Seasonal Migration to Mitigate Income Seasonality: Evidence from Bangladesh

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ABSTRACT

In northwest Bangladesh, some 36 per cent of poor households migrate every year during the lean (monga) period to cope with seasonal deprivation. Analysis of household survey data shows that the probability of seasonal migration is high for households with a high dependency ratio, high dependency on wage employment, and in villages with high unemployment; but low in villages with microcredit access. Findings show that seasonal migration helps households to smooth consumption and that non-migrant households who suffer during monga would likely benefit from deciding to migrate. But the cost of migration and lack of networking are potential barriers.

I. Introduction

Seasonal food deprivation is a recurrent problem in the northwest of Bangladesh (known as the greater Rangpur region). This hardship is caused, in part, by the region's mainly agriculture-dependent economic structure, along with poor agroclimate conditions (Afsar, 2005; CARE, 2005; Rahman, 1995; Zug, 2006). Bangladesh's agriculture sector is characterised by three rice-cropping seasons (aus, aman and boro), which together account for nine months out of the year. This leaves a three-month period of virtual economic inactivity, which is termed *monga*. Throughout this paper, monga refers to (i) the lean season (September to November, corresponding to the pre-harvest season for aman rice); (ii) the northwest or greater Rangpur region of Bangladesh, where the lean period is particularly acute; and (iii) the incidence of seasonality in general. Although the phenomenon of seasonality is perceived during other times of the year and in other regions of the country, it is nowhere as periodic or acute as in the greater Rangpur region, and it is the seasonality in the greater Rangpur region that is the focus of this paper.

There is virtually no alternate agricultural activity during this period, and the nonfarm sector in the northwest region is not large enough to absorb the seasonally unemployed population, who are mostly agricultural labourers or subsistence farmers. Furthermore, ecological vulnerability often intensifies the effects of the crop seasonality; that is, the monga period is often preceded by floods or drought.

An important concern is whether seasonal food deprivation is due to the lack of food availability. Although Bangladesh is not fully food solvent, its own production and import volumes are large enough to make concerns about seasonal deprivation in the northwest region a nonissue (WFP, 2005). It is perhaps then the lack of purchasing power rather than food availability that makes food inaccessible to the poor and manifests as seasonal food deprivation. During the monga season, the purchasing power of the poor is limited by a lack of income and employment, which cannot be overcome with meager assets and savings. As Sen (1981) observed about 30 years ago, seasonal deprivation is due to the working of an economic system that limits the ability of a segment of the population to acquire food and other basic necessities.

Seasonal deprivation may also be caused by a lack of access to credit. Many poor people in the northwest region lack reliable access to a well-functioning credit market. As a result, they are frequently drawn into an informal credit-market arrangement, termed *dadan*, which forces them to make advance sale of labour or crops in exchange for immediate food and money, often to their long-term detriment. Moreover, such safety-net measures as cash transfers, food-for-work, food coupons, and public work programmes have often proved inadequate to manage the crisis. If variations in consumption were only transitory and idiosyncratic across households, such interventions would have helped households mitigate their suffering. But since monga is widespread and often a result of structural factors (for example, low income, low productivity, and lack of diversification of local economies), government measures, which are not geared toward enhancing income and productivity in general, are of little help in containing monga over the long term.

The inadequacy of the aforementioned measures to reduce the seasonality of monga has often resulted in households resorting to seasonal migration.[1] In 2007, for example, about 36 per cent of poor households from greater Rangpur adopted migration to cope with the severity of monga. Seasonal migration supplements nonfarm earnings of the poor, providing them with a means to diversify income opportunities and accumulate collective capital (IOM, 2005). In addition, migrants' remittances may stimulate the local economy (Oberai, Prasad, and Sardana, 1989; Afsar, 2005; Deshingkar, 2005; IOM 2005).

Seasonal migration must be distinguished from general migration. The latter involves a physical movement from one area to another within a country (internal migration) or from one country to another (international migration). Increasingly, internal migration is viewed as more important than international migration; both types are considered measures to augment income and welfare, benefiting migrant households, as well as their communities and countries of origin.

The large body of literature on general migration defines its scope and role in the welfare of migrant families and their societies. Neoclassical microeconomic theory defines migration as an individual strategy for income maximisation (Todaro, 1969; Kalzuny, 1975; Yezer and Thurston, 1976; Navratil and Doyle, 1977; Hay 1980; Nakosteen and Zimmer 1980), while Stark and Taylor (1989) attribute it to a household strategy for minimising risk of income and consumption in an imperfect market. Srivastava (2005) explains that, lacking suitable employment or livelihood opportunities in local areas, internal migration is often a viable option with expectations of higher wages, better employment alternatives, and factors that maximise family employment in the destination areas. Migration tends to be motivated by a demand for migrant labour that is higher in the destination areas than in the local ones; that is, labour-market segmentation plays a role in internal migration. Other impetuses for migration include economic hardship during a time of crisis or emergency. Thus, migration is the result of individuals and households weighing the utility attainable from migrating versus not migrating. In a study of international migration during the 1997 Asian financial crisis, Yang (2008) shows that remittances from overseas migrants are influenced by fluctuation of the exchange rate between overseas and recipient countries.

Seasonal migration (either internal or external) is a temporary movement of labour or families in response to seasonal hardships caused by economic, climate, and social shocks; seasonal hardships may include the lack of food or income during certain months of the year when local markets do not offer income-earning opportunities. Seasonal migration can also be viewed as a strategy to augment income generally. Countries where seasonal migration is high are often characterised by growing economic inequalities, which create unequal employment opportunities and wage differentials across regions, leading people from poorer regions to travel to more developed ones, particularly during periods of crisis, such as agricultural seasonality. A study from Vietnam shows that, among other factors, social networks figure prominently in deciding who migrates (Brauw and Harigaya, 2007). The poorest of the poor often do not migrate because they lack start-up resources, information, and social networks (de Haan, 2005). Various studies have reported the development impacts of seasonal migration. Brauw and Harigaya (2007) show that seasonal migration has played an important role in the improving living standards in rural Vietnam. A study conducted in the state of Jharkhand, India shows that 98 per cent of migrant households reported an improved livelihood because of migration (Dayal and Karan, 2003). The same study found that migrant households had a better diet and a food expenditure 15 per cent higher than that of non-migrating households. Evidence from Thailand suggests that remittances from migration redistributed income to poorer regions and reduced income inequalities among households (Guest, 1998; Yang, 2004). For economies that undergo rapid urbanization, seasonal migration possibly contributes to welfare growth, including poverty reduction (Deshingkar, 2005).

This paper examines the issue of seasonal migration within the context of mitigating seasonal deprivation.[2] Using household survey data from the northwest region of Bangladesh, this paper asks the following questions: Is seasonal migration a viable strategy to mitigate seasonal hardships? Who migrates and what are the determinants of seasonal migration? What impact does it have on consumption-smoothing behaviour? The paper's analysis suggests that a substantial percentage of the rural poor in the northwest region migrates in response to the seasonal shortfall in employment and income, and seasonal migration is a valid strategy to mitigate seasonality of income and consumption.

