

Rana, Md. Soheli; Faye, Amy; Qaim, Martin

Article — Published Version

Temporary Migration Decisions and Effects on Household Income and Diets in Rural Bangladesh

Agricultural Economics

Provided in Cooperation with:

John Wiley & Sons

Suggested Citation: Rana, Md. Soheli; Faye, Amy; Qaim, Martin (2025) : Temporary Migration Decisions and Effects on Household Income and Diets in Rural Bangladesh, *Agricultural Economics*, ISSN 1574-0862, Wiley, Hoboken, NJ, Vol. 56, Iss. 5, pp. 769-781, <https://doi.org/10.1111/agec.70030>

This Version is available at:

<https://hdl.handle.net/10419/329811>

Standard-Nutzungsbedingungen:

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

Terms of use:

Documents in EconStor may be saved and copied for your personal and scholarly purposes.

You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.

If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.



<https://creativecommons.org/licenses/by/4.0/>

ORIGINAL ARTICLE OPEN ACCESS

Temporary Migration Decisions and Effects on Household Income and Diets in Rural Bangladesh

Md. Sohel Rana¹ | Amy Faye¹ | Matin Qaim^{1,2}¹Center for Development Research (ZEF), University of Bonn, Bonn, Germany | ²Institute for Food and Resource Economics, University of Bonn, Bonn, GermanyCorrespondence: Md. Sohel Rana (srana@uni-bonn.de)

Received: 23 March 2024 | Revised: 5 December 2024 | Accepted: 26 December 2024

Keywords: agricultural seasonality | Bangladesh | food security | nutrition | temporary migration

ABSTRACT

Temporary migration is a widely observed phenomenon among poor rural households, yet often overlooked by policy-makers and not captured well in standard household surveys. Although temporary migration is often related to agricultural seasonality, household preferences for temporary over longer-term migration, and the differential effects of these two types of migration on livelihoods, are not yet well understood. Here, we use survey data collected in northern Bangladesh to analyze determinants of households' choice between temporary and longer-term migration, and effects on various livelihood indicators. Issues of selection bias and endogeneity are addressed with instrumental variables. We show that temporary migration is more common than longer-term migration in poor agrarian societies, partly determined by socioeconomic and family demographic constraints. Although longer-term migration has larger positive effects on household income, temporary migration has larger positive effects on food consumption and dietary quality during lean periods. Our results suggest that temporary migration is an important strategy for poor rural households to cope with risks and therefore deserves more explicit attention in research and policy.

JEL Classification: J43, O15, Q18, R23

1 | Introduction

Severe labor market imperfections often induce migration among poor rural households in order to increase and diversify income, and mitigate risks (Mishra 2016; Murrugarra et al. 2011; Stark and Bloom 1985). Migration can be temporary, longer-term, or permanent. Temporary migration is a common phenomenon but is under-researched (Coffey et al. 2014; Keshri and Bhagat 2013; Khandker and Mahmud 2012; Lucas 2015; Sucharita 2020). In fact, temporary migration often remains “invisible” in poverty economics, as it is seldom properly accounted for in household surveys and censuses due to its transient nature. In this article, we analyze household-level determinants and effects of internal temporary migration with survey data specifically collected for this purpose and quantitative methods. In particular, we

examine household decisions for short-term temporary migration as opposed to longer-term migration, and compare effects on household income and dietary quality during agricultural lean periods. During these periods, many rural households experience income and nutrition shortfalls (Khandker et al. 2012; Zug 2006). Our study focuses on northern Bangladesh, a region with strong agricultural seasonality and recurring temporary migration (Khandker et al. 2012; Mobarak and Reimão 2020).

Existing studies on the determinants and effects of migration mostly focus on longer-term migration, which differs from temporary migration in many ways (Chen et al. 2019; Keshri and Bhagat 2013; Shahriar et al. 2006; Wang et al. 2021). For example, while neoclassical theories of migration predict that the rural poor would migrate to urban areas with higher mean

This is an open access article under the terms of the [Creative Commons Attribution](https://creativecommons.org/licenses/by/4.0/) License, which permits use, distribution and reproduction in any medium, provided the original work is properly cited.

© 2025 The Author(s). *Agricultural Economics* published by Wiley Periodicals LLC on behalf of International Association of Agricultural Economists.

wages, in Bangladesh, many temporary migrants migrate to other rural areas to work in agriculture (Meghir et al. 2022; Rana and Qaim 2024), although mean wages in urban areas are significantly higher (Lagakos et al. 2023). Furthermore, Lucas (2015) found that—unlike longer-term migration—temporary migration is primarily driven by job availability at the destination rather than wage differentials between the origin and destination.

A few studies analyze determinants of temporary migration (Asefawu and Nedessa 2022; Dodd et al. 2016; Keshri and Bhagat 2013; Khandker et al. 2012; Shahriar et al. 2006; Sucharita 2020), but do so only in comparison to non-migration. This leaves a conceptual gap in understanding the choice between temporary and longer-term migration—particularly among unskilled migrants, who are more prevalent than skilled migrants in poor agrarian contexts (Bryan et al. 2014; Khandker and Mahmud 2012). In this study, we focus only on migration for unskilled employment. Previous studies suggest that, unlike longer-term migration, temporary migration may not suffice to lift households out of poverty (Dash 2023; Mishra 2016), raising the question as to why many poor rural households still choose temporary over longer-term migration. In a recent study in northern Bangladesh, Rana and Qaim (2024) find that farm labor and family demographic constraints are possibly important reasons for some households to prefer temporary migration, but this finding is based on qualitative research with a small sample. We are not aware of previous quantitative research in this direction and context.

There are also a few studies examining the effects of temporary migration on household livelihoods (De Brauw and Harigaya 2007; Gibson and McKenzie 2014; Tiwari et al. 2022), but again mostly comparing only with the alternative of non-migration. One exception is Wang et al. (2021), who compare the effects of temporary and permanent migration on household expenditures and investments in China. We are aware of only two studies analyzing the effects of temporary migration on indicators of food security and nutrition, namely, Bryan et al. (2014) and Khandker et al. (2012), who show with data from northern Bangladesh that temporary migration—in comparison to non-migration—helps to mitigate hunger through increasing caloric intake during lean periods. However, caloric intake is only one dimension of nutrition and not necessarily a good indicator of dietary quality. Poor households often heavily rely on cheap staple foods to obtain sufficient calories but lack important nutrients, such as proteins, vitamins, and minerals. Protein and micronutrient deficiencies are particularly pronounced during agricultural lean periods and can have long-term negative health consequences (Development Initiatives 2022). To our knowledge, effects of temporary migration on dietary quality have not been analyzed before, neither in Bangladesh nor elsewhere.

We hypothesize that temporary migration helps to smooth consumption and dietary quality during lean periods and is partly determined by factors that are different from those of longer-term migration. More specifically, we pursue the following two research objectives: First, we identify factors explaining why rural households choose temporary over longer-term migration. Second, we investigate and compare the effects of temporary migration and longer-term migration on households' income and dietary quality during lean periods. In addressing concrete research gaps, the results can advance the research direction on

the economics of migration. In addition, they can be interesting and relevant from a policy perspective. The phenomenon of temporary migration is often overlooked by policy-makers. In Bangladesh, for instance, policy-makers suddenly realized during the COVID-19 shutdown that the rice in some parts of the country could not be harvested due to the shortage of migrant laborers. Temporary migration was then allowed sporadically to help with the harvest (Rahman et al. 2022). Nonetheless, the needs and perspectives of the temporary migrants themselves are still disregarded in national policies.

The rest of this article is organized as follows: Section 2 elaborates the conceptual framework. Section 3 explains the data collection and the econometric models used for the empirical analysis. Section 4 presents and discusses the results, while Section 5 concludes.

