MITIGATING SEASONAL HUNGER
EVIDENCE FROM NORTHWEST BANGLADESH

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ABSTRACT

The paper reviews the evidence regarding factors underlying the persistence of seasonal poverty and hunger in large parts of the developing world including sub-Saharan Africa and South Asia. It particularly focuses on an economically depressed and ecologically vulnerable region in northwest Bangladesh that has a history of famine dating back to the Great Bengal Famine of 1942-44 and still remains particularly vulnerable to seasonal hunger. Based on the results derived from recent household survey data, the paper covers a wide range of issues, namely, the extent and nature of vulnerability to seasonal hunger, the capability of households for self-insurance against seasonal shocks, the household coping mechanisms and the role of seasonal migration in particular, the effectiveness of social safety net programmes, the role of microfinance, and the underlying structural factors causing both chronic poverty and seasonal hunger. These findings lead to an assessment of public policy options for mitigating seasonal poverty and hunger.

I. INTRODUCTION

Seasonal poverty and hunger once featured prominently in the poverty literature, but has of late received much less attention.[1] The glare and shine of the newly found apparent economic prosperity in parts of the developing world, including urban India, may be responsible for this detraction. Yet, it is likely that just as the problem of extreme poverty and food insecurity remains persistent in large parts of the developing world, so do its seasonal dimensions; and this has implications for our understanding of the nature of food deprivation, its effect on health and nutrition, and the effectiveness of policies. Another reason for revisiting the seasonality issue is the new threat to global food security and poverty arising from climate changes and the associated extreme weather conditions that may make seasonal shocks more frequent, severe and unpredictable. It is the poor people in ecologically vulnerable regions who will be most at risk.

According to the estimates made by the Food and Agriculture Organisation for the mid-1990s, there were one billion poor people - "the bottom billion" as Paul Collier (2007) calls them - who were not food secure in the sense that they did not have at all times access to sufficient food to meet the dietary requirements to maintain healthy life. However, there is no direct account of how many people suffer from food insecurity due to seasonal hunger. That is because seasonal hunger is "missing" in official data and analysis that report average and annualized poverty numbers. In fact, several studies show that a much larger number of rural households are vulnerable every year to poverty than what is implied by the standard poverty statistics. In other words, some of the non-poor measured by annual data may be seasonal poor because they cannot maintain consumption above the poverty line in response to seasonal shocks (e.g., Dercon and Krishnan, 2000).

In spite of the lack official data, some recent studies point to the severity and persistence of seasonal hunger. Drawing examples from India, Malawi, and Myanmar, one such study provides a compelling account of the magnitude of seasonal hunger (Devereux, Vatila, and Swan, 2008). In sub-Saharan Africa, seasonal hunger is found to be a major dimension of

declining food availability and increasing instability in food supply (Devereux, 2009). In fact, it appears reasonable to argue that most of the world's acute hunger and under-nutrition occurs in the annual "hunger season", the time of year when the previous year's harvest stocks have dwindled, food prices are high, wages are low and jobs are scarce, and the poor people are left with very little food entitlement in terms of income, savings, carry-over of food stocks or access to credit. Seasonal hunger has also been aptly called the "father of famine", so that controlling seasonal hunger is a step toward averting famine.

II. SOURCES OF SEASONALITY OF HUNGER AND POVERTY

The reason for the persistence of seasonal poverty and hunger is derived from the fact that more than 80 percent of the world's poor live in rural areas and most of them depend on agriculture as their main source of living - either as landless labourers or small farmers. The bulk of agriculture in the developing world is still subject to distinct annual cycles of crop production where nature still controls the cycle. In many areas, where water or temperature constraints allow only one major crop harvest per year, poverty is driven by seasonal cycles, worsening especially in the pre-harvest months. The seasonality of mono-crop agriculture dependent on climatic conditions not only leads to large seasonal variations in rural incomes, but also makes such incomes subject to the vagaries of nature, and as such, unpredictable to a large extent.

Where a majority of households depend on highly seasonal agriculture for living, it is only to be expected that household incomes will vary seasonally, often quite sharply.[2] For example, in a study using an ICRISAT sample of Indian villages, agricultural households were found to have received on an average 75 percent of their annual income in a three-month period (Chaudhuri and Paxson, 2001, 2002). But seasonal hunger does not result from income seasonality alone; it is typically an extension or a particular manifestation of poverty in general. It is the poor, and typically the extremely poor, who lack capacity to maintain their food consumption at the time of seasonal fall in income; they are even less capable of self-insuring against occasional seasonal stress of unpredictable severity.

There are varying evidences regarding factors that determine poor people's ability to smooth consumption in the face of income fluctuations. There are

traditional risk management devices employed by rural households, such as local pooling of resources or mutual support provided by family or friends. Such community-based insurance is feasible when the risks are idiosyncratic (i.e., particular to households), but have limited use in the event of aggregate shocks like the seasonal ones.