The paper is structured as follows. The second section discusses the data and its major characteristics, such as the incidence of seasonal migration as a coping strategy and its relation to seasonal hardships (measured by starvation and meal rationing). The third section presents an analytical framework of how seasonal migration can help smooth consumption during the lean season. The fourth section analyses the determinants of seasonal migration, while the fifth one assesses the potential effect of seasonal migration on rural households' consumption-smoothing behaviour. Finally, section six summarises the study' findings and their policy implications.

2. Data Source and Characteristics

This paper draws on the data from a 2006/2007 rural household survey of 480,918 poor households living in Bangladesh's northwest region. Conducted by the Institute of Microfinance (InM) and the Palli Karma Shahayak Foundation (PKSF), the survey collected baseline data to target ultra-poor households vulnerable to seasonal deprivation during the monga season. The survey covered all five districts in the northwest region. In Kurigram and Lalmonirhat districts, it covered all rural *upazilas*;[3] and a selected number of acutely monga-prone upazilas in the other three (Gaibandha, Nilphamari, and Rangpur).[4] In all, 15 upazilas were covered (comprising 146 unions and 2,433 villages).[5] The households selected for the survey were designated as ultra-poor, implying they were monga-prone and eligible for flexible microfinancing, known as Programmed Initiatives for Monga Eradication (PRIME), to have been introduced by PKSF the following year.[6] Although monga seasonality is most acute in the northwest, this region is not homogeneous; monga severity varies, depending on agroclimate conditions and the location of a particular area, as well as the cropping cycle. For example, some areas of greater Rangpur are subject to frequent droughts and floods, which intensify the monga effect. Moreover, about one-fifth of villages in greater Rangpur are located in the so-called *char* areas.[7] These areas are characterised by poor vegetation, scarcity of drinking water, and poor sanitation, which make their residents more vulnerable to a systemic shock, such as monga, than those living on the mainland. In its impact analysis of seasonal migration during the monga season, this study takes these location and agroclimate characteristics into account.

Seasonal hardship can be variously measured. Since monga manifests as dwindling employment opportunities, household income is affected first. Since most rural people in the affected areas are quite poor, they have scant resources to make up for the lost income; consequently, their consumption (first nonfood and then food) becomes squeezed. Food deprivation reflects the most extreme form of seasonality, and thus this paper uses it to measure monga seasonality. As a normal practice, rural residents in Bangladesh consume three full meals a day. During the monga crisis period, they first attempt to ration their meals by consuming less each time. It is only when the crisis hits them the hardest that they are forced to skip meals altogether, leading to starvation. It is evident that seasonal hardship is severe in the greater Rangpur region during monga. Indeed, more than 90 per cent of ultra-poor households do not have full meals during this lean season. Of the region's five districts, Nilphamari has the lowest starvation rate and the highest consumption rate of full meals; thus, households in this district appear to fare better than those in the other four (Table 1).

Table 1. Distribution of household meal consumption during the monga period, by district in the greater Rangpur region (%)

Meal

consumption status	Kurigram	Gaibandha	Nilphamari	Lalmonirhat	Rangpur	All districts
Starvation	48.47	57.62	26.16	47.95	56.34	47.27
Meal rationing	50.14	40.79	60.37	49.54	40.35	48.29
Consumption of full meals	1.39	1.59	13.47	2.51	3.31	4.44
Observations	120,426	128,987	102,866	56,772	71,867	480,918

Source: InM 2006/2007 survey data.

Poor households in the greater Rangpur region are found to adopt various coping measures, including seasonal migration, to combat the seasonality of monga (Table 2). Overall, more than 65 per cent adopt some type of coping measure. While more households resort to informal coping (30%) than formal coping (16%), a good many (19%) do both. With regard to the coping subcategories, seasonal migration ranks first, with 36 per cent having adopted the measure during the 2006-2007 monga period.

Table 2. Household distribution during monga, by coping measure and seasonal migration pattern

Household coping measure	Households adopting the measure (%)	Household rate of seasonal migration (%)
Coping category		
Formal only	16.3	-
Informal only	29.8	75.3
Both formal and informal	19.2	70.7
Non-coping	34.7	-
Coping subcategory		
Informal	49.0	73.5
Advance labour sale	4.4	57.5
Advance crop sale	0.5	43.6
Advance asset sale	11.4	49.0
Seasonal migration	36.0	100.0
Informal loan	12.4	44.4
Formal	35.5	38.2
Government and nongovernmental support	31.7	38.5
Formal loan	5.8	36.6
Observations	480,918	

Source: InM 2006/2007 survey data.

Note: Percentage figures total more than 100 because households adopt multiple coping mechanisms.

Overall, more than 55 per cent of the poor households that use coping measures during the monga period adopt seasonal migration. However, migration patterns vary, depending on the types of other coping measures adopted (Table 2). The rate of labour migration is nearly 58 per cent among the 74 per cent of households that resort to informal coping mechanisms; interestingly, the rate of seasonal migration is quite high among households that adopt formal coping measures (38%), although only about half as high as for those adopting informal ones, which is to be expected. The findings clearly show that adopting only one measure is hardly enough to cope with the severity of monga, even among households with access to formal credit.

How do household meal-consumption patterns vary by migration status? To examine this issue, we must first take a closer look at household meal-consumption patterns. Since the InM survey collects data on household meal consumption for both monga and non-monga periods, we can also determine how households fare throughout the year; for example, how many always have full meals, how many never face starvation, and so on. If a household suffers from starvation at any time of year (that is, during monga and non-monga), we refer to this hardship as year-round starvation. The hardship of slightly better-off households who never suffer from starvation, but must ration their meals at one point or another, is termed year-round meal rationing. Together, these two groups represent households that are subject to some form of food deprivation during any time of year. The status of a third group of households, who never suffer food deprivation at any time of year, is referred to as year-round consumption of full meals.

Table 3 shows the distribution of poor households in the greater Rangpur region by their food consumptions status for all three periods of the year, for both migrant and non-migrant households. During the monga period, the incidence of starvation is higher among migrant households than among non-migrant households, and the difference is statistically significant. For all three periods of the year, incidence of full meal consumption is less for migrant households than for non-migrant households. Does this mean that seasonal migration has made the seasonal hardship worse? Not necessarily, as we could hypothesise that seasonal hardship would have been even worse had the poor not migrated during the lean season. More important, factors other than migration (both observed and unobserved) can also affect seasonality; such factors must be controlled for to determine the true impact of seasonal migration. We explore this issue in section 5.

Table 3. Distribution of households (%) by seasonal migration and food consumption status

	Starvation		Meal rationing		Full meals	
Period	Migrant households	Non-migrant households	Migrant households	Non-migrant households	Migrant households	Non-migrant households
	49.2	46.2	47.3	48.8	3.5	5.0
Monga	(0.001)**		(0.002)**		(0.0003)**	
	7.3	9.2	53.7	49.3	39.0	41.5
Non-monga	(0.0008)**		(0.002)**		(0.001)**	
	51.7	49.4	45.5	46.3	2.8	4.3
Year-round	(0.002)**		(0.001)**		(0.0006)**	
Observations		307,823			173,095	

Source: InM 2006/2007 survey data.

Note: Figures in parentheses are standard errors of the difference; ** indicates a statistical significance level of 5 per cent or better.