2 | Conceptual Framework

Our study is embedded in the theory of the “new economics of labor migration” (NELM). Moving beyond traditional economic models that portray migration as an individual decision based on wage differentials (Todaro 1969), NELM considers migration as a collective decision made by the household (Abreu 2012; Stark and Bloom 1985). Building on this framework, we conceptualize three fundamental factors influencing migration decisions. First, NELM suggests that incomplete labor markets at the origin can lead to relative deprivation, motivating households to send migrants to improve their economic well-being. Second, migrant networks are a form of social capital, providing information and support, thus facilitating households' migration decisions. Third, households are risk-averse and mutually interdependent units that make migration decisions collectively based on their members' opportunities, risks, and constraints (Stark and Bloom 1985). For instance, when considering migration, the wage opportunities at the potential destinations are uncertain (Bryan et al. 2014). Networks, such as friends with better information and connections, can help reduce such risks (Khandker et al. 2012), meaning that household members with a strong network may be the best candidates for migration. At the same time, questions as to who in the household will look after the family farm and left-behind dependents are also being considered. Thus, NELM provides useful insights to analyze rural households' migration decisions (Abreu 2012).

However, in reality, different types of migration decisions are possible, such as temporary or longer-term migration. In its standard form, NELM does not differentiate between the types of migration, so we need to refine some of the ideas to make the framework useful for our purpose. Although all three factors of NELM mentioned above matter for both temporary and longer-term migration, we expect that the third factor is particularly relevant for differentiating between the types of migration. For instance, if longer-term migration were the only available migration option, many households with farm labor and family demographic constraints might not engage in migration at all. Yet, temporary migration during agricultural lean periods may still be feasible for these households. Although often not captured in official statistics, temporary migration is a common phenomenon in many countries, including Bangladesh, China, and India,

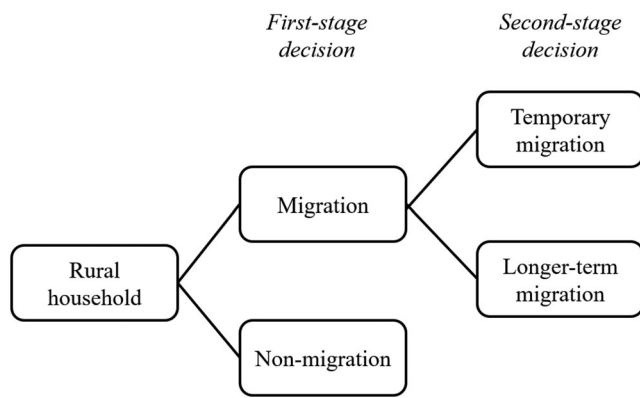


FIGURE 1 | Temporary migration as a two-stage decision-making process.

among others (Keshri and Bhagat 2013; Khandker and Mahmud 2012; Rana and Qaim 2024; Sucharita 2020; Wang et al. 2021).

Temporary migration can be conceptualized as a two-stage decision-making process, as shown in Figure 1. In the first stage, a household decides whether to consider migration at all, whereas in the second stage, if migration is considered, it decides whether to opt for temporary or longer-term migration. It should be stressed that the two stages do not necessarily occur sequentially. The two decisions may be made simultaneously, even though the concrete role of the influencing factors may vary by decision-making stage.

In line with NELM, we hypothesize that incomplete labor markets at the origin—for instance, in terms of seasonal fluctuations in employment opportunities and wages—encourage households to opt for migration. However, seasonal fluctuations alone may make temporary migration more likely than longer-term migration. In northern Bangladesh, agricultural lean periods occur twice per year, each lasting for 2–3 months, when on-farm employment opportunities drop drastically (Bryan et al. 2014; Gill et al. 2003; Khandker and Mahmud 2012; Zug 2006). Although unskilled jobs are available year-round in urban areas, job availability in rural areas varies temporally across Bangladesh. In the central, southern, and eastern parts of the country, crop harvests occur 1 month earlier than in northern Bangladesh, encouraging temporary rural-to-rural outmigration from the north during its pre-harvest lean period. Once the harvests in other parts of the country are over, these temporary migrants return to their home villages to harvest their own fields or work as agricultural laborers in the local market.

Also, in line with NELM and existing empirical studies (De Brauw and Harigaya 2007; Giuliatti et al. 2018; Khandker et al. 2012; Stark and Bloom 1985), we hypothesize that migrant networks and the size of such networks have a positive influence on household migration decisions. Migrant networks can include relatives or friends from the origin village, who have migration experience and/or connections to relevant people at potential destinations. We expect that migrant network matter for both temporary and longer-term migration.

In terms of household members’ opportunities and constraints, NELM would predict that the following four factors would discourage migration: (i) household’s engagement in own farming, (ii) a small household size (few members), (iii) the presence of household members requiring special care, and (iv) distrust among neighbors in the sense that neighbors would not be trusted to look after the left-behind family. Some of these predictions were confirmed by empirical studies in different geographical contexts (Asefawu and Nedessa 2022; Coffey et al. 2014; Deshingkar and Start 2003; Dodd et al. 2016; Khandker et al. 2012; Konseiga 2005). However, there are also studies not finding significant effects of such household constraints on migration decisions (Shonchoy 2015; Sucharita 2020).

We expect that household and family constraints play a stronger role for longer-term migration than for temporary migration. For instance, temporary migration during agricultural lean periods may not conflict with own farming, whereas longer-term migration would. Similarly, the spouse may take care of children and other dependents alone temporarily, but not for longer periods. Most existing studies only look at longer-term migration and are therefore not able to test potential differences. A few studies look at temporary migration in comparison to non-migration, but some of them include migration for more than a 6-month period, while others exclude migration for less than 30 days, even though such short-term migration is not uncommon to smooth consumption during agricultural lean periods.

To avoid ambiguity, we compare temporary migration to longer-term migration and differentiate between them using the following definitions. Temporary migration is an income-driven movement of individuals outside of their own village for any period of up to 3 months—aligning with the usual duration of agricultural lean periods, after which they return to their village and engage actively in the local labor market. In contrast, longer-term migration is made for more than 3 months. Longer-term migrants may sporadically visit their families, yet without actively participating in the local labor market during these visits.

Concerning our second objective, previous research suggests that temporary migration may smooth food consumption and improve caloric intake during lean periods (Bryan et al. 2014; Khandker et al. 2012). We investigate here whether positive effects are also observed for dietary quality in terms of consuming nutrient-rich foods during lean periods. Longer-term migration may be a household strategy to increase income in general, independent of seasonality, whereas temporary migration is primarily a household strategy to cope with seasonality (Coffey et al. 2014; Khandker et al. 2012; Wang et al. 2021). Against this background, the lean-period dietary effects of temporary migration may possibly be larger than those of longer-term migration.

3 | Materials and Methods

3.1 | Data

We use household survey data collected in northern Bangladesh in 2023 employing a multi-stage sampling procedure. We

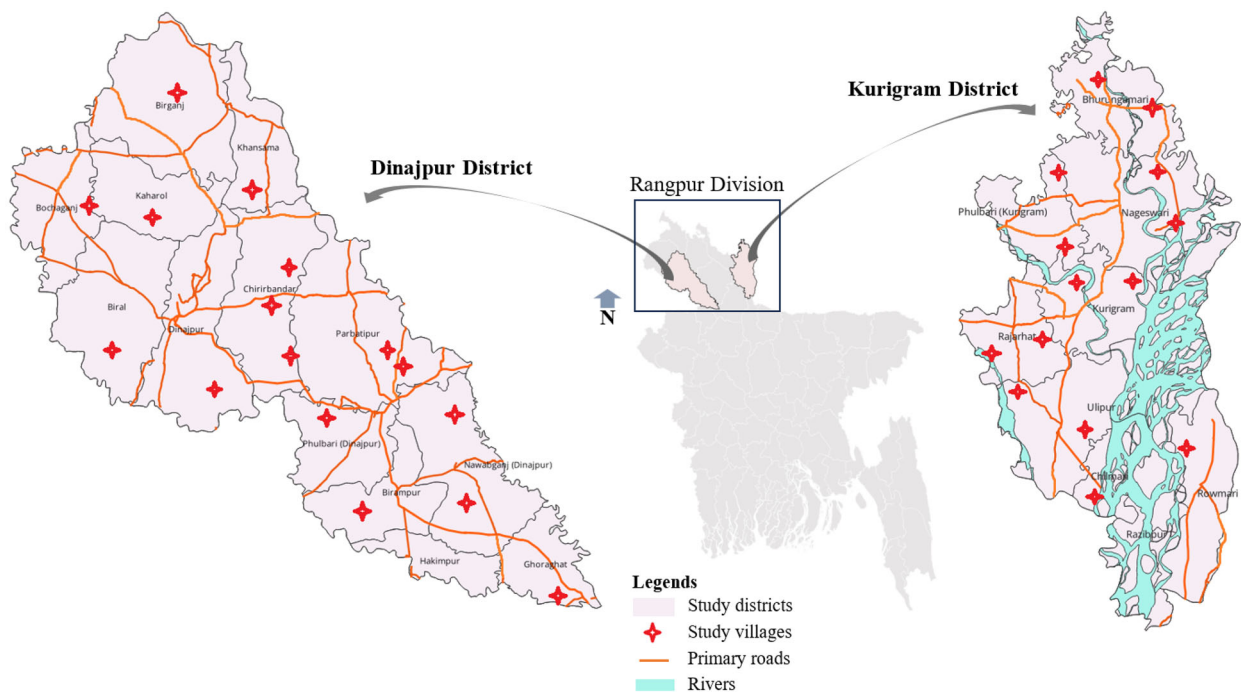


FIGURE 2 | Geographic locations of study villages (Source: Own presentation based on free GIS and open street map data).

