

Seasonal Hunger and Its Mitigation in Northwest Bangladesh*

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Running title: “Seasonal Hunger in Northwest Bangladesh”

*The authors would like to thank the InM staff for the collection and cleaning of the data used in this paper. The paper benefited from the useful comments of the two anonymous referees of this journal. Finally, the authors thank Norma Adams for editing the paper. The views expressed in this paper are entirely those of the authors and do not reflect those of the World Bank or its affiliated organizations.

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Abstract

Seasonal hunger may result from seasonality of agriculture when households fail to smooth income and consumption. Using household survey data from the northwest region of Bangladesh, this paper examines alternative measures of seasonal hunger, and provides some evidence to support policies and programs needed to mitigate seasonal hunger. The results suggest that a large majority of food-vulnerable households are the perpetual poor, as opposed to a small percentage of households who are subject to food deprivation only during the lean period. Findings suggest that government safety net programs and microcredit provide a cushion for the poor to stave off seasonal hunger.

Keywords: Measurement and Analysis of Poverty; Government Policy, Provision and Effects of Welfare Programs;

JEL classification: I32, I38, O53

1. Introduction

The objective of this paper is to determine the extent of seasonal hunger and vulnerability to seasonal hunger among the rural households in Bangladesh, especially in the northwest region of Bangladesh (also known as the greater Rangpur region), and examine policy options for mitigating them.¹ Seasonal hunger, also known as *monga* in the greater Rangpur region, is a

deprivation of food during certain months of the year resulting from inadequate employment and income. The agriculture sector in rural Bangladesh is dependent on three major rice crops (*aus*, *aman* and *boro*) covering nine months of the year, and leaving the period of September to November (which is the pre-harvest period of *aman* rice) with virtually no economic activity for the rural poor of the greater Rangpur region. These three months refer to the monga period of the northwest region.

Monga is an acute form of seasonality in food consumption that causes food deprivation, or what Sen (1981) calls lack of entitlement to food. According to Sen (1981), lack of food entitlement is a result of economic and non-economic (such as agroclimate) forces that prevent the poor from having access to jobs and other forms of economic and social security. Consumption smoothing usually happens through income smoothing, savings (buffer stock), inter-family transfers (self-insurance), or other mechanisms. Almost all of these measures fail for many poor households during the monga period, and consequently consumption smoothing does not happen.

Households in the greater Rangpur region, having failed to smooth consumption through the preventive mechanisms described above, often adopt coping measures that put them at further disadvantage in the long run. For example, many households resort to distress sale of assets (such as land) and advance sale of labour and crops to stave off the adverse effects of monga, but such measures are likely to limit their future earnings. Other households resort to seasonal migration, and still others benefit from government-provided social safety net programs such as vulnerable group feeding (VGF), food for work (FFW), and so on. Although these latter measures help without causing adverse side effects, they are obviously not adequate, at least not

in greater Rangpur; otherwise a large number of poor households would not have skipped meals or resorted to other coping mechanisms.

There is a large body of literature on seasonality and consumption smoothing. One of the findings from the literature is that seasonal variation in household income may often be quite high. For example, Chaudhuri and Paxson (2001) find from a study of Indian villages that agricultural households, on average, receive 75 per cent of their annual income in just a three-month period. Income fluctuation in the absence of buffer stock or self-insurance leads to consumption fluctuation (Sahn, 1989; Paxson, 1993; Dercon and Krishnan, 2000). Other factors contributing to seasonality in consumption are seasonal variation in prices, preferences, labour efforts, and precautionary savings motives (Chaudhuri and Paxson, 2001). For instance, Paxson (1993) finds that the observed seasonality in consumption in rural Thailand results more from the variation in prices or preferences (which are common to all households) than from households' inability to use savings or credit.

Yet, credit could potentially be an important determinant of seasonal consumption, especially in very poor rural economies (Townsend, 1995). Evidence suggests that credit constraints prevent poor households from smoothing consumption not just across seasons but also across years (Rosenzweig, 1988; Rosenzweig and Wolpin, 1993; Chaudhuri and Paxson, 2001). Pitt and Khandker (2002) show that microcredit provision helps smooth consumption by offering an effective means to diversify agricultural income and employment in rural Bangladesh. In addition to these factors, there are, of course, socioeconomic and agroclimatic conditions that influence consumption seasonality. For example, in greater Rangpur, the incidence of flood or drought that precedes the monga period plays a major role in determining the severity of the crop seasonality.

Even with this understanding of the patterns and causes of income and consumption seasonality, it remains a serious public policy quagmire in greater Rangpur, compared to that in the other parts of Bangladesh. And it has led to the failure of many public policies and programs that are intended to help rural households mitigate poverty in general and seasonality in particular, at least in greater Rangpur. However, the acute form of seasonality of agriculture is amenable to right policies, which is indeed evident in other areas of Bangladesh.

Before enacting any policy interventions, it is important to examine why seasonal food deprivation, or *monga*, has been persistent in the greater Rangpur region, compared with other parts of Bangladesh. Similarly, it is important to ascertain what public policies affect most the seasonality of agriculture and its ramifications. For example, if seasonal food deprivation is driven primarily by the price fluctuations, the goal of a policy could be to stabilize prices. On the other hand, if seasonality is driven largely by the credit constraints, there is a clear need for more credit – formal or informal. It is worth noting, in this context, that alternatives to formal credit such as informal lenders could be costlier from a household efficiency standpoint and susceptible to failing completely in the event of an aggregate shock (Townsend; 1995). While exploring what policies and programs matter most in combating income seasonality, it is also important to look at how the households, especially poor households, cope with *monga*; that is, what mechanisms they adopt to smooth consumption during the lean season.

