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Seasonal Poverty and the COVID-19 Pandemic

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ABSTRACT

Seasonal Poverty and the COVID-19 Pandemic

Poor populations in low-income countries are likely to suffer the worst of the economic fallout from the COVID-19 crisis. 75% of the world's poor reside in rural agrarian areas where livelihoods fluctuate with the seasonal crop cycle. We investigate how seasonality mediates economic impacts of the crisis by constructing panel data to track rural Bangladeshi and Nepali households before and after the onset of the pandemic. We report how economic need may diverge from local infection risk in three key ways. First, current declines in employment and food security foreshadow even greater deprivation during the traditional agricultural lean season. Second, distress during harvest periods displaces agricultural and labor investment and will depress future earnings capacity. Third, nutritional and mental health deficits induced by the crisis can hinder economic decision-making and child development over the long term. Our findings inform how to target resources to facilitate economic recovery in rural areas.

JEL Classification:
I15, Q12, O13, H12

Keywords:
COVID-19, seasonality, agriculture, nutrition, health, South Asia

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1 Introduction

The economic fallout from the COVID-19 pandemic has been felt around the world. Instability caused by the disease itself coupled with lockdown policies to contain its spread have led to universal declines in economic activity. The impacts fall especially hard on poor populations that live close to subsistence and lack the resources to insure against economic hardship (Egger et al., 2020). With an estimated three quarters of the world's poor living in rural areas (Ravallion et al., 2007), it is imperative to understand how the effects of the pandemic interact with rural economies when interpreting data and designing policy around COVID-19.

Seasonality has long been recognized as a salient feature of economic life in rural communities. More than a century ago Hill (1884) noted that deaths in India fell during peak agricultural months, and this pattern has persisted over the years (e.g. Becker, 1981; Becker and Weng, 1998). Still today, many countries in Sub-Saharan Africa and South and Southeast Asia suffer from pre-harvest "hungry" seasons of food deprivation among the rural poor, followed by post-harvest periods where agrarian production funds investment in the future (see Vaitla et al., 2009; Taylor and Charlton, 2018). In this paper we explore how this predictable cycle mediates the pandemic's economic effects and present evidence on ways in which the timing of economic need in rural communities may diverge from their health exposure.

Distress during the agricultural lean season stems from a combination of high prices and little income. The period immediately before harvest is the time of year when local food stocks are lowest, and the restricted supply drives up prices in isolated regions. At the same time, limited agricultural labor demand keeps wages low. These two factors create a predictable, widespread decline in real income that many poor households are unable to insure against (Sen, 1981; Khandker and Mahmud, 2012; Gilbert et al., 2017). The COVID-19 pandemic replicates these conditions by segmenting markets, barring supply of traded goods, and by dampening labor demand through the global recession. Thus, the current

crisis has the potential to depress harvest earnings and exacerbate lean season deprivation.

The pandemic places particular strain on rural communities relative to other economic crises because migration restrictions are fundamental to disease containment. Rural households commonly turn to short-term labor migration as a method of self-insurance, especially in the face of community-wide shocks (Bryan et al., 2014; Rosenzweig and Udry, 2014; Morten, 2019; Barker et al., 2020). Without this option, vulnerable populations lose an important tool to deal with economic distress.

In this article, we investigate how the COVID-19 pandemic interacts with the agricultural cycle in rural communities in Nepal and Bangladesh. We combine new phone survey data from 90 villages in Nepal and 79 villages in Bangladesh collected in April through June 2020, immediately after the pandemic reached the region, with existing survey data from prior years to construct a household panel. This panel, covering 2,023 households in Nepal and 294 households in Bangladesh, spans both lean and harvest seasons in prior years and allows us to compare conditions during the COVID-19 lockdown with the typical seasonal pattern.

Even though COVID-19 reached our regions of study around a harvest season, we find economic wellbeing during the pandemic to be far worse than is typical. Employment and earnings both fall to below their regular lean season levels, resulting in a fourfold increase in household food insecurity. Food insecurity in the April and May 2020 harvest period reaches levels near the usual lean season peak. If the global economic slowdown persists through the traditional lean season, we anticipate that economic wellbeing will deteriorate even further than has already been documented.

Economic distress during a harvest period can have long-term consequences because of household financial constraints. Our populations of study were previously selected for participation in seasonal loan programs, where high takeup rates reflect seasonal liquidity shortages (see Mobarak and Vernot, 2020; Bryan et al., 2019). Seasonality in household finances, common to rural populations around the world, leads households to time their pro-

ductive investments around agricultural harvests (e.g. Fink and Masiye, 2020; Dillon, 2020). Economic distress during a harvest period can force households to forego such investment, depressing their expected future earnings even after the pandemic itself abates. Such investments take the form of buying agricultural inputs (e.g. fertilizer) for the next crop cycle, or migrating to cities seasonally and use the remittance income to mitigate the deprivations expected during the following pre-harvest lean season.

We report direct evidence of decreased labor migration during the COVID period, which forces households to forego future remittance income. In both study samples, migration rates during the pandemic are well below normal. While limiting migration is beneficial to public health during a pandemic, these lost opportunities will extend the economic distress of the COVID crisis by limiting a critical tool that rural Nepalis and Bangladeshis normally use to address seasonal deprivation (Khandker and Mahmud, 2012).