collected data in the Rangpur Division (also known as “northern Bangladesh”), a region of Bangladesh with the highest proportion of agricultural labor-dependent households that are highly vulnerable to agricultural seasonality (BBS 2022; Khandker and Mahmud 2012). Non-agricultural job opportunities in Rangpur are meagre, so temporary migration during agricultural lean periods is common (Khandker et al. 2012).

Rangpur comprises eight districts, among which, we purposively chose Dinajpur and Kurigram, the two poorest districts with the highest proportions of agricultural labor-dependent households (BBS 2022; Hossain and Hossen 2020). Dinajpur has a total of 2131 villages, from which we randomly selected 16 for our survey, whereas Kurigram has a total of 1872 villages, from which we randomly selected 14, resulting in a total of 30 survey villages (Figure 2).

In all 30 villages, we obtained complete household lists from the local government offices, known as the *union parishad* offices. According to these lists, 7441 households reside in the 30 selected villages. Power calculations with a 99% confidence level and a 5% margin of error suggested that we should survey a minimum of 612 households. To be on the safe side, we randomly selected 10% of the households in each village plus some replacement households in the case of non-responses or missing data. We surveyed a total of 878 households.

Personal interviews were carried out in the local language using a structured questionnaire developed for this purpose and programmed in surveyCTO. There are two dominant lean periods in the study region: the *Aman* lean from September through November, occurring between the planting and harvesting of the *Aman* seasonal crop, and the *Boro* lean from February through April, transpiring between the planting and harvesting of the *Boro* crop (Gill et al. 2003; Rana and Qaim 2024). The survey

was conducted during the *Aman* planting period, June 2023 to August 2023, locally known as the “normal period,” when most temporary migrants are in their home villages to harvest *Boro* and plant *Aman* crops. Our questionnaire captured data for the past 12 months, covering August 2022 to July 2023. We collected data in three broad categories: (i) household assets, sociodemographic details, farming activities, and labor participation in the origin villages; (ii) household members’ migration details and migrant networks; and (iii) household employment, income, and food consumption during both the normal and lean periods over the past 12 months. The interviews were conducted mostly with the household head, who was often also the person migrating. Yet, the questions about food consumption were asked to someone who lived in the household year-round, often the spouse of the household head.

In the full household sample ($n = 878$), 27 households were involved in migration by sending skilled migrants. As this is different from unskilled migration, we excluded these households from our analysis. Moreover, there were 19 households in the sample that simultaneously sent temporary and longer-term unskilled migrants during the past 12 months. These households were also excluded, as we want to compare the decisions for and effects of temporary versus longer-term migration. We use the remaining 832 households. Among them, 461 (55%) participated in any form of migration during the 12 months prior to the interview, while 371 (45%) did not. Among the migrant households, 338 participated in temporary migration (41% of the total sample, 73% of the migrants), and 123 in longer-term migration (15% of the total sample, 27% of the migrants). All the temporary migrants and most of the longer-term migrants in our sample are male.

Around 81% of the temporary migrant households in our sample sent a migrant during the *Boro* lean period, 64% during the *Aman* lean, and 49% during both lean periods. Around 68% of

the temporary migrants migrated for relatively short periods of less than 30 days in one migration episode.

3.2 | Modeling Migration Decisions

For our first research objective, we want to explain households' temporary migration decisions, which—as discussed earlier—we conceptualize as a two-stage decision process. In the first stage, a household decides whether to participate in any type of migration, whereas in the second stage, conditional on a positive first-stage decision, it decides whether to participate in longer-term or in temporary migration. As both stages are not independent, we employ the two-stage Heckman selection model (Heckman 1979). In the first-stage selection equation (Equation 1), we use the full sample ($n = 832$) with any unskilled migration of household i (M_i) as the binary dependent variable. In the second-stage outcome equation (Equation 2), we use only the subsample of households participating in migration ($n = 461$). This stage explains household i 's participation in temporary migration versus longer-term migration (TM_i) by including the inverse Mills ratio (imr_i) generated from the selection equation (Heckman 1979). The explanatory variables in both equations build on NELM and our conceptual framework.

$$M_i = f(ES_i, MN_i, FDC_i, FLC_i, X_i, EV_i) \quad (1)$$

$$TM_i = g(ES_i, MN_i, FDC_i, FLC_i, X_i, imr_i) \quad (2)$$

where ES_i is a vector of variables indicating employment seasonality for household i , describing incomplete job markets at the origin, MN_i is the size of the household's migrant networks, FDC_i is a vector of family demographic constraints, and FLC_i represents possible farm labor constraints. These variables and their expected effects on M_i and TM_i are explained in more detail in Table 1. Moreover, we control for other relevant household- and village-level factors that may influence migration, X_i , including household head's age, education, occupation, wealth, access to microcredit and safety nets, and village-fixed effects, among others.

EV_i in Equation (1) is an exclusion variable, which is required for the correct specification of the Heckman selection model (Heckman 1979). It should influence the migration decision in Equation (1), but not the decision for the type of migration in Equation (2). In rural Bangladesh, membership in local social institutions (e.g., mosques/temple, and educational institutions) depends primarily on the individual's integrity and the household's social respect in the community. Such membership bestows social status, which may discourage households to participate in unskilled migration (Equation 1), as such migration is sometimes associated with social stigma in the local context (Rana and Qaim 2024). However, the social stigma applies to both temporary and longer-term migration. Therefore, the membership of local social institutions is not expected to play a significant role in Equation (2). Table A1 in the Online Appendix confirms that membership differs significantly between migrant and non-migrant households, but not between households participating in temporary and longer-term migration.

Given that migration (first-stage decision) is quite common in our sample, one might assume that selection bias in the second stage is possibly not much of an issue. However, as we show below (Table 3), the inverse Mills ratio is statistically significant in our second-stage model, confirming the presence of selection bias. We use the Heckman probit selection model, as the outcome variable in Equation (2) is binary. To further validate the results, we employ a control function approach (Wooldridge 2015) as a robustness check.

Given the relatively large number of explanatory variables included in our models, we tested for multicollinearity by calculating variance inflation factors. These are shown in Table A2 in the Online Appendix. They do not indicate a high correlation among our explanatory variables.

3.3 | Modeling Effects of Migration on Income and Dietary Quality

For our second research objective, we estimate and compare the effects of temporary migration (TM_i) and longer-term migration (LM_i) on income and dietary quality. The general idea is captured in the following regression model:

$$Y_{il} = \theta_0 + \theta_{tm} TM_i + \theta_{lm} LM_i + \theta_z Z_i + \mu_i \quad (3)$$

where Y_{il} is income or dietary quality of household i during lean period l . We are particularly interested in lean-period outcomes, as temporary migration takes place mostly during lean periods, as discussed earlier. Z_i is a vector of control variables, including the household head's age, education, and gender, household size, experience of seasonal employment fluctuation, and village-fixed effects, among others. μ_i is a random error term.

The problem with Equation (3) is that TM_i and LM_i are endogenous. Migration decisions may be influenced by unobserved characteristics, such as individual motivation or risk attitudes, which may also be correlated with the outcome variables. Such endogeneity would lead to biased estimates. We address this issue by using a multinomial endogenous switching regression (MESR) model, which also corrects for sample truncation. In the first stage of the MESR, we estimate a multinomial logit selection (MNLS) to explain households' selection into different types of migration (Dubin and McFadden 1984).¹ In the second stage, the effects of participating in temporary and longer-term migration on lean-period income and dietary quality are estimated by including the selection effect (imr_i) from the first-stage MNLS.