As for individual household behaviour, there is evidence that credit constraints and lack of ability to save may prevent poor households from smoothing consumption seasonally and over the years.[3] Even if rural poor households would like to save out of precautionary motives, lack of appropriate financial institutions could prevent them to do so. As an alternative, households might store grains as a buffer stock to smooth consumption; but the cost of storage due to spoilage can be high because of poor storage facilities.[4] The unpredictability of the extent of seasonal stress may also be a reason for inadequate self-insurance by poor households, either through savings or storage of grains. Seasonal food consumption of the poor are sometimes found to fall sharply when food stocks are drawn down (Deaton, 1991; Chaudhuri and Paxson, 2001). Even in case of a predictable income fall, it is not easy for a poor household which lives near subsistence to consciously fend for future hardship. Undergoing mild starvation year round instead of suffering from severe starvation in the hunger season may be preferable in terms of the nutritional wellbeing of the family members, but hardly looks like an option! In other words, immediate food needs may compromise poor households' ability or willingness for smoothing consumption.[5]

With limited ability to smooth consumption, poor households resort to many coping strategies. Some coping may be 'induced' by public policies, such as provision of employment in public works, even though at lower than market wages. Seasonal migration can also be a means of coping depending on the cost of such migration and the extent of spatial labour market integration. But the other coping mechanisms are clearly of the 'distress' variety, such as sale of assets, borrowing from moneylenders at exorbitant interest rates and advance sale of labour. Such coping is not only often inadequate to avoid seasonal hunger, but the households also become more vulnerable to future hunger and poverty. The adverse effects are compounded by the fact that such asset prices may plunge and interest rates may soar in the case of aggregate or co-variant shocks like the seasonal ones.

What policies can avert or alleviate seasonal poverty and hunger? It is important to ascertain the sources of seasonality of food deprivation that are amenable to policies. For example, if there are particular regional pockets of severe poverty and seasonal hunger, strengthening the local economy of those regions may be the way out. If seasonal hunger is driven by price fluctuations, the goal of policy could be to keep such fluctuations within reasonable limits. But, if lack of employment in the agricultural lean season is the problem, price stabilisation alone will not do. In such a case, policies to promote rural non-farm employment could be one way of limiting the effect of agricultural seasonality. Another possibility is to diversify food production and food habit by growing non-seasonal crop like cassava, which is a staple food in Africa and, not surprisingly, is known as a "famine reserve crop".[6] In the monsoon-fed rice agriculture of India and Bangladesh, promoting the production of irrigated winter rice has not only contributed to the growth of rice production, but has also significantly reduced the extent of seasonal agricultural cycle.[7]

If households are using buffer stocks, past savings, informal credit markets or intra-family risk pooling to smooth consumption, it is necessary to find out how efficient these mechanisms are, and whether there is scope for institutional innovations. Microcredit, for example, may have a role in consumption smoothing, both when loans are used directly for consumption and for supporting income-generating activities year round (Pitt and Khandker, 2002).

Targeted public schemes may also help combating seasonal hunger. The categories of interventions include emergency assistance, social protection safety nets such as provided by public works programme, and rural livelihoods development such as through asset transfer to the vulnerable households (Devereux, Vatila and Swan, 2008). When targeted seasonally, these interventions can enhance the welfare of the poor households by preventing them to resort to desperate coping strategies (e.g., Chetty and Looney, 2006). On the other hand, the interventions that are not seasonally targeted can have an impact on seasonal hunger only through their possible impact on year-round income and consumption, depending again on the capacity of the beneficiary households to smooth consumption.[8] Seasonal hunger aside, social safety net programmes are found to be more effective in arresting transitory poverty than persistent poverty.

Since seasonal hunger is a manifestation of poverty in general, the answer

to the problem ultimately lies in promoting poverty-alleviating economic growth. Experiences of countries show that economic growth alone is not enough; growth has to be broad-based enough so as to be able make the rural economies stronger, more diversified, and resilient to shocks - particularly in regions that are prone to seasonal hunger. It is noteworthy that, according to the Global Hunger Index (which combines data on malnourishment, underweight children and child mortality), the countries where hunger is rife includes India, Pakistan and Bangladesh alongside countries in sub-Saharan Africa.[9] However, unlike many sub-Saharan countries, South Asia has been making rapid progress in reducing the extent of hunger since the early 1990s. South Asia's persistent poor ranking in the Hunger Index, particularly in the case of India and Bangladesh, is because of the disproportionately large incidence of child malnutrition. This may be due to intra-household food distribution that discriminates against children, but seasonal food deprivation that particularly affects child nutrition may also be a contributing factor. This is a problem that warrants more attention from the South Asian policymakers.
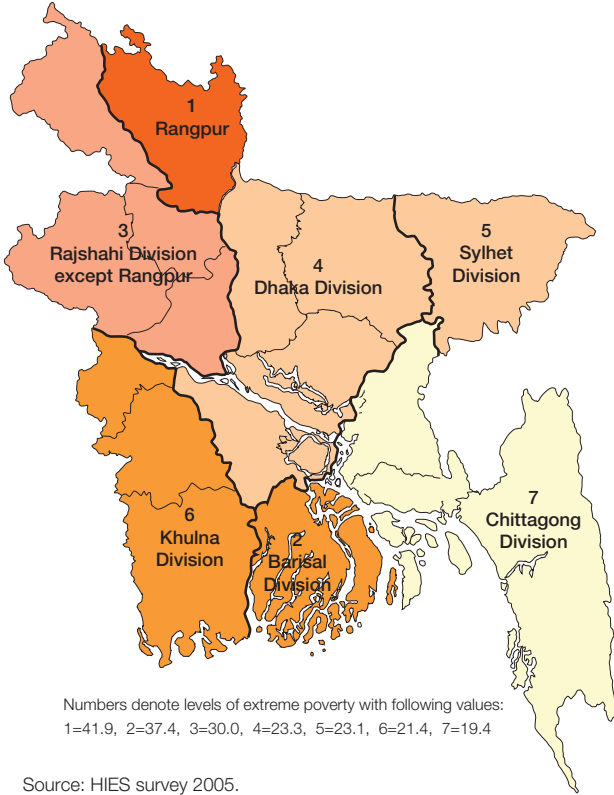
III. SEASONAL HUNGER IN BANGLADESH: THE VULNERABILITY OF NORTHWEST REGION

Bangladesh has achieved modest economic growth and considerable progress in many social development indicators over the past few decades; yet, well over a third of its population lives under the official poverty line, and hunger and malnutrition are widespread. The country is prone to flood, cyclone, and other forms of natural disasters that can adversely affect food security and amplify the effect of agricultural seasonality. There is even a larger threat arising from environmental degradation and the impact of climate change.