Finally, identifying the target population for any policy interventions to combat *monga* is critical. The observed seasonal hunger among the target population is what is called the *ex post* measure of the seasonal deprivation of food. However, for policymaking purpose, it is more important to identify who are going to be in seasonal hunger in the future (*ex ante* measure) than to know who already are. This *ex ante* measure of seasonal food deprivation may be called

vulnerability to seasonal deprivation, which is defined as the likelihood of remaining in or falling into seasonal hunger in the future. Understanding this vulnerability to seasonal hunger is important in shaping well-targeted policies. That is why vulnerability to seasonal deprivation is one of the major focuses of this paper.

This paper has four objectives: (1) to examine whether household welfare, measured in terms of poverty and its correlates, has improved over time in Bangladesh, especially in the greater Rangpur region; (2) to explore the nature of food deprivation and examine whether and to what extent it varies by season and region; (3) to find out what coping strategies households adopt to cope with *monga*; and (4) finally, to investigate what policies (credit, asset transfer, seasonal migration or social safety net programs) would help mitigate such deprivation.

2. Data and its characteristics

The paper uses two sets of household survey data to analyze the extent of seasonal hunger and the role of government policies in mitigating seasonal poverty. The first data set comes from the household income and expenditure surveys (HIES) of 2000 and 2005, carried out by the Bangladesh Bureau of Statistics (BBS). The sample is nationally representative and includes 5,040 rural households in 2000 and 6,040 rural households in 2005 from all regions of Bangladesh.² It provides a good way to examine the trend in seasonal poverty and hunger, both in greater Rangpur and in the rest of the country. In particular, the sample is rich enough to shed light on the persistent nature of seasonal deprivation and vulnerability to poverty.

The second data set is much more area focused and comes from a 2006 survey administered in greater Rangpur by the Institute of Microfinance (InM) for 482,928 households from 23 *upazilas* (subdistricts) and some 2,300 villages, and after data cleaning, 480,918

households are retained for the analysis in this paper. This survey was carried out as part of an effort of the *Palli Karma Shabayak Foundation* (PKSF), the only wholesale outlet of microfinance in Bangladesh, to identify the hardcore poor that are most vulnerable to monga, and to design and implement appropriate interventions to mitigate monga. The hardcore or extreme poor in the InM survey are identified as those households that satisfy at least one of the following criteria: having less than 50 decimals (half an acre) of land, having a monthly income of Tk.1500 (equivalent to US\$22) or less, or selling labour for daily wage. These households constitute roughly 60 per cent of the rural population of the greater Rangpur region. While the HIES data contain detailed questionnaires about living conditions, the InM survey contains limited information, with a focus on the extent of seasonal food deprivation and the coping mechanisms adopted by the poor to mitigate such deprivation.

Table 1 provides summary statistics of a few economic variables which describe, using the HIES data, the welfare of the rural households in greater Rangpur and the rest of the country. It also shows changes in these characteristics over a period of five years. In general, the welfare of rural households improves over the years; however, they remain worse in greater Rangpur than in the rest of the country. For example, household per capita expenditure in greater Rangpur in 2005 is about 72 per cent of that of the rest of the country. Similarly, household land asset holdings in greater Rangpur are almost 20 per cent less than that of the rest of the country in the same year. Finally, the households in the greater Rangpur region are more dependent on agriculture than those in the rest of the country – a fact that may have contributed to the higher seasonality of the rural households in the greater Rangpur region.

{TABLE 1 HERE}

3. Consumption, poverty, and hunger in rural Bangladesh

How does the monga-induced seasonality manifest itself? As indicated earlier, monga can be defined as the food deprivation experienced by the rural households during the lean season (the period between post-planting and pre-harvesting of the *aman* rice).³ The two data sets analyzed for this study give us an opportunity to develop alternate measures of the extent or severity of food deprivation. HIES data, with detailed information on household food consumption, allows us to measure food deprivation in terms of food poverty using the Food and Agricultural Organization (FAO) recommendation of 2,120 calories of daily food intake per person.⁴ The HIES data is also used to determine a household's moderate and extreme poverty, not just food poverty. A household is considered moderately poor if its per capita total expenditure (food and nonfood together) is less than the total poverty line established for the region.⁵ Similarly, a household is considered extremely poor if its per capita total consumption is less than the food poverty line. So the extreme poverty implies the direst form of deprivation. Table 2 shows the three poverty measures.

{TABLE 2 HERE}

As Table 2 shows, trends in the reduction of poverty in rural Bangladesh are not uniform across the regions. Although overall poverty has declined, the incidence of poverty in the lagging region of greater Rangpur is higher than that in the rest of the country. This inter-region gap is statistically significant for all poverty measures during both years (2000 and 2005). While the moderate poverty rate in 2005 was 43.5 per cent in the rest of the country, it was 61 per cent in

greater Rangpur. Food poverty in 2005 was also higher in greater Rangpur region (66.9%) than in the rest of the country (54.2%).

Since the focus of this paper is on seasonal hunger and poverty, not just poverty in general, we also consider the seasonal dimensions of food consumption and poverty. In the HIES surveys, food consumption was recorded for the month preceding the survey interviews and households were interviewed uniformly throughout the year across all regions of the country. That way, food consumption and consequently, the calculated food poverty reflect both seasonal and regional variations. To explore the seasonal variation in consumption, we group the households, by the season of their food consumption, into four groups: *boro* (March-May), *aus* (June-August), pre-harvest *aman*, which is the monga period (September-November), and *aman* (December-February).

Figure 1 shows, from HIES data, the variations in food consumption for rural households across seasons. In both 2000 and 2005, the overall food consumption in greater Rangpur is much lower than in the rest of the country. The seasonality in food consumption is also more pronounced in greater Rangpur than in the other regions, although consumption falls sharply during the pre-harvest *aman* period (that is, monga period) in both regions.

