Resilience of Riverine Households towards Dynamic Vulnerability

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Abstract

The main objectives of the study were to determine the resilience of riverine households towards dynamic vulnerability and to explore the relationships between some selected characteristics of the riverine households with their resilience. The study was conducted with the riverine household heads of Shiorbor village under Shalnagar union of Lohagara Upazila, Narail district. Seventy riverine households were selected purposively as sample from 200 households. A pre-tested structured interview schedule was used to collect data from the respondents during 15 April to 12 May, 2018. Additionally, Focus Group Discussion was conducted to identify different aspects of resilience towards dynamic vulnerability and different issues for problem scales. Pearson's Product Moment Correlation Coefficient (r) was computed to explore the relationship between the concerned variables. Majority of the respondents (89%) showed medium resilience while 11% had low resilience towards dynamic vulnerability. Resilience of the riverine households was better in case of life security aspect while poor in crop, livestock and fisheries sectors. Among the selected characteristics of the riverine households i.e. age, household assets, household farm size, annual household income, credit received and innovativeness showed positive significant relationships with their extent of resilience towards dynamic vulnerability. Majority (83%) of them faced medium problems in resilience towards dynamic vulnerability. Frequent flood and riverbank erosion, insufficient money to reconstruction of house, lack of information, lack of work, etc. were the main problems faced by the riverine people to be resilient with vulnerability. Riverine households think that technical and financial supports from different organizations, training, and other preparedness activities and also creating diversified income source to make them resilient to the vulnerability of flood and riverbank erosion.

Key words: Resilience, dynamic vulnerability, riverine households.

Introduction

Bangladesh is known to be highly vulnerable to flood and riverbank erosion faced every year minor to major of its effect. More than 310 rivers and tributaries have made Bangladesh a land of rivers (BBS, 2017). Rivers are not static features. In fact, they are constantly avulsing across the landscape, occupying new channels while leaving older ones dry. During the monsoon, water rises in rivers and causes floods. Regular river floods affect 30% of the country increasing up to 70% in extreme years (MoDMR, 2017). Households with lower income and less access to productive natural assets face higher exposure to risk of flooding in Bangladesh. Floods cause great destruction of the riverine household crops, houses and trees. They also cause death to human beings, cattle, etc.

Approximately 8700 ha of homestead and farming land are lost annually due to riverbank erosion which displaces approximately 0.20 million people (Alam, 2016 and IFAD, 2013). Displacement is the

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immediate impact of riverbank erosion. The effects of serious river bank erosion can be consequent loss of homesteads, school and land, and loss of many lives, livestock and fisheries. The displaced usually move to nearby areas but migrations to distant place are not uncommon. In erosion-prone areas, most families have witnessed a displacement in their lifetime. This involuntary movement can go up to 10 times or even more (DDM, 2012). At present, bank erosion and flood hazards in nearly 100 upazilas have become almost a regular feature. A resilient household is not immune to the impacts of every disaster. A resilient household is able to mitigate the impacts of small and moderate shocks on household livelihoods and well-being. The affected people become resilient towards dynamic vulnerability by applying some logical strategies based on the previous experiences whenever they faced severe situations. Improved access to economic and to information about appropriate strategies appears to be crucial to support adaptation processes locally and thus to enhance the resilience of vulnerable households. Anyway, the study objectives were primarily to determine the resilience of riverine households towards dynamic vulnerability and to explore the relationships between some selected characteristics of the riverine households with their resilience.

Methodology

The study was conducted at Shiorbor village of Lohagara upazila under Narail district. Two hundred households have found in the study area. Among them only 70 households (35% of the population) were riverine households. The riverine households of this village used to fight against the flood and riverbank erosion for survival. Thus all riverine households were purposively selected as a sample of the study.

Both qualitative and quantitative methods of data collection were employed. A pre-tested personal interview schedule was used to collect data from the selected respondents. Besides the questionnaire survey, qualitative methods i.e. two Focus Group Discussions (FGDs) were conducted in the study area comprising seven participants in each FGD to identify different aspects of resilience towards dynamic vulnerability and different problems for problem scales. Data were collected from 15 April to 12 May, 2018.

Selected characteristics of the respondents were measured by using standard measurement procedures. The focus variable of this study was resilience of riverine households towards dynamic vulnerability. It was determined under six aspects of resilience namely, housing and shelter, means of livelihoods, health and sanitation, crop, livestock and fisheries sectors, social network, and life security. The aspects were measured by using a 4-point rating scale as practiced by the respondents as 'regularly', 'occasionally', 'rarely' and 'not at all' and score was assigned as '3', '2', '1' and '0', respectively. Five statements were selected under each aspect. The score of all items of each aspect was added to obtain the total score of a single aspect. Relationship between the selected characteristics of riverine people and their livelihood status in vulnerability was computed through Pearson's Product Moment Correlation Coefficient (r). Problems faced by the riverine households to be resilient in

vulnerable situation were measured through 4-point rating scale. Score was assigned as '0' for not at all, '1' for low, '2' for medium and '3' for high extent of problems faced by the riverine households. Data obtained from the respondents were compiled to a master sheet, then tabulated and analyzed in accordance with the objectives of the study. The SPSS computer program was used for analyzing the data.