We also observe declines in nutrition and mental health associated with COVID-19, both of which can adversely affect long-term economic potential. It is already documented that childhood nutrition in our regions of study suffers during the agricultural lean season (e.g. Tetens et al., 2003; Hillbruner and Egan, 2008; Khandker, 2012). As the pandemic causes food shortages to persist into the harvest period, continued undernourishment of children can affect long-run physical and cognitive development (see Nandi et al., 2017; McGovern et al., 2017).

Moreover, we find evidence of mental health distress during the pandemic period. The prevalence of stress, depression, and irregular sleep in April and May 2020 exceeds any prior period including the 2019 lean season. These three indicators have been linked to economic decision-making with long-term consequences (see Ridley et al., 2020).

Together, our results indicate that the timing of economic distress may not coincide with disease prevalence for much of the world's most vulnerable population. To develop a comprehensive understanding of the full range of short and long-term economic effects of the COVID crisis on poor populations, we must grapple with possible interaction effects between

this public health shock and seasonality. We use panel datasets to track rural households before and after the onset of the crisis to understand these interactions. We learn that in agricultural regions, the global economic slowdown caused by COVID-19 can exacerbate deprivation when it overlaps with the lean season and can displace productive capacity at other times of year. This loss of productive capacity may depress economic activity well after the risk of illness is controlled, perpetuating cycles of poverty. Therefore, our findings are important for policymakers trying to balance disease containment, short-term economic well-being, and long-term economic recovery.

Our research relates to a a large body of work on seasonality and economic wellbeing. Seasonal poverty is observed in a number of contexts around the world. Researchers document substantial increases in poverty during the lean season in Burkina Faso (Gross et al., 2020), Ethiopia (Dercon and Krishnan, 2000), Kenya (Aggarwal et al., 2018), Madagascar (Dostie et al., 2002), Malawi (Ellis and Manda, 2012), Mali (Smale et al., 2019), Tanzania (Kaminski et al., 2016), Zambia Kumar (1988), Nicaragua (Macours and Vakis, 2010), Bangladesh (Khandker, 2012), India (Chaudhuri and Paxson, 2002), Indonesia (Basu and Wong, 2015), Thailand (Paxson, 1993), and inland China (Jalan and Ravallion, 2001), among others. The local name for the period before harvest roughly translates to "hunger" or "famine" season in many parts of the world including Malawi (Brune et al., 2011), Kenya, Nigeria, and Sudan (Swift, 1989), Bangladesh (Khandker, 2012), and Indonesia (Basu and Wong, 2015). In settings where agricultural seasonality is prevalent, negative economic shocks at harvest time are especially damaging to long-term economic prospects (e.g. Dercon and Christiaensen, 2011; Bellemare et al., 2013; Bacon et al., 2017; Guido et al., 2020; Pritchard et al., 2020).

In Section 2 of this article we describe the data and methodolgy used for analysis. Section 3 presents our main findings, and we conclude with a discussion of policy implications in Section 4.

2 Data and Methodology

We combine existing data from prior studies involving rural populations in Nepal and Bangladesh with new phone survey data collected shortly after the onset of COVID-19 in the region to construct household panels. Panel data allows us to make within-household comparisons of outcomes during the COVID-19 period to comparable parts of the seasonal cycle in prior years.

2.1 Data from Nepal

Data from Nepal come from surveys among poor households in rural villages in the districts of Kailali and Kanchanpur in the Western Terai (plains) region. This sample resides in villages where we conducted a field experiment in partnership with the Nepali NGO *Backward Society Education* (BASE) that provided micro-loans during the pre-harvest lean season in summer 2019. Within each village, a group of community leaders were asked to assess household wealth, after which we randomly selected households from the bottom two thirds of the wealth distribution for survey participation.

Between July 2019 and June 2020, we collected seven rounds of survey data from our study sample. Initial baseline surveys were conducted in-person in July 2019, followed by five rounds of phone surveys from August 2019-January 2020 and a sixth round of phone surveys conducted in April through June of 2020. This final survey round immediately followed the beginning of the COVID-19 pandemic in Nepal.

Prior to the pandemic, phone surveys collected data on labor and wage income, food security, subjective wellbeing, migration and remittances, agricultural decisions, and output. The final survey round substituted detailed health questions for the module on agricultural decisions, and randomized between the food security and subjective wellbeing modules to shorten survey length. Timing of the surveys relative to the country's harvest cycle allows for meaningful comparisons in outcomes before and after the pandemic outbreak.

The initial sampling frame consists of 15 sub-districts from which we randomly selected 33 of the 73 rural wards for study. In these wards we randomly chose 97 villages from the set of 227 villages, but seven of these villages were dropped from the study due to flooding at the time of baseline data collection, leaving a sample of 90 villages.The final sample consists of roughly thirty households per village, leading to a sample of 2,636 households. Of these, we were able to reach 2,023 in the post-COVID survey round.

2.2 Data from Bangladesh

Data from Bangladesh come from surveys among landless households in rural villages in the Rangpur division in the northern part of the country. This sample resides in an area where we conducted a randomized evaluation of a seasonal migration loan program in partnership with RDRS, a local microfinance organization, in 2017 and 2018. Households were deemed eligible for program and survey participation if they owned less then a half acre of land. In this article we report only data from households in the control arm of the evaluation.

We collected two rounds of survey data in person person in January and July 2019. We then followed up among a subset of households with a third round of phone surveys in May 2020, shortly after the beginning of the COVID-19 pandemic in Bangladesh.

