

Farmers' Response to Flood Vulnerability in a Flood Prone Area of Narsingdi District

A. Hossain¹, M. J. Hoque² and M. H. Rahman³

Abstract

The purposes of the study were to determine the response ability of the farmers in a flood prone area and to explore the relationships between the farmers' response ability and their selected characteristics. The study was carried out at Karimpur and Alokballi villages under Sadar upazila of Narsingdi district. Data were collected from a sample of 100 farmers by using interview schedules in October 2010. Farmers' response ability was measured on the basis of their responses to the questions asked. Response ability of the farmers was measured across the seven aspects viz. housing condition, food and drinking water storage and handling, nutrition management, health care and hygiene, crop management, livestock and poultry management, and communication. Response ability in each of the responses was measured firstly and the overall response ability was measured by adding the score of all the responses. Correlation Coefficient (r) was used to explore relationships between the concerned variables. Majority of the farmers (64 percent) had medium response ability while 36 percent had low ability. There was no respondent having high response ability. Response ability of farmers was better in building a makeshift in high platform, protecting house from erosion, using bamboo-made bridge to connect latrine, using oral saline, safeguard, feeding livestock and poultry and keeping boat. But the same was very poor in collecting tube-well water, keeping carbolic acid, collecting locally available varieties of vegetables, taking pre-processed dry food, post flood jute seed sowing, fish culture and creating bamboo-made temporary bridges. Correlation analysis indicated that farmers' education, farm size, organizational exposure, training exposure, extension media contact and knowledge on responses during flood of the farmers had positive significant relationships with their response ability.

Keywords: *Farmers' response, flood vulnerability, and flood prone area*

Introduction

As flood is not a new phenomenon in Bangladesh, people of the country have traditionally developed different kinds of coping strategies to avoid or to decrease the loss due to flood. People in less flood affected area with better socio-economic condition were successfully able to cope up with the general affects of flood compared to the people in high and flash flooded area. However, many people become perplexed

what they will do during and after flood. Many of them are not well known about appropriate responses against flood. In Bangladesh, several response have been practiced by the communities include earthing up the houses, cultivation of quick growing crops, preparation of seedbeds in high places, cultivation of alternate crops to compensate flood losses, use hard cash in food collection, use *fitkerry* in drinking

¹Former MS Student, ²Associate Professor and ³Professor, respectively, Dept. of Agricultural Extension Education, Bangladesh Agricultural University, Mymensingh.

water, cleaning and repairing tube-wells and latrines etc. Cultivation of bananas and bamboos for food, shelter and rafts for mobility to be able to cope up during flood and to cope with the consequences of floods are generally used by the communities (Haque, 1997). Assistance from government and non-government organizations in terms of providing information and supplying certain critical inputs at the appropriate times would go a long way towards strengthening the ability of local people to respond more effectively to flood hazards. Government of Bangladesh has a disaster management vision *i.e.*, “to reduce the risk of people, especially the poor and disadvantaged from the effects of natural, environmental and human induced hazards to a manageable and acceptable humanitarian level and to have in place an efficient emergency response management system”. The mission of Ministry of Food and Disaster Management (MoFDM, 2008) is “to bring a paradigm shift in disaster management from conventional response to relief to a more comprehensive risk reduction culture and to promote food

security as an important factor in ensuring the reliance of the community to hazards. According to the MoFDM (2008), the components of disaster management cycle are prevention, mitigation, preparedness, response and recovery where response means immediate and ongoing activities, tasks, programs and systems to manage the effects of an incident that threatens life, property, operations, or the environment. Thus, it is necessary to determine people’s responses to flood vulnerability to minimize mass damages to human and properties.

In light of the above discussion and the back ground information, the present study has been undertaken with the major purpose of determining farmers’ response ability to flood vulnerability. However, the specific objectives of the study were: (1) to determine the ability of farmers’ response to flood vulnerability; (2) to explore the relationships between the selected characteristics of the respondents and their ability to respond during flood; and (3) to explore the problems and their solutions of flood vulnerable farmers and their suggestions to respond during flood.