Several factors however have contributed to reduction of food deprivation including seasonal hunger. Economic growth has been accompanied by reduction in poverty; the headcount poverty rate according to the official estimates declined from 59 percent in 1991 to 41 percent in 2005, and may have further declined to near 30 percent in 2010. The growth of production of food grains, mainly rice, has been ahead of population growth, while the share of irrigated winter rice in total production has increased to about 60 percent, contributing to a reduction in seasonality in both rice prices and

agricultural employment. The growth of rural non-farm sector has also contributed to reducing the effect of agricultural seasonality on the rural economy.[10]

Figure 1
Bangladesh: Regional Disparity in Poverty at a Glance

Numbers denote levels of extreme poverty with following values:
1=41.9, 2=37.4, 3=30.0, 4=23.3, 5=23.1, 6=21.4, 7=19.4

Source: HIES survey 2005.

There is however a region in northwest Bangladesh–the greater Rangpur region–that has not only lagged in poverty reduction compared to other regions, but has also remained particularly vulnerable to seasonal hunger, locally known as *monga* (Narayan, Yoshida and Zaman, 2007; Rahman, 1995; Elahi and Ara, 2008).[11] The Rangpur region is well-known in the famine literature; it was among the worst-hit districts in the Great Bengal Famine of 1942-44 and was literally the epicentre of the 1974 famine in

Bangladesh (Sen, 1984; Alamgir, 1980). The region is both economically depressed and ecologically vulnerable; it is prone to river erosion and frequent floods, crop yields are low because of the adverse effects of sand deposits caused by floods, infrastructure is poor, and there is very little employment opportunities outside agriculture. The region has a high proportion of landless households and the agricultural wage rates are considerably lower than in other parts of the country. It seems that households in Rangpur are trapped by economic geography where livelihoods opportunities are limited, vulnerable to natural disasters and tied to seasonal crop cycles.

Using the data from the official Household Income and Expenditure Survey (HIES) of 2000 and 2005, we can see the seasonal variations in household food expenditure in Rangpur and the rest of the country. The information on food expenditure in the HIES is collected in a way that permits estimates by season.[12] The estimates are in real terms at 2005 prices and are adjusted for both years by regional and income-class-specific price deflators. In view of the cropping cycle, four seasons are distinguished for the estimates: the Boro (winter rice) season of March-May, the Aus (early rain-fed rice) season of June-August, the pre-harvest Aman (the main rain-fed rice) season of September-November, and the post-Aman season of December-February. The pre-Aman season is the lean season, known as the *monga* season in Rangpur, when there are no major agricultural activities.

Figure 2
Monthly Household Food Expenditure by Season in Rangpur and Rest of Bangladesh, 2000 and 2005
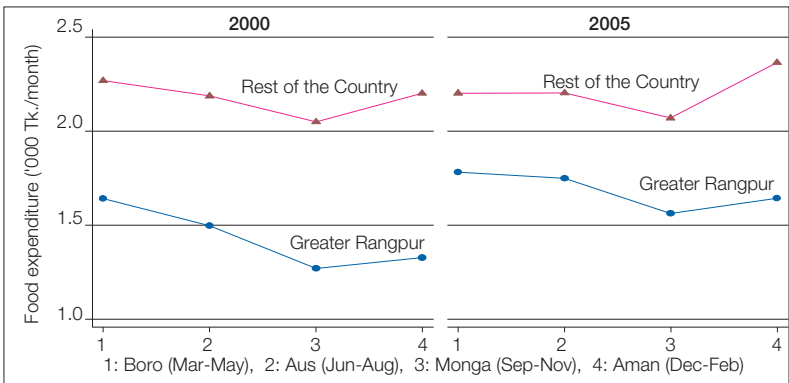
As can be seen from Figure 2, in both years the overall monthly food

consumption per household is much lower in Rangpur compared to the rest of the country, although the differences appear to have decreased because of the higher level of food consumption in Rangpur in 2005 compared to the level of 2000. It appears that there is marked seasonality in food consumption for the country as a whole, but it is more pronounced in Rangpur. It is the generally lower level of food consumption in Rangpur, along with its sharp seasonality, that seems to explain the severe seasonal food deprivation in this region. Moreover, as can be seen from Figure 2, households in Rangpur seem to recover from the dip in seasonal consumption more slowly than in the rest of the country.

The official headcount estimates of poverty in Bangladesh are derived from the HIES data using the poverty line based on the "cost of basic needs". Along with these estimates of poverty, estimates are also made for the incidence of "extreme poverty", which is defined by the household's total consumption falling short of the cost of the food basket included in the cost of basic needs.[13] The poverty lines are estimated to reflect price variations by income classes, season and region so as to make possible price-adjusted disaggregated estimates of poverty. To capture the seasonality in rural poverty, only the data from the rural HIES sample households are used. Several basic features can be observed from these estimates of extreme poverty for 2000 and 2005 in respect of rural areas in Rangpur and in the rest of the country (Table 1).

