Temporary migration: Characteristics, livelihood effects, and destination choices in northern rural Bangladesh

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ABSTRACT

Temporary migration is common in poor agrarian economies but remains largely underresearched. While this migration is weaker in reducing poverty than longer-term migration, the reasons many poor rural households continue to prefer temporary migration are inadequately explored in the literature. Similarly, while migration theories often emphasize income-driven migration from rural origins to urban destinations, the preference for rural destinations among many temporary migrants also remains unclear. Employing a mixed-method approach, this study addresses these two key questions in northern rural Bangladesh, contributing to the emerging literature on temporary migration in poor agrarian economies. A qualitative methodology is used to conceptualize temporary migration and destination decision-making, while these insights are further explored through quantitative data from over 800 household surveys and relevant econometric models.

The findings reveal that farm labor constraints and family obligations limit longer-term migration, making temporary migration a viable alternative for risk diversification in the lessdiversified local economy. For poor rural households, temporary migration is crucial for improving food consumption and dietary quality during agricultural lean periods, despite its relatively limited effects on overall household income compared to longer-term migration. Additionally, constrained, poor households often favor rural destinations for temporary migration, which offer a better income-to-cost ratio and allow short-duration mobility without exacerbating their existing constraints at home. By contrast, urban destinations, while associated with higher remittance potential, pose greater costs and risks, making them less viable for these households.

The study highlights the importance of supporting temporary migration as a critical risk mitigation strategy in poor agrarian contexts. Policy measures such as improving access to wage information, reducing search costs, and enhancing inter-district transportation networks could facilitate temporary migration, particularly to rural destinations, thereby improving the welfare of a significant portion of poor agrarian societies. These measures could not only benefit migrating households but also help address farm labor shortages in labor-intensive agricultural regions. Additionally, the study calls for further research into the effects of temporary migration on agricultural production in destination rural areas and the implications of farm mechanization for the livelihoods of rural-bound temporary migrant households.

ZUSAMMENFASSUNG

Temporäre Migration ist in armen Agrarökonomien weit verbreitet, wurde jedoch bisher weitgehend unzureichend erforscht. Obwohl diese Form der Migration weniger effektiv zur Armutsreduktion beiträgt als langfristige Migration, bleiben die Gründe, warum viele arme ländliche Haushalte weiterhin die temporäre Migration bevorzugen, in der Literatur unzureichend untersucht. Ebenso betonen Migrationstheorien häufig einkommensgetriebene Migrationsbewegungen von ländlichen Herkunftsregionen zu städtischen Zielorten, doch die Präferenz für ländliche Zielorte bei vielen temporären Migranten ist ebenfalls unklar. Diese Studie untersucht mithilfe eines Mixed-Methods-Ansatzes zwei zentrale Fragestellungen im nördlichen Bangladesch und leistet damit einen Beitrag zur aufkommenden Literatur über temporäre Migration in armen Agrarökonomien. Eine qualitative Methodik dient dazu, temporäre Migration und die Entscheidungsfindung bezüglich des Zielortes zu konzeptualisieren, während diese Erkenntnisse durch quantitative Daten aus über 800 Haushaltsbefragungen und relevante ökonometrische Modelle weiter analysiert werden.

Die Ergebnisse zeigen, dass Arbeitskraftengpässe in der Landwirtschaft und familiäre Verpflichtungen langfristige Migration einschränken, wodurch temporäre Migration zu einer praktikablen Alternative zur Risikodiversifizierung in der wenig diversifizierten lokalen Wirtschaft wird. Für arme ländliche Haushalte ist temporäre Migration von entscheidender Bedeutung, um die Nahrungsmittelaufnahme und die Ernährungsqualität während der landwirtschaftlichen Nebensaison zu verbessern, trotz ihrer relativ begrenzten Auswirkungen auf das Gesamteinkommen des Haushalts im Vergleich zur langfristigen Migration. Darüber hinaus bevorzugen eingeschränkte, arme Haushalte häufig ländliche Zielorte für die temporäre Migration, da diese ein besseres Einkommenskostenverhältnis bieten und eine Mobilität von kurzer Dauer ermöglichen, ohne bestehende Einschränkungen im Heimatort zu verschärfen. Im Gegensatz dazu sind städtische Zielorte zwar mit einem höheren Überweisungspotenzial verbunden, verursachen jedoch größere Kosten und Risiken, was sie für diese Haushalte weniger praktikabel macht.

Die Studie hebt hervor, wie wichtig es ist, temporäre Migration als entscheidende Strategie zur Risikominderung in armen Agrarkontexten. Politische Maßnahmen wie die Verbesserung des Zugangs zu Lohninformationen, die Senkung von Suchkosten und der Ausbau von interregionalen Verkehrsnetzwerken könnten die temporäre Migration, insbesondere zu ländlichen Zielorten, erleichtern und so das Wohlergehen eines erheblichen Teils armer Agrargesellschaften verbessern. Diese Maßnahmen kämen nicht nur migrierenden Haushalten zugute, sondern könnten auch dazu beitragen, Arbeitskraftengpässe in arbeitsintensiven Agrarregionen zu beheben. Darüber hinaus fordert die Studie weitere Forschung zu den Auswirkungen der temporären Migration auf die landwirtschaftliche Produktion in ländlichen Zielgebieten sowie zu den Implikationen der Mechanisierung der Landwirtschaft für die Lebensgrundlagen ländlich gebundener temporärer Migrantenhaushalte.

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TABLE OF CONTENTS

Contents

Abstract	iii
Zusammenfassung	iv
Acknowledgements	v
Table of contents	vi
List of tables	viii
List of figures	ix
List of abbreviation	х
1. Introduction and motivation	1
1.1. Problem statement and framing the research	1
1.2. Research context	3
1.3. Research question and objectives	4
1.4. Research methodology	5
1.4.1. Sampling	5
1.4.2. Ethics approval	8
1.4.3. Data collection	8
1.4.4. Data analysis	9
1.5 Limitations of the study	9
1.6 Organization of the thesis	10
2. Patterns of temporary rural migration: A study in northern Bangladesh	11
2.1. Introduction	12
2.2. Literature review and conceptual framework	14
2.3. Materials and methods	18
2.3.1. Data collection	18
2.3.2. Data analysis	21
2.4. Results	22
2.4.1. Agricultural seasonality	22
2.4.2. Migration decision-making	25
2.4.2.1. Temporary versus longer-term migration	25
2.4.2.2. Rural over urban destinations during temporary migration	32
2.5. Conclusion	36
3. Temporary migration decisions and effects on household income and diets in	39
rural Bangladesh	
3.1. Introduction	40
3.2. Conceptual framework	42
3.3. Materials and methods	45
3.3.1. Data	45
3.3.2. Modeling migration decisions	48
3.3.3. Modeling effects of migration on income and dietary quality	50
3.3.4. Measuring income and dietary quality	52
3.4. Results	54
3.4.1. Descriptive statistics	54
3.4.2. Factors explaining migration	55
3.4.3. Migration effects on dietary quality and income	58
3.5. Conclusion and policy implications	60
r, r,	

4. Destination choices during internal temporary migration: Evidence from	62	
northern Bangladesh		
4.1. Introduction	63	
4.2. Materials & methods	64	
4.2.1. Data	64	
4.2.2. Model specifications	66	
4.2.2.1. Modeling destination choices during temporary migration	67	
4.2.2.2. Modeling the income effects of different destination choices	71	
4.3. Empirical results	74	
4.3.1. Descriptive statistics	74	
4.3.2. Regression results	76	
4.3.2.1. Destination choices during temporary migration	76	
4.3.2.2. Income effects of the destination choice during temporary	79	
migration		
4.4. Conclusions and policy recommendations	80	
5. Conclusions and policy recommendations	83	
References	85	
Appendix A: Appendix to chapter 1	95	
Appendix B: Appendix to chapter 2		
Appendix C: Appendix to chapter 3	107	
Appendix D: Appendix to chapter 4	116	

LIST OF TABLES

Table 1.1:	Divisional statistics	6		
Table 1.2:	District statistics for Rangpur division			
Table 2.1:	Timelines of major crops and lean periods in northern Bangladesh			
Table 3.1:	Key explanatory variables and their expected effects on migration decisions			
Table 3.2:	Food groups for calculating the food consumption score (FCS)			
Table 3.3:	Factors explaining household migration decisions (two-stage Heckman			
	model)			
Table 3.4:	Effects of migration on household dietary quality and income			
Table 4.1:	4.1: Variables for analysing destination choices during temporary migration			
Table 4.2:	: Summary statistics of the key explanatory variables for destination choices			
Table 4.3:	Mean household income for different destination choices			
Table 4.4:	Factors for destination choices during temporary migration	77		
Table 4.5:	Income effects of the destination choice during temporary migration	79		
Table C1:	Mean of household's membership in local community institutions	107		
Table C2:	Collinearity tests for variables in two-stage Heckman probit selection	107		
	model			
Table C3:	Summary statistics of key explanatory variables for migration decision-	108		
	making	100		
Table C4:	Mean weekly consumption of various food groups	109		
Table C5:	Mean FCS, PCS, TPS, and household income during lean periods	109		
Table C6:	Robustness check (migration decisions using control function approach)	110		
Table C7:	First-stage MNLS results (Base category: <i>Mil</i> = 1, non-migration)	111		
Table C8:	Falsification tests for the IVs (effects of IVs on the control group)			
Table C9:	Second-stage regression results for FCS			
Table C10:	Second-stage regression results for PCS			
Table C11:	Second-stage regression results for TPS			
Table C12:	Second-stage regression results for income (Inc)			
Table C13:	Robustness checks (treatment effects estimated with IPWRA)			
Table D1:	: Mean of household experience of idiosyncratic economic shocks in the past			
	year	117		
Table D2:	Collinearity tests for variables to explain temporary migrant's destination	11/		
Table D2.	Choices Mean household income for different temperature microtion duration	110		
Table D3:	Mean differences of income from different local montest sources	119		
Table D4:	Factors for migration and temporary migration by compating solf solastion	119		
Table D5:	• Factors for migration and temporary migration by correcting self-selection			
Table D6.	Income effects of destination choices by correcting self-selection bias	120		
Table Do.	(equation 5)	120		
Table D7:	Factors for migration, temporary migration, and destination choices	121		
	employing multi-step control function approach (equation 2, 3, and 4)			
Table D8:	Full regression results from equation (5) using multi-step control function	122		
	approach			
Table D9:	First-stage regression results summary from 2sls	122		

LIST OF FIGURES

Figure 1.1:	Location of the study districts and villages	7
Figure 2.1:	Study districts and villages in northern Bangladesh	20
Figure 2.2:	Temporary migration and destination decision-making patterns	29
Figure 2.3:	Temporary migration pathways from northern Bangladesh	32
Figure 3.1:	Temporary migration as a two-stage decision-making process	43
Figure 3.2:	Geographic locations of study villages	47
Figure 4.1:	Migration and destination choice statistic	74
Figure D1:	Popular destination districts among temporary migrants from northern	118
0	Bangladesh	

LIST OF ABBREVIATION

2sls	Two-stage least squares		
ATT	Average treatment effects on the treated		
ATU	Average treatment effects on the untreated		
BBS	Bangladesh Bureau of Statistics		
BDT	Bangladeshi taka (currency)		
CDF	Cumulative distribution function		
ES	Employment seasonality		
EV	Exclusion variable		
FCS	Food consumption score		
FDC	Family demographic constraints		
FLC	Farm labor constraints		
GHK	Geweke-Hajivassiliou-Keane simulator		
HDDS	Household dietary diversity score		
imr	Inverse mills ratio		
IPWRA	Inverse probability weighting with regression adjustment		
IV	Instrumental variable		
LIML	Limited information maximum likelihood		
LM	Longer-term migration		
MESR	Multinomial endogenous switching regression		
MN	Migrant networks		
MNLS	Multinomial logit selection		
NELM	New economics of labor migration		
NGO	Non-government organization		
PCS	Protein consumption score		
PDF	Probability density function		
TM	Temporary migration		
TPS	Temporary protein shortfall		
USD\$	US dollar		
WFP	World Food Programme		
ZEF	Center for Development Research		

Dedicated to the indomitable student spirit of Bangladesh!

- Md. Sohel Rana

CHAPTER 1

1. Introduction and motivation

1.1. Problem statement and framing the research

Migration is a widely recognized strategy to diversify risks for poor rural households (Mishra, 2016; Murrugarra et al., 2011; Stark & Bloom, 1985; Sugden et al., 2021). Migration can be local or international, longer-term or temporary. For much of the 20th century, research focused primarily on international and longer-term internal migration (Bryan et al., 2014; Wang & Charles-Edwards, 2024). However, in-country temporary migration has gained recent attention, especially in poor agrarian contexts where it is more prevalent and displays distinct characteristics compared to longer-term migration (Bryan et al., 2014; Chen et al., 2019; Coffey et al., 2014; Keshri & Bhagat, 2013; Khandker & Mahmud 2012; Lucas, 2015; Shahriar et al., 2006; Sucharita 2020; Sun & Fan, 2010; Tiwari et al., 2022; Wang & Charles-Edwards, 2024; Wang et al., 2021). For instance, temporary migration is mostly poverty-driven, which is not necessarily true for longer-term migration (Mishra, 2016; Tiwari et al., 2022). Apart from earning income, longer-term migration could be motivated by better education, amenities or even marriage (Davin, 1999; Fafchamps & Shilpi, 2012; Lucas, 2015; Rajan & Chyrmang, 2016). Moreover, unlike longer-term migration, temporary migration is primarily driven by the availability of wages rather than wage differentials (Lucas, 2015).

Despite its prevalence, temporary migration in poor agrarian contexts is often overlooked in public policy, highlighting the need for a deeper understanding of its drivers and consequences. Some studies have explored factors for temporary migration, mostly comparing it as a choice against non-migration (Asefawu & Nedessa, 2022; Dodd et al., 2016; Keshri & Bhagat, 2013; Khandker et al., 2012; Shahriar et al., 2006; Sucharita, 2020). Research also exists on exploring the determinants for both temporary and longer-term migration, including studies in China (Sun & Fan, 2010; Hu et al., 2011; Wang et al., 2021), India (Keshri & Bhagat, 2013; Tiwari et al., 2022), and Pakistan (Chen et al., 2019). Existing studies indicate that temporary migration can generate higher income gains than non-migration (De Brauw & Harigaya, 2007; Fabry &

Maertens, 2024; Gibson & McKenzie, 2014; Mobarak & Akram, 2016; Tiwari et al., 2022). However, some studies also find that longer-term migration is more effective than temporary migration in reducing poverty (Dash, 2023; Mishra, 2016; Wang et al., 2021). This raises a question as to why many poor rural households still choose temporary over longer-term migration—a question not well understood in the existing literature. Our research aims to address this question in the first place.

While the positive income effects of temporary migration compared to non-migration have been explored, its income effects compared to longer-term migration and its impacts on household food consumption, particularly dietary quality, are poorly understood in the literature. Research shows that temporary migration can increase food expenditure (Wang et al., 2021) and alleviate seasonal hunger by increasing caloric intake during lean periods (Bryan et al., 2014; Khandker et al., 2012; Mobarak & Reimão, 2020). However, caloric intake alone does not necessarily indicate improved dietary quality, particularly for poor households that often rely on cheap, calorie-dense staple foods but may still lack essential nutrients (Ritchie, 2021). Protein and micronutrient deficiencies are particularly pronounced among the rural poor during agricultural lean periods and can have long-term negative health consequences (Development Initiatives, 2022; Lomborg, 2016; Raihan, 2022). To our knowledge, no study has examined how temporary migration affects income and dietary quality compared to longer-term migration—a gap that this research addresses. This can additionally extend our understanding of rural households' choice of temporary migration as opposed to longer-term migration.

Another assumption in migration studies is that urban destinations offer greater income gains than rural ones. Cities in Bangladesh, for example, often offer double the wage, even for physical labor-based jobs than the equivalent rural jobs in the country (Lagakos et al., 2023). As destination choice is largely dictated by the economic potentials of destination places (Regmi et al., 2019), the assumption of temporary migration from rural agriculture to modern sectors in urban destinations is common in the existing literature (Asefawu & Nedessa, 2022; Bryan et al., 2014; Coffey et al., 2014; de Brauw & Harigaya, 2007; Keshri & Bhagat, 2013; Lagakos et al., 2023; Liu & Xu, 2015; Sun & Fan, 2010; Tiwari et al., 2022; Wang et al., 2021). Likewise, policymakers in developing economies often perceive temporary migration primarily as a rural-to-urban move. In Bangladesh, for instance, temporary migration is thought to contribute to the overcrowding of cities (Afsar, 2005; Shonchoy, 2015), causing policymakers to hesitate in creating supportive policies. However, recent data from northern

rural Bangladesh, where temporary migration is common (Khandker et al., 2012; Mobarak & Reimão, 2020), suggest that more than half of temporary migrants choose rural destinations, particularly for agricultural works, despite lower wages (Bryan et al., 2014; Lagakos et al., 2023; Meghir et al., 2022; RDRS, 2018). This destination pattern is also common in neighbouring Myanmar and India (Visaria & Joshi, 2021; Wang & Charles-Edwards, 2024), which challenges widely held public beliefs about rural-to-urban migration.

While there are studies on destination choices during internal migration, most focus on ruralto-urban move during longer-term migration (Aydemir & Duman, 2021; Fafchamps & Shilpi, 2012; Thiede, 2023). A few also address rural-to-rural migration decisions for longer-term migrants (Chamberlin et al., 2020), but none have explored this for temporary migration, which is larger in scale and distinct in nature, as mentioned earlier. This research investigates why many rural households opt for temporary migration to rural areas as opposed to urban destinations—a question remaining unclear in the literature also.

1.2. Research context

Temporary migration is a common phenomenon in poor agrarian contexts like Bangladesh, China, India, Indonesia, Ethiopia, and Vietnam (Asefawu & Nedessa, 2022; de Brauw & Harigaya, 2007; Keshri & Bhagat, 2013; Khandker & Mahmud, 2012; Sucharita 2020; Wang & Charles-Edwards, 2024; Wang et al., 2021). This study focuses on Bangladesh, not only due to our familiarity with the country but also because it provides a valuable context for studying temporary migration in a poor agrarian setting (Bryan et al., 2014; Khandker & Mahmud, 2012; Shonchoy, 2015).

Given that temporary migration is primarily income-driven for poor rural households in Bangladesh and other South Asian countries (Khandker & Mahmud, 2012; Mishra, 2016; Sun & Fan, 2010; Tiwari et al., 2022), this research focuses exclusively on income-driven migration. Such migration can involve skilled labor (e.g., a household member with higher education migrating to the capital city or going abroad) or unskilled labor without requiring specific formal education. Both types of migration can be quite different in terms of their determinants and effects. This research focuses on unskilled migration, which is widely observed in poor agrarian contexts like Bangladesh, and is applicable for both temporary and longer-term migration.

The definition of temporary migration varies across countries. In China, it is tied to the internal visa system (i.e., *Hukou* registration), while in most other countries, migration duration in each

episode is the primary criterion (Wang & Charles-Edwards, 2024). However, the duration used to define temporary migration ranges from one to six months across different contexts (Keshri & Bhagat, 2013; Mueller et al., 2019; Wang & Charles-Edwards, 2024). In Bangladesh, temporary migration lasts from a few weeks to a few months, primarily during agricultural lean periods, when wage opportunities in the origin villages sharply decline (Bryan et al., 2014; Khandker & Mahmud, 2012; Mobarak & Reimão, 2020). These lean periods occur twice a year, each lasting 2–3 months between the planting and harvesting of rice, a staple crop (Bryan et al., 2014; Khandker et al., 2012; Mobarak & Akram, 2016; Gill et al., 2003). Aligning with the lean period's duration, we define temporary migration as a move for up to three months (90 days) in an episode. However, unskilled longer-term migrants can also adopt this pattern, returning home for a few days or weeks to rest from physically demanding jobs. During these returns, nonetheless, longer-term migrants rarely participate in the local labor market. Therefore, to differentiate between unskilled temporary and longer-term migration, we add another condition: the migrant's active participation in the local labor market during their return visits. Studies show that temporary migrants return often during planting and harvest seasons, the so-called normal periods, when wage opportunities normalize in their origin villages (Bryan et al., 2014; Khandker & Mahmud, 2012; Zug 2006).

1.3. Research question and objectives

This research addresses the overarching question: *Why do many rural people in poor agrarian societies often choose internal temporary migration as opposed to longer-term migration, and why do they prefer rural destinations over urban ones during temporary migration?*

To answer this question, the specific study objectives are:

Objective 1: To understand rural households' choice between temporary and longer-term migration.

Objective 2: To measure the income and dietary effects of temporary migration compared to longer-term migration.

Objective 3: To understand destination choices between rural and urban areas during temporary migration.

Objective 4: To measure the income effects of different destination choices during temporary migration.

1.4. Research methodology

Since temporary migration is transient by nature, it often remains invisible in poverty economics. Therefore, data on temporary migration are frequently scarce in statistics (Wang & Charles-Edwards, 2024). Consequently, we base this research on primary data.

Additionally, peoples' choice between temporary and longer-term migration, as well as between rural and urban destinations, remain poorly understood in the literature, as noted earlier. Therefore, we employ a mixed-method approach: first, a qualitative exploration to conceptualize these decisions, and second, a quantitative analysis informed by the qualitative findings to deepen our understanding. We address Objective 1 and 3 (i.e., temporary migration and destination decisions, respectively) using qualitative data initially in Chapter 2. We then extend the analysis of temporary migration choices (Objective 1) using quantitative data in Chapter 3. Similarly, destination choices during temporary migration (Objective 3) are further extended with quantitative methods in Chapter 4. Guided by the qualitative insights, Objective 2 (the income and dietary effects of temporary migration) is addressed solely with quantitative data in Chapter 3, while Objective 4 (the income effects of destination choices) is examined in Chapter 4. The overall methodology is summarized in Sections 1.4.1 to 1.4.4 and detailed in the respective chapters.

1.4.1. Sampling

We employed a *multi-stage sampling* approach to select study regions/divisions, districts, villages, and respondent households in Bangladesh. Temporary migration mainly occurs during agricultural lean periods, due to limited wage diversification in the origin villages, as mentioned earlier. Studies show that Rangpur division–also known as northern or northwest Bangladesh–experiences more pronounced agricultural lean periods than other parts of the country (Bryan et al., 2014; Khandker, 2012).

Rice is the staple crop in this region, cultivated in two main seasons: *Boro* (January to June) and *Aman* (July to December). During each season, there is a 2–3-month period between planting and harvest when agricultural wage opportunities drop drastically, resulting in lean periods for agriculture-dependent households (Bryan et al., 2014; Khandker 2012; Khandker & Mahmud, 2012). Compared to other regions, Rangpur has less diversification in cropping and rural economy, exacerbating the severity and impacts of lean periods in the region (Khandker, 2012; Khandker et al., 2012). This makes temporary migration a common risk-diversification strategy in the area, particularly among agriculture-dependent households

(Khandker et al., 2012; Mobarak & Reimão, 2020). Therefore, in the first stage, we purposively selected Rangpur division, the poorest division in the country with the highest proportion of agriculture labor-dependent households (Table 1.1).

Divisions	Population [†]	Poverty rate (%) ^{††}	% of agricultural labor-dependent households ^{†††}
Barishal	9,100,102	26.5	27%
Chattogram	33,202,326	18.4	22%
Dhaka	44,215,107	16.0	18%
Khulna	17,416,645	27.5	40%
Mymensingh	12,225,498	32.8	31%
Rajshahi	20,353,119	28.9	39%
Rangpur	17,610,956	47.2	44%
Sylhet	11,034,863	16.2	30%
Bangladesh	165,158,616	24.3	30%

Table 1.1: Divisional statistics

Source: [†]BBS (2022a); ^{††}Hossain & Hossen (2020); ^{†††}BBB (2022b)

There are eight districts in Rangpur division. In the second stage, we purposively selected two districts based on the proportion of agricultural labor-dependent households that are more vulnerable to agricultural lean periods thus more prone to temporary migration (Khandker et al., 2012). Accordingly, we chose the Kurigram and Dinajpur districts that also hold the highest poverty rates (Table 1.2) and include geographical variations in the region (Figure 1.1).

Districts	Population ^{\dagger}	Poverty rate (%) ^{††}	% of agricultural labor- dependent households ^{†††}
Dinajpur	3,315,238	64.3	45%
Gaibandha	2,562,232	46.7	43%
Kurigram	2,329,161	70.8	52%
Lalmonirhat	1,428,406	42.0	46%
Nilphamari	2,092,567	32.3	44%
Panchagarh	1,179,843	26.3	38%
Rangpur	3,169,615	43.8	42%
Thakurgaon	1,533,894	23.4	40%
Rangpur Division	7,610,956	47.2	44%

 Table 1.2: District statistics for Rangpur division

Source: [†]BBS (2022a); ^{††}Hossain & Hossen (2020); ^{†††}BBB (2022b)



Map source: Authors' construct from free GIS and open street map data

Figure 1.1: Location of the study districts and villages

There are 1,872 villages in Kurigram and 2,131 villages in Dinajpur. In the third stage, we selected villages from these districts following a stratified random sampling approach. For the qualitative exploration, we randomly selected four villages from each district, totaling eight villages. For the quantitative study, we randomly selected 16 villages from Dinajpur and 14 from Kurigram. The study locations are presented in Figure 1.1.

Finally, in the fourth stage, we randomly selected study participants. For the qualitative study, we sampled and interviewed 33 households from eight villages and conducted three focus group discussions with participants from diverse backgrounds, including both poor and affluent farm households, migrant and non-migrant households, and male and female household members. Further details are provided in Chapter 2. For the quantitative study, power calculations with a 99% confidence level and a 5% margin of error suggested to survey a minimum of 612 households. To be on the safe side, we randomly selected 10% of households in each of the 30 selected villages, along with some additional replacement households in case of non-responses or missing data. We surveyed a total of 878 households, including 10-14% of households from each village. Further details are provided in Chapters 3 and 4.

1.4.2. Ethics approval

After selecting the study districts, we prepared the data collection protocols, including the interview questionnaire and consent forms for potential study participants. The protocols were reviewed and approved by the Research Ethics Board of the Center for Development Research (ZEF) at the University of Bonn, Germany. A copy of the approval is provided in Appendix A1.

1.4.3. Data collection

For the qualitative exploration, we conduct in-depth interviews and focus group discussions using semi-structured questionnaires. For the quantitative study, we conduct household surveys with a structured questionnaire programmed in SurveyCTO. In both cases, data collection takes place between June and August, a period known as the "normal season" in northern Bangladesh, when temporary migrants often return to home for harvesting *Boro* and planting *Aman* seasonal rice. Qualitative data collection took place in June-August 2022. Informed by this qualitative exploration of temporary migration and destination decisions, we designed the quantitative study and conducted household surveys in June-August 2023.