3. Economic Framework of Consumption Shortfalls and Seasonal Migration

Figure 1 illustrates the utility function of a two-period household consumption model with a binding budget constraint. The model assumes that period 1 is the lean (monga) season and period 2 the harvest (aman) season (immediately following monga). Given the utility curve (u_1) of a household meeting its budget constraint, it would maximise its utility by consuming c_1 at e_1.

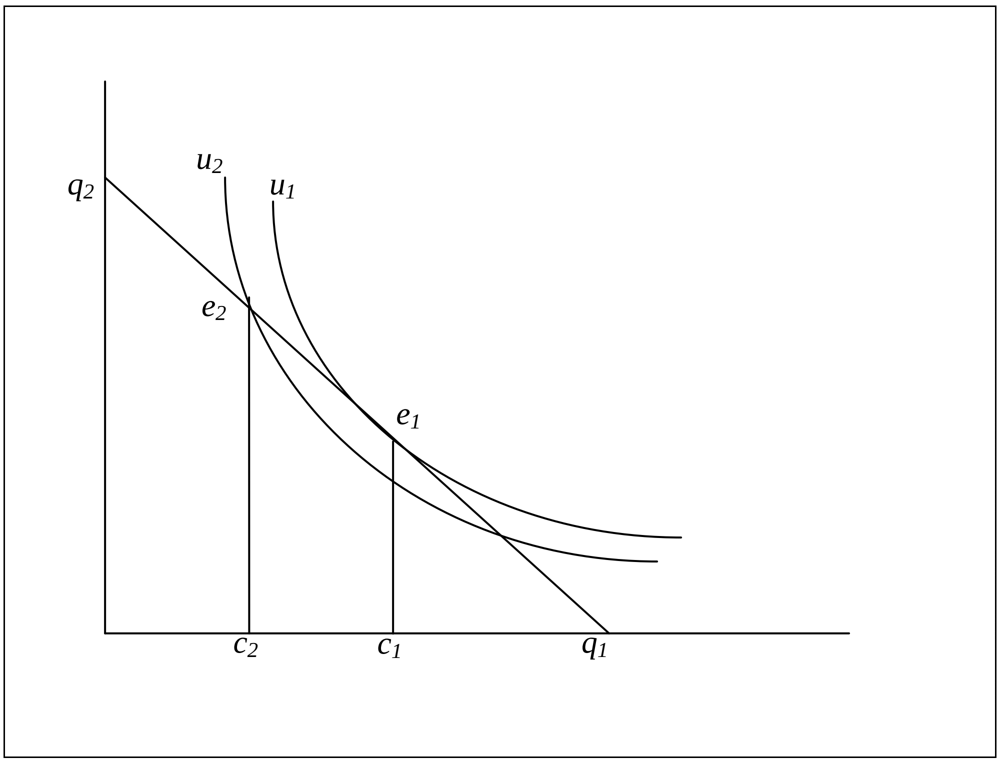

Figure 1. Household utility function during lean and harvest periods

However, the household may not have a continuous budget line (q_1q_2). Without income in period 1 (monga) to support its desired consumption, it could face a budget constraint and thus have a discontinuous budget line ($q_2e_2c_2$). In this situation, the household would be forced to consume c_2 at e_2 ($c_2 < c_1$) and drop to a lower welfare level, causing it to either starve or ration meals.

Even if its income in period 2 (aman) were to rise, this would have no effect on consumption during period 1.

Assuming that the household cannot borrow in period 1 against the income of period 2 (some other households may be able to do so), the alternative to seasonal food deprivation is to migrate to a distant market for wage income to support consumption during the lean period. The decision to migrate depends on the expected returns from migration, the knowledge about jobs in the distant market, and the ease of transition to a distant environment (Brauw and Harigaya, 2007); as mentioned earlier, knowledge about distant markets may also depend on the extent of social networks. However, there is a potential cost of migration against expected returns. Besides transport and relocation, the cost includes the income forgone in the local market due to migration. As long as the returns exceed cost, the household would migrate to the distant market, provided it has at least one able member (usually male) to do so.

We now turn to the development of a model of household migration to the distant market, following Brauw and Harigaya (2007). First we assume that, during the monga season, a household with a disposable labour of N units can draw from the local market an income of Y from two possible sources: farm activity (p) and/or wage market at a given wage rate (w).[8] If the household deploys N_p units of its labour force to production activities and the rest $(N\text{-}N_p)$ to wage employment, the derived income from production (Y_p) and wage activities (Y_w) from the local market is given by the following:

$$Y_p = \alpha \, ln(N_p) \tag{3.1}$$

$$Y_w = \beta w(N - N_p) \tag{3.2}$$

Thus, that household's total income without migration can be expressed as $Y = (Y_p + Y_w)$. It should be noted that α captures the effect of inputs to production activities (assumed as fixed), and β

captures the productivity of wage labour so that $0 \leq \beta \leq 1$. In the absence of a functional labour market, $\beta = 0$, while, for a fully functional market, $\beta = 1$.

The household may decide to send a portion of its labour force to a distant market if the perceived returns from migration are higher. We assume that the household sends *m* proportion of its labour *N* to the distant market at a prevailing wage rate of ρ, and further that this share *m* does not vary across production and wage activities. Since additional factors may influence the household's decision to migrate—such as migration cost (c) and informational factors (z), where z may include knowledge about the job in the target market, probability of getting such a job, and likelihood of adapting to a new environment—the perceived return per unit of labour in the distant market can be expressed by $f(\rho, c, z)$. The expected return from the distant market during the monga period is expressed as follows:[9]

$$Y_m = Nmf(p, c, z) \quad (3.3)$$

The expected returns from the local market with migration during the monga period are:

$$Y_p = \alpha \ln[N_p(1-m)] \quad (3.4)$$

$$Y_w = \beta w(N - N_p)(1-m) \quad (3.5)$$

The expected total household income from all activities, including migration, in the monga period is expressed as follows:

$$Y_t = Y_p + Y_w + Y_m = \alpha \ln[N_p(1-m)] + \beta w(N - N_p)(1-m) + Nmf(p, c, z) \quad (3.6)$$

The household will decide to migrate if $Y_t > (Y_{p+} + Y_w)$, where $m > 0$. To maximise Y_t we set $\frac{dY_t}{dm} = 0$, which yields the limiting value of *m* for the migration decision, expressed as follows:

$$m^* = 1 - \frac{\alpha}{Nf(p,c,Z) - \beta w(N - N_p)} \quad (3.7)$$

It is clear from equation (3.7) that a high return from production activities in the local market (that is, if α is high) lowers the share of migration labour (m^* is low); so does a high return from wage employment in the local market (where either β or w or both are high). Conversely, a high perceived return in the distant market (f is high) increases migration labour. Given that the household decides to migrate, the change in its income due to the migration decision is expressed as follows:

$$\Delta Y = (Y_t - Y_p - Y_w) = \alpha \ln(1 - m^*) - \beta w (N - N_p) m^* + N m^* f(p, c, Z) \tag{3.8}$$

In equation (3.8), the first two terms are the opportunity costs of migration (the potential loss of production and wage income from the local market due to migration), and the third term is the perceived income in the distant market. Three scenarios are possible:

I. $\Delta Y = 0$ if the perceived income gain in the distant market is equal to the combined loss of production and wage incomes in the local market, in which case, migration does not make any difference in household income.

II. $\Delta Y > 0$ if the perceived income gain in the distant market is greater than the combined loss of production and wage incomes in the local market, in which case, migration improves household income.