For robust estimates, we use instrumental variables (IVs) in the first-stage equation (Khonje et al. 2018; Kumar et al. 2019; Manda et al. 2021). We employ the leave-one out fractions of temporary and longer-term migrant-sending households in each village j as instruments (IV_j) for the respective choices of migration. Similar IVs were also used in other recent migration studies (Hossain et al. 2023; Mishra et al. 2022; Rahman 2022; Wang et al. 2021). In a village with more migrants, the larger collective experience and encouragement may positively influence individual migration decisions, especially for risk-averse households (Stark and Bloom 1985; Khandker et al. 2012). The first stage MNLS results are presented in Table A7 in the Online Appendix, confirming that

TABLE 1 | Key explanatory variables and their expected effects on migration decisions.

Variable	Definition	Expected sign in the model	
		Any migration versus non-migration (M_i)	Temporary versus longer-term migration (TM_i)
Employment seasonality (ES_i)			
Seasonal employment fluctuations	Finding daily wage opportunities is "easy" during normal periods but "difficult" during lean periods ^a (0/1)	(+)	(+)
Wage gap	Difference in daily wage amount experienced between normal and lean periods (Bangladeshi Taka, BDT)	(+)	(+)
Flood vulnerability	Household is located in flood-prone village (0/1)	(+)	(−)
Migrant networks (MN_i)			
Migrant network size	Number of migrant relatives/friends from the origin that the household can get support from during migration	(+)	(±)
Family demographic constraints (FDC_i)			
Small household	Household has up to four members (0/1)	(−)	(+)
Elderly member	Household has at least one member aged 60 years or older (0/1)	(−)	(+)
Children	Household has a child below 10 years of age (0/1)	(−)	(+)
Adolescent girl	Household has a female member aged 10–19 years (0/1)	(−)	(+)
Distrust in neighbors	Household distrusts neighbors for looking after their family (0/1)	(−)	(+)
Farm labor constraints (FLC_i)			
Crop farming	Household is engaged in crop farming (0/1)	(−)	(+)
Livestock farming	Household has livestock (0/1)	(−)	(+)

^aFor each household, we asked how "easy" or "difficult" it was to find daily wage opportunities in their origin villages both during the time of the survey (normal period) and during the preceding lean periods. Responses were recorded on a scale from 1 to 10, where 1 indicated "very difficult," and 10 "very easy." Responses above 5 were categorized as "easy", and up to 5 as "difficult".

our village-level IVs are relevant for household choices of the respective migration type.

A second criterion for IV validity is that they influence the outcomes only through the migration decision, and not through other channels. One may expect that villages with more migrants may differ from other villages in terms of job opportunities, wage rates, and other factors that could influence household income and diets through multiple channels, also for households not sending migrants themselves. Note, however, that we only sampled villages in two districts of northern Bangladesh where migration rates are high. Hence, while the exact migration rates differ somewhat between villages, the villages in our sample are all very similar in terms of general economic conditions, including seasonal fluctuations of job opportunities and wages. Also, we control for possible unobserved village-level heterogeneity by including village fixed effects in our model. We tested whether the IVs are correlated with the outcome variables by using a falsification test (Khonje et al. 2018; Manda et al. 2021). The results are presented in Table A8 in the Online Appendix, showing no

significant correlation for non-migrant households. Hence, we conclude that our IVs are valid.

The MESR model is specified as follows:

$$\text{First stage : } M_i = \omega_0 + \omega_z Z_i + \omega_{iv} IV_j + \vartheta_i \quad (4)$$

$$\text{Second stage : } Y_{il} = \theta_0 + \theta_m M_i + \theta_z Z_i + \theta_{imr} imr_i + \mu_i \quad (5)$$

where M_i denotes household i 's participation in temporary (TM_i) or longer-term migration (LM_i), IV_j includes the village proportions of temporary and longer-term migration to instrument households' endogenous choice of these two migration options, and Z_i is a vector of control variables discussed above for Equation (3). ω and θ represent parameters to be estimated in the respective equations, and ϑ and μ are random error terms.

We are particularly interested in the effects of temporary and longer-term migration, that is, θ_m in Equation (5). One advantage

of the MESR is that it simultaneously estimates the average treatment effects on the treated (ATT) and the average treatment effects on the untreated (ATU) groups of households (Kassie et al. 2014). ATT is the difference between the actual outcome of participating in temporary or longer-term migration, and the predicted counterfactual outcome that would have been obtained if the household had not chosen that migration type (Di Falco and Veronesi 2018; Khonje et al. 2018; Kassie et al. 2014). Given that households may systematically differ, the ATT cannot be interpreted as the effect that would occur if non-migrating households would also start to send migrants. This latter effect is represented by the ATU, calculated as the difference between the predicted counterfactual outcomes of choosing a certain type of migration and the actual outcomes of non-migration among the non-migrant households (Di Falco and Veronesi 2018; Kassie et al. 2014).

Rigorous causal identification with cross-section observational data is difficult because the validity of the IVs cannot be proven with certainty. Therefore, we carry out a robustness check with an alternative method. We employ the inverse probability weighting with regression adjustment (IPWRA) method. This method can only account for potential bias due to observed heterogeneity, meaning that the IPWRA approach is not necessarily better or more reliable than the MESR. Nevertheless, obtaining consistent results with two different methods would provide further trust in the reliability of the findings.

3.4 | Measuring Income and Dietary Quality

We expect that the main effect of temporary or longer-term migration on household income will be through remittances, including money sent home and brought home by the migrant household members. In the evaluation of the effects, we are particularly interested in the income earned during the lean periods. During the survey, we collected information on all sources of income (farm, off-farm and self-employment income, remittances, transfers, and other income) and their magnitude during the normal and lean periods of the preceding 12 months. Out of 338 temporary migrant households, 64 did not send a migrant during the latest *Boro* lean period (February–April, 2023), but did so during the *Aman* lean (September–November, 2022). For an inclusive evaluation, therefore, we look at the total household income earned during the last two lean periods combined. As mentioned, the lean periods are those during which most of the temporary migration occurs. The income is measured in 1000 Bangladeshi Taka (BDT).

To measure dietary quality, we use data collected on household-level food consumption over 7-day recall periods. First, we collected data on the frequency of consuming various food groups during the last 7 days prior to the interview taking place in June–August 2023, which represents household diets during the normal period. Second, we collected recall data on the frequency of food group consumption during a typical week in the last lean period. The last lean period from the time of the survey was the *Boro* lean, to which the recall questions referred. Only for the 64 households that had sent a temporary migrant exclusively during the last *Aman* lean, we collected data on their food consumption during that specific lean period, as we are interested in the effects of

migration.² For the recall data, we referred to a typical week in the second half of the lean period, when food stocks from own production are particularly low and when possible migration remittances are already available.³ Using these data and following WFP (2009) guidelines, we calculate three concrete dietary quality indicators, namely, the food consumption score (FCS), the protein consumption score (PCS), and the temporary protein shortfall (TPS), all three referring to household consumption during the lean period.⁴ These three indicators are explained in more detail below.

The FCS is a composite dietary quality indicator based on the weekly consumption frequency of nine food groups which are weighted by their nutritional importance. The nine food groups and their weighting factors are shown in Table 2. The weighting puts particular emphasis on the nutrient density of food groups, with nutrient-dense animal-sourced foods receiving higher weights and nutrient-poor foods receiving lower or zero weights. The FCS for each household is calculated by multiplying the weekly consumption frequency of a food group by the weighting factor and adding these products up for all nine food groups. Thus, the possible values of the FCS range between 0 and 112 (when all food groups are consumed on 7 days per week). The PCS is calculated in the same way but only considers the protein-rich food groups 1–3 in Table 2. Possible values of the PCS therefore range between 0 and 77.

Although FCS and PCS are useful for analyzing the effects of migration on dietary quality during the lean period, we are also interested in understanding the effects of migration on possible consumption shortfalls during lean periods in relation to normal consumption in the local context. This is expressed by TPS, which we calculate as follows (Kafle et al. 2020):

$$TPS_{ijl-n} = PCS_{jn} - PCS_{il} \quad (6)$$

where TPS_{ijl-n} is the temporary protein shortfall of household i residing in village j during lean period l in relation to normal period n , PCS_{jn} is the average protein consumption score in village j during normal period n , and PCS_{il} is the protein consumption score of household i from village j during lean period l . Positive values of TPS_{ijl-n} indicate the existence of temporary shortfalls, whereas values at or below zero indicate no shortfall.