During both in-depth interviews and household surveys, we primarily approached the household head, who is often the migrant member in the context of northern rural Bangladesh. If the sampled household included migrants, we prioritized interviewing those migrant

members to collect their detailed migration data. To gather households' food consumption data, we administered this part of the survey with an adult member who had been present in the household throughout the year, often the spouse of the head. The detailed data collection methodology and types of data gathered through in-depth interviews, group discussions, and household surveys are outlined in the respective chapters.

1.4.4. Data analysis

Qualitative data—33 in-depth interviews and three focus group discussions—are analyzed employing the coding and categorization technique (Kuckartz 2019; Saldaña 2013), which helps conceptualize rural people's decision patterns regarding choices of temporary versus longer-term migration (Objective 1) and destination choices between rural and urban areas (Objective 3). Further details are in Chapter 2.

Building on the qualitative exploration, we employ a two-stage Heckman probit selection model (Heckman, 1979) to analyze rural households' choices between temporary and longer-term migration, correcting for their self-selection into migration. To measure the comparative income and dietary effects (Objective 3), we utilize a multinomial endogenous switching regression (MESR) model with an instrumental variable (IV) approach (Dubin & McFadden, 1984; Kassie et al., 2014; Manda et al., 2021), addressing endogeneity challenges. In this analysis, we use the household survey dataset of 878 observations. Further details are in Chapter 3.

To further extend our qualitative conceptualization of temporary migrants' choices between rural and urban destinations (Objective 3) and the income effects of these destinations choices (Objective 4), we employ multi-step conditional regression analyses with subsamples, extending on Heckman (1979)'s two-stage decision model. These analyses correct for migrants' self-selection biases and are conducted using an individual-level dataset. The surveyed 878 households included 3,818 individual observations, which are utilized here. Further details are in Chapter 4.

1.5. Limitations of the study

The research questions could have been interesting to investigate in other regions of Bangladesh as well. However, due to resource constraints, we were unable to extend the investigation to other areas. For the same reason, the quantitative analysis is limited to using only cross-sectional data from a single year, affecting the causal strength of the findings.

1.6. Organization of the thesis

The entire thesis is organized as follows. Chapter 1 introduces the research by outlining the motivation for the study and its contribution to the literature, along with highlighting research objectives and overall methodology. Chapter 2 addresses Objectives 1 and 3 using an explorative qualitative methodology. In this chapter, we conceptualize rural households' decision patterns for choosing temporary versus longer-term migration as well as rural versus urban destinations during temporary migration. Chapter 2 also precedes Objective 2 by revealing the relevance of temporary migration to improve the dietary quality of poor rural households during agricultural lean periods. Objective 2 is then addressed with quantitative data in Chapter 3. Additionally, Chapter 3 extends Objective 1 utilizing quantitative methods to deepen our understanding of rural households' choices between temporary migration. Similarly, in Chapter 4, we extend our understanding of temporary migratis' destination choices between rural and urban areas (Objective 3) and the income effects of these different destination choices (Objective 4), employing quantitative data. Finally, the study results are summarized and their policy implications are outlined in the conclusion Chapter 5.

CHAPTER 2

2. Patterns of temporary rural migration: A study in northern Bangladesh¹

Abstract

Migration from rural to urban areas is common in many low- and middle-income countries. However, temporary migration from rural to other rural areas also occurs and is not yet well understood. Here, we conceptualize what drives rural people to migrate temporarily to other rural areas, rather than to urban areas where wages are usually higher. This question is analysed with qualitative data collected through group discussions and in-depth interviews with randomly selected households in northern rural Bangladesh, where temporary migration is widely observed. The data reveal that temporary migration is common especially among poor agriculture- dependent households with farm labour and family demographic constraints that prevent longer-term migration. Many temporary migrants prefer rural over urban destinations, influenced by their limited skills, social networks, negative perceptions of cities, and the comparative income-cost ratios between destinations. Our findings suggest that the notion of temporary migration in low- and middle-income countries being primarily a rural-to-urban move needs to be re-evaluated.

Keywords: Agricultural seasonality; Bangladesh; Temporary migration; Rural-torural migration

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2.1. Introduction

Migration is an effective strategy to offset income fluctuations and diversify income options for poor rural households (Mishra, 2016a; Murrugarra et al., 2011; Stark & Bloom, 1985; Sugden et al., 2021). Given widespread and severe rural labour market imperfections, migration is often the preferred choice for income diversification (Khandker & Mahmud, 2012; Mishra, 2016a). Longer-term migration is typically driven by better income-earning opportunities elsewhere, but can also have other reasons, such as seeking higher education, health facilities, better living environments, or marriage (Davin, 1999; Fafchamps & Shilpi, 2012; Lucas, 2015; Rajan & Chyrmang, 2016). In contrast, short-term temporary migration is purely income-driven, typically in response to income seasonality, poverty, and sometimes climate shocks (Coffey et al., 2014; Khandker & Mahmud, 2012; Mishra, 2016b; Shonchoy, 2015; Tiwari et al., 2022; Wang et al., 2021; Zug 2006).

Neoclassical economic theories, as well as the aspiration-capability framework of migration, predict income-driven migration from low- productive rural areas to be directed towards more lucrative modern sectors, usually located in urban areas (De Haas, 2021; Lee, 1966; Lewis, 1954; Mishra, 2016a; Todaro, 1969). Climate-induced migration in developing economies is also primarily directed towards urban destinations (Thiede, 2023). Therefore, existing research on temporary migration focuses mostly on the rural-to-urban stream (Asefawu & Nedessa, 2022; Bryan et al., 2014; Coffey et al., 2014; de Brauw & Harigaya, 2007; Hu et al., 2011; Keshri & Bhagat, 2013; Lagakos et al., 2023; Liu & Xu, 2015; Tiwari et al., 2022; Wang et al., 2021). Likewise, policymakers in developing economies often perceive temporary migration primarily as a rural-to-urban move. In Bangladesh, for instance, temporary migration is thought to contribute to the over-crowding of cities (Afsar, 2005; Shonchoy, 2015), causing policymakers to hesitate in creating supportive policies.

However, recent data from northern Bangladesh suggest that more than half of the temporary migrants choose rural destinations in search of agricultural employment (Meghir et al., 2022; RDRS, 2018), despite an urban-to-rural wage ratio of 1.89 in the country (Lagakos et al., 2023). This observation not only challenges widely-held public beliefs but also raises the question as to why rural people decide to migrate temporarily to other rural areas rather than to cities with better job opportunities and higher wages. Here, we explore this question in the context of northern Bangladesh, where temporary migration is particularly common due to pronounced agricultural lean periods (Khandker & Mahmud, 2012; Mobarak & Reimão, 2020).

To better understand the destination choices among temporary mi- grants, it is also instructive to analyse why many rural people decide for temporary instead of longer-term migration in the first place. Several existing studies examine determinants of temporary and longer-term migration, including research in China (Hu et al., 2011; Wang et al., 2021), India (Keshri & Bhagat, 2013; Tiwari et al., 2022), and Pakistan (Chen et al., 2019). We build on this existing knowledge in the context of northern Bangladesh to better understand rural people's decisions between temporary and longer-term migration, before exploring the choice of rural versus urban destinations among the temporary migrants.

For our research, we use a qualitative approach, which we consider suitable for understanding the nuances of personal motivations, perceptions, and constraints. In particular, we use data from group discussions and individual interviews with randomly selected households in northern rural Bangladesh. We seek to gain insights into how rural households make their first migration decision, and how their migration decisions evolve over time, pursuing two concrete research objectives: (1) understanding rural people's decision-making between temporary and longer-term migration, and (2) exploring factors driving their decisions to migrate temporarily to other rural rather than urban destinations. Our study and results are specific to northern Bangladesh, so caution should be exercised when extrapolating the findings to other regions. Moreover, the qualitative and explorative approach means that associations are not rigorously identified in a causal sense. Nevertheless, some of the general insights may still be useful to better understand the complexities of migration decisions in similar socio-economic contexts, also beyond northern Bangladesh.

The rest of this article is organized as follows. In Section 2, the relevant literature on temporary and longer-term migration and on migration destinations is discussed as a basis for our conceptual framework. Section 3 explains the collection of the qualitative data and the analytical approach. Section 4 presents and discusses the results, while Section 5 concludes.

2.2. Literature review and conceptual framework

There is a large body of literature explaining rural people's motives for migration. Neoclassical theories have explained migration through the *dual sector model of development* (Lewis, 1954), the *push-pull model* (Lee, 1966), and the *expected income model* (Harris & Todaro, 1970; Todaro, 1969). In essence, these models place spatial and sectoral differences in wages at the centre of the decision-making process for migration from low-productivity rural areas to more lucrative urban destinations. The *human capital model* by Sjaastad (1962) emphasises human capital factors such as age, education, and market-based cost-benefit calculations in migration decision-making.

The *aspiration-capability framework* is a relatively recent approach that explains migration as a function of 'aspirations' and 'capabilities' (Carling, 2002; De Haas, 2021). For example, poverty raises people's 'aspirations' to migrate, however, it also lowers their 'capability' to do so making them 'involuntarily immobile' (Carling, 2002). Capabilities are defined by De Haas (2021) as ranging from physical resources (e.g., financial means) and human capital (e.g., ideas, knowledge, and skills) to social capital (e.g., networks, and state policy). Instead of focusing on why people migrate, this framework is remarkable for explaining when people do not or cannot do so.

However, all these models largely focus on international migration and in-country permanent or longer-term migration. In many developing economies, in-country temporary migration is much bigger in size, yet largely under-researched (Keshri & Bhagat, 2013; Lucas, 2015; Mobarak & Reimão, 2020; Sucharita, 2020; Wang et al., 2021). The characteristics of temporary migration are different from those of longer-term migration (Keshri & Bhagat, 2013; Shahriar et al., 2006). For example, temporary migration is mostly poverty-driven, which is not necessarily true for longer-term migration (Mishra, 2016a). Moreover, unlike longer-term migration, temporary migration is more driven by the wage availability at the destination than by wage differentials between the origin and destination (Lucas, 2015).

We define temporary migration as the movement of individuals outside of their own village in search of income for a period of up to three months for each episode, after which they return to their village and actively participate in the local labour market. This is mainly a distress-driven type of migration that poor people make in search of low-skilled employment (Coffey et al., 2014; Keshri & Bhagat, 2013; Khandker & Mahmud, 2012; Tiwari et al., 2022). As temporary migration is typically associated with agricultural seasonality (Coffey et al., 2014;

Khandker & Mahmud, 2012; Shonchoy, 2015; Tiwari et al., 2022), and an agricultural lean period in northern Bangladesh lasts for 2-3 months (Bryan et al., 2014; Khandker & Mahmud, 2012; Mobarak & Reimão, 2020), a threshold of three months is considered appropriate to differentiate between temporary and longer-term migration.

Longer-term migration is hence defined to occur for a minimum of three months, but often spans the entire year. Longer-term migration also includes permanent or semi-permanent migration of individuals. Studies frequently highlight tertiary education, enhanced skills-sets, and greater household wealth as prerequisites for this type of migration (Chen et al., 2019; Coffey et al., 2014; Hu et al., 2011; Keshri & Bhagat, 2013; Mishra, 2016b; Tiwari et al., 2022). In poor rural contexts, many households fail to meet these prerequisites. Therefore, their choice for low-skilled temporary migration as opposed to high-skilled longer-term migration could be misleading—a fact that is rarely considered in the existing studies comparing these two types of migration.

Nevertheless, longer-term migration also occurs among poor households and often for lowskilled jobs, which can be compared to their choice of temporary migration. To distinguish between these two types of low-skilled migration, we introduce an additional indicator: the migrant's return to participate in the local labour market at the origin. Low-skilled longer-term migrants may occasionally return to visit their left-behind families in the origin villages, but they would not actively participate in the local labour market.

Temporary migration can help smooth income seasonality and reduce seasonal hunger by increasing food consumption (Bryan et al., 2014; Khandker et al., 2012; Wang et al., 2021). Yet, only one-third of poor rural households in northern Bangladesh engage in temporary migration (Khandker & Mahmud, 2012). Bryan et al. (2014) suggests resource incapability and a risk-averse attitude, especially the fear of failed migration in the face of uncertainty at potential destinations, as major reasons for not engaging in temporary migration. Khandker et al. (2012) identify the cost of migration and the lack of relevant social networks as potential barriers. More generally, the literature suggests that individual and community networks act as a form of social capital that can reduce the cost of migration and enhance migration capability (Chen et al., 2019; Dash, 2023; Mishra, 2016a; Shahriar et al., 2006; Stark & Bloom, 1985; Tiwari et al., 2022; Wang et al., 2021). However, the influence of such networks on decision-making between temporary and longer-term migration, and particularly between rural and urban destinations, remains unclear.

Existing studies also discuss the association of individual characteristics - such as age, education, occupation, gender, and marital status – with temporary migration decision-making. While temporary migrants are commonly younger than non-migrants (de Brauw & Harigaya, 2007; Dodd et al., 2016; Khandker & Mahmud, 2012; Shahriar et al., 2006; Sucharita, 2020; Tiwari et al., 2022; Wang et al., 2021), the results for education levels are mixed. In Vietnam, de Brauw & Harigaya (2007) find temporary migrants to be better educated than non-migrants, whereas most other studies show a significantly negative association between education and temporary migration (Coffey et al., 2014; Mishra, 2016a; Shahriar et al., 2006; Shonchoy, 2015; Srivastava, 2020; Tiwari et al., 2022; Wang et al., 2021). In contrast, the association between education and longer-term migration is mostly positive (Chen et al., 2019; Hu et al., 2011; Keshri & Bhagat, 2013; Wang et al., 2021). Individuals engaged in agriculture are often more prone to temporary migration (Khandker & Mahmud, 2012; Shahriar et al., 2006; Tiwari et al., 2022; Zug, 2006), whereas household engagement in agriculture also deters migration, including temporary migration (Coffey et al., 2014; Dodd et al., 2016). For marital status, the results are ambiguous for both temporary and longer-term migration (Hu et al., 2011; Shahriar et al., 2006). In terms of gender, especially in conservative socio-cultural contexts like Bangladesh, Indonesia, and Pakistan, women are observed to be less likely involved in incomedriven migration (Chen et al., 2019; Evertsen & van der Geest, 2019; Hugo, 1982; Shahriar et al., 2006). They are often left behind by their male counterparts to care for the household at the origin (Srivastava, 2020).

For several household characteristics, existing studies find mixed results. For instance, land ownership is positively associated with temporary migration in China (Wang et al., 2021; Wen et al., 2023), but negatively associated in Bangladesh (Khandker & Mahmud, 2012; Shahriar et al., 2006) and India (Dodd et al., 2016; Mishra, 2016b; Tiwari et al., 2022; Sucharita, 2020). Similarly, access to microcredit is positively associated with temporary migration in some situations (Dash, 2023; Mishra, 2016b; Shonchoy, 2015; Sucharita, 2020), but negatively in others (Khandker & Mahmud, 2012; Shahriar et al., 2006). Household size is mostly positively associated with temporary migration (Asefawu & Nedessa, 2022; Chen et al., 2019; Coffey et al., 2014; Dodd et al., 2016; Khandker & Mahmud, 2012; Wang et al., 2021), even though having to care for children and elderly family members can impose certain constraints, thus affecting migration decisions. Several studies highlight that separation from the family can trigger psychological anxiety among migrants (Banerjee & Duflo, 2007; Mucci et al., 2019).

We build on this literature to better understand which factors encourage the choice of temporary migration as opposed to longer-term migration in northern rural Bangladesh. Of particular interest are those factors that show ambiguous results in the existing literature, including individual characteristics such as education and marital status, and household characteristics such as land ownership, agricultural activities, and family demographics. Additionally, we investigate how social networks and gender influence decision-making between temporary and longer-term migration.

There is also a growing body of literature analysing how climate change and weather shocks influence migration. While climate change tends to increase migration in general, effects on temporary versus longer-term migration decisions seem to be context-specific. In East Africa, Mueller et al. (2020) find no significant effects of climate variability on temporary migration from rural communities. In northern Thailand, Entwisle et al. (2020) suggest that extreme floods and droughts have small effects on migration in general but have negative effects on temporary migration. Similarly, in Pakistan, floods appear insignificant for migration, but heat stress seems to induce longer-term migration (Mueller et al., 2014). Conversely, in Bangladesh, recurring floods are found to have positive effects on temporary migration (Call et al., 2017; Khandker & Mahmud, 2012).

In our context of northern Bangladesh, we conceptualize two plausible channels through which climate effects and weather shocks may influence migration decisions. First, extreme flood events and river-erosion could displace rural households, forcing them to migrate permanently. Second, floods, droughts, and extreme heat episodes may disrupt economic activities at the origin, especially farming, releasing labour to migrate either temporarily or for longer periods in search of employment elsewhere. In this study, we address all income-driven migration irrespective of the root causes.

Regarding our second research objective, the choice of temporary migration destinations, existing studies on temporary migration mainly focus on rural-to-urban movement, as mentioned above. A few studies analysing rural-to-rural migration exist, but mostly in connection with longer-term migration. For instance, Chamberlin et al. (2020) analyse the relevance of agro-environmental factors, such as land availability and crop production opportunities, for longer-term migration decisions to other rural destinations in Zambia. Fafchamps & Shilpi (2012) study the situation in Nepal and find a significant influence of physical distance, population density, ethnic and cultural similarities, and comparative amenities on the destination decisions for longer-term migration, mainly from rural to urban

but partly also from rural to other rural areas. Globally, Thiede (2023) shows that climateinduced in-country migration tends to concentrate in urban areas across the developing world. For temporary migration, it remains unclear why a significant share of the rural poor chooses to migrate to other rural instead of urban areas, which we address here.

2.3. Materials and methods

2.3.1. Data collection

To conceptualize migration decision-making of rural people in northern Bangladesh, we utilise qualitative data collected through individual interviews and group discussions. The study focuses on Rangpur Division (equivalent to northern Bangladesh), which is home to over 17 million people, constituting around 11% of the country's total population (BBS, 2022a). Rangpur holds the highest proportion of agriculture-dependent households in the country (BBS, 2022b) that are particularly vulnerable to agricultural seasonality (Khandker & Mahmud, 2012). As alternative economic opportunities in Rangpur are limited, temporary migration is a common and sometimes the only effective strategy for the rural poor to cope with agricultural lean periods (Khandker et al., 2012; Mobarak & Reimão, 2020). In essence, the majority of temporary migrants in Bangladesh originate from this region (Khandker & Mahmud, 2012).

Rangpur Division comprises eight administrative districts. Out of these, two districts— Kurigram and Dinajpur— were purposefully selected for this study, as they have the highest proportion of agriculture-dependent households. Around 52% and 45% of rural households in Kurigram and Dinajpur, respectively, depend on agricultural labour sales, compared to the divisional average of 44% in Rangpur and the national average of 30% (BBS, 2022b). In each of the two districts, we randomly selected four villages, leading to a total of eight study villages, as shown in Figure 2.1.

In these villages, the households for the interviews were selected randomly to obtain a representative picture of migration patterns, including non-migrants as well as temporary and longer-term migrants to rural and urban destinations. Data collection took place during the *Aman* planting period from July to August 2022, when most of the temporary migrants were present in their home villages. Additionally, this period includes one of the two largest festivals in Bangladesh—the *Eid* festival—when longer-term migrants also return to visit their families at the origin. On every working day, we reached the village around 3:00 PM– slightly before the afternoon *Asar* prayer, as this is when the working members typically return home from

their work. After making a transect walk through the village, we identified an entry point and then started conducting interviews with every 20th household on our right. This systematic random sampling approach enabled us to cover different clusters (locally known as '*para*') within the villages.

In total, 33 randomly selected households from the eight villages were interviewed, using a semi-structured questionnaire, as shown in Appendix B1. Interviews were conducted primarily with the household head, typically a male who in most cases was also the person migrating. In two households, we interviewed women migrant members. During the interviews, we refrained from introducing the term 'migration' and instead focused on understanding the timing, duration, and effects of agricultural seasonality for participant households. We let the participants bring up the topic of migration on their own and then delved deeper into it. We asked respondents to share their life stories in a chronological order, including the economic conditions of their households and any other relevant personal, family, or social events. Participants spontaneously described the situation that made them choose migration in the first place, and the process of changing their migration decisions over time.

Additionally, we held three group discussions with purposefully selected diverse groups of rural people, ranging from landless farmers and labour-based households to the so-called 'well-off' farmers who own agricultural lands. Current and past migrants as well as non-migrants participated in each group discussion. The purpose of these group discussions was mainly twofold: first, to conceptualize agricultural seasonality in the region and its general implications for households' migration decisions; second, to map temporary migration and destination decision-making for rural people. Additionally, we gathered insights from the groups regarding gender implications of temporary migration.

Both the individual interviews and the group discussions were facilitated by locally hired research assistants under the direct supervision of the researchers. We hired two research assistants, one from Kurigram and another from Dinajpur District, who spoke the regional dialects and understood the local socio-cultural contexts. Before conducting the interviews and group discussions, we obtained informed consent from all participants, clearly communicating the purpose of the study and emphasizing that their participation is entirely voluntary. The consent forms are available in Appendix B2. The study protocols were reviewed and approved by the Research Ethics Board of the Center for Development Research (ZEF) at the University of Bonn in Germany.



Map source: Authors' construct from free GIS and open street map data

Figure 2.1: Study districts and villages in northern Bangladesh

The list of interviews and discussions, along with basic profiles of the participants (e.g., age, gender, education, and household size) and summarized migration histories of the households, are presented in Appendix B3. The average size of households in our sample is 4.1, which is close to the average of 3.9 in Rangpur Division (BBS, 2022a). The other mean values are similar to official statistics for rural areas in Rangpur Division as well.

Over three-fourths of our sampled households (28 out of 33) were involved in migration at some point in the past, even though around one-fourth (7 out of 28) mentioned during the interviews that they were no longer migrating at that time. About two-thirds of the migrant households (19 out of 28) were involved in temporary migration. Concerning destination choices, around half of the temporary migrants (10 out of 19) migrate exclusively to other rural destinations. Furthermore, we observe that it is quite common for temporary migrants to switch between rural and urban destinations. Interestingly, we find no single household sending women on temporary migration. In three households (out of 33), women were engaged in longer-term migration to urban destinations.

Two of our sampled households had sent migrants solely for education; we consider them as non-migrant households in our study. One household had sent a migrant initially for low-skilled longer-term migration, who then switched to high-skilled longer-term migration. In this study, we refrain from analysing high-skilled longer-term migration, as the motives and influencing factors are often quite different from those of low-skilled migration, as discussed above.

2.3.2. Data analysis

The interviews and group discussions were conducted in the local language (i.e., Bengali) and audio-recorded whenever possible. The recordings were then transcribed and translated into English by the same research assistants, who administered the respective interview or discussion. In a few cases, respondents did not permit to record the interviews. In those cases, detailed notes were taken on paper, which were also transcribed and translated by the respective research assistants.

After the transcription and translation, we employed the *coding and categorization* method, following Saldaña (2013), to analyse the scripts. In this method, a segment of qualitative text, such as a sentence or a paragraph, is labelled with a word or short phrase– referred to as 'code'– that symbolically reflects the summative and salient essence of that data segment (Saldaña, 2013). This method helps condense a large volume of qualitative data into several meaningful

codes, which are then categorized based on their similarity and regularity to obtain conceptual patterns.

We completed two cycles of iterative coding on our interview and discussion scripts. In the first cycle, we reviewed the scripts carefully, assigning descriptive codes inductively to the data segments according to their emergent meaning. An example of this first-cycle coding is included in Appendix B4. In the second coding cycle, following Saldaña's (2013) approach, we revisited the transcripts, refined the first-cycle codes primarily by synthesizing the conceptually similar codes, and re-coded the transcripts iteratively. Then, we transferred all the second-cycle codes to a separate document, where we categorized (and re-categorized) them based on their trends and mutual relationships. The initial categorization of codes mostly followed a deductive approach (Kuckartz 2019; Saldaña 2013), where seemingly relevant codes were grouped based on our phenomena of interest. Through this exercise, certain decision-making patterns emerged in line with our research objectives. An example of this categorization exercise and the emergence of decision patterns is presented and elucidated in Appendix B4.

Using this analytical approach, we find the nuanced relevance of 'household constraints,' 'agricultural seasonality,' and several 'individual characteristics' in choosing temporary over longer-term migration. Similarly, factors such as 'agricultural endurance,' 'social networks,' 'income-cost ratios at destinations,' and 'urban negativity' are identified as relevant in choosing rural over urban destinations. The decision patterns, as emerged from the data, are explained in more detail in the results section.

2.4. Results

The findings are discussed in two broader subsections. First, we look at the agricultural seasonality in the study areas, and second, we analyse temporary migration and subsequent destination decision-making in more detail.

2.4.1. Agricultural seasonality

"Kamla manush kam thakle babu, kam na thakle kabu (in English: If there are jobs, agricultural labourers are well-off, otherwise, they are worse-off)"

A local Bengali saying from northern rural Bangladesh.

In both study districts, Kurigram and Dinajpur, we observed two major crop seasons per year, *Aman*, and *Boro*. In both seasons, paddy is the main crop cultivated. *Aman* cultivation occurs

from June/July to December, while *Boro* from January to May/June. In some highland areas, a third crop– such as mustard, short-duration potato, or vegetables– is cultivated between the early harvested *Aman* and the late planted *Boro*, or the *Aus* paddy between the early harvested *Boro* and late planted *Aman*. During the *Boro* season, some farmers– mostly well-off ones with greater land flexibility– also grow other crops, such as vegetables, wheat, maize, potato, onion, or jute. The *Boro* period, therefore, is characterized by a slightly higher level of crop diversification than the *Aman*.

In this region, we also observe the prevalence of two dominant lean periods. *Aman* lean usually occurs for 2-3 months between planting and harvesting the *Aman* paddy, from mid-August to mid-November. Similarly, *Boro* lean occurs from February to April, between planting and harvesting the *Boro* paddy. The interviews and group discussions reveal that rural communities in northern Bangladesh, particularly those relying on agricultural labour, face a severe shortage of income opportunities during those lean periods. This is due to the low labour demand during the paddy growing season, which cannot absorb the large number of agricultural labourers. The daily wage rate drops drastically to almost half or even less, limiting the labourer's ability to earn income in the local setting and to purchase higher-value, protein-rich foods such as meat and fish. Additionally, prices for rice and fresh seasonal vegetables tend to rise during these pre-harvest lean periods. These findings are consistent with the existing literature, showing that income and food price fluctuations have historically led to seasonal hunger, locally referred to as "*monga*," during the agricultural lean periods in northern Bangladesh (Bryan et al., 2014; Khandker & Mahmud, 2012; Zug, 2006).

