Study the Relationship between Selective Characteristics of Farmers and Their Practicing Coping Strategies towards Household Food Security during Flood Period

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

Article Information

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ABSTRACT

A study was carried out at flood affected reverine villages of three upazilas (small administrative unit) under Jamalpur district in Bangladesh during September, 2011 to May, 2012 to explore the relationship, contribution and direct–indirect effect between personal attributes and their coping strategies towards household food security practiced by the farmers during flood. Data were

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collected from randomly selected respondents and analyzed through both the qualitative and quantitative techniques by using a statistical program. Out of 18 personal, economic, social and psychological characteristics of the farmers, the personal education, housing condition, annual income, annual expenditure, savings, organizational participation, participation in IGAs, cosmopoliteness, environmental awareness, knowledge on flood coping mechanisms and household food security had positive but both credit received and utilization of received credit had negative. In addition, age, family size, training received, risk orientation and involvement in safety net programs are insignificant with coping strategies towards household food security during flood period.

Keywords: Personal characters; food security; coping strategies.

1. INTRODUCTION

Bangladesh is widely recognized as one of the most disaster prone countries in the world and it has been the focus of considerable international attention. The geographical location, land characteristics, multiplicity of rivers and the monsoon climate render Bangladesh highly vulnerable to natural hazards [1]. Of all the disasters the problem of flood has aggravated most from 1955 to 2004 and become one of the main concerns of people in Bangladesh [2] which almost a recurring features.

Slow onset floods that hit Bangladesh every year, usually last for one or more weeks, or even months that can also be lethal but tend to give people much more time to move to higher ground. These floods are a result of surface water runoff (flash floods are also a result of surface water runoff, but the terrain is a larger factor in the severity of the flood). As this kind of flood last for a long period, less likely to sweep away property, although it can lead to lose of stock, damage to agricultural products, roads, rail links and deaths may occur much more likely to be due to disease, malnutrition or snakebites.

Human personality is the most complex and fascinating phenomenon studied by many scientists. There are many interrelated and constituent attributes that characterize an individual and form an integral part in the development of their personality. It is rightly assumed that an individual's characteristic patterns to a considerable extent determine the attitude and influence in decision- making relating to almost every behavioral manifestation in life and even in coping towards all kinds of natural calamities. It becomes, therefore, very essential to describe some of these individual characteristics which may enable in understanding and prediction human behavior with reasonable degree of accuracy. The present study will give much emphasis on focusing the household food security of the farm families who are actually subsistence farmers and vulnerable to various natural calamities especially flood.

Because of chronic poverty, this category of people may use their natural environment in unsustainable ways, leading to further deterioration of their livelihood conditions [3]. This study is an attempt to investigate the facts and factors of food insecurity for the people in Bangladesh who are dwelling in reverine areas and are regularly affected by a slow on set flood of merely 30 days, with a view to facilitate policy makers to take timely and viable steps and workable strategies for addressing the food insecurity problem in consonance with the National Food Policy (NFP).

2. METHODOLOGY

The study was carried out at flood affected reverine villages of three upazilas (small administrative unit) under Jamalpur district in Bangladesh during September, 2011 to May, 2012 to explore the relationship, contribution and direct–indirect effect between personal attributes and their coping strategies towards household food security practiced by the farmers during flood period. Historically, Jamalpur district is familiar to a habitat of fragile economy, extreme poverty and chronic food insecurity. Due to poor drainage system the river network of the mighty rivers, the Brahmapurta and the Jamuna accompanied by their turbitories caused a slow on-set catastrophic flood of merely 30 days in a regular basis and affects riverside dwellers with varying intensity and magnitude of devastation.

Data were collected from randomly selected 336 respondents of 6720 flood affected farm families through both the qualitative and quantitative techniques. Eighteen personal, economic, social and psychological characteristics of the farmers that are considered as independent variables were age, personal education, family size, water

and sanitation condition, annual income, annual expenditure, savings, credit received, utilization of credit, training experience, organizational participation, participation in income generating activities, cosmopoliteness, risk orientation, environmental awareness, knowledge on flood coping mechanisms, household food situation during the year and sharing in safety net programs were the independent variables of the study.

The selection of independent variables based on expert opinion, peer group discussion, related literature and also consultation with learned supervisors, that seems like better matching relationship with the dependent variable. Descriptive statistics e.g. range, mean and standard deviation have been presented and the mean value under each variable was compared through computation of 'Duncan's Multiple Range Test' (DMRT). Chi-square test was also estimated to explore the relationship among the variables. Pearson Product Moment Correlation Coefficient (r) was used to determine the linear relationship among the variables.

