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Coping strategies of women in flood prone areas of Bangladesh

S Sheheli, MAM Khan[1]

Department of Agricultural Extension Education, [1]Department of Entomology, Faculty of Agriculture, Bangladesh Agricultural University, Mymensingh-2202, Bangladesh

Abstract

The present research have been undertaken to have an understanding of poor women's flood coping strategies in selected flood prone areas of Narsingdi district of Bangladesh. The objectives of the study were: (i) identifying and assessing a respondent's extent of practice of the strategies; (ii) determining the flood coping ability of poor women; and (iii) determining some important characteristics of poor women. The study was conducted in two villages namely, Karimpur of Karimpur union and Alokbali of Alokbali union in Sadar upazila under Narsingdi district. Data were collected from a total of 100 poor women from a population of 402. A structured interview schedule (questionnaire) was used to collect data from the selected sample, while a number of qualitative data collection methods were used which included focus group discussion (FGD), case study and key informant interviews (KII). The data were collected from June to August, 2014. The selected thirty coping strategies against floods were arranged in a 4-point scale in order to reveal a respondent's extent of practice of the strategies. Finally, the flood coping strategies indexes (FCSI) were made these are: (i) increasing the level of homestead and using sand bags in backyard to protect edge erosion; (ii) build a makeshift high platform at home; and (iii) keeping major dry food for future use, etc. Flood coping ability of poor women was measured by considering six dimensions of women's livelihoods. Majority of the poor women (66%) had low flood coping ability, while 22% had medium and the remaining 12% had very low coping availability in the study areas. It is notable that none of the respondents was found to have high flood coping ability. Educational status was very low and 66% had no formal education. Most of the respondents were less interested in continuing their child's education because of their poverty and less opportunity of educational institutes. The migration behavior is very common and 56% respondents are absolutely landless. Majority (68%) of the respondents had low extension media contact and 74% of the respondents were expecting training for protecting flood. The respondents identified five major sectors needing expansion to improve their existing livelihood status these are credit, working opportunity, health service, shelter, and education.

Key words: Coping mechanisms, food vulnerability, livelihood, Bangladesh

 ***Corresponding Author:** ssheheli@yahoo.com

Introduction

In Bangladesh, floods are more or less a recurring phenomenon. It faces at least one major disaster a year; it has lost on an average 3.02 % of its GDP every year during the last 10 years and holds the highest disaster mortality rate in the world (UN/ISDR, 2004). Each year about 26,000 sq km, 18 percent of the country is flooded (BBS, 2013). During severe floods, the affected area may exceed 55 percent of the total area of the country (Anonymous, 2013). The poor households living in the flood prone areas always fight with the climatic disasters like flood, cyclone, river erosion, etc (Yasmin and Ahmed, 2013). Flood makes life miserable and causes a big loss of life, property and crops (WFP, 2009). Every year during the rainy season, poor households face the devastating impacts of flood in terms of loss of assets and shelter, loss of livelihood opportunity, health hazard and increasing

food insecurity (Paul, 2009; Ahmed, 2005). Many people have to leave their houses and take shelter on high road or ground where they have to depend on charity (Paul *et al.,* 2011; UNDP, 2008). Flood also often leads to the disruption of the transport and communication system. In short, the effects of flood are manifold and immeasurable (Abrar and Azad, 2004; Few, 2003). Food is the main concern of poor households during and after flood (Rahman, 2010).

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 (Ahmed, 2010; Ahmad, 2004). People in less flood affected area successfully able to cope up with 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 **(**Khandker, 2007). In Bangladesh, several response have been practiced by the communities include earthling up the houses, cultivation of alternate crops to compensate flood losses, used hard cash in flood collection, use fitkerry in drinking water, cleaning and repairing tube-wells and latrines, etc (Siddika, 2008). Cultivation of banana 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 (Morshed, 2007). Assistance from GO and NGOs 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 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 MoFDG, 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. A few literatures were found (Paul and Routray, 2011; Haque and Zaman, 1994) basically emphasized on the current coping mechanisms that those different communities have developed over the years for such recurring events rather than concentrating the criteria that influence there coping capacities in the long run.