Improvements in agriculture, such as high-yielding and short-duration crop varieties, along with investments in rural infrastructure, microcredit schemes, social safety-net programs, and other risk management tools, have helped alleviate seasonal hunger by reducing the duration and severity of lean periods (Khandker & Mahmud, 2012; Palis et al., 2016; Shonchoy, 2015). Nevertheless, our data reveal the acute prevalence of seasonality in income and poverty in northern Bangladesh due to a lack of daily wage opportunities during agricultural lean periods. As a result, marginal farmers and agricultural labour-based households are often forced to cut back on food expenditures during these periods. While outright hunger is less prevalent nowadays, the literature shows that nutrient deficiencies resulting from low-quality diets are still common and tend to increase during agricultural lean periods (Lomborg, 2016; Raihan, 2022). Additionally, our data suggest that the rural poor tend to ignore minor health issues due

to financial constraints during lean periods, sometimes resulting in more severe long-term health problems.

During the planting and harvest seasons of the *Aman* and *Boro* paddy, which collectively span 4-6 months per year, agricultural labourers have the most opportunities to earn income in their villages. We refer to these months as the 'normal periods,' during which local wage rates are quite similar to those in other rural areas of Bangladesh. The timelines for major crop cultivation and lean periods in the study region are outlined in Table 2.1, based on our data.

Activity	Months	Lean period duration
Boro planting	January to Mid-February	
Boro lean	Mid-February to April	~2 months
Boro harvest	May to mid-June	
Aman planting	June/July to mid-August	
Aman lean	Mid-August to mid-November	2-3 months
Aman harvest	Mid-November to December	
JAN FEB MAR AF	R MAY JUN JUL AUG	SEP OCT NOV DEC
Boro plantation Boro lean	Boro harvest Aman plantation	Aman lean Aman harvest

Table 2.1: Timelines of major crops and lean periods in northern Bangladesh (Source: Authors)

In some environmentally vulnerable regions like flood-prone lowlands and *Char* areas (river islands) of Kurigram, the *Aman* lean period alone can sometimes last 5-6 months, with the lean periods collectively extending to seven months per year. In these areas, primarily one main crop is cultivated during the drier *Boro* period. During other months, especially from June to September, the crop lands are often flooded and not suitable for cultivation, prolonging the *Aman* lean period from June/July to October/November.

Our data suggest that the rural poor adopt various strategies to cope with lean seasonality, including reducing expenses, migration, taking out loans, and selling assets. Temporary migration for low-skilled jobs is a common tactic. Credit can sometimes be obtained from microcredit agencies or informally from friends, relatives, or neighbours at varying interest rates. In case of informal borrowing, repayment may also involve providing cheaper labour to

the lending farmers during normal periods. Selling stored food crops, livestock, or other assets is also adopted to help mitigate shocks, particularly idiosyncratic ones.

2.4.2. Migration decision-making

We now discuss temporary migration and destination decision-making in our sample households. By analysing the migration history of households, we have captured distinct patterns in their decisions to migrate initially, then choose between temporary and longer-term migration, and between rural and urban destinations. Here, we discuss these decision patterns and outline the critical factors influencing them. For a visual overview, the decision patterns and underlying factors are illustrated in Figure 2.2. It is important to note that the factors mentioned here are not necessarily complete and conclusive. Based on qualitative data, they simply highlight some key patterns that can help us understand some of the associated factors and complexities.

2.4.2.1. Temporary versus longer-term migration

"Men work only long enough to acquire the cash needed to buy things which only cash can buy, and when they have earned enough, they leave employment and return to subsistence farms" (Elkan 1959, 191).

Most of our randomly selected households have completed at least one episode of migration for income during their lifetime, with temporary migration being the prominent type. We observe that this migration is often undertaken to seek physical labour-intensive unskilled jobs with daily wages, such as agricultural labour in rural destinations, or rickshaw-pulling in cities. In contrast, longer-term migration is made for daily wage-based physical labour-intensive jobs, like year-round rickshaw-pulling, or for monthly salary-based unskilled or semi-skilled jobs in places like garment factories or private firms in cities. The decision patterns for temporary versus longer-term migration are outlined in Figure 2.2 and elucidated below.

2.4.2.1.1. Agricultural seasonality prompts temporary migration

Consistent with the existing literature, our findings suggest that poverty, triggered by poor agricultural conditions, socio-economic vulnerability, and climatic disasters, among other factors, is an important driver of income-driven migration in northern Bangladesh (Khandker & Mahmud, 2012; Mobarak & Reimão, 2020; Zug, 2006). Our data also clearly reveal that the *seasonality* nature of poverty, caused by agricultural lean periods, is key to understand people's choices between temporary and longer-term migration. We find that temporary migration predominantly occurs during the pre-harvest lean period, typically lasting for less than 45 days
per episode, to mitigate the temporary employment shortfall at the origin. Throughout the harvest and subsequent planting periods, employment opportunities and daily wage rates at the origin revert to normal.

Moreover, taking loans from neighbours or microcredit organizations is another common coping strategy for the rural poor. Under what conditions such loans can offset agricultural seasonality and the need for migration requires further investigation. However, particularly for microcredit loans, we observe that season-independent repayment systems compel poor borrowers to temporarily migrate to be able to continue repayment during lean periods. This is consistent with other studies from different contexts (Dash, 2023; Mishra, 2016b; Shonchoy, 2015; Sucharita, 2020).

Climate change may potentially aggravate agricultural seasonality, which could mean that poor rural households will have to extend their migration periods. Our interviews and one group discussion in a flood-prone village highlight the comparative preference for longer-term migration among the poor in climate-vulnerable regions, where the agricultural lean period is often prolonged, as previously discussed. However, this does not mean that longer-term migrants are always poorer or worse-off than temporary migrants. In our sample, the economic status of households participating in low-skilled longer-term migration is comparable to that of temporary migrant households, even though the motives of migration are sometimes different. We observe that longer-term migration is seen primarily as a strategy to alleviate poverty through regular remittances, whereas temporary migration aims to smooth seasonal hardships, particularly during short-duration lean periods. This is consistent with the literature (Mishra, 2016a; Tiwari et al., 2022; Wang et al., 2021), even though climate change may potentially change these patterns.

2.4.2.1.2. Farm labour constraints catalyse temporary migration

Our data reveal that marginal farmers and agricultural labour-based households with *own farming* for subsistence, particularly those with a *small-sized nuclear family structure*, are more likely to engage in temporary migration during lean periods than in longer-term migration. These households grow crops mostly for own consumption. Due to their low cash earnings and thus limited ability to hire labour from the market, they rely heavily on their own family labour for all agricultural operations. Additionally, family labour is considered superior to hired labour in terms of productivity and quality. Therefore, for these households, the opportunity costs of sending an adult member on a longer-term migration, especially during the labour-intensive

planting and harvest seasons, are high. Temporary migration allows them to smooth their income during lean periods while still maintaining their own farming operations. Therefore, small family structure and farm labour constraints seem to be relevant factors in the decision for temporary versus longer-term migration.

In contrast, we find *extended households* with more family members and households without own farming operations to be more likely involved in longer-term migration, irrespective of their location in villages with short-duration lean periods. These households do not have critical farm labour constraints. For them, the opportunity cost of returning from migration to participate in the origin's labour market is rather high.

All our randomly selected households with temporary migrants were engaged in subsistence farming at the origin. Also, many of them were nuclear with only one migrating member. Most of the nuclear households opting for migration chose temporary migration; merely one-quarter had longer-term migrants. Almost all nuclear households with longer-term migrants did not have their own farming at the origin.

2.4.2.1.3. Family demographic constraints discourage migration, particularly longer-term migration

Family demographic constraints constitute another set of household-level factors that influence migration dynamics, particularly in terms of discouraging migration and, if migration is necessary, preferring temporary over longer-term migration (Figure 2.2). Family demographic constraints include the presence of elderly, disabled, or severely ill family members, as well as adolescent daughters and children in need of special care, and recent marriage of the migrant member, among others.

Family demographic constraints often trigger *socio-cultural bindings*, which was mentioned as a reason against migration especially among well-off households. We define well-off households as those owning at least 33 decimals (equivalent to 1 *Bigha* or one-third of an acre) of agricultural land, which is commonly perceived as a source of *sufficient* income in the local context. These households mainly farm for commercial purposes, i.e., selling more than half of their harvest. Some of them migrate to diversify their income. However, our data suggest that the combination of being well-off and having family demographic constraints discourages migration. In fact, this combination is observed for most of our non-migrant households and also seems to be associated with an element of social expectations. Several of the better-off

households with family demographic constraints mentioned the concern of "what would the society think of me?" to explain their non-migration decision.

In contrast, extreme poverty may outweigh such socio-cultural bindings, meaning that poor households often migrate in spite of family demographic constraints. Yet, when choosing migration, family demographic constraints seem to be an important factor for preferring temporary migration. Our analysis suggests that such constraints often have a negative impact on individuals' psychological well-being during migration, which is consistent with the existing literature (Banerjee & Duflo, 2007; Mucci et al., 2019). For instance, the head of a nuclear household may experience persisting anxiety while away from their family, particularly if the left-behind household includes critical family obligations. Temporary migration with only a short period of separation from the family seems to be a preferred strategy in this case. This can partly explain the occurrence of some temporary migration from villages experiencing prolonged lean periods.

Furthermore, our data suggest that the new emergence of family demographic constraints, sometimes coupled with farm labour constraints, is also an important reason for longer-term migrants to switch to temporary migration (Box 1). Around half of the longer-term migrants in our sample had switched to temporary migration at some point, mainly due to newly emerged family-related constraints. In some cases, such increased family obligations also lead to stopping migration completely, if *sufficient* income has already been generated. Another related factor in such switching decision-making is the *aging* of migrants, which often comes with increased family obligations at the origin as well as reduced opportunities, particularly in physical labour-intensive jobs in urban destinations.

Box 1: "I, my wife, and our 17-year-old son migrated to Dhaka to work in garments (longer-term migration). After two years, when our daughter was born there, I returned home with my wife and daughter, leaving behind our son. I never returned to Dhaka because I needed to take care of my family and farm here (...which was managed by my elder brother before we got separated...). Nowadays, I temporarily migrate during our lean periods because this allows me to take care of my family here... and because our son cannot earn enough to remit to us. Rather, I send money to our son sometimes, especially when he falls ill, because his earnings from the garment industry are scanty...... Several times I asked him to return, but he has not. He has some (more than primary level) education.... also, he is not good at farming, so what would he do here upon return?"

A migrant with both temporary and longer-term migration experiences



Figure 2.2: Temporary migration and destination decision-making patterns (Source: Authors)

2.4.2.1.4. Social cost concerns discourage temporary migration among young, educated, and women

Many of our sampled longer-term migrants possess *more than primary education* and begin their migration at *young age*, usually before turning 25. These young migrants usually seek semi-skilled monthly salaried jobs in cities, particularly in garment factories or other private firms. They tend to avoid temporary migration, which often involves physically more demanding work.

Temporary migration, characterized by physical labour-based jobs, is often also associated with social demeaning, resulting in higher *social costs* in the origin societies. Young people, particularly those with more than primary education or coming from well-off households, seem to have a strong sensitivity to these social costs, as our data suggest. Such social stigma is less associated with longer-term migration, which can be a reason for some to choose longer-term migration, even when this may not lead to significant income benefits.

We find this social cost factor also to be particularly relevant for women migrants, which is consistent with the literature. In the conservative socio-cultural context, women are less likely to migrate than men due to the social custom of *purdah*² (Hugo, 1982). Evertsen & van der Geest (2019) find this custom strongly associated with social stigma that restricts women's migration in Bangladesh. Our research reveals that physical labour-based temporary migration rarely accommodates women's adherence to *purdah*, in addition to their possible lack of physical capability and personal security at temporary migration destinations. In fact, in our sample households and group discussions, we found no single case of a woman migrating temporarily. Households with capable adult members often face stigma when sending their women members on temporary migration. However, as mentioned, we observed a small number of households sending their women members on longer-term migration to cities. The growing job opportunities in the garments industry attract poor rural women to migrate for monthly salaried jobs that offer relatively better physical comforts and social dignity. During such migration, however, women are often accompanied by an adult male family member, typically their spouse, for personal security and to avoid social stigma in their origin societies.

² Purdah is a socio-religious-cultural custom of covering the full body of women by long clothes in public.

2.4.2.1.5. Nuanced effects of network support in migration decisions

Our research shows that the support network of relatives, friends, and neighbours, also referred to as 'kin,' plays a significant role in the decision to migrate. Rural poor households typically only get engaged in migration once they have established a functional *support network*. All migrants in our sample mentioned to seek support from already migrated kin or *sardar³*, at least in making their first migration. This assistance can include providing information or traveling support, and may also extend to financial, accommodation, job arrangement, and psycho-social support at the destination. Longer-term migrants frequently require job arrangement support from their kin at the destination, while information support may sometimes suffice for temporary migrants. Our data reveal the key importance of network support in offsetting rural poor's risk-aversion towards migration. Risk-aversion was earlier identified by Bryan et al. (2014) as an important reason for non-migration among the rural poor.

However, it is not so clear from our data whether the network support also plays a role in people's choices between temporary and longer-term migration. Factors such as individual and household characteristics, along with agricultural seasonality, discussed above are likely more relevant in making this decision. For instance, a household with farm labour and family demographic constraints is unlikely to pursue longer-term migration, even with support from longer-term migrant kin. Similarly, a household with no such constraints may choose longer-term migration, even if a good friend from the origin is involved in temporary migration.

Another important result from our research is that longer-term migration is more costly than temporary migration, both financially and emotionally. This was also pointed out in earlier studies in different contexts (Banerjee & Duflo, 2007; Coffey et al., 2014). Nevertheless, the financial cost may not be completely decisive for the choice between temporary and longer-term migration. For example, poor households without any constraints are more likely to choose longer-term migration and find ways to finance it, rather than choosing temporary migration solely based on cost concerns. *Network support* often plays a crucial role in financing migration costs and facilitating the migration process.

³*Sardar* refers to a 'leader' who arranges jobs as well as transportation for migrants to destinations. He maintains communication with potential employers and, accordingly, provides them with migrant labourers. He may receive a share from the migrants for arranging jobs and/or extra benefits from employers at the destination.

2.4.2.2. Rural over urban destinations during temporary migration

We use our sample data to map the typical temporary migration pathways from northern Bangladesh, as shown in Figure 2.3. Some migrate within Rangpur Division. Yet, most migrate to other divisions in Bangladesh, with rural and urban destinations in Dhaka Division being the main attraction points. Tangail, Gazipur, Faridpur, and Manikganj Districts in Dhaka Division are some of the popular rural destinations for temporary migrants. Most urban-bound migrants go to Dhaka City, Chittagong, and Sylhet, mainly due to the larger urban agglomerations and better wage opportunities there. Interestingly, travel distance and costs do not appear to be a decisive factor in the choice of temporary migration to rural versus urban destinations. Many of the temporary migrants in our sample travel to rural areas in Chittagong, Cumilla, Faridpur, Feni, Jashore, and Noakhali Districts, which are farther away than the most popular urban destination– Dhaka City (Figure 2.3).



Figure 2.3: Temporary migration pathways from northern Bangladesh (Source: Authors)

More than half of the temporary migrants in our sample migrate to rural areas, where they typically find day-labour jobs in crop farming, livestock, or fisheries. Seasonal patterns differ geographically within Bangladesh. Hence, agricultural job opportunities in rural areas vary temporally, with some regions offering work earlier or later in the year than others. For example, the paddy harvest in the southern and eastern parts of Bangladesh occurs one or two months earlier than in the north. Additionally, crop diversification levels vary across regions. Consequently, rural areas in other parts of the country often offer agricultural employment for migrant labourers during the northern lean periods.

In urban areas, temporary migrants can find work throughout the year in jobs such as rickshawpulling, construction/masonry, street vending, and brick kilning, among others. Our interviews and group discussions reveal that rickshaw-pulling is the most popular type of work for temporary migrants in urban areas, followed by construction/masonry. Factors associated with the destination choices for temporary migration are listed in Figure 2.2 and discussed below.

2.4.2.2.1. Nuanced implications of age, agricultural endurance, and place-based perceptions

The influence of *age* on destination selection appears to be ambiguous and individual-specific. In our sample, we observe temporary migrants to both rural and urban destinations at any age. However, two distinct patterns about the age of temporary migrants and their destination choices emerge from our data. First, *young* individuals with *low endurance* for agricultural jobs often opt for urban destinations when engaging in temporary migration. Second, as migrants *get older*, they prefer agricultural jobs in rural destinations.

To elucidate the first pattern, we define *endurance* as an individual's physical capability combined with their skills and experiences. As commonly observed, young individuals below 20 years of age often lack such endurance for agricultural jobs, potentially discouraging them from choosing rural destinations. Furthermore, the facets of agricultural endurance often vary between rural places of origin and destination. Our research reveals that agricultural jobs in origin villages often offer more *flexibility* in terms of working hours and days, which is not always the case in other rural destinations during migration. Therefore, people with sufficient agricultural skills at home may still face reduced endurance at other rural destinations, leading them to switch to urban destinations in pursuit of more flexibility. As mentioned, one common job for temporary migrants in urban areas is rickshaw-pulling, which offers more flexible working hours than agricultural jobs in rural destinations.

The perceived respectability and *social stigma* associated with urban and rural jobs may also influence the destination selection. Migration for agricultural jobs is often deemed less respectable in the origin societies, resulting in social stigma for those who migrate to rural areas. We noticed above that this concern about social stigma is particularly pronounced among *young* migrants or those from well-off households. As individuals age, this concern seems to diminish, which helps to explain the second pattern. Older people seem to prioritise *safety* and *comfort* over social stigma, contributing to stronger preferences for rural destinations. Our data reveal that agricultural jobs are perceived as physically more comfortable than urban jobs among older rural people. During our group discussions and interviews, a statement recurring frequently from older migrants was: "(*physical labour-based*) *urban jobs destroy the body*, *whereas agricultural jobs keep it fit.*"

Approximately one-quarter of the temporary migrants in our sample have been migrating to rural destinations since young age. The interview data reveal that they do not see cities as desirable destinations, primarily due to their limited life experiences. Many have negative attitudes towards cities, perceiving them as complex and potentially dangerous places. Nearly all rural-bound temporary migrants in our sample voiced a certain degree of negative perception of cities, mentioning concerns about safety, health hazards, traffic, and harassment. We term this perception as *urban negativity*, which often outweighs concerns about destination-specific social stigma, irrespective of the migrant's age, contributing to preferences for rural over urban destinations.

2.4.2.2.2. Network support affects the destination choice

Unlike the choice between temporary and longer-term migration, destination choice for temporary migration is critically influenced by the kin of potential migrants. All our sampled migrants decided on their first migration destination based on the experience of their migrant kin. Longer-term migrants, for instance, are often sent to their migrant kin who can provide transport, accommodation, job assistance, or mere psychological support at the destination. Temporary migrants may also join their kin or *sardar* and choose the destination as a group.

In fact, our data show that *group migration* is particularly prominent for temporary migration to rural destinations. Rural employers often favour hiring a group of labourers to ensure the timely completion of their farming tasks. Moreover, it is common for rural-bound migrants to travel to different rural destinations, sometimes even within the same migration episode, which is much less common for urban-bound migrants. These extensive travels are easier to

coordinate in a group. Furthermore, the interviews and group discussions revealed that group migration is considered more pleasurable and less risky (Box 2). In contrast, urban-bound migrants, who often stick to the same employer, may migrate alone, with only a phone call to their kin or employer at the destination. In other words, when a larger group of people from a village migrate to rural destinations, an aspiring migrant is likely to end up with them, especially when being risk-averse.

Another channel through which networks often influence aspiring migrants' destination choice is the information from previous migration experiences. The collective experience of networks can generate and change place-based perceptions in the origin societies. For example, a negative experience of a kin during migration to a city can trigger urban negativity among aspiring migrants, as frequently observed in our sample.

Box 2: "When I first migrated some 25-30 years ago, I wanted to join a group from our village (rather than migrating alone), traveling alone is dangerous.... I could go to Dhaka (urban), but I heard bad things about Dhaka.... Also, there were not many people from our area migrating there. But there was a big group from our village migrating to Manikganj and Tangail (rural) every year, I joined them.....

.... I never migrate alone because I need someone to take care of me in case of any accidents or sickness, or at the very least, I need someone to gossip with during travels or in free time after work (at destinations). Also, 'gerosthos' (employing farmers) usually prefer hiring a group of labourers rather than a single labourer to complete tasks quickly and adhere to crop calendars. So, the chances of getting jobs will increase if I migrate there in a group......"

A rural-bound temporary migrant

2.4.2.2.3. Duration of wage opportunities versus saving satisfaction

Our data show that expectations of longer-duration or *consistent wage opportunities* are a key factor for some to prefer urban over rural destinations during temporary migration. This is particularly true for households suffering from prolonged lean periods, such as those residing in flood-prone areas. It also applies to households without own agricultural production for whom labour supply is the main source of income. As discussed earlier, these households are more likely to choose longer-term migration, but, in case of family demographic constraints, they may opt for more frequent temporary migration to urban destinations, where jobs are more consistently available throughout the year than in rural areas.

Wage opportunities for migration in rural areas, particularly in agriculture, are typically seasonal and have a limited duration, often lasting for only 15-30 days per season. However, there are temporal variations in job opportunities across different rural regions, as discussed before. To take advantage of such variations, migrants need to travel frequently between rural

areas, even within the same migration episode. Our interviews and discussions suggest that those with sufficient *agricultural endurance* or *urban negativity* are willing to cope with such frequent travel. Others find this inconvenient and therefore prefer urban over rural destinations.

In contrast, one factor that clearly came out as a compelling argument for rural destinations is the *satisfaction of saving* income. While temporary urban jobs sometimes offer double or triple the daily wage than rural jobs, a significant share of these earnings often needs to be spent on living expenses in urban environments. This is different in rural locations, where employers often provide free accommodation and meals for temporary migrant labourers, resulting in a net income almost similar to that in urban destinations. Our data reveal that the often-higher *income-cost ratio* for migration to rural destinations provides rural-bound migrants with the psychological *satisfaction of saving* their 'hard-earned' income, which is consistent with the well-known phenomenon of loss aversion.⁴ This psychological effect contributes to a preference for rural destinations. In essence, while differences in gross wage rates matter, comparative *income-cost ratio* and the *satisfaction of saving* also play key roles in deciding between rural and urban destinations for temporary migration.

2.5. Conclusion

Migration from rural to urban areas is a common phenomenon in many low- and middleincome countries. However, temporary migration from rural to other rural areas also occurs and is so far not well understood. In this study, we have collected and used qualitative data from northern Bangladesh to explore what drives rural people to migrate temporarily to other rural areas instead of urban areas, where job opportunities and wages are typically better. Building on the existing literature, we have also analysed rural people's decision-making between temporary and longer-term migration.

In northern Bangladesh, as in many other developing economies, temporary migration during agricultural lean periods is more common than longer-term migration. The need to maintain the family farm and the availability of agricultural jobs at the origin during normal periods are impeding factors for longer-term migration. In fact, seasonal income fluctuation is found as the most important factor for triggering temporary migration decisions, which is consistent with earlier research (Coffey et al., 2014; Khandker & Mahmud, 2012; Tiwari et al., 2022; Zug, 2006). Additionally, certain household-level constraints offer a more comprehensive

⁴ This concept suggests that 'losses' have a greater influence on setting preferences than 'gains' (Tversky & Kahneman, 1991).

understanding of rural people's choices between temporary and longer-term migration. Labour constraints for family farming, and demographic constraints including the need to care for children, adolescents, or elderly family members, are also important reasons to prefer temporary over longer-term migration. While earlier studies argue that migration is often proportional to household size (Asefawu & Nedessa, 2022; Deshingkar & Start, 2003; Tsegai, 2005), we find that even small households often engage in temporary migration due to economic needs. This calls for policies to support temporary migration on the one hand, and for technological and institutional innovations to mitigate seasonal income fluctuations on the other.

Longer-term migration occurs almost exclusively to urban areas, whereas temporary migration is headed to both rural and urban destinations. In fact, temporary migration to rural areas is more common among migrants from northern rural Bangladesh. In rural destinations, temporary migrants are mostly engaged in agricultural jobs. Urban areas typically offer higher wages and sometimes more flexibility in jobs. However, staying in urban areas is also costlier and perceived by many as riskier. Urban negativity is especially pronounced among people lacking experiences and skills beyond agriculture. More generally, the higher income-cost ratio in rural destinations and the psychological satisfaction about saving income seem to be important factors for many to prefer rural over urban destinations.

In contrast, temporary migration to rural areas can be accompanied by social stigma, particularly influencing sensitive young migrants to prefer urban destinations and longer-term migration. Yet, our research also reveals that migration preferences can change over the lifespan of people, depending on age, physical capability, and family responsibilities, among other reasons. Interestingly, physical distance, while mentioned as a relevant factor in migration decisions in the literature (De Weerdt et al., 2021; Lucas, 2015), does not appear to be relevant in our case, neither for choosing between temporary and longer-term migration nor for selecting rural versus urban destinations.

Another critical factor in making decisions for migration in general, and migration destinations in particular, is the social network of people. A functional network can encourage and ease migration by offering information, financial, psychological, and job arrangement support, which is crucial, especially for longer-term migration to urban destinations. But also for temporary migration, networks shape aspiring migrants' place-based perceptions and offer various types of support. Particularly for temporary migrants to other rural areas, it is common to migrate in groups from their origin village. Going in a group not only makes migration more pleasurable but also reduces perceived risks. Therefore, group migration can be another reason for the widely observed preference for rural destinations among the risk-averse rural poor during their temporary migrations. Furthermore, we find that many initially urban-bound migrants eventually switch to rural destinations when they age. Earlier studies hardly analyse such destination decisions, which is where our study offers novel insights.

Our specific findings from northern Bangladesh cannot simply be generalized. Nevertheless, we expect that some of the general mechanisms of migration decision-making may be similar also in other parts of the world. Even though not much analysed yet, there are indications in the literature that rural-to-rural temporary migration is also widely observed in other parts of Asia and Africa (Christiaensen & Maertens, 2022). Temporary migration is particularly relevant in rural regions with widespread poverty and recurring agricultural lean periods. It may also gain in importance with climate change and more frequent weather extremes, reducing the local income-earning opportunities of agriculture-dependent households.

In any case, our findings suggest that traditional views of temporary migration only occurring from rural to urban areas need to be re-evaluated to better understand development opportunities and constraints, and design suitable policies to help the rural poor improve their situation. Further research with quantitative data will be useful to validate and extend the findings from our explorative qualitative research.

CHAPTER 3

3. Temporary migration decisions and effects on household income and diets in rural Bangladesh⁵

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. While 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 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.

Keywords: Agricultural seasonality; Bangladesh; Food security; Nutrition; Temporary migration.

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3.1. 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 & 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 & Bhagat, 2013; Khandker & 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 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 recurrent temporary migration (Khandker et al., 2012; Mobarak & 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 & 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 wages, in Bangladesh, most temporary migrants migrate to other rural areas to work in agriculture (Meghir et al., 2022; Rana & 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 & Nedessa, 2022; Dodd et al., 2016; Keshri & 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 & 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 & 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 effects of temporary migration on household livelihoods (De Brauw & Harigaya, 2007; Gibson & 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 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 longerterm 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.

