FLASH FLOODS, LIVELIHOODS AND FOOD SECURITY: EVIDENCE FROM THE AFFECTED SMALLHOLDER FARMING HOUSEHOLDS IN NORTHEAST BANGLADESH

Monishankar Sarkar[1]
Chirosree Roy Papry[2]

Abstract

The 2017 flash flood events in Northeast districts created differential impacts on poor people; therefore, the adaptation strategies adopted by the poor were insufficient to survive. The weakness in these strategies often resulted in vulnerability to them. The present paper attempts to argue that the impacts created by those barriers are heterogeneous in nature, which did not receive considerable attention in ongoing research on this issue. This research has been conducted in two villages in the Habiganj district. Purposive sampling methods were used aiming to investigate how poor households adapt to flash flood disasters. A mixed method was applied to capture the scenario, which included a household questionnaire survey, focus group discussions, key informant interviews, and informal discussions. Findings suggest that flood disasters affect farming households differently. As the findings reveal that the agriculture-based livelihoods are affected by the flash flood drastically that created household food insecurity in many smallholder farming households. The findings present some specific policy suggestions for policymakers and development workers to shape policies that may benefit all actors more inclusively.

Keywords: Agriculture based livelihoods, vulnerability, coping and adaptation strategies, food security

Introduction

The primary livelihood in rural Bangladesh revolves around agriculture. Although the country has experienced significant industrial advancements and overall economic growth, the traditional agricultural practices in rural areas have largely remained unchanged. Most of the rural population is poor and lacks education, leading them to continue their ancestral farming methods. Due to their limited education and literacy, they have not been able to adopt modern technologies and

[1] **Monishankar Sarkar**, Assistant Professor, Institute of Disaster Management and Vulnerability Studies (IDMVS), University of Dhaka. Email: ms@du.ac.bd

[2] **Chirosree Roy Papry**, Graduate Student, Institute of Disaster Management and Vulnerability Studies (IDMVS), University of Dhaka.

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equipment that could greatly enhance agricultural production. Consequently, these generations have continued to rely on traditional farming practices that employ basic technology. As a result, their agricultural output is limited and cannot support much in making the practice profitable for the households.

The Haor[3] basin in Northeastern Bangladesh is of international ecological importance as a huge population uses the flood-vulnerable basin as their habitat. The area of Bangladesh suffers from natural disasters like flash floods, waterlogging and flooding of low-lying areas, which has increased in recent decades. Flash floods are caused by heavy rainfall associated with a severe tropical storm or huge water coming from upstream with sediments (Islam, Haq, Ahmed, & Best, 2022; Rahman & Salehin, 2013). Flash floods are distinguished from regular floods by having a timescale of fewer than *six* hours between rainfall and the onset of flooding. Flash floods have a great impact on local food security. These floods disrupted the agricultural system, livelihood system, and local economies. Eventually, food crises are triggered by flash floods. This mixed-method paper focuses on identifying the impact of flash floods on agriculture-based livelihoods and food security.

Disasters like flood and cyclone cause significant economic shocks. Each year during monsoon season, flooding leads to an immediate loss of livelihoods. This sudden loss of agricultural means of support creates tremendous difficulties for the majority of the rural population. When faced with major setback, families are left with nothing and often struggle to find alternative employment opportunities. These situations are widespread in rural Bangladesh after each flood or cyclone event during monsoon period, as people anxiously await the harvesting.

Communities residing in Sunamganj, among the Northeastern districts, are particularly susceptible to natural disasters such as floods, water-related issues, and health concerns (Hoq, Raha, & Hossain, 2021). The residents of the low-lying hour region face significant vulnerability to flood disasters, and various factors, including political, economic, and social influences, severely constrain their ability to cope and adapt. These factors often result in the vicious cycle of poverty and indebtedness to local moneylenders (Mahajans) and microcredit institutions (Abedin & Khatun, 2020). In the aftermath of disaster vulnerability, coupled with economic fragility and a lack of adequate planning, the affected regions may experience dire consequences (Sarkar & Kulkarni, 2022).

[3] Haor is a wetland ecosystem in Northeastern Bangladesh that is a physically bowl-shaped shallow depression. Haor receives vast amounts of water from rivers and canals during each monsoon and becomes a massive water body. In Bengali, the Haor is also known as *Baor*, *Jheel,* and *Beel*.

