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Rural Outmigration and the Gendered Patterns of Agricultural Labor in Nepal

by Vanya Slavchevska, Cheryl Doss, Erdgin Mane, Susan
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¹ A small share of findings were originally published in Kar et al. (2018) report.

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Abstract

In Nepal, as in many developing countries, male outmigration from rural areas is significant and is rapidly transforming the sending communities. Using primary data collected from households in rural Nepali communities, this study analyzes the effects of male out-migration from rural agricultural areas on women's and men's work on and off the farm. Using an instrumental variable approach to correct for endogeneity related to outmigration, the study finds differential impacts on agricultural labor for the men and women who remain. Men reduce labor in non-farm work without significantly increasing their labor allocation to other activities. Women, on the other hand, increase their work on the farm taking on new responsibilities and moving from contributing family workers to primary farmers. Despite their growing roles as primary farmers, women in households with a migrant do not increase their work in higher value activities, and remain predominantly concentrated in producing staple grains. The analysis highlights the importance of recognizing the changing roles of rural women, especially with respect to the management of the family farm, but it also raises questions about the sustainability and resilience of rural livelihoods to shocks in remittance incomes.

Keywords: Rural outmigration, gender, labor supply, Nepal

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1. Introduction

When men migrate out of rural areas, those who remain are faced with both challenges and opportunities. Less male labor is available for agricultural work; the migrant's labor may be replaced by men or women who remain. New opportunities may arise for women to manage the farm. This may be empowering for them. It may also be a burden if the new responsibilities come without additional resources.

While studies have examined the impacts of male outmigration on labor force participation and employment in sending communities (Acosta, 2006; Amuedo-Dorantes & Pozo, 2006; Funkhouser, 1992; Kim, 2007; Lokshin & Glinskaya, 2009; Mendola & Carletto, 2012; Rodriguez & Tiongson, 2001), few have analyzed the specific impacts on agricultural work. Agriculture is the backbone of many developing economies and is the main employer for a large share of the rural population. Using survey data collected in 2017 by the Food and Agriculture Organization of the United Nations (FAO) and the World Bank, we analyze how male-dominated outmigration impacts the work and responsibilities of men and women in rural migrant-sending communities in Nepal. The survey collected comprehensive information on all types of migration from rural areas, as well as detailed information on individuals' livelihoods in sending areas, on agricultural production and food security. For a sub-set of women, it also collected self-reported information on their participation in specific agricultural activities and their time use through the Abbreviated Women's Empowerment in Agriculture Index (A-WEAI).

The Nepali context is particularly relevant for studying the gendered effects of migration on rural areas. Approximately half of all Nepali households have at least one family member who is an international or a domestic emigrant²; the 2011 census suggests that a quarter of all households have a family member abroad (IOM, 2019). The remittances generated from foreign employment were equivalent to 27.5 percent of Nepal's gross domestic product in 2017 (World Bank, 2020), and almost one-fifth of the country's poverty

² The estimates vary slightly depending on the source. The 2016 Demographic Health Survey (DHS) estimates that around 47% of households have at least one family member who has emigrated abroad or within Nepal in the last 10 years; the 2010-11 Nepal National Living Standard Survey estimates that 53% of all households have a member who is currently a domestic or international emigrant.

reduction between 1995 and 2004 has been attributed to migrant remittances (Lokshin, Bontch-Osmolovski, & Glinskaya, 2010). Men dominate international migration patterns. According to the 2011 census around 87 percent of international migrants are men, but other national data sources estimate the share to be higher (Lokshin & Glinskaya, 2009).

The study makes two contributions to the literature. First, it looks not only at how male-dominated migration impacts the employment of the remaining women and men, but it analyses changes in the types of work they do both on and off the farm. Our analysis uses labor information for all members of our sampled households, focusing broadly on the sector of employment and type of employee (e.g. agriculture and non-agriculture self-employment versus employee). In addition, we use A-WEAI data collected from one member of each household on the respondents' participation in a wide range of farm and non-farm productive activities. Second, we use a set of instrumental variables – historic weather shocks preceding the start of the migration combined with proxies for social norms around remittances – to identify the impacts of migration. Thus, we provide evidence of causal impacts of migration on the work of the family members who remain in rural areas.