It has been argued by many disaster researchers that poor women are the major victims of disasters due to their lower status than men in society and had little coping ability to sustain the shocks of seasonal calamities (Ahmed, 2010). Lower adaptive capacity of potential severe climate change impact is the cause to increase the vulnerabilities of the population residing in the developing countries like Bangladesh (IPCC, 2007). Poor women are more exposed to climate shocks and have fewer resources to protect their own lives, assets and livelihoods while looking after their families. They are also more dependent on natural resources for their subsistence. There are many ways in which women are affected differently, and more severely, by climate change. Thus, attention should be given to special groups such as women and children.

In light of the above discussion and the background information, the present study has been undertaken with the major purpose, to determine the flood copping strategies of poor women to flood vulnerability. Therefore, to eliminate the distressed condition as well as achieve a sustainable livelihood of poor women, the present study is conducted to identify the coping strategies of poor women against flood along with assess a respondent’s extent of practice of the strategies and to determine the flood coping ability of poor women and also identifying

the opinion of poor women to improve their livelihood situation.

Materials and Methods

The study was undertaken in Sadar upazila of the Narsingdi district in Bangladesh. Selected two villages in Sadar upazila under Narsingdi district were situated at the bank of river Meghna. These villages were primarily selected as a suitable area for the study because this upazila is one of the most flood prone upazila of the region. Every year flood occurs in these villages and causes a great deal of human sufferings and damages to crops, livestock, fisheries and valuable resources and most of people are vulnerable to chronic flood damages. The selection of the study areas were made by the suggestions of local Sub-assistant Agriculture Officer (SAAO), members of Union Parishad, NGO workers and upazila level officials who used to deal with flood affected people. An up to date list of all the poor households was prepared with the help of SAAO and members of Union Parishad. A total of 402 women (one from each household) of the selected two villages (namely, *Karimpur* and *Alokbali*) constituted the population of the study. Both qualitative and quantitative data collection procedures were used in the study. A sample of 100 household or 25 percent of the population was randomly selected from the population and interviewed them at their houses. Data were collected through the pre-tested interview schedule by face-to-face interview procedure during the period for three months from June to August 2014. The interviews, lasting about two hours, focused on their existing coping strategies against flood, coping ability etc. Cross-check interviews were conducted with SAAO, researchers and relevant non-government organization (NGO) workers. Where information was found to be contradictory, further assessment was carried out. A total of 8 key informants were interviewed and two case studies were conducted. Data from questionnaire interviews were coded and entered into a database system using Microsoft Excel software.

The focus variable of the study was coping strategies are practiced by poor women against flood. Thirty coping strategies were selected and arranged them (Table 1), based on experience gained in pre-testing of interview schedule, literature review and consultation with a number of key-informants. The coping strategies were arranged in a 4-point scale in order to reveal a respondent's extent of practice of the strategies. Each respondent asked to indicate her frequency of practice of a specific coping strategy (actions and measures) during and after flood by selecting one of the four possible responses. The responses were "frequently", "less frequently", "occasionally" and "not at all", while scores were assigned as 3, 2, 1, and 0, respectively for the coping strategies against flood. Thus, the range of score of coping strategies of the respondent could vary from 0-90; where '0' indicates no practice and '90' indicates frequently practices of different coping strategies against flood. To ascertain the comparison among the practices, flood coping strategies index (FCSI) was computed by using the following formula:

Flood Coping Strategies Index (FCSI) = $C_3 \times 3 + C_2 \times 2 + C_1 \times 1 + C_0 \times 0$

Where,

C_3 = frequency of women practice 'frequently';

C_2 = frequency of women practice 'less frequently';

C_1 = frequency of women practice 'occasionally'; and

C_0 = frequency of women practice 'not at all'.

Flood Coping Strategies Index (FCSI) could range from 0 to 300 where '0' indicates lowest practice and '300' indicates highest practice of coping strategies by poor women against floods.