Significant scholarly efforts have been made to safeguard livelihoods and promote sustainable agriculture. However, when families face the risk of starvation and have no other options, they are unable to diversify sources of income or explore alternative livelihood opportunities. In response to the threat of sudden livelihood loss, vulnerable populations often resort to precarious strategies such as seasonal or permanent migration and engage in high-interest debt agreements to cope and adapt (Sarkar & Nasreen, 2023). Most of the population, compelled to abandon their traditional occupations due to flood disasters, experiences a significant decline in their average daily income, regardless of the alternative occupation they pursue (Dey, Singh, Abhishek, Singh, & Chander, 2023).

This research examines whether impoverished families have made any provisions for potential flood events, regardless of their socioeconomic conditions. While some solvent households are better equipped to handle emergencies, the majority of insolvent households remain unprepared. As a result, the latter experience financial hardships, unemployment, problems associated with sudden livelihood loss, and, most importantly, lack the resilience to recover from livelihood losses related to being destitute. Those households that have made preparations are better able to confront these challenges than families that have not taken such measures.

Study rationale and conceptualization

The flood incidents in Bangladesh are increasing in frequency, severity, and duration, causing more damage to people, homelands, crops, and other assets. Flash floods have become more unpredictable in terms of onset and scale. The flood plains have been extending over the years. There is potential for increased crop production that can reduce extreme poverty among the local inhabitants on a considerable scale. About a third of the Haor area is *kanda*, a slightly raised land suitable for Rabi[4] crops.

Geographically, Haor areas are very different in nature in many ways compared to the mainland. Haor areas also have some unique features. The wetlands, where 80% of the land goes under water for 6 to 8 months during the monsoon and rainy seasons, and the remaining 20% of the land are Haor's natural "beel" areas (Banglapedia: 2015). For this reason, the Haor dwellers have to adjust to the Haor area's features.

People who live in the Haor areas commonly adjust to the environment and other things in Haor. But in recent years, the scenario has changed dramatically because

[4] Rabi crops or rabi harvest, also known as winter *crops, are* agricultural crops that are sown in winter and harvested in the spring in Bangladesh, India, Pakistan

of climate change and environmental degradation. Nowadays, typical wetlands are losing their behavior. Recently, during monsoon season, flash floods have attacked there, which is causing a significant loss of livelihoods, especially in agriculture and fish production. In general, flash floods have a significant impact on food security issues. These are the key living factors for the dwellers of Haor; they might follow some resilience strategy for the flash flood hazard. Many researchers, organizations, etc., have conducted extensive social science research to explore the characteristics of Haor areas, identify the issues, and identify the coping mechanisms of Haor people. But this research is being proposed to explore the analytical framework for understanding the impact of flash floods on rural livelihood.

This study considers food security as the availability of food and the capacity to obtain it are crucial components that all individuals must have access to the amount of food required for an active and healthy existence (Reutlinger, 1985). It's important to view food security from both national and individual angles. Food security refers to the availability of food and one's access to it.

A household can be considered food-secure when no member lives in hunger or faces the threat of starvation. It measures resilience and flexibility to future problems or the unavailability of critical food supplies due to different risk factors, including droughts, floods, flash floods, shipping disruptions, fuel shortages, economic instability, etc. The World Health Organization identifies three aspects of food security. These are food availability, food access, and food use. Food availability indicates the quantity of food that will be available on a consistent basis. Food access means having sufficient economic and physical resources to gain the proper foods for a nutritious diet. On the other hand, food use is the appropriate use of food based on knowledge of essential nutrition, care, and adequate water sanitation. The FAO adds an additional fourth point: the stability of the first three aspects of food security over time.

According to the International Centre for Trade and Sustainable Development, unsuccessful agriculture market regulation and the lack of anti-dumping mechanisms prompt much of the world's food security and malnutrition. In fact, food security is a complex issue, standing at the intersection of many disciplines. In developing countries, often 70 percent or more than 70 percent of the population lives in rural areas. In that perspective, agricultural development among small farmers and landless people ensures a livelihood for people, which allows them the opportunity to stay in their communities.