3. RESULTS AND DISCUSSION

3.1 Characteristics of the Farmers

Human characteristics are the bundle of habits. These characteristics attributes make a man into an individual, individual to others, separated from individual to individual, from community to community even from nation to nation. Behavioral pattern of a man is the aggregation of his characteristics. In spite of the influence of geographical location, local culture and customs on human characteristics but individual to individual has a sharp difference among these characteristics which might have considerable influence of farmer's behaviourable changes that accures to farmers participation in flood coping strategies. But it is necessary to limit the number) of independent variables (here 18 are selected) so that all the influencing factors of flood and/or coping strategies regarding household food cannot be dealt within a single study.

3.1.1 Age

Data in Table 1 showed the ages of the respondents ranged from 23 to 75, representing the transition from the middle age to the most elderly segment of the farming community, with a mean was 43.70 and standard deviation was 9.50. Similar wider range of population age was observed by Islam [4]. The chi-square value

(3.91) was insignificant. However, as whole majorities (77.1%) of them were belonging to under young and middle aged category. Similar findings were reported by Dey [5] and Roy [6]. The farmers who were at a young to a middle aged stage are generally more energetic and innovative.

3.1.2 Personal education

Data in Table 1 showed the level of education of respondents ranged from 0-15 (Illiterate 0, can sign only 0.5, primary education 1-5, secondary education 6-10 and above secondary <10) with a mean was 3.28 and standard deviation was 4.23. The chi-square value was 41.05 and it meant that the relationship between different categories of farmers and their level of education was highly significant. The combined education of primary, secondary and above secondary level constituted 39.6 percent of all category distribution of the respondents that are seems to very much lower than national average of Bangladesh 46.15% [7]. Akanda [8] found that majority (48%) of the respondents had low to no education.

3.1.3 Family size

Data in Table 1 showed the maximum family size scores of the respondent was 13 and minimum was 2 with a mean and standard deviationwas5.16 and 1.73 respectively. The chi-square value was estimated highly significant (15.95) meaning that there was a significant relationship between the different categories of farmers and their family size. In this study, an overwhelming majority (91.3 percent) of the farmers had small to medium family size category (small family consists of up to 4, medium 5 to 7 and large above 7 members). This finding has similarity with the studies of Islam [4]. It was indicated that proportion of nuclear family increased with increase in poverty. After marriage guardians of the family decided to separate other earning members for avoiding economic crisis and other intra family conflicts. This is why as exception nuclear family is also observed in the *char* (a tract of land surrounded by the waters of a river year-round or connected to the mainland under normal flow) area.

3.1.4 Water and sanitation condition

Data in Table 1 showed the water and sanitation condition of the respondents ranged from 3 to 18, with a mean was about 10.62 and standard deviation was 2.64. The calculated chi-square value was estimated (8.333) which was

insignificant, meaning that there was no relationship between the different categories of farmers and water and sanitation condition. The finding has similarity with the observation of Farhad [9] that the majority (95%) of the farmers maintained high to medium housing status where ownership, type, water supply, sanitation facilities and drainage system of the house was counted as indicators.

3.1.5 Annual income

Data in Table 1 showed the annual income of the respondents score ranged from 5-440 thousands taka with a mean was 115.03 thousands and a standard deviation was 70.09. The estimated chi-square value was (117.17) also found highly significant which pointed that there had a relationship between farmer categories and their family income. Data indicated that more than half (53.0 percent) of the farmers had medium annual income while a little below one fourth (21.8%) of them had high to very high income and one forth of them (25.3%) had low income. Mahzabin [10] found 67.3% of respondents had medium annual income group in her study on household food security status of selected farmers. High income help farmers through providing risk bearing ability and ability to invest more in coping strategies regarding food security during flood period (low income up to 70,000 taka, medium income 71,000 to 150,000 , high income 151,000 to 200,000 and very high income above 200,000 taka per annum).

3.1.6 Annual expenditure

Data in Table 1 showed the annual expenditure of a farmer varied from 6-576 thousands taka with a mean and standard deviation were estimated about 107.61 and 64.83, respectively. The mean value depicted a significant difference among farmer categories. The estimated chi-square value was (99.75) also showed a highly significant which pointed that there was a relationship between farmer categories and their family expenditure. Most of the farmers of the study area had a medium annual income, whereas the annual expenditure was in conformity with the income. Mahzabin [10] found in her study that 60.6% had medium, 34.6% high and 4.8% were having low annual expenditure.