III. $\Delta Y < 0$ if the perceived income gain in the distant market is less than the combined loss of production and wage incomes in the local market, in which case, migration worsens household income and welfare.

Equation (3.8) suggests that household income, and thus its consumption, depends on its decision to migrate during the lean season, its employment (self-employed production activities and wage employment), and labour force for migration, which, in turn, is determined by the dependency ratio. All of these factors are dependent on various other household and community exogenous characteristics (for example, age of household head, household land and nonland assets, availability of government and nongovernmental safety-net mechanisms in the community, and regional agroclimate characteristics). Because of the simultaneity of income or consumption (*Y)* and migration (*m*), it is not straightforward to determine that the causal effect of seasonal migration is the consumption pattern in equation (3.8). This estimation challenge is dealt with in section 5.

4. Determinants of Seasonal Migration

In equation (3.7), *m* measures the share of household labour force available for migration; however, our survey data does not include such information. Rather, what we observe is whether households seasonally migrate; that is, the decision to migrate (*m*) is a discrete binomial choice variable (1,0) that depends on the perceived benefits the household expects to derive from such migration. If those perceived benefits are more than the utility from not migrating, the household will migrate. That is, the perceived net utility (the algebraic sum of utilities from migration and non-migration) must be positive for the household to migrate. This net perceived utility for household *i* can be expressed as follows:

$$u_i^* = \beta x_i + \varepsilon_i \qquad (4.1)$$

where, u_i is the perceived utility, β is a vector of parameters to be estimated, x_i is a vector of household and community characteristics, and ε_i is the random error term. For migrant households, $u_i^* > 0$. But since we observe a household's migration decision, m_i, not the perceived utility (u_i^*), $m_i = 1$ if $u_i^* > 0$; otherwise, $m_i = 0$. Because of the binomial nature of the migration decision, a probit model is used to estimate it; this is expressed as follows:

$$prob(m = 1) = \int_{-\infty}^{\beta x} \phi(t)dt = \Phi(\beta x) \qquad (4.2)$$

In this equation, φ is the normal density distribution function, and Φ is the cumulative normal distribution function.

Both household- and community-level factors are likely to influence the decision to migrate during the monga season. Among the household factors, we consider various types of household assets, the dependency ratio, and age of the household head. Labour scarcity, particularly the role of working household members, is also an important factor, corroborated by other studies. For example, a seasonal migration study in the states of Andhra Pradesh and Madhya Pradesh, India found that, with one extra working household member, the migration probability increased by 17 per cent and 19 per cent, respectively (Deshingkar and Start, 2003). The availability of able-bodied working male members (as opposed to female members) makes the migration decision easier, and we use it as an explanatory variable. Our data shows that 91 per cent of rural households in greater Rangpur have at least one member who is a working adult male.

Community-level variables include village access to microcredit and safety-net programmes and village unemployment.[10] We also make use of three location and agroclimate variables that can affect household vulnerability to monga: average annual rainfall at the upazila level, proportion of highlands in the upazila, and whether the village is in a char area.[11] These factors directly affect household exposure to floods, drought, and river erosion, thereby affecting the relative severity of monga and a household's decision to migrate. In addition to controlling for these variables, we observe their interaction with household landholdings (expressed in decimals or one-hundredth of an acre). Finally, we control for unobserved area characteristics at the union level.

Table 4 presents the probit results of equation (4.2), along with the descriptive statistics of the major explanatory variables used in the regression. With an increase in the age of the household head, the probability of migration declines. This finding is not surprising since younger people are usually more able-bodied, energetic, and willing to take risks. Similar findings were reported by Mora and Taylor (2005). A large number of dependents (captured by a high dependency ratio) always creates extra demand for food; thus, the migration rate is likely to rise as the dependency ratio rises. An increase of 10 per cent in the dependency ratio increases the migration rate by nearly one per cent. Having a working male member increases the probability that a household will make a seasonal migration by about one-fourth.

Households with fewer landholdings have a higher tendency to migrate. This finding is corroborated by a number of studies that show the probability of migration decreases as the value of family landholdings increases (Stark and Taylor, 1989; Durand, Parrado, and Massey, 1996; Mora and Taylor, 2005; Garip, 2006). As expected, our findings show that an increase of 10 per cent in landholdings reduces the probability of migration by 0.9 per cent (Table 4).

The status of household head's employment also matters, so does the type of employment. Zug (2006) attributes the lack of income and employment opportunities as the major reason for migration flows, which takes a severe turn during seasonal fluctuations in the rural areas. Households headed by self-employed individuals are less likely to migrate than those headed by unemployed people. On the other hand, households whose heads are wage-employed are more likely to migrate compared to those whose heads are not. Agricultural activities are riskier and more seasonal than non-agricultural ones. Therefore, the probability of seasonal migration is higher among the households who have more agricultural assets than those who have less. This implies the predominant role of agriculture in the seasonally vulnerable income earning activity Cash savings have a positive effect on the decision to migrate because they help facilitate migration.[12]

Table 4. Probit estimates of household seasonal migration during monga

Explanatory variable	Marginal effect[1]	Mean of explanatory variables[2]
Age of household head (years)	-0.006**	40.0
	(0.001)	(12.7)
Age of household head squared	0.00004	-
	(0.001)	
Dependency ratio in household	0.081**	0.63
	(0.020)	(0.21)
Household size	0.011**	3.90
	(0.002)	(1.56)
Household has adult male worker	0.236**	0.91
	(0.006)	(0.28)
Log household land assets (decimals)	-0.086**	8.20
	(0.028)	(12.59)
Household has agricultural assets	0.073**	0.49
	(0.010)	(0.50)
Household has nonagricultural assets	-0.029**	0.13
	(0.008)	(0.34)
Household has cash savings	0.009*	0.34
	(0.005)	(0.47)
Household has livestock assets (cattle)	-0.004	0.26
	(0.004)	(0.44)
Household head is self-employed	-0.034**	0.16
	(0.008)	(0.37)
Household head is wage employed	0.081**	0.54
	(0.005)	(0.50)
Villagers have access to safety-net programmes	0.007	0.81
	(0.016)	(0.39)

Villagers have access to microcredit programmes	-0.075**	0.97
	(0.034)	(0.18)
Village unemployment rate	0.074**	0.30
	(0.036)	(0.24)
Village located in char area	0.181	0.19
	(0.026)	(0.39)
Proportion of highlands area in district	-0.931**	0.81
	(0.147)	(0.08)
Average annual rainfall (mm) in upazila	0.002	198.55
	(0.003)	(6.62)
Village located in char area*	-0.009*	-
Log of household land assets (decimals)	(0.005)	
Proportion of highlands area in district*	-0.006	-
Log of household land assets (decimals)	(0.023)	
Average annual rainfall (mm) in district*	-0.0005	-
Log of household land assets (decimals)	(0.0003)	
Pseudo R^2	0.180	
No. of observations	480,918	

Source: InM 2006/2007 survey data.

Note: ** indicates a statistical significance level of 5 per cent or better. The estimation equation also controls for union-level fixed effects.

[1] Figures in parentheses are robust standard errors.

[2] Figures in parentheses are standard deviations.