There are stages of food security, which range from food-secure situations to full-scale famine. "Famine and hunger are both rooted in food security. Food insecurity

can be categorized as chronic or transitory. Chronic food insecurity translates into a high degree of vulnerability to famine and hunger, and ensuring food security presupposes the elimination of that vulnerability. Substantial regional variations feature food security in Bangladesh. Different factors, for example, the tendency to natural disasters, the distribution, and quality of agricultural land, access to education and health facilities, the level of infrastructure development, employment opportunities, and dietary and caring practices, are possible reasons for this. There is a similarity between poverty levels and food insecurity. Poverty is a cause and outcome of food insecurity. Households that are poor have no means to acquire sufficient and nutritious food and are likely to be food insecure; food insecure people may have to sell or consume their productive assets to satisfy their immediate food needs. This weakens their longer-term income potential, and they may become poor.

A flash flood is conceived as a rapid flooding of low-lying areas: washes, rivers, dry lakes, and depressions. Heavy rain associated with a severe thunderstorm, a hurricane, a tropical storm, or meltwater from ice or snow flowing over ice sheets or snowfields could all be the cause. A flash flood may occur after a natural ice or debris dam collapses or a human structure, such as an anthropogenic dam. Flash floods are differentiated from regular floods by having a timescale of fewer than six between rainfall and the onset of flooding. Flash floods can occur under several types of conditions. Flash flooding occurs when it rains rapidly on saturated or dry soil with poor absorption ability. Flash floods can also be caused by extensive rainfall released by hurricanes and other tropical storms, as well as the sudden thawing effects of ice dams. Human activities can also cause floods to occur. When dams fail, much water can be released, destroying everything in its path. Flash flooding occurs so quickly that people are caught off-guard. Their situation may become dangerous if they encounter high, fast-moving water while traveling. If people are at their homes or workplaces, the water may rise quickly and trap them or cause damage to the property without them having a chance to protect it.

The broad objective of this study is to explore the impacts of flash floods on livelihoods and food security in the Haor area. To narrow down this broader objective, a few specific objectives were made: to explore the impacts of flash floods on rural agricultural livelihoods, to investigate the impacts of flash floods on crop production and entitlement failure, and to develop policy suggestions to alleviate the adverse effects of flash floods on livelihood and household food security.

Methodology and the Sources of Data

Purposive sampling was used in the study's completion. The information was gathered from those who have a direct connection to farming in accordance with

the goals of the study. Men and women from a range of age groups and professional specialties were recruited as responders. The sample was chosen after taking into account the community and disaster profile in its whole. But in accordance with the study's goals, attention has been focused on farmers, their means of subsistence, and food security. The data were gathered from two villages in the Habiganj upazila's Muradpur union and Kagapasha uinon. 40 residents from each village were questioned. Each village has participated in two FGDs and two KIIs. Additionally, primary data have been gathered utilizing the following techniques:

Data were gathered for this study utilizing both quantitative and qualitative methods, using a mixed-methods strategy. The household questionnaire survey was used to complete the quantitative research method, whilst case studies, focus groups, and key informant interviews were used in the qualitative research approach. Participatory techniques and instruments were used to gather primary data. Before each interview and discussion, consent was obtained. Community members became part in the data collection process on their own. In order to gather information regarding rural areas' internal and external concerns related to flash floods and solutions, participatory methods were more useful.

Both primary and secondary data sources were employed in this study to help the reader grasp the research question. Before gathering primary data, secondary data was analyzed to fully capture the scenario. Later, the study was carried out directly, and the study regions were the primary source of data collection. To better comprehend the study issues, both primary and secondary data have been utilized.

The key data sources include field-level household questionnaire surveys, interviews, case studies, and focus group discussions that collected the raw data. The local community, the chairman and members of the Upazila Union, and other governmental bodies that are connected to and interested in the subject have provided primary data. Secondary data aids in the early information gathering for the investigation. The published literature from a variety of secondary sources, such as journal articles, newspaper and newspaper columns, magazines, and books, has been studied for this study.

The study participants were selected from rural farming households. The adult members whose household income is below the poverty line, were chosen as the participants. The respondent selection procedure aimed at a daily household income of less than BDT 180. Before conducting interviews, the individuals' consent was sought. Participants had the choice to participate voluntarily or to leave the discussion at any time after being informed of the study's themes and components.