The analyses show that male outmigration affects women and men's roles in agriculture in distinct ways. Men reduce their labor supply to non-farm work without significantly increasing their labor supply to other activities leading to an overall decrease in their labor supply to any activity. Women continue to work on the farm but their roles shift from contributing family workers to primary farmers. Despite this shift in farm management, we find no evidence that women diversify into higher value activities, such as horticulture, cash crops or any livestock production. Nor do they increase participation in higher value nodes of the value chain, such as trading and processing agricultural products. Instead, they continue to grow staple grains, mostly for own consumption. The findings have important policy implications and are directly relevant for ongoing discourses around the feminization of agriculture and the 'changing opportunities' for women in rural areas (Doss et al., 2020; Slavchevska et al., 2016). While the massive out-migration of men from rural areas increases the number of women farm managers, it does not shift the composition of their productive

activities, raising important questions about the role of migration and remittances for agricultural growth, sustainable development and for building resilient rural livelihoods.

2. Literature review

The impacts of migration, especially international migration, on the labor supply of those remaining in sending communities has been widely studied. Few of these studies provide insights about the impacts of rural outmigration on agricultural work; instead they focus on aggregate labor supply decisions (Acosta, 2006 for El Salvador; Hanson, 2007 for Mexico; Lokshin & Glinskaya, 2009 for Nepal) or use data from only urban areas (Funkhouser, 1992; Kim, 2007). Analyses which focus on aggregate labor supply tend to find that migration leads to a reduction in women's labor supply, but do not find a similar effect on men's labor supply (Acosta, 2006; Hanson, 2007).

Patterns of work and opportunities vary across rural and urban spaces. Studies that differentiate between rural and urban areas tend to find that impacts of outmigration vary (Amuedo-Dorantes & Pozo, 2006; Lokshin & Glinskaya, 2009; Mendola & Carletto, 2012; Mu & van de Walle, 2011). Lokshin and Glinskaya (2009) find that the migration of male family members in Nepal reduces women's participation in market work by 5.4 percentage points. The decrease is greater in urban areas and among landless households and is smaller for women in households with large landholdings. Using national survey data from Albania, Mendola and Carletto (2012) find that having a *current* migrant abroad decreases female paid labor supply and increases unpaid work, while *past* migration increases women's participation in self-employment and decreases their supply of unpaid work. These effects of migration are actually driven by rural areas and the relocation of the traditional farm labor, not by women's labor supply changes in urban areas. They find no significant impacts on men's labor supply.

Many studies find that as men migrate, women take on more work on the family farm, often at the expense of non-farm work. In China, Mu and van de Walle (2011) find that male out-migration is linked to a re-allocation of women's labor away from non-agricultural activities to agriculture and no effects on male labor.

In Egypt, male-dominated migration has led to a reduction in women's participation in wage work and increased participation in unpaid family work and subsistence work (Binzel & Assaad, 2011). The effect is stronger when the household does not receive remittances, suggesting that the response is motivated by the household's need to replace the migrant labor on the family enterprises rather than by the relaxing of liquidity constraints because of remittances.

Overall, the findings indicate that migration is linked to significant changes in women's work, especially in rural areas. As men migrate, women often reduce paid employment and take on more work in the household. Within the household, women often continue to carry out productive work, including in agriculture. Labor force surveys and other national surveys struggle to accurately measure women's work, especially in rural areas and within the confines of the family farm or enterprise (Koolwal, 2019). So, some of the discrepancies in the literature in terms of whether women reduce their labor supply as a result of the migration of a family member, may also be linked to how employment, contributing family work and leisure are defined and interpreted.