3.2. 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 & 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 wellbeing. 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 & 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. While 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 type 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 seasons may still be feasible for these households. While often not captured in official statistics, temporary

migration is a common phenomenon in many countries, including Bangladesh, China, and India, among others (Keshri & Bhagat, 2013; Khandker & Mahmud, 2012; Rana & Qaim, 2024; Sucharita 2020; Wang et al., 2021).

Temporary migration can be conceptualized as a two-stage decision-making process, as shown in Figure 3.1. 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.



Figure 3.1: Temporary migration as a two-stage decision-making process

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 & Mahmud, 2012; Zug, 2006). While 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 one 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 & Harigaya, 2007; Giulietti et al., 2018; Khandker et al., 2012; Stark & 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 networks 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 & Nedessa, 2022; Coffey et al., 2014; Deshingkar & 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 nonmigration, but some of them include migration for more than six-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 incomedriven movement of individuals outside of their own village for any period up to three 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 three 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.

3.3. Materials and methods

3.3.1. Data

We use household survey data collected in northern Bangladesh in 2023 employing a multistage sampling procedure. We collected data in the Rangpur Division (equivalent to 'northern Bangladesh'), a region of Bangladesh with the highest proportion of agricultural labordependent households that are highly vulnerable to agricultural seasonality (BBS, 2022; Khandker & 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 & Hossen, 2020). Dinajpur has a total of 2,131 villages, from which we randomly selected 16 for our survey, whereas Kurigram has a total of 1,872 villages, from which we randomly selected 14, resulting in a total of 30 survey villages (Figure 3.2).

In all 30 villages, we obtained complete household lists from the local government offices, known as the *union parishad* offices. According to these lists, 7,441 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 & Qaim, 2024). The survey was conducted during the *Aman* planting period, June-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, socio-demographic 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.



Figure 3.2: Geographic locations of study villages (Source: own presentation based on free GIS and open street map data)

3.3.2. 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 either 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 (eq. 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 (eq. 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.

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

$$TM_i = g (ES_i, MN_i, FDC_i, FLC_i, X_i, imr_i)$$
(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 3.1. 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 households' social respect in the community. Such membership bestows social status, which may discourage households to participate in unskilled migration (eq. 1), as such migration is sometimes associated with social stigma in the local context (Rana & 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 C1 in the Appendix confirms that membership differs significantly between migrant and non-migrant households, but not between households participating in temporary and longer-term migration.

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	Livestock	Household has livestock $(0/1)$	(-)	(+)		

Table 3.1: Key explanatory variables and their expected effects on migration decisions

[†]For 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'.

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 3.3), 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 C2 in the Appendix. They do not indicate a high correlation among our explanatory variables.

3.3.3. Modeling effects of migration on income and dietary quality

For our second 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:

$$Y_{il} = \theta_0 + \theta_{tm} T M_i + \theta_{lm} L M_i + \theta_z Z_i + \mu_i$$
(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 & McFadden, 1984).⁶ 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 & Bloom, 1985; Khandker et al., 2012). The first stage MNLS results are presented in Table C7 in the Appendix, confirming that our village-level IVs are relevant for household choices of the respective migration type.

⁶ We 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.

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 C8 in the Appendix, showing no significant correlation for non-migrant households. Hence, we conclude that our IVs are valid.

The MESR model is specified as follows:

First stage:
$$M_i = \omega_0 + \omega_z Z_i + \omega_{i\nu} I V_i + \vartheta_i$$
 (4)

Second stage:
$$Y_{il} = \theta_0 + \theta_m M_i + \theta_z Z_i + \theta_{imr} imr_i + \mu_i$$
 (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 different 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, i.e., 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 & 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 & 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.

3.3.4. 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.⁷ 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.⁸ 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.⁹ 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 3.2. 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 3.2. Possible values of the PCS therefore range between 0 and 77.

	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

Table 3.2: Food groups for calculating the food consumption score (FCS)

Source: Based on WFP (2009).

⁷ To 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 .

⁸ We 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.

⁹ Another 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 nutrient adequacy ratios.

While 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):

$$TPS_{iil-n} = PCS_{in} - PCS_{il} \tag{6}$$

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_{ijl} 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.

3.4. Results

3.4.1. Descriptive statistics

Summary statistics of key explanatory variables for migration decision-making are shown in Table C3 in the 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 C4 in the 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 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 C5).¹⁰

¹⁰ The 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.

Table C5 in the 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.

3.4.2. Factors explaining migration

Table 3.3 presents results from the Heckman selection model explained in equations (1) and (2). Column (1) of Table 3.3 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 3.3) 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, e.g., harvest season, as an increasing gap also implies better wages in the origin villages during normal periods. Floods can prolong lean periods (Khandker & Mahmud, 2012; Rana & 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.

Variables	(1) Any migration vs	(2) Temporary vs longer-
	non-migration (M_i)	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 (MNi)		
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]

 Table 3.3: Factors explaining household migration decisions (two-stage Heckman model)

Wald chi2(24) = 100.69; N=832; robust standard errors in square brackets- []; *p<0.10, **p<0.05, ***p<0.01

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 socio-cultural 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 migration more likely than longer-term migration, which is plausible, as livestock farming requires family labor all year round (Deshingkar & 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 3.3 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 C6 in the Appendix).

3.4.3. Migration effects on dietary quality and income

Table 3.4 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 C9-C12 in the Appendix. Column (1) and (2) of Table 3.4 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.

		Average treatment effects on the treated (ATT)		Average treatment effects on the untreated (ATU)			
Outcome variable	Type of migration	(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	ТМ	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	ТМ	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	ТМ	-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]

Table 3.4 : Effects of migration on	household dietary	quality and income
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N=832; Robust standard errors in square brackets- []. TM, temporary migration; LM, longer-term migration; FCS, food consumption score; PCS, protein consumption score; TPS, temporary protein shortfall; Income refers to lean period income and is measured in thousand Bangladeshi Taka (BDT); *p<0.10, **p<0.05, ***p<0.01

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 3.4).

The effects of the different types of migration on lean-period income are also shown in Table 3.4. 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 3.4. While 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 C13 in the Appendix. They are very similar to the MESR results in Table 3.4 and support the same conclusions.

3.5. 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 & Bhagat, 2013; Lucas, 2015; Tiwari et al., 2022; Wang et al., 2021).

While several studies analyze determinants of temporary migration (Asefawu & Nedessa, 2022; Dodd et al., 2016; Keshri & 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 socio-demographic 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. While 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 & 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 heterogenous 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.
CHAPTER 4

4. Destination choices during internal temporary migration: Evidence from northern Bangladesh¹¹

Abstract

Whilst migration to urban areas is often understood through higher wage opportunities, it remains unclear why many rural poor prefer rural destinations, particularly for temporary migration. This preference also calls for an investigation into the household-level income effects of different destination choices. Our study focuses on northern rural Bangladesh, where temporary migration is common. We analyze temporary migrant's destination choices, accounting for their self-selection into migration. Additionally, we address endogeneity when examining the income effects of different destination choices. Findings reveal that the income-to-cost ratio is often more favorable in rural destinations. Yet, rural destinations are not necessarily better than urban destinations in increasing total household income. In fact, remittances from rural-bound temporary migration are lower than those from urban-bound migration. However, given migrants' constraints, rural destinations offer greater utility maximization, which helps explain their preference for these destinations.

Keywords: Agricultural lean periods; Bangladesh; Destination choices; Temporary migration; Rural-to-rural migration

¹¹ This is a joint paper with Amy Faye, who contributed to conceptualizing the research and to revising and editing the draft manuscript. I developed the research idea, collected and analyzed the data, and drafted the manuscript.

4.1. Introduction

Globally, around 682 million people live in extreme poverty, of whom, around 75% reside in rural agrarian societies where they inevitably face livelihood fluctuations and seasonal hunger during agricultural lean periods (Christensen, 2023; Kharel et al., 2021). In northern Bangladesh, for example, a 2-3 months' lean period occurs twice a year during the two dominant cropping seasons, affecting around seven million rural poor from around two million agricultural labor-dependent households (BBS, 2022; Bryan et al., 2014; Khandker & Mahmud, 2012; Zug, 2006). Studies have identified temporary migration as a common strategy for the rural poor to cope with income seasonality and seasonal hunger during lean periods, when on-farm wage opportunities drastically drop in the origin villages (Bryan et al., 2014; Coffey et al., 2014; Khandker & Mahmud, 2012; Khandker et al., 2014; Khandker & Mahmud, 2012; Khandker et al., 2012; Kharel et al., 2021; Rana et al., 2025).

Existing migration theories predict such income-driven migration originating from the lowproductive rural agricultural sector to follow higher-paying modern sectors in urban areas (De Haas, 2021; Lee, 1966; Lewis, 1954; Todaro, 1969). Consequently, the assumption of temporary migration from rural to urban destinations is common in the existing literature (Asefawu & Nedessa, 2022; Bryan et al., 2014; Coffey et al., 2014; de Brauw & Harigaya, 2007; Keshri & Bhagat, 2013; Lagakos et al., 2023; Liu & Xu, 2015; Tiwari et al., 2022; Wang et al., 2021). However, Meghir et al. (2022) find around 65% of temporary migrants from northern rural Bangladesh migrating to other rural destinations during their lean periods, despite the higher wage opportunities in Bangladeshi cities for migrant laborers in physical labor-based jobs like rickshaw-pulling, construction sites, among others (Bryan et al., 2014; Lagakos et al., 2023). Similar rural-to-rural temporary migration is also common in neighbouring Myanmar and India (Visaria & Joshi, 2021; Wang & Charles-Edwards, 2024). This raises a fundamental question as to why many temporary migrants prefer other rural destinations over urban, a topic not well understood in the existing literature.

Several studies explain the destination choices for internal migration, but this is mostly for permanent or longer-term migration types, where the migrants often maintain a weakened connection to their places of origin (Aydemir & Duman, 2021; Chamberlin et al., 2020; De Weerdt et al., 2021; Fafchamps & Shilpi, 2012; Thiede, 2023). To our knowledge, there is only one study by Rana & Qaim (2024) that explains the destination choices for temporary migration, employing a qualitative methodology. Their study highlights the importance of migrant's individual characteristics such as, age, skills, and education, and perceptions such as

prior negative perception of cities, in destination decision-making during temporary migration. Furthermore, the influence of migrant networks, and destination characteristics such as, comparative income-to-cost ratio, physical comfort, and wage opportunities are also found crucial in such decision-making.

We build on this existing knowledge and employ a quantitative methodology to enhance our understanding of temporary migrants' destination decision-making. For instance, although distance is an important factor in the destination decision-making during permanent migration (Aydemir & Duman, 2021; De Weerdt et al., 2021; Fafchamps & Shilpi, 2012; Lee, 1966; Lucas, 2015), Rana & Qaim (2024) could not corroborate this for temporary migration. Our paper re-evaluates this potentially ambiguous aspect using quantitative data. Additionally, Rana & Qaim (2024) conclude that rural destinations often offer better income-to-cost ratio than urban destinations, which questions the widely held beliefs about urban destinations offering greater income gains. Conversely, a recent study in Peru finds positive welfare gains from temporary labor mobility irrespective of the destination type (Fabry & Maertens, 2024). Our study examines the comparative income effects of destination choices during temporary migration from different geographical contexts to contribute to this emerging literature on temporary migration.

In brief, we aim to achieve two objectives: 1) identifying factors for temporary migration decisions to rural versus urban destinations, and 2) investigating the household-level income effects of such destination choices. We organize this article as follows: Section 2 presents the data and specified models used to achieve our research objectives. The empirical results are presented and discussed in Section 3. Finally, we conclude the article and outline its policy implications in Section 4.

4.2. Materials & methods

4.2.1. Data

We conduct the study in Rangpur Division of Bangladesh–the poorest division in the country, where agricultural seasonality is more pronounced and temporary migration is more common than in other parts of the country (Hossain & Hossen, 2020; Khandker & Mahmud, 2012; Khandker et al., 2012). Around 47% of rural households from this region send migrants temporarily (Kharel et al., 2021), with many migrating to other rural destinations in search of temporary farm jobs (Bryan et al., 2014; Meghir et al., 2022).

Rangpur division consists of eight districts. Among them, we select the two poorest districts, namely, Dinajpur and Kurigram with the highest proportion of agricultural labor-dependent households that are more vulnerable to agricultural seasonality thus more prone to temporary migration during lean periods (BBS, 2022; Hossain & Hossen, 2020; Khandker et al., 2012). Dinajpur district comprises of 2,131 villages, while Kurigram has 1,872 (BBS, 2014). Following stratified random sampling, we select a total of 30 villages- 16 from Dinajpur and 14 from Kurigram.

Following the village selection, we collect household lists for the selected villages from the respective local government offices, known as the *union parishad* office. The selected 30 villages have a total of 7,441 households, as calculated from the lists. At 99% confidence level and 5% margin of error, we estimate to survey a minimum of 612 households. We randomly select 10% of households from each village for the survey, with an additional 6% as replacements in case of non-response. We survey a total of 878 households from the lists. The surveyed households include approximately 10-14% of total households from each village.

There are two dominant agricultural lean periods in northern Bangladesh: the *Aman* lean in September-November between planting and harvesting the *Aman* seasonal crops, and the *Boro* lean in February-April between planting and harvesting the *Boro* seasonal crops (Bryan et al., 2014; Gill et al., 2003; Rana et al., 2025). The rest of the year are considered normal periods with normalized wage opportunities in the origin villages (Rana et al., 2025). We conduct the survey during the *Boro* post-harvest period, June-August 2023, when most temporary migrants are in their villages to harvest the *Boro* seasonal crops and plant the next *Aman* seasonal crops.

The survey was administered with the head of the household who is often the migrant member. We collect key demographic characteristics, e.g., age, gender, education, and occupation, labor participation at the origin, and detailed migration data for every member of the household. At the household level, we collect data about household's assets, agriculture farming, migrant networks, and employment availability during the lean and normal periods, and season-wise income from farm and non-farm sources. During the survey, we referred to the past 12 months (August 2022- July 2023) for collecting time-variant data such as farming, migration, and income. To address individual migrant's perception about destination cities, we referred to their perception prior to making their first migration.

In the full dataset (n=878), 371 households (~42%) did not send any migrants for income. On the other hand, 330 households (~38%) sent exclusively temporary migrants, who migrated for

a period of up to three months per episode and actively participated in the origin village's labor market upon every return. The dataset also contains 150 households (~17%) that sent exclusively longer-term migrants, and 27 households (~3%) sending both types of migrants simultaneously.

The dataset includes 3,818 individuals from 878 households. Since destination choice is largely influenced by migrants' individual characteristics (Regmi et al., 2019), we utilize the individual members' dataset here. From this dataset, we remove 44 individuals migrating for immediate non-income purposes, such as pursuing education. Moreover, 981 kids with age equal or less than 14 years are removed as they rarely migrate for income¹². After removing these observations, we have a dataset of 2,793 individual members containing 385 members engaging exclusively in temporary migration (~14%), 220 members exclusively in longer-term migration (~8%), and the remaining 2,188 non-migrant members (~78%). Out of the 385 temporary migrants, 259 individuals (~67%) migrated to rural destinations, and 126 individuals (~33%) to urban destinations in their latest migration episode.

4.2.2. Model specifications

Households' participation in migration is self-selected. Similarly, the intra-household decisionmaking regarding a member's migration is also not random (Chiswick, 1999; Lee, 1966). Therefore, to understand temporary migrants' choice of destinations or the household-level income effects of different destination choices, it is crucial to correct for self-selection bias. Accordingly, we utilize a multi-step conditional regression analysis with subsamples, extending the Heckman selection model limited to two stages. In this approach, potential selfselection effects are estimated as the inverse Mills ratio (*imr*), following Heckman (1979). After estimating a binary outcome model, a probit model in our case, we predict the linear predictor for individual *i*'s participation (xb_i). This predictor is then used to calculate the inverse Mills ratio for individual *i* (*imr_i*), using equation (1) below, following Heckman (1979):

$$imr_i = \frac{\phi(xb_i)}{1 - \Phi(xb_i)} \tag{1}$$

where, $\phi(xb_i)$ and $\Phi(xb_i)$ are the probability density function (PDF) and the cumulative distribution function (CDF) of the standard normal distribution evaluated at xb_i , respectively.

¹² None of the excluded kids in our dataset engaged in migration.

This imr_i is then incorporated in the subsequent regression step to correct for potential self-selection bias. Our multi-step conditional regression models are specified in the following.

4.2.2.1. Modeling destination choices during temporary migration

For the first research objective, we utilize a three-step conditional probit selection model with subsample analysis. In the first-step, equation (2), we utilize the entire individual dataset of 2,793 observations to model the participation of individual *i* in migration versus non-migration (M_i). In the second-step, equation (3), we utilize the subsample of 605 individual migrants to model their participation in temporary versus longer-term migration (TM_i), incorporating their self-selection into migration ($imr1_i$) that we calculate from equation (2) based on equation (1). In the third-step, equation (4), we use only the subsample of 385 temporary migrants to model their choices of rural versus urban destinations (R_i), incorporating their self-selection into temporary migration ($imr2_i$), as calculated from equation (3). The three-step conditional probit equations are specified as below:

$$M_i = \alpha \left(x_{ij}, c_{jk}, ev_j \right) + u_i \tag{2}$$

$$TM_i = \beta \left(x_{ij}, c_{jk}, imr1_i \right) + e_i \tag{3}$$

$$R_i = \delta \left(v_i, c_{jk}, imr2_i \right) + \mu_i \tag{4}$$

In equation (2), we account for the characteristics of individual *i* and household *j* (x_{ij}) relevant for individual *i*'s participation in migration, as conceptualized in the literature (Rana et al., 2025; Stark & Bloom, 1985). This vector includes migrant *i*'s individual characteristics such as age, education, gender, and primary occupation type, and household *j*'s characteristics such as its experience of seasonal employment fluctuations, farm labor or family obligations¹³, and the size of migrant networks at the origin. In this equation, we also account for relevant other controls for household *j* and village *k* (c_{jk}). They include household size, wealth, access to alternative livelihoods, and proximity to nearby migration hubs. Additionally, they include some relevant village-level controls such as, whether the village is in a flood-prone area, and village-level fixed effects. For consistent estimates, this vector of c_{jk} is controlled for in all subsequent equations.

¹³Farm labor obligations, particularly in labor-intensive livestock farming, and family obligations due to the presence of kids, distrusts of neighbors for family care during migration, and smaller household size with less member flexibility (see Rana et al., 2025 for more details).

Equation (3) models the individual migrant *i*'s selection into temporary versus longer-term migration (TM_i) by accounting for similar vectors of x_{ij} and c_{jk} , and the selection effects in migration-*imr*1_{*i*}, as calculated from equation (2). Since we use similar sets of explanatory variables in both equations (2) and (3), for a robust estimation of the selection effect-*imr*1_{*i*}, we utilize an exclusionary variable (ev_j) in equation (2), as suggested by Heckman (1979). We use households' experience of random economic shocks in their crops, livestock, and assets in the past 12 months as the exclusionary variable. These idiosyncratic economic shocks can sometimes restrict their capability of sending migrants (Rana et al., 2025). However, these shocks are unlikely to affect households' choice between the physical labor-based temporary and longer-term migration, if they have already decided about migration (Rana et al., 2025)¹⁴. Table D1 in the Appendix confirms that the experience of random economic shocks differs significantly between migrant and non-migrants (M_i), but not between temporary and longer-term migrants (TM_i), confirming our hypothesis.

Finally, equation (4) models the temporary migrant's choice of rural versus urban destinations in their latest migration episode by correcting their self-selection in temporary migration $(imr2_i)$. In this equation, we incorporate v_i as the vector of relevant explanatory variables for individual migrant *i*'s choice of destination, aligning with Rana & Qaim (2024). This vector includes migrant *i*'s individual characteristics- I_i , negative perception of urban areas- U_i , experience of the latest destination- D_i , migrant networks- N_i , and distance travelled in the latest migration episode- $Dist_i$. These variables are described in Table 4.1. The parameters to be estimated in the respective equations are represented by α , β , and δ , and the error term by u_i , e_i , and μ_i . Since equations (3) and (4) include distinct sets of explanatory variables relevant to their respective outcome variables, we do not introduce any additional exclusionary variable in equation (3), apart from the self-selection into migration $(imr1_i)$.

Regarding individual characteristics (I_i), studies find that individuals with higher education are more prone to longer-term migration, or at least to urban destinations during temporary migration (Rana & Qaim, 2024; Rana et al., 2025), as education rarely brings extra benefits in rural destinations. Educated individuals often possess increased life-skills making them confident about better opportunities in cities. Conversely, individuals with lower or no

¹⁴Another type of idiosyncratic shock includes the sudden death or severe accident of a working household member—family demographic shocks that may affect individual migrant's choice between temporary and longer-term migration due to increased family obligations (Rana & Qaim, 2024). We separate these shocks and use only economic shocks as the exclusionary variable here.

education often lack life-skills, leading to a preference for simpler settings like in rural destinations. For better estimates about the association of individuals' education with their destination choices, we also account for their skills (discussed in detail below) in this model.

•	Expected sign in the model (Rural vs urban destination, Re)	
(<i>I</i> _i)		
Education in schooling years (1-14)	(-)	
Occupation being agricultural farming (1/0)	(+)	
Engagement in agriculture labor sale at the origin (1/0)	(+)	
Perception of 'difficulty' for living and	(+)	
earning in urban destinations before making		
the first migration (1/0).		
characteristics (<i>D_i</i>)		
Experience of the income-to-cost ratio at the	(+)	
latest destination (Likert scale of 1-10),		
Experience of physical comfort at the latest	(+)	
destination (Likert scale of 1-10),		
Have migrant kin or relatives migrating to rural destinations $(1/0)$.	(+)	
Size of the migrant group in the latest	(+)	
migration episode.		
Physical distance (km) between the migrant's origin and destination sub districts	(+/-)	
	 I_i) Education in schooling years (1-14) Occupation being agricultural farming (1/0) Engagement in agriculture labor sale at the origin (1/0) Perception of 'difficulty' for living and earning in urban destinations before making the first migration (1/0). Pharacteristics (D_i) Experience of the income-to-cost ratio at the latest destination (Likert scale of 1-10), Experience of physical comfort at the latest destination (Likert scale of 1-10), Have migrant kin or relatives migrating to rural destinations (1/0). Size of the migrant group in the latest migration episode. Physical distance (km) between the migrant's origin and destination sub-districts. 	

Table 4.1: Variables for analysing destination choices during temporary migration

Similarly, individuals engaged in agriculture at the origin may prefer agricultural jobs in rural destinations during temporary migration. We consider individuals' engagement in agricultural farming and farm labor sale at the origin as proxies (see Table 4.1). However, any physical sensitivity to agricultural jobs (e.g., cannot bend waist to harvest rice, among others) may discourage sensitive individuals from choosing rural destinations, which we control for in this model. Moreover, we account for other relevant factors at the individual (e.g., age) and household levels (e.g., household size, agricultural landholdings, family demographic shocks, and engagement in crop farming, livestock farming, business, safety-nets, and microcredit).

Regarding urban negativity (U_i) , individuals with lower education or lacking skills beyond agriculture often view urban destinations as a difficult place for earning and living (Banerjee

& Duflo, 2007; Rana & Qaim, 2024). This negative perception of cities often discourages aspiring migrants with lower education or skills from choosing urban destinations. Therefore, apart from education, we also account for migrants' lack of life-skills beyond agriculture.

For individual migrants' experiences at their latest destination (D_i), we collect their experience ratings on a 1-10 Likert scale, where 1 denotes 'worst' and 10 denotes 'best'. For example, a migrant rating 10 for income-to-cost ratio characteristic means they could save most of their daily earnings at the latest migration destination. This often occurs in rural destinations in Bangladesh, where employers frequently offer free accommodation and meals for migrant laborers (Rana & Qaim, 2024). Conversely, in urban destinations, around half of daily wages typically go toward accommodation and meal expenses (Rana & Qaim, 2024), shifting their income-to-cost experience closer to 'worst.' Therefore, although wage opportunities are higher in urban areas, rural destinations may offer greater psychological satisfaction from saving 'hard-earned' income, influencing poor migrant laborers' destination choices—a concept similar to 'loss-aversion'¹⁵.

Similarly, while jobs in both types of destinations can be physically demanding, agricultural tasks in rural destinations may offer comparatively better physical comforts to the migrants from rural origins. In contrast, urban destinations often provide longer-duration wage opportunities than rural ones (Bryan et al., 2014). This is particularly encouraging for temporary migrants from flood-prone villages, where lean periods are often prolonged due to weather extreme (Khandker & Mahmud, 2012; Rana et al., 2025). Therefore, we also account for migrants' experiences concerning wage opportunity duration at their latest migration destination, the geographic location of the village in flood-prone areas, and village fixed effects.

Regarding migrant networks (N_i), in addition to the influence of migrant kin, the size of the migrant group from the origin may play a key role in choosing destinations. A larger group size reduces rural poor's risk-aversion toward migration and makes their migration pleasurable. Rural-bound migrants often travel in large groups, which is frequently required for employment in rural destinations. Employers in these areas tend to prefer hiring larger groups of migrant laborers to keep up with their crop calendar (Rana & Qaim, 2024). Conversely, migration in larger groups may raise competition for jobs at rickshaw garages or construction sites in urban destinations. Group migration, therefore, could be more closely associated with rural-bound

¹⁵ Loss aversion concept suggests that 'losses' have greater influence on setting preferences than 'gains' (Tversky & Kahneman, 1991).

temporary migration, potentially encouraging risk-averse rural poor to prefer rural destinations. We utilize data on group size from migrant's latest migration episode for this analysis.

Regarding the implications of migration distance $(Dist_i)$ for destination choices, earlier studies have found that longer-distance permanent migrations move towards urban centers (De Weerdt et al., 2021; Lee, 1966). However, the relationship between distance and destination choices during temporary migration remains unclear, which we address here. We collect data on the destination sub-district for each migrant's latest migration episode. The physical distance in kilometer (km) between the origin and destination sub-districts is then calculated using a georeferencing system. Here, we mainly use the bus-road distance, as buses are the common transport mode across the country. Moreover, we control for the proximity of individual migrant's household to the nearest migration hub, often the closest sub-district.

Due to the relatively large number of explanatory variables included in the model, we tested for multicollinearity by calculating the variance inflation factors for each equation. The results are shown in Table D2 in the Appendix. They do not indicate a high correlation among the explanatory variables and selection effects.

To check the robustness of our findings, we employ a system of simultaneous mixed-process equations using limited information maximum likelihood (LIML), following Roodman (2011). When multiple equations are mutually interdependent and deal with subsamples in different equations, as in our case, this analytical approach proves useful. For this analysis, we use the *cmp* command in Stata, incorporating equation (2), (3), and (4) while excluding their respective *imrs*. We skip the likelihood-ratio test, use five random draws for the Geweke-Hajivassiliou-Keane (GHK) simulator, and apply the Newton-Raphson method for optimization.