Flood coping ability of poor women was measured by considering six dimensions of women's livelihoods. These dimensions are food security, crop production, housing and shelter, livestock and poultry rearing, health and sanitation, means of livelihoods. The flood coping ability of the poor women was understood on the basis of the practices coping mechanisms followed by the poor women during and after flood conditions. A number of questions were asked to the women to explain her actions and measures towards adaptation and mitigation of vulnerability and damages during and after floods. This list of actions was prepared following the scale used by Rahman (2010) and

some modification made based on suggestions of upazila and district level officials and experts on disaster management. A specific coping action of a respondent was judged either as 'high coping ability,' medium coping ability,' 'low coping ability', and 'very low coping ability', while weights were assigned for these as 3, 2, 1 and 0, respectively. The overall flood coping ability score of a respondent was measured by adding scores for her responses to all six dimensions of livelihood. So, overall flood coping ability score of a respondent could range from 0 to 18, while '0' indicates the lowest level of coping ability and '18' indicates the highest level of coping ability.

Seven characteristics of the poor women were considered as explanatory variables which were education, duration of living and migration behavior, occupational status, per capita income, organizational participation, extension media contact, and training exposure. Moreover, secondary information (web articles, organizations reports and scientific reports) were used to crosscheck, complement or illustrate the primary data, collected through the survey schedule.

Results and Discussions

Flood coping strategies of poor women against floods

In the study areas, multi-dimensional coping strategies were identified, depending upon people's cultural and socio-economic context rather than the vulnerability severity or risks. On the basis of poor women's opinion and real situation in the flood prone areas, the identified flood coping strategies were classified into three main categories: prevention strategies, management strategies and recovery strategies.

Prevention strategies

(a) Preparedness for flood: In the study area, very few women (20%) go to shelters after they heard early warning and rest of the women prepared themselves with their own knowledge (traditional approaches) that has developed over the years. One third of the respondents prepared themselves with their traditional approaches such as cultivating short duration crop before flood and also cultivating water resistance crop variety.

(b) Protecting houses and homesteads: About 35% of the respondents use sand bags to protect soil erosion of their homestead area. Before the flood season, many respondents (45%) tied their house with strong rope or wire to tie four sides to large trees in a secure and balanced way. For reducing the impact of strong winds they make their roof with gentle slope towards the south-east. In addition, respondents try to make their houses more resilient to flood by emphasizing walls and roofs with locally available resources (Parvin *et al.,* 2008). Majority of the respondents (59%) build extra indigenous structures one corner of the room made of bamboo called *Machan/Pataton* to protect household items, store foods, fuel and goods from flood (Paul, 2010) and increased the base level of households and elevated the level of cow sheds. In Kenya, along with indigenous techniques of storage people adopted some modern techniques for storing more foods (Songok *et al.,* 2011) similar to the other countries of Africa continent.

(c) Storing essential items: Most of the poor women (58%) preserve fuels, matches, dry food (such as rice, puffed rice, flattened rice, chili, pulses, *gur*, onion, and potato) and keep these in polythene bag, jute bag, plastic container and aluminium pots at home. Other important goods such as oil, ropes and medicine were preserved by 35% respondents and very few respondents (only 10%) prepare portable mud stoves for future use. Women often collect firewood to store in dry places for later use. Women also store fodder for domestic animals, seeds, food, blankets, which are also used to protect goats and poultry from flood water. Many women store cooking utensils, productive assets (i.e., ploughs, fishing nets) and other valuables under the soil to protect them from being washed away by floods.

Management strategies of flood

(a) Safety of family members: In the study areas during floods, women constantly look after all family members and animals to ensure their safety. Many respondents (40%) construct high platforms for their safety, using the *chouki* (traditional bed) and bamboo.

Some of the respondents (19%) transferred their family members to safer areas during flooded season. Similarly *char* and cyclone affected people also move their valuables and family to a relative house or nearby lower risky areas peoples' house, sometimes in the road, embankments or elevated areas (Rahman, 2010).

