



Contribution of the Characteristics of Farmers to use of Coping Strategies towards Household Food Security

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Authors' contributions

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ABSTRACT

A study was carried out at each of three flood affected reverine villages of three upazilas (small administrative unit) under Jamalpur district in Bangladesh during September, 2011 to May, 2012 to find out the contribution of the characteristics of the farmers to the use of coping strategies towards household food security practiced by the farmers during flood. Data were collected from randomly selected 336 respondents both the qualitative and quantitative techniques and analyzed with the help of SPSS. Out of 18 characteristics, 11 had positive, 2 had negative and 5 had no significant relation with coping strategies towards household food security during flood period. Stepwise regression analysis revealed that six variables namely participation in income generating activities (IGAs) (20.1 percent), knowledge on flood coping mechanisms (8.5 percent), cosmopolitaness (6.5 percent), utilization percentage of received credit (2.0 percent), water and sanitation condition (1.6 percent) and year round household food situation (0.8 percent) were the major contributing variables which combindly explained 39.5 percent of total variations. Path analysis revealed that knowledge on flood coping mechanisms had the highest positive direct effects (0.285) and participation in IGAs had highest positive indirect effects (0.169) on coping strategy practices. Considering the relative contribution on the coping strategy practices towards household food security during flood period, based on their direct effects, the six variables could be arranged as follows knowledge on flood coping mechanism > participation in income generating activities > cosmopolitaness > water and sanitation condition > year round household food situation > utilization of received credit.

Keywords: Characteristics; contribution; food security.

1. INTRODUCTION

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 [1]. It becomes, therefore, very essential to describe some of these individual characteristics which may enable one in understanding and prediction human behavior with reasonable degree of accuracy. 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 behavioral changes that accuracies to farmers participation in flood coping strategies [1]. But it is necessary to limit the number of independent variables so that all the influencing factors of flood and/or coping strategies regarding household food can not be dealt within a single study. In this study 18 personal, economic, social and psychological characteristics of the farmers that were dealt and considered as independent variables. Farhad [2] and Sarker [3] found both negative and positive relationship between respondents' selected

characteristics and their flood coping strategies. On the other hand Shahiduzzaman [4], Mahzabin [5] and Rahman [6] found the same results on relationship between respondents' selected characteristics and their household food security status. From the above discussion, the present study has been undertaken to find out the characteristics of flood affected farmers that contributed on their coping strategies towards household food security.

2. METHODOLOGY

The study was carried out at each of three flood affected reverine villages of three upazilas (small administrative unit) under Jamalpur district in Bangladesh during September, 2011 to May, 2012 to find out the contribution of the characteristics of the farmers to the use of coping strategies towards household food security practiced by the farmers during flood. Historically, Jamalpur district is familiar to a habitat of fragile economy, extreme poverty and chronic food insecurity. The study area lies between 24°34 and 25°59 north latitude and between 89°40 and 89°56 east longitude having annual average rainfall 2174 mm and temperature varies from maximum 33.3°C to minimum 12°C. 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 and analyzed with the help of SPSS. Pearson's Product Moment Co-efficient of Correlation (r) was used to test the null hypothesis concerning the relationships between the variables. Five percent (0.05) level of probability was used as the basis for rejection of the null hypothesis. In order to find out the contribution of 18 selected characteristics as independent variables (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, cosmopolitaness, risk orientation, environmental awareness, knowledge on flood coping mechanisms, year round household food situation and involvement in safety net programs) of the respondents to their coping strategies towards household food security during flood period (dependent variable), the relationships among the variables were determined first by conducting correlation test. Then regression analysis was run to determine the independent variables that responsible for household food security during flood period. Stepwise multiple regression analysis finally computed to determine the actual contribution of the selected independent variables to the dependent variable. Path analysis was also conducted to assess the direct and indirect effects of the independent variables on dependent variable.

3. RESULTS AND DISCUSSIONS

3.1 Relationship between the Selected Characteristics and Household Food Security

The coping strategies towards household food security during flood period had significantly positive relation with 11 factors (independent variables) 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**), cosmopolitaness (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. Thus the correlation coefficient was significant incase of the above 13 independent variables while the rest five other factors was insignificant. This five variables (age, family size, training experience, risk orientation and involvement in safety net programme) showed non significant relation might be due to locality, respondents of the study area, their socio-economic condition, previous experience on disaster, severity of flood damage. 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 programme (-0.017). The results of correlation test between the independent and dependent variables have been shown in Table 1.