Table 1
Headcount Incidence of Extreme Poverty in *Monga* and other Seasons in Rural Areas in Rangpur and Rest of Bangladesh, 2000 And 2005

Period	Greater Rangpur		Rest of the country		Whole country	
	2000	2005	2000	2005	2000	2005
Monga season	66.0	48.3	43.9	31.6	45.6	33.0
Non-*monga* season	52.3	43.0	38.4	28.6	39.7	29.9
All seasons	55.5	44.2	39.9	29.4	41.8	31.1
Observations	440	520	4,600	5,520	5,040	6,040

Sources: HIES surveys, 2002 and 2005 (rural sample).

First, as expected, the poverty situation is generally worse in the Rangpur region than in the rest of the country. Second, the poverty situation is considerably worse during the *monga* period than during the rest of the year. Thirdly, the poverty situation improves from 2000 to 2005. Finally, the

gap in poverty status between the *monga* and non-*monga* periods is larger in the Rangpur region than in rest of the country, which is consistent with the earlier finding that consumption seasonality in the Rangpur region is higher than that in other regions, particularly according to the 2000 estimates (the seasonal difference is nearly 14 percentage points in Rangpur compared to 6 percentage points in the rest of the country).

A more direct assessment of seasonal hunger in the Rangpur region can be made from the results of a baseline survey administered by the Institute of Microfinance (InM) in 2006 to generate information about *all* poor (and, as such, *monga*-prone) households in the region. Information is available from this survey for 480,918 households, which satisfied the criteria of being poor and which constituted about 60 percent of all household in the region.[14] Because of its very large size, the survey collected only limited information, with a focus on the extent of seasonal food deprivation and the coping mechanisms adopted by the poor.

The data from the InM survey have information on household meal consumption pattern at two time points (during *monga* and non-*monga* periods), and the reported degree of starvation can be graded in terms of severity as (a) starvation (no meals in some days), (b) meal rationing (skipping a meal or two in some days), and (c) full meals. The data can be used not only to show the extent of seasonal hunger among the poor households, but can also be used to construct the transition matrix of their movements among various meal consumption statuses from one period to another, which can indicate *ex ante* vulnerability (Dercon, 2002).

Table 2 presents such a transition matrix of household food consumption pattern across seasons. The striking features of these estimates are the

Table 2
Transition of Food-Deprived Households between *Monga* and Non-*Monga* Periods (N=480,918)

| | | *Monga* period | | | |
		Starvation	*Meal rationing*	*Full meals*	*Total*
Non-monga period	*Starvation*	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

Sources: InM baseline survey, 2006.

extent of food deprivation year round among the households and the severity of the seasonal hunger. We find that 58.8 percent of the households (the dark-shaded area) are subject to what may be called the perpetual food deprivation of some form (because the households experience food-deprivation in both *monga* and non-*monga* seasons). Another 36.8 percent of the households (light-shaded area) experience food deprivation (meal rationing or starvation) during the lean season only. The percentage of households who face hunger, the most severe form of food deprivation, goes up from 8.6 percent in the non-*monga* season to 47.3 in the *monga* season.

It is evident from these estimates that the poor households in Rangpur do not have enough ability to avoid starvation in the *monga* season through various self-insurance mechanisms (e.g. grain storage, savings or borrowings), since seasonal starvation of this magnitude can hardly be by choice. The pattern of the intra-seasonal transition of the households among the categories of food deprivation also suggests that seasonal hunger is due to aggregate shocks rather than due to idiosyncratic (household-specific) reasons, and that the hunger in the *monga* season is an extension of year-round poverty and food deprivation. Notice that the households which are subject to starvation during the *monga* season are predominantly the ones which suffer the milder form of food deprivation (meal rationing) in the non-*monga* seasons as well. Policies for mitigating seasonal hunger need to therefore go into the structural causes of poverty, apart from addressing the factors that create income seasonality and constrain households' ability to self-insure against such seasonality.

IV. HOUSEHOLD COPING STRATEGIES AND IMPACT OF POLICIES

In order to alleviate seasonal hunger, poor households may adopt various coping measures, some of which may put them at further disadvantage in the longer run. For example, some 16 percent of the households in the InM survey discussed above resorted to advance sale of assets or advance sale of labour and crops during the *monga* season, while 12 percent took loans from informal sources.[15] These coping measures are mostly taken under extreme distress at a high cost of future income erosion. Fewer than 10 percent received some support (mostly food) during the lean season from government and non-government sources under various safety net

programmes. About two-thirds of the households obtained loans from formal sources, mainly from the quasi-formal source of microcredit, while an equal proportion resorted to seasonal out-migration as a coping strategy. It is also noteworthy that about 34 percent of the households suffering from starvation in the *monga*-season (and 36 percent of those experiencing meal rationing) had recourse to none of these coping measures.[16]

The statistical exercises based on the data suggest that the households of day labourers are the most vulnerable in not being able to adopt any coping method.[17] The vulnerability of this particular sub-group among the poor households is evident from further findings suggesting that, in redressing the extent of seasonal hunger, any coping ability is better than nothing. Moreover, households that have access to formal coping methods such as microcredit or social safety net programmes are found to be better able to avoid the informal coping methods that are adopted only at the risk of further hardship through future erosion of income or assets (Osmani, 2010). Overall, the picture is one of grossly inadequate coping abilities of the *monga*-vulnerable households in Rangpur.

Seasonal Migration

Given the widespread phenomenon of seasonal migration in Rangpur, some further analyses of such migration as a coping mechanism are in order. Using the InM survey data, a number of questions may be explored: Is the decision to migrate driven by the extent of hunger or the expectation of higher income? What factors, household-specific or community-level, affect the households' weighing of expected income gains against the cost of migration? And, does migration make households necessarily better-off, particularly in coping with seasonal hunger?