Study Area

Haor basin consists of many haors and beels (with static water), and includes divers, streams, irrigation canals, and vast areas of seasonally flooded cultivated plains. The saucer-shaped shallow depression, popular as the black swamp, covers parts of the Sunamganj, Moulvibazar, and Habiganj districts and stretches as far as the Kishoreganj and Netrokona districts of Northeast Bangladesh.

The basin is bordered by mountain ranges of India, with Meghalaya to the north, Tripura and Mizoram to the south, and Manipur and Assam to the east. Fishing and agriculture is the main income-generating activity for the local inhabitants. Though a significant part of the area is controlled and exploited by local powerful elites, government bodies have been working together for preserving the wetland environment.

Figure (a): Habiganj in Country Map

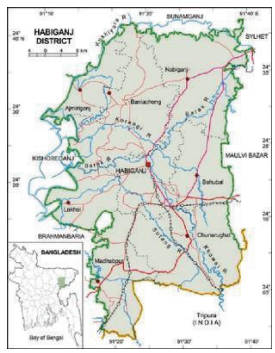


Figure (b): Habijganj District

Figure (b): Baniachang Upazila (Sub-District)

The study has been conducted in one of the most disaster prone upazila which is Baniyachang under Habiganj district located in broader Sylhet division. Habiganj is one of the eastern districts, prone to flood and flash flood in almost of its constitutional upazilas. Among them Baniyachang is most vulnerable.

Baniyachang is situated between 24^0 32′ 30″ north latitude and 91^0 20′ 00″ east longitude. If has 39816 households and total area 482.25 km^2. As of the 1991 Bangladesh census, Baniyachang has a population of 235855. Males constitute 50.84% of the population and females 49.16% . Baniyachang upazila with as area of 482.25km^2, is bounded with by Sallah and Deria upazilas on the north, Habiganj sadar and Nabiganj upazilas on the east, Ajmiriganj, Mithamain and Austagram upazilas on the west. Main revers are Kushiyara, Kalai and Barat. Notable Beels Chargaon, Bata, Sonamoa, Dhala, Chatal and Chandra Beel. Two unions have been selected, they are Muradpur and Kagapasha union.

Results and Discussions

This section presents the finding data and associated explanations. The analysis of survey data drawn from the villages under of Muradpur and Kagapasha union have explored a variety of features in line with the study objectives.

Only 53.83% people have their own agricultural land, and 43.17% people do not possess any agricultural land, and leave by working as agriculture day laborers and some other kinds of day-laboring activities. Non-ownership of farmland and engaging in daily basis jobs are considered risky and vulnerable jobs that can be affected anytime –particularly when natural disaster occurs. Among the agricultural landowners 36.19% are urban people and 58.71 are village people.

The main crops of the areas are paddy and wheat. Rice is the cash crop, and the farmers draw single crop, and they are rainfall dependent to produce rice. Most of the fruits grown by the local inhabitants on their homestead includes mango, black berry, jackfruits, and papaya. But these fruits are grown on traditional manner on raised homestead land, and not commercially. Those are produced for consumption mainly, and sometimes for sale.

Table 2: Sociodemographic features of the respondents

Indicators	Distribution	Percentage (%)
Sex Distribution		
	Male	77.5 %
	Female	22.5 %
Age Group		
	15-25	
	26-35	6 %
	36-45	56 %
	46-55	19 %
	55+	6 %
Major Occupational Categories		
	Day laborer	15 %
	Crop farmer	70 %
	Fisherman	45 %
	Livestock rearing	60 %
Income (Monthly)		
	2,000 – 5,000	25 %
	5,001- 8,000	44 %
	8001 – 11,000	21 %
	11,000 +	10 %

Source: Field Survey

As Table 2 presents, both male and female participants were interviewed and surveyed. The study considers the gender-based variations to focus on the impacts of flash flood and food security crisis, and to see if there any gender-based variations. The study shows that two third of the respondent are male and rest of the participants are female. Both male and female respondents directly engaged in agricultural farming. Consent was taken in advance before conducting an interview. Males are more engaged in cultivation and related activates than the females. Males engage in agricultural work that requires more physical strength. They are involved from land preparation to harvesting the crops. Women are more involved in household activities, but they also engage in farming activities that requires less physical strength.

