

Working Paper No. 30

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Abstract

This paper analyzes the nexus among risk, deprivation and vulnerability that confront the rural poor in their daily life. It examines the nature of shocks, the consequent economic burden, and the coping mechanisms. It explains how shocks affect deprivation and vulnerability of households to poverty. The prominent shocks are health, death, crop, property and livestock, typically of the idiosyncratic in nature, except possibly that of crop. However, the effects of such shocks are likely to be more adverse for households that have difficulty maintaining their consumption level above the poverty threshold. Capability deprivation is measured here by the food adequacy level of the household during the preceding 12 months. We use an ordered-probit model to estimate the effect of various shocks on food deprivation. The results show that the poor significantly depend on investable surplus and liquidation of asset and property (i.e., self-insurance) in order to overcome the burden of shocks and the burden of shocks significantly affects the food adequacy level. In light of the evidence on the possible impact of Grameen Kalyan health intervention, it is argued that well-designed microinsurance products may be more effective and less costly than the usual mix of self-insurance, ad-hoc relief and rehabilitation measures to cope with shocks so that risks of future poverty, namely vulnerability, can be minimized.

Key Words: Deprivation, Economic & Health Shocks, Food Adequacy and Vulnerability to Poverty

JEL Codes: G21, I32, O12, O15 & O16

Risk, Deprivation and Vulnerability Facing the Rural Poor of Bangladesh*

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1. Introduction

This paper examines the conceptual boundaries and overlaps (i.e., intersections) among the concepts of capability, exclusion and vulnerability. In addition, the paper reviews the data requirements of capturing these concepts. Sen (1999 and 2000) introduced the concepts of capability and exclusion while the concept of vulnerability has been used by various authors. But in the context of poverty the third one i.e., vulnerability refers to the probability of households falling below the poverty threshold or in other words, the poor falling into deeper poverty. Ravallion (1988) was the first to broach a formal analysis of the propensity to fall into poverty.¹

The concept of human capability has been initiated by Amartya Sen (1999, Ch 4) as “the substantive freedoms he or she enjoys to lead the kind of life he or she has reason to value” (p87). Consequently, “poverty must be seen as the deprivation of basic capabilities rather than merely as lowness of incomes” (ibid.). Some key components of capability are (a) mortality, (b) nutrition, (c) epidemiological environment, and (d) social exclusion. Hence in this broader notion of poverty, each of these elements is integral, but they make up just four of seven (non-exhaustive) elements of deprivation that Sen has advanced; gender, locational risks and unemployment being the rest.

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¹ Other references include Ahsan (1994), Kochar (1995) and Morduch (1994).

This paper integrates all four of these capability elements in the analysis to follow as they each relate intimately to the concept of poverty even in the narrow neo-classicist's focus on the 'consumption space'.² Common measurements of poverty are based on the monetization of the nutritional intake (caloric equivalent), and thus lead directly to the concern over vulnerability to poverty. Next, health economists believe that the ex-ante health status of an individual has a strong correlation with the probability of disease (both communicable as well as non-communicable). Moreover, it has been well recorded and we shall also see it below that health shocks frequently lead to consumption shocks.

Finally, social exclusion is frequently associated with discrimination on account of 'unfavorable' group identification. Broader issues of exclusion become relevant if there are persistent patterns of ethnic tensions, strife and discrimination along with faith, gender, family status, challenging intellectual and physical condition, wealth or cultural divides. Due to sensitivity, many believe these attitudes are difficult to obtain accurately from face-to-face interviews, which would render the interpretation of survey data awkward. However, to the extent that health condition/status may itself serve as a contributory factor in being 'excluded', this is very much within the framework of analysis to follow.

While everyone constantly faces a wide range of risks, e.g., illness and injury, death of livestock, harvest failure, flood, cyclones, drought and so on, the impact of such events may be quite different on the rural poor than the non-poor and urban dwellers. The poor usually adopt various self-insurance devices, which entail high implicit costs, many of which have longer run consequences which are not generally reversible as have been examined well elsewhere (Ahsan 2009). Several authors have proposed that microinsurance products (e.g., life, health and livestock) if suitably designed would go a long way in preventing the risks of further poverty (Ahsan 2009, Dror 2007 and Morduch 2006). The present study however focuses on the prior task of identifying the scope of various idiosyncratic shocks in compromising the vulnerability and deprivation status of the poor in the absence of formal risk shifting.

While modeling the risk of someone falling into poverty would require panel data, or at least repeated cross-sections data, the present authors have access to just one cross-section of household survey data as described below. Consequently this paper contributes to the extant literature by carrying out an in-depth analysis of various risks faced by the poor, and analyze how the poor cope with each of these shocks and with what consequences. This is very much in search for a holistic hierarchy of analyses to be carried out to fully understand the complex phenomenon at hand, namely the impact of shocks on the poor and their vulnerability. In particular, the authors focus on a particular dimension of capability deprivation, namely the adequacy of food (or, the incidence of hunger) in the family and how that depends on the nature of the shock. In light of the evidence on the possible impact of Grameen Kalyan health intervention, it is argued that well-designed microinsurance products may be more effective and less costly than the status-quo of a mix of self-insurance, ad-hoc relief and rehabilitation

² Gender aspects have however been explored fully in Ahsan *et al.* (2013).

measures to cope with shocks so that risks of future poverty, namely vulnerability, can be minimized.

The above remarks complete the introduction to the paper, while the remainder proceeds as follows. In section 2, we review both analytical and empirical claims as to why some shocks such as those related to health events are uniquely hard to deal with on the part of the poor thus leaving them especially vulnerable to poverty. Section 3 dwells on methodological issues of data construction and empirical methods pursued in this study. In section 4, we offer results of the analysis examining the various risks faced by the poor in Bangladesh and how these are being met, where we also include an analysis of the 'adequacy-of-food' measure of capability deprivation and relate it to the shocks encountered. Section 5 draws some tentative conclusions.

2. Shocks and Deprivation

While many types of idiosyncratic shocks may cause deprivation, and in this study we examine the impact of a variety of these (e.g., health and illness, death, crop, property and livestock), it is argued below that health shocks are the primary determinants of vulnerability. A broader schematic view of shocks encompasses (i) idiosyncratic ones affecting individual families or households ('micro'), (ii) those affecting an entire community ('meso') as well as (iii) those of an aggregate ('macro') nature affecting an entire region or country (Sinha and Lipton 1999, cited by World Bank 2000).

The poor rely on both formal and informal strategies to manage these risks (see Table A1 of the appendix). Informal strategies are linked to individuals, households or communities and formal ones refer to market-based activities and public interventions. A successful reduction of risk reduces the probability of a shock occurring, while risk mitigation reduces the impact of shocks; and finally, coping strategies influence the impact of a shock, especially beyond the very present. Some of the common practices are reviewed below.

Crop income shocks: Both risk mitigation and coping strategies have implications on poverty. Poor households, being highly risk averse, mitigate risks ex-ante through asset and income diversification and self-insurance. Whether caused by low prices or loss of yield, crop shocks are believed to lead to costly adjustments in behavior that adversely impacts on the income generating process so that even permanent income may decline. Examples of the latter mode include the adoption of low risk-low return technology in production, informal borrowing, and the possible ex-ante diversion of capital from productive to financial use (i.e., precautionary saving) as well as the ex-post depletion of productive assets (e.g., land or bullocks) in order to smooth consumption (e.g., Eswaran and Kotwal 1989 and Morduch 1994).

A related theme in this literature is that the credit markets play a central insurance role in smoothing consumption over idiosyncratic crop income shocks. Defining x to be the family permanent income, c as actual consumption and z the poverty line, Morduch (1994) characterized stochastic poverty by the conditions that $c < z < x$. He notes that a functioning

credit market would have prevented this type of poverty. Consequently, inter-household differences in vulnerability would arise out of their differential access to credit (Eswaran & Kotwal, 1989). Those having access to formal financial services or microfinance utilizes their liquid resources to cope with the shocks. They also borrow from informal moneylenders at high interest rates. If these measures prove insufficient, households may need to reduce consumption, increase labor supply or cut down on education expenditure.

One implication of the credit process is that good shocks will ease credit constraints, and lead to greater risk-taking and higher expected income down the road, while negative shocks would lead to poverty traps. Consequently, such behavior would explain persistence in income patterns, though that was not intrinsic to the income process (Morduch 1994, p. 223). These analytical arguments are often employed to counter the claim put forward by Deaton (1992, p. 203) that rural incomes are independently and identically distributed (iid).