(b) Food security: Most of the households depend on agriculture and wage labor for their livelihood. Flooding season is particularly threatening for them. Majority of the strategies are being followed during June to September, which is the main flood period in Narsingdi. In study areas, early flood comes (2013) in the monsoon season, it destroys the standing crops, which results a huge disaster to those people which they cannot cope with easily as well as food shortages occurred. In this case, a household faces a food crisis during flood and especially women are responsible for adjusting household food security by changing their food consumption behavior. The study revealed that 74% of the poor women reduced or modified the amount of food per meal and 52% of the respondents reduce the number of meals per day in the flood affected season. Although the poor women live on limited amount of food per meal, the amount of meal further reduced during flood period. Researcher also found that cent percent women reliance upon less preferred food items during and after floods. The less preferred food items included *chira* (husked rice), *muri* (puffed rice), biscuits received as relief, *ruti* from wheat flour and local leafy vegetables (*kalmi shak, pat shak, kochu shak*, etc.) which are available in the vicinity free of cost. A commonly found flood coping strategy followed by large percentage of respondent (88%) for food security was that they purchase or borrow food on credit only in two months (the period of severe food insecurity). Bangladesh government has identified that other than population living in the coastal belt is more vulnerable than other areas of the country (MoEF, 2005) and about 88% of the people of Hatiya upazilla live below the poverty line in respect of income and calorie intake (Banglapedia, 2006).

(c) Protecting livestock, poultry and other assets: A common coping strategies found that when flood water reaches at the level of the livestock shed, keep their livestock and poultry at home or on the ceiling of their home. Since, grass in not available, respondent give straw, kitchen by-product leaves of bamboo and banana, etc. as a feed to their livestock. Few respondents (21%) send their cattle to relatives' house or nearby safer areas, sometimes in the road side people's house and farms.

(d) Migration and involve in income-generating activities (IGAs): During flood period (June through August), many household heads (76% male) go and stay in other city for working as agricultural laborer and other labor-intensive jobs to earn for their family. That time, the female members have to take all responsibilities of the family. As a result, about 63% of the respondents involve in income generating activities (IGAs) during flood. The IGAs include selling laborer, working as home workers etc. Sometimes respondents (3%) are engaged in begging. In the study areas, most commonly post disaster coping involve survive with foods and shelters. For that, people involved themselves in government or NGO sponsored "food for work" or "cash for work" programmes. Very few respondents (4%) said that their husband take care of them and help them in cooking and take care of children during flood. Respondent said that in every year many women migrated in Dhaka city from their villages. Respondent also said that migrated women sometimes compromise with their values and dignity. The major activities that employ women in urban areas include serving as domestic help, brick breaking, sewing, jute bag making, ash selling, fish and vegetable vending, selling rice cakes and working in the readymade garment industry.

(e) Land selling and other assets: During flood, respondents tried to cope with their savings if they have any or sell their property, jewelries, livestock, small poultry and valuable things (Karim and Mimura, 2008; Parvin *et al.*, 2008). About 35% respondents need to sell livestock in an attempt to hold cash security for procuring food. Only few respondents (5%) informed that they used to spend their savings during flood and crisis period. Researcher found that 6% respondents sold their lands during crisis period (since 2011-2013).

(f) Borrow money: In the study areas, borrowing of money is a common coping measure. Ninno and Dorosh (2003) found similar findings. More than 78% of the respondents meet household financial needs from borrowing in crisis period. Data showed that 65% respondent used borrowed money for food purchase and 55% used to rebuild house and 12% used emergencies. People borrowed money after a cyclone (79%) to rebuild livelihoods, meet food consumption needs and emergencies (Paul *et al.,* 2011). In the study area, different sources are available for borrowing. These are neighbors, friends, relatives, local moneylenders, GOs, NGOs, and microfinance organizations. Most of the respondents (58%) take loan from local *mahajans*/ local moneylenders. Respondent said that these loans are available at any time and any amount, and also said that it is easy to take. Moreover, they can return the money any time at their convenience. But, it is important that the interest rate of such borrowing was very high (60 to 120%). Many respondents (34%) borrowed from microfinance organizations and interest rate is 12-14 percent. But none of the respondents borrowed from GOs, although interest rate of such borrowing was very low (7 to 9%).

Recovery strategies

In the study areas, after flood, the respondents usually survive by selling of land, livestock, housing materials, and personal belongings; and by borrowing. Respondent are involved in rebuilding houses, re-stocking livestock, securing an income, repaying borrowed money, treating affected family members, and restoring other aspects of life such as children's education by their own way. According to previous study, many villagers could not get employment and relied on savings for food and other emergency purposes, gathering of wild foods, fuel woods, and extra income by temporary migration, etc. (Yasmin and Ahmed, 2013; Paul *et al*., 2011; Parvin *et al.,* 2008).