Table 2 also depicts that the respondents from different age-groups provided valuable information about the study questions. As the aged people and the children do not engage in agriculture directly, they were not included in the study as respondents. But sometimes the experienced people share their story about their struggling life with against flash flood as well as flood hazard. Out of 80 respondents, 56% respondents were from the 35-45 years age group, where only a few of the respondents were in at range more than 55 years old. And (15-25), (26-35) and (46-55) years age range consist of rest of the respondents. To collect integrated knowledge the research has conducted on the different ages of people.

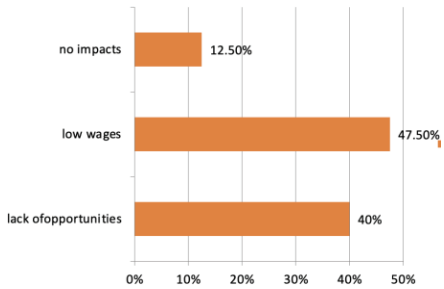
Respondents from various occupational groups, as Table 2 depicts, participated in this study. We tried to continue our conversation with different classes of people who are available to the area. But the main focus is the people engaged in farming and fishing. Some people are involved in both agriculture and fishing, as they engaged in these two different types of work in two different times. Many of them are also involved in livestock rearing. People from other occupational groups also received considerable attention. Only a few numbers of the respondent are involved as day laborers.

> More than 80 percent of villagers are directly or indirectly engaged with agriculture. There are some people having secondary occupations besides farming.
>
> --A focus group discussion participant

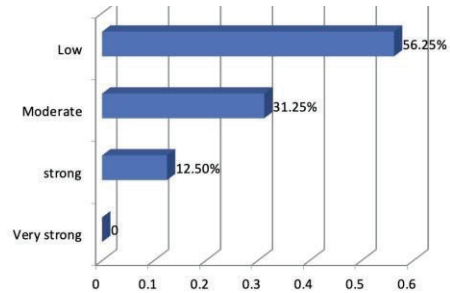
Table 2 also depicts the income distribution of the respondents. Most of the respondents practice subsistence farming, and live hand to mouth. As most of respondents are farmers, their earnings are very poor to lead a quality life. The respondents have an average 0.05 hectors of homestead land. The maximum

respondent does not have land for cultivate. They are only one crop cultivates. According to them about 44% respondent or their family income 5000-8000 Tk per month and they cannot lead standard means of living for the family members. Another 25% of the respondents' household income falls between 2000-5000tk per month. They have no savings at the end of the month, that is why it is very tough to recover or cope with any disaster situation. Only 21% of respondents earn 8000-11000 taka per month and they are farmers who have own lands to cultivate.

> Most people live hand to mouth because most of the people are farmers and there is less. As they remain destitute.
>
> --A focus group discussion participant



1 a) Impacts on the local labor market



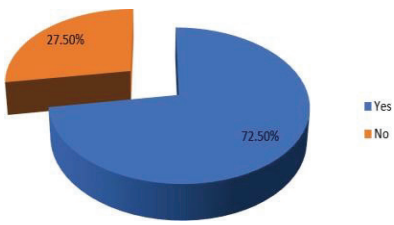
1 b) Rural-urban linkage

Figure 1 a) depicts that the flood disaster creates substantial impact on the local labor market. Consequently, wages dropped, and opportunities were reduced. While there are few respondents whose residents ware not directly affected by the flood. Flash flood has direct impact on local labor markets. Unemployment becomes a major problem during and after the flash flood. Employment opportunity decline and, most importantly, wage rates are falling are common scenarios that appeared after the flash flood. Another thing is that there is also labor crisis while harvesting the crops. Failures of labor-based entitlement have direct impact on food security of household as well as local level.

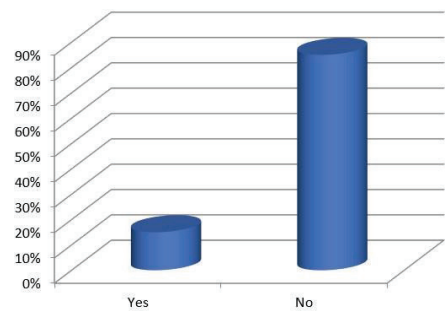
Figure 1 b) portrays information regarding rural-urban linkage in the study area. Networks always helps to survive. The rural-urban network helps the people from both sides to exchange products, services and necessary issues. Both rural and urban people get the benefits of such connections. In the study areas, as the figure shows, the rural urban linkage is awfully low. Only communication system is the

boat, through which the people are very loosely connected. Only 12.50% participants have comment that the linkage is strong, whereas majority of the respondents (more than 56%) mentioned that the urban linkage is very weak or low. Majority of the respondents believe that such loosely connectedness does not help rural people to get help when needed, particularly in the period of disaster or at the wake of disaster. People cannot move easily without boat. They are fully dependent on it. Boat communication takes more time. People became the victims of that situation during natural disasters.