In-person surveys collected detailed retrospective information on food security and migration history, which we use for comparison to the post-COVID economic situation. While data on other outcomes exist, the timing of the 2020 survey relative to the 2019 rounds makes direct comparison difficult because of the seasonal agricultural cycle.

The initial sampling frame for in-person surveys consists of villages in the catchment area of 100 RDRS branches participating in the study. One untreated village from each branch was randomly selected for surveying, making up the data used in this article. In each sample village, roughly twenty eligible households were identified via random walk sampling for survey. This strategy generated a sample of 1,891 households in the initial sample.

For the post-COVID phone survey, we randomly selected a subset of sample households

to contact by phone, stratified by both treatment status and migration history. Among the untreated sample, we contacted 388 households out of which 294 were reached and consented to participate in the follow-up survey.

2.3 Earnings and Seasonality

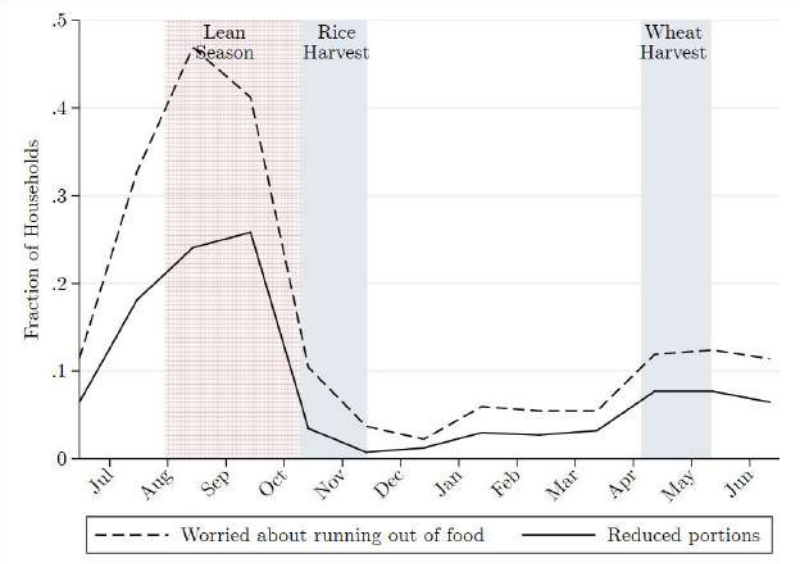
Agriculture and short-term migration both feature prominently in the economic livelihoods of the populations of study. In the sample from Nepal, 86% of households surveyed cultivate rice and 75% had a circular labor migrant that returned home at least once in the eight months of survey data. In Northern Bangladesh, 75% of households surveyed participate in agriculture on owned or rented land, and 47% had a regular household member that migrated for part of the year in 2018. These two activities are highly seasonal as the returns to agriculture are concentrated at harvest and migration is more attractive at times of year when local labor returns are low.

More broadly, both study populations live in rural communities where economic activity is closely tied to the seasonal agricultural cycle. Local employment and earnings fluctuate according to agricultural labor demand, which peaks during times of plating and harvest. Local food prices follow a countercyclical seasonal pattern according to food availability, which reaches its maximum at harvest. These two patterns combine to place the most stress on households immediately before crop harvest when both food stores and labor demand are low.

Households in our study have low wealth, and therefore limited ability to self-insure against this seasonal cycle. In figure 1 we plot the monthly rate of food insecurity in both samples prior to the pandemic outbreak base don retrospective self-reports. As Panel A shows, food insecurity in Nepal peaks in the months of August, September, and October, shortly before the November rice harvest. The seasonal cycle is slightly delayed in Northern Bangladesh, shown in Panel B, where food insecurity peaks in the two months before the December rice harvest with a smaller spike just before the secondary harvest in April.

Seasonality in Food Security in Western Terai of Nepal and Northern Bangladesh

A. Share of Food Insecure Households in Western Nepal



B. Share of Households Reducing Portion Sizes in Northern Bangladesh

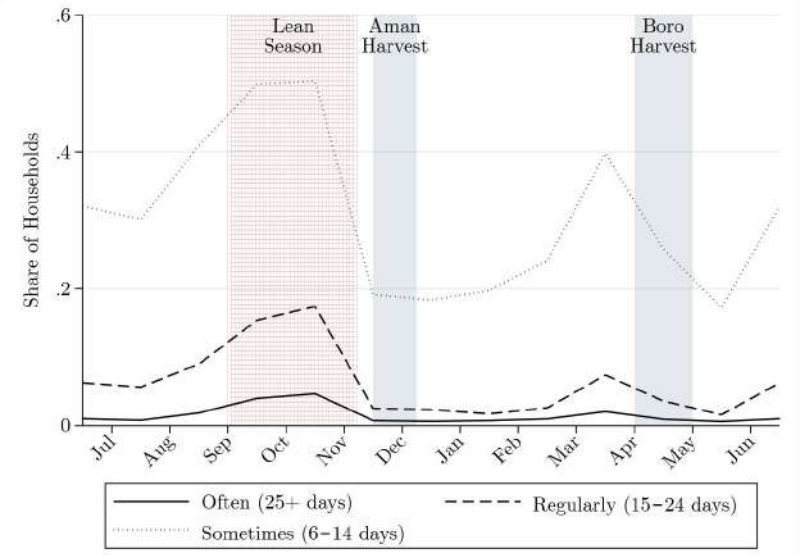


Figure 1: Rates of food insecurity around the seasonal agricultural cycle in a typical year. A. Data collected during the sixth phone survey round asking about a typical year. B. Data collected during the two in-person survey rounds asking retrospectively by month.

