Livelihood Shocks and Coping Strategies: An Empirical Study of Bangladesh Households

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Abstract

Households plan strategically for facing risks associated with livelihood security. Choosing a particular set of coping strategies depends on a number of factors including the types of crisis households face and options available. Often, poor households risk future income generating capacity for maintaining current food consumption. This paper examines strategies used by rural households for coping with the shocks and investigates whether there is any distinctive pattern in adopting these strategies. Using a cross section data set covering 1600 households from the northwestern Bangladesh, we estimate a trivariate probit model for explaining the adoption of coping strategies. Results indicate that choice of coping strategies depend on diversity and stability of household income sources. Households with higher education have greater access to stable incomes sources and have more income sources, and so are less likely to adopt ex-post coping strategies. Households with more assets are more likely to divest assets or obtain secured loans rather than rely on unsecured loans. Wealthier households are not less likely to adopt current adjustment strategies, suggesting that there is a general sequence of coping strategies that all households follow, irrespective of the assets they own.

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1. Introduction

A number of studies of famine in South Asia and Africa have suggested that people who live in conditions which put their livelihood strategies at recurrent risk, will develop strategies to minimize risk to their livelihood. In most studies, the household is taken as the unit of analysis because it is assumed that decisions about production, investment and consumption are taken primarily at the household level. Some studies also point to the importance of responses that are formulated at a community level and identify factors such as increasing integration of urban and rural food and labor markets which have reduced or changed the significance of community level strategies over time (Corbett J. 1988).

Several different classifications of coping strategies are used in these studies. Corbett (1988) classifies the strategies into precautionary strategies – the strategies that households use in response to repeated exposure to the same type of non-acute risk, and crisis strategies—strategies to cope with an unusually severe threat to food security. A key argument in coping strategy literature is the sequence in which households take certain strategies according to levels of distress. Watts (1983) suggests that, “households do not respond arbitrarily to a food crisis for which they are in some sense conceptually prepared; rather they do so serially, with respect to the intensity of what one might call famine signals.” His survey led him to group the 10 most commonly observed responses into the following sequence:

1. collect famine foods
2. borrow grain from kin
3. sale of labor power (migration)
4. engage in dry season farming (migration)

5. sale of small livestock
6. borrow grain or money from merchants/ moneylenders
7. sale of domestic assets
8. pledge farmland
9. sale of farmland
10. migrate permanently.

Cutler (1986) describes a model of pre-famine behavior as applied to Beja famine migrants in Sudan. There emerges a clear sequence of coping strategies which fall into three distinct stages:

a) Adaptive strategies: sale of livestock, labor migration, use of credit, and self employment.

b) Sale of key productive assets: sale of tools, sale of animals, sale of land.

c) Mass migration.

Rahmato (1987) suggests that the elements of famine survival may be grouped into four sequential series of activities. In the first stage of this sequence households would cope with a risk to their livelihood by austerity and reduced food consumption. At the same time there would be increased reliance on loans and transfers of food and assets within and between families. Temporary migration in search of wage employment formed the second stage. Once these options had been exhausted farmers would rely on divestment, but this is selective and gradual and the exact sequence in which assets were sold or mortgaged depended very much on current market conditions. Detailed case studies of the transactions that households undertook and why are reported. The fourth and terminal stage of these strategies was crisis migration and the decision to resort to this was often taken at a community as well as a household level.

Dunn and Valdivia (1996) make an important distinction between ex-ante strategies of income diversification, which help to reduce households' exposure to shocks, and ex-post coping strategies to offset the effects of shocks after they occur. They argue that in Andean semi-arid regions, households with more opportunities for ex-post adjustment (greater assets in the form of livestock), have fewer incentives for ex-ante risk-reducing strategies.

According to Frankenberger (1992), when households suffer a shock such as the floods, they do not remain passive but employ several coping strategies. These coping strategies are fallback mechanisms for when habitual means of meeting needs are disrupted. The first thing households do when they suffer a shock is to attempt to minimize risks and manage losses to ensure some minimal level of sustenance. The second strategy employed by households in distress is divestment, or the gradual disposal of assets. Frankenberger (1992) classifies asset disposal as a coping strategy into several phases, with liquid assets, such as jewelry, being disposed of first and productive assets later. When productive assets are disposed of, it becomes more difficult for the person or household to return to a pre-crisis state. Finally, the household or individual may embark upon distress migration, which is a sign of failure to cope with the crisis. In summary, the coping strategy literature suggests that there is a general sequence of different types of strategies that households adopt sequentially as stress becomes more prolonged, initially adopting strategies that will not jeopardize future earnings, and only resorting to strategies that will reduce future earnings if necessary.