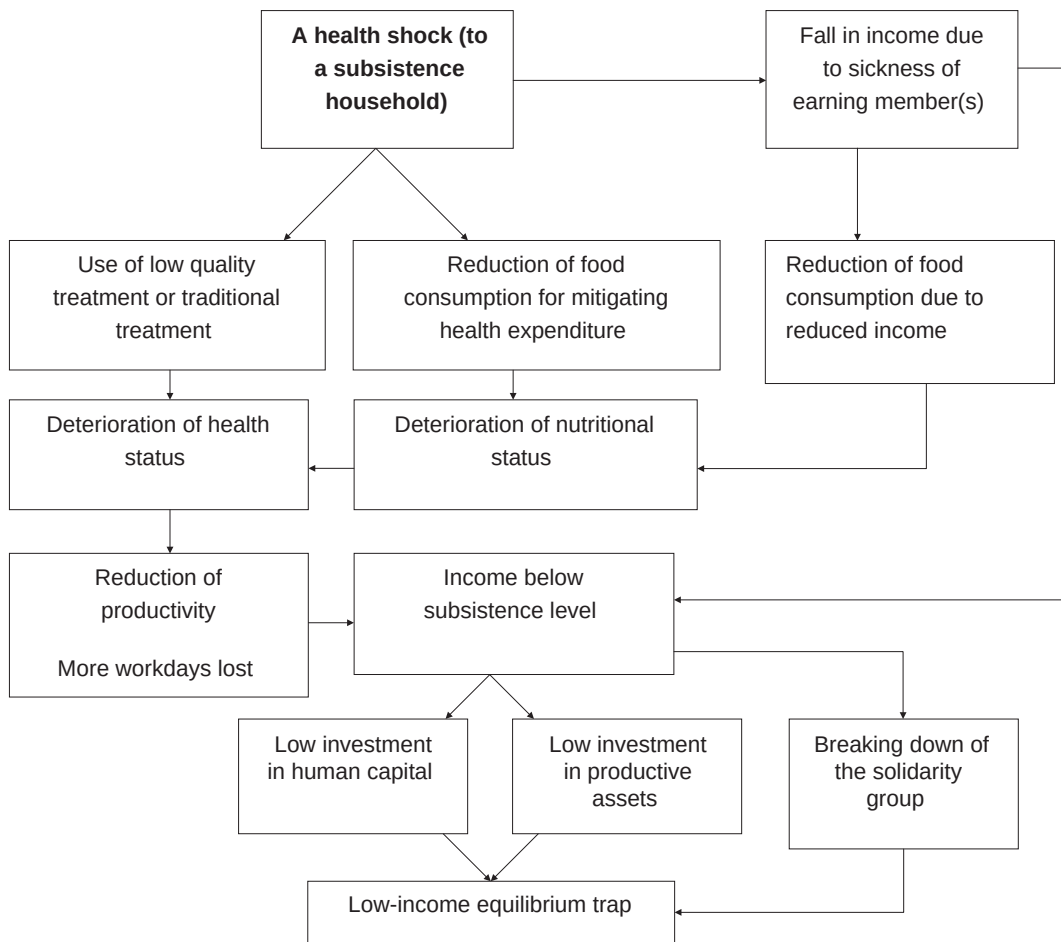
The Evidence (ICRISAT and other Data): Anjini Kochar (1995) provides a counter-point to the analytical arguments reviewed above. She argues that not all idiosyncratic shocks (e.g., crop income or health) have a similar impact on household vulnerability. In particular, using ICRISAT data she finds that labor market activity may allow households to insure against crop income shocks, but the same avenue is not feasible in the case of health exigencies. It also implies that the demographic composition of the family, namely the stock of able-bodied males, would suggest that poorer (typically smaller) households have only a limited access to this mode of insurance in the event of crop income losses.

Health Shocks: The economic cost of illness is two-fold; the cost of medical care and the loss in income associated with reduced labor supply and productivity. Short-run self-insurance mechanisms such as the depletion of savings, sale of assets, loan from moneylenders and exhaustion of current income flows may typically allow them to ride out smaller events, but not health events that compromise the capacity to perform activities of daily living (ADL). Loss of savings or capital combined with the paucity of social insurance devices in developing countries often forces the poor into deeper poverty (and the low-income non-poor into poverty) by their limited ability to cope. Consequently, health shocks can trap the vulnerable households indefinitely into poverty cycles. Gertler and Gruber (2002) found that even though many families were able to self-insure minor illnesses, they were unable to maintain their living standards in the face of major illnesses.

Many of these coping responses often force households to enter into a source of financing with a high long-term cost for a short-term benefit. Dercon and Hoddinott (2005) state that “shocks affecting health may be a cause of a form of poverty trap: a permanently lower equilibrium income stream in the long run following a negative shock, making previously feasible outcomes impossible” (p.125). Evidence derived from some case studies in developing countries shows that illness, injury or death was the single most common reason for households falling into poverty (World Bank 1993). There is also evidence that a health crisis adversely affects income, the means of subsistence, and the schooling of the poor (Kochar 1995; Sinha and Lipton, 1999, cited by World Bank, 2000; Commission on Macroeconomics and Health (CMH), 2002).

Hamid (2008) has argued that living below the subsistence level of income for a period of time may force households to make insufficient investments in human (e.g., education of children) as well as physical capital (productive assets). Moreover, for borrowers of microcredit it may threaten the repayment behavior causing a breakdown of the solidarity group. Thus households facing health shocks may converge to a low-income steady state in the long run.

Figure 1:
Potential Effects of a Health Shock on the Economy of a Subsistence Household



Source: Hamid (2008)

The cycle of effects may be explained with the help of a flow-chart (Figure 1). A health shock may affect the economy of a subsistence household in various ways. Firstly, household income may decline due to reduced labor supply (workdays lost) and productivity. This may reduce the food consumption level, which, in turn, affects the nutritional status of the household. Secondly, nutritional status may also be affected by a reduction in food consumption due to healthcare expenditure incurred for the treatment of any sick household member regardless of whether she/he is a breadwinner. Thirdly, there is evidence that the majority of the rural poor in

Bangladesh seek treatment from informal providers (drug stores, quacks and traditional healers) and, thus, they usually receive ex-ante low quality treatment. The use of low quality care along with poor nutritional status may lead to deterioration in the health status of the household.³ This may lead to a reduction in work capacity, which may push the household income below subsistence level.⁴

A Grameen Bank study revealed that amongst the 42 percent of its borrowers who failed to improve their socio-economic condition in spite of access to credit, 60 percent had experienced a serious illness in the family, especially chronic illness of household members (earning members in particular, Ahmed, *et al.* 2005 and Hamid 2008). In the ICRISAT sample, 39% of families reported loss of workdays due to illness in a given year, the incidence being slightly higher (43%) for poorer families (Kochar 1995).

3. Findings

3.1 Data

This paper uses the data on the incidence of various shocks (death, health, crop, property, livestock, etc.) including life cycle events, costs of coping and the nature of coping mechanisms, which were all obtained from a 2009 survey of rural households carried out by InM. The survey collected data on the shocks that occurred over the two years preceding the survey. The survey successfully collected data in the summer of 2009 from 3,941 stratified randomly selected households (accounting for 19,424 individuals) drawn from 120 villages spread over seven out of 14 districts in rural Bangladesh where Grameen Kalyan (GrK), a social business company affiliated with the Grameen Bank, had been operating its prepaid card-based micro health insurance (MHI) scheme.

The survey used a program-control design in which ten healthcare delivery centers were selected purposively taking two things into consideration - a suitable mix of old and new centers and the geographic variation among these locations. Each GrK program area physically comprises of an approximate radius of 8 km around the respective health centre. One comparable Union Council, the smallest civil administrative unit in Bangladesh, adjacent to each GrK program centre was then selected purposively to serve as the 'control' area in question. The control areas lay wholly outside the radius of GrK operational boundary but shared similar characteristics in all other respects. A sample of 7 villages were randomly selected from each of the 10 program strata and 5 villages from each of the 10 control strata from a listing of all the villages in both these strata, thus yielding a total of 120 villages which

³ There is some empirical evidence in support of this argument. Bangladesh Health Equity Watch (BHEW), in a recent survey on the drugs prescribed for the treatment of pneumonia, fever/cough/cold, and diarrhoea, found that prescribed drugs are appropriate in only 18 percent cases; in 75 percent of cases the drugs neither benefit nor harm, and in 7 percent of cases they do harm the health of the users (Anon, 2008).

⁴ The situation may be persistent over the generation if height growth of the children is obstructed due to health shocks. There is evidence that children who experience slow height growth perform poorly in school, cognitive function, and acquiring skills; and have lower level of activity (Lasky *et al.* 1981; Johnston *et al.* 1987; Grantham-McGregor *et al.* 1999).

were considered as primary sampling units (PSUs). Thus the survey covered 70 program and 50 control villages. The number of program hhs came to 2,477, of whom 935 were GrK cardholders (CH) and the remainder 1,542 were non-cardholders (NCH), while the number of control hhs stood at 1,464.

The household questionnaire focused on many socio-economic variables including the demographic context (age, gender, education and dependents), occupation of the household head and that of all members, borrowing-lending behavior, food expenditure, non-food expenditure, distribution of operating land and non-land assets, experience with shocks, health status, healthcare choices and out-of-pocket expenses. In addition, it obtained village-level attributes including education, health and physical infrastructure, active presence of MFIs and insurance companies, and records of natural disasters including river erosion and pest attacks in the survey zone.

3.2 Analytical Methods

We have incorporated a number of priori plausible elements in the analysis of deprivation. We begin with an examination of the association of the type of crisis/shocks (e.g., crop, death, health, property and livestock) facing the households with their occupational characteristics. We then go on to analyze the pecuniary costs (both direct and coping costs) of meeting each variety of shocks and then further explore the details of the (coping) mechanisms availed by the households in securing the necessary funds and/or otherwise to manage the crises. This information is provided below in several tables and graphs.

In addition, we have conducted a multivariate analysis to determine the effects of various shocks on deprivation. Here we have chosen to focus on 'household food adequacy' as an indicator of deprivation. We have specified ordered probit models to determine the impact of a variety of independent variables on the probability of facing a food shortage, both generally and under each specific shock. The logic here is that subsistence households would ordinarily be forced to reduce food consumption due to a shock (e.g., illnesses that lead to lower wage income). Hence the independent variables are those that define a subsistence household (e.g., education, land holding, income and wealth status, occupation, presence of secondary earners, etc.) or those that lead to large coping costs (e.g., absence of micro credit/insurance or other low-cost alternatives). Since food deficit can be of varying severity, we have chosen an ordered method whereby the dependent variable takes on several values such that 'deficit during the whole year' is labeled 0, 'deficit some of the time' is set to 1, 'neither deficit nor surplus' is given 2 and the 'surplus status (over the preceding 12 months)' gets a score of 3.

4. Empirical Results

4.1 Nature of Shocks

Household level shocks have generally been categorized in the literature into death, health, crop, property and livestock (e.g., Dercon *et al.* 2005, Santos *et al.* 2011). We follow a similar approach. Death shock is referred as the death of any member (earning/non-earning) of the household. Health shock includes certain illnesses (e.g., short, but acute or long term, surgical or non-surgical hospitalization, accidents and illnesses incurring large expenditures). Crop shock is defined as the loss or damage of crops due to natural (heavy rainfall, drought, flood, storm, etc.) or man-made (conflict, envy, etc.) catastrophes. Property shock refers to the depletion of any fixed asset of domestic or business use (e.g., on account of robbery/theft, destruction by natural phenomena such as river erosion, flood, cyclone, fire and industrial/factory/warehouse accidents), while livestock shock deals with the death or loss of cattle or goat/sheep.