4 | Results

4.1 | Descriptive Statistics

Summary statistics of key explanatory variables for migration decision-making are shown in Table A3 in the Online Appendix. A test of mean differences mostly supports our hypothesized associations with indicators of employment seasonality, migrant networks, and family demographic and farm labor constraints.

Table A4 in the Online Appendix shows summary statistics of households' weekly consumption frequency of various food groups, and their FCS and PCS during normal and lean periods. Staples, oils and fats are consumed daily by almost all sample households throughout the year. However, notable seasonal

TABLE 2 | Food groups for calculating the food consumption score (FCS).

	Food groups	Frequency of weekly consumption	Weighting factor
1	Meat, fish, eggs	0–7	4
2	Milk, dairy products	0–7	4
3	Legumes, pulses	0–7	3
4	Staples (grains, roots, tubers)	0–7	2
5	Vegetables	0–7	1
6	Fruits	0–7	1
7	Oils, fats	0–7	0.5
8	Sugar, sweets	0–7	0.5
9	Condiments	0–7	0

Source: Based on WFP (2009).

consumption differences are observed for most nutrient-dense food groups. For the total sample, FCS and PCS are significantly lower during lean than during normal periods. This is also observed for the subsamples of non-migrant and longer-term migrant households. However, strikingly for temporary migrant households, the opposite is true: FCS and PCS are higher during the lean. Also, compared to the other two groups, temporary migrant households have better dietary quality during the lean period (Table A5).⁵

Table A5 in the Online Appendix also shows mean incomes of the three subsamples during lean periods. The lean period income of temporary migrant households is around BDT 62 thousand (USD\$ 519) on average, slightly higher than that of non-migrant households. However, the mean income difference between these two groups is statistically insignificant. This may indicate that temporary migration can alleviate income shortfalls for poor households during lean periods that would otherwise be worse off. In contrast, longer-term migrant households have significantly higher mean incomes than both other groups.

4.2 | Factors Explaining Migration

Table 3 presents results from the Heckman selection model explained in Equations (1) and (2). Column (1) of Table 3 shows the first-stage equation explaining any unskilled migration (M_i). Column (2) shows the decision of choosing temporary over longer-term migration (TM_i) for the subsample of migrant households.

As hypothesized, employment shortfalls at the origin during lean periods increase the likelihood of any migration (column 1 of Table 3) and also the likelihood of choosing temporary over longer-term migration. This makes sense, as the objective of temporary migration is to smooth shortfalls during recurring lean periods, whereas the objective of longer-term migration is more broadly to increase income. Wage differences between normal and lean periods do not seem to influence the general migration decision over and above the effect of seasonal employment fluctuation. However, in the second-stage decision, wage gaps increase the likelihood of temporary migration, motivating migrants to return home during normal periods, for example, harvest seasons,

as an increasing gap also implies better wages in the origin villages during normal periods. Floods can prolong lean periods (Khandker and Mahmud 2012; Rana and Qaim 2024), so it is unsurprising that vulnerability to floods increases the likelihood of choosing longer-term migration.

In terms of migrant networks, we find that the size of the network that can help during migration, positively influences the general migration decision. Moreover, the size of the migrant network is positively associated with the likelihood of temporary migration. Longer-term migrants often target specific jobs at the destination, which can be arranged by one person from the network. For temporary migrants, in contrast, a larger migrant network is more important. Temporary migrants often move across different destinations even during the same migration episode. As discussed earlier, the time of the harvest varies regionally, meaning that migrant workers move from place to place to find available jobs. In this respect, receiving information and support from network members migrating to different regions can be very useful. It is also common that temporary migration is organized in groups, which can mitigate risks and make migration more pleasurable.

In terms of family demographic constraints, small households are less likely to send migrants, and if they do, temporary migration is more likely than longer-term migration. This aligns with our hypotheses. Having elderly household members, children, or adolescent girls does not seem to influence the general migration decision significantly. Nevertheless, if migration is chosen, having children or adolescent girls makes temporary migration more likely. Childcare obligations and personal attachment make it less likely for a parent to migrate for longer periods. In the conservative sociocultural context of northern Bangladesh, it is also uncommon to leave families with adolescent girls behind without protection through a male adult. Distrust in neighbors makes migration less likely, and if migration occurs, this factor is more likely to induce temporary migration to reduce the time of absence, as hypothesized.

In terms of farm labor constraints, households engaged in crop and livestock farming are less likely to send migrants, as these activities require family labor. However, crop farming does not influence the second-stage decision, whereas livestock farming does. Being involved in livestock farming makes temporary

TABLE 3 | Factors explaining household migration decisions (two-stage Heckman selection model).

Variables	(1) Any migration versus non-migration (M_i)	(2) Temporary versus longer-term migration (TM_i)
Employment seasonality (ES_i)		
Seasonal employment fluctuations	0.25** [0.11]	0.71*** [0.16]
Wage gap	0.00 [0.00]	0.001** [0.00]
Flood vulnerability	−0.15 [0.19]	−0.61*** [0.23]
Migrant networks (MN_i)		
Migrant network size	0.12*** [0.01]	0.06** [0.03]
Family demographic constraints (FDC_i)		
Small household	−0.21* [0.13]	0.39** [0.19]
Elderly member	−0.19 [0.13]	0.28 [0.19]
Children	−0.09 [0.12]	0.42** [0.18]
Adolescent girl	−0.05 [0.11]	0.40** [0.16]
Distrust in neighbors	−1.17*** [0.13]	1.17*** [0.38]
Farm labor constraints (FLC_i)		
Crop farming	−0.41*** [0.13]	0.11 [0.18]
Livestock farming	−0.29** [0.12]	0.44*** [0.16]
Controls (X_i)		
Household head's age	−0.01 [0.01]	−0.03*** [0.01]
Household head's education	−0.03* [0.02]	0.04 [0.02]
Household head: Male	−0.14 [0.36]	0.44 [0.51]
Major occupation: Agriculture	0.18 [0.17]	0.77*** [0.23]
Major occupation: Selling labor	−0.04 [0.15]	0.72*** [0.21]
Having a business	−0.51*** [0.13]	0.02 [0.20]
Membership of microcredit NGOs	0.21* [0.12]	−0.22 [0.16]
Access to safety-nets	−0.15 [0.12]	−0.04 [0.18]
Experience of damage	−0.39*** [0.11]	−0.13 [0.18]
Distance to nearby migration hub	0.00 [0.00]	−0.00 [0.00]
Land ownership	−0.02*** [0.01]	0.01 [0.01]
Wealth index	0.13*** [0.04]	−0.12** [0.05]
Village fixed effects	0.00*** [0.00]	−0.00 [0.00]
Membership of social institutions (EV_i)	−0.45*** [0.17]	
Inverse Mills ratio (imr_i)		−0.47* [0.28]
Constant	0.28 [0.53]	−0.47 [0.80]

Note: Wald χ^2 (24) = 100.69; N = 832; robust standard errors in square brackets—[]; * p < 0.10, ** p < 0.05, *** p < 0.01.

migration more likely than longer-term migration, which is plausible, as livestock farming requires family labor all year round (Deshingkar and Start 2003). Around 62% of our sample households have cattle, which is predominantly managed by household members. Hiring labor for livestock activities is uncommon in rural Bangladesh. However, hiring labor for crop farming is widespread, even among smallholders. Therefore, crop farming-related family labor constraints may not significantly affect the migration duration decisions.

The other control variables in Table 3 also provide a few interesting insights. Ownership of a non-agricultural business,

larger landholdings, and higher education levels of the household head are negatively associated with the likelihood of unskilled migration. This may be related to lower economic needs for unskilled migration and possibly labor constraints, but also to the social stigma associated with unskilled migration that better-off households would like to avoid. Against this background, the positive and significant coefficient for the wealth index in the first-stage equation is somewhat surprising. This may be related to capabilities and resources needed for migration (De Haas 2021), apart from the possibility of reverse causality. However, wealth is negatively associated with temporary migration, meaning that temporary migration is more common among the poor. Finally,

agriculture-dependent households, either through own farming or labor sales, are more likely to migrate temporarily during lean periods, when budget constraints occur and free labor time is available.