4.2.2.2. Modeling the income effects of different destination choices

For our second research objective, we utilize the same individual-level dataset to measure the income effects. We use the lean period income of household j (*Inc_j*) as the outcome variable in this analysis, as temporary migration takes place mainly during the lean period (Coffey et al., 2014; Khandker & Mahmud, 2012; Mobarak & Reimão, 2020). The income effects of the individual migrant *i*'s choice of rural versus urban destination during temporary migration (R_i) is captured in equation (5) below:

$$Inc_{j} = \theta \left(R_{i}, z_{jk}, imr_{i} \right) + \varepsilon_{i}$$
(5)

Studies have also shown that earning a lot of remittance is often not a priority for constrained poor temporary migrants (Banerjee & Duflo, 2007). Therefore, to better understand the income effects of destination choices during temporary migration, we use three indicators of income: i) household *j*'s total lean period income from all sources (tot_inc_j), ii) income earned exclusively from temporary migration remittances ($remit_inc_j$), and iii) income from the origin's labor market ($loc_inc_j = tot_inc_j - remit_inc_j$). Season- and source-wise income amount were collected in Bangladeshi Taka (BDT). We use the logarithmic transformation of income data in this analysis.

To obtain a more consistent estimate of the income effects, we control for certain relevant household and village characteristics for income (z_{jk}) in equation (5). These characteristics include the household head's age, education, and gender, household size, and experience of seasonal employment fluctuation, as well as some village-level factors, such as the location of the village in flood-prone areas, and village fixed effects. The parameters are represented by θ , and the error term by ε_i . From equation (5), we report the coefficient (θ) for choosing rural versus urban destinations (R_i) as the estimated effects on the households' lean period income (Inc_j).

In equation (5), we also account for the migrant's self-selection into destinations- $imr3_i$, which is calculated from equation (4) based on equation (1). However, $imr3_i$ appears insignificant in equation (5) for all indicators of income, as presented in Table D6 in the Appendix. This suggests that self-selection into destinations may not be a challenging issue when estimating the income effects of different destination choices. Nevertheless, we cannot entirely rule out the possibility of endogeneity in destination choice, particularly arising from unobserved heterogeneity. To address this challenge, we apply a control function approach, which is effective in correcting this type of endogeneity (Wooldridge, 2015).

In this approach, we calculate the control function or residuals (*res*) from equation (2), (3), and (4), and then incorporate them into the subsequent equations, instead of *imrs*. While *imr* is useful to correct self-selection bias, residuals account for the endogeneity arising from unobserved factors, mentioned above, by capturing the part of participation that is not explained by the controlled variables in the respective equation. To calculate residuals, after estimating a regression, we predict the probability of participation for individual i (p_i^*). Next, we calculate the residual for individual i's participation (*resi*) as the difference between the

observed value of participation (p_i) and the predicted probability of participation (p_i^*) , as outlined in equation (6) below:

$$res_i = p_i - p_i^* \tag{6}$$

In our multi-step control function analysis, we calculate $res I_i$ from equation (2) based on equation (6) and incorporate it into equation (3), replacing $imrI_i$. Similarly, $res 2_i$ is calculated from equation (3) and used in equation (4). Finally, we calculate $res 3_i$ from the destination choice equation (4) and incorporate it into the income effects equation (5). In this analysis, we use a similar exclusionary variable (ev_j) design, as discussed earlier in the multi-step conditional probit selection model.

Using control function approach, in equation (5), $res3_i$ appears significant sparsely for different income indicators, as shown in row (1) of Table 4.5 in the results section. Additionally, $res1_i$ and $res2_i$ appear significant in the respective equations, as presented in Table D7 in the Appendix.

To check robustness of our results from the multi-step control function analysis, we employ a similar approach of simultaneous mixed-process equations with LIML, as discussed earlier. Additionally, we use a two-stage least square (2sls) analysis with an instrumental variable (IV) design as an alternative strategy to further test the robustness of our findings. The general two-stage equations for this analysis are outlined in equation (7) and (8) below:

First stage:
$$R_i^* = \delta\left(v_i, c_{jk}, z_{jk}, IV_i, imr2_i\right) + \mu_i$$
 (7)

Second stage: $Inc_j = \theta (R_i^*, v_i, c_{jk}, z_{jk}) + \varepsilon_i$ (8)

where, R_i^* represents migrant *i*'s instrumented choice of rural versus urban destination, and IV_i denotes the instruments. We use the presence of rural-bound temporary migrant kin or relatives (see Table 4.1 for details) as an instrument here. This instrument is expected to influence migrant *i*'s choice of rural over urban destinations (R_i) through network effects, but not to directly affect household income. The first-stage regression results, presented in Table D9 in the Appendix, confirm the relevance of the instrument, with an F-statistic of 73.81 indicating its strength.

4.3. Empirical results

4.3.1. Descriptive statistics

Our data reveal that many migrations in northern rural Bangladesh are temporary and many of these temporary migrations follow rural destinations, as illustrated in Figure 4.1. Only some 3% of the migrants are female who migrate only to urban destinations, preferably to work in garments. We observe no female members migrating temporarily, as this migration involves higher social stigma for them, while garments offer better wage opportunities through longer-term migration.



Figure 4.1: Migration and destination choice statistic

Among the 259 rural-bound temporary migrants in our sample, approximately 19% migrate to the Bogra district (~112 km from Rangpur city), 17% to the Tangail district (~218 km), 15% to the Comilla district (~402 km), and the rest to 26 other districts across the country. In contrast, Dhaka, the capital city of Bangladesh with the largest urban agglomeration, appears to be the most attractive destination for urban-bound temporary migrants. About 62% of them chose Dhaka (~296 km) in their latest migration episode, while the rest were almost evenly distributed among 21 other cities/towns across the country. A map showing the popular destinations for temporary migration is presented in Figure D1 in the Appendix.

Popular wage opportunities in rural destinations includes planting/harvesting rice, working in other crop fields and brick kilns, among others. About 85% of our rural-bound temporary migrants were engaged in rice planting/harvesting during their latest migration episode. In contrast, about 48% of our urban-bound temporary migrants worked in masonry/construction sites, and around 39% in rickshaw-pulling in cities.

The summary statistics of the key explanatory variables for destination choices during temporary migration are presented in Table 4.2 below. A test of mean differences between rural-

and urban-bound temporary migrants generally supports our hypothesized associations between destination choices and indicators of individual characteristics (I_i), urban negativity (U_i), experience of destination characteristics (D_i), and migrant networks (N_i). Additionally, migration distance ($Dist_i$) shows a significant negative association with the choice of rural destinations, aligning with the existing literature.

Variables	(1) All observations	(2) Rural-bound	(3) Urban-bound	(4) Mean difference (2-3)
	(n=385)	(n=259)	migrants (n=126)	unicicice (2 0)
Individual characteristics (<i>I</i> _i)				
Education	3.42 (3.74)	2.66 (3.18)	4.97 (4.30)	-2.31*** [0.39]
Occupation: Agriculture farming	0.23 (0.42)	0.24 (0.43)	0.20 (0.40)	0.04 [0.05]
Agriculture labor sale	0.85 (0.36)	0.93 (0.25)	0.67 (0.47)	0.26*** [0.04]
Urban negativity (<i>Ui</i>)				
Prior negative perception of cities	0.34 (0.48)	0.49 (0.50)	0.03 (0.18)	0.46*** [0.05]
Experience of destination characte	eristics (D _i)			
Income-to-cost ratio	6.24 (3.14)	7.32 (2.93)	4.02 (2.26)	3.30*** [0.30]
Physical comfort	6.61 (3.24)	7.05 (3.23)	5.71 (3.09)	1.34*** [0.35]
Migrant networks (N _i)				
Rural-bound migrant kin	0.64 (0.48)	0.90 (0.30)	0.11 (0.32)	0.79*** [0.03]
Migrant group size	6.92 (5.04)	8.31 (5.06)	4.05 (3.59)	4.27*** [0.50]
Migration distance (Dist _i)				
Travel distance	274.82 (130.49)	251.58 (134.27)	322.60 (108.07)	-71.02*** [13.72]

Standard deviation in parentheses- (); standard errors in square brackets- []; *p<0.10, **p<0.05, ***p<0.01

Regarding the second research objective, we observe an insignificant mean difference in the households' total income during the lean period (tot_inc_j) between rural- and urban-bound temporary migrant households, as presented in Table 4.3 below. However, the mean income from migration remittances $(remit_inc_j)$ and income from the local labor market (loc_inc_j) differ significantly between these two groups. Households sending temporary migrants to urban areas appear to receive larger remittances than those sending to rural areas. Conversely, rural-bound temporary migrant households tend to have higher income from the origin's local labor markets compared to those with urban-bound migrants.

One plausible mechanism for these effects could be the duration of temporary migration. Approximately 80% of our rural-bound temporary migrant samples stayed for a shorter duration of less than 30 days in their latest migration episode. In contrast, around 57% of our urban-bound migrants stayed for longer than 30 days during their temporary migration. This indicates that urban-bound temporary migrants tend to stay longer at their destinations, generating higher remittances. Conversely, rural-bound temporary migrants may already diversify their risks at the origin's labor market before making shorter duration migration to rural destinations. Table D3 in the Appendix presents that temporary migration for shorter

duration of less than 30 days in an episode is significantly associated with lower remittances and higher income from the local labor market, which are plausible.

Income variables (<i>Inc_j</i>)	(1) All observations (n=385)	(2) Rural- bound temporary migrants (n=259)	(3) Urban- bound temporary migrants (n=126)	(4) Mean difference (2-3)
Total income (<i>tot inc_j</i>)	4.00 (0.65)	3.98 (0.64)	4.03 (0.67)	-0.05 [0.07]
Remittance income	3.09 (0.92)	2.98 (0.86)	3.31 (1.00)	-0.34*** [0.10]
$(remit_inc_j)$				
Local market income (<i>loc_inci</i>)	2.95 (1.34)	3.11 (1.23)	2.61 (1.49)	0.51*** [0.14]

 Table 4.3: Mean household income for different destination choices

Standard deviation in parentheses- (); standard errors in square brackets- []; *p<0.10, **p<0.05, ***p<0.01

Local market income options include both on-farm and off-farm strategies. Table D4 in the Appendix presents that rural-bound temporary migrants earn significantly more from livestock farming and labor sales at the origin. These income effects are further elaborated in the regression results section.

4.3.2. Regression results

Here, we present and discuss the regression results. First, we discuss individual migrants' destination choices during temporary migration (R_i). Next, we analyze the comparative income effects (Inc_i) associated with these destination choices.

4.3.2.1. Destination choices during temporary migration

As mentioned earlier, our three-step conditional probit selection model addresses three key questions: i) why the rural poor choose to migrate (M_i , eq. 2), ii) why they opt for temporary as opposed to longer-term migration (TM_i , eq. 3), and iii) why they prefer rural over urban destinations during their temporary migration (R_i , eq. 4). Results from equation (2) and (3) are presented in Table D5 in the Appendix¹⁶. The results from equation (4), which addresses our first research objective, are presented in column (1) of Table 4.4 below. Overall, most of our

¹⁶ The choices of migration (eq. 2) and temporary versus longer-term migration (eq. 3) have already been studied in the literature, employing both qualitative and quantitative methodologies (Chen et al., 2019; Hu et al., 2011; Keshri & Bhagat, 2013; Rana & Qaim, 2024; Rana et al., 2025; Stark & Bloom, 1985; Todaro, 1969). In brief, existing studies find that households' poor earning at the origin and the presence of functional migration networks are important factors influencing the decision to migrate. Conversely, the presence of farm labor and family obligations discourages constrained households from migrating. However, even constrained poor households may migrate to diversify risks in their less-diversified economy. In such cases, they often prefer temporary migration, which maximizes their utility without exacerbating their constraints. Our regression results align with existing literature despite using different contexts and datasets.

hypotheses on destination decision-making hold. It is important to note that these results reflect associations, not causal relationships.

Variables	(1) Multi-step	(2) Simultaneous
	conditional probit	mixed process
	selection model with	equations using
	subsamples	LIML
	Rural vs urban	Rural vs urban
	destination choice (R_i)	destination choice (R_i)
Individual characteristics (<i>I</i> _i)		
Education	-0.14** [0.06]	-0.09** [0.05]
Occupation: Agriculture farming	0.02 [0.30]	-0.14 [0.23]
Agriculture labor sale	1.08** [0.44]	0.90*** [0.32]
Relevant controls		
Physical sensitivity to agriculture	-1.10** [0.47]	-1.10*** [0.40]
Age	0.00 [0.01]	-0.00 [0.01]
Household size	-0.21* [0.11]	-0.16* [0.09]
Agricultural landholdings	0.01 [0.02]	0.01 [0.02]
Crop farming	-0.69** [0.35]	-0.67** [0.32]
Livestock farming	0.76** [0.32]	0.62** [0.24]
Family demographic shocks	-1.09** [0.52]	-0.77** [0.39]
Business	0.33 [0.34]	0.34 [0.35]
Social safety-nets	0.23 0.32	0.24 0.26
Microcredit memberships	-0.48* [0.29]	-0.46* [0.24]
Urban negativity (U_i)		
Prior negative perception of cities	1.09*** [0.34]	0.96*** [0.28]
Relevant controls		
Lack of skills beyond agriculture	0.77*** [0.26]	0.65*** [0.22]
Experience of destination characteristics (D_i)		
Income-to-cost ratio	0.36*** [0.06]	0.30*** [0.06]
Physical comfort	0.06 [0.05]	0.07* [0.04]
Relevant controls		
Daily wage opportunities	-0.21** [0.10]	-0.16** [0.08]
Flood vulnerability of the village	0.76 [0.72]	0.59 [0.50]
Village fixed effects	0.00 0.00	0.00 0.00
Migrant networks (N _i)		
Rural boundness of the closest migrant kin	3.02*** [0.45]	2.56*** [0.45]
Migrant group size	0.11*** [0.04]	0.08** [0.03]
Migration distance (<i>Dist</i> _i)		
Travel distance	-0.00*** [0.00]	-0.00*** [0.00]
Relevant controls		
Household distance to the nearby migration hub	-0.01 [0.01]	-0.01 [0.01]
imr2 _i	-0.73** [0.32]	
Constant	1.10 [1.65]	-0.25 [1.09]
Wald chi2	153.03	834.14

Table 4.4: Factors for destination choices during temporary migrat	ion
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N=2,793; robust standard errors in square brackets- []; *p<0.10, **p<0.05, ***p<0.01

Individual characteristics, such as migrant's low education and engagement in agricultural labor sale at the origin, are significantly associated with their preference for rural destinations

during migration, as anticipated. Although individuals' engagement in farming does not seem to affect their destination choices, any physical sensitivity to farming discourages them from choosing rural destinations, which is plausible.

Negative perceptions of cities before the first migration, along with a lack of life-skills beyond agriculture, are significantly associated with choosing rural destinations, even in the latest migration episode. Moreover, a better daily wage compared to expenses (i.e., income-to-cost ratio) also influences migrants' preference for rural over urban destinations, though reverse causality is plausible here. While physical comforts at destinations do not show a strong association, wage opportunities are more closely linked to choosing urban destinations. Therefore, it is likely that rural poor, who are unable to pursue longer-term migration due to household constraints, yet seek longer-duration wage opportunities, prefer to migrate to urban destinations.

Regarding migrant networks, the presence of migrant kin or relatives migrating to rural destinations affects aspiring migrant's destination preferences through network effects. Similarly, a larger migrant group size is strongly associated with choosing rural over urban destinations, as expected.

Also, distance is significantly associated with the destination choice. Our data reveal that ruralbound temporary migration is significantly more common over shorter distances, likely to minimize migration costs, which aligns with loss-aversion theory (Tversky & Kahneman, 1991) and classical migration theories (Lee, 1966). Additionally, shorter-distance migration can minimize the duration of migrants' separation from their left-behind families. This is particularly important for rural-bound temporary migrant households that often face greater labor constraints for livestock farming and labor sales, along with increased family obligations due to a less flexible member structure (Table 4.4).

Selection effects (*imr*) are significant at every stage of the model, as shown in Table 4.4 above and Table D5 in the Appendix, requiring their correction. The results from the simultaneous mixed process equations are presented in column (2) of Table 4.4. These results are consistent with those from our main model, demonstrating the model's robustness.

4.3.2.2. Income effects of the destination choice during temporary migration

Results from the multi-step control function analysis, showing the income effects of destination choices during temporary migration (equation 5), are summarized in row (1) of Table 4.5 below. Results from equations (2), (3), and (4) using this approach are presented in Table D7, and the full regression results for equation (5) are in Table D8 in the Appendix.

While temporary migration generally generates positive income gains for poorer households (Fabry & Maertens, 2024; Rana et al., 2025), we observe that the choice of rural over urban destinations during this migration does not affect the households' total income (*tot_inc_j*). While rural destinations are often associated with better income-to-cost ratio than urban ones (Table 4.4), urban-bound migration generates greater remittances (*remit_inc_j*). A plausible reason could be the longer duration of urban-bound temporary migration compared to rural-bound ones, as mentioned earlier.

Model	Variable	Total income	Remittance income	Local market income
(1) Multi star	Dunal area unh an		0.20*** [0.12]	0 50*** [0 17]
(1) Multi-step	Rural over urban	-0.08 [0.08]	-0.39*** [0.12]	0.39 [0.17]
control function	destination choice (R_i)			
analysis with	$res3_i$	0.28* [0.16]	0.41 [0.40]	-0.31 [0.43]
subsamples	Constant	3.92*** [0.28]	2.85*** [0.36]	2.63*** [0.45]
-	Controls (z_i)	Yes	Yes	Yes
(2) Simultaneous	Rural over urban	-0.10 [0.10]	-0.46*** [0.13]	0.65*** [0.22]
mixed process	destination choice (R_i)			
equations using	Constant	4.02*** [0.30]	3.17*** [0.34]	2.48*** [0.45]
LIML	Controls (z_i)	Yes	Yes	Yes
(3) Two-stage	Rural over urban	-0.51*** [0.17]	-0.56** [0.25]	0.18 [0.30]
least square	destination choice (R_i)			
	Constant	4.15*** [0.47]	1.81*** [0.62]	2.97*** [0.86]
	Controls (z_i)	Yes	Yes	Yes

 Table 4.5: Income effects of the destination choice during temporary migration

N=2,793; Income in Bangladeshi Taka (BDT) and transformed to log; $res3_i$ - control function for individual migrant *i*'s participation in destinations; robust standard errors in square brackets- []; *p<0.10, **p<0.05, ***p<0.01

One may wonder why many rural-bound temporary migrants prefer shorter migration durations with comparatively lower remittances. As we have seen from equation (3) (Table D5 in the Appendix), farm labor and family obligations are critical factors in choosing temporary over longer-term migration, which is also consistent with the existing literature (Banerjee & Duflo, 2007; Rana et al., 2025). Some of these households may have greater constraints that limit their migration duration. For these households, earning lot of remittances is often not a priority, mentioned earlier. They rather prefer longer stays with their families by optimally diversifying their risks at the origin before migrating.

We have also demonstrated in equation (4) (Table 4.4) that households' engagement in livestock farming and selling labor at the origin is positively and significantly associated with their choice of rural over urban destinations. Similarly, rural-bound temporary migrants earn significantly more from these two sources (Table D4 in the Appendix). This explains the significantly higher income from the local labor market (loc_inc_j) for rural-bound temporary migrants, as presented in Table 4.5.

Some of these income options, particularly livestock farming, create significant labor constraints at the origin, prompting shorter-duration temporary migration, as also noted in the existing literature (Deshingkar & Start, 2003; Rana et al., 2025). For such short-duration migration, rural destinations with a more favorable income-to-cost ratio offer better utility maximization than urban ones. Conversely, utility maximization in urban destinations requires longer stays, which can be discouraging for households with farm labor or family constraints. In other words, urban-bound temporary migration with longer stays at destinations often limits scopes to diversify risks at the origin, relying primarily on remittances. This finding extends Rana & Qaim (2024)'s conclusion about the better income-to-cost ratio characteristic of rural destinations.

Results from the simultaneous mixed process equations, presented in row (2) of Table 4.5, are consistent with our main model. However, results from 2sls, presented in row (3) of Table 4.5, show that rural-bound temporary migration is associated with significantly lower total income, with the sign remaining consistent with our main model. Similarly, although 2sls does not find a significant association between rural-bound migration and household income from the local labor market, it suggests a positive relationship, again consistent with our main model.

4.4. Conclusions and policy recommendations

Given that urban destinations often offer greater wage opportunities than their rural counterparts, understanding why many rural poor prefer rural destinations during their incomedriven temporary migration is crucial for identifying the motives behind this migration. Rana & Qaim (2024) provided valuable insights into such destination decision-making using an explorative qualitative methodology. However, certain aspects, such as the implications of migration distance and income effects of different destination choices, remained unclear. We employ a quantitative methodology to extend their qualitative findings and deepen our understanding of destination choices during temporary migration. We employ a multi-step conditional probit selection model with subsamples, extending on Heckman (1979), to analyze destination choices of temporary migrants from rural origins, correcting for their self-selection into migration and temporary migration. To address endogeneity in analyzing the income effects of different destination choices, we employ a multi-step control function approach with subsamples, extending on Wooldridge (2015).

Aligning with existing studies (Rana & Qaim, 2024; Regmi et al., 2019), we find that the choice of destination for temporary migrants from northern Bangladesh is strongly associated with their individual characteristics, prior perceptions and subsequent experiences of the destination, and the influence of migrant networks. Additionally, we find that longer-distance migration is often associated with urban destinations, also consistent with existing literature (De Weerdt et al., 2021; Lee, 1966). Although rural destinations often offer a better income-to-cost ratio than urban ones, which is plausible, they are not necessarily better than urban destinations to increase total household income, as we demonstrate. In contrast, urban-bound temporary migration generates higher remittances, partly because this group of migrants tend to stay longer at destinations to maximize their utility. However, constrained poor households often prioritize spending more time with their families by optimally diversifying their risks at the origin's labor markets, and then choose shorter migration duration. For such short-duration migration, rural destinations with more favorable income-to-cost ratio are better.

These findings are crucial for policies aimed at facilitating temporary migration for the rural poor. In particular, policies should support rural-bound temporary migration, as many poor temporary migrants prefer this strategy after optimally exploiting local labor markets. Many of these migrants are constrained by limited education and skills and hold negative perceptions of urban areas, which hinder rural-to-urban migration despite higher remittance potential. Furthermore, rural-to-rural migration is crucial to address farm labor shortages in destination rural areas, particularly in poor agrarian contexts like Bangladesh, where agriculture mechanization rates remain low (Rahman et al., 2021). In recent years, the shortage of local agricultural laborers has been a major challenge in regions of Bangladesh growing laborintensive crops (Rahman et al., 2021). This was evident during the COVID-19 pandemic when the harvest of the main crop-rice-was severely affected by a shortage of migrant laborers (Rahman et al., 2022). Facilitating rural-bound temporary migration between early- and lateharvesting rural areas or between labor-short and labor-surplus regions could help address this issue, as experienced in Bangladesh during the pandemic. Such migration could be supported by policies through providing wage information, reducing search costs, and improving interdistrict transportation networks.

Further research could explore the effects of temporary migrant laborers on crop production in destination rural areas. Additionally, examining how farm mechanization affects livelihoods of agriculture labor-dependent rural poor–who often rely on temporary migration as an important risk diversification strategy (Rana et al., 2025)–could be another important avenue for further research.

CHAPTER 5

5. Conclusions and policy recommendations

Temporary migration is common in poor agrarian economies. While this migration is weaker in reducing poverty than longer-term migration, why many poor rural households still prefer temporary migration as opposed to longer-term migration is unclear in the literature. Furthermore, studies have shown that many temporary migrants choose rural destinations as opposed to urban ones, despite lower wage opportunities. This underscores an investigation into destination choices of temporary migrants in poor agrarian contexts. We address these questions in northern rural Bangladesh to better understand temporary migration decisions.

We employ a mixed-method approach in this study. First, we conceptualize rural households' temporary migration and destination decision patterns utilizing an explorative qualitative methodology. The data are analysed using *coding and categorization technique*, which is a widely recognized method for extracting patterns from qualitative data. Second, we deepen our understanding of these decision patterns with quantitative data. Selection bias and endogeneity challenges are addressed with relevant econometric models.

Our qualitative study, in Chapter 2, reveals that farm labour constraints and family obligations prevent migration, particularly longer-term migration. However, temporary migration may not exacerbate these constrains, motivating poor rural households to migrate temporarily for diversifying their risks. Poorer households engage in temporary migration to improve their food consumption during agricultural lean periods, when they usually suffer from hunger. We extend these results with quantitative data in Chapter 3, where we show that households' socioeconomic and family demographic constraints are indeed significantly associated with their preference for temporary migration. While 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. Therefore, although temporary migration is less effective in reducing poverty, it remains an important strategy for constrained, poor rural households to cope with recurring income seasonality and improve diet during hunger seasons.

Regarding the temporary migrants' destination choices between rural and urban areas, our qualitative study highlights the importance of migrants' individual characteristics, their perceptions and subsequent experiences of destinations, and the influence of migrant networks (Chapter 2). With quantitative data, later in Chapter 4, we show that while rural destinations are often associated with better income-to-cost ratio than urban destinations, remittance income from urban-bound temporary migration is higher. Yet, constrained poor prefer short-duration temporary migration to rural destinations, after optimally diversifying their risks at the origin's labor market. Rural destinations with a more favourable income-to-cost ratio often offers greater utility maximization during these short-duration migrations, resulting in preference for this destination type among constrained, poor households.

Our research shows that temporary migration is an important risk mitigation strategy for the rural poor in their less diversified rural economy. Moreover, it is an important option to improve their dietary quality during hunger seasons. Therefore, along with increasing wage opportunities in the origin's incomplete labor market, policies should support this type of migration for the welfare of poorer segments of society in poor agrarian economies.

Rural-bound temporary migration should be particularly supported, as many constrained, poor temporary migrants prefer it compared to longer-term migration, and it often offers greater utility maximization than urban-bound temporary migration. Policies could facilitate this migration through providing wage information, reducing search costs, and improving interdistrict transportation networks. Furthermore, rural-to-rural temporary migration can address farm labor shortages in labor-intensive crop growing regions, particularly in poor agrarian contexts like Bangladesh, where agriculture mechanization rates remain low. Facilitating temporary migration to rural areas could help address this labor shortage challenge, as recently experienced in Bangladesh during the COVID-19 pandemic.

Further research could explore the effects of temporary migrant laborers on crop production in destination rural areas. Additionally, examining how farm mechanization affects livelihoods of poor rural-bound temporary migrants—who often rely on temporary migration as an important risk diversification strategy—could be another avenue for further research.