2.4 Methodology

In this article we compare the economic wellbeing of households surveyed during the COVID-19 pandemic to what we would expect in a typical agricultural cycle. Data collection during

the pandemic took place in April and May, coinciding with the secondary harvest in both areas of study. When possible, we compare 2020 outcomes to their levels in 2018 and 2019, which represent typical years to the best of our knowledge. Where we lack data that far back, we instead compare the 2020 secondary harvest period to the 2019 or 2018 primary harvest.

All results are generated by fixed effect regressions of the form

$$Y_{it} = \alpha_t + \delta_i + \epsilon_{it} \tag{1}$$

where i indexes households or individuals and t indexes survey rounds or months. We report the trend in a given outcome Y as a series of period (α) fixed effects, with the comparison of interest being the difference between pre-COVID and post-COVID periods. We address issues of panel imbalance by including unit fixed effects (δ) so that all comparisons are made within household or individual across time. Standard errors are clustered at the household level with 95% confidence intervals depicted graphically, and all results are robust to limiting to a balanced panel subsample.

3 Results

Overall, we observe declines in economic activity and food security in both samples following the pandemic outbreak. Even though COVID-19 reached South Asia around a harvest period, employment and household earnings in April and May are below their typical lean season levels, and well below that of the prior harvest season. As a result of this economic distress, food insecurity is nearly four times more prevalent than is typical for this time of year, and more closely resembles the traditional lean season peak. These already dire conditions may deteriorate further if the economic slowdown persists into the traditional lean season.

The economic fallout from COVID-19 may persist beyond the outbreak itself due to

foregone investment and long-term adverse health impacts. Our two populations of study were selected specifically because they face seasonal financial constraints, so economic distress during a typical period of liquidity may force them to forego productive investment. We report a direct antecedent of persistence in the form of decreased labor migration, which will lead to a loss of future remittance income. Moreover, food insecurity can hinder long-term child development. Accompanying the physical health impacts, we find evidence of mental health distress that has also been shows to perpetuate poverty.

3.1 Economic Activity

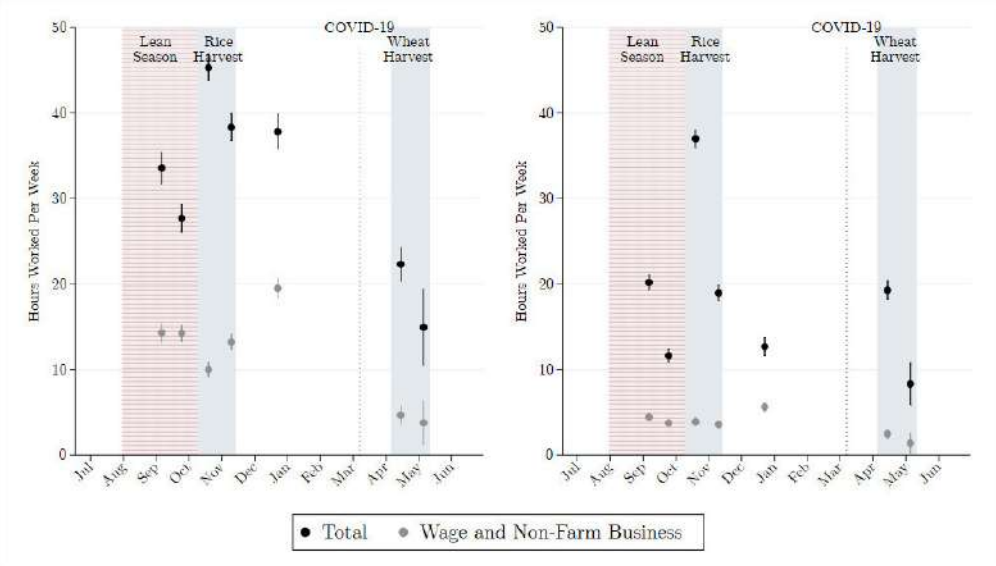
Economic activity after the pandemic, during and immediately following the 2020 secondary harvest, is well below its 2019 primary harvest level. Figure 2 plots economic activity by survey round in Nepal. Hours worked, shown in Panel A, are lower in April and May 2020 than in any other survey period, especially for men who typically work outside the household. This decline comes from significant decreases in both non-farm work, including family-owned businesses, as well as farm work, including family agriculture. Non-farm hours drop to below half of any prior period, and hours worked in agriculture also decline relative to the prior harvest season. The change in hours worked is indicative of a depressed local economy with limited capacity to substitute toward home production.