The dataset actually identifies 3,485 distinct shocks faced by the sample households over the two-year period preceding the survey (Table A2 in the appendix). However many of these were events that could have been foreseen and in some way an outcome of household decision making process (e.g., to go for higher education, to migrate domestically or abroad, incurring wedding expenses and dowry payments, etc.). Hence if one ignores these and focuses instead on events that are mostly of the 'acts of nature' variety, it turns out that about 47 percent of the households (i.e., 1,840 out of 3,941) experienced some 2,352 shocks during the two-year period in question with, of course, some households having to confront multiple events.⁵ In Table 1 these shocks are captured under five broad categories, while a more detailed breakdown is available in the Appendix Table A2. While the information is shown separately for program and control areas in Table 1, it is clear that there is no major difference in the distribution of shocks between the two areas except for the aggregate categories of shocks as illustrated in the last two rows.

About 64 percent of all crises in the sample population are related to death and health incidents (accidents, chronic illnesses and major acute illnesses). While 153 deaths were reported by 3,941 households comprising of 19,424 persons over the two-year period, i.e., 0.4 percent per annum, the rate is more than double from an actuarial perspective (Ahsan and Hakim 2010). However it ought to be kept in mind that this is a one-shot data, while actuarial figures are based on long-term experience in a very large population.

⁵ Details of the construction of these 5 aggregate categories are outlined in the notes of Table A2 in the appendix. To be precise, of the total number of 3,941 households in the sample, some 1,840 hhs reported 2,352 separate events of the type being cited in the text over the 2-year horizon. In particular, even for death, 152 households lost 153 members indicating multiple events occurring in some households (Table 1).

Table 1
Nature of Shocks Faced by the Household during the Two-year Period

Nature of crisis	Program area % (n)	Control area % (n)	Total % (n)	Shock per sampled household				Average per year (per person or per hhs as appropriate)	% of hhs reporting an incident per year
				Program (n=2,477) (%)	Control (n=1,464) (%)	Total (n=3,941) (%)	p-value (Program vs. Control)		
Death	6.72 (89)	6.23 (64)	6.51 (153)	3.55 (88)	4.37 (64)	3.86 (152)	0.80	3.94 (per thousand) (77)	1.93 (76)
Health	57.63 (763)	52.14 (536)	55.23 (1,299)	28.66 (710)	32.86 (481)	30.22 (1,191)	0.12	3.34 (per hundred) (650)	15.11 (596)
Crop	14.2 (188)	16.83 (173)	15.35 (361)	7.59 (188)	11.82 (173)	9.16 (361)	0.17	4.58 (per hundred) (181)	4.58 (181)
Property	8.76 (116)	11.87 (122)	10.12 (238)	4.52 (112)	8.06 (118)	5.84 (230)	0.27	6.13 (per thousand) (119)	2.91 (115)
Livestock	12.69 (168)	12.94 (133)	12.8 (301)	6.78 (168)	9.08 (133)	7.64 (301)	0.46	7.75 (per thousand) (151)	3.82 (151)
Total	100 (1,324)	100 (1,028)	100 (2,352)	N/A	N/A	N/A	N/A	N/A	N/A
Health shocks (Death & Health)	64.35 (852)	58.37 (600)	61.74 (1,452)	31.29 (775)	36.34 (532)	33.16 (1,307)	0.06	-	-
Non-health shocks	35.65 (472)	41.64 (428)	38.27 (900)	17.12 (424)	24.66 (361)	19.92 (785)	0.01	-	-

Note: The figures in columns 2-4 denote proportions of each shock in the total number of reported events (2,352) over the two preceding years for the 'program area', 'control area' and in total, respectively. The last two columns present the incidence of each shock as an annual proportion among all individuals and among all households in the sample respectively, i.e., inclusive of those reporting no shocks. However, in view of some households reporting multiple events in the same category, the last column gives the fraction of reporting households as a proportion of all sample households. Thus, for example, 1,191 hhs reported 1,299 episodes of health shocks during the last two years (i.e., 596 hhs reported 650 episodes of health shocks per year). Correspondingly, in the second last column, 3.34 is precisely $[(650/19,424)*100]$, while the last column equals $[(596/3,941)*100]$, etc. Finally, note that figures in the parentheses in each cell denote the number of observations.

Health exigencies appear to be the single most common shock that respondents had to face. A total of 1,191 households reported 1,299 incidents over the two years, i.e., about 15 percent of the hhs reporting an incident each year, which may appear a little high from an insurance perspective. Thus if one were to focus on one variety of risk that the public authorities would like to mitigate, it is health. Here restating the health events on a per capita basis is not very helpful since most micro health insurance (MHI) programs treat families as a unit. It is to be observed that many (indeed about 53 percent) of the health 'shocks' cited above were actually of a chronic nature, which typically are not fully covered by health insurance schemes. Alternatively,

if the primary focus of an MHI program is to offer hospitalization, the above figures need not be overwhelming (Ahsan and Barua 2010).⁶ While the incidence of arsenic in drinking water, at 6.22 percent, is higher in the control zone compared to the program zone (2.58% level, $p \leq 0.29$) and while the incidence of health shocks appears to be a little higher there, the difference is not statistically significant.

For other shocks, when pooled together, the control hhs appear to encounter proportionately more shocks than program hhs ($p \leq 0.01$), which may well be due to their greater involvement in occupations such as agriculture, though this was seen to be statistically not significant (Ahsan *et al.* 2013). At the disaggregate level, however, differences disappear. Livestock losses have to be interpreted with care since here the per-household loss experience as presented in Table 1 is by itself not very informative. Elsewhere it has been noted that altogether 1,832 sample hhs owned 4,223 cattle heads (4,211 cows/bulls and 12 buffalos), while 607 hhs owned 1,408 sheep and goats where, of course, the same household may have owned several kinds of livestock (Ahsan *et al.* 2013, Table 11) in multiple units as also evident from Table 1A.

Table 1A
Value of Livestock Losses

Livestock Ownership & Loss	Total	Program			Control
		Card Holder	Non-card Holder	Total	
Average value of livestock per owner household(current)	35,385 [37,649] (2,058)	35,770 [32,347] (510)	37,467 [47,669] (769)	36,791 [42,225] (1,279)	33,077 [28,467] (779)
Average annual loss incurred by the household due to livestock death	10,527 [11,277] (301)	10,683 [12,993] (71)	11,791 [11,362] (97)	11,323 [12,053] (168)	9,523 [10,169] (133)
Loss ratio	4.35	4.16	3.97	4.04	4.92
(p-value of the loss ratio: program vs. control)	0.34				

Note: (a) 'Livestock' includes cattle (both cow/bullock), buffalo, sheep and goat.

(b) Loss ratio was calculated by dividing the total livestock loss that the household incurred by the total value of the livestock at present (e.g., loss ratio= $(10,527 \times 301) / (35,385 \times 2,058) \times 100$).

Thus it is hard to utilize the 301 deaths over two years cited in Table 1 to determine the annual loss ratio for each kind of livestock. However the survey data does record both the current monetary value of livestock owned by the hh as well as the value of annual loss, which is presented in Table 1A.

The standard loss ratios are typically presented in-kind rather than cash, and in the former context losses in the range of 4 to 5 percent would appear to be on the high side. One must recognize, however, that most animals in question here are uninsured and are presumably not

⁶ Besides, as already stated, this is a one shot data, and thus it is premature to gauge at the actuarial aspects on the basis of this dataset alone.

properly vaccinated.⁷ The shortage of veterinarian specialists in most rural locations is known to be a contributing factor behind the poor livestock health in Bangladesh.

Table 2
Two year Frequency of Shocks (row-wise) by the Occupation of the Household Head

Nature of Shocks	Agriculture [29.94] (1180)	Day labor [15.91] (627)	Transport [6.62] (261)	Small Business [14.36] (566)	Medium Business [4.52] (178)	Wage Employment [9.13] (360)	Housewife [9.36] (369)	Other [10.15]	Total [100]
Death	29.41 (45)	13.73 (21)	4.58 (7)	10.46 (16)	5.88 (9)	7.84 (12)	16.99 (26)	11.11 (17)	100 (153)
Health	32.56 (423)	14.16 (184)	6.31 (82)	14.4 (187)	5.16 (67)	8.39 (109)	7.93 (103)	11.09 (144)	100 (1,299)
Crop	54.85 (198)	8.59 (31)	4.16 (15)	11.91 (43)	2.77 (10)	6.65 (24)	3.88 (14)	7.2 (26)	100 (361)
Property	31.93 (76)	15.97 (38)	9.66 (23)	16.81 (40)	3.36 (8)	6.72 (16)	5.88 (14)	9.66 (23)	100 (238)
Livestock	44.85 (135)	16.94 (51)	5.32 (16)	9.3 (28)	2.99 (9)	6.31 (19)	4.98 (15)	9.3 (28)	100 (301)
Total	37.29 (877)	13.82 (325)	6.08 (143)	13.35 (314)	4.38 (103)	7.65 (180)	7.31 (172)	10.12 (238)	100 (2,352)
p-value (min vs. column total)	0.29	0.41	0.76	0.54	0.81	0.83	0.63	0.63	NA
p-value (max vs. column total)	0.00	0.55	0.52	0.55	0.83	0.82	0.10	0.83	NA
p-value (popul ation share vs. column total)	0.001	0.39	0.83	0.68	0.96	0.56	0.43	0.99	

Note: The first figure in square brackets in the top row shows the proportion of households that are classified as headed by someone belonging to the indicated 'occupation', while those in the last row indicate the share of all shocks faced by the occupational group in question. Figures inside parentheses in the last row yield the number of shocks faced by each occupational group.