References

- Abreu, A. (2012). The new economics of labor migration: Beware of neoclassicals bearing gifts. *Forum for Social Economics* 41(1), 46–67. <u>https://doi.org/10.1007/s12143-010-9077-2</u>
- Afsar, R. (2005). Bangladesh: Internal migration and pro-poor policy. In I. Pinto-Dobernig(Ed.), Migration, Development and Policy Reduction in Asia (pp. 85-108). InternationalOrganizationforMigration(IOM).

https://publications.iom.int/system/files/pdf/migration_dev_pov_asia.pdf

- Asefawu, G. S., & Nedessa, K. G. (2022). Nature, patterns, and determinants of seasonal outmigration in the north-eastern part of Ethiopia. *Norwegian Journal of Geography*, 76(3), 177–191. <u>https://doi.org/10.1080/00291951.2022.2076610</u>
- Aydemir, A. B. & Duman, E. (2021). Migrant networks and destination choice: Evidence from moves across Turkish provinces (IZA discussion paper no. 14677). Institute of Labor Economics (IZA), Bonn. <u>https://repec.iza.org/dp14677.pdf</u>
- Banerjee, A., & Duflo, E. (2007). The economic lives of the poor. *Journal of Economic Perspectives*, 21(1), 141–167. <u>https://doi.org/10.1257/jep.21.1.141</u>
- BBS. (2014). Population and housing census 2011: Union statistics (National report- Volume 2). Bangladesh Bureau of Statistics (BBS), Dhaka.
- BBS. (2022a). *Population & housing census 2022: Preliminary report*. Bangladesh Bureau of Statistics (BBS), Dhaka.
- BBS. (2022 or 2022b). Agriculture census 2019: Structure of agricultural holdings and livestock & fisheries (National series- Volume 1). Bangladesh Bureau of Statistics (BBS), Dhaka.
- Bryan, G., Chowdhury, S., & Mobarak, A. M. (2014). Underinvestment in a profitable technology: The case of seasonal migration in Bangladesh. *Econometrica*, 82(5), 1671– 1748. <u>https://doi.org/10.3982/ecta10489</u>
- Call, M., Gray, C., Yunus, M., & Emch, M. (2017). Disruption, not displacement: Environmental variability and temporary migration in Bangladesh. *Global Environmental Change*, 46, 157–165. <u>https://doi.org/10.1016/j.gloenvcha.2017.08.008</u>
- Carling, J. (2002). Migration in the age of involuntary immobility: Theoretical reflections and Cape Verdean experiences. *Journal of Ethnic and Migration Studies*, 28(1), 5–42. <u>https://doi.org/10.1080/13691830120103912</u>

- Chamberlin, J., Jayne, T. S., & Sitko, N. J. (2020). Rural in-migration and agricultural development: Evidence from Zambia. Agricultural Economics, 51(4), 491–504. <u>https://doi.org/10.1111/agec.12567</u>
- Chen, J., Kosec, K., & Mueller, V. (2019). Temporary and permanent migrant selection: Theory and evidence of ability-search cost dynamics. *Review of Development Economics*, 23(4), 1477–1519. https://doi.org/10.1111/rode.12617
- Chiswick, B.R. (1999). Are immigrants favorably self-selected? *American Economic Review* 89(2), 181–185. <u>https://doi.org/10.1257/aer.89.2.181</u>
- Christensen, Z. (2023). Economic poverty trends: Global, regional and national. Development Initiatives (DI), Bristol. <u>https://devinit.org/resources/poverty-trends-global-regional-and-national/</u>
- Christiaensen, L. & Maertens, M. (2022). Rural employment in Africa: Trends and challenges. Annual Review of Resource Economics, 14(1), 267-289. <u>https://doi.org/10.1146/annurev-resource-111820-014312</u>
- Coffey, D., Papp, J., & Spears, D. (2014). Short-term labor migration from rural north India: Evidence from new survey data. *Population Research and Policy Review*, 34(3), 361–380. <u>https://doi.org/10.1007/s11113-014-9349-2</u>
- Dash, M. K. (2023). Causes and consequences of circular migration in Odisha: Evidence from a study of four underdeveloped districts, In B. Potnuru, N. Thakur and P. Kumar (Eds.), *Development Outlook of Education and Migration: An Indian Perspective* (pp. 163-184). Springer
- Davin, D. (1999). Why people migrate. In *Internal Migration in Contemporary China*, (pp. 49–77). Palgrave Macmillan. <u>https://doi.org/10.1057/9780230376717_5</u>
- De Brauw, A., & Harigaya, T. (2007). Seasonal migration and improving living standards in Vietnam. American Journal of Agricultural Economics 89(2), 430–447. <u>http://www.jstor.org/stable/4492821</u>
- De Haas, H. (2021). A theory of migration: The aspirations-capabilities framework. *Comparative Migration Studies*, 9(1). <u>https://doi.org/10.1186/s40878-020-00210-4</u>
- De Weerdt, J., Christiaensen, L. & Kanbur, R. (2021). When distance drives destination, towns can stimulate development (IZA discussion paper no. 14157). Institute of Labor Economics (IZA), Bonn.

- Deshingkar, P. & Start, D. (2003). Seasonal migration for livelihoods in India: Coping, accumulation and exclusion (Working paper no. 220). Overseas Development Institute, London. <u>https://www.files.ethz.ch/isn/95707/wp220.pdf</u>
- Development Initiatives. (2022). *Global nutrition report 2022*. Development Initiatives, Bristol.
- Di Falco, S. & Veronesi, M. (2018). Managing environmental risk in presence of climate change: The role of adaptation in the Nile Basin of Ethiopia. In L. Lipper, N. McCarthy, D. Zilberman, S. Asfaw & G. Branca (Eds), *Climate Smart Agriculture: Building Resilience to Climate Change* (pp. 497-526), Natural Resource Management and Policy, vol 52. Springer. <u>https://doi.org/10.1007/978-3-319-61194-5_21</u>
- Dodd, W., Humphries, S., Patel, K., Majowicz, S. E., & Dewey, C. (2016). Determinants of temporary labour migration in southern India. Asian Population Studies, 12(3), 294–311. <u>https://doi.org/10.1080/17441730.2016.1207929</u>
- Dubin, J.A., & McFadden, D. (1984). An econometric analysis of residential electric appliance holdings and consumption. *Econometrica*, 52(2), 345-362. <u>https://doi.org/10.2307/1911493</u>
- Elkan, W. (1959). Migrant labor in Africa: An economist's approach. *The American Economic Review*, 49(2), 188–197. <u>https://www.jstor.org/stable/1816114</u>
- Entwisle, B., Verdery, A. M., & Williams, N. E. (2020). Climate change and migration: New insights from a dynamic model of out-migration and return migration. *American Journal* of Sociology, 125(6), 1469–1512. <u>https://doi.org/10.1086/709463</u>
- Evertsen, K. F. & van der Geest, K. (2019). Gender, environment and migration in Bangladesh. *Climate and Development*, 12(1), 12-22. <u>https://doi.org/10.1080/17565529.2019.1596059</u>
- Fabry, A., & Maertens, M. (2024). Temporary labor mobility to various geographical and sectoral destinations improves rural incomes – Insights from Peru. World Development, 185, 106782. <u>https://doi.org/10.1016/j.worlddev.2024.106782</u>
- Fafchamps, M., & Shilpi, F. (2012). Determinants of the choice of migration destination. Oxford Bulletin of Economics and Statistics, 75(3), 388–409. <u>https://doi.org/10.1111/j.1468-0084.2012.00706.x</u>
- Fongar, A., Gödecke, T., Aseta, A., & Qaim, M. (2018). How well do different dietary and nutrition assessment tools match? Insights from rural Kenya. *Public Health Nutrition*, 22(3), 391–403. <u>https://doi.org/10.1017/s1368980018002756</u>

- Gibson, J., & McKenzie, D. (2014). The development impact of a best practice seasonal worker policy. *The Review of Economics and Statistics* 96(2), 229–243. http://www.jstor.org/stable/43554927
- Gill, G. J., Farrington, J., Anderson, E., et al. (2003). Food security and the millennium development goal on hunger in Asia (Working paper no. 231), Overseas Development Institute, London. https://www.files.ethz.ch/isn/22639/wp231_web.pdf
- Giulietti, C., Wahba, J., & Zenou, Y. (2018). Strong versus weak ties in migration. *European Economic Review*, 104, 111–137. <u>https://doi.org/10.1016/j.euroecorev.2018.02.006</u>
- Harris, J. R. & Todaro, M. P. (1970). Migration, unemployment and development: A twosector analysis. *The American Economic Review*, 60(1), 126–42. <u>https://www.jstor.org/stable/1807860</u>
- Heckman, J. J. (1979). Sample selection bias as a specification error. *Econometrica*, 47(1), 153-161. <u>https://doi.org/10.2307/1912352</u>
- Hossain, M., Mullally, C., & Önel, G. (2023). Migration and economic activity at origin: the role of female household headship in rural Bangladesh. *Empirical Economics*. <u>https://doi.org/10.1007/s00181-023-02500-z</u>
- Hossain, S. S., & Hossen, M. A. (2020). *Poverty maps of Bangladesh 2016: Key findings*. Bangladesh Bureau of Statistics (BBS), Dhaka.
- Hu, F., Xu, Z., & Chen, Y. (2011). Circular migration, or permanent stay? Evidence from China's rural–urban migration. *China Economic Review*, 22(1), 64–74. https://doi.org/10.1016/j.chieco.2010.09.007
- Hugo, G. J. (1982). Circular migration in Indonesia. Population and Development Review, 8(1), 59. <u>https://doi.org/10.2307/1972690</u>
- Kafle, K., Benfica, R., & Winters, P. (2020). Does relative deprivation induce migration? Evidence from Sub-Saharan Africa. American Journal of Agricultural Economics, 102(3), 999–1019. https://doi.org/10.1002/ajae.12007
- Kassie, M., Teklewold, H., Marenya, P., Jaleta, M., & Erenstein, O. (2014). Production risks and food security under alternative technology choices in Malawi: Application of a multinomial endogenous switching regression. *Journal of Agricultural Economics*, 66(3), 640–659. <u>https://doi.org/10.1111/1477-9552.12099</u>
- Keshri, K., & Bhagat, R. B. (2013). Socioeconomic determinants of temporary labour migration in India. Asian Population Studies, 9(2), 175–195. <u>https://doi.org/10.1080/17441730.2013.797294</u>

- Khandker, S. R. & Mahmud, W. (2012). *Seasonal hunger and public policies: Evidence from northwest Bangladesh*. The World Bank.
- Khandker, S. R. (2012). Seasonality of income and poverty in Bangladesh. *Journal of Development Economics*, 97(2), 244–256. <u>https://doi.org/10.1016/j.jdeveco.2011.05.001</u>
- Khandker, S. R., Khalily, M. A. B., & Samad, H. A. (2012). Seasonal migration to mitigate income seasonality: Evidence from Bangladesh. *Journal of Development Studies*, 48(8), 1063–1083. <u>https://doi.org/10.1080/00220388.2011.561325</u>
- Kharel, A., Mobarak, A.M., Shenoy, A. & Vernot, C. (2021). Seasonal poverty and the COVID-19 pandemic (G²LM|LIC working paper no. 52). Gender, Growth, and Labour Markets in Low Income Countries Programme (G²LM|LIC), Institute of Labor Economics (IZA). <u>https://g2lm-lic.iza.org/wp-content/uploads/2021/11/glmlic-wp052.pdf</u>
- Khonje, M. G., Manda, J., Mkandawire, P., Tufa, A., & Alene, A. D. (2018). Adoption and welfare impacts of multiple agricultural technologies: Evidence from eastern Zambia. *Agricultural Economics*, 49(5), 599–609. <u>https://doi.org/10.1111/agec.12445</u>
- Konseiga, A. (2005). Regional integration beyond the traditional trade benefits: Labor mobility contribution. Peter Lang, Frankfurt am Main, Germany.
- Kuckartz, U. (2019). Qualitative text analysis: A systematic approach. In G. Kaiser & N.
 Presmeg, *Compendium for Early Career Researchers in Mathematics Education*, (pp. 181-198). Springer
- Kumar, A., Mishra, A. K., Saroj, S., & Joshi, P. K. (2019). Impact of traditional versus modern dairy value chains on food security: Evidence from India's dairy sector. *Food Policy*, 83, 260–270. <u>https://doi.org/10.1016/j.foodpol.2019.01.010</u>
- Lagakos, D., Mobarak, A. M., & Waugh, M. E. (2023). The welfare effects of encouraging rural–urban migration. *Econometrica*, 91(3), 803–837. https://doi.org/10.3982/ecta15962
- Lee, E.S. (1966). A theory of migration. *Demography*, 3(1), 47–57. https://doi.org/10.2307/2060063
- Lewis, W. A. (1954). Economic development with unlimited supplies of labour. *Manchester School*, 22(2), 139–191. <u>https://doi.org/10.1111/j.1467-9957.1954.tb00021.x</u>
- Liu, Y., & Xu, W. (2015). Destination choices of permanent and temporary migrants in China, 1985–2005. *Population, Space and Place, 23*(1). <u>https://doi.org/10.1002/psp.1963</u>

- Lomborg, B. (2016, March 28). Helping farmers in the lean season. *The Daily Star*. <u>https://www.thedailystar.net/op-ed/politics/how-stipends-bus-tickets-can-help-rural-</u> families-overcome-the-hungry-season-1200478
- Lucas, R. E. B. (2015). *Internal migration in developing economies: An overview* (KNOMAD working paper no. 6). The Global Knowledge Partnership on Migration and Development (KNOMAD).
- Manda, J., Azzarri, C., Feleke, S., Kotu, B. H., Claessens, L., & Bekunda, M. (2021). Welfare impacts of smallholder farmers' participation in multiple output markets: Empirical evidence from Tanzania. *PLOS ONE*, 16(5), e0250848. https://doi.org/10.1371/journal.pone.0250848
- Meghir, C., Mobarak, A.M., Mommaerts, C., & Morten, M. (2022). Migration and informal insurance: Evidence from a randomized controlled trial and a structural model. *The Review of Economic Studies*, 89(1), 452–480. https://doi.org/10.1093/restud/rdab021
- Mishra, D. K. (2016 or 2016a). Introduction: Internal migration in contemporary India- an overview of issues and concerns. In D.K. Mishra (Ed.), *Internal Migration in Contemporary India*, (pp. 1-25). Sage Publications, India.
- Mishra, D. K. (2016b). Seasonal migration from Odisha: A view from the field. In D.K. Mishra (Ed.), *Internal Migration in Contemporary India*, (pp. 263-290). Sage Publications, India.
- Mishra, K., Kondratjeva, O., & Shively, G. (2022). Do remittances reshape household expenditures? Evidence from Nepal. World Development, 157, 105926. <u>https://doi.org/10.1016/j.worlddev.2022.105926</u>
- Mobarak, A. M. & Akram, A. A. (2016). Seasonal migration to increase incomes of poor households in Bangladesh. Bangladesh Priorities, Copenhagen Consensus Center. <u>https://www.copenhagenconsensus.com/sites/default/files/mobarak_seasonal_migration_.pdf</u>
- Mobarak, A. M. & Reimão, M. E. (2020). Seasonal poverty and seasonal migration in Asia. *Asian Development Review*, *37*(1), 1–42. <u>https://doi.org/10.1162/adev_a_00139</u>
- Mucci, N., Traversini, V., Giorgi, G., Tommasi, E., De Sio, S., & Arcangeli, G. (2019).
 Migrant workers and psychological health: A systematic review. *Sustainability*, *12*(1), 120. <u>https://doi.org/10.3390/su12010120</u>

- Mueller, V., Gray, C., & Kosec, K. (2014). Heat stress increases long-term human migration in rural Pakistan. *Nature Climate Change*, 4(3), 182–185. https://doi.org/10.1038/nclimate2103
- Mueller, V., Sheriff, G., Dou, X., & Gray, C. (2019). Temporary migration and climate variation in eastern Africa. World Development, 126, 104704. <u>https://doi.org/10.1016/j.worlddev.2019.104704</u>
- Murrugarra, E., Larrison, J. & Sasin, M. J. (2011). *Migration and poverty: Toward better opportunities for the poor*. The World Bank.
- Musungu, A.L., Kubik, Z., & Qaim, M. (2024). Drought shocks and labor reallocation in rural Africa: Evidence from Ethiopia. *European Review of Agricultural Economics*, <u>https://doi.org/10.1093/erae/jbae020</u>.
- Palis, F. G., Malabayabas, A. J. B., Singleton, G. R., Mazid, M. A., & Johnson, D. E. (2016). Early harvest of monsoon rice to address seasonal hunger in northwest Bangladesh. *Food Security*, 8(2), 443–457. <u>https://doi.org/10.1007/s12571-016-0560-3</u>
- Rahman, K. W. (2022). International migration and the religious schooling of children in the home country: Evidence from Bangladesh. *Journal of Population Economics*, 36(3), 1963–2005. <u>https://doi.org/10.1007/s00148-022-00912-2</u>
- Rahman, M. M., Ali, M. R., Oliver, M. M. H., et al. (2021). Farm mechanization in Bangladesh: A review of the status, roles, policy, and potentials. *Journal of Agriculture* and Food Research, 6, 100225. <u>https://doi.org/10.1016/j.jafr.2021.100225</u>
- Rahman, M. T., Akter, S., Rana, M. R., Sabuz, A. A., & Jubayer, M. F. (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. <u>https://doi.org/10.1016/j.jafr.2021.100258</u>
- Raihan, J. (2022, July 30). Kurigrame kajer monga kateni (in English: Deficiency for wage opportunities persists in Kurigram). *The Daily Prothom Alo*, D4. https://www.prothomalo.com/bangladesh/milrmugiof
- Rajan, S. I. & Chyrmang, R. (2016). Labour migration in the north east. In D.K. Mishra (Ed.), *Internal Migration in Contemporary India*, (pp. 96-153). Sage Publications, India.
- Rana, M. S., & Qaim, M. (2024). Patterns of temporary rural migration: A study in northern
 Bangladesh. World Development, 182, 106718.
 <u>https://doi.org/10.1016/j.worlddev.2024.106718</u>

- Rana, M. S., Faye, A., & Qaim, M. (2025). Temporary migration decisions and effects on household income and diets in rural Bangladesh. *Agricultural Economics*. <u>https://doi.org/10.1111/agec.70030</u>
- RDRS. (2018). Year completion report for the No Lean Season program, FY: May 2017-April 2018 (Working Report). Rangpur Dinajpur Rural Services (RDRS), Bangladesh.
- Regmi, M., Paudel, K. P., & Bhattarai, K. (2019). Migration decisions and destination choices. *Journal of the Asia Pacific Economy*, 25(2), 197–226. <u>https://doi.org/10.1080/13547860.2019.1643195</u>
- Ritchie, H. (2021, July 12). Three billion people cannot afford a healthy diet. *Our world in data*. <u>https://ourworldindata.org/diet-affordability</u>
- Roodman, D. (2011). Fitting fully observed recursive mixed-process models with cmp. *The Stata Journal*, *11*(2), 159–206. https://doi.org/10.1177/1536867x1101100202
- Saldaña, J. (2013). *The coding manual for qualitative researchers (2nd Edition)*. Sage Publications
- Shahriar, A. Z. M., Zeba, S., Shonchoy, A. S. M. P. & Parveen, S. (2006). Seasonal migration of labor in the autumn lean period: Evidence from Kurigram District, Bangladesh (ESS working paper #07). Dept. of Economics & Social Science, Brac University, Dhaka.
- Shonchoy, A. S. (2015). Seasonal migration and microcredit during agricultural lean seasons: Evidence from northwest Bangladesh. *The Developing Economies* 53(1), 1–26. <u>https://doi.org/10.1111/deve.12063</u>
- Sjaastad, L. A. (1962). The costs and returns of human migration. *Journal of Political Economy*, 70(5), 80–93. <u>https://www.jstor.org/stable/1829105</u>
- Srivastava, R. (2020). Labour migration, vulnerability, and development policy: The pandemic as inflexion point? *The Indian Journal of Labour Economics*, 63(4), 859–883. <u>https://doi.org/10.1007/s41027-020-00301-x</u>
- Stark, O., & Bloom, D. E. (1985). The new economics of labor migration. *The American Economic Review* 75(2), 173–178. <u>https://www.jstor.org/stable/1805591</u>
- Sucharita, S. (2020). Socio-economic determinants of temporary labour migration in western Jharkhand, India. *Millennial Asia 11*(2), 226–251. <u>https://doi.org/10.1177/0976399620925451</u>
- Sugden, F., Nigussie, L., Debevec, L., & Nijbroek, R. (2021). Migration, environmental change and agrarian transition in upland regions: Learning from Ethiopia, Kenya and

Nepal. *The Journal of Peasant Studies*, 49(5), 1101–1131. https://doi.org/10.1080/03066150.2021.1894552

- Sun, M., & Fan, C. C. (2010). China's permanent and temporary migrants: Differentials and changes, 1990–2000. *The Professional Geographer*, 63(1), 92–112. https://doi.org/10.1080/00330124.2010.533562
- Thiede, B. C. (2023). Climate variability and internal migration to urban and rural areas: Evidence from global microdata (KNOMAD working paper no. 55). The Global Knowledge Partnership on Migration and Development (KNOMAD).
- Tiwari, C., Bhattacharjee, S., Sethi, P., & Chakrabarti, D. (2022). Internal migration and rural inequalities in India. *Population Research and Policy Review*, 41(4), 1673–1698. <u>https://doi.org/10.1007/s11113-022-09707-5</u>
- Todaro, M. P. (1969). A model of labor migration and urban unemployment in less developed countries. *American Economic Review*, 59(1), 138-148. https://www.jstor.org/stable/1811100
- Tsegai, D. (2005). The economics of migration in the Volta Basin of Ghana: Household and district-level analysis. Cuvillier Verlag.
- Tversky, A. & Kahneman, D. (1991). Loss aversion in riskless choice: A reference-dependent model. *The Quarterly Journal of Economics*, 106(4), 1039–1061. https://doi.org/10.2307/2937956
- Visaria, L., & Joshi, H. (2021). Seasonal sugarcane harvesters of Gujarat: Trapped in a cycle of poverty. *Journal of Social and Economic Development*, 23(S1), 113–130. <u>https://doi.org/10.1007/s40847-020-00120-2</u>
- Wang, C., Liu, X. & Yan, Z. (2021). Temporary versus permanent migration: The impact on expenditure patterns of households left behind. *Review of Economics of the Household* 19(3), 873-911. <u>https://doi.org/10.1007/s11150-020-09505-y</u>
- Wang, Y., & Charles-Edwards, E. (2024). The ontology, measurement, and features of temporary internal migration in selected countries of Asia. Asian Population Studies, 1– 20. <u>https://doi.org/10.1080/17441730.2024.2363024</u>
- Wen, L., Paudel, K. P., & He, Q. (2023). Temporary migration and land renting behavior. *Economic Analysis and Policy*, 78(June), 1372–1391. <u>https://doi.org/10.1016/j.eap.2023.05.009</u>
- WFP. (2009). Comprehensive food security & vulnerability analysis guidelines (first edition).World Food Program, Rome.

- Wooldridge, J. M. (2015). Control function methods in applied econometrics. *Journal of Human Resources*, 50, 420-445. <u>http://www.jstor.org/stable/24735991</u>
- Zug, S. (2006). Monga—Seasonal food insecurity in Bangladesh—Bringing the information together. *The Journal of Social Studies, 111*.

Appendix A: Appendix to chapter 1

Appendix A1

Ethics approval

ZEF Bonn, Genscherallee 3, D-53113 Bonn, Germany

Center for Development Research University of Boon

University of Bonn

Dr. Silke Tönsjost Head ZEF Research Ethics Board University of Bonn E-Mail: silke.toensjost@uni-bonn.de Tel.: ++49-(0)228-73-1794 www.zef.de

Ethical Clearance

The following research has been pre-reviewed for ethical standards by the ZEF Research Ethics Board. The researcher named below applied for ethical clearance before commencing the research. The application was independently reviewed by two reviewers of the Board and found to be ethically sound. The ZEF Research Ethics Board includes senior researchers from ZEF and the Institute for Food and Resource Economics (ILR), both University of Bonn. The Ethical Clearance is based on the ZEF Ethics Policy¹.

Registration code:	9b_22Sohel Rana		
Title of the research study:	Reasons for Rural-Rural Temporary Migration the Rural Seasonal Poor: An Empirical Study fro Northern Bangladesh		
Location(s) of field research	Bangladesh		
If applicable, name of a larger project:			
Name of the researcher:	Sohel Rana		
Department / affiliated institute:	ZEFb		
Source of funding:	DAAD/ EPOS and fiat panis		
Date of approval of the ethical clearance:	23.08.2022		
Rheinische Friedrich-Wilhelms-Universi Zentrum für Entwicklungsforschung (Z Bonn International Graduate School for Development Research (BIGS-DR) 53113 Bonn Germany Dr. Silke Tönsjöst	tāt EF)		

Appendix B: Appendix to chapter 2

Appendix B1

Guiding Questions for Individual Interviews

[After collecting the informed consent, read out the following text to the potential participant

We would like to record our conversation on this voice-recorder so that we can listen to our conversation later and do not miss any of your valuable inputs. May we please record our conversation? Please let me know if you do not feel comfortable recording the conversation, I can then take notes on pen and paper instead.]

Questions

Q.1 Name, age, and occupation of the participant; farm-status of the household (HH); number of HH members & working members?

Q.2 Timing of the agricultural lean period in your village? Does this lean period affect your HH?

- How does it affect your HH?
- Which measure(s) do you resort to offset the effects of lean periods? Why this measure(s)?

For migrant households

Q.3 Explain the household's migration history?

- Why and how did you decide about your first migration?
- Could you please describe your migration journey from the first migration till date? (Particularly, focus on your migration timing and duration, timing of return, migration destinations and any changes in your migration destinations, type of works/jobs you found and how did you find the jobs, etc.)

Q.4 Why do/did you migrate temporarily? Why not for longer-term and vice-versa? How was this decision made in your household?

• If the household/migrant conducts both temporary and longer-term migration, or switched from one to another, why so?

Q.5 Why do/did you migrate to this certain destination (rural or urban)? Why not to the other type of destination? How was this decision made in your household?

• If the household sends migrants to both rural and urban destinations, or switched from one to another, why so?

[Clarification questions, if not clarified yet]

Q.6 How some individual characteristics (e.g., age, education, skills, marital status, etc.) are/were relevant for your migration and destination decisions?

Q.7 How some family or societal factors (e.g., family demographic or farm labour constraints, social constraints, etc.) affect(ed) your migration and destination decisions?

Q.8 Do/did you get any kind of support from family members, friends, neighbors, relatives, etc. before/during your migration? What types of support and how did you get it?

Q.9 How was your migration pattern in the last 3 years during the COVID and before the COVID pandemic?