We hypothesize that the pattern of coping strategies that households adopt depends on specific characteristics of the household and the nature of the shocks that the households experience. In order to test these hypotheses, we divide coping

strategies into three categories: “current adjustment”, “unsecured borrowing”, and “secured borrowing/divestment”. Current adjustment strategies include strategies of reducing household food consumption, shifting to less preferred foods with lower cash cost, and reallocating household labor to increase current income. Unsecured borrowing refers to borrowing that is not secured by providing household assets as collateral – households borrow against expected future incomes. The main sources of unsecured borrowing are from relatives, moneylenders, merchants, and NGOs. NGOs normally target loans to poorer households. Finally, households may cope with shocks by divesting of assets or borrow against assets owned by the household.

We hypothesize that households with more assets will be more likely to use divestment or secured borrowing strategies rather than unsecured borrowing, on the assumption that unsecured borrowing has a higher cost than secured borrowing. In addition, households with more assets may be less likely to undertake current adjustment strategies, again because the cost of divestment strategies is comparatively less for them.

Education may affect selection of coping strategies in several ways. One possibility is that households with higher education are able to secure higher and more stable incomes, thus reducing the need to adopt any kind of ex-post coping strategy. Another way that education may affect choice of coping strategy is through increased access to information about the potential costs associated with different kinds of coping strategies. For instance, education may provide household members with increased awareness of the health costs associated with reducing diet quantity and quality, and numeracy skills may provide individuals with greater understanding of costs of loans from moneylenders.

The kinds of coping strategies adopted by households may also depend on the type of shocks that stress household livelihoods. Some shocks, such as floods or

cyclones, may have unforeseen and sudden onset, have the potential to suddenly destroy household assets, but have a limited duration. Other shocks, such as droughts, may provide households with earlier warning of their onset, have longer term (yearlong) impacts on agricultural production, but with less capacity to destroy household assets. Illness may afflict household members suddenly with prospects for long-term, even permanent loss of household earning capacity. Households are aware of some kinds of shocks, such as dowry payments, well in advance of their onset, and may pursue more well-planned strategies to smooth the adjustments over time. Given the different characteristics of shocks in terms of the timing of their onset and the kinds of costs they impose on households, we expect that the probability of adopting a particular type of coping strategy will depend on the type of shock that the household experiences.

The paper presents the determinants household selection of three types of coping strategy: i) current adjustment, ii) unsecured loans, and iii) divestment and secured loans. The common determinants for both of the stages include incident of natural disasters, productive asset loss, health problems, and other income vulnerabilities. In addition, a number of household characteristics: education of household head, food security status, and sex of household head, non food expenditure (as a proxy for household income level), variables measuring diversity of income sources and access to stable employment, value of household assets, are also included as explanatory variables for household choice of coping strategy.

2. Coping Strategies in Northwest Bangladesh: Data and Methods

Many households in Bangladesh continue to face problems in obtaining stable and adequate access to food, acute and chronic illness, losing productive assets, natural disasters, and a range of other crisis and shocks. Food insecurity remains one

of the most visible manifestations of their poverty and it has attracted considerable debate at both a theoretical and a policy level. Food security varies from the recurrent and predictable food deficits faced by many in the 'hungry season' prior to the harvest, to more severe entitlement failures that arise from a mix of socioeconomic, environmental, health and political factors.

Natural disasters play a major role in the livelihoods of people living in the northwestern part of Bangladesh. Flooding is a normal part of the ecology of Bangladesh, a country through which three major rivers drain into the Bay of Bengal. The northwestern part of the country is particularly vulnerable to flood as it lies right on the south of Meghalayan region of India. Generally floods lead to major crop losses, losses of other assets and lower employment opportunities and thus affect household incomes as well as market prices. Bangladesh experienced seventeen highly damaging floods in the 20th century, highest in the world. Since independence, the country has experienced floods of a vast magnitude in 1974, 1987, 1988, l996, 1998, 2000 and 2004 (Hossain, A, 2004). The 1998 flood, dubbed the flood of the century, was especially serious, however, because of the depth of water and its duration. At its peak in early September, the 1998 flood covered two thirds of Bangladesh, causing severe damage to the monsoon rice crop and threatening the food security of tens of millions of households.