{Figure 1 HERE}

Such seasonality of food consumption is also evident from the InM survey data. This data allows us to categorize a household's food deprivation status into three groups by its daily meal intake: involuntary meal skipping, meal rationing (households consume less than they would normally would in a day), and full meals (households consume desired quantity of meals, which is

usually three meals a day). This information was recorded for both monga and non-monga periods for all households. Table 3 shows that except for the district of Nilphamari, a high percentage of the rural extreme poor in greater Rangpur region skipped meals during the monga season of 2006. Some 47 per cent of the poor households had to skip meals during monga season, while only 4.4 per cent had full meals during the same period. More strikingly, 8.5 per cent households skipped meals even during the non-monga season – an indication of the dire situation among the very poor in greater Rangpur region. The incidence of skipping meals during the non-monga period varies from 2 per cent to 17 per cent across districts in the greater Rangpur region. Combining meal skipping with meal rationing, we find that more than 95 per cent of the extreme or hardcore poor in the greater Rangpur region suffered from seasonal food deprivation during the lean period of 2006 as against 59 per cent during non-monga period.

{TABLE 3 HERE}

4. Vulnerability to poverty and seasonal hunger

The phenomenon of seasonal poverty and hunger can be either ex post or ex ante. The different measures of household wellbeing (such as moderate poverty, food poverty, or extreme poverty) presented in the last section are ex post measures. For policymaking purposes, it is perhaps more important to know who is likely to be poor or have food insecurity in the future (ex ante measure). Vulnerability refers to such ex ante measure (Pritchett, Suryahadi, and Sumarto 2000; Chaudhuri 2003; Chaudhuri, Jalan, and Suryahadi 2002). In this section, we formulate a measure of vulnerability to poverty and seasonal food deprivation using both HIES and InM data.

Vulnerability of a household is formally defined by the future probability of its having a shortfall from the poverty line expenditure. In practice it is often measured by the cumulative distribution function of consumption shortfalls, normalized by the variance of the error term of the consumption equation. More formally, if c_{it} represents the consumption level of household i during time t against the poverty line z_{it} , its vulnerability is given by

$$V_{it} = \Pr[c_{it} < z_{it}] = \Pr[\ln(c_{it}) < \ln(z_{it})], \quad (4.1)$$

and the index of such vulnerability is given by

$$\hat{v}_{it} = \Pr[\xi_{it} < \frac{\ln(z_{it}) - X_{it}\hat{\beta}}{\sqrt{X_{it}\hat{\theta}}}] = \phi_{it}[\frac{\ln(z_{it}) - X_{it}\hat{\beta}}{\sqrt{X_{it}\hat{\theta}}}] \quad (4.2)$$

where X is a vector of household and community characteristics used in consumption equation, $\hat{\beta}$ is an estimate of the vector of parameters influencing consumption, $\hat{\theta}$ is the estimate of the variance of the error term of consumption equation, $\phi_{it}(\cdot)$ is the cumulative normal distribution function, and ξ_{it} is given by

$$\xi_{it} = \frac{\ln(c_{it}) - X_{it}\hat{\beta}}{\sqrt{X_{it}\hat{\theta}}} \quad (4.3)$$

Here we assume that $\ln(c_{it})$ is normally distributed in a large sample with a mean of $X_{it}\hat{\beta}$ and a variance of $X_{it}\hat{\theta}$. Further details of this formulation can be found in Chaudhuri (2003) and Khandker (2006).

Using consumption data, one can calculate the vulnerability index of a household based on equation (4.2), which gives its probability of being poor in the future based on its current characteristics.⁶ The index varies from 0 to 1, where 0 indicates non-vulnerability and 1 indicates maximum vulnerability. From this broad spectrum of probabilities, identification of vulnerable

households is done by setting a cut-off value of the index, which requires some judgment. A common practice is to set the cut-off value at 0.5. So we consider a household vulnerable if its vulnerability index is higher than 0.5 and non-vulnerable otherwise. The HIES data also allow us to calculate household vulnerability by season, because, as mentioned before, household food consumption reflects a seasonal pattern.

Estimates of household food poverty and food vulnerability (based on estimates of a food consumption equation) by region and season are presented in Table 4. The share of food-poor households in the greater Rangpur region is higher than in the rest of the country; however, this disparity, while being statistically significant all along, went down quite a bit from 2000 to 2005. For example, there was a 16.8-point inter-region difference in the food poverty figures in 2000, which fell to 12.7 points by 2005.

{TABLE 4 HERE}

As for food vulnerability, there are three important observations that can be made from this table. First, the share of food vulnerable households has declined over time in all regions of Bangladesh. For example, 80.9 per cent rural households in greater Rangpur were food vulnerable in 2000, and this share dropped to 76.7 per cent in 2005. The corresponding figures for the rest of the country were 69.5 per cent in 2000 and 55.5 per cent in 2005. While the vulnerability reduction was statistically significant in the rest of the country, it was not so in greater Rangpur (as indicated by t_{FPGR} and t_{FVGR}). Second, food vulnerability is higher during the monga period than during the non-monga period, and, the difference is statistically significant. Third, the extent of food vulnerability is higher in greater Rangpur than in the rest of the country,

and in most cases, more so during the monga season (the inter-region differences are all statistically significant, as indicated by the t-statistics in the last column). To sum up, households in greater Rangpur are more vulnerable to food poverty than those in the rest of the country, more so during the monga period, and such vulnerability did not go down over time as much in greater Rangpur as it did in the rest of the country.

The question is: who are these vulnerable households? We argue that most of these vulnerable households are also extreme poor. In fact, as Table 5 shows, over 90 per cent of the extreme poor in the greater Rangpur region were food vulnerable in 2000, and this situation did not improve at all over the years. While the share of food-vulnerable households among the extreme poor was slightly less in the rest of the country in 2000, it went down by 7 percentage points by 2005. Not surprisingly, the share of food-vulnerable households is much lower among the non-poor households. For example, it is at least 30 percentage points less in the greater Rangpur region during both years. This share follows the same time trend as that among the extreme poor.