Flood coping strategies practice index (FCSPI)

Thirty (30) commonly followed flood coping strategies by poor women have been arranged (on the basis of FCSPI) in Table 1. Here, lower rank such as 1 indicates more practiced and higher rank such as 30 indicates least practiced flood coping strategies by poor women.

Flood coping ability of poor women

Flood coping ability of poor women was measured by considering six dimensions of women's livelihoods. These dimensions are food security, housing and shelter, crop production, livestock and poultry rearing, health and sanitation, means of livelihoods. A number of questions were asked to the respondents to explain her actions and measures towards adaptation and mitigation of vulnerability and damages during and after floods. Analysis of the responses of respondents to the questions concerning flood coping ability of six selected livelihood dimension is shown in Table 2.

Flood coping ability of poor women of the livelihood dimensions is reflected by mean scores, which ranged from the highest 1.75 to the lowest 0.35. This indicated a difference of 1.40, suggesting a relatively high discrepancy between the mean scores of the six livelihood dimensions.

The livelihood dimensions "housing and shelter" received the highest mean score of 1.75 and was indicated as high flood coping ability by the surveyed women. Data revealed that respondents have some level of preparedness and mitigation strategies regarding their housing and shelter. Therefore, the coping ability of the respondents in this aspect was reasonably found higher than the all other aspects. The respondents had moderate coping ability regarding health, while their coping ability regarding crop production, and livestock and poultry rearing were low to very low as indicated by respective mean values. Actually, the flood affected poor women in the study area do not have enough plans regarding preparedness, mitigation, recovery or response when their crops and livestock affected by floods.

Usually, GO-NGOs and other development agencies put more emphasis on health and sanitation sector during and after flood, the flood coping ability of the respondents in this aspect was reasonably found high

than the other four livelihood dimensions. Such as relief work, some tube well was placed from government for drinking water. In addition, health worker was actively worked in this area and advice about different types of diseases (like diarrheic, cholera and skin diseases etc.) which were appeared during and after flood. The lowest mean score (0.35) was recorded for the livelihood dimension "food security" and this was identified as "lowest flood coping ability" by the rural women. In the study area, food availability was worse in the early period of flood and this situation become worsening in the late period of flood. This result indicates that priority should be given to assist facilities for the improvement of flood coping ability of poor women towards all of the six livelihood dimensions which

Table 1. Rank order of different practice of flood coping strategies by the poor women (n=100)

Flood coping strategies	**FCSPI**	**Rank**
Increasing the level of homestead & using sand bags in backyard to protect erosion	155	1
Build a makeshift high platform at home	150	2
Keeping major dry food for future use	141	3
Keeping livestock and poultry at home on ceiling	137	4
Rely upon less expensive food items	129	5
Keeping major dry food for future use	127	6
Limit/reduce amount of food per meal	125	7
Reduce adult consumption, children could eat more	123	8
Borrow from moneylenders, GOs & NGOs	117	9
Managing feed for cattle and poultry	114	10
Reduced number of meals per day	111	11
Engaging in work to earn	109	12
Keeping livestock and poultry in farm & safer place	107	13
Transferred children and goods to relative's house	104	14
Cultivating short duration crop before flood	103	15
Cultivating mixed cropping	101	16
Going shelter house during severely flooded	99	17
Sell cattle/livestock, land and other assets	96	18
Purchase/borrow food on credit	94	19
Storing 'oral saline' to control outbreak of diarrheal disease	78	20
Migrate to city or other area	77	21
Spend money from savings	64	22
Stop sending children to school for saving money	63	23
Use of rain water for drinking	57	24
Cultivating water resistance crop variety	54	25
Creating bamboo-made temporary bridges to household with the non-submerged road	48	26
Preserving essential medicine and water purifying tablets	33	27
Making temporary toilet with bamboo, wood & gunny bags or polythene sheet	29	28
Using tube-well to avoid water born diseases	18	29
Keeping carbolic acid in room to prevent snake	17	30

would play key role to increase their livelihood status. Therefore, the selected all six livelihood dimensions of the present study should be emphasized in the planning program of GOs and NGOs.