Access to microcredit programmes has a negative effect on seasonal migration, suggesting that households participating in them to generate off-farm income and employment are less likely to feel threatened during the lean season and hence less likely to migrate. By contrast, social safety-net programmes (for example, old-age pensions or vulnerable-group feeding and development programmes) have no significant effect on seasonal migration. High village-level unemployment increases the likelihood of migration; a rise of 10 per cent in the unemployment rate increases the probability of migration by 0.7 per cent. Better agroclimate factors, such as presence of highlands, make an area less prone to flooding and more agriculturally productive; hence, they help to reduce the probability of seasonal migration. The findings mentioned in this section reaffirm our assumption that households with less physical endowment and employment security are more likely make seasonal migrations during monga.

5. Impacts of Seasonal Migration on Seasonality of Consumption

In section 2, the descriptive analysis in Tables 3 provides a correlation between household food deprivation and seasonal migration; however, it does not tell us whether seasonal deprivation drives seasonal migration or seasonal migration determines the extent of seasonal deprivation. What we observe are confounding influences of all possible factors causing both seasonal migration and seasonal deprivation. If our interest is to establish the causality between seasonal migration and food deprivation, we must isolate the roles of these individual factors to discover the extent of seasonal migration's effect on seasonal deprivation. For policymaking purposes, it is important to determine whether seasonal migration reduces seasonal deprivation.

The model of equation (3.8) in section 3 is subject to bias because a household's decision to migrate is not exogenously given. As discussed in section 4, seasonal migration is determined by a host of factors that are also likely to influence the extent of seasonal deprivation. One way to determine the effects of migration on a household's seasonal deprivation is to use an instrumental variable in the estimation method that would directly influence the migration decision, but only indirectly influence the outcome of interest. In their estimation, Brauw and Harigay (2007) use such factors as networking and knowledge about jobs outside local markets, which can only influence the decision to migrate, but not directly affect the outcome of migration. Indeed, networking ability may enable an individual to more easily secure economic opportunities through migration. Use of networking as an instrument has been mentioned in other studies (Stark, 1991; Carrington, Detragiache, and Vishwanath, 1996). A study in the Philippines on remittances from international migration uses fixed effects with a panel data to control for endogeneity in the remittance (Yang, 2008). However, we could not use the instrumental variable regression or fixed effects model since we did not have the appropriate instruments or panel data. Therefore, we could not follow a two-stage Heckman selection method to estimate the impact of seasonal migration by combining equations (3.7) and (3.8).

Thus, to control for endogeneity in the migration decision, we use the endogenous switching regression method proposed by Maddala (1983). Unlike the two-stage instrumental variable model, which would have allowed us to directly estimate the effects of migration on household welfare, a switching regression allows us to carry out a counterfactual analysis, which can estimate the potential benefits of migration and non-migration for both migrant and non-migrant households. This model is described below.

We assume that m_i denotes household i's decision to make the seasonal migration (m_i = 1 when a household migrates, 0 when it does not), which is determined by the following selection model:

$$\text{if } \gamma Z_i + u_i > 0 \text{, then } m_i = 1 \tag{5.1}$$

and

$$\text{if } \gamma Z_i + u_i \leq 0 \text{, then } m_i = 0 \tag{5.2}$$

In this model, Z_i is a vector of household and village characteristics that determines the household decision to migrate during the monga season, γ is the parameter to be estimated, and u_i is the error term. We further assume that the outcome (for example, seasonal food deprivation) equations of migrant and non-migrant households are as follows:

$$C_{1i} = \beta_1 X_{1i} + \varepsilon_{1i} \text{, when a household migrates } (m_i = 1) \tag{5.3}$$

$$C_{0i} = \beta_0 X_{0i} + \varepsilon_{0i} \text{, when a household does not migrate } (m_i = 0) \tag{5.4}$$

In these equations, X_{1i} and X_{0i} are the respective vectors of household and community characteristics that determine a household's food consumption when it does and does not migrate; β_1 and β_0 are the parameters to be estimated, and ε_1 and ε_0 are the error terms. The outcome equations include all the X variables used in the probit equation for seasonal migration, including the dummy variables for union to control for any local-level heterogeneity. The error terms, u_i, ε_1 and ε_0, are assumed to have a tri-variate normal distribution with mean vector zero and covariance matrix,

$$\Omega = \begin{bmatrix} \sigma_1^2 & \sigma_{01} & \sigma_{1u} \\ & \sigma_0^2 & \sigma_{0u} \\ & & \sigma_u^2 \end{bmatrix}$$

where σ_u^2, σ_1^2, and σ_0^2 are the variances of u_i, ε_1, and ε_0 respectively, and σ_{1u}, σ_{0u}, and σ_{01} are the covariances of ε_1 and u_i, ε_0 and u_i, and ε_0 and ε_1 respectively. In a switching regression model, outcome equations are run after controlling for household selection bias. From the three levels of household food-consumption patterns, we derive two outcomes to estimate impact. The first one is starvation, an extreme form of hardship. The second is general food deprivation, constructed by combining starvation and meal rationing; that is, a household undergoes general food deprivation if it either starves or rations meals.

Table 5 shows the estimation of starvation of migrant and non-migrant households during the three periods: monga, non-monga, and year-round. A household's assets (all types) generally lower its probability of starvation, regardless of its migration status. For example, having agricultural assets lowers starvation during monga and year-round by about 13 percentage points for migrant households and by 10 percentage points for non-migrant households. Employment status of the household head does not affect its starvation probability during monga. The presence of male workers in the household, an important determinant of seasonal migration, also figures prominently in a household's starvation during monga and non-monga periods. For example, having male workers lowers the probability of a household's seasonal starvation by 6.1 percentage points for migrant households and 8.6 percentage points for non-migrant households. The village-level unemployment rate, not surprisingly, increases starvation of non-migrant households during the non-monga period and year-round. Finally, such locations as char areas increase starvation, while highlands and areas with more rainfall lower it.

In addition to regression coefficients, Table 5 presents σ_1, σ_0, ρ_1, and ρ_0, the last two terms being the correlation coefficients between ε_1 and u_i, and ε_0 and u_i respectively. The same sign of ρ_1 and ρ_0 indicates that the unobserved factors that influence a household's migration decision affect consumption outcomes the same way, while opposite signs of ρ_1 and ρ_0 indicate that unobserved factors have opposite effects on the migration decision and food consumption. Table 5 also presents the inverse Mill's ratio (λ), which is the estimate of the normal density function over the cumulative density function of the variable Z or $\frac{\varphi(\gamma Z)}{\Phi(\gamma Z)}$, calculated from the migration equation. The inclusion of λ in the outcome equation controls for the unobserved factors (endogeneity bias) that influence a household's initial migration decision. Since λ is statistically significant, the dependent variable (household's starvation) is indeed affected by the endogeneity of migration.

The findings presented in Table 6, which estimates a household's general food-deprivation pattern (combining starvation and meal rationing), are similar to those shown in Table 5. Household assets and community characteristics have similar effects on a household's general food deprivation.