3.1.1 Contribution of the selected variables to the coping strategies towards household food security during flood period

Linear multiple regression analysis was computed in order to determine the contribution of various characteristics of the farmers to their coping strategies towards household food security. Only 13 variables which had significant relationship (both positive and negative) with coping strategies towards household food security during flood period were included in the regression analysis model. The regression coefficient of only six variables namely water and sanitation condition, utilization percentage of received credit, participation in income generating activities, cosmopolitaness, knowledge on flood coping mechanism and year round household food situation were statistically significant indicating that these six variables had significant contribution to the coping strategies towards household food security practiced by the farmers during flood period. The other seven variables had no significant contribution to the same (Table 2).

The R^2 value was 0.403 and the corresponding F value was 15.463 which were significant at 0.000 levels. The R^2 value indicated that 40.3 percent of the total variation in the coping strategies towards household food security practiced by the farmers during flood period was explained by the

6 variables included in the regression analysis. The adjusted R^2 however, was shown 0.337 which indicates that the model accounted for 33.7 percent of total variance in the criterion variable indicating no or little multi-co-linearity effect among the predicting variables. Therefore, to avoid the multi-co-linearity problem and to ascertain the individual contribution of predicting variables on the criterion variable, stepwise multiple regression analysis was run. It was observed from the Table 2 that out of 13 variables, only six variables namely water and sanitation condition, utilization of received credit, participation in IGA, cosmopolitaness, knowledge on flood coping mechanism and year round household food situation were entered into the regression model. The results of step wise multiple regressions are presented in Table 3.

This time the R^2 value was 0.395 with an F value of 35.815 (significant at 0.000 level). The R^2 value indicated that 39.5% of the total variation in coping strategies towards household food security during flood period was explained by these six variables together and the rest 60.5% remained unexplained. The adjusted R^2 , however, was found 0.384 which was very close to the R^2 value indicating that the model accounted for a dependable analysis. However, the six variables had significant contribution to the coping strategies towards household food security during flood period and other 12 variables had no significant contribution to the same.

Table 1. 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	0.054
	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. Cosmopolitaness	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 program	-0.017

** Significant at 0.01 level, * significant at 0.05 level

Table 2. Regression coefficient of coping strategy towards household food security practices by the farmers with their selected characteristics

Selected characteristics of the farmers	Un standardized coefficients	Standardized coefficients	t-Value	Signifi- cant level
	B	Beta		
Constant	34.855		5.860	0.000
Personal education	-0.110	-0.062	-1.128	0.260
Water and sanitation condition	0.360	0.127*	2.683	0.008
Annual income	0.008	0.071	0.570	0.569
Annual expenditure	-0.008	-0.070	-0.663	0.508
Savings	-0.012	-0.029	-0.445	0.650
Credit received	-0.003	-0.013	-0.244	0.807
Utilization of received credit	-0.021	-0.125*	-2.286	0.023
Organizational participation	-0.008	-0.020	-0.374	0.709
Participation in IGA	0.527	0.284**	5.703	0.000
Cosmopolitaness	0.582	0.235**	4.673	0.000
Environmental awareness	0.004	0.001	0.023	0.981
Knowledge on flood coping mechanism	0.216	0.309**	6.127	0.000
Year round household food situation	0.254	0.128*	2.368	0.018
R ² = 0.403, Adjusted R ² = 0.377, F value = 15.463, P = 0.000				

** Significant at 0.01 level, * significant at 0.05 level

Table 3. Regression coefficient of the statistically significant characteristics of the farmers with their practices of coping strategy towards household food security

Selected characteristics of the farmers	Un standardized coefficients	Standardized coefficients	Signifi- cant level	t-Value
	B	Beta		
Constant	37.664		0.000	
Water and sanitation condition (X ₁)	0.316	0.111	0.016*	2.431
Utilization of received credit (X ₂)	-0.025	-0.147	0.001**	-3.329
Participation in IGAs (X ₃) condition	0.517	0.279	0.000***	5.970
Cosmopolitaness (X ₄)	0.502	0.203	0.000***	4.491
Knowledge on flood coping mechanism (X ₅)	0.200	0.285	0.000***	6.051
Year round household food situation (X ₆)	0.189	0.095	0.038*	2.083
R ² = 0.395, Adjusted R ² = 0.384, F = 35.815, P = 0.000				