The statistical significance of the inverse Mills ratio (imr_i) confirms that correcting for selection bias is important. Our approach of comparing temporary to longer-term migration yields differential effects, especially with respect to household and family demographic factors and constraints, as hypothesized. As a robustness check, we employed a control function approach, which yields very similar results (Table A6 in the Online Appendix).

4.3 | Migration Effects on Dietary Quality and Income

Table 4 summarizes the MESR results in terms of the effects of temporary migration (TM) and longer-term migration (LM) on household dietary quality and income. Full estimation results are presented in Tables A9–A12 in the Online Appendix. Column (1) and (2) of Table 4 show the predicted values of the outcome variables with participation in a certain type of migration (actual) and without participation (counterfactual), respectively. Column (3) presents the difference between these predicted values, which is the ATT. As can be seen, households with TM have an average FCS of around 69 during the lean period, but would only have an FCS of around 49 had they not sent temporary migrants. This implies that the ATT for participating in TM is an increase of almost 20 in the mean FCS during the lean period, and this effect is statistically significant at the 1% level.

Households sending longer-term migrants experience a significant increase in their FCS too, though with a much smaller ATT (an increase in mean FCS of 3). Also, for the PCS, the ATT of temporary migration is larger than that of longer-term migration. Furthermore, while both types of migration help to offset temporary protein shortfalls (TPS) during the lean period, temporary migration generates a considerably larger effect here as well.

These results suggest that temporary migration is more effective than longer-term migration in smoothing food consumption and improving dietary quality during the lean period. During the survey, we could also sense that households involved in temporary migration come from the poorest sections of society and are vulnerable to risks of insufficient consumption of nutrient-rich foods. Therefore, one can expect that these households devote a large part of their migration-related income to smoothing consumption during lean periods, when they, otherwise, would have faced serious consumption deficits. In contrast, households involved in longer-term migration are inclined to utilize their migration-related income for improving living standards more generally, through savings and wealth-building, rather than for consumption smoothing. These households also do not suffer from consumption shortfalls to the same extent, as indicated by their higher predicted counterfactual outcomes for FCS and PCS without migration (column 2 of Table 4).

TABLE 4 | Effects of migration on household dietary quality and income.

Outcome variable	Type of migration	Average treatment effects on the treated (ATT)			Average treatment effects on the untreated (ATU)		
		(1) Actual outcome with participation	(2) Counterfactual outcome without participation	(3) ATT (1–2)	(4) Counterfactual outcome with participation	(5) Actual outcome without participation	(6) ATU (4–5)
FCS	TM	68.76 [0.22]	49.13 [0.39]	19.63*** [0.45]	68.76 [0.25]	54.44 [0.38]	14.33*** [0.45]
	LM	61.65 [0.60]	58.36 [0.81]	3.29*** [1.01]	56.96 [0.37]	54.44 [0.38]	2.52*** [0.53]
PCS	TM	39.61 [0.19]	23.08 [0.34]	16.53*** [0.39]	40.88 [0.22]	27.85 [0.32]	13.02*** [0.39]
	LM	34.27 [0.53]	31.03 [0.69]	3.24*** [0.87]	30.54 [0.33]	27.85 [0.32]	2.69*** [0.46]
TPS	TM	–1.17 [0.19]	14.13 [0.25]	–15.30*** [0.31]	–1.71 [0.19]	9.87 [0.24]	–11.58*** [0.31]
	LM	4.50 [0.63]	7.44 [0.51]	–2.94*** [0.81]	8.08 [0.38]	9.87 [0.24]	–1.80*** [0.45]
Income	TM	62.46 [0.46]	57.66 [0.81]	4.80*** [0.93]	60.72 [0.50]	59.49 [0.85]	1.23 [0.99]
	LM	81.58 [2.37]	76.27 [2.05]	5.31** [3.13]	85.89 [1.45]	59.49 [0.85]	26.40*** [1.68]

Notes: $N = 832$; Robust standard errors in square brackets – []. Income refers to lean period income and is measured in thousand Bangladeshi Taka (BDT); * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Abbreviations: FCS, food consumption score; LM, longer-term migration; PCS, protein consumption score; TM, temporary migration; TPS, temporary protein shortfall.

The effects of the different types of migration on lean-period income are also shown in Table 4. Temporary migration leads to significantly higher lean-period income, with an ATT of BDT 4.8 thousand (USD\$ 40). This income gain through temporary migration is likely the main mechanism underlying the effects in terms of food consumption smoothing. However, longer-term migration generates income gains that are larger than those of temporary migration. In our sample, over two-third of temporary migrants migrated for shorter duration of less than 30 days, probably due to their constraints, as discussed earlier. Longer-term migration, in contrast, is not only longer but often also involves higher-paying jobs; hence the larger income effects for LM are unsurprising.

The ATT is the estimated effect of migration for those who decided to migrate. Given that households self-select into migration, migrants may systematically differ from non-migrants, so the effects of migration for non-migrants might also be different. This is reflected in the ATU, shown in column (6) of Table 4. Although the ATU are somewhat different from the ATT in terms of the exact coefficient magnitudes, the general patterns are the same: if non-migrants decided to migrate, temporary migration would have larger positive effects on dietary quality during lean periods, whereas longer-term migration would produce larger income gains.

As mentioned, we also carry out a robustness check using IPWRA as an alternative methodological approach. The results are shown in Table A13 in the Online Appendix. They are very similar to the MESR results in Table 4 and support the same conclusions.

5 | Conclusion and Policy Implications

Poor rural households often resort to unskilled migration as a response to seasonality and incomplete markets in agrarian societies worldwide. Such migration is often temporary in nature, lasting for less than 30 days. However, despite its importance for the rural poor, short-term temporary migration often remains invisible for researchers and policy-makers. Most existing research focuses on longer-term migration. Yet, the drivers and effects of short-term temporary and longer-term migration are likely different (Chen et al. 2019; Keshri and Bhagat 2013; Lucas 2015; Tiwari et al. 2022; Wang et al. 2021).

Although several studies analyze determinants of temporary migration (Asefawu and Nedessa 2022; Dodd et al. 2016; Keshri and Bhagat 2013; Khandker et al. 2012; Shahriar et al. 2006; Sucharita 2020), these studies typically consider non-migration as the only alternative. In our study with primary data from rural areas in northern Bangladesh, we have shown that this standard treatment of temporary migration as a binary choice against non-migration is incomplete in explaining migration decision-making. Consistent with earlier research, we highlight the important roles of employment seasonality and migrant networks in shaping migration decisions. However, we also show that some household and family demographic constraints, which reduce the likelihood of migration in general, tend to increase the likelihood of temporary over longer-term migration. Especially the poorer households have a strong preference for temporary migration, which can be explained by their specific needs and

abilities. They often face labor and other sociodemographic constraints that may prevent them from engaging in longer-term migration, which is, moreover, financially more costly.

Our data suggest that temporary migration is an effective strategy, particularly for the poorer section of the society, to smooth income and consumption shortfalls during lean periods. Temporary migration significantly improves their dietary quality during lean periods and thus helps to offset temporary nutrition shortfalls. This is an important finding in the context of rural Bangladesh, where many poor people still suffer from protein and micronutrient deficiencies (Raihan 2022).

Interestingly, longer-term migration has larger positive income effects than temporary migration, whereas temporary migration has larger positive effects on lean-period food consumption and dietary quality. This makes sense given the different objectives of both types of migration. Although temporary migration, mostly observed among the poorest households, is a key strategy to smooth consumption and prevent dietary shortfalls, longer-term migration is primarily a strategy to increase income and improve living standards in the longer term through savings and wealth-building.

Agricultural seasonality is a predictable phenomenon that agriculture-dependent households try to cope with. However, the vulnerabilities of poor rural households will likely further increase and become less predictable due to climate change, shrinking farm sizes, and several other factors. This requires more policy attention to identify risks for poor households and implement effective adaptation strategies. Advancements in agricultural technology to reduce the duration of lean periods and make farming more productive and resilient are one important avenue (Palis et al. 2016). Improvements in rural non-agricultural employment opportunities and social safety-net programs are another important avenue (Khandker and Mahmud 2012; Musungu et al. 2024; Shonchoy 2015). However, as we have demonstrated here, temporary migration can also be an effective strategy for smoothing consumption and preventing dietary shortfalls during lean periods, particularly for the resource- and demographically-constrained rural poor. The different avenues are not mutually exclusive. They should be seen as complements, serving the needs of vulnerable households under heterogeneous conditions.