{TABLE 5 HERE}

It is important in any vulnerability analysis to investigate how much of the vulnerability is due to an occasional or unexpected consumption shortfall for the households that are otherwise non-poor, and how much is due to a perpetuation of consumption shortfall for the households that are already poor. This is important for policy as different types of vulnerability may need different types of interventions. By looking at the poverty status of a vulnerable household, we can determine the type of food deprivation to which it is susceptible. We can do so for all food-

vulnerable households using the HIES data. To be more specific, among the food-vulnerable households, those who are already poor are likely to be perpetual poor, while those who are not poor are likely to be subject to what we call consumption volatility.

As reported in Table 6, among the food-vulnerable households, perpetuity of food poverty is a major concern in both 2000 and 2005. In the greater Rangpur region, the shares of the households with perpetuity in consumption shortfall among the food-vulnerable households are 95.2 per cent and 92.8 per cent in 2000 and 2005, respectively.⁷ The corresponding figures for the rest of the country are 89.8 per cent and 89.7 per cent, respectively. Thus we see that households that continuously have low food consumption constitute a significantly large share of households that are vulnerable to year-round food deprivation, and the situation improved very little over time.

{TABLE 6 HERE}

Unlike the HIES data, the InM data does not have necessary information to calculate vulnerability index (ex ante measure). However, since it has information on household meal consumption pattern at two time points (during monga and non-monga periods), we use a transition matrix to observe their movements among various meal consumption statuses from one period to another, which is a sign of vulnerability (Dercon, 2002). Table 7 presents such a transition matrix of household food consumption pattern across seasons. We find that 58.8 per cent of the sample households (shaded in dark gray) are subject to what we can call the perpetuation of shortfall in food consumption (because households experience food-deprivation in both monga and non-monga seasons). Among this group, 5.6 percentage households face the

most severe form of food deprivation as they skip meals during both periods. We also find that 36.8 per cent of the sample households (shaded in light gray) undergo occasional shortfall in consumption (because they skip or ration meals during the lean season only).

{TABLE 7 HERE}

The InM data also allow us to look at the household's own perception about the perpetuity of consumption shortfall during a future monga – which is a subjective way to look at the vulnerability. Households were asked about the likelihood of their falling into food deprivation during the following monga season. Table 8 reports this likelihood, grouped by the households' food consumption pattern during the most recent monga; that is, by their anticipated future deprivation against their current deprivation.

{TABLE 8 HERE}

Among those skip meals (47.3% of the sample households) during monga, a significantly large share (81.6%, as calculated from Table 8) anticipate that they are very likely to face seasonal food deprivation during the following monga, while only 6.8 per cent are of the opinion that food deprivation is somewhat likely, and 11.6 per cent do not foresee food deprivation during a future monga. If we combine all those that are food deprived during the monga and those that fear a possible food deprivation in a future monga, we see a pattern somewhat similar to that reported in Table 8. A great majority (78.2 percentage points in the total of 95.6% households,

shaded in dark gray) of households that go through food deprivation now, also anticipate future deprivation.

5. Household coping strategies to mitigate seasonal hunger

What do the poor do to cope with seasonal deprivation? A better understanding of the coping strategies of the poor will aid in the design of appropriate policy interventions. Based on the survey data of InM, we present in Table 9 a summary of coping mechanisms adopted by the poor in greater Rangpur during the monga of 2006 by the severity of seasonal hunger. This helps us understand better how good these coping mechanisms are at reducing the incidence of meal skipping. Some 65 per cent of the extreme poor in greater Rangpur managed to adopt one or more coping methods to mitigate the adversity of monga.⁸ The coping measures vary quite a lot among the households. Some 39 per cent of the households who had three meals a day during the monga season did not adopt any coping measures. These households would not probably need to adopt any

{TABLE 9 HERE}

coping measure to mitigate seasonal deprivation. However, these households account for only 4 to 5 per cent among the coping and non-coping households. Among the poor who either skip or ration meals during the monga period, a large percentage (more than 30%) did not adopt any coping measures, implying a lack of access to any coping mechanism. Some 30 per cent received some support (mostly food) during the lean season from government and non-government sources (safety net programs). Fewer than 6 per cent obtained loans from formal sources (mainly

microcredit), and some 12 per cent from informal sources.⁹ It is no surprise that access to formal credit was so low during the seasonality of monga. Formal credit from sources such as commercial and agricultural banks is inaccessible to rural poor because of the lender's collateral requirement which poses an insurmountable hurdle for the rural poor. Group-based lending programs such as microcredit, too, have been traditionally unwilling to target ultra-poor as they are less entrepreneurial and pose a credit risk to the lenders.¹⁰ It is worth noting that a large majority among the very poor (36%) sought seasonal out-migration to cope with the monga. Seasonal labour migration is a fairly common measures adopted by households to cope with the seasonality when other measures are not adequate. Some 16 per cent also sold labour, crops, or assets, in advance.

6. Mitigating seasonal food deprivation with public programs

Do the public programs such as safety net programs and microcredit that households access during the monga season do a good job, especially those in the greater Rangpur region? If the coping strategies are found to be effective, then strengthening these programs and policies is likely to mitigate the severity of seasonal deprivation during the monga period. For example, if microcredit indeed helps reduce the severity of food deprivation, the provision of microcredit in greater Rangpur should be improved. In this section, we attempt to determine, using the InM survey data, whether such public programs play a role in reducing the extent and severity of monga in greater Rangpur.¹¹

We estimate a multinomial probit (MNP) model since the outcome variable (the food deprivation status of the households during the monga period) can take on one of the three discrete values (1 for skipping meals, 2 for rationing meals and 3 for having full meals).

Household meal skipping status (which has a value 1) is used as the base category in the estimation.