*** P<0.001 level ** P<0.01 level * P<0.05

3.2 Coping Strategy Model

Referring to the statistics given in Table 3 the regression model for coping strategies towards household food security during flood period is as follows:

$$Y = 37.664 + 0.316 X_1 - 0.025 X_2 + 0.517 X_3 + 0.502 X_4 + 0.200 X_5 + 0.189 X_6$$

Where,

Y = Coping strategies towards household food security during flood period,
 X₁ = Water and sanitation condition, X₂ = Utilization of received credit,
 X₃ = Participation in IGA, X₄ = Cosmopolitaness,
 X₅ = knowledge on flood coping mechanism and
 X₆ = year round household food situation.

The coping strategy model means that the coping strategies towards household food security during flood period was 37.664 out of the central informative value 64.86 (mean of coping strategies). In view of the significant contributions of the above mentioned six factors to the variation in the coping strategies towards household food security during flood period practiced by the farmers, the researcher rejected the concerned null hypothesis and concluded that each of the above six factors had significant effect on coping strategies towards household food security during flood period practices by the farmers. It is evident from the coping strategy model in the following way:

“The flood affected people who had better water and sanitation condition, were able to properly utilize their received credit, more actively participated in income generating activities with higher cosmopolitaness, better knowledge on flood coping mechanism, adequately secured their year round household food situation were

found to have better to apply coping strategies towards household food security during flood period.”

The R² value found in the stepwise regression was 0.395, which was significant at 0.000 levels. Therefore it could be concluded that whatever variation was in the coping strategy towards household food security, it was mainly due to the contributions of these six variables. The unique contribution by each of the variables was also determined by taking the change in R² value occurred for entered of a particular variable in the stepwise regression model. Among the six variables participation in income generating activities alone contributed the major proportion (20.1%) of the variation in practice flood coping strategies towards household food security during flood period followed by knowledge on flood coping mechanism (8.5%), cosmopolitaness (6.5%), utilization percentage of received credit (2.0%), water and sanitation condition (1.4%) and year round household food situation (0.8%)(Table 4).

3.2.1 Path analysis for measuring direct and indirect effects of selected independent variables on coping strategies practices towards household food security during flood period

In the present study, ‘path analysis’ was done to have clear understanding of direct and indirect effects of selected six variables which were entered into the stepwise regression model on the coping strategy practices towards household food security during flood period in the following way: at first the correlation matrix with path coefficient (p) of six significant characteristics were prepared. In fact path-coefficient, p is an inherent correlation owned by the respondent in automatic manner. It is the direct effect of specific characteristics on dependent variable

Table 4. Stepwise multiple regression analysis showing contribution of the selected characteristics to the practice of flood coping strategies towards household food security during flood period

Variables entered	Multiple R ²	Change in R ²	Variance explained	Significance level
Participation in IGA	0.201	0.201	20.1	0.000
Knowledge on flood coping mechanism	0.286	0.085	8.5	0.000
Cosmopolitaness	0.351	0.065	6.5	0.000
Utilization of received credit	0.371	0.020	2.0	0.001
Water and sanitation condition	0.387	0.016	1.6	0.003
Year round household food situation	0.395	0.008	0.8	0.038

Table 5. Path coefficient showing the direct and indirect effects of selected independent variables on the practices of coping strategy towards household food security during flood period