Parts of the northwest are also plagued with droughts that create significant hardships for all households living in those areas. There were severe droughts in 1979, 1981, 1982 and 1989. The intensification of drought is now a cause of high concern. The drought occurrence cycle is becoming narrower and narrower. Apart from crop loss of that particular year, drought has other long term implications. The

soils dry up and water tables fall drastically making land unfit for agriculture. The poor are the worst victims of this scenario. Research shows that shortage of water decreases agricultural activities which forces down their wages while lack of access to safe water increases their vulnerability to diseases especially diarrhea (Commonwealth Knowledge Network).

Households in drought prone areas suffer more from food shortage and illness. Poverty is more intense and widespread; few NGOs or other service providers work there; agriculture is less productive but more expensive; and credit is only available from money lenders, with their higher interest rates. Households living in drought prone areas have even higher food insecurity than flood prone areas. The majority of the farmers in these areas have difficulty in growing irrigated rice due to soil conditions and poor access to water. The wage rate is the lowest in the region. Relatively wealthier households engage only in agriculture (14%) and one third of the households are agriculture laborers (Rashid 2002).

Illness is another major crisis that the households in the northwestern Bangladesh suffer most. Households in Bangladesh lose seven to nine workdays every month on an average due to illness. This is especially significant for the poor households who rely on selling labor for their survival (Rashid 2002). Finally, all households face large financial costs associated with important social or family events, such as funerals, marriages, religious and community feasts, and other obligations.

Depending on the severity of crisis and nature of shocks, households adopt a range of different strategies. This paper analyzes the determinants of coping strategies adopted by households and to empirically examine the sequential nature of the strategies. The analysis uses cross section data on 1600 households from a livelihoods survey collected by CARE and DFID in Bangladesh during April and May

2001. A multi stage random sampling design was used to make the sample representative at the CARE beneficiary level and at the ecological zone level. The northwest study region was divided into two strata: vulnerable areas (drought prone and flood prone areas) and non-vulnerable areas and samples of equal size were drawn from each stratum. From a sampling frame of all villages in the study area, 40 villages are randomly selected from each stratum. From each village, 20 households are randomly selected. See Rashid (2002) for more details about the sampling approach.

Table 1 gives the incidence of various crises among the sample households. Shortage of food and illness are the two most prevalent crisis faced by Bangladesh households. About 81.7 percent of households faced food shortage while 74.5 percent of households experienced illness in the family during 2000. Numbers in Table 1 indicate that the incidence of these two crisis increases with poverty. Loss of animals and poor crop production are also very common crisis afflicting 39.7 and 21.5 percent of the sample households. These two and other shocks listed in Table 1 are not asset neutral and their incidence rate is generally higher among richer households. Thus the incidence rate of shocks is not uniform among all households and contrary to popular belief the incidence rate may be higher among the richer households than poorer households for certain shocks.

Table 2 lists coping strategies adopted by sample households. These coping strategies may be classified into three broad categories: current adjustment strategies, unsecured borrowing strategies and divestment and secured borrowing strategies.

Current Adjustment:

Among current adjustment strategies, adjustment to meals is the most common strategy - adopted by 72.4 percent of households. These adjustments to

meals include reducing the number of meals eaten in a day or going a whole day without eating, substituting less preferred and less expensive foods and limiting portions at meal times. The adoption of this strategy is even more prevalent among the poorest of the households, as would be expected given the poverty level and vulnerability to shocks and stresses (Rashid 2002). About 4.6 percent of households have consumed unusual foods such as non edible tubers and leaves during a shock to cope with the food shortage.

Unsecured loans:

The analysis of the household data set confirmed that unsecured borrowing was one of the main coping mechanisms used by households in response to the shocks. Sixty-seven percent of the households have taken credit in any given year in Northwest Bangladesh. The most common source of loans during a shock is relatives and neighbors. Households borrow from neighbors or relatives (24.1 percent of households did this), from NGOs (20.8%), from local moneylenders (16%), from Grameen Bank (10.7%) and from other Banks (3.8%). Households borrow during a period of crisis and the demand for financial credit for food purchases during a flood period is extensive. The extreme poor households borrow from local moneylenders , the *mahajans*, with a high interest rate (120 to 240%) as NGO credit is relatively inaccessible to them. NGOs target the poor households that are slightly better off than extreme poor households as they are more likely to repay.

Divestment and secured loans:

Divestment of assets and secured borrowing is a very important coping strategy for households exposed to severe shocks. In severe shocks where current adjustment alone cannot mitigate the livelihood shocks selling household assets becomes inevitable. For example, to pay a large medical bill or dowry, or to replace an ox that died during a disaster a household may have to sell an asset to generate sufficient

cash. Selling of a cow or a bullock (11.2 percent of households did this), selling of a small animal (8.9 percent) are two most common divestment and secured borrowing strategies adopted by sample households for coping with shocks.