Table 2. Flood coping ability of poor women (n= 100)

Dimensions	Possible score	Mean	Rank
Food security	0-3	0.35	6
Housing and shelter	0-3	1.75	1
Crop production	0-3	0.52	4
Livestock and poultry rearing	0-3	0.43	5
Health and sanitation	0-3	1.17	2
Means of livelihoods	0-3	1.03	3
Total flood coping ability	0-18	5.47	

Summary of six livelihood dimensions

Poor women are categorized based on obtained score as shown in Table 3. Overwhelming majority of the respondents (76%) had low flood coping ability as compared to 22% having medium and only one percent having high coping ability against food security dimension. Poor women in the study areas, live on limited amount of food per meal, the amount further reduced during and after the flood period. They could store only little amounts of food and their purchasing power had been severely constrained in the flood affected period. In the study areas, respondents have traditionally developed some coping strategies to minimize the flood problem. Such as when water enters their houses they make high stages in their houses and live on it. They also keep their agricultural products and other household assets on the same stage. But all the respondents don't possess the same ability to cope with flood in relation to housing and shelter. It is important to note that no respondent having high coping ability. Most of the respondents (75%) of the study areas were landless as they had too little sized cultivable land (0.02 ha), mainly taken as *borga* (share cropping) from others (wealthy landowners). They suddenly lose their crops without talking slightest precautionary measure due to there is no forecast available. Of the rural women, 84% had low, 16% had medium flood coping ability against livestock and poultry rearing. None of the selected poor women had high flood coping ability against livestock and poultry rearing. Some respondents (22%) kept their livestock and poultry on their living place. But, most of the respondents (59%) were not able to make high stage only for livestock and poultry with bamboo, wood, etc when the livestock house is inundated with flood water. About 90% respondent said that making cost and area (homestead area) are main responding factor for that. Many of the respondents (43%) sold the livestock and poultry during flood. Table 3 shows that majority of the respondents (59%) had medium coping ability as compare to 41% having low coping ability in respect to health and sanitation aspect. During flood, pure drinking water and toilet facilities were a great problem reported by 98% of the respondents. To cope with this problem poor women collect their drinking water from other's tube well this was not inundated with flood water. Rarely, only 6% of the respondents used water purification tablet and many respondents (13%) said that they wanted to boil water for purification but couldn't perform it. Respondents also said that sometimes they used rain water for drinking and cooking purposes. During flood, some of the respondents (7%) made temporary toilet with bamboo, wood and gunny bags or polythene sheet. However, all the respondents don't have the same coping ability. Actually, coping ability of the respondents varies from one to another due to their personal and socioeconomic condition. Data showed that majority of the respondents (62%) had medium coping ability compared to 38% having low coping ability and no one having high coping ability in respect to means of livelihoods aspect. Studied women said that only limited livelihoods opportunities during the rainy season because all surrounding areas are inundated and they cannot use land for agricultural purposes. Moreover, their mobility is restricted due to flood. Majority of the male members (72%) worked as wage labor and it is their principal occupation and secondarily worked in farming (20%). Here, farming included crop

production, livestock, aquaculture and integrated farming. During flood most of the household head's had no work. In addition, the most of the studied respondents live under poverty line. Consequently, many male members of household migrate to other areas as a seasonal labor for securing their livelihoods. The respondents cannot afford to send their children to school during flood for two reasons; firstly, they cannot provide support their children for education (although the education is free of cost) secondly, if children are employed in jobs (small household jobs and others available in the locality), they can contribute to the family income at the crisis period. This situation was more common in study areas. Actually, their livelihood was passed very miserably.