3.1.7 Savings

Saving of a farmer ranged from taka 0 to 195 with a mean and standard deviation were about 11.40 and 18.88, respectively. The result of chi-square was (18.88) showed a significant positive relationship exists between the savings and different categories of farmers which imply that, there is a variation among different categories of farmers in terms of their savings. An overwhelming majority (84.5%) of the respondents were low saver compared to negligible proportion (11.9 percent) were medium saver and very negligible proportion (2.7% and 0.9%) were high and very high saver, respectively. The result is similar to the findings of Roy [6] that 96.2, 64.36 and 96.7% of respondents were no to low savings respectively. The result indicates that they had less scope to cope with the vulnerable situation by using their savings.

3.1.8 Received credit

Data in Table 1 showed the received credit score of the farmers ranged from 0 to 300 with a mean and standard deviation were about 14.44 and 29.73, respectively. The mean of received credit scores of marginal, small and medium farmers were 11.91, 15.04 and 14.77, respectively. The computed chi-square value was (4.57) that showed a statistical insignificance which indicates that, there was no relationship among different categories of farmers and their received credits. Considering all three categories of farmer (based on land ownership marginal 0.02 to 0.20, small 0.21 to 1.0 and medium farmer 1.01.to 3.0 hectare of land) together, as a half (48.4%) of them had different levels of access to credit, due to the credit programs of the NGOs and banks but till now more than one tenth of them go to *Mohajon* (money lender) for loan where interest is so high. Roy [6] found 90.4, 65.82 and 68.3% of respondents had received zero to low credit in their studies respectively.

3.1.9 Utilization of credit

Data in Table 1 showed the utilization of credit of farmers ranged from 0 to 100 with a mean and standard deviation were about 40.95 and 44.03, respectively. The computed chi-square value (9.90) was showed statistically insignificant which indicates that, there was no relationship among different categories of farmers and their credit utilization. Credit use discrimination among farmer categories such as marginal, small and medium did not show any deviated trend. Similar findings were observed earlier by Akanda [8].

3.1.10 Training experience

Data in Table 1 showed the farmers' training experiences ranged from 0-24 with a mean was

1.46 and standard deviation was 4.30. Mean of training experience depicted a significant difference among three farmer categories. The computed chi-square value (25.80) also indicated to a highly significant which meant that there was a relationship between farmer categories and their training experience. In all categories of farmers 77.1% did not have any training experience. Al-Amin [11] found majority of char women (79.5%) did not get any opportunity to receive any training and near about one-fifths (18.5%) had short training experience.

3.1.11 Organizational participation

Data in Table 1 showed the organizational participation scores of the farmers ranged from 0 to 92 with a mean and standard deviation were 11.42 and 18.17, respectively. The chi-square value (44.36) was found to be significant which means that there is a relationship between different categories of farmers and their organizational participation. More than one thirds of farmers (39.3%) did not have any organizational participation while 46.7% of the farmers had low, 8.0% medium and only 6.0% had high participation. Similar factual evidence of farmers' non participation has been documented in earlier studies done by Islam [4] (56.67%) and Haque [12] (66.19%). In all categories of farmers 86.00% of farmers had no to low organizational participation.

3.1.12 Income generating activities

Data in Table 1 showed the computed income generating activities score of the farmers ranged from 0 to 26 with a mean and standard deviation were about 17.21 and 4.05, respectively. The computed chi-square value (46.94) was showed a statistically significant. In this study, highest proportion (75.3%) of the farmers fall in the medium income generating activities category compared to 18.8% under high, 5.7% in low and only 0.3% in no income generating activities. Roy [6] observed 99.7% of respondents had operated low to medium income generating activities. From the results, it is evident that, medium farmers had higher mean income generating activities scores which implied that medium farmers are more responsive to income generating activities than their marginal and small farmer counterparts. From the study it has been observed that majority (57.50%) of income generating activities were with crop production, 14.84% with vegetable and tree production, 19.56% with livestock production, 1.02% with fish culture and 7.07% with non agricultural activities.

3.1.13 Cosmopoliteness

The cosmopoliteness scores of the farmers ranged from 0 to 15 with a mean and standard deviation were about 5.41 and 3.45, respectively. The computed chi-square value (9.59) was found significant indicating that there is a relationship among different categories of farmers with respect to their degree of cosmopoliteness. In this study more than half (52.1%) of the farmers having low cosmopoliteness compared to 42.9% medium and only 5.1% had high cosmopoliteness. The findings had similarity with the findings of Al-Amin [11] that majority of the respondents were under low cosmopoliteness category.