Besides household and community variables we also include union dummies to control for the role of union-level unobserved characteristics.¹² There are three coping mechanisms with possible policy concern as far as the seasonality of monga is concerned: support from safety net programs, loans from microcredit programs, and seasonal migration. It is obvious from the findings reported in Table 9 that a significant share of households in the affected areas adopt these mechanisms to cope with monga. However, household level variables representing the adoption of these strategies cannot be used directly in the estimation because of possible self-selection biases. So instead, we create these village level equivalents of those variables to control for such biases: if village has safety net programs to assist households during the monga period, if village has microcredit programs to disburse credits during the monga period, and the share of village population that make seasonal migration during the monga period.

Table 10 presents results of the MNP estimation. It also reports the mean and standard deviation of the all explanatory variables in the last column. In general, the older the head of a household head the higher the probability of skipping meals during the period. An old household member, with a limited physical ability, cannot be as productive as a young one, and may contribute even less or nothing during the monga period when the availability of jobs is very limited. As expected, household assets of any kind (land, non-land, savings) lower the probability that household would skip meals during monga and increase the probabilities of rationing meals or having full meals during monga. For example, a 10 per cent increase in the land asset lowers the probability of skipping meals during monga by 5.3 percentage points, and increases the

probability of meal rationing by 4.5 percentage points and that of having full meals by 0.8 percentage points.

{TABLE 10 HERE}

Our objective is to find out whether some of the policies can help address the food insecurity during monga. The results suggest that the probability of hunger is very much context specific and is partially determined by agroclimate conditions and location factors.¹³ Favourable rainfall and higher elevation help reduce the probability skipping meals during the monga period.

More importantly, the results confirm that even after netting out the influence of unobserved agroclimate and location factors, most of the policies identified here do indeed help reduce seasonal hunger among the hardcore poor in the greater Rangpur region. Presence of microcredit programs helps reduce the incidence of seasonal hunger. For example, the households in villages with microcredit programs have about 8.5 percentage points less probability of skipping meals during the monga period. Microcredit borrowing can prevent affected households from taking drastic measures such as distress sale of labour or asset, or simply to satisfy food consumption needs when seasonality hits them. Moreover, as mentioned before, microcredit programs that are designed flexibly to address the needs of seasonality (such as PRIME) help households smooth consumption by providing consumption loans and cash for work during the monga period. They also provide production loans and trainings for IGAs. Similarly, the safety net programs are found to redress the incidence of skipping meals during monga by 6.8 percentage points. The roles of the safety net programs during the monga period are not much different from that of the flexible microcredit programs that provide cash. These

programs provide mostly cash and/or food grains to allow the households to cope with seasonal hunger. So the potential contribution of microcredit and safety net programs during the lean season cannot be denied. Unfortunately, because of the inadequate coverage or resource of these programs only about 35 per cent of the households in the affected areas benefit from them. Therefore, the coverage and scale of the operation of microcredit and safety net programs should be expanded so that they can play an important role in redressing seasonal meal skipping among the most vulnerable households.

Finally, the role of seasonal migration during the monga period cannot be underestimated. Households from villages with higher proportion of seasonal migrants are less likely to skip meals during the monga season. The findings are consistent with other studies that show that seasonal migration not only helps the affected households cope with the seasonality, but it can also improve their living standards (Khandker and others 2011; Brauw and Harigaya 2007).

7. Conclusions

Seasonality of income and consumption is due to the agricultural crop cycle, which may force many poor households to starve during the lean crop season when employment (either in agriculture or non-agriculture) is scarce. Seasonality of consumption may also be influenced by seasonal preferences but seasonal hunger is certainly not. In order to curb the role of agricultural seasonality in consumption and hunger, policies may aim at influencing seasonality of income, rather than seasonality of preferences.¹⁴

The analysis of this paper of the HIES data suggests that household consumption is much lower in the greater Rangpur region than in other regions, and that seasonal fluctuation in

consumption is also higher there than in the rest of the country. The extent of rural extreme poverty is also higher in monga-affected areas (47.9%) than in non-affected (29.4%) areas (HIES 2005 data). Besides the poverty measures, households' vulnerability to poverty is also high in the greater Rangpur region, although it has declined over time. As monga is a manifestation of seasonal deprivation, we would expect the higher incidence of vulnerability to be mostly due to occasional consumption shortfall in the greater Rangpur region. But HIES data suggest that consumption shortfall is not just a seasonal phenomenon, but is also persistent throughout the year in both regions.

Although more than one third of the extreme poor population cannot find any coping method, the remaining households in greater Rangpur region adopt a variety of formal and informal coping methods to mitigate seasonal hunger. Among the informal methods, seasonal migration is an important way of alleviating seasonality in income, employment, and consumption. Among formal methods, social safety net programs are quite important. However, these coping measures are not adequate to curb the rate of meal skipping among the poor.

In many agrarian societies, households manage seasonality through self-insurance (use of buffer stock) or mutual insurance (through interfamily transfers), and other means, all as part of their crop cycle. The incidence and severity of monga indicate a failure of these means. They also indicate a failure of public policies and programs that are intended to provide the safety nets people need to manage seasonality of income and consumption and, hence, monga. Government institutions employ short-term measures such as cash transfers, food-for-work, food coupons, and public works to manage monga. If variations in consumption were only transitory in nature and idiosyncratic across households, these interventions would probably have helped rural households handle monga seasonality. But, as we have seen, consumption shortfall is a year-

round problem caused more by low income and low productivity than by transitory seasonal fluctuation in income. Thus, if interventions that are not geared toward enhancing income and productivity throughout the year or are not adequate enough they are perhaps not much of help in containing monga in the greater Rangpur on a sustained basis.