Although divestment and secured borrowing is an important strategy available to households for mitigating shocks, it is adopted less frequently than current adjustment. Eighty-nine percent of the households have used a current adjustment strategy, 64 percent households have used unsecured borrowing strategy while only 25 percent of households used divestment and secured borrowing. Twenty-three percent of households have used current adjustment exclusively; four percent households used only borrowing strategy; one percent have used a divestment and secured borrowing strategy without using a current adjustment strategy and a borrowing strategy. Sixteen percent of the households used all three types of coping strategies while five percent of the households did not use any of the listed strategies for coping with risks. Thus the adoptions of coping strategies are interdependent and cannot be analyzed in isolation. A proper empirical model for explaining coping strategy choices need to take these interdependencies into account. We propose using a Trivariate Probit model for explaining the adoption of current adjustment, unsecured borrowing and divestment and secured borrowing strategies for coping with livelihood shocks.

Empirical Models:

Two empirical models of household selection of coping strategies are estimated to assess the impacts of household characteristics and types of shocks on choice of coping strategies. The first model is a single-equation Probit model with binary dependent variable that takes a value of 1 if the household adopts any kind of coping strategy, and 0 otherwise. Independent variables used to explain adoption of coping strategies are given in Table 3. The first five are dummy variables corresponding to

types of shock that the household experienced. The number of months of access to food and household food expenditures are measures related to household current income level. Total value of assets is the monetary value of all assets owned by the household. The remaining variables are included to capture dimensions of householeshold income diversification. A set of three dummy variables take the value of one if the household has two, three, or four or more sources of income, respectively. The final dummy variables identify whether or not the household is engaged in agricultural daily wage labor, non-agricultural daily wage labor, a business, or has a permanent salaried job. The first two categories of daily wage employment are considered to be quite unstable income sources, especially agricultural labor, which is highly seasonal by nature. In contrast, business and permanent salaried jobs are considered to be more stable household income sources. The final variable represents the number of years of formal schooling completed by the household head.

Because of the simultaneous nature of the household choices about combinations of coping strategies to adopt, a Trivariate Probit model was estimated to explain the choice of the households' coping strategies where y_1, y_2 and y_3 are the three binary dependent variables. Here y_1 is current adjustment that takes one if the household adopts current adjustment strategy and zero otherwise, y_2 is unsecured borrowing that takes one if the household adopts unsecured borrowing strategy and zero otherwise and y_3 is divestment and borrowing from secured sources that takes one if the household adopts divestment or secured borrowing strategy and zero otherwise. The Trivariate Probit model:

$$y_1 = \begin{cases} 1 \text{ if } \mathrm{X}\beta + \varepsilon_1 > 0 \\ 0 \text{ otherwise} \end{cases}$$

$$y_2 = \begin{cases} 1 \text{ if } \mathrm{Z}\gamma + \varepsilon_2 > 0 \\ 0 \text{ otherwise} \end{cases} \tag{1}$$

$$y_3 = \begin{cases} 1 \text{ if } \mathrm{W}\theta + \varepsilon_3 > 0 \\ 0 \text{ otherwise} \end{cases}$$

With covariance

$$\begin{pmatrix} \varepsilon_1 \\ \varepsilon_2 \\ \varepsilon_3 \end{pmatrix} \rightarrow N\left(0,\ \Sigma\right) \tag{2}$$

Instead of numerical approximations, the GHK (Geweke-Hajivassiliou-Keane) smooth recursive simulator was used to approximate the integrals.

L is the lower triangular Cholesky decomposition of Σ, such that $LL' = \Sigma$:

$$L = \begin{pmatrix} l_{1l} & 0 & 0 \\ l_{21} & l_{22} & 0 \\ l_{31} & l_{32} & l_{33} \end{pmatrix} \tag{3}$$

Hence:

$$\begin{pmatrix} \varepsilon_1 \\ \varepsilon_2 \\ \varepsilon_3 \end{pmatrix} = \begin{pmatrix} l_{1l} & 0 & 0 \\ l_{21} & l_{22} & 0 \\ l_{31} & l_{32} & l_{33} \end{pmatrix} \begin{pmatrix} \nu_1 \\ \nu_2 \\ \nu_3 \end{pmatrix}$$

where the ν_i are independent standard normal random variables.