Table 3. Distribution of the poor women based on their flood coping ability score (n=100)

Dimensions	Categories (score)	Percentage of the Respondents (n= 100)	Mean	Sd
Food security	Low coping ability (0-1)	76	0.35	0.28
	Medium coping ability (2)	22		
	High coping ability (3)	2		
Housing & shelter	Low coping ability (0-1)	42	1.75	0.78
	Medium coping ability (2)	56		
	High coping ability (3)	2		
Crop production	Low coping ability (0-1)	65	0.52	0.41
	Medium coping ability (2)	35		
	High coping ability (3)	0		
Livestock & poultry rearing	Low coping ability (0-1)	84	0.43	0.29
	Medium coping ability (2)	16		
	High coping ability (3)	0		
Health and sanitation	Low coping ability (0-1)	41	1.17	0.49
	Medium coping ability (2)	59		
	High coping ability (3)	0		
Means of livelihoods	Low coping ability (0-1)	38	1.03	0.50
	Medium coping ability (2)	62		
	High coping ability (3)	0		

Source: Field survey

Overall flood coping ability

The observed flood coping ability score ranged from 2 to 13 against a possible range score of 0 to 18. From these coping ability scores, poor women have been classified into three categories as shown in Table 4.

Data contained in the table 4 shows that majority of the poor women (66%) had low flood coping ability, while 22% had medium and the remaining 12% had very low coping availability in the study area. It is note able that none of the respondents was found to have high flood coping ability. Researcher observed that studied women maintain many things of household management side by side flood coping activities. As women are the worst victims of floods

Table 4. Distribution of poor women based on their overall flood coping ability (n = 100)

Categories	Percentage of respondents	Mean	Sd
Very low coping ability (Up to 5)	12	4.67	1.29
Low coping ability (6-9)	66		
Medium coping ability (10-13)	22		
High coping ability (Above 14)	00		

Source: Field survey

(Rahman, 2010) and their flood coping ability remains low in the society.

Selected characteristics of the poor women

The salient features of seven selected characteristics of all the respondents have been presented in table 5.

Opinion of poor women regarding impact of flood on their economic livelihood

Opinions of poor women were gathered regarding the impact of floods on their economic livelihood during the last four years through interviews and focus group discussions.

Table 5. Salient features of seven selected characteristics the respondents (n = 100)

Selected characteristics	Key findings
Education	● Educational status was very low and 66% had no formal education ● Less interested in continuing their child's education because of poverty and less opportunity of educational institutes ● Under poor socio-economic conditions children are bound to leave school and to engage themselves in work for earning
Duration of living and migration behavior	● 56% respondents are absolutely landless ● 68% respondents live in the locality for short duration (5 years) ● 15 % respondents live in the locality for long duration (above 20 years) ● 60% respondents had migration tendency from their houses (1-3 times) ● Migration behavior is very common
Occupational status	● All of the respondents are housewife ● Many of the respondents earn money by engaging in different types of locally available income activities during and after flood ● 78% of the male head's of the respondents were day laborer ● Many of them (male) have the trend to work as seasonal laborer in different areas of the country during crisis period
Per capita income	● Average per capita monthly income (Tk. 872) was much lower than that of the national average, which was Tk.2,992 (BBS, 2007)
Organizational participation	● Majority of the respondents (79%) had affiliation with NGOs ● 83% of the respondents received credit from all possible sources, among them 43% received credit from NGOs ● The average amount of credit received by a respondents was Tk. 15800/year from all possible sources
Extension media contact	● Majority (68%) of the respondents had low extension media contact ● None of the respondents had high extension media contact
Training exposure	● 74% of the respondents were expecting training ● 33% of the respondents received formal training on flood coping ability from NGOs

Source: Field survey

Seven items of economic livelihoods were identified as the major areas that affected by the floods and opinions of poor women are summarized as follows:

Impact of floods on poor women's economic livelihoods, 2014

- Loss of housing and homestead
- Crop production loss
- Livestock death
- Loss in productivity
- Limited access to market
- Supply shortage and price of inputs
- Loss of income, savings and employment

In order to gain a better understanding about the impact of floods on poor women's economic livelihoods, the results of one case study are illustrated as follows:

Case illustrations of a respondent of Alokbali village, Narsingdi (August, 2014)