This decline in hours worked corresponds with lower household earnings during the pandemic, depicted in Panel B. Household non-farm income is significantly lower during the pandemic than in any other prior survey round, and 67% lower during the 2020 wheat harvest when compared to the 2019 rice harvest[1]. The cause of this decline spreads beyond the local economy as household remittances are similarly 64% lower than their prior harvest level. Migration and remittance income frequently serve as insurance mechanisms in response to local economic hardship, but in this case the global nature of the pandemic makes

[1]Farm income is difficult to quantify because a large fraction of production is devoted to home consumption, and local prices are not well measured. However, wheat planting decisions were made prior to the outbreak of COVID-19 so there is limited capacity to replace lost non-farm income with home production

Economic Activity in Western Terai of Nepal

A. Hours Worked by Survey Round and Gender



B. Household Earnings by Survey Round

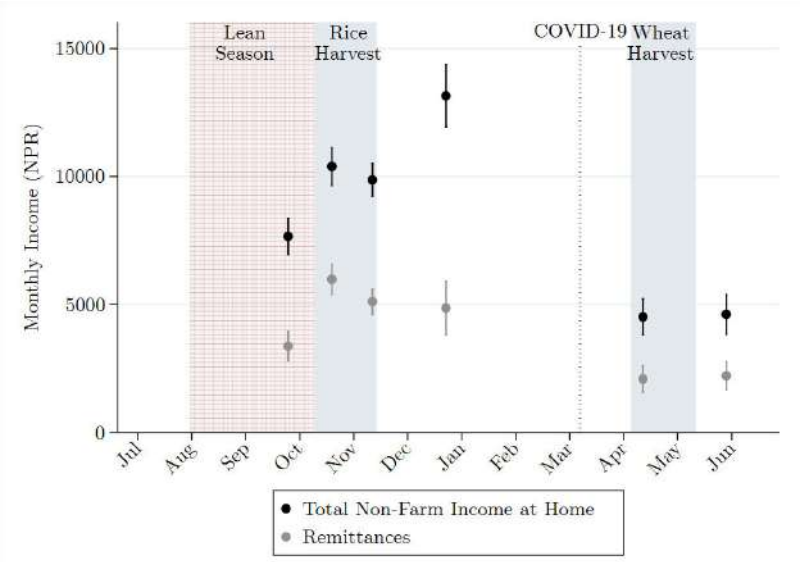


Figure 2: Hours worked and household earnings in Western Terai, Nepal. Averages net of household fixed effects with 95% confidence intervals. A. Male adults in left panel, female adults in right panel. B. Total household non-farm earnings.

this channel of household stabilization unavailable.

We observe a similar pattern in Northern Bangladesh when comparing the post Boro harvest period in May 2020 to the post Aman harvest period in January 2019. The fraction

of households in which at least one member was employed for at least one day in the week prior to survey drops from 97% in the earlier survey to 47% during the COVID-19 period. Reported earnings also fall by 45% on average, with 30% of households reporting no income from any source including remittances and outside assistance in the prior week.

Data on household food security confirms that these shocks to earnings represent real economic distress. If these shocks were transitory or represented temporal displacement of earnings, then we would expect to see households adjust resources to smooth consumption through the pandemic period. Instead, as we show in figure 3, food insecurity is significantly above its typical post-harvest level. The two panels represent food insecurity in the Nepal and Bangladesh samples, respectively. The trend line in each represents prior years, while the plotted points represent survey responses in 2019 and 2020. In both samples, food insecurity follows the trend almost exactly until March 2020, when COVID-19 reached this region, after which it spikes up by more than 20 percentage points above trend in Nepal and nearly 15 percentage points above trend in Bangladesh.

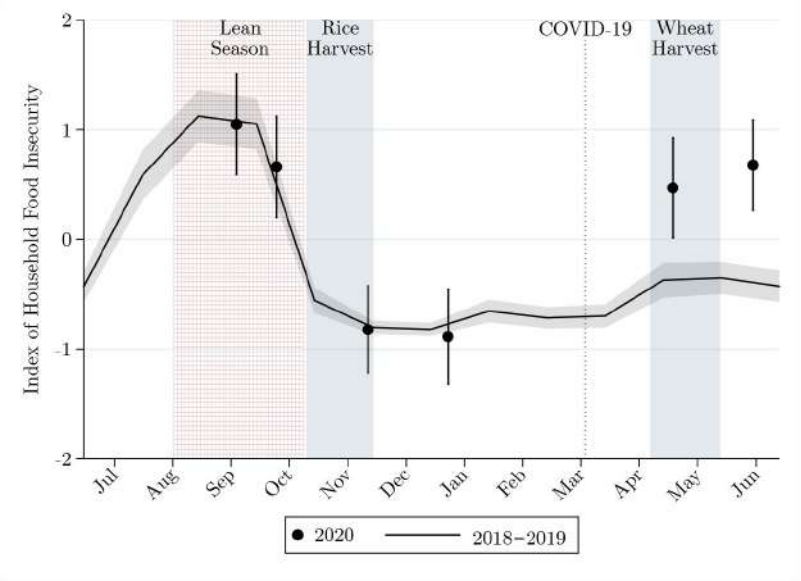
These results are distressing precisely because the pandemic arrived in these regions during a post-harvest period. The economic activity we observe in both samples is more comparable to a lean season than to harvest at a time when households are usually under the least economic distress. As these economies approach their typical lean season months, we can expect conditions for rural households to deteriorate even further if the economic slowdown caused by the pandemic continues.