Methodology

The study was conducted in two villages namely Karimpur of Karimpur union and Alokali of Alokali union in Sadar upazila under Narsingdi district. These villages were situated at the bank of river Meghna. Every year flood occurs in these villages and causes a great deal of human sufferings and damages to crops, livestock, fisheries and other valuable resources. No previous study was conducted in this area on people’s responses to flood vulnerability. To bring the area in the light of nations’ concern it was selected as the locale of the study. Updated lists of all the farmers of the selected villages were prepared with the

help of Sub-Assistant Agriculture Officer (SAAO) and Ward Member. The total number of farmers in the selected villages was 1021, which constituted the population of the study. Around 10% of the farmers from the population were selected as a sample of the study through random sampling method. Moreover, a reserve list of 10 farmers was prepared in case of accidental use.

A draft interview schedule was prepared in advance before finally using the same for data collection. The draft schedule was pre-tested among fifteen farmers from the study area. The pre-test facilitated the researcher

to identify faulty questions in the draft schedule and hence necessary corrections and modifications were made in the schedule on the basis of the pre-test results. Farmers' responses were measured by considering seven dimensions, namely housing condition, food and drinking water storage and handling, nutrition management, health care and hygiene, crop management, livestock and poultry management and communication. Ability of farmers' responses of flood vulnerability was measured by checking extent of practices against 20 responses during flood. Extent of practices was measured by a 3-point rating scale such as regularly, occasionally, and not at all and the weightage against the scale were 2, 1, and 0, respectively. Response ability of a respondent to flood vulnerability was computed by adding all scores obtained by him/her in all twenty responses. The scores could range from 0 to 40, where zero indicating the lowest ability of responses,

while '40' indicating the highest ability of responses to flood vulnerability.

Data were collected during the period from 6 October to 27 October, 2010. At the end of data collection, the collected data were compiled, tabulated and analyzed. The local units were converted into standard units. The qualitative data were transferred into quantitative data by appropriate scoring technique. The responses of the respondents that were recorded in the interview schedule were transferred into a master sheet for entering the data into the computer. The coded data were put into the computer for statistical analysis. The SPSS computer programme was used for analyzing the data. Various descriptive statistical measures such as range, frequency, number, percentage, mean and standard deviation etc. were used for categorization and describing the variables. Pearson's Product Moment Correlation Coefficient (r) was used for testing the relationships between the concerned variables.

Findings and Discussion

Farmers' Response Ability to Flood Vulnerability

Farmers' response ability score in the study area ranged from 9 to 24 against the possible range from 0 to 40; the mean and the standard deviation were 15.11 and 3.60, respectively. The respondents were classified into three categories as shown in Table 1.

Majority of the respondents (64%) had medium response ability and 36 percent had low response ability to flood vulnerability. However, among the respondents none of them had response ability to flood. In order to conceive the overall response ability to flood vulnerability of different categories of farmers across the response ability and aspects of livelihood affected by flood,

Table 1 Category wise distribution of the farmers according to their response ability to flood vulnerability (n=100)

Category	No.	Percent	Mean	SD
Low response ability (Up to 13)	36	36	15.11	3.60
Medium response ability (14-28)	64	64		
High response ability (Above 28)	0	0		

the three groups were compared in regards to response ability score. The educated and trained farmers' response was higher than that of the illiterate and less contact with extension personnel. Islam (2005) found

most of the farmers (68.75%) had medium practices on flood coping strategies and only 28.75% of them had high practices on flood coping mechanisms on their farming system.

Rana (2009) found 83% of the respondents had medium disaster management ability as compared to 12% had low and only 5% had

high disaster management ability. As response is one of the components of disaster management ability so it could be mentioned that the response ability of the respondents were quite low. Table 2. shows the extent of practices of the farmers on various responses to flood vulnerability.

Table 2 Extent of practices of various responses of the farmers to flood vulnerability

Responses during floods	Extent of practice			Mean
	Regularly (every year)	Occasionally (Not every year)	Not at all	
Build a makeshift high platform (with the house) and put perishable belongings there to avoid submergence	84	8	8	1.76
Protect the house from being eroded by wave activity by creating a protection belt (use bamboo sticks/jute sticks etc)	33	50	17	1.16
Safeguard perishable food items, cooking fuel, and valuables from submergence.	12	35	53	0.59
Collect tube well water, If safe water is not available, purify drinking water by using water purifying tablets.	13	27	60	0.53
Collect locally available varieties of vegetables and take them in addition to <i>dal-bhat</i> .	14	35	51	0.63
Use pre-processed dry food and take sufficient amount of water in order to avoid dehydration.	1	10	89	0.12
Transfer sick member to nearest health care center.	6	33	61	0.45
Avoid defecation in open water try to use sanitary latrine	26	33	41	0.85
Keep the homestead sanitary latrine connected with the house by making a bamboo-made makeshift bridge (locally known as <i>Shako</i>)	30	50	20	1.1
Use 'oral saline' when there is an outbreak of diarrhoeal diseases.	17	58	25	0.92
Keep carbolic acid in small bottles hanging along the outer sidewalls to avoid snake invasion and snake bites.	1	2	97	0.04