The GHK simulator evaluates $\Pr\left(\varepsilon_1 < \mathrm{b}_1,\ \varepsilon_2 < \mathrm{b}_2, \varepsilon_3 < \mathrm{b}_3\right)$ where $\left(\varepsilon_1, \varepsilon_2, \varepsilon_3\right)$ are normal random variables with covariance structure presented in (2). The simulated probability function is as follows:

$$\widetilde{\Pr}_{GHK} = \frac{1}{D}\sum_{d=1}^{D}\left\{\Phi\left[\mathrm{b}_1 / l_{11}\right]\Phi\left[\left(b_2 - l_{21}\nu_1^{*d}\right)/ l_{22}\right]\Phi\left[\left(\mathrm{b}_3 - l_{31}\nu_1^{*d} - l_{32}\nu_2^{*d}\right)/ l_{33}\right]\right\} \qquad (4)$$

where ν_1^{*d} and ν_2^{*d} are the d-th draw of ν_1^* and ν_2^*, and where $\Phi(.)$ is the univariate normal CDF. The simulated probability (4) is then plugged into the likelihood function, and standard maximization techniques are used.

3. Empirical Results

Income diversification and access to more stable sources of income are important ex-ante strategies that households may pursue to minimize the impacts of shocks on income and consumption patterns. In Bangladesh, education provides households with better access to this type of ex-ante strategy. Table 4 demonstrates that education of household head is positively related with income diversification and greater access to stable jobs. The percent of households with four or more sources of income increased from less than 60% of households where the head has no education to over 86% for households with post-secondary education. Also reliance on agricultural and non-agricultural daily labor decreases with education level of the household head, while access to business and salaried jobs increases.

Results from the Univariate Probit estimation are given in table 5. The probability of adopting a coping strategy is positively associated with household exposure to all kinds of shocks (natural disaster, loss of productive assets, illness, and other). Households with more months of adequate access to food are less likely to adopt any coping mechanism, but interestingly, higher levels of household income (expenditures) and assets do not reduce the probability that households adopt coping strategies. Households with more assets are actually more likely to adopt some coping mechanisms (This result is significant at the 10% level.) These results indicate that,

at least for the households included in this survey, higher levels of current income and greater household assets do not protect households from the need to adopt strategies to cope with shocks. Greater income diversification, as measured by the number of sources of household income, reduces the probability that households need to adopt coping mechanisms. The model results suggest that any number of income sources greater than one reduces the probability that coping mechanisms need to be adopted. This result indicates that the ex-ante strategy of income diversification is an effective way to reduce reliance on ex-post coping mechanisms, which impose greater costs on household welfare and reduce resilience to cope with future shocks. Households engaged in more unstable sources of income, especially non-agricultural daily labor, are more likely to adopt coping mechanisms.

The results from the maximum likelihood estimates of parameters for the Trivariate Probit model, reported in Table 6, reveal patterns of choice of coping strategy that depend on the type of shock that the household is exposed to and on household characteristics. The likelihood that households will adopt current adjustment strategies is positively related to all types of shocks, except payment of dowry. This result is consistent with the fact that households can anticipate the need for dowry payments and need not resort to short run coping strategies. Households with more months of adequate food are less likely to adopt current adjustment strategies, but level of household expenditures and value of assets do not significantly affect adoption of current adjustment strategies. Households with diversified incomes (more than one source of income) are less likely to adopt current adjustment strategies, and households engaged in agricultural daily wage labor are more likely to adopt current adjustment strategies. Therefore, households with less stable incomes are more likely to adopt current adjustment strategies

Exposure to all types of shock increase the probability that households will pursue unsecured borrowing strategies, with the exception of loss of productive assets. This finding is unexpected, since borrowing to replace productive assets should normally be an economically viable activity. Perhaps this result is due to the fact that the implicit or explicit costs of unsecured borrowing are greater than the expected returns from replacing the lost productive assets. The likelihood of unsecured borrowing is lower for households with more assets. Comparing with the results from the third equation for divestment and secured borrowing, households with more assets are more likely to divest of assets or borrow against their collateral rather than take out unsecured loans. This result also suggests that the costs of unsecured loans are very high. Furthermore, households with more assets are less likely to be eligible for unsecured loans from NGOs, thus excluding them from access to lower-costs sources for unsecured loans. Households with higher expenditure (income) levels are more likely to obtain unsecured loans. Since unsecured loans are borrowed against expected future incomes, households with higher current incomes may expect to have higher future incomes, and therefore face lower expected opportunity costs of loan repayments in the future. Potential borrowers are also more likely to offer unsecured loans to households with higher incomes, since these households would be more likely to have the necessary funds to repay the loan.