3.2 Channels of Persistence

Our findings on food security suggest how the economic fallout from COVID-19 may persist beyond the presence of the disease itself. Most directly, long-term investment can decline when households are economically distressed. The regular seasonal pattern of food insecurity shows that even in normal times, many rural households are financially constrained to the point they cannot smooth resources over regular, predictable income fluctuations. Instead,

Food Insecurity in Western Terai of Nepal and Northern Bangladesh

A. Monthly Food Insecurity in Western Terai, Nepal



B. Monthly Food Insecurity in Northern Bangladesh

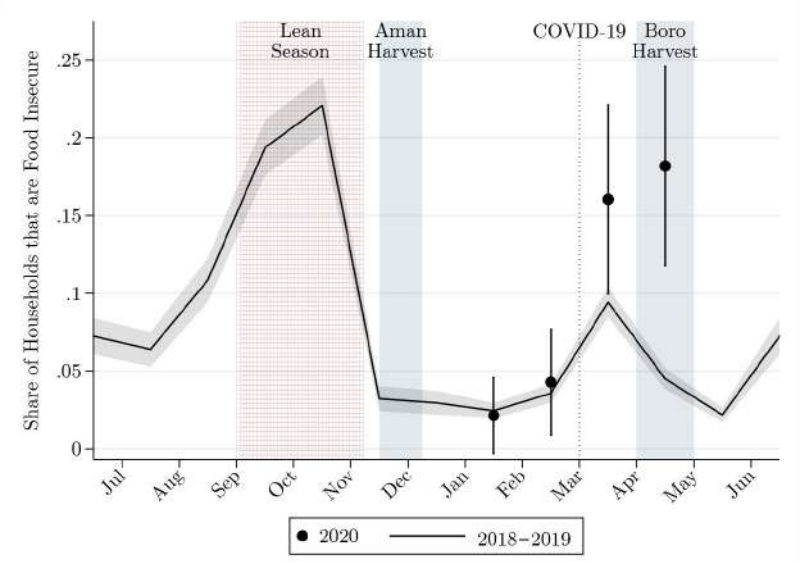


Figure 3: Rates of food insecurity around the seasonal agricultural cycle in a typical year. Averages net of household fixed effects with 95% confidence intervals. A. Typical year data collected during the sixth phone survey round asking about a typical month. 2019–2020 data collected during contemporaneous phone survey rounds. B. Food insecurity indicates reducing portions for at least 15 days in a month. 2018–2019 data collected during the two in-person survey rounds asking retrospectively by month. 2020 data collected in phone survey asking retrospectively by month.

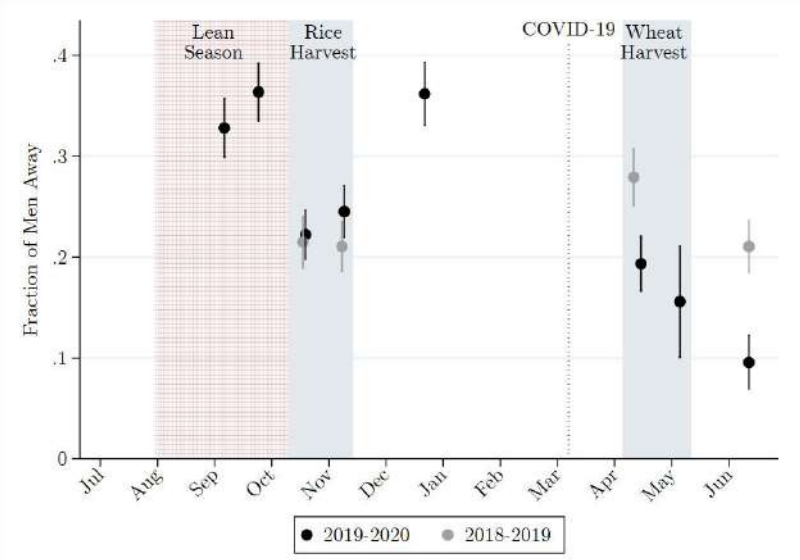
productive investment is typically concentrated in post-harvest periods when resources are available (Fink and Masiye, 2020; Dillon, 2020). The level of economic distress during the current harvest season may presage foregone investment that dampens productivity into the future.

We directly observe lower productive labor market investment in the form of depressed rates of migration. Labor migration can be considered an investment where workers must pay up front transportation costs to reap future earnings returns (e.g. Bryan et al., 2014). We show in figure 4 that migration is below its expected level in both study samples. Panel A plots the fraction of households in Nepal with a male worker away in each round of survey. Prior to COVID-19, the migration rate during the 2019 rice harvest was roughly 25%, similar to the 2018 rice harvest. By contrast, the rate during the 2020 wheat harvest fell to less than 20%, well below its 2019 counterpart, and continued to decline post-harvest to around one third its typical level. Panel B tells the same story in Northern Bangladesh. Between March 15 and May 15, 2020, 65% of households reported a returning migrant. By contrast, only 10% had a return migrant over this two-month period in 2019. The rate of return during the pandemic far exceeds the typical stock of outstanding short-term (under twelve months) migrants at this time of year, indicating that medium- to long-term migrants also left their place of work during this period. If migrants remain unable to travel int he latter part of the year when departures are typically high, then remittance income may fall even farther than anticipated.