⁷ While the loss ratio is about 25% higher in the control area, the difference is not statistically significant. Given that the incidence of micro borrowing is significantly higher in the program than in control areas (60% vs. 44%), and majority of program hhs borrow from Grameen Bank, which provides some livestock insurance, the latter are more likely to benefit from knowledge regarding livestock health and vaccination regardless of their insurance status (Ahsan et al. 2013).

Two year's data does not allow a full exploration of the pattern of shock distribution across occupational groups either; however, a quick review leads to the conclusion that these shocks are broadly distributed among the population groups (Tables 2-3). In particular, Table 2 illustrates both the occupational make up of sample households (top row), while the subsequent rows allocate each variety of shock to the various occupations. Thus the second column, for example, tells us that 'agricultural households', while constituting about 30 percent of the whole sample, expectedly faced majority of crop shocks (about 55%) and a rather high share of livestock losses (about 45%). Thus it is seen that while health shocks are fairly uniformly distributed among the population, crop risks and livestock death are disproportionately borne by agriculturists, and naturally occupational groups such as 'medium businesses' or housewife-headed households face only minimal exposure to these shocks.

Curiously death events hit female-headed households more frequently, about 17% of all, though their numerical strength in the sample stood at mere 9.4 percent. This may however have a simple explanation. Many of these households may have become female-headed just because the male heads has passed away during the preceding 24 months.

Table 2A
The Incidence of Earning Member's Death

Gender of the Household Head	Total	Program			Control
		Card Holder	Non-card Holder	Total	
Percentage of female-headed households with at least one earning member's death over the last two years	4.32 (21)	6.41 (5)	4.91 (11)	5.3 (16)	2.72 (5)
Percentage of male-headed households with at least one earning member's death over the last two years	0.64 (22)	0.35 (3)	0.46 (6)	0.41 (9)	1.02 (13)
p-value (female vs. male-headed hhs)	0.00	0.00	0.00	0.00	0.051

Note: The total numbers of male and female-headed households were 3,455 and 486 respectively.

The survey questionnaire, however, only identified if the dead were earning members or not regardless of gender, though it is common knowledge that males are the primary bread earners in the rural context. Nevertheless it is instructive to note the pattern of deaths between male & female-headed hhs as reported in Table 2A. As the p-values indicate, there are substantial differences in the incidence of earning member deaths among female-headed hhs, which confirms the hypothesis advanced earlier.

The shock distribution over occupational groups has been made even more transparent in Table 3. This illustrates, that since health shocks form a majority (55.2%), one would expect these to be the highest category of shocks for each occupational group. Viewed by columns it is seen to be the case, except that those occupied in agriculture appear to back the trend (48.2 vis-à-vis the average of 55.2 percent, $p\text{-value} \leq 0.01$). As for death, while 6.5 percent of all shocks were death, as already noted above, female-headed households had the highest incidence (15.1%),

i.e., more than double the overall rate. For the remaining categories of shocks the findings are all intuitive. However it is seen that 'day labors' also face a high incidence of livestock death and wage employees face higher than average incidence (60.6%) of health shocks.⁸ Thus it may appear that the agriculturists are the healthiest lot while the salaried staff are among the weakest.⁹ While hard labor and being out in the fresh air may well be correlated with health outcomes, the high incidence illness among office staff may have to do less with stale air in the office, but more with access to subsidized health care and above all to care facilities in semi-urban areas, where such employments are mostly located.

Table 3
Frequency of Shocks over 2 Years (column wise) by Occupation

Nature of Shocks	Agriculture [29.94] (1180)	Day Labor [15.91] (627)	Transport [6.62] (261)	Small Business [14.36] (566)	Medium Business [4.52] (178)	Wage Employment [9.13] (360)	Housewife [9.36] (369)	Other [10.15] (400)	Row total	p-value (min vs. row total)	p-value (max vs. row total)
Death	5.13 (45)	6.46 (21)	4.9 (7)	5.1 (16)	8.74 (9)	6.67 (12)	15.12 (26)	7.14 (17)	6.51 (153)	0.86	0.13
Health	48.23 (423)	56.62 (184)	57.34 (82)	59.55 (187)	65.05 (67)	60.56 (109)	59.88 (103)	60.5 (144)	55.23 (1,299)	0.01	0.11
Crop	22.58 (198)	9.54 (31)	10.49 (15)	13.69 (43)	9.71 (10)	13.33 (24)	8.14 (14)	10.92 (26)	15.35 (361)	0.46	0.03
Property	8.67 (76)	11.69 (38)	16.08 (23)	12.74 (40)	7.77 (8)	8.89 (16)	8.14 (14)	9.66 (23)	10.12 (238)	0.83	0.38
Livestock	15.39 (135)	15.69 (51)	11.19 (16)	8.92 (28)	8.74 (9)	10.56 (19)	8.72 (15)	11.76 (28)	12.8 (301)	0.64	0.57
Column total	100 (877)	100 (325)	100 (143)	100 (314)	100 (103)	100 (180)	100 (172)	100 (238)	100 (2,352)		

Note: Here again the figures in square brackets in the top row show the proportion of households that are classified as headed by someone belonging to the indicated 'occupation'. Both the high and low figures have been shown in bold face in individual cells for each category of shock if found significantly different from the mean in each row.

⁸ Such information would be very useful in providing a good backdrop to the design of insurance products. For example, in livestock insurance, it would be important to find means of including the 'day labor' category of owners, whether they be borrowers of microcredit or not.

⁹ Even higher incidence of health shocks appear to afflict those engaged in 'medium business'; however due to the relatively small sample size, there is not much to be explained there.

4.2 Costs of Shocks

Households bear both direct costs (value of the loss due to the shock) and coping/mitigation costs (Table 4), which vary with the type of shock. Data shows that direct loss is higher compared to coping costs for most shocks. This may imply that households are not fully capable of dealing with crises as they happen and as a consequence remedial measures are needed beyond the point of immediate impact. Among the typical insurable shocks, the highest cost per affected household relates to property followed by death, crop and health. However, individual share of shock is highest in health followed by property, crop and livestock.

Table 4
Costs of Shocks in Taka

Type of Crises	Direct Costs (in Taka)		Coping Costs (in Taka)		Total Costs (in Taka)		Share (%) of Costs of Shocks (N=3,941)
	Last year	Previous year	Last year	Previous year	Per affected hh per year	Per sampled hh per year (N=3,941)	
Death	29,655 [74,197] (76)	34,195 [59,875] (60)	17,765 [29,134] (85)	18,302 [27,151] (63)	22,921 [36,399] (152)	884 [8,382]	11.46
Health*	-	-	16,309 [21,666] (882)	23,755 [39,924] (495)	11,022 [16,985] (1,186)	3,317 [10,599]	43.02
Crop	21,686 [62,187] (277)	20,505 [17,584] (91)	20,001 [52,525] (92)	13,286 [11,837] (35)	14,136 [40,916] (360)	1,291 [13,005]	16.74
Property	20,741 [27,956] (162)	41,564 [72,761] (78)	18,384 [37,011] (100)	27,456 [42,121] (54)	21,527 [35,796] (230)	1,259 [10,003]	16.33
Livestock	20,144 [22,129] (202)	20,437 [19,194] (111)	16,393 [22,163] (55)	13,471 [10,621] (24)	12,562 [14,375] (301)	959 [5,183]	12.44
Total	24,515 [52,617] (640)	29,371 [49,579] (321)	18,087 [28,740] (1,132)	23,760 [38,486] (639)	16,515 [29,668] (1,840)	7,711 [21,880]	100

Note: (a) For health shocks, while we enumerated the number of workdays lost, we were not able to obtain any figure for the value of lost wages. Thus the 'direct cost' of illness remains unknown at this time.

(b) The figure in the last column takes all costs associated with a given shock over the two years and divides it by the number of households reporting the events. Thus, for example, while only 882 and 495 health events were reported in the two years respectively, each with a high average expense, when divided by the total number of households affected (i.e., 1,186), the annual average per hh expense was reduced significantly.

(c) The figures in squared brackets are the standard errors.

(d) The figures in round parentheses are the number of cases/events.

4.3 Coping Mechanisms

The respondents were asked to itemize up to two main sources of mitigating a shock. The responses have been categorized into nineteen different coping strategies: regular income; savings; borrowing without interest; borrowing with interest from individual (family/friends); borrowing from NGOs; borrowing from banks; selling permanent assets (e.g., land, home, trees); mortgaging permanent assets; selling temporary assets; mortgaging temporary assets; selling livestock; splitting the household; reducing expenditure; discontinuing children's education; seeking donation, relief, insurance or any other source.

Table 5
Coping Mechanisms Used for Mortality and Health Shocks

Coping Mechanisms		Death		Health Shocks	
		Recent year	Previous year	Recent year	Previous year
		Percent (N)	Percent (N)	Percent (N)	Percent (N)
From regular income		25.97 (40)	28.30 (30)	32.35 (527)	27.95 (242)
From savings		22.08 (34)	21.70 (23)	19.71 (321)	22.52 (195)
Borrowing (with or without interest)	Borrowing without interest	9.09 (14)	5.66 (6)	12.03 (196)	8.55 (74)
	Borrowing with interest from individual	7.79 (12)	7.55 (8)	8.59 (140)	8.78 (76)
	Borrowing from NGO/MFIs	7.79 (12)	7.55 (8)	7.86 (128)	8.20 (71)
	Borrowing from banks	1.95 (3)	1.89 (2)	0.61 (10)	0.12 (1)
	Total Borrowing	26.26 (41)	22.65 (24)	29.09 (474)	25.65 (222)
Asset depletion (both permanent and temporary)	Selling permanent assets	2.60 (4)	3.77 (4)	1.84 (30)	2.66 (23)
	Mortgaging permanent assets	2.60 (4)	1.89 (2)	2.03 (33)	2.19 (19)
	Selling temporary assets	0.65 (1)	1.89 (2)	1.17 (19)	2.08 (18)
	Mortgaging temporary assets	0.65 (1)	-	0.06 (1)	0.12 (1)
	Total Asset Depletion	6.5 (10)	7.55 (8)	5.1 (83)	7.05 (61)
Selling livestock		1.30 (2)	4.72 (5)	2.39 (39)	4.27 (37)
Donation		7.14 (11)	3.77 (4)	3.68 (60)	4.16 (36)
Insurance		- (-)	0.94 (1)	-	-
'Unable to cope with the shock'		6.49 (10)	4.72 (5)	3.93 (64)	4.62 (40)
Other		3.90 (6)	5.66 (6)	3.74 (61)	3.81 (33)
Total		100 (154)	100 (106)	100 (1,629)	100 (866)

Note: (a) Since the above table is based on two possible responses to mitigating each shock, the total number of shocks appears larger than the actual figure for shocks. For example, for the 153 deaths while we could have obtained up to 306 responses over the two years, we actually obtained 260.