The probability that households will divest assets or obtain secured loans is positively related to exposure to all forms of shock. Reliance on this type of coping strategy is also, unsurprisingly, positively correlated with the value of assets owned by the household. Households that lack assets obviously cannot rely on these strategies, while the cost of these strategies for households with many assets is relatively lower. A more surprising result, however, is the very low magnitude of the marginal effect of the asset variable. While households with more assets are more likely to divest or

obtain secured loans, the increase in the probability that they will do so is very small for a given increase in the value of assets. Note also that the magnitude of the marginal effect is very similar, but opposite in sign, to the marginal effect of value of assets on unsecured loans. This suggests that as household value of assets increase, households substitute divestment or secured loans for unsecured loans. As in the case of unsecured loans, the diversification and stability of household income sources do not have any significant impact on the probability that households will divest or borrow against their assets.

The direct impacts of education of the household head on choice of coping strategy are very limited. More educated household heads are not any less likely to adopt any coping strategy, as shown in the results from the Univariate Probit model in Table 5. However, it should be emphasized that this model also includes variables related to diversity and stability of household income, which we have seen are highly correlated with education, and also explain variation in the probability of adopting a coping strategy. Thus, the main benefit of education is that it provides households with access to more stable incomes, which reduces the need for households to adopt ex-post coping strategies. In terms of the particular types of coping strategies adopted, households with higher education are less likely to obtain unsecured loans. This may be explained by the fact that households with more education, numeracy skills in particular, may be better able to assess the true costs of unsecured loans from moneylenders.

4. Conclusions

This paper argues that the particular responses adopted by a household vary according to the causes of the crisis, types of crisis, and household characteristics. Empirical results from models of adoption of coping strategies reveal important

patterns of how households respond to different types of shocks according to household characteristics, most importantly the number of income sources and access to stable income sources, household ownership of assets, and education level of household head.

One set of choices that households face is between ex-ante strategies to diversity and secure stable sources of income, to reduce the likelihood of experiencing livelihood shocks. Access to more stable income, through diversification of income sources or securing more stable forms of employment, reduces overall reliance on coping strategies, and the types of strategy that households with more secure incomes use less are current adjustment strategies. With the exception of increased reliance on unsecured borrowing by agricultural daily laborers, households with more stable incomes resort to unsecured and secured borrowing as much as those with more variable incomes. This probably reflects the widespread incidence of natural disasters and other types of shocks that do not affect incomes which afflict many households in rural Bangladesh. Increased education provides households with greater opportunities to pursue ex-ante stabilization policies rather than ex-post coping strategies.

Greater wealth increases households' use of divestment and secured loan strategies, and less reliance on unsecured loans. However, greater household wealth does not reduce reliance on current adjustment strategies. This finding is consistent with the notion that all households, regardless of their assets, follow a predictable sequence of coping strategies. Current adjustment strategies are adopted irrespective of the household wealth, since they impose the least costs to households in terms of future earnings potential. If current adjustments are not sufficient, then households must borrow, either against future incomes or against owned assets. Households with more assets prefer to sell off assets or obtain secured loans rather than unsecured

loans. This suggests that the costs of unsecured loans impose greater costs on borrowers. Policies to increase access to low-cost, unsecured loans to households with few assets could provide these vulnerable households with more effective ways to cope with shocks that they face.

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Table 1. Distribution of households exposed to shocks

Type of Shock	Percent of households in the sample that experienced the crisis				
	Always poor households	Usually poor Households	Cyclical poor Households	Occasionally poor households	All households
Shortage of food	87.5	80.7	79.9	74.7	82.3
Illness	79.5	79.7	73.7	65.3	75.8
Loss of livestock/poultry	35.9	44.3	47.6	48.1	42.2
Poor production	7.5	14.2	33.8	42.5	20.6
Flood	6.9	7.6	11.4	10.2	8.6
Wind damage	1.8	5.7	9.6	15.1	6.6
Dowry/wedding	4.7	9.5	6.3	7.0	6.4
Excessive rainfall	8.0	6.0	4.5	6.3	6.6
Drought	2.1	6.3	9.0	12.3	6.2
Theft	1.7	4.1	6.0	7.0	4.0
Death of household member	4.4	3.5	4.5	4.2	4.2
Market fluctuation	3.5	3.2	4.8	4.2	3.8
Cyclone	2.3	4.1	1.8	2.8	2.6
At least one of the above shocks	97.1	94.6	92.8	93.7	95.1
Simultaneous incidence of two or more of the above shocks	86.6	87.7	88.9	85.2	87.0

Source: Rashid, D. 2002.