Table 5. Switching regression estimates of household starvation with and without seasonal household migration

Household characteristic	Monga period starvation		Non-monga period starvation		Year-round starvation	
	Migrant	Non-migrant	Migrant	Non-migrant	Migrant	Non-migrant
Age of head (years)	0.002**	0.001*	-0.0001	-0.001*	0.002**	0.001**
	(0.001)	(0.0007)	(0.0006)	(0.0006)	(0.001)	(0.0006)
Age of head squared	-0.00001	-0.00001	0.00001	0.00001**	-0.00002*	-0.00002
	(0.00001)	(0.00001)	(0.00001)	(0.000003)	(0.00001)	(0.00001)
Dependency ratio	0.013	-0.029	-0.014	-0.056**	0.036	-0.001
	(0.034)	(0.024)	(0.030)	(0.026)	(0.036)	(0.024)
Size	0.009**	0.007**	0.003	0.008**	0.009**	0.006**
	(0.003)	(0.002)	(0.002)	(0.003)	(0.003)	(0.002)
Has adult male worker	-0.061**	-0.086**	-0.004	-0.010	0.059**	-0.091**
	(0.016)	(0.010)	(0.011)	(0.008)	(0.016)	(0.009)
Land asset log (decimals)	-0.127	-0.360**	0.230**	-0.109	-0.009	-0.305**
	(0.114)	(0.108)	(0.088)	(0.094)	(0.105)	(0.105)
Has agricultural asset	-0.129**	-0.097**	-0.008	-0.035**	-0.127**	-0.101**
	(0.016)	(0.015)	(0.011)	(0.010)	(0.016)	(0.015)
Has nonagricultural asset	-0.080**	-0.039**	-0.008	-0.017**	-0.075**	-0.041**
	(0.016)	(0.012)	(0.008)	(0.007)	(0.016)	(0.011)

Has cash savings	-0.030**	-0.018**	-0.008	-0.007	-0.037**	-0.022**
	(0.009)	(0.009)	(0.005)	(0.006)	(0.009)	(0.008)
Has livestock asset (cattle)	-0.043**	-0.028**	-0.005	-0.011**	-0.046**	-0.031**
	(0.007)	(0.006)	(0.004)	(0.004)	(0.007)	(0.005)
Has self-employed head	-0.002	-0.017	-0.006	0.002	-0.019	-0.020*
	(0.017)	(0.012)	(0.011)	(0.007)	(0.016)	(0.011)
Has wage-employed head	0.017	-0.004	0.002	-0.009**	0.022*	-0.006
	(0.012)	(0.007)	(0.006)	(0.004)	(0.011)	(0.007)
Villagers have access to	-0.074**	-0.005	0.042**	0.028*	-0.047**	0.009
safety-net programmes	(0.023)	(0.022)	(0.017)	(0.016)	(0.023)	(0.021)
Villagers have access to	-0.0004	-0.048	0.033	0.029	0.016	-0.023
microcredit programmes	(0.037)	(0.052)	(0.021)	(0.028)	(0.035)	(0.051)
Village unemployment rate	0.075	-0.054	-0.019	0.129**	0.053	0.090*
	(0.053)	(0.048)	(0.038)	(0.037)	(0.053)	(0.047)
Village located in char area	-0.005	0.081**	0.028	0.034	-0.007	0.077**
	(0.035)	(0.037)	(0.020)	(0.022)	(0.036)	(0.037)
Proportion of highlands in upazila	-0.868**	-0.866**	-0.108	-0.337**	-0.820**	-0.993**
	(0.212)	(0.162)	(0.124)	(0.090)	(0.220)	(0.164)
Average annual rainfall in upazila (mm)	-0.034**	-0.034**	-0.007**	-0.021**	-0.038**	-0.038**
	(0.005)	(0.004)	(0.003)	(0.004)	(0.005)	(0.004)
Village located in char area*	-0.005	0.011	-0.001	-0.010	0.00005	-0.011
Log land asset (decimals)	(0.035)	(0.009)	(0.006)	(0.007)	(0.007)	(0.009)

Proportion of highlands in upazila*	0.161**	0.145**	-0.089**	-0.074**	0.124**	0.126**
Log land asset (decimals)	(0.041)	(0.031)	(0.024)	(0.020)	(0.040)	(0.031)
Average annual rainfall in upazila (mm)*	-0.0002	0.001*	-0.001**	0.001*	-0.0006	0.0008
Log land asset (decimals)	(0.0005)	(0.0005)	(0.0004)	(0.0005)	(0.0005)	(0.0005)
Inverse Mill's ratio (λ)	0.706**	0.397**	0.706**	0.397**	0.706**	0.397**
	(0.001)	(0.0006)	(0.001)	(0.0006)	(0.001)	(0.0006)
Wald $\chi^2(35)$	2,700.17		164.77		2,812.96	
Log pseudo-likelihood	-528,139.61		-258,469.3		-525,807.17	
σ_1	0.462**		0.249**		0.460**	
	(0.007)		(0.039)		(0.007)	
σ_0	0.462**		0.273**		0.459**	
	(0.006)		(0.031)		(0.007)	
ϱ_1	0.014		0.045		0.013	
	(0.042)		(0.060)		(0.042)	
ϱ_0	-0.099**		0.129*		-0.058*	
	(0.047)		(0.077)		(0.045)	
No. observations			480,918			

Source: InM 2006/2007 survey data.

Note: Figures in parentheses are robust standard errors. * and ** indicate a significance level of 10 per cent and 5 per cent or better, respectively. Regression also controls for unobserved fixed effects at the union level.

Table 6. Switching regression estimates of general food deprivation of households with and without seasonal migration

Household characteristic	Monga-period deprivation		Non-monga period deprivation		Year-round deprivation	
	Migrant	Non-migrant	Migrant	Non-migrant	Migrant	Non-migrant
Age of head (years)	0.001*	0.001**	0.001**	0.001**	0.0007**	0.0005**
	(0.0003)	(0.0003)	(0.0009)	(0.0006)	(0.0003)	(0.0003)
Age of head squared	-0.00002	-0.00005	-0.00001	-0.0001	-0.00001	-0.00002
	(0.00002)	(0.00004)	(0.0001)	(0.0006)	(0.00006)	(0.0002)
Dependency ratio	-0.011	0.022**	0.020	-0.005	0.022**	0.022**
	(0.011)	(0.006)	(0.036)	(0.022)	(0.008)	(0.005)
Size	0.001	-0.002**	0.012**	0.007**	-0.0005	-0.002**
	(0.001)	(0.0008)	(0.003)	(0.002)	(0.0009)	(0.001)
Has adult male worker	-0.014**	-0.016**	-0.097**	-0.099**	0.017	-0.015**
	(0.007)	(0.003)	(0.014)	(0.008)	(0.014)	(0.003)
Log land asset (decimals)	-0.024	-0.058	-0.121	-0.276**	-0.014	-0.061*
	(0.023)	(0.040)	(0.100)	(0.120)	(0.019)	(0.034)
Has agricultural asset	-0.013	-0.018**	-0.069**	-0.087**	-0.022**	-0.017**
	(0.008)	(0.004)	(0.014)	(0.014)	(0.005)	(0.004)
Has nonagricultural asset	-0.028**	-0.016**	-0.046**	-0.043**	-0.017**	-0.015**
	(0.008)	(0.004)	(0.013)	(0.009)	(0.004)	(0.003)