This decline in migration foreshadows lost income in the future as would-be migrants are unable to earn and send remittances. Moreover, depressed migration may persist well after the pandemic as relationships with prior employers deteriorate. Short-term labor migration among poor rural populations is highly dependent on connections to employers (Lagakos et al., 2020). Therefore, even when transit returns to normal, migration may be slow to recover in these settings if the pandemic severs existing relationships. It is unclear whether the migration data reflect a broader trend in investment by households or migration is

Household Migration in Western Terai of Nepal and Northern Bangladesh

A. Temporary Migration in Western Terai, Nepal



B. Migration Departures and Returns in Northern Bangladesh

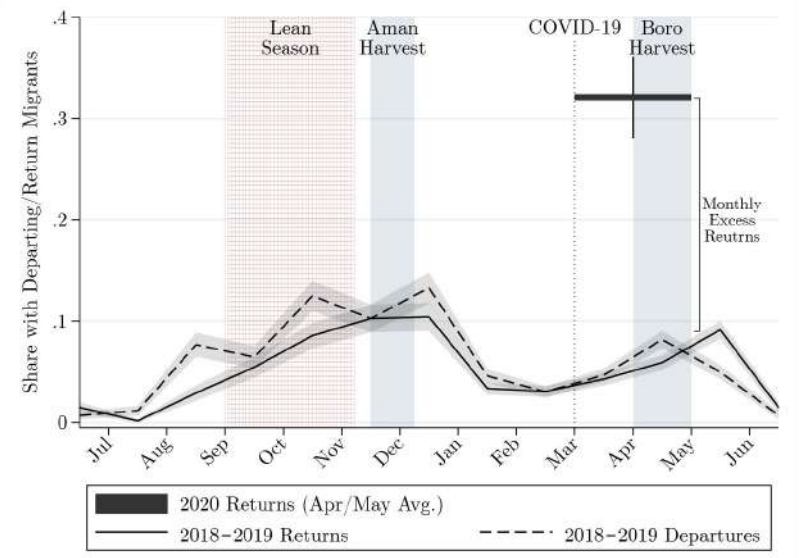


Figure 4: Rates of short term migration. Averages net of household fixed effects with 95% confidence intervals. A. Fraction of households with a male aged 18–65 currently away but considered a household member by survey round. B. Migration departures and returns by month. 2018–2019 data collected during the two in-person survey rounds asking retrospectively by migration episode. 2020 value represents the monthly average for the two months from March 15 to May 15, and the gap represents the monthly excess returns for each of two months.

particularly impacted due to the unique nature of a disease spread by interpersonal contact (see Barker et al., 2020). In either case, households currently unable to engage in labor migration can anticipate future decreases in income from lost remittances.

Health impacts generated by COVID-19 may also extend the persistence of economic shocks. In addition to physical ailments directly caused by the disease (e.g. Almond, 2006), poor nutrition can hinder child development with long-term repercussions. Food unavailability during the lean season regularly leads to measurable declines in energy intake for children in our area of study (Tetens et al., 2003; Khandker, 2012), so the fact that the current post-harvest level of food insecurity resembles a typical lean season raises the possibility that childhood undernutrition has similarly persisted past its normal duration. Nutrition throughout childhood has been linked to adult income and capacity (see Nandi et al., 2017; McGovern et al., 2017), so the economic shock caused by COVID-19 may be substantial enough to linger across generations.

The physical health impacts of the pandemic are accompanied by deterioration in mental health as well. In figure 5 we show how self-reported measures of mental health evolve across survey rounds in Nepal, each reported on a five point scale. Surveys focus on stress, depression, and irregular sleep, three indicators that have been linked to economic decision-making in ways that reinforce existing poverty (see Ridley et al., 2020). The fraction of the population reporting high stress, shown in Panel A, rises by 12 percentage points in May and June 2020 to nearly double its prior level. The fraction reporting high depression, Panel B, similarly doubles from 14–16 percent in prior surveys to 29 percent during the pandemic. The frequency of irregular sleep, Panel C, also rises with 15 percent of the population reporting irregular sleep in May and June.

In Panel D, we average the three indicators into a single index. There is a clear gap between the prior harvest and lean seasons, mostly driven by respondents moving from "Rarely" and "Never" to "Sometimes". The average decline in mental health is nearly twice as large in the April harvest season, post-COVID, when respondents are much more likely