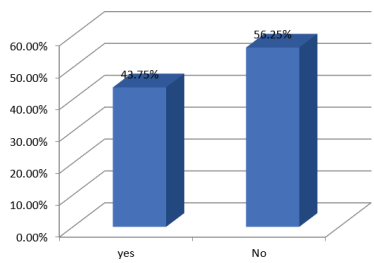
The opinion survey of the respondents clearly depicts that meagre safety net coverage cannot be treated as a viable strategy for the local people. Because more than two-thirds of them are beyond the coverage of any safety net programs. From the collected data and opinion survey of the respondents shows clearly that only 35% of the respondents receive social safety net. Most of the farmers cannot get the benefits and remain outside the coverage of social safety net-based facilities. Consequently, as the data reveals, about 65% percent could not be capable of receiving any kind of social safety net support.



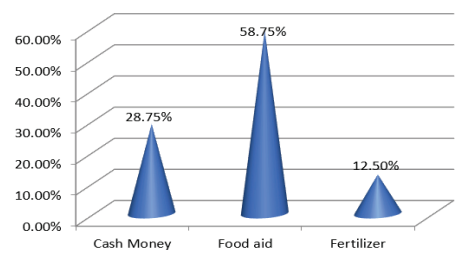
2 a) Facility available to sell assets for food



2. b) Getting right price to sell assets



2 c) receiving aid (food/ money)



2 d) Assistance that respondents prefer

Source: Field Survey

Figure 2 a) represents the data regarding the availability of the facilities to sell assets for food during emergencies. This explains that during after flash flood situation they can sell assets for food, and they have facility to exchange anything for fulfill their food intake. 72.50% of the respondent have said yes in terms of sell assets for food or exchange anything for food.

Figure 2 b) demonstrates the information about receiving right prices for selling assets. This figure shows that people who sold their assets during flash flood situation they didn't receive proper value for their assets. They had to sell their assets at a reasonable price. Because they had no way to fulfill their need for household food then. As a result, they had to sell their valuable assets at minimum cost.

> I sold my 3 goat and 2 cow during the flash flood situation. I sold these only at 15000 Tk. It was total loss, but I had no alternative. -A focus group discussion participant

Figure 2 c) portrays information about receiving assistance in terms of money, assets, food. The figure is about receiving assistance in the form of money assets, food from informal sources. 56.25% of the respondent have said no. only 43.75% percent respondent said yes that they received assistance as money, assets, food from various information sources. Most of them get assistance from their relatives.

The Figure 2 d) is about preferable support needed to improve from disastrous situation. Most of the respondent said they need to enough food items during disaster because they didn't have enough food to eat. 58.75% of respondents preferred food items as a support. 28.75% participants preferred cash money. As they are very poor, they didn't have any savings that is why they needed to cash money.