Responses during floods	Extent of practice			Mean
	Regularly (every year)	Occasionally (Not every year)	Not at all	
Provide support to the falling trees by holding them up with a bamboo support and fastening the trees to the support to keep them standing	10	56	34	0.76
Fruits can be taken away or trees can be pruned according to the method recommended by extension worker	14	41	45	0.69
Post flood jute seed sowing	3	7	90	0.13
Homestead vegetable cultivation	95	4	1	1.94
Fish culture in ponds, throw tree branches so that fish feel safe and do not go astray.	2	0	98	0.04
Safeguard livestock and poultry from submergence by placing those on elevated platforms and rafts.	12	69	19	0.93
Provide water, feed and fodder to livestock and poultry regularly.	64	29	7	1.28
Create bamboo-made temporary bridges to connect the household with the non-submerged roads.	0	8	92	0.08
Keep a boat for maintaining communication, especially for transferring sick and/or the elderly to safer places.	55	32	13	1.42

According to Table 2 response ability of farmers was better in building a makeshift in high platform, protecting house from erosion, using bamboo-made bridge to connect latrine, using oral saline, safeguard, feeding livestock and poultry and keeping boat. But the ability was very poor in collecting tube-well water, keeping carbolic acid, collecting locally available varieties of vegetables, taking pre-processed dry food, post flood jute seed sowing, fish culture and creating bamboo-made temporary bridges.

Selected Characteristics of the Farmers

The findings indicate that the highest proportion (54%) of the farmers were in the middle aged category compared to 28% belonged to young aged category and 18% to old aged category. Thus, 82% of the farmers belonged to young to middle aged category. Table 3 shows that 28% of the respondents were illiterate, 27% can sign only and 37% of the respondent comprised of primary education, 8% comprised of secondary education.

Table 3 Salient features of the respondents

Characteristics	Unit of measurement	Possible range	Observed range	Respondents' categories	Respondents' percent	Mean	SD
Age	Year	Unknown	21-63	Young (up to 30)	28	39.34	11.093
				Middle (31-50)	54		
				Old (above 50)	18		
Education	Year of schooling	Unknown	0-12	Illiterate (0)	28	2.075	2.399
				Can sign only (0.5)	27		
				Primary (1-5)	37		
				Secondary & above (>5)	8		
Family size	Number	Unknown	3-14	Small (up to 4)	15	7.53	2.932
				Medium (5-6)	26		
				Large (above 6)	59		
Farm size	Hectare	Unknown	0-1.36	Landless (< 0.02)	18	.238	.23
				Small & marginal (.02-1)	81		
				Medium (1- 3)	1		
Organizational exposure	Score	Unknown	0-13	No participation(0)	52	1.39	2.329
				Low participation (1-7)	44		
				Medium participation (>7)	4		
Annual family income	'000'TK	Unknown	27.4-838	Low (up to 60)	15	118.37	104.36
				Medium (61-120)	54		
				High(above 120)	31		
Training exposure	Days	Unknown	0-15	No training (0)	97	0.42	2.413
				Short duration (1-3)	0		
				Long duration(>3)	3		
Extension media contact	Score	0-30	0-10	Low (up to 9)	94	3.91	2.362
				Medium (10-19)	6		
				High(>19)	0		
Social mobility	Score	0-18	0-8	Low (up to 6)	99	0.23	.874
				Medium (7-13)	1		
				High(>13)	0		
Knowledge on responses during flood	Score	0-24	1-14	Low (<8)	36	8.31	1.958
				Medium (8-16)	64		
				High(>16)	0		

Majority of the farmers (59%) had large sized family, 15% had small and 26% had medium sized family. Data indicated that the average family size (7.53) of the respondents in the study area was much higher than the national average of 4.9 (BBS, 2008). Most of the farmers (81%) had marginal to small farm. The average farm size of the farmers was 0.2378 hectares, which was lower than that of the national average (0.46 ha; BBS, 2006). This may indicate that the average farm size of the respondents in the study area was smaller than that of a typical farming community of Bangladesh.