(b) The figures in brackets in each cell are the number of relevant observations (n).

Tables 5 and 6 show the mechanisms rural households have used for coping with each type of crisis reviewed in Table 3. Note that we have considered both the responses for each shock in constructing these tables and thus the number of coping means exceed the number of shocks. The data shows that in about half the cases households bear the costs from their regular income and savings for life risks (death) and health shocks (Table 5). However, in about another 25-30 percent of cases, borrowing is the principal source of mitigation, while the remainder relies on a mix of selling and/or mortgaging assets, donations or are simply unable or unwilling to deal with the loss.¹⁰

Thus overall, in about 50-60% of cases, the means of risk mitigation (namely liquidation of saving, new borrowing and/or disposal of assets, including livestock) reduce the potential future earnings of the household as they appear to use up saved capital of one kind or another or incur new debt-servicing obligations. Though about 54% of sample households are known to be microcredit borrowers, only a fraction (between 5 and 10 percent) typically finds the NGO/MFI loans as a source of mitigating their loss.¹¹ This is not surprising since the loans are typically annual, which is mostly allocated to different uses soon after disbursement, thus not proving to be a convenient means of mitigating shocks except on fortuitous contexts when the timing of the two events accidentally overlap.

In a similar vein we note that although 935 hhs were covered by GrK health coverage, none reported 'insurance' to have been an avenue of overcoming the health shock faced by the family. While the impact of MFI loan and health intervention programs on health financing issues would take us far afield, suffice it to say that the partial pre-payment system of GrK is not typically described as 'health insurance' in the usual documentation and apparently the cardholders do not appear to recognize the program as an insurance mechanism either. Besides, 'health shocks' would typically involve inpatient care (surgical or otherwise), which are beyond the scope of GrK type of services, which are best characterized as subsidized care programs (Ahsan *et al.* 2012).

¹⁰ The respondents had the option to report if they were unable to cope with a given shock. In hindsight the phrasing of the question appears inadequate to obtain the targeted information. Some losses of kind (e.g., loss of a family member) are not retrievable in a physical sense, hence the coping issue relates to dealing with either funeral expenses and/or the flow of income the deceased was contributing to the household finances. In case of loss of livestock or personal property, it can be replaced if financial means are available, and even if not replaced, this may have been a deliberate decision reflecting priority setting by the household. But the latter situation may also be categorized by the respondent as 'unable to cope'. Loss of standing crops is more complex, which generally cannot be replaced and hence belong to the 'unable to cope' category, but the missing food may have been purchased with the help of disposable resources. Here, as elsewhere, the respondents may claim 'unable to cope' and at the same time list sources of financing the grain shortfall. Ideally therefore, the physical replacement of the lost property and financing thereof (as appropriate) ought to have been two separate questions. In all other cases, when the coping literally means resorting to a mode of finance, the answer would be of unambiguous quality. Therefore caution needs to be applied when interpreting the data in Tables 5 and 6 relating to 'unable to cope'.

¹¹ Only for property losses (possibly by microenterprise borrowers) about 16% on average claim to have found NGO credit to be of some help.

Table 6
Coping Mechanism Used for the Damage to Crops, Property and Livestock

Coping Mechanisms		Crop		Property		Livestock	
		Recent year	Previous year	Recent year	Previous year	Recent year	Previous year
		Percent (N)	Percent (N)	Percent (N)	Percent (N)	Percent (N)	Percent (N)
Unable to cope with the shock		52.27 (184)	39.64 (44)	33.54 (106)	20.81 (31)	70.04 (166)	71.72 (71)
From regular income		14.77 (52)	15.32 (17)	17.72 (56)	12.75 (19)	9.70 (23)	8.08 (8)
From savings		11.36 (40)	10.81 (12)	13.61 (43)	11.41 (17)	8.44 (20)	9.09 (9)
Borrowing (with or without interest)	Borrowing without interest	4.83 (17)	9.01 (10)	5.38 (17)	10.74 (16)	3.38 (8)	2.02 (2)
	Borrowing with interest from individual	6.25 (22)	5.41 (6)	8.23 (26)	10.74 (16)	0.42 (1)	1.01 (1)
	Borrowing from NGO/MFIs	4.55 (16)	9.01 (10)	13.29 (42)	20.13 (30)	6.33 (15)	4.04 (4)
	Borrowing from banks	0.57 (2)	0.90 (1)	0.32 (1)	2.01 (3)	-	-
	Total Borrowing	16.2 (57)	24.33 (27)	27.22 (86)	43.62 (65)	10.13 (24)	7.07 (7)
Asset (permanent or temporary) and livestock disposal	Selling permanent assets	0.57 (2)	0.90 (1)	0.63 (2)	1.34 (2)	-	-
	Mortgaging permanent assets	0.57 (2)	2.70 (3)	2.22 (7)	2.01 (3)	0.42 (1)	1.01 (1)
	Selling temporary assets	0.28 (1)	0.90 (1)	0.95 (3)	0.67 (1)	0.00 (0)	1.01 (1)
	Mortgaging temporary assets	-	-	-	-	0.84 (2)	0.00 (0)
	Total Asset Depletion	1.42 (5)	4.5 (5)	3.8 (12)	4.02 (6)	1.26 (3)	2.02 (2)
Selling livestock		2.27 (8)	2.70 (3)	0.63 (2)	1.34 (2)	-	-
Splitting household		-	0.90 (1)	-	-	-	-
Relief		-	-	0.32 (1)	-	-	-
Donation		0.28 (1)	-	1.27 (4)	4.03 (6)	-	1.01 (1)
Other		1.42 (5)	1.80 (2)	1.90 (6)	2.01 (3)	0.42 (1)	1.01 (1)
Total		100 (352)	100 (111)	100 (316)	100 (149)	100 (237)	100 (99)

Note: The figures in brackets in each cell are the number of relevant observations (n).

When it comes to crop, property and livestock related shocks, the share of households claiming 'unable to cope' is much higher, ranging from about 30% or 50% to 70% for property, crop and livestock, respectively (Table 6). Notwithstanding the ambiguity of the response as noted above, unless the animal had been insured, the scope of recouping the lost cattle is hard for the poor. Hence they may well have to manage without the cattle. Moreover, if the cattle or crop at stake is meant to serve as the principal means of livelihood, when the shock occurs the household is left totally vulnerable to poverty. Unlike death or health shocks, access to regular income and savings is also of much limited scope in these cases, especially in case of livestock, presumably on account of spending priority within the household. Santos *et al.* (2011) also report similar results in case of climatic shocks. However, we observe once more that a majority of the risks analyzed above, especially life, property, livestock and possibly crop too, are in principle insurable events subject to the availability of adequate-sized risk-pools. Hence the insurance type of innovations may prove superior to the status quo, namely the strategy of coping with these shocks by means of new borrowing and the sale of productive assets, liquid or otherwise (Ahsan 2009).

4.4 Effects of Shocks on Capability Deprivation

We have measured the level of shocks the households are exposed to by the costs of the shocks (both direct and coping costs) in order to quantify them (Table 4). As stated previously we have used a specific, but primary indicator of capability deprivation as measured by food adequacy level in the household. Data shows that about one-third (34%) of households have some sort of food deficit, while a further 46% are on the threshold, having neither a deficit nor a surplus. Thus only 20 percent enjoy a food surplus (Table 7). This is a rather plausible pattern for the rural poor.

In terms of the magnitude of the monetized value of the aggregate burden of major economic shocks, the second and third columns in Table 7 indicate that the overall burden is not strictly proportional to the level of deprivation as measured by food adequacy. The bottom two groups, while accounting for about 34% of hhs, bear only 25% of the costs of shocks, and the upper two groups (the relatively better off) bear proportionately more (66% vs. 75%) of the burden. The evidence would be consistent with the hypothesis that the costs of shocks were proportional to the household net worth. A similar observation can also be made from a more detailed examination (Table A4 of the appendix). Santos *et al.* (2011) also concluded that common household shocks inflict proportionately greater burden on the relatively less poor in terms of the magnitude of loss per reported shock.

Table 7
Food Sufficiency Level in the Household and Costs of Shocks (in Taka)

HH Food Availability	Share (%) of HHs (n)	Share of Cost of Major Shocks% (n)	p-value (Column 2 vs. Column 3)
Food deficit throughout the year	7.82 (308)	5.20 (308)	0.187
Occasional food deficit	26.52 (1,045)	20.16 (1045)	0.00
Neither deficit nor surplus of food	46.05 (1,815)	47.62 (1815)	0.34
Surplus of food	19.61 (773)	27.02 (773)	0.00
Total	100 (3,941)	100 (3,941)	NA

Note: The figure in parentheses is the number of cases (n).

Table 7A
Incidence of Shock by Food-Scarcity Group

	Food Sufficiency Level in the Household % (n)	Shocks Reported by the Household Per Year (%)				
		Death	Health	Crop	Property	Livestock
Food deficit throughout the year	7.82 (308)	2.92 (9)	30.84 (95)	11.04 (34)	12.34 (38)	3.90 (12)
Occasional food deficit	26.52 (1,045)	4.21 (44)	30.14 (315)	10.91 (114)	8.13 (85)	10.14 (106)
Neither deficit nor surplus of food	46.05 (1,815)	3.64 (66)	29.04 (527)	7.88 (143)	7.44 (135)	7.16 (130)
Surplus of food	19.61 (773)	4.27 (33)	32.21 (249)	8.93 (69)	7.37 (57)	6.60 (51)
p-test (food deficit vs. food surplus group)	NA	0.85	0.80	0.73	0.41	0.72
p-test (hi-lo, column-wise)	NA	0.299	0.52	0.063	0.01	0.01
Total	100 (3,941)	3.86 (152)	30.09 (1186)	9.13 (360)	7.99 (315)	7.59 (299)

Note: The figure in parentheses is the number of cases (n).