Rahela begum (52), has 6 members in the family and possesses only homestead area, no cultivable land. She had been living in this village since 2003, when she lost her previous shelter due to massive erosion of the mighty river Meghna. Begum reported that she usually falls in food crisis twice a year during lean periods (July to September and March to April) and at the same time, she and her husbands' cope to earn money and decrease their earning sources as a result, affecting her and her family members tremendously. In addition, buying less preferable food items, reducing amount of food per meal and going bad in empty stomach were the regular practice during the months of crisis. During the case study, daily income of her family was Tk.120 and she had to pay most of income to purchase food (Tk.70 for purchasing rice only). Her family income was so poor and insufficient that she could not provide good foods like fish, meat, egg, fruits, etc., to her children. She mentioned that it is very difficult to maintain a family with this poor income. During the flood, Begum used to borrow food from neighbors and shops. But she had to pay double amount (as food or money) for the borrowed food. Sometimes she borrowed from local moneylenders for the survival of her family. Although the interest rate was very high (nearly 20%), she preferred this loan as it was easily available.

Begum lives in only one room house and she also keeps her ducks and chickens in a corner of the same room. She told that her house has no protective wall and as a result, her two little children suffered from respiratory problems due to the chilling effect of cold wind in the winter nights of last year. She even could not pay for the medicine. She also mentioned that her kitchen has no roof and is situated outside of the main part of house. When the problem is aggravated due to excessive rain, she has to cook food from the neighbor's kitchen. In addition, the roof of her house has broken and she lives in a very distressed condition because of her housing condition.

Suggestions of poor women to improve their livelihood situation

The opinion of poor women on improving their livelihood situation was collected through interviews and focus group discussions. They identified five major sectors needing improvement to improve their livelihood, and a summary of their responses obtained from interview is presented in Figure 1.

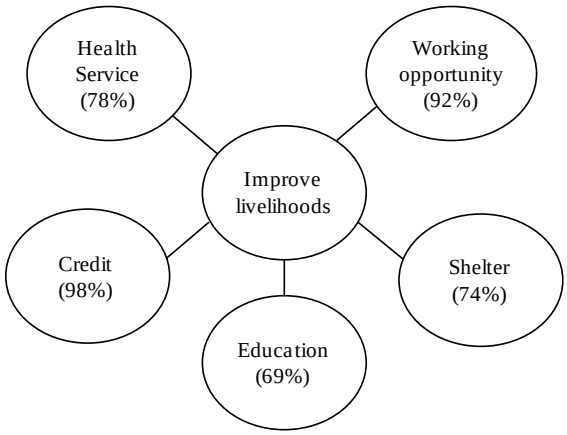

Figure 1. Ideas of poor women for the improvement of livelihoods (n = 100)

It is noteworthy that credit availability (interest free or low interest) was most important to the poor women for improving their livelihood. In addition, they gave priority to working opportunity, health service, shelter, and education to improve their existing livelihood status. The poor women in the study areas liked to have suitable income generating opportunity throughout the year in their locality so that they themselves could resolve their food security problems. Moreover, they demanded special attention from the government for alleviating their poverty situation. The opinions expressed by poor women were based on their experiences in performing household activities in their family, knowledge that they learned from their surroundings. Hence, to improve their livelihood, the above mentioned ideas need to be properly facilitated in the society.

Conclusion

In the study area, the respondents faced severe extent of crisis regarding livelihoods during and after floods and they were vulnerable to flood due to their geographical condition. Especially, the poor women are the major victims towards floods that often damage their crops, livestock, fish stocks, property and lives. This article tried to look into the poor women's coping strategies against flood, based on the real experiences of women affected by flood in the study area of Bangladesh. The respondents had low level coping ability against floods and also found that they have only limited resources and appropriate income opportunities as well as livelihood opportunities during and after floods. Moreover, in the study area, communication facilities, training facilities, education were not developed due to less attention from policy makers. So, it can be concluded that their abject poverty, lack of resources, appropriate income opportunities during crisis period and lack of attention from policy makers reduces one's coping ability against floods. Therefore, it is recommended that the government should undertake programs for creating such opportunities with the support of training, credit, technological supports and marketing opportunities. The government should encourage the private entrepreneurs (like garments, food processing, small scale manufacturing etc) to establish industries and businesses in the flood affected areas so that people of such vulnerable areas could be able to earn their livelihoods throughout the year. GO-NGO partnership towards this end can be helpful for poor women in the study area.

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