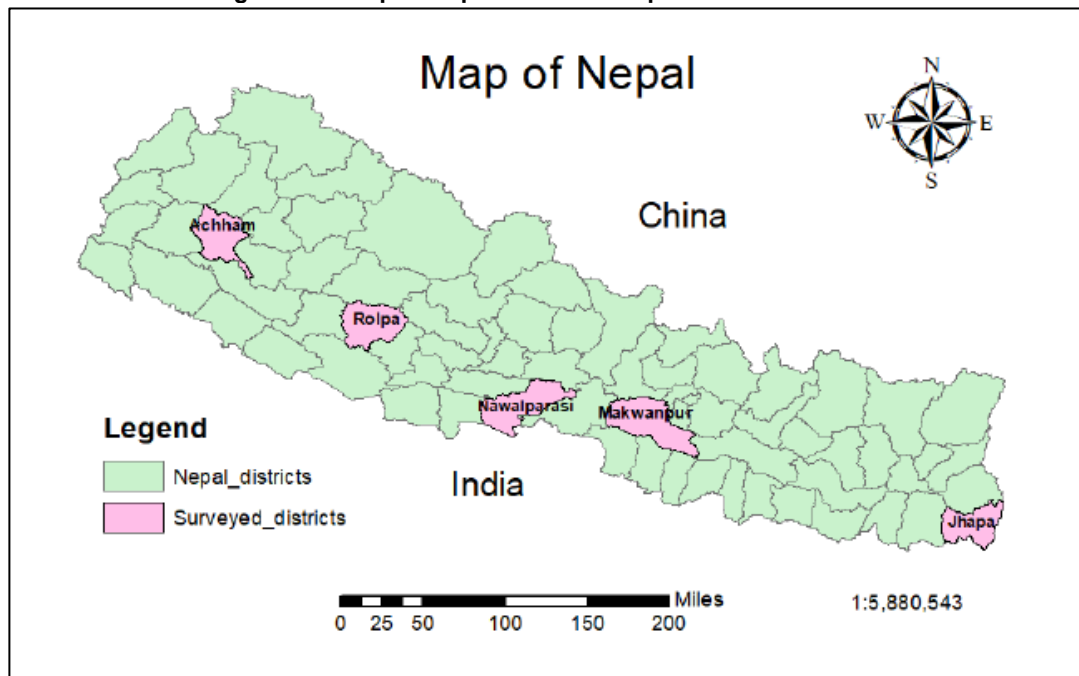
Moreover, the majority of studies focus on women's labor supply and provide sparing evidence about the impacts on men's labor supply in rural areas. The few that look at both men and women tend to find no effects on men's labor (Mendola & Carletto, 2012; Mu & van de Walle, 2011).

Significant gaps remain in our understanding of how male-dominated migration influences the labor market outcomes of the people who remain. Most analyses take a labor market perspective focusing on whether those who remain reduce their overall labor supply or reallocate labor between farm and non-farm or between paid and unpaid work. However, these analyses often do not look deeper at how work within agriculture may be changing for the men and women who remain. If the men and women remaining increase participation on the family farm, do they also diversify into higher value activities or do they continue to carry out the business as usual? Are they investing in livelihoods that are sustainable and resilient in the face of migration shocks? These are key questions at the center of this study.

3. Data

This study draws on a multi-topic household survey from Nepal collected between August and November 2017. The survey was collected under a joint FAO–World Bank project on rural transformation and the feminization of agriculture. The survey was implemented by the Nepa School of Social Science and Humanities and the Kathmandu-based research and consultancy firm Inter Disciplinary Analysts (IDA), with technical guidance and support from FAO. The sample includes 1,002 household from five districts: Achham, Rolpa, Nawalparasi, Makwanpur, and Jhapa. These districts were purposefully selected for the study based on two criteria: (i) high outmigration rates based on the latest census data, and (ii) a wide geographic coverage. The selected districts are distributed across the hills and the Terai (the mountains were

Figure 1: A map of Nepal with the sampled districts marked



Source: Authors' elaboration

excluded because of extremely low population densities) and the five former³ developmental regions (Figure 1). The sample is representative of the rural population of these districts. The sample was stratified in order to have 50 percent households with a migrant member in each enumeration area.