Highest proportion (52%) of the respondents had no participation in different social and community based organizations, 44% had low participation and 4% of the respondents were found with moderate participation in different social and community based organizations.

Table 3 reveal that 15% of the farmers had low annual family income, while 54% had medium annual family income and 31% had high family income. Ninety seven percent (97%) of the farmers had no training, and only 3% had long duration training. Thus, it could be said that almost all of the respondents had no training in the study area. It was found

that 94% of the respondents had low extension media contact and only 6% of the respondents had medium extension media contact and there were no respondent found with high contact. Data contained in the Table 3 shows that most of the respondents (99%) having low and have no high and only one farmer found in medium category. The result indicates that only some of the respondents usually go outside their locality to collect necessary information, suggestions and technologies relevant to cope with flood. Social mobility is the characteristics of the progressive farmers. It was found that 36% of the respondents had low knowledge, 64% of the respondents had medium knowledge and there was no respondent bearing high knowledge on responses during flood. Islam (2005), in his study on knowledge and practices of farmers on flood coping found most of his respondents (57.5%) had medium knowledge. In general, the level of knowledge of the respondents was not satisfactory. Knowledge is one of the most important factors to respond highly.

Relationship between the Selected Characteristics of the Farmers and Their Ability to Respond to Flood Vulnerability

Pearson's product moment co-efficient of correlation (r) was used to determine the relationships between the variables concerned. As mentioned earlier, there were ten selected characteristics of the farmers in the study. The selected characteristics were: age, education, family size, farm size, organizational exposure, annual family income, training exposure, extension media contact, social mobility and knowledge on responses during flood. The dependent variable was "farmers' responses to flood vulnerability in a flood prone area." The results of the correlation

analysis between the concerned variables have been presented in Table 4.

Table 4 Relationships between selected characteristics of the farmers and their response ability to flood

Independent variables (selected characteristics)	Correlation coefficient (r)
Age	0.181
Education	0.500**
Family size	0.176
Farm size	0.365**
Organizational exposure	0.344**
Annual family income	0.177
Training exposure	0.232*
Extension media contact	0.417**
Social mobility	0.088
Knowledge on responses	0.532**

** Correlation is significant at 0.01 level of probability (table value 0.257)

* Correlation is significant at 0.05 level of probability (table value 0.197)

Dependent variable: Farmers' Responses to Flood Vulnerability

Correlation analysis indicated that farmers' education, farm size, organizational exposure, training exposure, extension media contact and knowledge on responses during flood of the farmers had positive significant relationships with their response ability. On the other hand, age, family size, annual family income and social mobility of the farmers showed no significant relationships with their response ability. Education of the farmers was directly related to their response to flood. This implies flood responses increase with their increasing educational status. Islam (2005) found that education of the farmers had a significant and positive relationship with their flood coping knowledge. Farm size of the farmers was directly related to their response to flood. Thus, it indicated that farmers with large farm size were likely to have higher response to flood vulnerability. Because farmers with large farm size got high income which makes

strong economic base of the farmers and contribute to increase their responses. Rana (2009), Munna (2009) and Islam (2005) found that farm size had significant relationships with their flood coping ability of farmers. Farmers having more organizational exposure would have more opportunity to increase their response ability to flood. Rana (2009) and Khatun (2009) found that organizational exposure had significant and positive relationship with their flood coping ability of farmers. Training exposure of the respondents had a significant and positive relationship with their response to flood that high training exposure makes strong response of farmers and contributes to decrease losses due to flood. It is found that extension media contact of the respondents was directly related to their response to flood. Based on the above findings, it was concluded that extension media contact of the farmers was directly related to their response to flood.

Farmers' knowledge on responses during flood of the farmers was significantly related to their response to flood vulnerability. It means that higher the knowledge on responses during flood higher was their responses to flood vulnerability. Islam (2005) in his study found, with the increase of farmers' knowledge on flood coping mechanism, there was a corresponding increase in the flood coping abilities.