Because of the simultaneity of factors affecting both households' migration decision and their extent of food deprivation, it is not easy to determine which way the causality runs. While a simple comparison of migrant and non-migrant households does not show much difference in the food deprivation status, econometric modelling exercises using the InM survey data do provide some answers. The data come from a detailed follow-up survey of 2008-09 which was carried out in respect of a sub-sample of the InM's baseline survey of 2006. It appears that, both the hypotheses of maximizing expected income and that of avoiding food deprivation have some validity in explaining seasonal migration (Khandker and Mahmud,

2010). Both community-level and household characteristics can be important in determining the decision to migrate; households which have younger working members or more wage workers compared to self-employed ones or larger number of dependants or less landholdings are more likely to migrate. Higher land productivity (reflected in better agro-climatic conditions) and lower village-level unemployment reduces the probability of migration.

Interestingly, the social safety net programmes, such as old-age pension or vulnerable group feeding programme for women and children, do not seem to significantly affect seasonal migration, while access to microcredit does have a negative impact. But a study, using randomized evaluation of a programme that offered credit for inducing seasonal migration among poor people in Rangpur, found that 40 percent of the households decided to migrate (compared to 13 percent in the control group) and that such migration had positive short-run and long-run impacts on household welfare (Mobarak, 2010). These results need not be inconsistent. While conventional microcredit used for income-generating activities that are not subject to seasonality may discourage migration, other forms of credit or financial assistance may help households to overcome the barriers to migration. The two types of credit can in fact be part of complementary strategies for mitigating seasonal hunger.

Further econometric exercises with the InM survey data show that the impact of migration is positive on household welfare as expected.[18] Because of migration, the households are at least 5.2 percent less likely to be in starvation and 8.5 percent less likely to ration meals during the *monga* period and the likelihood of their food deprivation year round is also reduced. These estimates of course reflect the household-level impact of migration under the existing labour market situation and as such do not fully capture the welfare gains of the local economy arising from migration on such a large scale. Interestingly, the exercise also shows (by simulating a counterfactual) that had the non-migrant households migrated, the reduction of seasonal starvation would have been even higher for them. The question then remains why more people do not migrate to avoid starvation. The explanations are likely to lie in the barriers to migration such as the costs involved, lack of social networking needed for such migration and inadequate spatial integration of labour markets.

Social Safety Net Programmes

Social safety net programmes can act as a kind of social insurance against seasonal poverty, but their impact may be limited by both inappropriate targeting and limited coverage dictated by fund constraints.

The safety net programmes in Bangladesh are both seasonal (e.g. food/cash for work, test relief and emergency assistance) and year-round (e.g. vulnerable group feeding for mothers and children, old-age pension, and food/cash for education). These programmes are generally found to be well targeted for the poor households in Bangladesh.[19] On the basis of the InM baseline survey data, this is found to be true for the Rangpur region as well, although the coverage of the programmes is evidently much too inadequate to meet the needs of all poor households. The probability of being a beneficiary is found to increase for households which are of larger size or have wage labourer as household head, or have less land and less non-agricultural assets or live in villages having larger unemployment rates.[20] However, irrespective of being beneficiaries or not, the households have to largely depend on other coping mechanisms. Moreover, these programmes do not seem to be regionally targeted according to poverty incidence, so that the percent of population covered is found to be no higher in the Rangpur region than in the rest of the country.

How effective are these safety net programmes in alleviating food deprivation for the beneficiary households? Since the participation of households in these programmes is not random even among the poor households but depends on both household-level and area characteristics, the same kind of estimation problems arise as in the case of measuring the effect of migration. Using statistical techniques to control for this selection bias, it is possible to measure the *actual* safety net benefits for the participant households and the *potential* benefits for non-participant households had they received such benefits.[21] The results of the exercise, based again on the InM follow-up survey of 2008-09, show that the probability of *monga*-season starvation decreases by 4.4 percent for the programme participants and *potentially* by 2.5 percent for the non-participants.[22] Moreover, both the actual and potential benefits of the programmes can also be seen in reducing the milder from of food deprivation (that is, meal rationing) as also in reducing year-round food deprivation of both kinds.

Since most of the major safety net programmes are of long-term nature (vulnerable group feeding for mothers and children, food/cash for education, old age allowance), the estimated year-round beneficial effects are to be expected. Given the extent of seasonal hunger and the limited ability of the households to smooth consumption, the challenge is to seasonally target the safety net benefits. The existing seasonal programmes mostly consist of employment in public earthwork projects, which are not very suitable for the *monga* season (which is also the late rainy season). Overall, while the beneficial impacts of safety net programmes are not in doubt, the problem lies in their limited coverage and the inadequate amounts of benefits transferred. The results suggest that even with any modest scaling up of the existing programmes, it will be difficult to make a dent on the seasonal hunger of the severity as observed in Rangpur.

Microcredit for the Ultra-Poor

As noted earlier, the InM baseline survey of 2006, which covered all poor households in the Rangpur region, showed that about two-thirds of the households were members of the microcredit programmes.[23] This was a substantially lower rate of participation than in most regions in Bangladesh, and confirms the view that the ultra-poor households as well as the regional pockets of extreme poverty are bypassed by the regular microcredit programmes.[24] However, as the *monga* phenomenon has recently come into public policy discourses and has been recognized as a problem deserving special attention in poverty alleviation programmes, a number of policy initiatives have been undertaken. As part of this, in 2006, the Programme Initiatives for *Monga* Eradication (PRIME) was introduced by the Palli Karma Shahayak Foundation (PKSF), the country's premier wholesale microfinance lending institution.[25]

PRIME's objective is to deal exclusively with the hard-core poor who are highly vulnerable to seasonal poverty in the Rangpur region. It has several features that distinguishes it from regular microcredit programmes: interest rates are relatively low, repayment is on more flexible terms, production loans can be used for consumption if so needed, no fixed savings or weekly meetings are stipulated, and loans are often combined with other benefits like skill training, provision of health services and facilitation of migration.