Findings and Discussion

Overall Resilience of Riverine Households: Overall resilience score of the respondents towards dynamic vulnerability ranged from 23 to 56 against the possible range of 0 to 90, with a mean of 41.13 and a standard deviation of 6.56. Data in Table 1 show that the highest proportion (88.6%) of the respondents had medium resilience while 11.4% had low resilience in the vulnerable situation. Most of the riverine households had low to medium resilience towards dynamic vulnerability.

Table 1 Categorization of riverine households according to their overall resilience towards dynamic vulnerability

Respondents			Mean	Std. Dev.
Categories (score)	Number	%		
Low (≤30)	8	11.4		
Medium (31-60)	62	88.6	41.13	6.56
High (>60)	0	0		

Displacement due to riverbank erosion and low earning opportunities with low wage and others issues reduce the resilience power of the respondents in the vulnerable situation. Displaced households face more vulnerability in the study area. Their more innovativeness, different GOs and NGOs aid, diversification of income source, etc. could help the riverine households to be resilient in the vulnerable situation. This finding supports by findings of Khatun *et al.* (2009).

Aspects-wise Resilience of Riverine Households: Six aspects of resilience were selected to assess the extent of resilience of riverine households. These were housing and shelter, means of livelihoods, health and sanitation, crop, livestock and fisheries sectors, social network, and life security. The computed practice score of all the aspects have been shown in Table 2.

Housing and Shelter: The highest proportion (72.9%) of the respondents showed medium resilience followed by 27.1% of them showing low resilience while there was no high resilience towards dynamic vulnerability. Sarker (2010) found that majority of the farmers (62%) had medium coping mechanism. Riverbank erosion causes great sufferings to respondents in relation to housing and shelter compared to flood. Many houses are taken away by the strong wind, flood and the riverbank erosion mostly in the study area. They have traditionally developed some resilience to face the vulnerability. Before the natural hazards, some sell their movable assets, some raise their houses with soil and some take shelter in the school building or in a flood shelter when the house is severely flooded or totally affected by erosion.

Table 2 Aspects-wise resilience of riverine people towards dynamic vulnerability

Aspects	Range			Respondents		Mean	Std. Dev.
	Possible	Observed	Categories	Number	%		
Housing and shelter	0-15	3-10	Low (≤5)	19	27.1	6.53	1.61
			Medium (6-10)	51	72.9		
			High (>10)	0	0		
Means of livelihoods	0-15	2-12	Low (≤5)	13	18.6	7.86	2.37
			Medium (6-10)	46	65.7		
			High (>10)	11	15.7		
Health and sanitation	0-15	4-11	Low (≤5)	1	1.4	8.41	1.14
			Medium (6-10)	67	95.7		
			High (>10)	2	2.9		
Crop, livestock and fisheries sectors	0-15	0-9	Low (≤5)	46	65.7	4.29	2.35
			Medium (6-10)	24	34.3		
			High (>10)	0	0		
Social network	0-15	2-10	Low (≤5)	41	58.6	5.34	2.04
			Medium (6-10)	29	41.4		
			High (>10)	0	0		
Life security	0-15	4-13	Low (≤5)	7	10	8.70	2.22
			Medium (6-10)	44	62.9		
			High (>10)	19	27.1		

Means of Livelihoods: Majority of the respondents (65.7%) showed medium resilience compared to 18.6% and 15.7% showing low and high resilience towards dynamic vulnerability, respectively (Table 2). As they increase their homestead area with soil and sell their movable assets. So they can store fuel for cooking and keep the money for future use and buy major food items during and after flood and riverbank erosion. Similar findings were found by Khatun *et al.* (2009) but her percentage was quite different.

Health and Sanitation: The possible range of resilience score of the respondents could vary from 0 to 15 while the observed range was 4 to 11 with an average and a standard deviation of 8.41 and 1.14, respectively (Table 2). Majority of the respondents (95.7%) showed medium resilience compared to 2.9% and only 1.4% showing high and low resilience towards dynamic vulnerability, respectively. Health and sanitation is an important issue for the development of human life. During and immediately after flood safe drinking water and toilet become worst and people affect with different kinds of diseases. People mainly suffer from water borne and skin diseases. As the respondents' homestead area was high, so their tube-well and toilet did not go under water during and after the flood. But the respondents which faced riverbank erosion, they lost their all health and sanitation facilities and most of the cases outbreak of diseases occurred. Sarker (2010) found 88% respondents had the medium practice of coping mechanism in respect of health and sanitation aspect.