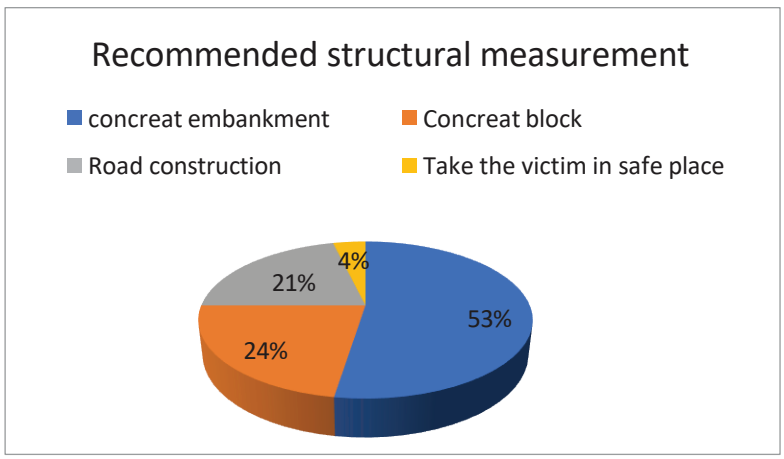


Figure-3: Recommended structural measurement

Figure 3 focuses on respondents' recommendations regarding structural measurement. These respondents seemed more knowledgeable and experienced and have specific recommendations regarding flooding impacts and livelihood failure issues. As the table shows, 52% of the respondents suggested that concrete embankment is more effective for flash flood. A few respondents, about only 23%, suggested that concrete block is also necessary to protect their homestead lands. The homesteads of many respondents are already eroded partially and reduced by flood water. Erosion is a major problem during flash floods. To protect their homestead land, the respondent recommended to use concrete block. Only a few respondents proposed that they need a concrete road. The existing earthen embankment is already destroyed partially by the last flash flood. Local respondents suggested to construct a higher raised embankment with sides covered by concrete blocks, that might protect the enclosed areas from even higher-level flood water.

Policy Suggestions and Way Forward

This study proposes several policy suggestions, to improve the situation from the existing exposure and vulnerability.

It is crucial to establish Baniyachang upazila as an agriculture-based economic zone so that the poor and affected farmer can migrate seasonally to search for and ensure better income, when there is less employment opportunities within and nearby villages. Creating work opportunities for everyone, especially for the victims during the wake of disasters can protect households from hunger and nutritional deficits.

To protect earthen embankment, it is efficient practice to use concrete blocks on both sides. Protecting embankment means protecting communities from adverse impacts flash flood disaster and associated waterlogging.

Crop-failure and loss of agriculture-based livelihoods are hard realities after each disaster events, so government should provide additional incentives, like fertilizer and seeds to the affected families, so that they remain motivate to practice farming. At the same time, disasters lower the crop price in the affected villages, and the households are compelled to sell crops with reduced price to meet immediate food and nutritional demands for their families. The government should purchase crops from those families at a proper rate, which ensures them to stay connected and motivated during crisis.

After each flood disaster, acute shortage of safe drinking water has become a major problem. Water-borne diseases can be curbed if the government ensures to provide pure drinking water during and after disasters. Interest-free and low-interest loan

should be available and accessible to the communities and disaster victims, so that the households can come back to their earlier situation sooner.

Social safety net programs should cover all the victims and poor immediately after the disasters. Afforestation programs should be strengthened. Tree plantation should be introduced in rural area. Trees must be planted inside of the embankment.

Local government should be equipped with a strong flash flood monitoring cell that can monitor weather and flood situation to develop local immediate solutions to the flood disasters. Area based rescue team should be organized and activated so that the team can assist the villagers to recover from the ongoing crisis during and after the flood disaster.

Conclusion

Among various natural disasters that are evident in haor areas, flood is the most frequent and more severe. Both frequency and severity of haor flood have been increasing in recent decades and affecting haor communities. Communities take indigenous strategies to cope with floods, but those traditional strategies are not enough for their survival in the face of increasing events. Therefore, the strategies are proved outdated and ineffective. Flooding becomes stronger, widespread, and becoming out of control over time. Natural disasters are unstoppable, but efficient coping and adaptation strategies may reduce the loss of lives, livestock, livelihoods in a considerable scale.

The 2017 flash flood not only destroys assets of both rich and poor farmers, but it also brought prolonged human suffering for the inhabitants who have been directly affected by inundation. The communities had suffered a lot due to their inadequacy in terms of illiteracy, lack of knowledge regarding effective strategies, inefficient community management, and weaker adaptation strategies.

Many inhabitants try to plant more trees as part of their long-term adaptation strategy, as they believe that both the afforestation and concrete-covered sustainable embankment can minimize the flood vulnerability of *haor* community. Well facilitated rehabilitation programs can save the affected communities. Income-generating opportunities should be created. Inter-ministerial coordination, as well as collaboration, can play a significant role in solving this problem. As a result, the regional economy and crop production have been ever faster than any previous year. If the preventive measures are not taken efficiently, the communities may face food insecurity in the long run. The suggested policy recommendations may help achieving sustainable development goals regarding

hunger, strengthening community resilience, and achieving sustainable future in the *haor* region.

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