In terms of incidence of shocks (i.e., the frequency) however, Table 7A illustrates a more disaggregate pattern, which when combined with the average cost of shocks (Table A4) reveal more nuanced but a-priori plausible outcomes. It is seen that while the frequency of health shocks, the predominant category, are by and large proportionately distributed among hhs, the average cost borne by the two better-off groups in terms of food availability however much exceed those borne by the less well off. The food deficit group, while actually experiencing the highest rate of crop and property shocks, incurs average losses that are a mere fraction of that befalling the food-surplus group. Again losses would appear proportional to the value of the initial ownership of arable land and property. Similarly, for livestock, while the 'occasional food

deficit' group experiences the most losses frequency-wise, in terms of the average loss per unit, the figure is relatively modest presumably since they own mostly sheep/goat rather than cattle. One must however not lose sight of the fact that the frequency matters too. Further, the relatively modest unit loss per event confronting the less well-off may well be more burdensome than the larger losses faced by the better off in terms of their superior capacity to overcome adversity.

Before leaving this point on the magnitude of losses, it should be observed that death of a family member appears to cause a disproportionately large burden per event on the most vulnerable, namely those suffering a recurrent food deficit throughout the year (Table A4). While the two year data is too inadequate to form an impression of the underlying actuarial figures, the chronic food deficit group is seen to have suffered the least incidence of mortality (2.9% vis-à-vis 3.9% for the sample as a whole) thus moderating the impact of the large per episode loss. This is somewhat counter-intuitive since it can be argued that the group lacking adequate nutrition would be more susceptible to disease, adverse climate and old age than the group having sufficient nutrition.

We next analyze the determinants of food adequacy by specifying ordered-probit models and estimate the corresponding marginal effects, where the focus is on the impact of shocks and its interaction with potential consumption smoothing interventions such as microcredit and/or micro health insurance. The household level attributes we control for are: age (in years) of the hh head; gender of the hh head (female =1, male = 0); education of the hh head (measured in years); household size; the dependency ratio/total number of earners, occupation of the hh head,¹² number of hh members living abroad; costs of shocks (measured in Taka); value of non-land asset in BDT); and, amount of operating agricultural land¹³ (in decimals). Some village level attributes are controlled for as well, e.g., pest attack in the village in the last five years.

¹² For this exercise occupation of the household head was categorized into three broad groups. High-skill occupation includes government service, private wage employment, NGO workers, 'medium' businessmen, moneylender and contractor. Medium-skill occupation covers those engaged in agricultural production, poultry, fisheries, village medical practice and in retailing agricultural produce. Lastly, low-skill occupation consisted of day labor, construction worker, barber, mechanic, driver/helper, boatman, rickshaw/ van puller, self-employed, beggar, those in private tuition, housewife, retired and people engaged in various other occupations.

¹³ In defining operating land we included mortgaged-in land with owned cultivable land and excluded mortgaged-out land and the amount of land leased-out for sharecropping.

Table 8
Ordered Probit Estimation of Food Adequacy Level

Explanatory Variable	Dependent Variable: Food Sufficiency Level (0=Deficit in Whole Year, 1= Sometime Deficit, 2= Neither Deficit nor Surplus & 3= Surplus)					
	Total	Death	Health	Crop	Property	Livestock
Age of the Household Head (in years)	-0.004** (0.002)	-0.004*** (0.002)	-0.004** (0.002)	-0.004** (0.002)	-0.004*** (0.002)	-0.004** (0.002)
Gender of the Household Head (1= Female & 0= Male)	0.030 (0.076)	0.034 (0.075)	0.032 (0.075)	0.030 (0.075)	0.030 (0.075)	0.031 (0.076)
Education of the household head (in years)	0.027*** (0.006)	0.027*** (0.006)	0.027*** (0.006)	0.027*** (0.006)	0.027*** (0.006)	0.027*** (0.006)
Actual Household Size	-0.064*** (0.013)	-0.068*** (0.013)	-0.067*** (0.013)	-0.064*** (0.013)	-0.066*** (0.013)	-0.067*** (0.013)
Occupation of the Household Head ¹						
High grade occupation	0.354*** (0.083)	0.344*** (0.083)	0.344*** (0.083)	0.355*** (0.084)	0.348*** (0.084)	0.341*** (0.083)
Medium grade occupation	0.199*** (0.054)	0.188*** (0.055)	0.188*** (0.055)	0.226*** (0.055)	0.186*** (0.055)	0.197*** (0.054)
Total number of expatriate members in the household	0.289*** (0.048)	0.292*** (0.048)	0.294*** (0.048)	0.281*** (0.048)	0.291*** (0.048)	0.290*** (0.048)
Total number of earning members in the household	0.083*** (0.026)	0.085*** (0.025)	0.085*** (0.025)	0.080*** (0.026)	0.083*** (0.026)	0.084*** (0.026)
Operating agricultural land (in decimal)	0.002*** (0.000)	0.002*** (0.0005)	0.002*** (0.0005)	0.002*** (0.0005)	0.002*** (0.0005)	0.0021*** (0.0005)
Non land asset (log value)	0.280*** (0.023)	0.275*** (0.023)	0.275*** (0.0230)	0.279*** (0.023)	0.276*** (0.023)	0.277*** (0.023)
Cost of shocks (log value)	-0.016*** (0.005)	-0.001 (0.010)	-0.004 (0.004)	-0.039*** (0.009)	-0.013* (0.008)	-0.020** (0.008)
Area (1= program & 0 = control)	0.194*** (0.054)	0.205*** (0.054)	0.205*** (0.054)	0.191*** (0.053)	0.201*** (0.054)	0.202*** (0.054)
Incidence of pest attack in the village in last five years	-0.142** (0.058)	-0.142** (0.059)	-0.141** (0.058)	-0.148*** (0.056)	-0.141** (0.058)	-0.142** (0.059)
Cut point 1	1.21	1.22	1.21	1.23	1.22	1.22
Cut point 2	2.47	2.48	2.47	2.49	2.48	2.48
Cut point 3	4.05	4.04	4.04	4.07	4.05	4.06
Number of Observations	3941	3941	3941	3941	3941	3941
F-distribution	44.13***	43.69***	43.47***	44.28***	44.10***	44.49***
Number of Strata	20	20	20	20	20	20
Number of PSUs (Primary sampling units)	120	120	120	120	120	120

Note: 1. Low grade occupation is the reference category.

2. Figures in parentheses are standard errors.

3. *** Indicates significant at the 1% level, ** at the 5% level and *at the 10% level.

Tables 8 and 8A (including the appendix Tables A5 and A6) each present the ordered probit estimates of food adequacy, the dependent variable, in six equations, i.e., one for the aggregate cost of shocks and one each for the five distinct categories of shocks being analyzed here. Each model is seen to be jointly significant at one percent level.

Ordinarily one would expect that education, number of hh members living abroad, number of earning members in the household¹⁴, quantity of operating agricultural land, value of non-land assets, and higher skill occupations would each lead to greater resources and/or better capacity to process information and hence be in positive association with the food adequacy level, which is borne out by the regression analysis here (Table 8).

Increase in demographic variables such as, age of hh head, hh size and the dependency ratio can likewise be thought of as having a dampening effect on the access to food, which appears consistent with the results presented in the tables cited above. It is interesting that the effect of pest attacks persists through time such that even if an attack occurred 5 years ago, it still impacts the food availability today.

Most explanatory variables in all equations therefore behave in a predictable manner and all except a few have robust ($p\text{-value} < 0.05$) association with food sufficiency level. Importantly the economic burden of shock does not appear to impact the access to food significantly in the case of death and health shocks. Further, unlike crop and livestock shocks, the impact of property shock on food availability also fails to be robust. This is a plausible pattern because loss or damage to property may not affect the food availability in the short run whereas crop failure or loss of livestock has an immediate impact.

Thus one must accept the hypothesis that the existing consumption smoothing devices at the disposal of the household, efficient or otherwise, are adequate to overcome the shocks in the case of health and death events. We have earlier seen that in a majority of cases these victims have used their regular income, liquid saving and borrowing to cope with shocks, which apparently has allowed them to gain access to adequate food. It ought to be noted however that in measuring the cost of health and death shocks, we were unable to incorporate income lost due to illness or death of earning members as a component of the direct cost of shocks.

¹⁴ The earning member variable is highly correlated with the 'dependency ratio', and switching these two around does not make much of a difference to the results, except in the sign; both are highly significant in all cases.