Has cash savings	-0.011**	-0.014**	-0.065**	-0.043**	-0.014**	-0.017**
	(0.004)	(0.004)	(0.009)	(0.009)	(0.003)	(0.004)
Has livestock asset (cattle)	-0.005	-0.006**	-0.025**	-0.036**	-0.002	-0.007**
	(0.003)	(0.002)	(0.006)	(0.006)	(0.002)	(0.002)
Has self-employed head	0.013**	0.009**	-0.039**	-0.038**	0.008**	0.007**
	(0.005)	(0.003)	(0.013)	(0.009)	(0.004)	(0.003)
Has wage-employed head	0.004	0.012**	0.040**	0.007	0.006	0.013**
	(0.004)	(0.003)	(0.011)	(0.006)	(0.004)	(0.002)
Villagers have access to	-0.004	0.003	-0.059**	0.046**	-0.004	-0.002
safety-net programmes	(0.004)	(0.005)	(0.020)	(0.019)	(0.004)	(0.004)
Villagers have access to	-0.016**	-0.010	-0.054*	-0.028	-0.008	-0.003
microcredit programmes	(0.007)	(0.011)	(0.031)	(0.033)	(0.006)	(0.007)
Village unemployment rate	-0.008	0.004	0.244**	0.031	0.009	0. 011
	(0.014)	(0.014)	(0.041)	(0.043)	(0.010)	(0.011)
Village located in char area	0.0004	0.019*	0.036	0.052*	0.004	0.021**
	(0.010)	(0.010)	(0.034)	(0.031)	(0.007)	(0.008)
Proportion highlands in upazila	-0.681**	-0.592**	-0.666**	-0.723**	-0.621**	-0.557**
	(0.077)	(0.058)	(0.237)	(0.171)	(0.070)	(0.054)
Average annual rainfall in upazila (mm)	-0.011**	-0.008**	-0.030**	-0.039**	-0.012**	-0.008**
	(0.002)	(0.001)	(0.005)	(0.004)	(0.001)	(0.001)

Village located in char area*	0.006**	0.008**	0.025**	0.010	-0.006**	0.009**
Log land asset (decimals)	(0.002)	(0.003)	(0.008)	(0.011)	(0.002)	(0.003)
Proportion highlands in upazila*	-0.070**	-0.087**	0.116**	0.147**	-0.077**	-0.089**
Log land asset (decimals)	(0.018)	(0.016)	(0.042)	(0.033)	(0.016)	(0.016)
Average annual rainfall in upazila (mm)*	0.0004**	-0.0001	-0.0001	0.0005	0.0003**	-0.00001
Log land asset (decimals)	(0.0001)	(0.0002)	(0.0005)	(0.0006)	(0.0001)	(0.0001)
Inverse Mill's ratio (λ)	0.706**	0.397**	0.706**	0.397**	0.706**	0.397**
	(0.001)	(0.0006)	(0.001)	(0.0006)	(0.001)	(0.0006)
Wald $\chi^2(35)$	354.37		2,284.11		626.86	
Log pseudo-likelihood	-116,292.85		-511,380.3		-76,602.82	
σ_1	0.178**		0.444**		0.160**	
	(0.044)		(0.009)		(0.038)	
σ_0	0.207**		0.447**		0.193**	
	(0.031)		(0.008)		(0.033)	
ϱ_1	-0.044		-0.009		-0.097	
	(0.044)		(0.039)		(0.125)	
ϱ_0	-0.038		-0.020		-0.049	
	(0.040)		(0.045)		(0.044)	
No. observations			480,918			

Source: InM 2006/2007 survey data.

Note: Figures in parentheses are robust standard errors. * and ** indicate a significance level of 10 per cent and 5 per cent or better, respectively. Regression also controls for unobserved fixed effects at the union level.

Tables 5 and 6 show the estimates for migrant and non-migrant households; however, they do not show the potential benefits of migration in mitigating seasonal deprivation. To calculate the benefits of seasonal migration on seasonal deprivation, in accordance with Lokshin and Sajaia (2004), we construct the following terms:

$$yc_{1\_1i} = E(y_{1i} \mid m=1, x_{1i}) = x_{1i}\beta_1 + \sigma_1\rho_1\phi(\gamma Z_i)/\Phi(\gamma Z_i)$$

= conditional expected value of outcome of a migrant household with migration,

$$yc_{0\_1i} = E(y_{0i} \mid m=1, x_{1i}) = x_{1i}\beta_0 + \sigma_0\rho_0\phi(\gamma Z_i)/\Phi(\gamma Z_i)$$

= conditional expected value of outcome of a migrant household had it not migrated (counterfactual),

$$yc_{0\_0i} = E(y_{0i} \mid m=0, x_{0i}) = x_{0i}\beta_0 - \sigma_0\rho_0\phi(\gamma Z_i)/[1-\Phi(\gamma Z_i)]$$

= conditional expected value of outcome of a non-migrant household without migration,

$$yc_{1\_0i} = E(y_{1i} \mid m=0, x_{0i}) = x_{0i}\beta_1 - \sigma_1\rho_1\phi(\gamma Z_i)/[1-\Phi(\gamma Z_i)]$$

= conditional expected value of outcome of a non-migrant household had it migrated (counterfactual).

Here ϕ and Φ represent the normal density distribution function and the cumulative normal distribution function, respectively.

Based on the above calculations, we construct the migration impacts on household outcomes, as follows:

$yc_{\_1i} = yc_{1\_1i} - yc_{0\_1i}$ = expected outcome of a migrant household – expected outcome of a migrant household had it not migrated (counterfactual)

= change in outcome of a migrant household due to migration.

$yc_{\_0i} = yc_{1\_0i} - yc_{0\_0i}$ =expected outcome of a non-migrant household had it migrated (counterfactual) – expected outcome of a non-migrant household

= change in outcome of a non-migrant household due to migration had it migrated.

We can also compare the expected outcome gains between migrant and non-migrant households by taking a second-order difference, expressed as follows:

$$yc_{\_i} = yc_{\_1i} - yc_{\_0i}$$

Based on the outputs presented in Tables 5 and 6, Table 7 estimates the potential benefits of seasonal migration. It is obvious from the counterfactual comparison that seasonal migration lowers a household's hardship for both migrant and non-migrant households during the three periods: monga, non-monga, and year-round. With regard to starvation during the monga period, the expected reduction for migrant households is 8.1 percentage points (which are actually accrued to them) and 1.5 percentage points for non-migrant households (which would have accrued to them had they deiced to migrate). Similarly, as a result of migration, a household's general food deprivation during the monga period declines by 1.8 percentage points for migrant households and 1.6 percentage points for non-migrant households. The pattern is similar for hardships during the non-monga period and year-round. With regard to year-round hardships, the reduction in the general food deprivation of migrant households (2.0 percentage points) is less than that of non-migrant households (2.8 percentage points).

Table 7. Impact of seasonal migration on household food deprivation

Seasonal migration household status	Starvation		General food deprivation	
		Monga period		
Migrant	-0.081**	Difference =	-0.018**	Difference =
	(0.0002)	-0.066**	(0.0001)	-0.002**
Non-migrant	-0.015**	(0.0003)	-0.016**	(0.00007)
	(0.0002)		(0.00004)	
		Non-monga period		
Migrant	-0.051**	Difference =	-0.031**	Difference =
	(0.0001)	-0.011**	(0.0002)	-0.029**
Non-migrant	-0.040**	(0.0002)	-0.002**	(0.0002)
	(0.0001)		(0.0001)	
		Year-round		
Migrant	-0.051**	Difference =	-0.020**	Difference =
	(0.0002)	-0.046**	(0.0001)	0.008**
Non-migrant	-0.005**	(0.0003)	-0.028**	(0.00007)
	(0.0001)		(0.00004)	

Source: InM 2006/2007 survey data.