Therefore, policies must be adopted to help increase as well as diversify rural income in the northwest part of Bangladesh. The regression analysis of this paper shows that increasing the intensity of microcredit and safety net operations in the regions where seasonality is acute can help affected households avoid skipping meals and increase the likelihood that these households would at least ration meals or have full meals. As such, providing a better access to these programs can be an effective policy directive for mitigating seasonal hunger and poverty. Similarly, policy initiatives to facilitate and smooth seasonal migration can be an option too, and examples of such measures could be providing information about the distant job markets, training, and providing credit to finance seasonal migration of the ultra-poor during the lean season, helping migrants safely remit money to family members, and so on. 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), assists the poor migrant workers of the state of Madhya Pradesh in various ways which include providing job information, raising awareness and wage negotiation assistance (IOM, 2008).

Given the severity of the seasonality in the northwest region of rural Bangladesh, a single policy intervention may not be enough and but all the measures recommended in this paper may need to be coordinated and implemented together. At the same time, the underlying phenomenon of the seasonality, the lack or loss of employment during the monga period, should also be addressed. One option could be crop diversification – trying alternate crops during the

lean season of monga, which could employ the otherwise seasonally unemployed poor population. However, a more effective way would be to strengthen the non-farm sector which is relatively undeveloped in the northwest region and once developed, could be resilient to the seasonality of monga.

¹ Throughout this paper, the terms “northwest region” and “greater Rangpur region” are used interchangeably. Five districts of the recently formed Rangpur division are covered in this study: Kurigram, Gaibandha, Nilphamari, Lalmonirhat and Rangpur.

² The HIES survey divides Bangladesh into 23 statistical regions, one of which is the greater Rangpur region. Households from these regions were selected randomly in proportion to their population, so that the HIES data are representative at the regional level.

³ In addition to representing the seasonal hunger itself, the term *monga* also refers to the lean season when such seasonal hunger happens. And the greater Rangpur region is generally known as the *monga* area.

⁴ More precisely, the food poverty line is calculated by estimating the cost of a food basket needed to maintain the per capita daily caloric requirement (2,120 calories) recommended by Food and Agricultural Organization (FAO) and the World Health Organization (WHO) (FAO/WHO 1973). For Bangladesh, the food basket contains mostly rice, and other food items including pulse, milk, meat, fish, fruits, and vegetables in specific quantities. The cost of the food basket is calculated from the local prices of the food items, and since it varies by region, so does the food poverty line.

⁵ Total poverty line is the sum of food and non-food poverty lines where 30 percent of the food expenditure is allowed for non-food.

⁶ We first regress household per capita consumption expenditure (log form) against the characteristics at the household level (head’s gender, age, education, employment type, land and non-land asset, availability of electricity, and so on) and the village level (prices of consumer goods, wage, infrastructure and agroclimate characteristics), and predict both the log consumption and the standard error. Finally, we compute the vulnerability index from the right hand side of equation (4.2).

⁷ These figures are calculated by dividing the share of households with perpetuity in consumption shortfall by the share of all food vulnerable households (Table 6).

⁸ This does not mean, however, that the remaining 35 percent households did not need any help. Many of them simply do not have the means to adopt any strategy.

⁹ The majority of informal loans (about 50 percent) are from relatives, friends, and neighbours. The rest of the lenders consist of informal money lenders, landlords, shopkeepers, employers, and input suppliers.

¹⁰ It is only in recent years that microcredit programs have started offering loans on flexible terms and conditions that are targeted to ultra-poor and address the needs during the seasonality such as *monga*. Examples of such programs are BRAC's ultra-poor program and PKSF's PRIME (for more information please see Bandiera and others 2010; InM 2009). PRIME, for example, helps households smooth consumption by providing consumption loans and cash for work during the lean season, besides providing noncredit services such as technical services for IGA implementation and training for distant-market employment in case of seasonal migration. In addition, PRIME provides production loans like regular microfinance once households can withstand seasonal shocks in consumption. Thus, these targeted programs can help the ultra-poor graduate into mainstream microcredit once they are able to absorb seasonal shocks.

¹¹ Note that besides these two major coping mechanisms households are found to adopt seasonal migration as a major coping strategy to cope with *monga*. In fact, recent findings do support that seasonal migration helps the poor in the northwest region (Khandker, Khaliliy and Samad (2011); Chowdhury, Mobarak and Bryan 2009)

¹² A union is the lowest administrative unit (below *upazila* or sub district), and contains a few villages. The union-level fixed-effects (FE) method is used to reduce the bias due to endogeneity of program placement such as microcredit.

¹³ Endogeneity of policy variables such as microcredit and safety net programs is possible with cross-sectional data. However, we have used the union-level FE method to estimate equation to control for any unobserved union-level heterogeneity. The estimated equation also included district-level rainfall information as an additional control. Nonetheless, since we cannot control for program endogeneity (due to lack of suitable instruments or panel data at HH-level), we investigated the correlation between the residuals of estimation equation and the three village level policy variables. We found that the correlations between the residual and these variables are both negative but

statistically insignificant. That is, if there is any bias left due to endogeneity of the village-level program placement, our estimates of policy variables using union-level fixed-effects method are, at worst, underestimated.

¹⁴ Seasonal deprivation cannot be a seasonal preference of the poor.

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Tables

Table 1: Selected welfare indicators of rural households

Indicators	Greater Rangpur region		Rest of the country		Whole sample	
	2000	2005	2000	2005	2000	2005
Per capita total expenditure (Tk./month)	541.6	630.4	740.5	875.7	722.4	852.5
Per capita food expenditure (Tk./month)	308.0	376.6	425.5	461.8	414.8	453.8
Land asset (decimal)	82.0	123.7	84.3	152.6	84.1	149.9
Head's employment is in agriculture sector	0.89	0.63	0.74	0.52	0.75	0.53
Access to formal credit (%)	6.4	7.1	9.6	9.3	9.3	9.1
Observations	440	520	4,600	5,520	5,040	6,040

Note: Monetary figures are CPI adjusted with base year 2000.

Source: HIES surveys, 2002 and 2005.