Table 2. List of coping strategies and percent of households in the sample adopting the strategy

Coping Strategies and Categories	% of households in the sample adopting
Current Adjustment	
Adjustment to Meals	75.3%
Sold agricultural products at a lower price	3.8%
Sold men labor	36.0%
Sold women labor	15.9%
Occupation change	4.6%
Sold standing crop	2.4%
Migrated to sale labor	5.3%
Taken famine foods	4.2%
Taken relief	14.1%
Sold poultry birds	33.3%
Unsecured Loans	
Loan from neighbors/relatives	25.9%
Loan from Money Lender	16.4%
Loan from NGO	19.3%
Grain loan from kin	1.4%
Cash/cereal loan from merchants	0.8%
Loan from Grameen bank	10.1%
Farmland mortgage out	6.0
Farmland leased out	0.6%
Pledging labor	5.8%
Divestment & Secured Loans	
Sold household productive assets	1.3%
Sold small animals	8.4%
Sold trees	7.6%
Sold jewelry	0.6%
Sold cows/bullock	10.9%
Sold tin sheets	0.4%
Sold farmland	3.4%
Loan from bank	3.8%
None of the above strategies	5%
Current adjustment only	26%
Unsecured loan only	4%
Divestment & secured loan only	1%
Current adjustment plus divestment & secured loan	7%
Current Adjustment plus unsecured loan	43%
Unsecured loan plus divestment & secured loan	1%
All three strategies	16%

Table 3. Independent variables for probit models of adoption of coping strategies

Independent variables	Type of variable
Household experienced natural disaster in last year	Dummy
Loss of productive assets in last year	Dummy
Household members experienced illness in last year	Dummy
Other income vulnerability experienced in last year	Dummy
Paid dowry in last year	Dummy
Number of months HHs have access to adequate food	Numerical
Total value of asset (in '0000' Bangladeshi *Taka*)	Continuous
Annual expenditure on non food items (in '0000' *Taka*)	Continuous
Number of income sources: 2	Dummy
Number of income sources: 3	Dummy
Number of income sources: 4 and more	Dummy
Occupation: agricultural wage labor	Dummy
Occupation: non agricultural wage labor	Dummy
Occupation: business	Dummy
Occupation: salaried employment	Dummy
Household heads education: years completed	Numerical

Table 4: Household expenditures, value of assets, number of income sources and types of employment, by education level of HH Head.

Education Level of HH Head	Expenditures on non-food items	Value of HH assets	% HH with 2 sources of income	% with 3 sources of income	% with 4 or more sources of income	% engaged in agricultural daily labor	% engaged in non-ag daily labor	% engaged in business	% with salaried job
No education	6362.91	46327.35	15.6%	24.4%	56.2%	63.2%	15.2%	20.9%	1.4%
Primary completed	8424.60	87506.23	10.1%	20.7%	66.2%	52.1%	13.6%	28.0%	4.8%
Secondary completed	11124.44	147145.42	8.5%	18.6%	72.0%	26.7%	9.7%	30.1%	9.7%
College & higher	15502.52	209517.62	0%	14.3%	85.7%	4.8%	0.0%	33.3%	57.1%

Table 5: Household's choice of any coping strategy

Coping strategies: Univariate probit regression results			
Independent variables	Coefficients	Regression Results Z - statistic	Marginal effects
Dependent variable: Any coping strategy			
Household experienced natural disaster in last year	0.4589	1.70*	0.1381 *
Loss of productive assets in last year	0.8684	4.42***	0.2614 ***
Household members experienced illness in last year	1.1168	7.07***	0.3361 ***
Other income vulnerability experienced in last year	1.3295	4.43***	0.4001 ***
Paid dowry in last year	1.1373	2.03**	0.3423 **
Number of months HHs have access to adequate food	-0.1011	-2.81***	-0.0304 ***
Total value of asset (in '0000' Bangladeshi *Taka*)	0.0110	1.51*	0.0033 *
Annual expenditure on non food items (in '0000' *Taka*)	-0.0336	-0.42	-0.0101
Number of income sources: 2	-1.2584	-1.92**	-0.3788 **
Number of income sources: 3	-1.2458	-1.93**	-0.3750 **
Number of income sources: 4 and more	-1.0621	-1.66*	-0.3197 *
Occupation: agricultural wage labor	0.7476	3.94***	0.2250 ***
Occupation: non agricultural wage labor	0.7235	2.13**	0.2178 **
Occupation: business	0.2004	1.14	0.0603
Occupation: salaried employment	-0.1389	-0.48	-0.0418
Household heads education: years completed	-0.0222	-0.97	-0.0067
Number of observations	1600		
***Significant at the 1% level, **Significant at 5% level, & *Significant at the 10% level			