Our findings underscore that a blanket negative perception of temporary migration, as often observed among policy-makers in Bangladesh and elsewhere (Afsar 2005; Shonchoy 2015), is inappropriate. There is a need for recognizing the important role of temporary migration for rural household livelihoods, for capturing this phenomenon more explicitly in statistical data, and for improving related conditions through supportive policies.

Acknowledgments

We are grateful to the German Academic Exchange Service (DAAD) and the Foundation Fiat Panis for financially supporting this research. We acknowledge the data collection support from a team of 10 enumerators and the field-based logistics support in Rangpur from RDRS—a local non-government organization (NGO) in Bangladesh. We are also grateful

to the co-editor-in-chief of this journal, Sangeeta Bansal, and the two anonymous reviewers for their valuable comments and suggestions.

Open access funding enabled and organized by Projekt DEAL.

SUPPORTING INFORMATION

Additional supporting information can be found in the online version of the article on the publisher's website.

Endnotes

¹We could use the MNLS instead of the Heckman also to model the determinants of temporary migration (first objective), but the Heckman model allows us to explicitly estimate the two stages of decision-making, which the MNLS does not.

²To control for possible systematic differences, we include a dummy variable for the 64 households reporting food group consumption for the last *Aman* lean in the MESR model, as part of the vector Z_i .

³We acknowledge that such recall data are associated with inaccuracies but note that these apply equally to households with and without temporary or longer-term migration. Therefore, we do not expect any systematic bias in our evaluation of migration effects.

⁴Another indicator that has become popular in recent research to proxy household food access and dietary quality is the household dietary diversity score (HDDS) (Fongar et al., 2018). HDDS simply counts the number of food groups consumed by the household over a specified recall period, so data requirements are low. One drawback of the HDDS is that it neither considers the quantity nor the frequency of food group consumption. As we have data on the frequency of consumption, we use food and protein consumption scores that offer more information on dietary quality. However, as we do not have data on food quantities consumed, we cannot calculate more detailed dietary intake measures, such as nutrient adequacy ratios.

⁵The fact that temporary migrant (TM) households have a higher mean FCS or PCS than longer-term migrant (LM) households is surprising, as TM households are poorer on average. Note, however, that this pattern is only observed during lean periods; during normal periods, LM households have a higher FCS and PCS, as expected. As explained above, we asked households to report their food consumption for the second half of the lean period, when possible TM remittances are already available. Temporary migrants may also have returned by that time, and the joy of the family reunion may possibly lead to higher-than-normal food consumption for a certain period. This needs to be kept in mind when interpreting the results. However, as the survey questions were identical for all households, independent of their migration status, the results still reflect the situation correctly for this specific period.

References

Abreu, A. 2012. "The New Economics of Labor Migration: Beware of Neoclassicals Bearing Gifts." *Forum for Social Economics* 41, no. 1: 46–67. <https://doi.org/10.1007/s12143-010-9077-2>.

Afsar, R. 2005. "Bangladesh: Internal Migration and Pro-poor policy." In *Migration, Development and Policy Reduction in Asia*, edited by I. Pinto-Dobernig, 85–108. International Organization for Migration (IOM). https://publications.iom.int/system/files/pdf/migration_dev_pov_asia.pdf.

Asefaw, G. S., and K. G. Nedessa. 2022. "Nature, Patterns, and Determinants of Seasonal Outmigration in the North-eastern Part of Ethiopia." *Norwegian Journal of Geography* 76, no. 3: 177–191. <https://doi.org/10.1080/00291951.2022.2076610>.

BBS. 2022. "Agriculture Census 2019: Structure of Agricultural Holdings and Livestock & Fisheries (National Series, Volume 1)." Bangladesh Bureau of Statistics (BBS).

Bryan, G., S. Chowdhury, and A. M. Mobarak. 2014. "Underinvestment in a Profitable Technology: The Case of Seasonal Migration in Bangladesh." *Econometrica* 82, no. 5: 1671–1748. <https://doi.org/10.3982/ecta10489>.

Chen, J., K. Kosec, and V. Mueller. 2019. "Temporary and Permanent Migrant Selection: Theory and Evidence of Ability-Search Cost Dynamics." *Review of Development Economics* 23, no. 4: 1477–1519. <https://doi.org/10.1111/rode.12617>.

Coffey, D., J. Papp, and D. Spears. 2014. "Short-Term Labor Migration From Rural North India: Evidence From New Survey Data." *Population Research and Policy Review* 34, no. 3: 361–380. <https://doi.org/10.1007/s11113-014-9349-2>.

Dash, M. K. 2023. "Causes and Consequences of Circular Migration in Odisha: Evidence From a Study of Four Underdeveloped districts." In *Development Outlook of Education and Migration: An Indian Perspective*, edited by B. Potnuru, N. Thakur, and P. Kumar, 163–184. Springer.

De Brauw, A., and T. Harigaya. 2007. "Seasonal Migration and Improving Living Standards in Vietnam." *American Journal of Agricultural Economics* 89, no. 2: 430–447. <http://www.jstor.org/stable/4492821>.

De Haas, H. 2021. "A Theory of Migration: The Aspirations-Capabilities Framework." *Comparative Migration Studies* 9: 8. <https://doi.org/10.1186/s40878-020-00210-4>.

Deshingkar, P., and D. Start. 2003. "Seasonal Migration for Livelihoods in India: Coping, Accumulation and Exclusion." Working Paper No. 220. Overseas Development Institute.

Development Initiatives. 2022. "Global Nutrition Report: Stronger Commitments for Greater Action." Development Initiatives. <https://globalnutritionreport.org/reports/2022-global-nutrition-report/>.

Di Falco, S., and M. Veronesi. 2018. "Managing Environmental Risk in Presence of Climate Change: The Role of Adaptation in the Nile Basin of Ethiopia." In *Climate Smart Agriculture: Building Resilience to Climate Change*, edited by L. Lipper, N. McCarthy, D. Zilberman, S. Asfaw, and G. Branca, 497–552. Natural Resource Management and Policy, vol 52. Springer. https://doi.org/10.1007/978-3-319-61194-5_21.

Dodd, W., S. Humphries, K. Patel, S. E. Majowicz, and C. Dewey. 2016. "Determinants of Temporary Labour Migration in Southern India." *Asian Population Studies* 12, no. 3: 294–311. <https://doi.org/10.1080/17441730.2016.1207929>.

Dubin, J. A., and D. McFadden. 1984. "An Econometric Analysis of Residential Electric Appliance Holdings and Consumption." *Econometrica* 52, no. 2: 345–362. <https://doi.org/10.2307/1911493>.

Fongar, A., T. Gödecke, A. Aseta, and M. Qaim. 2018. "How Well Do Different Dietary and Nutrition Assessment Tools Match? Insights From Rural Kenya." *Public Health Nutrition* 22, no. 3: 391–403. <https://doi.org/10.1017/s1368980018002756>.

Gibson, J., and D. McKenzie. 2014. "The Development Impact of a Best Practice Seasonal Worker Policy." *Review of Economics and Statistics* 96, no. 2: 229–243. <http://www.jstor.org/stable/43554927>.

Gill, G. J., J. Farrington, E. Anderson, et al. 2003. "Food Security and the Millennium Development Goal on Hunger in Asia." Working Paper No. 231. Overseas Development Institute. https://www.files.ethz.ch/isn/22639/wp231_web.pdf.

Giulietti, C., J. Wahba, and Y. Zenou. 2018. "Strong Versus Weak Ties in Migration." *European Economic Review* 104: 111–137. <https://doi.org/10.1016/j.eurocorev.2018.02.006>.

Heckman, J. J. 1979. "Sample Selection Bias as a Specification Error." *Econometrica* 47, no. 1: 153–161. <https://doi.org/10.2307/1912352>.

Hossain, M., C. Mullally, and G. Önel. 2023. "Migration and Economic Activity at Origin: The Role of Female Household Headship in Rural Bangladesh." *Empirical Economics* 66: 1757–1818. <https://doi.org/10.1007/s00181-023-02500-z>.