Table 2: Insecurity measures of rural households in Bangladesh

Insecurity measures	Greater Rangpur		Rest of the country		Whole sample	
	2000 (A)	2005 (B)	2000 (C)	2005 (D)	2000 (E)	2005 (F)
Moderate poverty headcount (%)	70.9	61.0	54.8	43.5	56.3	45.1
	$t_{AB}=-3.26, t_{CD}=-11.47, t_{AC}=-6.67, t_{BD}=-8.05$				$t_{EF}=-11.80$	
Food poverty headcount (%)	79.3	66.9	62.5	54.2	82.3	78.8
	$t_{AB}=-4.35, t_{CD}=-8.51, t_{AC}=-7.21, t_{BD}=-5.86$				$t_{EF}=-9.30$	
Extreme poverty headcount (%)	60.9	47.9	39.9	29.4	41.8	31.1
	$t_{AB}=-4.08, t_{CD}=-11.22, t_{AC}=-8.76, t_{BD}=-9.17$				$t_{EF}=-11.78$	
Observations	440	520	4,600	5,520	5,040	6,040

Note: t_{AB} , t_{CD} , etc. are t-statistics of the differences of the figures in pairs of columns A-B, C-D, etc.

Source: HIES surveys, 2002 and 2005.

Table 3: Distribution of household meal consumption status (%) in greater Rangpur

Consumption status	Kurigram district	Gaibandha district	Nilphamari district	Lalmonirhat district	Rangpur district¹	Greater Rangpur region
Non-monga period						
Meal skipping	2.08	12.18	2.32	14.36	17.10	8.53
Meal rationing	49.36	63.44	32.89	54.78	53.33	50.85
Consumption of full meals	48.56	24.38	64.79	30.86	29.57	40.62
Monga period						
Meal skipping	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

¹Rangpur district should not be confused with the greater Rangpur region which includes 5 districts including Rangpur.

Source: InM survey, 2006.

Table 4: Distribution of food poverty (FP) and vulnerability (FV) by season (%)

Period	Greater Rangpur		Rest of the country		t-statistics across regions
	2000	2005	2000	2005	
<i>Monga</i> season	FP=85.0 FV=98.0	FP=69.2 FV=84.2	FP=69.5 FV=79.0	FP=59.3 FV=66.7	$t_{FP2000}=-3.34$, $t_{FV2000}=-4.74$, $t_{FP2005}=-2.22$, $t_{FV2005}=-4.14$
Non- <i>monga</i> season	FP=77.6 FV=75.9 $t_{FP2000}=-1.60$, $t_{FV2000}=-5.08$	FP=66.3 FV=74.5 $t_{FP2005}=-0.59$, $t_{FV2005}=-2.20$	FP=59.8 FV=66.0 $t_{FP2000}=-6.12$, $t_{FV2000}=-8.64$	FP=52.3 FV=51.4 $t_{FP2005}=-4.59$, $t_{FV2005}=-10.20$	$t_{FP2000}=-6.61$, $t_{FV2000}=-3.78$, $t_{FP2005}=-5.59$, $t_{FV2005}=-9.32$
All seasons	FP=79.3 FV=80.9 $t_{FPGR}=-4.35$, $t_{FVGR}=-1.58$	FP=66.9 FV=76.7	FP=62.5 FV=69.5 $t_{FPRC}=-8.51$, $t_{FVRC}=-14.77$	FP=54.2 FV=55.5	$t_{FP2000}=-7.21$, $t_{FV2000}=-5.11$, $t_{FP2005}=-5.86$, $t_{FV2005}=-9.87$
Observations	440	520	4,600	5,520	

Note: t_{FP} , t_{FV} are t-statistics of the differences in pairs of food poverty and food vulnerability figures, respectively, and defined as follows: t-statistics with subscripts 2000 and 2005 compare figures in *monga* and non-*monga* periods restricted to 2000 and 2005, respectively, while those with subscripts GR and RC compare figures in 2000 and 2005 that are restricted to the greater Rangpur and the rest of the country, respectively. In the last column, t-statistics compare figures across regions.

Source: HIES surveys, 2002 and 2005.

Table 5: Share of food vulnerable households in extreme poor and non-poor households (%)

Poverty status	Greater Rangpur		Rest of the country	
	2000 (A)	2005 (B)	2000 (C)	2005 (D)
Households are in extreme poverty	92.9	94.4	89.2	82.1
Households are not in extreme poverty	62.2	60.5	56.5	44.4
Observations	440	520	4,600	5,520

Source: HIES surveys, 2002 and 2005.

Table 6: Consumption volatility and perpetuity of consumption shortfall among food vulnerable households

Vulnerability type	Greater Rangpur		Rest of the country	
	2000 (A)	2005 (B)	2000 (C)	2005 (D)
Share of all food vulnerable households	80.9	76.7	69.5	55.5
Share of food vulnerable households with consumption volatility	3.9	5.6	7.1	5.7
Share of food vulnerable households with perpetuity in consumption shortfall	77.0	71.2	62.4	49.8
Observations	440	520	4,600	5,520

Source: HIES surveys, 2002 and 2005.

Table 7: Transition of food-deprived households between *monga* and non-*monga* periods
(N=480,918)

		<i>Monga</i> period			
		Meal skipping	Meal rationing	Full meals	Total
Non- <i>monga</i> period	Meal skipping	0.056	0.029	0.001	0.086
	Meal rationing	0.366	0.137	0.005	0.508
	Full meals	0.051	0.317	0.038	0.406
	Total	0.473	0.483	0.044	1.00

Source: InM survey, 2006.

Table 8: Household perception about suffering in a future *monga* by food deprivation during *monga* period (N=480,918)

		Exposure of last <i>monga</i>			
		Meal skipping	Meal rationing	Full meals	Total
perception about future <i>monga</i>	Suffering is very likely	0.386	0.142	0.002	0.530
	Suffering is somewhat likely	0.032	0.222	0.030	0.284

Suffering is not likely	0.055	0.119	0.012	0.186
Total	0.473	0.483	0.044	1.00

Source: InM survey, 2006.