Note: Figures in parentheses are standard errors. ** indicates a significance level of 5 per cent or better.

An important finding of this analysis is that the accrued benefits to migrant households are higher than those for non-migrant households for nearly all outcomes (their differences being statistically significant). This clearly points to the underlying differences between the migrant and non-migrant households. Many non-migrant households decide not to migrate simply because they are incapable of making the migration, not because they think migrating is unhelpful. A major obstacle to making seasonal migration is the absence of able-bodied male workers in the household. Our analysis controls for this factor. Yet it would be interesting to conduct the analysis with a sample that excludes households without any male worker, which account for 9 per cent of our sample. When we re-do our analysis excluding these households, we find that the impact-gap between migrant and non-migrant households has reduced a bit for most outcomes, although the overall trend has not changed (Table A1).

6. Conclusion

At least 100,000 people in Bangladesh migrate each year from the monga-affected greater Rangpur region to other areas seeking better economic opportunities. Seasonal migration during the lean period seems a necessary tool for poor families, as external help or their own resources are inadequate for dealing with the seasonality of income and consumption. Younger people migrate more than older ones simply because they are able to work harder. About 54 per cent of poor households in the northwest depend solely on wage labour. Moreover, given the dominance of agriculture in the rural economy, labourers are highly vulnerable to seasonal deprivation. Not surprisingly, wage-employed individuals are more likely to migrate. Households with agricultural assets are also more likely to migrate. Microfinance seems to reduce the need for seasonal out-migration by providing alternatives for seasonally unemployed people.

As expected, the effect of migration on household welfare is positive. During monga, seasonal migration lowers the starvation of migrant households by 8.1 percentage points and general food deprivation by 1.8 percentage points. More interestingly, migrant households also perceive the benefits of seasonal migration during non-lean periods. This study shows that non-migrant households would likewise have benefited from seasonal migration. The question is why they do not pursue it. It may be that such households require funding to support seasonal migration, which may not be available. In addition, not all households have the social networking ability, which is critical to the decision to migrate and where to locate.

Given that the most critical factor for the hardship of the ultra-poor during the monga season is the lack of agricultural or nonfarm employment, the policy options to reduce seasonality of poverty are clear. Creating alternative income-earning opportunities would no doubt help diversify rural income and redress seasonal deprivation in a sustainable way. Alternate income generation could be facilitated through microfinance or by promoting broad-based, government-supported development initiatives. Microfinance programmes targeting the ultra-poor, who are highly vulnerable to seasonal hardships, could provide microloans on flexible terms to encourage nonfarm income-generation activities during the lean season.

At the same time, when local resources are not enough to deal with the severity of monga, households may still need to migrate as an alternate arrangement. But migration can be costly. People sell advance labour, crops, and assets or borrow at high interest rates to finance migration and support family members until remittances from migrating household members are received. In such a situation, having an organisational support scheme to provide the migrant households assistance can make their seasonal migration more efficient and less costly. For example, both government and nongovernmental organizations (NGOs) can provide information about the distant job markets, training, and credit to finance seasonal migration of the ultra-poor during the lean season, and help migrants safely remit money to family members. In India, for example, the Migrant Labour Support Programme, funded by the UK Department for International Development (DFID) and implemented by the NGO Grameen Vikas Trust (GVT), provides poor migrants in the state of Madhya Pradesh a wide range of support, including job information, awareness-raising, and wage negotiation assistance (IOM, 2008). A World Bank–funded programme in the same state, called Mazdoor.org, provides migrant labourers skill-enhancement training. In the state of Orissa, yet another NGO helps migrants in Gujrat send money back to Orissa. However, a detailed long-term study is needed to investigate the effectiveness of such schemes.[13]

Annex

Table A1. Impacts of seasonal migration on household food deprivation

Estimate is restricted to households with no adult male workers (N = 438,438)

Seasonal migration household status	Starvation		General food deprivation	
		Monga period		
Migrant	-0.075**	Difference =	-0.019**	Difference =
	(0.0002)	-0.056**	(0.0001)	-0.003**
Non-migrant	-0.018**	(0.0003)	-0.016**	(0.0001)
	(0.0002)		(0.00005)	
		Non-monga period		
Migrant	-0.044**	Difference =	-0.032**	Difference =
	(0.0001)	-0.005**	(0.0005)	-0.029**
Non-migrant	-0.039**	(0.0002)	-0.003**	(0.0003)
	(0.0001)		(0.0002)	
		Year-round		
Migrant	-0.049**	Difference =	-0.021**	Difference =
	(0.0002)	-0.039**	(0.0001)	0.007**
Non-migrant	-0.010**	(0.0003)	-0.028**	(0.00007)
	(0.0002)		(0.00004)	

Source: InM 2006/2007 survey data.

Note: Figures in parentheses are standard errors. ** indicates a significance level of 5 per cent or better.

Notes

1. Better access to microfinance is another option that allows rural households to engage in nonfarm activities to avoid farming unemployment. The survey data shows that, although microcredit programmes are available in 97 per cent of the villages studied, only 36.6 per cent of ultra-poor households are members of MFIs. One reason that microcredit may not be relevant to many ultra-poor households is the strict lending conditions, such as weekly payment and meeting schedules. Moreover, since most rural nonfarm activities in the northwest region depend heavily on farm activities, seasonality of agriculture may also affect those nonfarm activities.
2. Throughout this paper, the term *household migration* refers to the physical migration of one or more capable household members, as opposed to whole-family migration, which is rare.
3. An upazila is a subdistrict-level, administrative unit comprising 20-30 villages.
4. It is expected that the PKSF will cover the remaining upazilas under this ongoing study; once completed, all poor households in greater Rangpur will have been covered.
5. A union is the geographical unit immediately below the upazila and above the village.
6. Ultra-poor households are defined as households that own up to 50 decimals of land, work for an agricultural daily wage, or have a per capita monthly income of less than Tk 1,500 (US$25).

7. Char areas are land formations created from river sediment; some are attached to the mainland, while others are midstream islands. While emerging char areas create new settlements, erosion subjects them to unpredictable land loss. Tens of millions of poor people throughout Bangladesh with no other place to move live in such areas.
8. For simplicity, we assume that households derive their total income from selling labour in the wage market and undertaking production activities only. Other income sources, such as those from human capital, buffer stock, non-migration remittances, or safety net, are assumed as non-existent or insignificant.
9. It is assumed that, in the distant market, the household would sell wages only as it would be unlikely to engage in production activities.
10. The rate of village-level unemployment has been defined as the proportion of village households with unemployed household heads.
11. According to the Bangladesh Agricultural Research Council (BARC), highlands are areas where the flood level remains below three feet.
12. This finding is consistent with the fact that the poorest of the poor are less likely to migrate.
13. This paper in no way recommends migration as a coping strategy to deal with the seasonality of monga. Given the reality of the seasonality of monga in northwest Bangladesh and that seasonal migration may be unavoidable, this paper merely suggests ways to mitigate the hardship of that process.

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