluntary groups have to work together, otherwise it will not be fruitful to achieve their needs. The peoples of Dakkhin (south) Namanir char are not found well off regarding their socio-demographic characteristics including educational status, monthly income, occupation etc. They are the major victims of environmental hazards especially floods that often damage their crops, livestock, fish stocks, property and lives. To minimize the losses in such exigencies, it is necessary that a system must be created for increasing preparedness at all levels i.e. government, civil society and community. Char people should be considered as an important stakeholder in disaster management in all policies and strategies adopted by Government. To live with such vulnerable situations arising from disaster char peoples need to display enormous strength and capacity in managing risk to rebuild the damaged livelihoods and guarantee their family survival. Due to lack of knowledge of flood preparedness and emergency response, these peoples face the worsen condition. Awareness has to be built among them about importance of safe drinking water, not to contaminate water, importance of proper hand washing and hygienic sanitation system etc. Awareness growing programs by Government and NGOs are going on in this area but it must be ensured that every single gets concerned. Students of primary and high schools can act as a medium to grow awareness among their parents and other family members. For that organizing different programs and training in the school level may work for the students and they can carry information to their houses too. Growing awareness among them about importance of female's participation in any kinds of social activities that helps in developing socio economic condition. As people get unemployed during flood hence more working opportunity will help to remove unemployment problem and economic status will be developed and monthly income will enrich. They are not known about many kinds of adaptation practices during or after flood. Training about adaptation practices may reduce the losses mostly. Humanitarian aids are the fundamental issue for flood affected peoples during flood. The assistances from government of Bangladesh to reduce their vulnerability such as unhygienic condition and to improve their socio-economic condition are much needed to overcome the losses of flood diseases and losses. It is noticed that proper policy, planning and good governance can also reduce any sort of hazard and can increase the socio-economic situation through different micro credit schemes in collaboration of government, non-government and international agencies. Government need to play a vital role to help char people to cope with different disaster.

5.2 Recommendations

The vulnerability of the people of the study area is high and this is mainly related to several factors. As the area is highly vulnerable to flood disaster, we have to take some measures that will be helpful for the people as well as to the environment and society. The following measures can be taken-

- To construct strong embankment, dam, barriers in appropriate location, direction and with stable materials
- Raised house yield
- Made flood protection house
- Develop drainage system
- Dredging river
- Crop pattern change
- Floating vegetation
- Flood tolerant crop production
- Fish culture and poultry like duck culture
- Awareness rising
- Be alert about any up-coming flood
- Develop warning system
- Availability of transport during flood
- Giving loan without interest from GO and NGO
- Increase community participation
- The government should be more aware about this issue
- Ensuring quality life providing best facilities in low-lying or char area
- Establishing resilient community in the flood affected area
- Proper distribution of resource among the community people in disaster affected area
- Ensuring food security for reducing food crisis in char area
- Increasing social forestry program for balancing condition of environment
- Practicing alternative livelihood pattern in the char area for improving socio-economic status
- Providing available financial support for protecting any kind of catastrophic event
- Providing relief facilities in balancing condition among the community people in char area
- Increasing the literacy level in char area for improving socio-economic condition
- Community-based awareness raising programs should be strengthened
- It is essential to modernize the meteorological and hydrological networks for forecasting and warning systems
- GO and NGOs should take infrastructure development and income generating activities for char people
- Local people should be encouraged to develop themselves with the help of others while taking into account their mental or emotional thinking
- Women should be empowered in every sector of the society
- Providing training and several awareness raising programs at local level.

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