Table 9: Coping measures during *monga* by consumption pattern (%)

Coping measures	Meal skipping	Meal rationing	Full meals	Whole sample
Coping households	66.36	66.34	63.42	65.25
Informal coping	50.32	48.08	44.13	48.91
Advance labor sale	4.52	4.22	4.18	4.36
Advance crop sale	0.48	0.59	0.58	0.54
Advance asset sale	4.52	9.57	6.89	11.35
Migration	37.46	35.23	28.67	35.99
Informal loan	12.26	12.24	15.23	12.38
Formal coping	36.53	34.31	35.59	35.42
Support from safety net programs	33.41	30.26	28.63	31.67
Formal loan	4.94	6.21	10.20	5.79
Non-coping households	33.64	35.66	38.58	34.75
Observations	227,307	232,225	21,386	480,918

Note: Sum of percentage figures add to more than 100 because households adopt multiple coping mechanisms.

Source: InM survey, 2006.

Table 10: Fixed-effects multinomial probit estimates of the food consumption status during the munga period

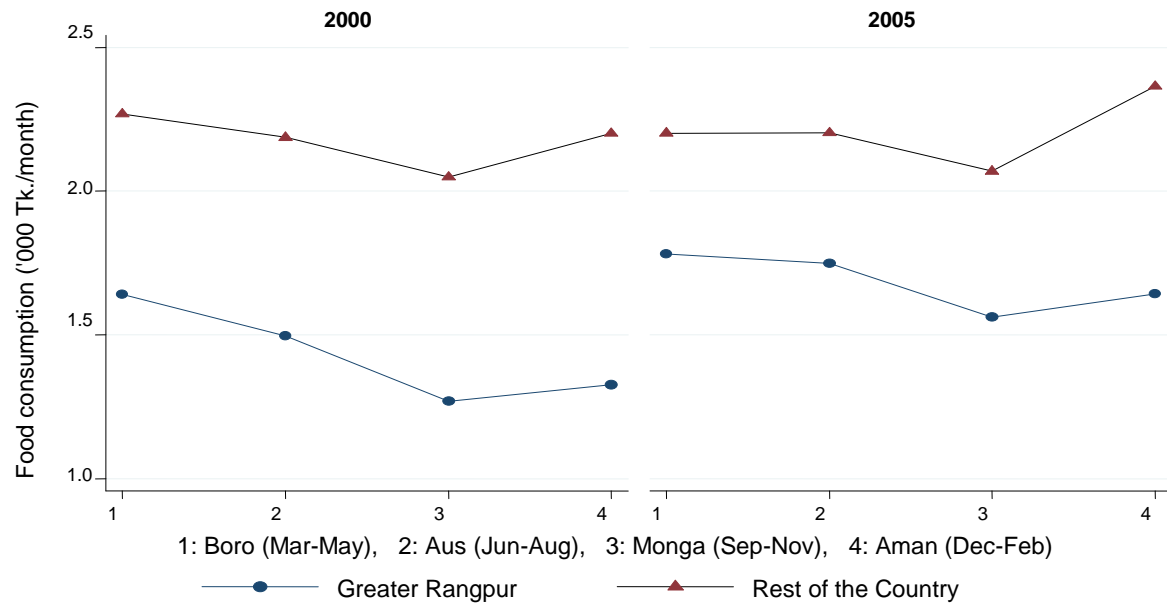
Explanatory variables	Food consumption status			Means of explanatory variables
	Meal skipping	Meal rationing	Having full meals	
Head's age (years)	0.002** (10.77)	-0.001** (-9.60)	-0.0002** (-5.51)	39.98 (12.68)
Dependency ratio	-0.010 (-0.62)	0.012 (0.76)	-0.002 (-0.52)	0.63 (0.21)
HH head is self-employed	-0.009 (-0.60)	0.012 (0.82)	-0.003 (-1.07)	0.16 (0.37)
HH head is wage employed	-0.013 (-1.02)	0.013 (1.11)	-0.0004 (-0.15)	0.54 (0.50)
Log of land asset (decimal)	-0.053** (-17.12)	0.045** (14.66)	0.008** (9.21)	8.20 (12.59)
HH has agricultural asset	-0.049** (-3.30)	0.037** (2.59)	0.012** (3.56)	0.49 (0.50)
HH has nonagricultural asset	-0.072** (-5.63)	0.054** (4.37)	0.018** (6.20)	0.13 (0.34)
HH has cash savings	-0.032** (-3.47)	0.022** (2.49)	0.010** (3.73)	0.34 (0.47)
Has cow	-0.040** (-6.36)	0.034** (5.57)	0.006** (3.74)	0.26 (0.44)
Village has safety net programs	-0.068** (-2.96)	0.066** (3.05)	0.002 (0.27)	0.81 (0.39)
Village has micro-credit programs	-0.085** (-2.10)	0.066* (1.68)	0.019** (2.76)	0.97 (0.18)
Proportion of village population that makes seasonal migration	-0.121** (-7.06)	0.094** (5.69)	0.026** (8.46)	0.36 (0.26)
Proportion of highland in the upazila	-0.228* (-1.91)	0.074 (0.54)	0.203** (6.16)	198.54 (6.62)
Average yearly rainfall in upazila	-0.004**	0.004**	-0.0001	198.54

(mm)	(-2.06)	(2.20)	(-0.27)	(6.62)
Wald χ^2	986.66, prob> $\chi^2=0.000$			

Notes: Marginal effects of the explanatory variables are shown. Figures in parentheses are t-statistics except for last column where they are standard deviations. Regression additionally includes union dummies to control for unobserved union-level fixed effects. * and ** denotes a significance level of 10% and 5% respectively.

Source: InM survey, 2006.

Figure 1: Food consumption by season



Source: HIES surveys, 2000 and 2005.