Crop, livestock and Fisheries Sectors: The possible range of resilience score of the respondents could vary from 0 to 15 while the observed range was from 0 to 9 with a mean of 4.29 and a standard deviation of 2.35 (Table 2). Results indicated that 65.7% of the respondents showed low resilience

while 34.3% showed medium and there was no high resilience towards dynamic vulnerability. Due to riverbank erosion the crop, livestock and fisheries sectors suffer much and respondents are not interested in this sector, and they also migrate to another occupation to lead their life. Most of the respondents sell their crop, livestock, and fishes; they get to cash in hand for emergency uses and buy necessary things such as dry food, medicine, clothes, etc. for in a vulnerable situation when their earning opportunities are fully interrupted. Similar findings were found by Munna (2009) and Khatun *et al.* (2009) in livestock sectors. Kamruzzaman (2010) found majority of the farmers (76.7%) had low coping strategies regarding fisheries aspects. But Rana (2009) found that majority of the respondents had medium coping ability in crop production.

Social network: The possible range of resilience score of the respondents could vary from 0 to 15 while the observed range was 2 to 10 with an average and a standard deviation of 5.34 and 2.04, respectively (Table 2). The highest proportion (58.6%) of the respondents showed low resilience followed by 41.4% of them showing medium resilience while there was no high resilience towards dynamic vulnerability. Lives and properties go under destruction during devastating disasters. Thus riverine households became vulnerable. The affected people remain scattered and take shelter in different safer places like highland, school building or relative's house, etc. They can not get immediate food from different Gos and NGOs. Most of the respondents rarely maintain communication with union parishad chairman/members/local leaders.

Social network analysis is attracting increasing attention as a tool for measuring social connectivity that arises through exchanges in information, labor, money and food (Hanneman and Riddle, 2005 and Webb and Bodin, 2008).

Life security: The possible range of resilience score of the respondents could vary from 0 to 15 while the observed range was 4 to 13 with an average and a standard deviation of 8.70 and 2.22, respectively (Table 2). Majority of the respondents (62.9%) showed medium resilience compared to 27.1% and 10% showing high and low resilience towards dynamic vulnerability, respectively. Medium percent ages of respondents keep carbolic acid in the room for preventing snake. They keep their children and women in safe places, keep essential medicine and provide health support to sick family members during flood and riverbank erosion.

Comparison of different aspects of resilience of riverine households towards dynamic vulnerability: Figure 1 shows that highest extent of resilience score (121.8) of the respondents was in life security followed by health and sanitation (117.8), means of livelihoods (110), housing and shelter (91.4), social network (74.8), respectively and the lowest extent of resilience (60) of the respondents was in crop, livestock and fisheries sectors. It might be worthy to mention that the differences among the aspects of resilience of riverine households towards dynamic vulnerability were medium. So, the riverine households should practice more resilience mechanisms for all the aspects to increase their resilience.
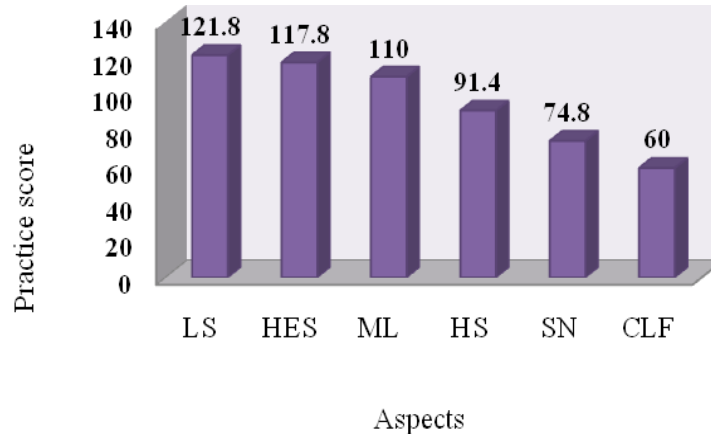
Legend: LS= Life security; HES= Health and sanitation; ML= Means of livelihoods;
HS= Housing and shelter; SN= Social network; CLF= Crop, livestock and fisheries sectors

Figure 1 Comparison of different aspects of resilience of riverine households towards dynamic vulnerability

Figure 1 shows that life security of the riverine people appeared as the most cared aspects of resilience. This finding may be due to that their life is very much at risk for the people dwelling on bank of river. And every human being tries to save his life first and do accordingly. Obviously, if the lives are saved, they need to sustain with foods and drinks basically. For this, they need to reply on crops, livestock and fisheries. Anyway, the matter of resilience for the riverine people was the least for this aspect.