There are reasons why the regular microcredit programmes have not reached the ultra-poor, particularly those who are hard hit by seasonal

poverty. The ultra-poor are generally considered to be less creditworthy than the moderate poor because of their lower capacity to engage in income-generating self-employment. The commonly practiced weekly repayment schedule is at odds with seasonality of income and employment. The fact that many rural non-farm activities are also linked to the agricultural cycle often limits the ability of microcredit agencies to support new loans during lean seasons. Moreover, group-based lending works well when income variations are idiosyncratic so that group members assist each other through difficult times. But when seasonality is systematic, affecting everyone in a group, the ability of mutual insurance is severely curtailed, and the group as a whole has a greater incentive to collude on a strategy of default. The PRIME initiative therefore represents an experiment in designing microcredit programmes in a way so as to suit the needs of the hard-core poor who are vulnerable to seasonal poverty. This, of course, involves some subsidies, even if implicit—such as in terms of provision of loans at easier terms by PKSF to the microfinance institutions (MFIs) and probably also cross-subsisidisation by the MFIs themselves between PRIME and their regular microcredit programmes.

In terms of mobilization of the ultra-poor into microcredit, PRIME has been a success. Within less than two years since its initiation in 2006-07, some 62 percent of the poor households in the Rangpur region were found to participate in some form of microfinance. Of these, 29 percent were PRIME participants, while 33 percent participated in regular microfinance. These estimates are from the InM's follow-up survey of 2008-09 discussed earlier.[26] It is clear that the MFIs successfully outreached the ultra-poor in Rangpur under the PRIME initiative in parallel to their already existing regular microcredit programmes in the region. The experience so far is that the both types of programmes have also been successful in terms of almost as high a loan recovery rate (above 95 percent) as is found in other parts of the country. Furthermore, PRIME appears to be better designed compared to regular microcredit in reaching the ultra-poor households. For example, among the poor households, those who are relatively better endowed with land and non-land assets are found to be more likely to join regular microcredit rather than PRIME.[27]

How effective is PRIME in alleviating seasonal and chronic food deprivation? To estimate this programme impact, quasi-experimental models can be used on the basis of a set of panel data on the participant and non-participant households in the PRIME villages. The data come from a sub-sample of InM's baseline survey of 2006 and the above mentioned

follow-up survey of the same households conducted in 2008-09 (the details of the methodology and results are given in Appendix). The results suggest that PRIME reduces the probability of starvation during the *monga* season by 5.5 percent compared to a statistically insignificant impact of regular microfinance programmes. For the non-*monga* season as well, PRIME has a larger impact in reducing the probability of food deprivation generally (i.e., starvation and meal rationing combined) compared to regular microcredit - by 11 percent and 5.5 percent respectively.[28] These results do not however tell us much about the longer-term impacts of the two types of programmes in terms of asset accumulation and net worth of the households. It is possible that regular microfinance programmes have longer-term benefits through asset accumulation while PRIME alleviates more immediate and severe types of hardship like starvation.[29] These findings also suggest that microcredit programmes can be variously designed to reflect their two very different characteristics: a banking operation for the poor requiring financial viability, and a subsidised social safety-net type programme for the poor.

V. ADDRESSING STRUCTURAL CAUSES OF SEASONAL POVERTY: SOME CONCLUDING REMARKS

There are structural factors underlying both extreme poverty and its seasonality in ecologically vulnerable and economically depressed regions like Rangpur. Policy interventions such as social safety net programmes and specially designed microcredit programmes targeted to the ultra-poor are likely to have some beneficial impact; but in order to have a sustainable solution of the problem, such interventions need to be combined with policies addressing the underlying structural factors. It may be noted, however, that because of the broad classification and the subjective nature of food deprivation status used in this study, the estimated impact of the interventions may not convey the full extent of the benefits accrued to the households.
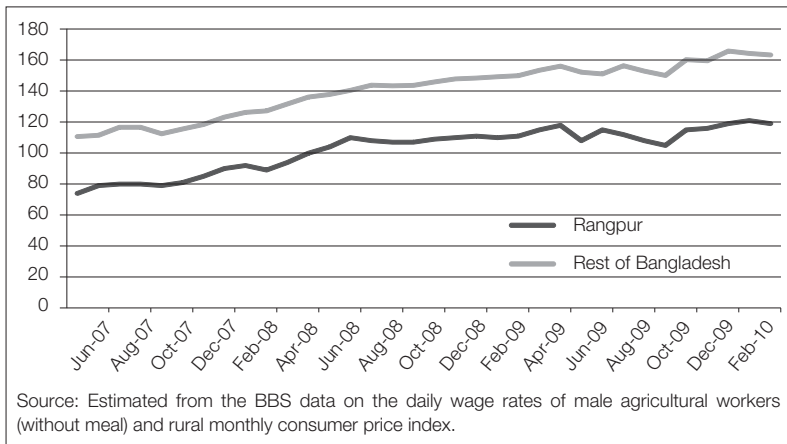
The regions like Rangpur typically have lower public investment in infrastructure, which in turn makes private investment in agriculture and in non-farm rural activities less attractive compared to better-endowed regions. According to data from Bangladesh's population census of 2000, the percent of rural households having electricity varied from 4 percent to 13 percent in the four districts of greater Rangpur, compared to the national average of 20 percent for rural households. Poor infrastructure inhibits the growth of non-farm activities thus accentuating the seasonality of income

and employment.[30] Improved infrastructure can also help through better integration of local agricultural and labour markets with those at the national levels. Over the years, there is likely to have been some improvement in this regard. This may be a factor that may explain why since 1974 seasonal hunger in Rangpur has never taken the proportions of famine in spite of occurrence of floods and crop damages of much more severe intensity than happened in that year.