Hossain, S. S., and M. A. Hossen. 2020. "Poverty Maps of Bangladesh 2016: Key Findings." Bangladesh Bureau of Statistics (BBS).

- Kafle, K., R. Benfica, and P. Winters. 2020. "Does Relative Deprivation Induce Migration? Evidence From Sub-Saharan Africa." *American Journal of Agricultural Economics* 102, no. 3: 999–1019. <https://doi.org/10.1002/ajae.12007>.
- Kassie, M., H. Teklewold, P. Marennya, M. Jaleta, and O. Erenstein. 2014. "Production Risks and Food Security Under Alternative Technology Choices in Malawi: Application of a Multinomial Endogenous Switching Regression." *Journal of Agricultural Economics* 66, no. 3: 640–659. <https://doi.org/10.1111/1477-9552.12099>.
- Keshri, K., and R. B. Bhagat. 2013. "Socioeconomic Determinants of Temporary Labour Migration in India." *Asian Population Studies* 9, no. 2: 175–195. <https://doi.org/10.1080/17441730.2013.797294>.
- Khandker, S. R., M. A. B. Khalily, and H. A. Samad. 2012. "Seasonal Migration to Mitigate Income Seasonality: Evidence From Bangladesh." *Journal of Development Studies* 48, no. 8: 1063–1083. <https://doi.org/10.1080/00220388.2011.561325>.
- Khandker, S. R., and W. Mahmud. 2012. "Seasonal Hunger and Public Policies: Evidence From Northwest Bangladesh." The World Bank.
- Khonje, M. G., J. Manda, P. Mkandawire, A. Tufa, and A. D. Alene. 2018. "Adoption and Welfare Impacts of Multiple Agricultural Technologies: Evidence From Eastern Zambia." *Agricultural Economics* 49, no. 5: 599–609. <https://doi.org/10.1111/agec.12445>.
- Konseiga, A. 2005. "Regional Integration Beyond the Traditional Trade Benefits: Labor Mobility Contribution." Peter Lang.
- Kumar, A., A. K. Mishra, S. Saroj, and P. K. Joshi. 2019. "Impact of Traditional Versus Modern Dairy Value Chains on Food Security: Evidence From India's Dairy Sector." *Food Policy* 83: 260–270. <https://doi.org/10.1016/j.foodpol.2019.01.010>.
- Lagakos, D., A. M. Mobarak, and M. E. Waugh. 2023. "The Welfare Effects of Encouraging Rural–Urban Migration." *Econometrica* 91, no. 3: 803–837. <https://doi.org/10.3982/ecta15962>.
- Lucas, R. E. B. 2015. "Internal Migration in Developing Economies: An Overview." Working Paper No. 6. The Global Knowledge Partnership on Migration and Development (KNOMAD).
- Manda, J., C. Azzarri, S. Feleke, B. H. Kotu, L. Claessens, and M. Bekunda. 2021. "Welfare Impacts of Smallholder Farmers' Participation in Multiple Output Markets: Empirical Evidence From Tanzania." *PLOS ONE* 16, no. 5: e0250848. <https://doi.org/10.1371/journal.pone.0250848>.
- Meghir, C., A. M. Mobarak, C. Mommaerts, and M. Morten. 2022. "Migration and Informal Insurance: Evidence From a Randomized Controlled Trial and a Structural Model." *Review of Economic Studies* 89, no. 1: 452–480. <https://doi.org/10.1093/restud/rdab021>.
- Mishra, D. K. 2016. "Introduction: Internal Migration in Contemporary India – An Overview of Issues and concerns." In *Internal Migration in Contemporary India*, edited by D. K. Mishra, 1–25. Sage Publications.
- Mishra, K., O. Kondratjeva, and G. Shively. 2022. "Do Remittances Reshape Household Expenditures? Evidence From Nepal." *World Development* 157: 105926. <https://doi.org/10.1016/j.worlddev.2022.105926>.
- Mobarak, A. M., and M. E. Reimão. 2020. "Seasonal Poverty and Seasonal Migration in Asia." *Asian Development Review* 37, no. 1: 1–42. https://doi.org/10.1162/adev_a_00139.
- Murrugarra, E., J. Larrison, and M. J. Sasin. 2011. *Migration and Poverty: Toward Better Opportunities for the Poor*. World Bank Publications.
- Musungu, A. L., Z. Kubik, and M. Qaim. 2024. "Drought Shocks and Labor Reallocation in Rural Africa: Evidence From Ethiopia." *European Review of Agricultural Economics* 51, no. 4: 1045–1068. <https://doi.org/10.1093/erae/jbae020>.
- Palis, F. G., A. J. B. Malabayabas, G. R. Singleton, M. A. Mazid, and D. E. Johnson. 2016. "Early Harvest of Monsoon Rice to Address Seasonal Hunger in Northwest Bangladesh." *Food Security* 8, no. 2: 443–457. <https://doi.org/10.1007/s12571-016-0560-3>.
- Rahman, K. W. 2022. "International Migration and the Religious Schooling of Children in the Home Country: Evidence From Bangladesh." *Journal of Population Economics* 36, no. 3: 1963–2005. <https://doi.org/10.1007/s00148-022-00912-2>.
- Rahman, M. T., S. Akter, M. R. Rana, A. A. Sabuz, and M. F. Jubayer. 2022. "How COVID-19 Pandemic Is Affecting Achieved Food Security in Bangladesh: A Perspective With Required Policy Interventions." *Journal of Agriculture and Food Research* 7: 100258. <https://doi.org/10.1016/j.jafr.2021.100258>.
- Raihan, J. (2022). "Kurigrame kajer monga kateni (in English: The Deficiency of Work Opportunities Persists in Kurigram)." The Daily Prothom Alo. <https://www.prothomalo.com/bangladesh/milrmugiof>.
- Rana, M. S., and M. Qaim. 2024. "Patterns of Temporary Rural Migration: A Study in Northern Bangladesh." *World Development* 182: 106718. <https://doi.org/10.1016/j.worlddev.2024.106718>.
- Shahriar, A. Z. M., S. Zeba, A. S. M. P. Shonchoy, and S. Parveen. 2006. "Seasonal Migration of Labor in the Autumn Lean Period: Evidence From Kurigram District, Bangladesh." ESS Working Paper No. 07. Dept. of Economics & Social Science, Brac University.
- Shonchoy, A. S. 2015. "Seasonal Migration and Microcredit During Agricultural Lean Seasons: Evidence From Northwest Bangladesh." *Developing Economics* 53, no. 1: 1–26. <https://doi.org/10.1111/deve.12063>.
- Stark, O., and D. E. Bloom. 1985. "The New Economics of Labor Migration." *American Economic Review* 75, no. 2: 173–178. <https://www.jstor.org/stable/1805591>.
- Sucharita, S. 2020. "Socio-Economic Determinants of Temporary Labour Migration in Western Jharkhand, India." *Millennial Asia* 11, no. 2: 226–251. <https://doi.org/10.1177/0976399620925451>.
- Tiwari, C., S. Bhattacharjee, P. Sethi, and D. Chakrabarti. 2022. "Internal Migration and Rural Inequalities in India." *Population Research and Policy Review* 41, no. 4: 1673–1698. <https://doi.org/10.1007/s11113-022-09707-5>.
- Todaro, M. P. 1969. "A Model of Labor Migration and Urban Unemployment in Less Developed Countries." *American Economic Review* 59, no. 1: 138–148. <https://www.jstor.org/stable/1811100>.
- Wang, C., X. Liu, and Z. Yan. 2021. "Temporary Versus Permanent Migration: The Impact on Expenditure Patterns of Households Left Behind." *Review of Economics of the Household* 19, no. 3: 873–911. <https://doi.org/10.1007/s11150-020-09505-y>.
- WFP. 2009. "Comprehensive Food Security & Vulnerability Analysis Guidelines (first edition)." World Food Program.
- Wooldridge, J. M. 2015. "Control Function Methods in Applied Econometrics." *Journal of Human Resources* 50, no. 2: 420–445. <http://www.jstor.org/stable/24735991>.
- Zug, S. 2006. "Monga—Seasonal Food Insecurity in Bangladesh—Bringing the Information Together." *Journal of Social Studies* 111.

Supporting Information

Additional supporting information can be found online in the Supporting Information section.