Independent variables	Effect of independent variable			Variables through which substantial indirect effects are channeled	
	Direct	Indirect	Total		
Water and sanitation condition (X ₁)	.111	.156114	.267114	.003381	Utilization of received credit (X ₂)
				.045198	Participation in IGA (X ₃)
				.01624	Cosmopolitaness (X ₄)
				.06954	Knowledge on flood coping mechanism (X ₅)
				.021755	Year round household food situation (X ₆)
Utilization of received credit (X ₂)	-.147	-.093966	-.240966	-.017298	Participation in IGA (X ₃)
				-.047705	Cosmopolitaness (X ₄)
				-.02337	Knowledge on flood coping mechanism (X ₅)
				-.00304	Year round household food situation (X ₆)
				-.002553	Water and sanitation condition (X ₁)
Participation in IGA (X ₃)	.279	.169266	.448266	.0297	Cosmopolitaness (X ₄)
				.097862	Knowledge on flood coping mechanism (X ₅)
				.016704	Year round household food situation (X ₆)
				.016038	Water and sanitation condition (X ₁)
				.008928	Utilization of received credit (X ₂)
Cosmopolite ness (X ₄)	.203	.117385	.320385	.04185	Knowledge on flood coping mechanism (X ₅)
				.01729	Year round household food situation (X ₆)
				.00888	Water and sanitation condition (X ₁)
				.034545	Utilization of received credit (X ₂)
				.01482	Participation in IGA (X ₃)
Knowledge on flood coping mechanism (X ₅)	.285	.138789	.423789	-.004085	Year round household food situation (X ₆)
				.027084	Water and sanitation condition (X ₁)
				.012054	Utilization of received credit (X ₂)
				.093186	Participation in IGA (X ₃)
				.010556	Cosmopolitaness (X ₄)
Year round household food situation (X ₆)	.095	.10336	.19836	.025419	Water and sanitation condition (X ₁)
				.004704	Utilization of received credit (X ₂)
				.048546	Participation in IGA (X ₃)
				.036946	Cosmopolitaness (X ₄)
				-.012255	Knowledge on flood coping mechanism (X ₅)

and the indirect effects of other characteristics working in group are obtained by multiplying the column values and the standard coefficient (β) value of each variable. Variables through which substantial indirect effects were channeled were also explored. The 'path coefficient' of selected independent variables with respect to coping strategy practices is shown in Table 5.

Data indicate that six variables namely participation in income generating activities, knowledge on flood coping mechanism, cosmopolitanism, utilization percentage of received credit, water and sanitation condition and year round household food situation had direct positive and negative effect on coping strategy practices towards household food security during flood period. The mentioned also indicate that among the independent variables knowledge on flood coping mechanism had the highest direct positive value (0.285) on coping strategy practices and its total indirect effect was 0.138789, which was exerted through participation in income generating activities (0.093186), cosmopolitanism (0.010556), utilization of received credit (0.012054), water and sanitation condition (0.027084) and year round household food situation was (-0.004085).

Participation in income generating activities had the second highest direct positive effect (0.279) on coping strategy practices. The total indirect effect of participation in income generating activities was 0.169266 which was exerted through knowledge on flood coping mechanism (0.097862), cosmopolitanism (0.0297), utilization of received credit (0.008928), water and sanitation condition (0.016038) and year round household food situation (0.016704).

Among the six variables mentioned above, participation in income generating activities, knowledge on flood coping mechanism and cosmopolitanism had more direct effects than their indirect effects, while utilization of received credit, water and sanitation condition and year round household food situation had more indirect effects than their direct effects on coping strategy practices. The main bold face values are direct effects and non-bold values are path wise indirect effects and the row wise sum of direct and indirect effects must be equal to the correlation coefficient (r). Considering the relative contribution on the coping strategy practices towards household food security during flood period, based on their direct effects, the six

variables could be arranged as follows knowledge on flood coping mechanism > participation in income generating activities > cosmopolitanism > water and sanitation condition > year round household food situation > utilization of received credit.

4. CONCLUSION

Among the 13 factors (those were significantly correlated with coping strategy towards household food security), only six factors, namely water and sanitation condition, utilization percentage of received credit, participation in IGAs, cosmopolitanism, knowledge on flood coping mechanism and year round household food situation had significant contribution to practice the coping strategy towards household food security during flood period. According to the regression model it was evident that the rural people who had better water and sanitation condition, could properly utilize their received credit, more actively participated in IGAs, with higher cosmopolitanism, better knowledge on flood coping mechanism, adequately secured their year round household food situation were found to more favourably to apply coping strategies towards household food security during flood period.

5. RECOMMENDATIONS

Considering the relative contribution on the coping strategy practices towards household food security during flood period, based on their direct effects, the six variables could be arranged as follows knowledge on flood coping mechanism > participation in IGAs > cosmopolitanism > water and sanitation condition > year round household food situation > utilization of credit. Thus, it can be stated that most of the variables related to household income which played a vital contribution towards increasing effectiveness of coping strategy practices by the flood affected people towards their household food security during flood period. Both GO and NGOs can make better contribution in this area of development through dispersing soft loan, training, motivation etc.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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