Lack of agricultural and rural diversification due to both agro-ecological factors and poor infrastructure is a major reason behind the seasonality of poverty and hunger. According to the 2005 HIES data for rural households, not only per capita rural income was 30 percent lower in greater Rangpur compared to the national average, but also the share of farm income in total income was much higher and the seasonality of crop income was much more pronounced in Rangpur compared to the national estimates. The recent introduction of some new rice varieties and other dry-season crops, which are especially suitable for the region, indicates that agricultural research and extension have an important role to play in addressing the problem.

The agricultural wage rates in Rangpur have remained consistently much lower compared to the rest of the country (Figure 3). However, in both cases there has been an upward trend suggesting both an improvement in

Figure 3
Monthly Average of Agricultural Daily Wage Rates: Rangpur vs Rest of Bangladesh; June 2007 - March 2010 (Deflated by Rural CPI; 1995-96 = 100)

Source: Estimated from the BBS data on the daily wage rates of male agricultural workers (without meal) and rural monthly consumer price index.

the agricultural labour market situation and some degree of spatial integration of the labour markets across Rangpur and the rest of the country. Moreover, the real wages seem to have withstood remarkably well the impact of the recent food price hikes.

The people in the Rangpur region are not only vulnerable to river erosion and floods, but also a significant proportion (about 15 percent) live in the ecologically vulnerable *char* areas consisting of land emerged from rivers including tiny island-like land fragments. While land scarcity compels people to live in such areas, there is poor land administration with illegal land grabbing that curtails the land rights of the poor. Enforcement of an equitable land policy can have a major impact on the livelihoods of the poor in this region.

The good news is that, with the recent attention focused on the problem of *monga* in Rangpur, the situation seems to have been improving. Compared to the InM baseline survey of 2006, the follow-up survey of 2008-09 showed that the incidence of starvation during the *monga* season among the sample households (representing the poorest 60 percent of the entire population of the region) declined from 51 percent to 45 percent. Preliminary results from a second follow-up survey carried out during January-March of 2010 shows a much larger decline in *monga*-season starvation to 28 percent. This decline has been, however, accompanied by a rise in the incidence of meal rationing, which is to be expected as people move to a lesser degree of food deprivation. These improvements are all the more remarkable given the fact that the country was severely affected by the food crisis of 2008.

The bad news is that some other parts of the country in the south-western coastal regions, which are already economically relatively backward, are now facing the threat to livelihoods because of environmental degradation and climate change. Increasing intrusion of saline water and more unpredictable weather conditions are adversely affecting farmers and fishermen. The resulting pattern of poverty may be different from that of Rangpur and may call for different types of policy interventions; but there still will be lessons to be drawn from the experience of Rangpur.

Appendix

Estimation of the Impact of Regular Microcredit and Microcredit for the Ultra-Poor under PRIME

The estimates are based on panel data on a sample of households who were randomly selected from InM's baseline survey of 2006 for a follow-up survey during December-February of 2008-09. The results therefore reflect impact assessment after about two years of the introduction of PRIME. The sample households belong to the villages where PRIME was implemented and can be distinguished as participants in PRIME, participants in regular microcredit, and non-participants. The availability of season-specific panel data helps to resolve two common sources of bias in impact assessment, namely unobserved household- and village-specific heterogeneity and common seasonal affects on the outcome variable and programme participation. For this, we use a fixed-effect method combined with propensity score matching (PSM). With the panel data available, we write the outcome equation as follows:

$$y_{ijst} = \alpha + x_{ijt}\,\beta + p_{ijt}\,\gamma + \mu_{ij} + \eta_j + \mu_s + \xi_{ijst}\,, \qquad (1)$$

where y represents measures of starvation, x represents a vector of household and community characteristics affecting outcomes, p measures the programme participation status, t is year, and μ_{ij}, η_j, and μ_s measure unobserved household, village, and season-specific fixed characteristics.

For the two-year period, if we take the difference of the above equation from the 2nd to 1st period, we eliminate the unobserved time-invarying household, village, and seasonal common fixed-effects (latent heterogeneity); that is,

$$\Delta y_{ijs} = \Delta x_{ij}\,\beta + \Delta p_{ij}\,\gamma + \Delta \xi_{ijs} \qquad (2)$$

For cleaning out the initial heterogeneity prior to doing the above differencing, we apply propensity score matching (PSM), which is a method of choice for selecting the comparison group in panel data studies. Following Hirano, Imbens and Ridder (2003), a weighted least squares regression model that weights non-participants according to their

propensity score can yield a fully efficient estimator in the following regression:

$$\Delta y_{ijs} = \Delta x_{ij}\beta + \gamma T + \Delta \xi_{ijs},$$ (3)

where T = treatment status. The weights to be used in the above regression are 1 for treated households and $p/(1-p)$ for control observations, where p is the estimated p-score using the PSM method in the pre-programme baseline data. The results are presented in Table A1.

Table A1
Programme Impacts Using P-Weighted Fixed-Effect Propensity Score Matching Method

Outcome variable (meal consumption status)		
	PRIME	Regular microfinance
Starvation during *monga*	-0.055***	0.039
Starvation or meal rationing during *monga*	-0.002	-0.008***
Starvation during non-*monga*	-0.009	-0.005
Starvation or meal rationing during non-*monga*	-0.111***	-0.055**
Observations (no.)	4517	

Source: Khandker and Mahmud (2010).