Table 6: Household's choice of current adjustment, unsecured borrowing, and divestment and secured borrowing

Coping strategies: Trivariate probit regression results			
Independent variables	Coefficients	Regression Results Z - statistic	Marginal effects
Dependent variable: Current adjustment			
Household experienced natural disaster in last year	0.5325	3.49***	0.2112 ***
Loss of productive assets in last year	0.5522	4.97***	0.2190 ***
Household members experienced illness in last year	0.6236	5.93***	0.2473 ***
Other income vulnerability experienced in last year	0.4197	3.24***	0.1664 ***
Paid dowry in last year	0.2302	1.09	0.0913
Number of months HHs have access to adequate food	-0.1078	-4.31***	-0.0427 ***
Total value of asset (in '0000' Bangladeshi *Taka*)	-0.0051	-1.30	-0.0020
Annual expenditure on non food items (in '0000' *Taka*)	-0.0534	-1.09	-0.0212
Number of income sources: 2	-0.7479	-1.74*	-0.2966 *
Number of income sources: 3	-1.0819	-2.60***	-0.4290 ***
Number of income sources: 4 and more	-0.7258	-1.75*	-0.2878 *
Occupation: agricultural wage labor	0.6310	5.12***	0.2502 ***
Occupation: non agricultural wage labor	0.1843	1.08	0.0731
Occupation: business	0.1140	0.97	0.0452
Occupation: salaried employment	-0.2974	-1.47	-0.1179
Household heads education: years completed	-0.0229	-1.52	-0.0091
Dependent variable: Unsecured borrowing			
Household experienced natural disaster in last year	0.1965	2.27**	0.0661 **
Loss of productive assets in last year	0.0350	0.50	0.0118
Household members experienced illness in last year	0.3086	3.87***	0.1038 ***
Other income vulnerability experienced in last year	0.2016	2.44**	0.0678 **
Paid dowry in last year	0.2542	1.73*	0.0854 *
Number of months HHs have access to adequate food	-0.0181	-1.08	-0.0061
Total value of asset (in '0000' Bangladeshi *Taka*)	-0.0099	-3.01***	-0.0033 ***
Annual expenditure on non food items (in '0000' *Taka*)	0.2555	5.04***	0.0859 ***
Number of income sources: 2	-0.0264	-0.11	-0.0089
Number of income sources: 3	0.0019	0.01	0.0006
Number of income sources: 4 and more	0.0895	0.39	0.0301
Occupation: agricultural wage labor	0.2242	2.86***	0.0754 ***
Occupation: non agricultural wage labor	0.0064	0.06	0.0022
Occupation: business	0.2365	2.84***	0.0795 ***
Occupation: salaried employment	-0.0544	-0.32	-0.0183
Household heads education: years completed	-0.0241	-2.14**	-0.0081 **
Dependent variable: Divestment and secured borrowing			
Household experienced natural disaster in last year	0.2606	3.00***	0.0557 ***
Loss of productive assets in last year	0.1723	2.34**	0.0369 **
Household members experienced illness in last year	0.1621	1.86*	0.0347 *
Other income vulnerability experienced in last year	0.3393	4.06***	0.0726 ***
Paid dowry in last year	0.4107	2.98***	0.0879 ***
Number of months HHs have access to adequate food	0.0272	1.49	0.0058
Total value of asset (in '0000' Bangladeshi *Taka*)	0.0133	3.76***	0.0028 ***
Annual expenditure on non food items (in '0000' *Taka*)	0.2554	4.91***	0.0546 ***
Number of income sources: 2	0.0046	0.01	0.0010
Number of income sources: 3	0.3355	1.09	0.0718
Number of income sources: 4 and more	0.5022	1.65*	0.1075 *
Occupation: agricultural wage labor	-0.0939	-1.12	-0.0201
Occupation: non agricultural wage labor	-0.1719	-1.58	-0.0368
Occupation: business	-0.1224	-1.41	-0.0262
Occupation: salaried employment	-0.1389	-0.77	-0.0297
Household heads education: years completed	-0.0008	-0.07	-0.0002
Number of observations	1600		
rho12	0.0024	0.0382	
rho13	-0.0104	-0.1938*	
rho23	-0.1004	-2.270*	
LR test of rho12=rho13=rho23=0:Chi square	7.0120*		
***Significant at the 1% level, **Significant at 5% level, & *Significant at the 10% level			