Problems Faced by the Farmers and Their Solutions

The researcher selected 20 progressive farmers to explore their faced problems and to get suggestions for overcoming these problems during flood. They told about their problems to respond during flood and the possible solutions were also given by them. The problems stated by them are listed and their solutions are written.

Table 4 Problems and their solutions provided by the farmers to improve their response ability

Problems	Frequency	Rank	Suggestions
Lack of flood resistant variety of rice	12	1	Providing flood resistant variety of rice by the government
Roads are submerged	9	2	Roads should be made high so that flood can not damage it
Electricity is not available	7	3	Govt. should take necessary steps for electrification.
Lack of pure drinking water	6	4	Providing tubewells in high places and water purifying tablets should be more available and cheap.
Inadequate relief	5	5	During and after flood adequate relief should be provided by the govt. and concerned agencies.
Crops are flooded before harvest	4	6	Govt. should provide subsidies in case of sudden crop loss by flood.
Household eroded by wave activity	3	7	Effective technologies should be invented to protect households.
Medicine like oral saline becomes unavailable during flood	3	7	Government should preserve enough medicine and oral saline prior to ensure proper distribution of medicine.

Most of the farmers told lack of flood resistant variety of rice (Rank 1) was the major problem and their suggestion was the government should provide flood resistant variety of rice and some respondent suggest about early maturing variety. The second problem was low lying roads (Rank 2) and their suggestion was to uplift the roads

specially the main road of the village. And the other problems are according to their rank, unavailability of electricity, lack of pure drinking water, inadequate relief, crops are flooded before harvest, household eroded by wave activity, medicine like oral saline become unavailable during flood (Rank 7).

Conclusion

Most of the farmers in the study area did not have proper response ability and they were vulnerable to flood due to their geographical condition. Socio-economic condition of the char people will not improve if necessary steps were not taken to address the specific aspects of flood vulnerability. It can be concluded that people of the study area were not aware about the insecurity and problem of unavailability and/or collection of pre-processed dry food and sufficient amount of clean and safe drinking water during flood. From the study it is revealed that effectiveness of carbolic acid to avoid snake invasion and snake bite was not known to the people still now. In the study area communication facilities and construction of temporary bridges were not developed due to

lack of cooperation and government initiatives. Majority of the people in the study area were not aware about the impact of contaminated water on human health and the way how to purify uncleaned and contaminated water. It can be concluded that farmers' response ability increased with the increase of their education. It is, therefore can be said that proper education will be helpful to improve the response ability of farmers. As extension media is the main source for providing information regarding modern technologies and techniques for proper responses to flood, farmers' response ability cannot be developed without increasing their contact with different extension media.

References

- BBS. 2006. *Statistical Yearbook of Bangladesh*. Bangladesh Bureau of Statistics, Statistics Division, Ministry of Planning, Government of the People's Republic of Bangladesh, Dhaka.
- BBS. 2008. *Statistical Yearbook of Bangladesh*. Bangladesh Bureau of Statistics, Statistics Division, Ministry of Planning, Government of the People's Republic of Bangladesh, Dhaka.
- Haque, E.C. 1997. *Hazards in a Fickle Environment*: Bangladesh Academic Publishers: Dordrecht.
- Islam, M.S. 2005. Farmers' Ability to Cope with Flood in a Selected Area of Jamalpur District. *M. S. Thesis*, Department of Agricultural Extension Education, Bangladesh Agricultural University, Mymensingh.
- Khatun, F. 2009. Flood Coping Ability of Ultra Poor Household Women in A Flood Prone Area of Jamalpur

- District. *M.S.. Thesis*, Department of Agricultural Extension Education, Bangladesh Agricultural University, Mymensingh.
- MoFDM. 2008. *National Plan for Disaster Management 2008-2015*. Ministry of Food and Disaster Management, Government of the People's Republic of Bangladesh, Dhaka.
- Munna, A.H. 2009. Flood Coping Ability of Ultra Poor Farmers in A *Haor* Area of Kishoreganj District. *M.S. Thesis*, Department of Agricultural Extension Education, Bangladesh Agricultural University, Mymensingh.
- Rana, S. 2009. Disaster Management Ability of Farmers in a Selected Haor Area of Kishoreganj District. *M.S.. Thesis*, Department of Agricultural Extension Education, Bangladesh Agricultural University, Mymensingh.