3.1.14 Risk orientation

Data in Table 1 showed the risk orientation scores of the farmers ranged from 20 to 30 against the possible score of 10 to 30 with a mean and standard deviation of 28.11 and 1.69, respectively. The chi-square value (1.46) did not show statistically significant. Majority (93.2%) of the respondents had high risk orientation compared to 6.5% had medium risk and a few only 0.3% had low risk orientation. Higher risk oriented farmers (more than 90%) have the ability to combat the risk by using proper practices. Though the results were dissimilar with the results of Roy [6] that they found low risk oriented farmers were 17.60 and 10.4% in their concerned studies respectively but these assertive attitude indicated the sampled people had preparedness for the coming flood distortion.

3.1.15 Environmental awareness

Data in Table 1 showed the environmental awareness score of the farmers ranged from 25-40 with a mean and a standard deviation were about 35.69 and 2.24 respectively. The computed chi-square value (9.031) was found a statistical significance which indicates that there is a relationship among different categories of farmers and their level of environmental awareness. Majority (97.3%) of all the farmers had high environmental awareness and only 2.7% of them had medium awareness. Islam [13] found the majority of the Farmers Field School (FFS) farmers had high (90%) environmental awareness. The rationale of such high environment awareness belongs to farmer's innate tendency to conserve this environment conducive to meet the demand of the day and to meet the demand of the day to come, as well.

3.1.1 Knowledge on flood coping mechanisms

Data in Table 1 showed the knowledge on flood coping mechanisms score of the farmers ranged from 11 to 56 against the possible range of 0 to 56 with a mean and standard deviation of 39.05 and 10.73, respectively. The estimated chi-squire value (15.38) was found statistically significant. The result is contrary with the result of Islam [14] that majority (94.90%) of the farmers had low to medium knowledge on agrochemicals use. But Haque [12] found 65.20, 77.90, 59.15 and 71.90% respectively that the farmers had low to medium knowledge on their respective study.

3.1.17 Year round household food situation

Household food situation during a year ranged from 12-36 with a mean was 28.90 and standard deviation was 3.78, respectively. The mean value depicted a significant difference among farmer categories with respect to their household food security. The computed chi-square value (32.140) also showed highly significant. Data indicates that a majority (59.82%) of the farmers could affirm their medium food security status leaving 27.68% high and more than one tenth (12.50%) of low food security status. The result is slightly differ from the results of Haque [12] that majority percent of farmers could affirm their high (58.57%), 37.14% medium and 4.29% low food security status.

3.1.18 Involvement in safety net programmes

Data in Table 1 showed the involvement in safety net programs by the respondent farmers ranged from 0 to 25, with a mean was 3.37 and standard deviation was 4.46. No significant mean difference was found among farmers categories. The chi-square value (4.35) also showed non-significant. An overwhelming majority of (92.6%) of farmers had low safety net recipient followed by only 6.5% had medium safety net recipient and an uncountable number (only 0.9%) had high safety net recipient. HISAL [15] in their survey found that about 20 percent of respondents had access to different safety net programs in *haor* (a marshy wetland ecosystem in the north eastern part of Bangladesh which physically is a bowl or saucer shaped depression that looks like inland seas during the monsoon floods).area of Kishoreganj district.

Table 1. Results of characteristics of respondent farmers in a sample

Characteristics	Percentage distribution of farmers			
	Range	Mean	SD	Chi-square (x^2)
1. Age	23-75	43.70	9.50	3 .91 , P <0.417 = NS
2. Personal education	.00-15.00	3.28	4.23	41.05, P<0.000 = HS
3. Family size	2-13	5.16	1.73	15.95, P< 0.003 = HS
4 Water and sanitation condition	3-18	10.62	2.64	8.333, P<0.080 = NS
5. Annual income	5-440	115.03	70.09	117.17, P< 0.000 = HS
6. Annual expenditure	6-576	107.61	64.83	99.75, P< 0.000 = HS
7. Savings	0-195	11.40	18.88	18.88, P< 0.004 = HS
8. Credit received	0-300	14.44	29.73	4.57, P <0.60 = NS
9. Utilization of credit	0-100	40.95	44.03	9.90, P<0.129 = NS
10. Training experience	0-24	1.46	4.30	25.80, P <0.000 = HS
11. Organizational participation	0-92	11.42	18.17	44.36, P<0.000 = HS
12. Participation in income generating activities	0-26	17.21	4.05	46.94, P<0.000 = HS
13. Cosmopoliteness	0-15	5.41	3.45	9.59, P<0.048 = S
14. Risk orientation	20-30	28.11	1.69	1.46, P<0.834 = NS
15.Environmental awareness	25-40	35.69	2.24	9.031, P<0.011= HS
16. Knowledge on flood coping mechanism	11-56	39.05	10.73	15.38, P<0.004 = HS
17. Year round household food situation	15-36	28.90	3.78	32.140, P<0.000 = HS
18. Involvement in safety net programme	0-25	3.77	4.46	4.35, P<0.361 = NS