For non-migrant households

Q.10 Why doesn't/didn't your HH send migrant? What are the restricting factors? Rank the factors.

Q.11 Do you (or any member from your HH) have any plan to migrate in future? Why or why not?

• [If yes] which type of migration and destination, would you prefer? Why so?
Appendix B2

Informed consent for individual interview

[A copy translated into the local language was used]

[Read out loud to the potential respondent]

As-salamu-alai-kum/Adab! Am I talking to the head of this household? YES IN NO

My name is I am a bachelor/master's student from *<university name of the research* assistant>. I am assisting *<researcher's names>* in collecting data for their research with the *<institute name>*.

Your household has been randomly selected for this interview. Through this interview, we would like to know about *the kajer ovaber somoy* (agricultural lean periods) in your village and how you manage your living in those period(s). Some of our questions could be related to your household's socio-economic status and household member's details. If you do not want to answer these questions or any other questions, you can always skip the questions or stop the interview at any time.

The interview may take around one hour. Your participation in the interview is completely voluntary and it will not incur any costs to you except your time. By participating in this interview, you will not receive any incentives or benefits in return.

We are conducting this interview with around _____ households from around _____ villages of *Dinajpur* and *Kurigram* Districts. All your data will be maintained with utmost confidentiality and used for the research purpose only.

If you please agree to participate voluntarily in this interview, I would kindly request you to give us your consent through signing on this consent form. Please let us know if you have any question about this interview.

Name of the Participant:	Age:	Gender:
Village:	District:	
Signature:	Date:	

[Only if the respondent agrees to participate in the interview but does not want to sign this form, start your voice recorder, and then read out the following]

If you do not feel comfortable to sign on this consent paper, please allow us with your verbal consent which will be recorded on this voice recorder/phone. You are *[respondent's name]* of *[age]* from *[village]* of *[district]* who has been randomly selected for the interview. Do you please give us your consent to conduct this interview with you on *[date]*?

Informed consent for group discussion

[A copy translated into the local language was used]

[Read out loud to the participants]

As-salamu-alai-kum/Adab!

My name is I am a bachelor/master's student from *<university name of the research assistant>*. I am assisting *<researcher's names>* in collecting data for their research with the *<institute name>*. We are kindly inviting you to take part in this group discussion. Through this discussion, we would like to know about *the kajer ovaber somoy* (agricultural lean periods) in your village and how do you manage your living in this period(s). If anyone of you do not want to continue your participation, you can always leave the discussion at any time.

The discussion may take around one hour and half. Your participation in the discussion is completely voluntary and it will not incur any costs to you except your time. By participating in this discussion, you will not receive any incentives or benefits in return. All your data will be maintained with utmost confidentiality and used for the research purpose only.

If you please agree to participate voluntarily in this discussion, I would kindly request you to give us your consent through signing in the participants' list below. Please let us know if you have any question.

Village:	District	t:	_ Date:	
Sl. #	Name	Age	Gender	Signature
1				
2				
3				
4				
5				
6				

Group discussion participants' list and consent:

SI. #	Name	Age	Gender	Signature
7				
8				
9				
10				
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Appendix B3

Table B3 1	• List of	individual	interviews	and grour	discussions
Table DS.1	• List OI	munividual		and group	uiscussions

Sl.	Date	District	Village	Participant's	Participant's	Participant's	Household	Household's migration history (and destination type) *
				age	gender	schooling years	Size	
Indiv	vidual interviews							
1	24.07.2022	Kurigram	Nazimkhan	35	Male	10	4	Stopped migration from a longer-term migration (urban)
2	24.07.2022	Kurigram	Nazimkhan	38	Male	0	6	Temporary migration (rural)
3	24.07.2022	Kurigram	Nazimkhan	33	Male	0	3	Temporary migration (initially urban, then switched to rural)
4	24.07.2022	Kurigram	Nazimkhan	53	Male	0	4	Temporary migration (initially urban, then switched to rural shortly, then again to urban)
5	27.04.2022	Kurigram	Kebol Krishna	43	Male	12	4	Non-migration
6	27.04.2022	Kurigram	Kebol Krishna	28	Male	6	3	Longer-term migration (urban)
7	27.04.2022	Kurigram	Kebol Krishna	26	Male	0	3	Temporary migration (urban)
8	27.04.2022	Kurigram	Kebol Krishna	45	Male	9	5	Temporary migration (rural), switched from a longer-term migration (urban)
9	29.07.2022	Dinajpur	Khoyerbari	30 & 27	Male & female	6 & 10	4	Stopped migration altogether from a longer-term migration (urban)
10	29.07.2022	Dinajpur	Khoyerbari	36	Male	0	5	Non-migration
11	29.07.2022	Dinajpur	Khoyerbari	33	Male	7	4	Stopped migration recently from a longer-term migration (urban)
12	29.07.2022	Dinajpur	Khoyerbari	42	Male	0	4	Temporary migration (urban), switched from a longer- term migration (urban)
13	29.07.2022	Dinajpur	Khoyerbari	30	Male	3	3	Temporary migration (rural), switched from a longer-term migration (urban)
14	31.07.2022	Dinajpur	Aladipur	40	Male	0	5	Stopped migration recently; initially, made a longer-term migration (urban), then switched to temporary migration (initially urban, then rural), and finally stopped migration.
15	31.07.2022	Dinajpur	Aladipur	40	Male	0	5	One member [eldest son, age 20] is currently on a longer- term migration (urban); one member [household head] switched to temporary migration (rural) from a longer- term migration (urban); one member [wife of the head] stopped migration from a longer-term migration (urban).
16	31.07.2022	Dinajpur	Aladipur	55	Male	0	3	Temporary migration (rural)
17	03.08.2022	Dinajpur	Bishnupur	42	Male	0	4	Non-migration
18	03.08.2022	Dinajpur	Bishnupur	60	Male	0	2	Temporary migration (initially, urban, then switched to rural)

SI.	Date	District	Village	Participant's age	Participant's gender	Participant's schooling years	Household Size	Household's migration history (and destination type) *
19	03.08.2022	Dinajpur	Bishnupur	33 & 26	Male & female	10 & 10	4	Stopped migration recently altogether from a longer-term migration (urban)
20	12.08.2022	Kurigram	Kebol Krishna	47	Male	0	4	Temporary migration (rural and urban, simultaneously)
21	12.08.2022	Kurigram	Kebol Krishna	34	Male	0	6	Longer-term migration (urban)
22	14.08.2022	Kurigram	Chilakhana	36	Male	8	4	Stopped migration recently from a temporary migration (rural)
23	14.08.2022	Kurigram	Chilakhana	38	Male	12	4	Longer-term migration (urban), and international migration (middle-east)
24	14.08.2022	Kurigram	Chilakhana	36	Male	6	4	Stopped migration recently; Initially, made a longer-term migration (urban), then switched to temporary migration (rural), then stopped migration recently.
25	17.08.2022	Kurigram	Nazimkhan	36	Male	0	5	Temporary migration (initially urban, then switched to rural shortly, and then again to urban)
26	25.08.2022	Kurigram	Jatrapur	28	Male	8	4	Longer-term migration (urban)
27	25.08.2022	Kurigram	Jatrapur	56	Male	15 (Degree pass)	3	Non-migration
28	26.08.2022	Dinajpur	Dokkhin Nagar	52	Male	12	4	Non-migration
29	26.08.2022	Dinajpur	Dokkhin Nagar	42	Male	0	5	Temporary migration (rural)
30	26.08.2022	Dinajpur	Dokkhin Nagar	33	Male	9	6	Longer-term migration (urban)
31	27.08.2022	Dinajpur	Neula	35	Male	4	4	Temporary migration (rural)
32	27.08.2022	Dinajpur	Neula	28	Male	13	3	Temporary migration (rural)
33	27.08.2022	Dinajpur	Neula	40	Male	3	4	Temporary migration (rural and urban, simultaneously)
Grou	ip discussions							
1	08.08.2022	Dinajpur	Bishnupur	Age range of	Mixed (03	Min. 0, max. 12	Min. 2,	Number of participants: 20
				participants: 25- 70	female, 17 male)		max. 6	Households with non-migration and different types of migration histories
2	24.08.2022	Kurigram	Nazimkhan	Age range of	Mixed (02	Min. 0, max. 10	Min. 3,	Number of participants: 16
				participants: 21- 65	female, 14 male)		max. 7	Households with non-migration and different types of migration histories
3	29.08.2022	Kurigram	Jatrapur	Age range of	Mixed (14	Min. 0, max. 14	Min. 2,	Number of participants: 26
				participants: 17- 70	female, 12 male)		max. 7	Households with non-migration and different types of migration histories

***Table B3.2:** Summary of the interviewed households' migration & destination experiences

Migration experience type	# of households	# of households per temporary migration destination type		
		Rural	Urban	Both
Non-migration	5	-	-	-
Only temporary migration	13	6	1	6
Only longer-term migration	9	-	-	-
Both temporary and longer-term migration	б	4	1	1
Total	33	10	2	7

Appendix B4

Coding and categorization of the qualitative data

We completed two cycles of iterative coding on our interview and discussion scripts. In the first cycle, we reviewed the scripts carefully, assigning descriptive codes inductively to the data segments according to their emergent meaning. An example of this first cycle coding is shown below.

Example of the first cycle coding

Script			Codes
Q: Could you please talk us through your migration history, starting from your very first migration?		Lenovo	Temp mig to Urban
A: Around 14 years back, I first migrated to Dhaka, to pull rickshaw there for a month. Of course, I		Lenovo	Mig reason: Poverty
migrated because of our poverty, and there were no jobs at home. I was around 19 years old then,		Lenovo	Mig reason: Employment lack
physically well-bodied to work. We had small-scale farming, just for 12 katha land; my father was		Lenovo	Young age
		Leneve	
Q: Was that 12 katha land owned by you or you rented in?		Lenovo	Small-scale farming
A: No, the land was rented in as Adi system [half of the production goes to the landowner]. We had		Lenovo	Landless farmer
no agricultural land except our homestead		Lenovo	Eldest son bigger responsibility
So, I was helping my father in our own farming since I was 10-12 years old. I was the eldest son, I had		Lenovo	Selling agri-labour
one younger brother and a younger sister. So, I had responsibility. I was selling [agricultural] labour		Lenovo	Normal pariod: 4 months
to other's farms also to earn little more income. But, you see, we had only two seasonal crops then,		Lenovo	Normal period: 4 months
other months, I was working as a contractual labour to <i><removed anonymity<="" for="" i="">, who was a big</removed></i>		Lenovo	Selling agri-labour
farmer in our village. I was mostly looking after his livestock as a <i>Rakhal</i> [herder]. But, the payment		Lenovo Septemb	ber 11, 2022
was scanty, I was getting a very small monthly salary, but the good thing was that I was getting daily		Scant wage from agr	j-labour sale
foods from him.			💭 Reply 🛛 Resolve
Q: How about your education? Were not you studying then?			
A: No., Education is not for poor people like us. I left school after my class III, and started helping our		Lenovo	"Education not for the poor"
family in farming and earning. My younger brother was studying then. He studied until class VIII,		Lenovo	Longer-term mig to Urban
then he also left school and migrated to Dhaka to work in garments factory			
Q: Okay, sorry, please continue your story first, I will come to your brother's story later. You were saying your job as a <u>Rakhal</u> in your village.			
A: Yes, during this work, my uncle ('mama') offered me to migrate with him to Dhaka. He was pulling		Lenovo	Networks: Migration with
rickshaw in there. He was working there whole year. First time, I stayed there only a month and then			
returned home. You see, rickshaw pulling is not easy, it is physically heavy. Although, my body was		Lenovo	Rickshaw: Physically heavy
great, but I did not have rickshaw pulling experience before. Also, I became homesick after 2-3		Lenovo	Homesickness for return
weeks. After a month, I came back, stayed here 1-2 weeks, and then again traveled to Dhaka.			Town of the last of the
Q: Sorry again for the interruption, but did you migrate to Dhaka during the lean period or normal	- Andrewson - A	Lenovo	remp mig during lean periods
period?	and the second sec	Lenovo	Own household labour
A: An, that I don't remember correctly, but probably, during the lean period. Normally, this is when		Lenovo	Own farming
whole year? We cannot hire labour from the local market, they are expensive. Yes, you can hire	and the second se	Lenovo	Expensive hired labours
them, if you have a very large-scale farming. We always did farm mostly for our own consumption,	and the second sec	Lenovo	Labour hire for large-scale farm
we rarely sell them. So, we always try to keep the farming cost minimum. So, it is better that we do	and the second sec	Lenovo	Minimizing costs for subsisten
not nire labour and do it by our own labour. So, I had to come back to the village at least during the harvest and plantation times [to be]p my father managing the farming]			
		Lenovo	Own tamily labours for
This [temporary migration to Dhaka for rickshaw pulling] continued around 4-5 years, then I got		Lenovo	Marriage
farming for our own consumption, but my father was not helping me much. Recause you see we	and a state of the	Lenovo	Family disintegration
got separated with some psychological conflicts. So, I realized that I must reduce my migration	and a state of the	Lenovo	Own farming
duration. Previously, sometimes I was staying even 2-3 months in Dhaka. But now [after getting	and the second second	Lenovo	Own farming reduces mig
separated from parents' family], I could not stay outside more than a month, because, I had to look		Lenovo	own ranning reduces mile

In the second coding cycle, following Saldaña's (2013) approach, we revisited the transcripts, refined the first-cycle codes primarily by synthesizing the conceptually similar codes, and recoded the transcripts iteratively. Then, we transferred all the second-cycle codes to a separate document, where we categorized (and re-categorized) them based on their trends and mutual relationships. The initial categorization of codes mostly followed a deductive approach (Kuckartz 2019; Saldaña 2013), where seemingly relevant codes were grouped based on our phenomena of interest. Through this exercise, certain decision-making patterns emerged in line with our research objectives. An example of this categorization exercise and the emergence of decision patterns is shown in Figure B4.1 and discussed in detail below.

(1) Subset of codes: Own (subsistence) farming, family labours, expensive hired labours, superior quality of family labours, small-sized family

(II) Iterative categorization Agriculture farming

(1) Subset of codes: Elderly member, kids, adolescent daughters, household security & welfare, recent marriage, homesickness, household disintegration, small-sized family

Family demographic structure

categorization (II) Iterative

Farm labour constraints [Emerging pattern: Prompts agriculture-based households to prefer temporary migration during lean periods instead of longer-term migration.]

(III) Sub-category:

(III) Sub-category: Demographic constraints

[Emerging pattern: (i) Discourages, particularly well-off households, from engaging in migration. (ii) Prompts poor households opting for temporary migration to reduce migrants' detachment duration.]



Figure B4.1: Building patterns from the codes (Source: Authors)

As shown in Figure B4.1, the second cycle codes that emerged as mutually related for one of our phenomena of interest— households' *agriculture farming*— are categorized in the first *subset of codes* (Step I in Figure B4.1). During this exercise, we went back and forth to the

coded transcripts to confirm the essence of each code (II). In this process, sometimes new codes with relevant essence were incorporated, or old codes were discarded due to irrelevance. For instance, 'small-sized family' was not included in the initial subset for *agriculture farming*. However, the data revealed a nuanced connection between family size and agriculture farming concerning temporary versus longer-term migration decision-making. Similarly, 'commercial farming (i.e., farming for selling more than half of the harvest),' initially included in the subset, was commonly observed to be relevant for non-migration decisions but not for deciding between temporary and longer-term migration. Therefore, this code was removed here and transferred to another subset of codes relevant for general migration decision-making.

Through this iterative process, a pattern emerged indicating that these codes commonly refer to the labour constraints for agriculture-based households, which prompts them to prefer shortduration temporary migration during agricultural lean periods over longer-term migration. We termed this category as *farm labour constraints* (III), which is frequently referred to as a decision-making factor in our results section. Sometimes, several categories of codes were further merged based on their mutual relations to form a broader category with an overarching pattern (IV), as presented in the example (Figure B4.1).

Appendix references

Kuckartz, U. (2019). Qualitative Text Analysis: A Systematic Approach. In G. Kaiser & N.
Presmeg, *Compendium for Early Career Researchers in Mathematics Education*, (pp. 181-198). Springer

Saldaña, J. (2013). *The Coding Manual for Qualitative Researchers (2nd Edition)*. Sage Publications

Appendix C: Appendix to chapter 3

Table C1: Mean of household's membership in local community institutions

Variable	(1) All observations (n=832)	(2) Unskilled migrant (n=461)	(3) Non- migrant (n=371)	(4) Difference (2-3)	(5) Temporary migrant (n=338)	(6) Longer-term migrant (n=123)	(7) Difference (5-6)
Membership of social institutions (EV;)	0.12 (0.33)	0.09 (0.29)	0.15 (0.36)	-0.06*** [0.02]	0.09 (0.28)	0.11 (0.32)	-0.03 [0.03]

Standard deviations in parentheses- (), standard errors in square brackets- []; *p<0.10, **p<0.05, ***p<0.01

Variables	Variance Inflation Factor (VIF)				
	First-stage	Second-stage			
Employment seasonality (ESi)		¥			
Seasonal employment fluctuations	1.28	1.27			
Wage gap	1.23	1.23			
Flood vulnerability	1.19	1.20			
Migrant networks (MN _i)					
Migrant network size	1.17	1.14			
Family demographic constraints (FDC _i)					
Small household	1.57	1.53			
Elderly member	1.36	1.27			
Children	1.33	1.31			
Adolescent girl	1.14	1.10			
Distrust in neighbors	1.13	1.03			
Farm labor constraints (FLC _i)					
Crop farming	1.31	1.31			
Livestock farming	1.25	1.21			
Controls (Xi)					
Household head's age	1.57	1.46			
Household head's education	1.28	1.29			
Household head: Male	1.05	1.07			
Major occupation: Agriculture	2.18	2.19			
Major occupation: Selling labor	2.24	2.23			
Having a business	1.25	1.21			
Membership of microcredit NGOs	1.08	1.05			
Access to safety-nets	1.09	1.12			
Experience of damage	1.06	1.09			
Distance to nearby migration hub	1.14	1.14			
Land ownership	1.52	1.38			
Wealth index	1.86	1.76			
Village fixed effects	1.31	1.37			
Membership of social institutions	1.10				
Mean VIF	1.35	1.33			
N	832	461			

Table C2: Collinearity tests for variables in two-stage Heckman probit selection model

Variables	(1) All	(2) Unskilled migrant	(3) Non-	(4) Difference (2-3)	(5) Temporary	(6) Longer-term	(7) Differences
	observations (n=832)	(n=461)	migrant (n=371)		migrant (n=338)	migrant (n=123)	(5-6)
Employment seasonality	(ES)		(1 0 / 1)		(1 000)	(1 120)	
Seasonal employment	0.47	0.55	0.37	0 18***	0.64	0.28	0 36***
fluctuations	(0, 50)	(0.50)	(0.48)	[0.03]	(0.48)	(0.45)	[0 05]
Wage gap	111.17	125.27	93.65	31.62***	144.90	71.34	73.55***
(in BDT)	(128.90)	(133.82)	(120.40)	[8.93]	(134.34)	(116.94)	[13.68]
Flood vulnerability	0.11	0.12	0.10	0.02	0.09	0.20	-0.11***
5	(0.31)	(0.32)	(0.30)	[0.02]	(0.28)	(0.40)	[0.03]
Migrant networks (MNi)				L J			
Migrant network size	5.69	7.54	3.38	4.16***	8.36	5.30	3.06***
5	(4.92)	(4.98)	(3.74)	[0.31]	(4.84)	(4.65)	[0.50]
Family demographic con	straints (FDC _i)	5 Z	· · ·		\$ <i>1</i>	· · · ·	
Small household	0.61	0.57	0.67	-0.09***	0.61	0.46	0.15***
	(0.49)	(0.50)	(0.47)	[0.03]	(0.49)	(0.50)	[0.05]
Elderly member	0.32	0.28	0.36	-0.08**	0.26	0.33	-0.07
	(0.47)	(0.45)	(0.48)	[0.03]	(0.44)	(0.47)	[0.05]
Children	0.58	0.60	0.56	0.05	0.63	0.53	0.10**
	(0.49)	(0.49)	(0.50)	[0.03]	(0.48)	(0.50)	[0.05]
Adolescent girl	0.38	0.38	0.37	0.01	0.41	0.31	0.10**
	(0.49)	(0.49)	(0.48)	[0.03]	(0.49)	(0.46)	[0.05]
Distrust in neighbors	0.22	0.07	0.41	-0.34***	0.08	0.03	0.05*
	(0.41)	(0.25)	(0.49)	[0.03]	(0.28)	(0.18)	[0.03]
Farm labor constraints (A	FLCi)						
Crop farming	0.67	0.62	0.74	-0.13***	0.64	0.54	0.11**
	(0.47)	(0.49)	(0.44)	[0.03]	(0.48)	(0.50)	[0.05]
Livestock farming	0.62	0.56	0.70	-0.15***	0.59	0.46	0.14***
	(0.49)	(0.50)	(0.46)	[0.03]	(0.49)	(0.50)	[0.05]

Table (C3: Summary	v statistics of	of kev ey	planatory	variables	for mig	pration	decision-	making
IGOIC	Co. Samma	Decentron .	o i i i o i	ipianacoi j		101 1111	51001011		manning

 $Standard \ deviations \ in \ parentheses-(), \ standard \ errors \ in \ square \ brackets-[]; \ *p<0.10, \ **p<0.05, \ ***p<0.01$

Food groups	All observations (n=832)		Temporary migrants (n=338)			Longer-term migrants (n=123)			Non-migrants (n=371)			
	Normal	Lean	Differences	Normal	Lean	Differences	Normal	Lean	Differences	Normal	Lean	Differences
	period	period	(normal –	period	period	(normal –	period	period	(normal –	period	period	(normal –
			lean)			lean)			lean)			lean)
Meat, fish	5.48	4.88	0.60***	5.38	5.99	-0.61***	5.56	4.93	0.63***	5.55	3.85	1.69***
	(1.83)	(2.24)	[0.08]	(1.86)	(1.60)	[0.11]	(1.94)	(2.12)	[0.17]	(1.78)	(2.29)	[0.10]
Milk, dairy products	1.79	1.33	0.46***	1.68	1.61	0.07	1.90	1.44	0.46**	1.85	1.04	0.82***
	(2.69)	(2.31)	[0.08]	(2.63)	(2.42)	[0.11]	(2.61)	(2.29)	[0.22]	(2.76)	(2.17)	[0.14]
Legumes, pulses	2.94	2.91	0.03	2.91	3.07	-0.16***	3.02	2.93	0.08	2.95	2.77	0.19***
	(1.80)	(1.69)	[0.04]	(1.87)	(1.75)	[0.06]	(1.84)	(1.68)	[0.10]	(1.71)	(1.64)	[0.06]
Staples	7.00	6.99	0.00	7.00	7.00	0.00	7.00	7.00	0.00	7.000	6.99	0.00
	(0.00)	(0.03)	[0.00]	(0.00)	(0.00)	[0.00]	(0.00)	(0.00)	[0.00]	(0.000)	(0.05)	[0.00]
Vegetables	6.20	6.05	0.15***	6.15	6.34	-0.18**	6.14	6.05	0.09	6.26	5.78	0.47***
	(1.34)	(1.35)	[0.05]	(1.40)	(1.15)	[0.07]	(1.49)	(1.36)	[0.12]	(1.23)	(1.46)	[0.07]
Fruits	3.55	2.44	1.11***	3.21	3.36	-0.14	3.67	2.33	1.34***	3.82	1.64	2.18***
	(2.70)	(2.19)	[0.10]	(2.69)	(2.08)	[0.17]	(2.69)	(2.29)	[0.28]	(2.68)	(1.94)	[0.12]
Oils, fats	6.99	6.99	0.00	6.99	6.99	0.00	7.00	7.00	0.00	7.00	7.00	0.00
	(0.10)	(0.10)	[0.00]	(0.16)	(0.16)	[0.00]	(0.00)	(0.00)	[0.00]	(0.00)	(0.00)	[0.00]
Sugar, sweets	3.76	3.52	0.24***	3.79	3.92	-0.13**	3.32	3.01	0.31***	3.88	3.33	0.54***
	(2.92)	(2.92)	[0.04]	(2.94)	(2.82)	[0.06]	(2.99)	(2.95)	[0.12]	(2.88)	(2.96)	[0.06]
FCS	67.05	61.32	5.73***	65.74	68.76	-3.02***	67.87	61.65	6.22***	67.98	54.44	13.55***
	(17.04)	(17.60)	[0.57]	(17.46)	(14.95)	[0.79]	(17.12)	(17.55)	[1.40]	(16.58)	(17.11)	[0.76]
PCS	37.93	33.58	4.35***	36.98	39.61	-2.63***	38.90	34.27	4.63***	38.47	27.85	10.61***
	(15.54)	(15.55)	[0.51]	(15.74)	(13.39)	[0.69]	(15.56)	(15.48)	[1.25]	(15.35)	(15.31)	[0.73]

 Table C4: Mean weekly consumption of various food groups

Standard deviations in parentheses- (), standard errors in square brackets- []; *p<0.10, **p<0.05, ***p<0.01

Table	C5: Mean	FCS,	PCS,	TPS,	and	household	income	during	lean	periods
								0		

	(1) All observations	(2) Temporary migrants	(3) Longer-term	(4) Non-migrants	(5) Differences	(6) Differences	(7) Differences
	(n=832)	(n=338)	migrants (n=123)	(n=371)	(2-4)	(3-4)	(2-3)
FCS	61.32	68.76	61.65	54.44	14.32***	7.22***	7.10***
	(17.60)	(14.95)	(17.55)	(17.11)	[1.21]	[1.79]	[1.65]
DCG	33.58	39.61	34.27	27.85	11.76***	6.41***	5.34***
PCS	(15.55)	(13.39)	(15.48)	(15.31)	[1.08]	[1.60]	[1.47]
TDS	4.59	-1.17	4.50	9.87	-11.05***	-5.38***	-5.67***
IPS	(15.41)	(13.61)	(16.41)	(14.75)	[1.07]	[1.58]	[1.52]
Income	63.96	62.46	81.58	59.49	2.97	22.08***	-19.11***
(in thousand BDT)	(53.30)	(42.44)	(57.12)	(59.48)	[3.91]	[6.13]	[4.93]

 $Standard \ deviations \ in \ parentheses-(), \ standard \ errors \ in \ square \ brackets-[]; \ *p<0.10, \ **p<0.05, \ ***p<0.01$