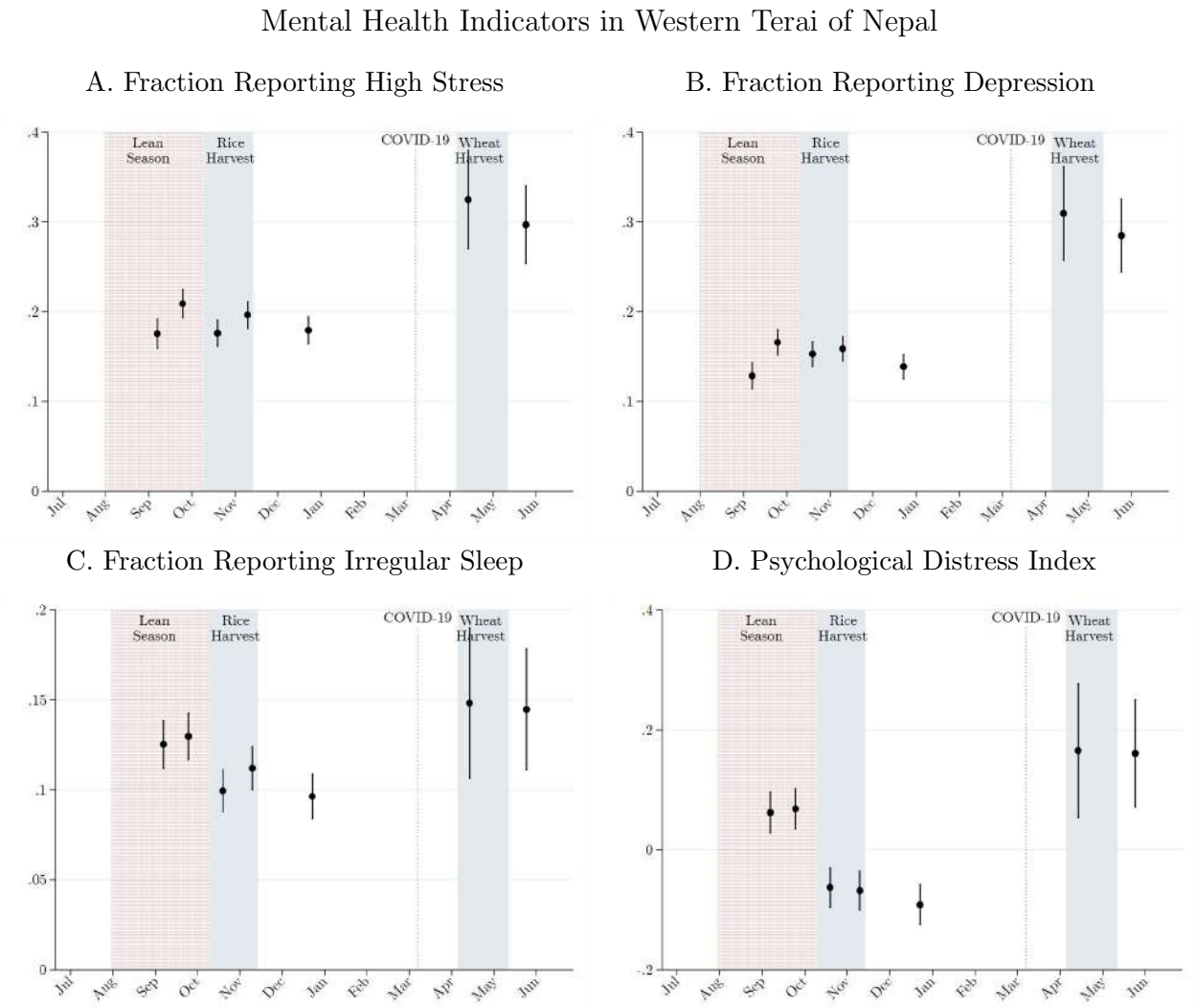


Figure 5: Means and 95% confidence intervals. A–C. Fraction reporting "Always" or "Often" as opposed to "Sometimes", "Rarely", or "Never" for stress, depression, and poor sleep. D. Average rating across all three indicators.

to report "Often" or "Always". The three indicators consistently indicate that deteriorating mental health may be an additional source of economic risk with lasting repercussions.

4 Discussion

COVID-19 remains an important public health threat that needs to be brought under control. Given the urgent need to balance contagion and mortality stemming from both the virus and economic deprivation, governments should pursue smart containment strategies that account

for regional variation in disease risk, economic activities that are critical for sustaining food security, and sectors the poor depend on for maintaining their livelihoods.

For the vast majority of the world's poor that live in rural areas, this final factor calls for careful consideration of how the seasonal agricultural cycle affects the local economy. In this article, we document among two rural populations in South Asia how economic stress follows a predictable cycle according to the timing of planting and harvest. We already observe evidence of severe economic slowdowns leading to lost earnings and food insecurity in these populations even though the pandemic arrived during a harvest period. As the lean season approaches, we anticipate conditions will deteriorate further, putting these communities in even greater economic distress. It is imperative for policymakers to interpret data on economic wellbeing and target resources to rural communities around the agricultural cycle.

Economic distress in these communities partly manifests in the form of food insecurity and declining mental health. Our findings point indicate that public health policy can supplement economic support to help households stabilize through the global economic crisis. Specifically, direct food aid can alleviate the nutritional deficits induced by loss of earnings and mental health services can help households manage the unanticipated economic shock. Many local organizations had already incorporated counseling into their other activities before the pandemic (e.g. BRAC, 2020), and should adapt these programs with safe social distancing to assist households in their areas of operation. Again, these actions will be most imperative at times of year when agricultural labor demand and output is low.

Our results highlight two channels of persistence that may decouple the timing of economic distress caused by COVID-19 from the virus itself. First, we report evidence of economic distress at a time of year typically associated with higher income. Households that normally rely on the cash flow from harvest periods to make agricultural and labor market investments may forego these investments, losing out on income in the future. We observe especially high declines in rates of labor migration, indicating that many households will miss out on future remittance earnings that compose a substantial fraction of total income.

Second, the nutrition and mental health costs of COVID-19 can further depress future income. Both factors are linked to economic capacity and decision-making, meaning households facing challenges now may see persistent losses in earnings. Nutrition in particular has long-term effects on child development meaning the severity of the pandemic may lead to economic fallout for generations to come. Even after the pandemic is brought under control, it will be important to direct resources to combat these persistent effects in order to make a full economic recovery from the crisis.

Overall, effect of the COVID-19 outbreak in rural communities is highly dependent on how the timing relates to the agricultural seasonal cycle. As harvest seasons vary around the world, so too will the economic impacts of the pandemic. As the crisis continues to unfold, it will be important for governments and other organizations to be sensitive to seasonality in determining how to allocate limited resources.

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