Table 8A
Ordered Probit Estimation of Food Adequacy Level: Scope of MF Interventions

Explanatory Variable	Dependent Variable: Food Sufficiency Level (0=Deficit in Whole Year, 1= Sometime Deficit, 2= Neither Deficit nor Surplus & 3= Surplus)					
	Total	Death	Health	Crop	Property	Livestock
Age of the Household Head (in years)	-0.003** (0.002)	-0.004** (0.002)	-0.004** (0.002)	-0.004** (0.002)	-0.004** (0.002)	-0.004** (0.002)
Gender of the Household Head (1= Female & 0= Male)	0.047 (0.073)	0.052 (0.072)	0.049 (0.073)	0.045 (0.072)	0.047 (0.072)	0.047 (0.073)
Education of the household head (in years)	0.027*** (0.006)	0.027*** (0.006)	0.027*** (0.006)	0.027*** (0.006)	0.027*** (0.006)	0.027*** (0.006)
Actual Household Size	-0.030** (0.013)	-0.033*** (0.013)	-0.033*** (0.013)	-0.032*** (0.013)	-0.032*** (0.013)	-0.033*** (0.013)
Dependency Ratio	-0.163*** (0.035)	-0.168*** (0.035)	-0.167*** (0.035)	-0.155*** (0.036)	-0.164*** (0.035)	-0.167*** (0.035)
Occupation of the Household Head ¹						
High grade occupation	0.375*** (0.082)	0.371*** (0.082)	0.370*** (0.082)	0.379*** (0.083)	0.373*** (0.082)	0.367*** (0.082)
Medium grade occupation	0.209*** (0.053)	0.192*** (0.054)	0.193*** (0.054)	0.231*** (0.054)	0.191*** (0.054)	0.202*** (0.053)
Total number of expatriate member in the household	0.317*** (0.045)	0.320*** (0.045)	0.322*** (0.045)	0.308*** (0.045)	0.319*** (0.045)	0.318*** (0.044)
Operating agricultural land (in decimal)	0.002*** (0.0005)	0.002*** (0.0005)	0.002*** (0.0005)	0.002*** (0.0005)	0.002*** (0.0005)	0.002*** (0.0005)
Non land asset (log value)	0.273*** (0.023)	0.268*** (0.023)	0.268*** (0.023)	0.272*** (0.023)	0.269*** (0.023)	0.270*** (0.023)
Cost of shocks (log value)	-0.019*** (0.005)	-0.003 (0.010)	-0.004 (0.005)	-0.040*** (0.009)	-0.013* (0.008)	-0.021*** (0.008)
GK membership & current GB Borrower (1=Yes & 0=No)	0.166*** (0.059)	0.179*** (0.058)	0.178*** (0.058)	0.173*** (0.057)	0.175*** (0.058)	0.179*** (0.058)
GK membership & current other MFI (i.e., non -GB) Borrower (1=Yes & 0=No)	0.337 (0.224)	0.348 (0.226)	0.349 (0.225)	0.338 (0.230)	0.340 (0.227)	0.348 (0.226)
GK membership & current non-MFI Borrower (1=Yes & 0=No)	-0.155 (0.155)	-0.161 (0.150)	-0.161 (0.150)	-0.186 (0.152)	-0.153 (0.150)	-0.160 (0.150)
GK membership but current non-Borrower (1=Yes & 0=No)	0.430*** (0.145)	0.454*** (0.151)	0.450*** (0.150)	0.448*** (0.155)	0.442*** (0.151)	0.445*** (0.151)
Incidence of pest attack in the village in last five years	-0.140** (0.058)	-0.141** (0.059)	-0.139** (0.059)	-0.147*** (0.056)	-0.140** (0.058)	-0.140** (0.059)
Cut point 1	0.978	0.975	0.973	1.003	0.984	0.987
Cut point 2	2.242	2.235	2.233	2.272	2.245	2.247
Cut point 3	3.815	3.800	3.798	3.846	3.811	3.815
Number of Observations	3941	3941	3941	3941	3941	3941
F-distribution	36.33***	36.04***	35.83***	36.37***	36.73***	35.93***
Number of Strata	20	20	20	20	20	20
Number of PSUs (Primary sampling units)	120	120	120	120	120	120

Note: 1. Low grade occupation is the reference category;

2. Figures in parentheses are standard errors.

3. *** Indicates significant at the 1% level, ** at the 5% level and *at the 10% level.

On the role of microfinance interventions, first note that program areas cited above are defined to be those where GK has been running an MHI scheme (essentially primary care) where the card-holdership is about 38 percent. While it is a pre-paid scheme by design, unfortunately it still requires significant co-payment at the point of service delivery (Ahsan et al. 2012). Table 8 shows that households residing in program areas fare better in terms food adequacy than that in the control region. However since the program areas comprise of those who are members of both GK MHI and micro credit and others who are GK members but are non-borrowers, in order to examine the nature of these interactions on the access to food, additional categories are introduced in the probit analysis, where GK non-members constitute the reference category (Table 8A).

Interestingly it is seen that GK membership, when combined with either 'GB credit' or 'not currently recipient of any credit whatsoever', appears to be associated with greater access to food. However this still does not answer the question of the actual process by which access to food improves. Is it that better health allows GK members to participate more fully in the labor market or in other income generating activities? Why is no participation (by merely 12 percent of members) in credit so helpful, is it a self-selection by those who are already relatively better off? Have these members so to speak 'graduated' out of poverty? More intriguing is the observation that the enhanced access to food for GK members seem to evaporate (i.e., become insignificant) when they participate in other (i.e., non-GB) microcredit. Or that the access to food actually deteriorates (though not statistically significant) when GK members become recipients of non-MF credit, typically from moneylenders. These latter events, which may be closely related to multiple borrowing by the same household, also call for deeper analysis. Is non-GB credit of too small an amount (or too costly, especially in case of loans from moneylenders) thus acting as a barrier to accessing adequate food? The latter remark is to be understood in a context where about half of microcredit (and larger for non-MFI loans) is dedicated toward current consumption in rural Bangladesh (see Ahsan et al. 2013).

5. Conclusions

Rural households encounter various shocks. The most prominent of these are: death and health related shocks, crop failure or damage, loss of livestock, loss or damage of household fixed assets, and wedding and dowry expenses. Many of these inflict a large economic burden on the affected households. Among the insurable risks the larger burdens appear to be associated with health shocks followed by property shocks. Rural survey data reveals that these latter shocks disproportionately affect households whose primary members are typically engaged in agriculture (crop and livestock), casual labor (livestock), transport work (health) and small businesses (property). Regular household income and accumulated savings are not sufficient to cope with these shocks. Consequently, they mainly deal with these by additional borrowing and selling physical assets and livestock, all of which are unsustainable in any forward-looking context. Thus, this paper provides the evidence that the risk mitigation devices at the disposal of the poor are mostly of a self-insurance nature, and that the adopted means leave them more

vulnerable to future poverty than they would have been either in the absence of shocks or in the presence of more benign coping means.

The paper also explores to what extent the economic burden of shocks may compound the food scarcity level in a household, a primary indicator of human capability. There appears to be some support in favor of the hypothesis that there is a link between the cost of shocks and food deprivation, especially for crop and livestock losses. Interestingly even an elementary health intervention (in the pre-paid MHI mode) implemented by Grameen Kalyan appears to make a difference to the access to food for all categories of shocks analyzed in the paper, though only in certain scenarios. While the exact channel seems hard to pin down, it is robustly seen that membership in the GK program, in combination with either GB credit or no credit whatsoever, is associated with greater access to food. Non-MFI credit or non-GB credit seem to neutralize the presumed advantage of MHI.

A plausible implication of these findings is that low-cost coping mechanisms as for example, a well-designed microinsurance with a large risk-pool may be an important device to protect the poor against risks of deprivation and shock induced poverty as claimed in the conceptual analysis (Ahsan 2009). Elsewhere it has been argued that the singular lack of an enabling regulatory stance combined with inefficient product design prevent the poor from securing access to what should in principle have been the cheapest means of overcoming their misfortunes.¹⁵

¹⁵ The design and distribution-regulatory aspects of microinsurance are analyzed in depth, respectively, by Ahsan and Hakim (2010) and Ahsan and Mahmud (2012).

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Appendix

Table A1
Mechanisms for Managing Risks

Objective		Informal Mechanisms		Formal Mechanisms	
		Individual and Household	Group Based	Market Based	Publicly Provided
Reducing Risks		- Preventive health practices - Migration - More secure income sources	- Collective action for infrastructure, dikes, terraces - Common property resource management		- Sound economic policy - Environmental policy - Education and training Policy - Public health policy - Infrastructure (dams, roads) - Active labor market policies
Mitigating Risk	Diversification	- Crop and plot diversification - Income source diversification - Investment in Physical and human capital	- Occupational associations - Rotating saving and credit associations	- Saving accounts in financial institutions - Microfinance	- Agricultural extension - Liberalized trade - Protection of property Rights
	Insurance	- Marriage and extended family - Sharecropper tenancy - Buffer stocks	Investment in social capital (networks, associations, rituals, reciprocal gift giving)	- Old age annuities - Accident, disability, and other insurance	- Pension systems - Mandated insurance for unemployment, illness, disability, and other risks
Coping with Shocks		- Sale of assets - Loans from money-lenders - Childlabor - Reduced consumption - Seasonal or temporary migration	Transfers from networks of mutual support	- Sale of financial assets - Loan from Financial institutions	- Social assistance - Workfare - Subsidies - Social funds - Cash transfers

Source: Originally due to Holzmann and Jørgensen, 2000, but the table above has been adapted from World Bank (2001).

Table A2
The nature of Loss Recorded over the Two Years Preceding the Survey

Sl. No.	Nature of Crisis	Percent per Affected HH (Frequency)
1.	Death of an earning member of the family	1.23 (43)
2.	Death of a non-earning member of the family	3.16 (110)
3.	Earning member suffering chronic diseases	8.95 (312)
4.	Other member suffering chorionic diseases	9.64 (336)
5.	Accident by an earning member	1.69 (59)
6.	Accident by other member	1.84 (64)
7.	Expenditure incurred for short term acute illness	15.15 (528)
8.	Crop damage	10.36 (361)
9.	Robbery/theft	3.07 (107)
10.	Death of livestock	8.64 (301)
11.	Death of poultry	5.16 (180)
12.	Destruction of house/land by river erosion	0.23 (8)
13.	Damage due to flood/cyclone	3.07 (107)
14.	Damage of house due to fire	0.32 (11)
15.	Damage of machinery due to accident	0.14 (5)
16.	Business loss	2.61 (91)
17.	Expenses for wedding	7.6 (265)
18.	Expenses for dowry	2.38 (83)
19.	Dismissal from service	0.11 (4)
20.	Lump sum large expenses for education	1.61 (56)
21.	Lump sum large expenses for migrating abroad	11.02 (384)
22.	Other	2.01 (70)
Total		100 (3,485)

Note: (a) The figures in brackets in each cell are the number of relevant observations (n).