Notes

[1] For some early studies on the subject, see, for example, Schofield (1977), Kurien (1976), and Chambers, Longhurst and Pacey (1981).

[2] All the major food crops, namely, rice, wheat and maize, are seasonal. This is a reason why crop failures due to drought or flood can create famine-like situations in many parts of the world with sky rocketing food prices just like what was witnessed in 2008.

[3] See, for example, Rosenzweig (1988), Rosenzweig and Wolpin (1993) and Chaudhuri and Paxson (2001).

[4] In fact, the cash flow management of small subsistence farmers may be such that they are often forced to sell their produces at bottom prices during harvest and buy foods later at high prices when they do not have enough income. Farmers are thus deprived form entitlement to the food they produce.

[5] This should be distinguished from seasonality in food consumption that may arise out of preferences related to relative changes in food prices, labour effort and energy requirements, and seasonal choice of food. For instance, Paxson's (1993) findings suggest that in rural Thailand the observed seasonality in consumption patterns results from seasonal variation in prices or preferences, which are common to all households, rather than from an inability of poor households to use savings or borrowings to smooth consumption.

[6] For example, Dostie, Haggblade, and Randriamamony (2002) find that the most promising way to reduce the severity of seasonal hunger in a country such as Madagascar is to increase agricultural productivity of the secondary food crops such as cassava, and other roots and tubers. The problem is however a low yield per hectare with the production of cassava and similar root crops compared to wheat or maize.

[7] In Bangladesh, about 60 percent of total rice production now comes from irrigated dry-season rice; but in India, rain-fed rice production is still dominant.

[8] Much of rice cultivation in South Asia depends on the monsoon rains so that the pre-harvest lean season, which is usually the late rainy season, is not suitable for earthwork for building infrastructure.

[9] The index is prepared by IFPRI in collaboration with two other organizations; for the rankings for 2010 for selected countries, see *The Economist*, October 16, 2010, p. 97.

[10] On these issues, Ahmed, Haggblade and Chowdhury (2000).

[11] Rangpur was one of the old 17 districts and now comprises of 4 administrative districts.

[12] Food consumption is calculated from the HIES data using consumption figures reported during the week or month preceding the interview, and since households interviewed were distributed over a year, seasonality can be captured even if the same households were not interviewed over the year.

[13] This implies that even if the entire household expenditure is on food, this will only meet the minimum food needs, let alone the needs of non-food consumption.

[14] The poor households were identified as those satisfying at least one of the following criteria: having less than 50 decimals of land, having a monthly income of Taka 1500 or less, or selling labour for daily wage. However, it turned out that the landownership criterion alone could qualify about 98 percent of the households to be classified as poor; see InM (2009).

[15] About half of the informal loans are from relatives, friends, and neighbors; the rest consist of loans from traditional moneylenders, landlords, shopkeepers, employers, and input suppliers.

[16] On the other hand, some households adopted multiple coping measures.

[17] This result comes from a multinomial logit model showing how various household and area characteristics effect household decision-making regarding the option of alternative coping methods against the situation of not coping; see Khandker and Mahmud (2010).

[18] For this, an endogenous switching regression method as proposed by Maddala (1983) is used to control for the endogeneity of the decision to migrate. Unlike the two-stage instrumental variable model which would have allowed us to directly estimate the impacts of migration on the household welfare outcome, a switching regression model can estimate both actual and potential benefits from migration for migrating and non-migrating households, respectively; for details, see Khandker and Mahmud (2010)

[19] For an IFPRI study on this, see Ahmed (2009).

[20] These results are estimated by using a probit model to explain inclusion in the programmes in terms of various household and community characteristics, Khandker and Mahmud (2010).

[21] Again, an endogenous switching regression model as proposed by Maddala (1983) is used to control for the selection bias in programme participation and to derive both actual and potential benefits for participant and non-participant households, respectively; for details, see Khandker and Mahmud (2010).

[22] The higher benefits for the participants suggest that the programmes are well-targeted despite their inadequate coverage.

[23] It may be remembered that the survey households constituted about 60 percent of all households of the Rangpur region.

[24] The number of borrowers in the microcredit programmes in Bangladesh is currently estimated to be about 20 millions, after adjusting for nearly one-third of them taking loans from multiple sources. This would mean that nearly two-thirds of all households in the country are covered by these porgrammes and that the coverage would be even higher for rural areas.

[25] PKSF is an apex institution that channels funds from the government and foreign donors to its partner non-governmental organizations engaged in microfinance.

[26] These estimates are from the InM's follow-up survey of 2008-09 discussed earlier.

[27] Using the cross-section data from the InM follow up survey of 2008-09, a maximum-likelihood multinomial logit (MNL) model was estimated to see how household and community characteristics   determined participation in PRIME and in regular microfinance; see Khandker and Mahmud (2010).

[28] Similar favourable outcomes are also found in the case of other multi-dimensional microcredit programmes specially targeted to the ultra-poor, although those programmes were not particularly aimed at mitigating seasonal poverty; see Matin and Hulme (2003); Emran, Robano and Smith (2009).

[29] We re-ran the same regression with two types of microcredit memberships - those started before PRIME and those after PRIME (that is, after 2006). We find that longer exposure to regular microfinance have higher impact on meal rationing than the shorter ones, thus confirming our assumption.

[30] Based on the HIES data, Khandker and Mahmud (2010) estimate an econometric model showing how the interactions of agro-ecological and infrastructure-related variables accentuates poverty and its seasonality in Rangpur compared to other regions in the country.

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