Variables	(1)	(2)
	Any migration vs non- migration (<i>M_i</i>)	Temporary vs longer-term migration (TM _i)
Employment seasonality (ESi)		
Seasonal employment fluctuations	0.25** [0.11]	0.65*** [0.18]
Wage gap	$0.00\ [0.00]$	0.00 [0.00]
Flood vulnerability	-0.16 [0.19]	-0.60** [0.23]
Migrant networks (MNi)		
Migrant network size	0.12*** [0.01]	0.03 [0.04]
Family demographic constraints (FDCi)		
Small household	-0.21 [0.13]	0.53** [0.21]
Elderly member	-0.19 [0.13]	0.39* [0.21]
Children	-0.09 [0.12]	0.49** [0.19]
Adolescent girl	-0.04 [0.11]	0.45*** [0.17]
Distrust in neighbors	-1.17*** [0.13]	1.75*** [0.55]
Farm labor constraints (FLC _i)		
Crop farming	-0.41*** [0.13]	0.26 [0.21]
Livestock farming	-0.29** [0.12]	0.56*** [0.18]
Controls (Xi)		
Household head's age	-0.01 [0.01]	-0.03*** [0.01]
Household head's education	-0.03* [0.02]	0.06** [0.03]
Household head: Male	-0.14 [0.37]	0.54 [0.53]
Major occupation: Agriculture	0.17 [0.17]	0.75*** [0.24]
Major occupation: Selling labor	-0.05 [0.16]	0.78*** [0.21]
Having a business	-0.51*** [0.13]	0.22 [0.25]
Membership of microcredit NGOs	0.21* [0.12]	-0.32* [0.19]
Access to social safety nets	-0.15 [0.12]	0.02 [0.20]
Experience of damage	-0.38*** [0.11]	0.03 [0.22]
Distance to nearby migration hub	0.01 [0.00]	-0.01 [0.01]
Land ownership	-0.02*** [0.01]	0.01 [0.01]
Wealth index	0.13*** [0.04]	-0.16** [0.06]
Village fixed effects	0.00*** [0.00]	-0.00 [0.00]
Membership of social institutions	-0.45*** [0.18]	
Constant	0.26 (0.54)	-0.03 [0.89]
Residuals		-2.19** [1.10]
Wald chi2(25)	267.86	153.68

Table C6: Robustness check (migration decisions using control function approach)

N= 832; Robust standard errors in square brackets- []; *p<0.10, **p<0.05, ***p<0.01

Variables	<i>M_{il}</i> = 2, Longer-term migration	<i>M_{il}</i> = 3, Temporary migration		
IVs:				
Temporary migration proportion of the village	0.01 [0.01]	0.04*** [0.01]		
Longer-term migration proportion of the village	0.07*** [0.02]	0.00 [0.02]		
Employment seasonality (ESi)				
Seasonal employment fluctuations	-0.48* [0.27]	0.78*** [0.23]		
Wage gap	-0.00 [0.00]	0.00 [0.00]		
Flood vulnerability	-0.62 [0.48]	-0.30 [0.39]		
Migrant networks (<i>MNi</i>)				
Migrant network size	0.10*** [0.04]	0.25*** [0.03]		
Family demographic constraints (FDC _i)				
Small household	-1.00*** [0.32]	-0.21 [0.25]		
Elderly member	-0.70** [0.32]	-0.19 [0.26]		
Children	-0.81*** [0.31]	-0.05 [0.23]		
Adolescent girl	-0.73** [0.30]	0.11 [0.22]		
Distrust in neighbors	-3.08*** [0.56]	-1.63*** [0.29]		
Farm-labor constraints (FLC _i)				
Crop farming	-0.72** [0.32]	-0.74*** [0.25]		
Livestock farming	-0.90*** [0.28]	-0.31 [0.23]		
Controls (Xi)				
Household head's age	0.02 [0.01]	-0.03*** [0.01]		
Household head's education	-0.09** [0.04]	-0.05 [0.03]		
Household head: Male	-0.69 [0.90]	0.17 [0.67]		
Major occupation: Agriculture	-0.53 [0.40]	0.83** [0.34]		
Major occupation: Selling labor	-0.80** [0.36]	0.42 [0.32]		
Having a business	-0.82** [0.32]	-0.88*** [0.26]		
Membership of microcredit NGOs	0.57* [0.30]	0.18 [0.23]		
Access to safety-nets	-0.06 [0.30]	-0.30 [0.24]		
Experience of damage	-0.37 [0.29]	-0.68*** [0.21]		
Distance to nearby migration hub	0.01 [0.01]	0.00 [0.01]		
Land ownership	-0.03* [0.01]	-0.03** [0.01]		
Wealth index	0.29*** [0.08]	0.10 [0.08]		
Village fixed effects	0.00 [0.00]	0.00** [0.00]		
Constant	0.11 [1.39]	-1.77* [1.03]		

Table C7: First-stage MNLS results (Base category: $M_{il} = 1$, non-migration)

N= 832; Wald chi2(52) = 305.13; Robust standard errors in square brackets- []; *** p<0.01, ** p<0.05, * p<0.1

Variables	FCS	PCS	TPS	Income
IVs:				
Temporary migration proportion of	-0.06	-0.06	0.09	0.05
the village	[0.07]	[0.06]	[0.06]	[0.27]
Longer-term migration proportion	0.09	0.08	0.05	-0.37
of the village	[0.12]	[0.11]	[0.11]	[0.46]
Constant	40.73***	16.30**	13.65*	37.05*
	[7.73]	[7.23]	[7.35]	[20.92]
Controls (Z_i)	Yes	Yes	Yes	Yes
p-value	0.00	0.00	0.00	0.00

Table C8: Falsification tests for the IVs (effects of IVs on the control group)

N=371 (non-migrant households); Robust standard errors in square brackets- []; FCS, food consumption score; PCS, protein consumption score; TPS, temporary protein shortfall; Income in thousand ('000) BDT; * p<0.10, ** p<0.05, *** p<0.01

	(1)	(2)	(3)	(4)	(5)	(6)
Variables	FCS_1	Anciliary	FCS_2	Anciliary	FCS_3	Anciliary
Household member number	1.87***		0.57		0.57	
	(0.45)		(0.86)		(0.73)	
Household head's age	-0.03		0.13		-0.10**	
	(0.05)		(0.10)		(0.05)	
Household head's education	0.46***		0.21		0.48	
	(0.15)		(0.51)		(0.32)	
Household head: Male	1.55		2.29		8.55	
	(4.69)		(10.32)		(10.34)	
Seasonal employment shortfalls	-6.64***		-11.91**		-1.65	
	(1.85)		(5.37)		(1.47)	
Flood vulnerability of the village	-9.50***		3.98		-4.79**	
	(2.80)		(3.15)		(2.30)	
Experience of damage	-2.14		7.82**		0.12	
	(1.33)		(3.81)		(2.91)	
Aman report dummy	0.00		0.00		-4.51**	
	(0.00)		(0.00)		(1.83)	
Village fixed effects	0.00***		-0.00***		-0.00	
-	(0.00)		(0.00)		(0.00)	
_m2	-8.14				-14.00***	
	(5.37)				(4.49)	
_m3	8.73*		-14.84***			
	(4.55)		(3.14)			
Sigma2		321.99***		597.69***		410.15***
		(46.19)		(100.67)		(126.65)
rho2		-0.58				-0.89***
		(0.42)				(0.16)
rho3		0.62*		-0.78***		
		(0.34)		(0.12)		
_m1			14.58***		11.77***	
			(3.71)		(4.17)	
rhol				0.76***		0.75***
				(0.15)		(0.17)
Constant	41.98***		60.28***		63.95***	
	(2.82)		(13.92)		(9.50)	

Table C9: Second-stage regression results for FCS	;
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N=832; Robust standard errors in parentheses- (); * p<0.10, ** p<0.05, *** p<0.01

Table	C10:	Second-stage	regression	results	for	PCS
Lanc	CIU.	Second Stuge	regression	results	101	100

	(1)	(2)	(3)	(4)	(5)	(6)
Variables	PCS_1	Anciliary	PCS_2	Anciliary	PCS_3	Anciliary
Household member number	1.56***		0.30		0.22	
	(0.37)		(0.85)		(0.58)	
Household head's age	-0.02		0.15*		-0.08*	
	(0.05)		(0.09)		(0.04)	
Household head's education	0.35**		0.17		0.48*	
	(0.15)		(0.41)		(0.26)	
Household head: Male	0.23		1.51		6.70	
	(3.94)		(6.79)		(8.48)	
Seasonal employment shortfalls	-5.15***		-10.62**		-0.19	
	(1.74)		(4.75)		(1.27)	
Flood vulnerability of the village	-8.08***		3.90		-4.15**	
	(2.39)		(2.47)		(1.98)	
Experience of damage	-2.12*		7.76**		0.46	
Entreme of animage	(1.14)		(3.86)		(2.56)	
Aman report dummy	0.00		0.00		-4.14**	
1 2	(0.00)		(0.00)		(1.90)	
Village fixed effects	0.00***		-0.00***		-0.00	
e	(0.00)		(0.00)		(0.00)	
m2	-6.76				-12.64***	
—	(5.33)				(3.82)	
m3	7.58*		-13.37***			
—	(4.51)		(2.82)			
Sigma2		255.39***		471.21***		323.57***
-		(35.82)		(72.09)		(98.16)
rho2		-0.54				-0.90***
		(0.45)				(0.14)
rho3		0.61		-0.79***		
		(0.37)		(0.13)		
m1			12.91***		9.96***	
_			(3.32)		(3.58)	
rho1				0.76***	. ,	0.71***
				(0.16)		(0.17)
Constant	17.49***		31.24***		34.88***	
	(2.45)		(9.50)		(7.77)	

N=832; Robust standard errors in parentheses- (); * p<0.10, ** p<0.05, *** p<0.01

Table	C11:	Second-stage	regression	results	for	TPS
Indic	UII .	Second Stuge	regression	results	101	110

	(1)	(2)	(3)	(4)	(5)	(6)
Variables	TPS_1	Anciliary	TPS_2	Anciliary	TPS_3	Anciliary
Household member number	-1.30***		-0.53		-0.15	
TT 1 1 1 1 1	(0.37)		(0.92)		(0.69)	
Household head's age	0.01		-0.13		0.06	
TT 1 111 19 1 /	(0.05)		(0.10)		(0.06)	
Household head's education	-0.24**		-0.07		-0.42*	
TT 1 111 1 NC 1	(0.11)		(0.47)		(0.25)	
Household head: Male	-0.40		-2.63		-2.53	
	(5.00)		(6.70)		(7.80)	
Seasonal employment shortfalls	5.48***		12.2/**		1.26	
	(1.99)		(5.02)		(1.35)	
Flood vulnerability of the village	2.84		-10.01***		-1.47	
6	(2.35)		(2.49)		(2.26)	
Experience of damage	1.62		-6.13		0.56	
1 8	(1.00)		(3.94)		(2.73)	
Aman report dummy	0.00		0.00		4.50**	
1 2	(0.00)		(0.00)		(1.77)	
Village fixed effects	-0.00**		0.01***		0.00*	
-	(0.00)		(0.00)		(0.00)	
_m2	5.48				10.91***	
	(6.06)				(3.33)	
_m3	-5.96		14.80***			
	(5.09)		(2.86)			
Sigma2		232.85***		540.47***		298.10***
		(34.22)		(66.31)		(68.17)
rho2		0.46				0.81***
		(0.52)				(0.17)
rho3		-0.50		0.82***		
		(0.43)		(0.14)		
_ml			-14.03***		-9.25***	
			(3.29)		(3.11)	
rhol				-0.77***		-0.69***
				(0.17)		(0.17)
Constant	13.78***		2.42		-6.19	
	(2.99)		(10.61)		(7.04)	

N=832; Robust standard errors in parentheses- (); * p<0.10, ** p<0.05, *** p<0.01

	(1)	(2)	(3)	(4)	(5)	(6)
Variables	Inc_1	Anciliary	Inc_2	Anciliary	Inc_3	Anciliary
Household member number	6.52*		11.27**		3.48***	
	(3.79)		(4.72)		(1.04)	
Household head's age	-0.41*		-1.35***		-0.06	
	(0.23)		(0.33)		(0.21)	
Household head's education	0.60		-0.34		1.27*	
	(1.34)		(1.17)		(0.68)	
Household head: Male	29.19***		17.71		22.28	
	(6.28)		(36.50)		(15.79)	
Seasonal employment shortfalls	-10.38*		-6.73		-4.73	
	(6.14)		(13.45)		(3.52)	
Flood vulnerability of the village	-16.69***		-22.55**		-1.66	
	(4.53)		(11.50)		(3.03)	
Experience of damage	-7.79		-0.85		0.49	
	(4.77)		(9.75)		(3.49)	
Aman report dummy	0.00		0.00		-0.71	
	(0.00)		(0.00)		(6.68)	
Village fixed effects	-0.00		-0.01***		-0.00*	
	(0.00)		(0.00)		(0.00)	
_m2	-31.06***				-15.00*	
	(7.93)				(8.90)	
_m3	25.26***		13.06			
	(7.80)		(13.77)			
Sigma2		4,150.27***		2,805.13***		1,987.33***
		(666.37)		(244.73)		(412.06)
rho2		-0.62***				-0.43**
		(0.13)				(0.21)
rho3		0.50***		0.32		
		(0.14)		(0.31)		
m1			-12.52		13.99*	
_			(17.29)		(7.29)	
rho l				-0.30		0.40**
				(0.39)		(0.18)
Constant	35.67**		116.61***	· /	41.61**	× /
	(14.85)		(36.07)		(17.34)	

Table C12: Second-stage regression results for income (Inc)

N=832; Robust standard errors in parentheses- (); * p<0.10, ** p<0.05, *** p<0.01

Table C13: Robustness checks	(treatment effects estimated with IPWRA)
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	FCS	PCS	TPS	Income
Temporary migration vs non-	17.07***	14.76***	-13.47***	-0.13
migration	[1.73]	[1.68]	[1.60]	[7.05]
Longer-term migration vs non-	10.17***	9.35***	-8.77***	20.11**
migration	[2.21]	[1.96]	[2.14]	[8.14]

N=832; Robust standard errors in square bracket- []. *p<0.10, **p<0.05, ***p<0.01

Appendix D: Appendix to chapter 4

Variable	(1) All observations (n=2,793)	(2) Migrants (n=605)	(3) Non- migrants (n=2,188)	(4) Mean difference (2-3)	(5) Temporary migrants (n=385)	(6) Longer- term migrants (n=220)	(7) Mean difference (5-6)
Experience	0.35	0.30	0.36	-0.06***	0.30	0.31	-0.01
of random economic shocks (ev_i)	(0.48)	(0.46)	(0.48)	[0.02]	(0.46)	(0.46)	[0.04]

Table D1: Mean of household experience of idiosyncratic economic shocks in the past year

Standard deviation in parentheses- (); standard error in square brackets- []; *p<0.10, **p<0.05, ***p<0.01

Variables	Variance Inflation Factor (VIF)					
variables	Migration vs	Temporary	Rural vs urban			
	non-	vs longer-	destination			
	migration	term	choice (<i>R_i</i>)			
	(M_i)	migration				
		(TM_i)				
Individual characteristics (<i>I_i</i>)						
Education	1.81	1.79	1.76			
Occupation: Agriculture farming	1.46	2.09	1.37			
Agricultural labor sale			1.41			
Relevant controls						
Physical sensitivity to agriculture			1.26			
Age	1.86	2.57	1.58			
Household size	1.40	1.50	1.21			
Agricultural landholdings	1.24	1.28	1.31			
Crop farming	1.21	1.77	1.30			
Livestock farming	1.16	1.54	1.19			
Family demographic shocks	1.01	1.07	1.07			
Business	1 12	1 47	1.09			
Social safety-nets	1.09	1.17	1.15			
Microcredit memberships	1.05	1.22	1.13			
Urban negativity (U.)	1.00	1.05	1.12			
Drior negative percention of cities			1 44			
Polovent controls			1.44			
Leaf of skills beyond conjoulture			1 40			
Exact of skills beyond agriculture			1.42			
Experience of desunation characteristics (D_i)			1 20			
Income-to-cost ratio			1.39			
Physical comfort			1.19			
Relevant controls			1.00			
Daily wage opportunities			1.09			
Flood vulnerability of the village	1.16	1.20	1.19			
Village-level fixed effects	1.30	1.65	1.34			
Migrant networks <i>(Ni)</i>						
Rural boundness of the closest migrant kin			1.63			
Migrant group size			1.39			
Migration distance (Dist _i)						
Travel distance (km)			1.15			
Relevant controls						
Household distance to the nearby migration hub	1.12	1.14	1.16			
Other controls (X _i)						
Gender	1.55					
Occupation: Labor sales	1.60	3.94				
Seasonal employment fluctuation at the origin	1.14	1.16				
Children	1.18	1.31				
Elderly	1.31	1.24				
Distrust in neighbors	1.12	1.78				
Size of the migrant network	1.12	2.82				
Random economic shocks (ev.)	1.05	2.02				
imr:	1.00	7 59	2 38			
Mean VIF	1 28	1.96	1 34			
N	2 702	605	285			
1 N	2,193	005	202			

Table D2: Collinearity tests for variables to explain temporary migrant's destination choices



Map source: Author's construct on the free map from LGED Bangladesh

Figure D1: Popular destination districts among temporary migrants from northern Bangladesh

Income variables (<i>Inc_j</i>)	(1) All observations (n=385)	(2) <30 days duration in an episode (n=258)	(3) >30 days duration in an episode (n=127)	(4) Mean difference (2-3)
Total income (tot_inc_j)	4.00 (0.65)	3.97 (0.65)	4.06 (0.65)	-0.10 [0.07]
Remittance income	3.09 (0.92)	2.91 (0.90)	3.45 (0.86)	-0.53*** [0.10]
$(remit_inc_j)$				
Local market income	2.95 (1.34)	3.09 (1.28)	2.65 (1.41)	0.45*** [0.14]
(loc_inc_j)				

Table D3. Weath household meetine for different temporary migration duration	Table D3:	Mean	household	income	for	different	temporary	migration	duration
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Standard deviation in parentheses- (); standard errors in square brackets- []; *p<0.10, **p<0.05, ***p<0.01

Income sources	(1) All observations (n=385)	(2) Rural-bound temporary migrants (n=259)	(3) Urban-bound temporary migrants (n=126)	(4) Mean difference (2-3)
Crop farming	0.37 (1.07)	0.42 (1.15)	0.27 (0.90)	0.15 [0.12]
Livestock farming	0.37 (1.06)	0.45 (1.14)	0.20 (0.83)	0.25** [0.11]
Labor sale	2.14 (1.49)	2.32 (1.42)	1.76 (1.57)	0.55*** [0.16]
Business	0.46 (1.19)	0.43 (1.16)	0.54 (1.24)	-0.11 [0.13]
Monthly fixed/service	0.27 (0.74)	0.23 (0.67)	0.35 (0.85)	-0.12 [0.08]
Seasonal safety-nets	0.32 (0.69)	0.33 (0.70)	0.30 (0.67)	0.03 [0.07]
Rents and assets	0.03 (0.34)	0.03 (0.38)	0.02 (0.25)	0.01 [0.04]
Others	0.01 (0.19)	0.01 (0.23)	0.00 (0.00)	0.01 [0.02]

Table D4: Mean differences of income from different local market sources

Standard deviation in parentheses- (); standard errors in square brackets- []; *p<0.10, **p<0.05, ***p<0.01

Table D5: Factors for migration and temporary migration by correcting self-selection (equation

2 and 3)

Variables	Migration vs non-	Temporary vs longer-
	migration (M_i)	term migration (TM_i)
Age	-0.02*** [0.00]	0.03*** [0.01]
Education	-0.01 [0.01]	-0.05*** [0.02]
Occupation: Agriculture farming	0.31*** [0.11]	1.11*** [0.28]
Occupation: Labor sale	0.52*** [0.09]	0.57** [0.25]
Seasonal employment fluctuation at the origin	0.04 [0.07]	0.70*** [0.14]
Children	0.04 [0.07]	0.35** [0.16]
Elderly	-0.07 [0.08]	0.41** [0.18]
Distrust in neighbors	-0.84*** [0.10]	1.78*** [0.39]
Crop farming	-0.33*** [0.08]	0.53*** [0.18]
Livestock farming	-0.27*** [0.08]	0.58*** [0.17]
Family demographic shocks	-0.32 [0.29]	-0.46 [0.63]
Size of the migrant network	0.05*** [0.01]	0.02 [0.02]
Household size	0.00 [0.02]	-0.17*** [0.05]
Agricultural landholdings	-0.00 [0.00]	-0.01 [0.01]
Business	-0.35*** [0.09]	0.47** [0.19]
Social safety-nets	-0.14* [0.08]	0.01 [0.17]
Microcredit memberships	0.04 [0.08]	0.03 [0.16]
Household distance to the nearby migration hub	0.00 [0.00]	-0.01* [0.00]
Flood vulnerability of the village	-0.19 [0.12]	-0.38* [0.21]
Village-level fixed effects	0.00*** [0.00]	-0.00 [0.00]
Gender	2.00*** [0.12]	
Random economic shocks (ev_j)	-0.13* [0.07]	
<i>imr</i> _i		1.66*** [0.55]
Constant	-3.80*** [0.32]	-2.46*** [0.66]
Wald chi2	551.25	240.54
Observations	2,793	605

Robust standard errors in square brackets- []; *p<0.10, **p<0.05, ***p<0.01

Table D6:	Income effects	of destination	choices by	v correct	ing se	elf-sel	lection	bias	(equat	tion 5)
36 1 1	¥7 · 11		F / I ·	D	•	•	т	1	1 4 9	

Model	Variable	Total income (tot_inc _j)	Remittance income (remit_inc _j)	Local market income <i>(loc_inc_j)</i>
Multi-step conditional	Rural over urban destination choice (<i>R_i</i>)	0.06 [0.10]	-0.22 [0.18]	0.45* [0.23]
probit selection	imr3 _i	-0.10 [0.08]	-0.11 [0.14]	0.09 [0.18]
model with	Constant	3.89*** [0.28]	2.80*** [0.36]	2.67*** [0.45]
subsamples	Controls (z_i)	Yes	Yes	Yes

Standard errors in square brackets- []; *p<0.10, **p<0.05, ***p<0.01

Table D7: Factors for migration, temporary migration, and destination choices employing multi-step control function approach (equation 2, 3, and 4)

Variables	Migration vs	Temporary vs	Rural vs urban
		migration (TM:)	choice (R_i)
Individual characteristics (I:)	(1/1)		
Education	-0.01 [0.01]	-0.05** [0.02]	-0.15*** [0.06]
Occupation: Agriculture farming	0.31*** [0.11]	0.82** [0.33]	-0.01 [0.29]
Agricultural labor sale			1.27*** [0.46]
Relevant controls			
Physical sensitivity to agriculture			-1.16** [0.45]
Age	-0.02*** [0.00]	0.05*** [0.01]	0.01 [0.01]
Household size	0.00 [0.02]	-0.18*** [0.05]	-0.26** [0.11]
Agricultural landholdings	-0.00 [0.00]	-0.01 [0.02]	0.02 [0.02]
Crop farming	-0.33*** [0.08]	0.79*** [0.26]	-0.80** [0.36]
Livestock farming	-0.27*** [0.08]	0.80*** [0.22]	0.76** [0.33]
Family demographic shocks	-0.32 [0.29]	-0.26 [0.71]	-1.02** [0.50]
Business	-0.35*** [0.09]	0.76*** [0.27]	0.33 [0.34]
Social safety-nets	-0.14* [0.08]	0.10 [0.19]	0.22 [0.32]
Microcredit memberships	0.04 [0.08]	0.00[0.16]	-0 54* [0 30]
Urban negativity (U:)	0.01[0.00]	0.00[0.10]	0.01 [0.00]
Prior negative perception of cities			1 16*** [0 33]
Relevant controls			[0.00]
Lack of skills beyond agriculture			0.69** [0.27]
Experience of destination characteristics (D _i)			
Income-to-cost ratio			0.38*** [0.07]
Physical comfort			0.07 [0.05]
Relevant controls			
Daily wage opportunities			-0.27** [0.11]
Flood vulnerability of the village	-0 19 [0 12]	-0 28 [0 23]	0.69[0.71]
Village-level fixed effects	0.00*** [0.00]	-0.00* [0.00]	0.00 [0.00]
Migrant networks (Ni)	0.000 [0.000]	0.000 [0.000]	
Rural boundness of the closest migrant kin			3.15*** [0.48]
Migrant group size			0.11*** [0.04]
Migration distance (Disti)			
Travel distance (km)			-0.00*** [0.00]
Relevant controls			[0.00]
Household distance to the nearby migration hub	0.00 [0.00]	-0.01** [0.00]	-0.01 [0.01]
Other controls (X _i)	0.00 [0.00]	0.01 [0.00]	0.01 [0.01]
Gender	2.00*** [0.12]		
Occupation: Labor sale	0.52*** [0.09]	0.14 [0.36]	
Seasonal employment fluctuation at the origin	0.04 [0.07]	0.67*** [0.14]	
Children	0.04 [0.07]	0.33** [0.16]	
Elderly	-0.07[0.08]	0 51*** [0 19]	
Distrust in neighbors	-0.84*** [0.10]	2.54*** [0.57]	
Size of the migrant network	0.05*** [0.01]	-0.01 [0.04]	
Random economic shocks (ev.)	-0.13* [0.07]		
res _i	0.12 [0.07]	-5.32*** [1.71]	2.57*** [0.97]
Constant	-3.80*** [0 32]	1.45 [0 97]	-0.01 [1 43]
Wald chi2	551 25	255 59	137.98
Observations	2.793	605	385

Standard errors in square brackets- []; *p<0.10, **p<0.05, ***p<0.01

Variable	Total income	Remittance income	Local market income
	(tot_inc _j)	(remit_inc _j)	(loc_inc _j)
Rural over urban destination choice (R_i)	-0.08 [0.08]	-0.39*** [0.12]	0.59*** [0.17]
Age	-0.00 [0.00]	-0.00 [0.00]	0.00 [0.01]
Education	0.01 [0.01]	-0.00 [0.01]	0.00 [0.02]
Gender	0.26* [0.15]	0.10 [0.22]	-0.16 [0.24]
Household size	0.04 [0.03]	0.03 [0.04]	0.12*** [0.04]
Seasonal employment fluctuation at the origin	-0.13* [0.07]	0.18* [0.10]	-0.62*** [0.13]
Flood vulnerability of the village	0.09 [0.10]	0.17 [0.18]	0.06 [0.18]
Village-level fixed effects	-0.00 [0.00]	0.00* [0.00]	-0.00 [0.00]
$res3_i$	0.28* [0.16]	0.41 [0.40]	-0.31 [0.43]
Constant	3.92*** [0.28]	2.85*** [0.36]	2.63*** [0.45]

Table D8: Full regression results from equation (5) using multi-step control function approach

Standard errors in square brackets- []; *p<0.10, **p<0.05, ***p<0.01

Table D9: First-stage regression results summary from 2sls

Variables	Choice of rural versus urban destination (R_i)	
Instrument: Rural-bound migrant kin (1/0)	0.54^{***} [0.05]	
Constant	0.60*** [0.16]	
F-statistics	73.81	
Controls	Yes	

Standard errors in square brackets- []; *p<0.10, **p<0.05, ***p<0.01.