Relationship between the selected characteristics of riverine households and their extent of resilience towards dynamic vulnerability: Pearson's Product Moment Coefficient of Correlation (r) was computed in order to explore relationship between the selected characteristics of the riverine households and their extent of resilience towards dynamic vulnerability. The selected characteristics were the farmers' age, years of schooling, household size, household assets, household farm size,

annual household income, organizational participation, decision making ability, credit received and innovativeness (Table 3).

Table 3 Relationship between the selected characteristics of riverine households and their extent of resilience towards dynamic vulnerability

Personal characteristics of the riverine households	Correlation Co-efficient (r) with 68 df
Age	0.240*
Years of schooling	0.075
Household size	0.191
Household assets	0.262*
Households farm size	0.520**
Annual household income	0.381**
Organizational participation	0.206
Decision making ability	0.026
Credit received	0.270*
Innovativeness	0.543**

*** Correlation is significant at the 0 .01 level;
Correlation is significant at the 0 .05 level

Among 10 characteristics, age, household assets, household farm size, annual household income, credit received and innovativeness of the riverine households were positively correlated with their resilience towards dynamic vulnerability. Data in Table 4 show that resilience towards dynamic vulnerability increases with the increase of the above mentioned characteristics of the respondents. The combination of characteristics indicate that these have a bit closer in nature i.e. they increase the abilities of farmers towards achieving a better resilience to vulnerabilities. Hence, it can presumably be could have assisted in boosting significant positive associations with their resilience capacities. The rest characteristics of the riverine people were not significantly correlated with their resilience towards dynamic vulnerability. It might be due to the reason that these characteristics of the respondents did not vary with their extent of variation in resilience.

Problems Faced by the Riverine Households to be Resilient in Vulnerable Situation: The observed score of the problems faced by the riverine households to be resilient in vulnerable situation ranged from 12 to 31 against a possible range of 0 to 42. Data presented in Table 5 shows that the mean and standard deviation of this score was 23.30 and 4.51, respectively.

Data presented in Table 5 indicates that the highest proportion (82.9%) of the respondents in the study area faced medium extent of problem, while the rest 12.8% and only 4.3% of the respondents faced high and low extent of problem to be resilient in vulnerable situation. Majority of the respondents (95.7%) faced medium to high problems in vulnerable situation. This might be due to the similar socio-economic background of the respondents.

Table 4 Categorization of riverine households based on their problems faced to be resilient in vulnerable situation

Respondents in problem			Mean	Std. Dev.
Categories (score)	Number	%		
Low (≤14)	3	4.3		
Medium (15-28)	58	82.9	23.30	4.51
High (>28)	9	12.8		

The extent of problems faced by the riverine households to be resilient in vulnerable situation with their rank order show that "frequent flood and riverbank erosion" first position. In the riverine areas, flood and riverbank erosion is a serious problem and occurs frequently, hence farmers cannot use their land for more production purpose and sometimes they also lose their cultivable land due to riverbank erosion.

Findings also indicated that the problem which ranked second was "insufficient money to reconstruction of house" and third one "lack of information". "Unusual death of children" was the least important problem among those faced by the riverine households to be resilient in vulnerable situation. Riverine households have less chance to carry on their own earning activities in the vulnerable situation. Moreover, they get few prices their own resources in vulnerable situation which requires buying their daily major food items. So, insufficient money reduces their dwelling room facilities and also their cloth, health and education facilities. Low communication with the service provider occur lacking information among them and they face various problems frequently. Finally, "Unusual death of children" was least important problem among the respondents in the study area. They ranked it last because riverine people try to protect their children in safer places with possible care.

Conclusions

Resilience of riverine people towards dynamic vulnerability should be more improved through both GOs and NGOs by providing adequate technical and financial support, training and other preparedness activities and also creating diversified income source to make them resilient to vulnerability of flood and riverbank erosion. Age, household assets, household farm size, annual household income, credit received and innovativeness were some the personal characteristics of the riverine people found to be significantly linked to their extent of resilience towards dynamic vulnerability. In formulating any action plan for the riverine people regarding such activities, at least these variables might be considered on priority basis. Riverine people faced several problems in their earning sectors and daily life due to frequent flood and riverbank erosion. Some of the problems may be solved through awareness creation and practical training while others may need some financial and policy supports. Hence, Ministry of Disaster Management and Relief in collaboration with other NGOs should take necessary steps to solve these problems and make them resilient towards dynamic vulnerability.

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