NS=Non significant, S Significant and HS=Highly significant
Source: collected and calculated from data of sample

Table 2. Correlation between independent and dependent variables (N=336)

Dependent variable	Independent variables	Correlation coefficient (r)
Coping strategies towards household food security during flood period	1. Age	0.41
		0 .054
	2. Personal education	0.184**
	3. Family size	0-.036
	4. Water and sanitation condition	0.267**
	5. Annual income	0.242**
	6. Annual expenditure	0.186**
	7. Savings	0.191**
	8. Credit received	-0.171**
	9. Utilization of received credit	-0.241**
	10. Training Experience	0.002
	11. Organizational participation	0.123*
	12. Participation in IGA	0.448**
	13. Cosmopoliteness	0.320**
	14. Risk orientation	-0.093
	15. Environmental awareness	0.220**
	16. Knowledge on flood coping mechanism	0.424**
	17. Year round household food situation	0.198**
	18. Involvement in safety net programme	-0.017

*** Significant at 0.01 level, * significant at 0.05 level*
Source: collected and calculated from data of sample

3.2 Relationship between the Selected Characteristics and Household Food Security

As it was shown in Table 2, the coping strategies towards household food security during flood period (dependent variable) had a significant positive relation with 11 factors such as: personal education 0.184**, water and sanitation condition 0.267**, annual income 0.242**, annual expenditure 0.186**, savings 0.191**, organizational participation 0.123*, participation in income generating activities 0.448**, cosmopoliteness 0.320**, environmental awareness 0.220**, knowledge on flood coping mechanism 0.424** and year round household food security 0.198**. On the other hand, two factors (independent variables) like credit received -0.171** and utilization of received credit -0.241** had significantly negative relationship with coping strategies towards household food security during flood period (Table 2).

The correlation coefficient was significant incase of the above 13 independent variables and coping strategies towards household food security during flood period while the rest five other factors was insignificant. Based on the computed 'r' value, the concerned null hypothesis was rejected for the above mentioned significant (positive and negative) characteristics

and accepted in case of age (0.054), family size -0.036, training experience 0.002, risk orientation -0.093 and involvement in safety net program-0.017.

The research depended on collected several related literatures and selected only 18 relevant characteristics that would be played a vital role for coping strategies towards household food security. But five variables (age, family size, training experience, risk orientation and involvement in safety net programme) showed insignificant relation might be due to locality, respondents of the study area, their socio-economic condition, previous experience on disaster, severity of flood damage.

4. CONCLUSION

Among 18 selected characteristics on coping strategies towards household food security during flood period had significant positive relationship with 11 factors such as: personal education, water and sanitation condition, annual income, annual expenditure, savings, organizational participation, participation in IGA, cosmopoliteness, environmental awareness, knowledge on flood coping mechanism and household food security and with two factors like credit received and utilization of received credit had significantly negative relationship. Rest five variables (age, family size, training experience, risk orientation and involvement in safety

net programme) showed non significant relation.

5. RECOMMENDATIONS

Special attention on the above 11 characteristics that are positively significant should be given to increase the effectiveness of coping strategies towards household food security during flood period so that they can lead a sustainable food secured livelihoods. To overcome the adverse situation, steps should be taken to provide training on IGA's that can engage their idle maroon lifetime into busy life as well as more family income especially in the lean period. Training on flood coping techniques can change their both behavioural and psychological attitude that people employ to master, tolerate, reduce or minimize stressful events. Diversified job opportunities, diversified use of local and personal resources are created so that they can earn and cope by utilizing more resources during flood period. Therefore, requires a significant assistance and coordinated response by the GO, NGOs and other entities that can make better contribution in this area of development to help the flood affected community to recover from the disruption.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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