(b) The construction of the 5 broad categories of shocks as reported in Table 1 in the text can be easily gleaned from the above data. First we combine the death of both earning and non-earning member of the family (items 1 and 2) to obtain the (i) death shock figure of 153. Similarly, (ii) the 1,299 health shocks comprises of major ailments of both earning and non-earning members (3, 4, 5, 6 and 7). Both (iii) crop and (iv) livestock losses are each shown directly under a single head, but (v) the 'property shock' figure of 238 is made up of several elements: robbery/theft, destruction of house/land by river erosion, damage due to flood/cyclone, damage of house due to fire and damage of machinery due to accident (i.e., adding up 9, 12, 13, 14 and 15). This yields a total of 2,352 shocks that are in principle of the insurable variety.

Table A3
Causes of Death and Accidents over the Last Two Years Preceding the Survey

Causes of Death /Accident	Death	Accident
	% (n)	% (n)
Illness related to aging	25.00 (26)	1.63 (2)
All other diseases	42.31 (44)	3.25 (4)
Child birth	1.92 (2)	
Suicide	1.92 (2)	0.81 (1)
Murder	0.96 (1)	
Road accident	3.85 (4)	37.40 (46)
Falling from tree	0.96 (1)	8.94 (11)
Fire burn	-	2.44 (3)
Snake bite	0.96 (1)	1.63 (2)
Machinery handling	-	4.88 (6)
Natural disaster	-	
Drowning	1.92 (2)	0.81 (1)
Other	20.19 (21)	23.58 (29)
Cause unreported	32.03 (49)	14.63 (18)
Total	100 (153)	100 (123)

Note: The figures in brackets in each cell are the number of relevant observations (n).

Table A4
Average Burden of Shocks among the Food-Deprived

	Food Sufficiency Level in the Households% (n)	Average Cost (both direct and coping) of Shocks per Reported Household Per Year				
		Death	Health	Crop	Property	Livestock
Food deficit throughout the year	7.82 (308)	33,000 (37,305) [9]	8197 (8741) [95]	8,603 (6,944) [34]	9,654 (9,841) [38]	9,552 (13,858) [12]
Occasional food deficit	26.52 (1,045)	18,282 (26,892) [44]	8838 (13374) [315]	9,445 (9,381) [114]	21,236 (79,238) [85]	5,303 (5,605) [106]
Neither deficit nor surplus of food	46.05 (1,815)	15,816 (18,546) [66]	12268 (19457) [527]	13,301 (13,328) [143]	50,937 (81,760) [135]	6,154 (6,653) [130]
Surplus of food	19.61 (773)	40,389 (61,348) [33]	12224 (17501) [249]	26,343 (89,960) [69]	57,070 (74,559) [57]	8,114 (8,826) [51]
Total	100 (3,941)	22,923 (36,399) [152]	11,022 (16,985) [1186]	14,136 (40,916) [360]	39,052 (76,455) [315]	6,323 (7,193) [299]

Note: The figure in parentheses in the second column is the number of cases (n), while those in the remaining columns to the right indicate the standard error. The square brackets in these columns however indicate the number of cases in each cell.

Table A5
Marginal Effects for the Order Probit Models Presented in Table 8

Explanatory Variable	Dependent Variable: Food Sufficiency Level (0=Deficit in Whole Year, 1= Sometime Deficit, 2= Neither Deficit nor Surplus & 3= Surplus)					
	Total	Death	Health	Crop	Property	Livestock
Age of the Household Head (in years)	-0.001** [0.0004]	-0.001*** [0.0004]	-0.001*** [0.0004]	-0.001*** [0.0004]	-0.001*** [0.0004]	-0.001*** [0.0004]
Gender of the Household Head (1= Female & 0= Male)	0.007 [0.0169]	0.008 [0.017]	0.007 [0.017]	0.007 [0.017]	0.007 [0.017]	0.007 [0.017]
Education of the household head (in years)	0.006*** [0.0013]	0.006*** [0.001]	0.006*** [0.001]	0.006*** [0.001]	0.006*** [0.001]	0.006*** [0.001]
Actual Household Size	-0.014*** [0.0029]	-0.015*** [0.003]	-0.015*** [0.003]	-0.014*** [0.003]	-0.014*** [0.003]	-0.015*** [0.003]
Occupation of the Household Head ¹						
High grade occupation	0.087*** [0.0231]	0.085*** [0.023]	0.085*** [0.023]	0.088*** [0.023]	0.086*** [0.023]	0.084*** [0.023]
Medium grade occupation	0.046*** [0.0131]	0.043*** [0.013]	0.043*** [0.013]	0.052*** [0.013]	0.042*** [0.013]	0.045*** [0.013]
Number of expatriate member in the household	0.063*** [0.0104]	0.064*** [0.010]	0.064*** [0.010]	0.061*** [0.010]	0.064*** [0.010]	0.063*** [0.010]
Number of earning member in the household	0.018*** [0.0057]	0.018*** [0.006]	0.018*** [0.006]	0.017*** [0.006]	0.018*** [0.006]	0.018*** [0.006]
Operating agricultural land (in decimal)	0.000*** [0.0001]	0.0005*** [0.0001]	0.0005*** [0.0001]	0.0005*** [0.0001]	0.0005*** [0.0001]	0.0005*** [0.0001]
Non land asset (log value)	0.061*** [0.0052]	0.060*** [0.005]	0.060*** [0.005]	0.061*** [0.005]	0.060*** [0.005]	0.060*** [0.005]
Cost of shocks (log value)	-0.004*** [0.0011]	0.000 [0.002]	-0.001 [0.001]	-0.009*** [0.002]	-0.003* [0.002]	-0.004*** [0.002]
Area (1=program & 0=control)	0.042*** [0.0114]	0.045*** [0.012]	0.045*** [0.012]	0.041*** [0.011]	0.044*** [0.012]	0.044*** [0.012]
Incidence of pest attack in the village in last five years	-0.031** [0.0121]	-0.031*** [0.012]	-0.030*** [0.012]	-0.032*** [0.012]	-0.030*** [0.012]	-0.031*** [0.012]

Note: 1. Low grade occupation is the reference category.
2. Figures in parentheses are standard errors.
3. *** Indicates significant at the 1% level, ** at the 5% level and *at the 10% level.

Table A6
Marginal Effects for the Order Probit Models Presented in Table 8
(Household as Member of GK)

Explanatory Variable	Dependent Variable: Food Sufficiency Level (0=Deficit in Whole Year, 1= Sometime Deficit, 2= Neither Deficit nor Surplus & 3= Surplus)					
	Total	Death	Health	Crop	Property	Livestock
Age of the Household Head (in years)	-0.001** (0.0003)	-0.001*** (0.0003)	-0.001** (0.0003)	-0.001** (0.0003)	-0.001** (0.0003)	-0.001** (0.0003)
Gender of the Household Head (1= Female & 0= Male)	0.010 (0.016)	0.012 (0.017)	0.011 (0.017)	0.010 (0.016)	0.010 (0.016)	0.011 (0.017)
Education of the household head (in years)	0.006*** (0.001)	0.006*** (0.001)	0.006*** (0.001)	0.006*** (0.001)	0.006*** (0.001)	0.006*** (0.001)
Actual Household Size	-0.006** (0.003)	-0.007*** (0.003)	-0.007*** (0.003)	-0.007*** (0.003)	-0.007*** (0.003)	-0.007*** (0.003)
Dependency Ratio	-0.035*** (0.008)	-0.037*** (0.008)	-0.037*** (0.008)	-0.034*** (0.008)	-0.036*** (0.008)	-0.036*** (0.008)
Occupation of the Household Head ¹						
High grade occupation	0.094*** (0.023)	0.093*** (0.023)	0.093*** (0.023)	0.095*** (0.023)	0.094*** (0.023)	0.092*** (0.023)
Medium grade occupation	0.048*** (0.013)	0.044*** (0.013)	0.044*** (0.013)	0.053*** (0.013)	0.044*** (0.013)	0.046*** (0.013)
Total number of expatriate member in the household	0.069*** (0.010)	0.070*** (0.010)	0.071*** (0.010)	0.067*** (0.010)	0.070*** (0.010)	0.070*** (0.010)
Operating agricultural land (in decimal)	0.0004*** (0.0001)	0.0004*** (0.0001)	0.0004*** (0.0001)	0.0005*** (0.0001)	0.0004*** (0.0001)	0.0004*** (0.0001)
Non land asset (log value)	0.059*** (0.005)	0.059*** (0.005)	0.059*** (0.005)	0.059*** (0.005)	0.059*** (0.005)	0.059*** (0.005)
Cost of shocks (log value)	-0.004*** (0.001)	-0.001 (0.002)	-0.001 (0.001)	-0.009*** (0.002)	-0.003* (0.002)	-0.005*** (0.002)
GK membership & current GB Borrower (1=Yes & 0=No)	0.039*** (0.015)	0.042*** (0.015)	0.042*** (0.015)	0.041*** (0.014)	0.041*** (0.014)	0.042*** (0.015)
GK membership & current other MFI (i.e., non-GB) Borrower (1=Yes & 0=No)	0.087 (0.067)	0.090 (0.068)	0.091 (0.068)	0.087 (0.068)	0.088 (0.068)	0.090 (0.068)
GK membership & current non-MFI Borrower (1=Yes & 0=No)	-0.031 (0.028)	-0.032 (0.027)	-0.032 (0.027)	-0.036 (0.027)	-0.031 (0.027)	-0.032 (0.027)
GK membership but current non- Borrower (1=Yes & 0=No)	0.115*** (0.046)	0.124*** (0.048)	0.122*** (0.048)	0.121*** (0.049)	0.120*** (0.048)	0.120*** (0.048)
Incidence of pest attack in the village in last five years	-0.030*** (0.012)	-0.030** (0.013)	-0.030** (0.012)	-0.032*** (0.012)	-0.030** (0.012)	-0.030** (0.012)

Note: 1. Low grade occupation is the reference category.

2. Figures in parentheses are standard errors.

3. *** Indicates significant at the 1% level, ** at the 5% level and *at the 10% level.

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