³ This is the administrative division before the new constitution in 2015 in Nepal.

The survey comprised two separate instruments: a household questionnaire and the A-WEAI questionnaire.⁴ The household questionnaire was designed to capture detailed, sex-disaggregated, and gender-relevant information on migration, agriculture, work, and other characteristics of rural households. The migration modules followed existing guidelines and recommendations for collecting migration data (de Brauw & Carletto, 2012). The family member who was most knowledgeable about the affairs of the household, including agriculture, completed the household questionnaire, reporting on the activities of each household member. Thus, we have information on 2,910 individuals age 16 and older currently residing in the 1002 sampled households. We refer to this as our full sample. We disaggregate this into the full sample of women and the full sample of men.

The second instrument is the A-WEAI, which collects *self-reported* information on five domains of empowerment — input into decisions about agricultural production, access to and decision-making about resources, control over use of income, group membership and time use (Alkire et al., 2013; Malapit et al., 2017). For this study, we use the A-WEAI to construct indicators of participation in a range of productive activities on and off the farm, taking into account the diversity of agricultural activities on a farm as self-reported by the respondent. We administered the A-WEAI questionnaire to *one person* per household. In households with a current migrant, this was the spouse of the migrant. If the migrant was not married, we randomly selected another woman in the household. In households without a migrant, the A-WEAI respondent was either the man or the woman of the primary couple. The A-WEAI data was collected from 726 women (421 from households with an international migrant and 305 from non-migrant households) and 271 men from non-migrant households. We refer to this as the A-WEAI sample.

⁴ There was a third instrument: The Food Insecurity Experience Scale (FIES), but the results related to the FIES are beyond the focus of the current study. Some discussion and results related to the effects of male outmigration on the food security of the family left behind are available in (Kar et al., 2018).

4. Descriptive statistics

Characteristics of Nepali migration

The study started with an objective to disentangle the impacts of different types of migration – domestic, international, and return migration – on the gendered patterns of agricultural labor. However, in the sampled areas most outmigration is to international destinations. Domestic migration, especially migration for economic reasons, is a much smaller phenomenon, with only 92 individuals reported as domestic migrants and only 55 households having only a domestic migrant. Most domestic migrants are men who are working or studying in Kathmandu. Our sample has few return migrants, defined as family members who have come back home after working and living away. Thus, for our analysis, we focus on the impacts of international migration.

International migration from Nepal is heavily dominated by men – more than 93 percent of the current international migrants in the sample are men (Table 1). On average, migrants are younger than those who remain. Migrants are also better educated: only 9 percent of international migrants have no education compared to 33 percent of the nonmigrants. The majority of international migrants (67 percent) have a secondary education compared to 48 percent of the nonmigrants, indicating a significant drain of human capital from rural areas.

Table 1. Selected characteristics of migrants compared to the people who stay behind (age 16+), Nepal

	(1) International migrants		(2) Individuals who remain		p-value
	Mean	Std. Err.	Mean	Std. Err.	
<i>Individual characteristics</i>					
Female†	0.07	0.02	0.57	0.0	***
Age (years)	31.19	0.47	37.93	0.44	***
No education†	0.09	0.02	0.33	0.03	***
Primary education†	0.24	0.04	0.18	0.01	
Secondary education†	0.67	0.05	0.48	0.03	***
High caste	0.41	0.07	0.43	0.07	
Low caste	0.21	0.06	0.12	0.03	**
Muslim	0.04	0.03	0.02	0.02	
Never married†	0.24	0.03	0.20	0.01	
Married†	0.75	0.03	0.73	0.01	
Widowed/divorced†	0.01	0.00	0.07	0.01	***
Observations	530		2910		

Note: Authors' estimates. The difference is significant at the 10%*, 5%** and 1% level***.

Respondents report that economic factors are the main drivers of migration. This is likely linked to both push and pull factors, such as low agricultural incomes, few non-farm employment opportunities in rural areas, and demand for labor in construction and hospitality abroad. While India was traditionally the main destination for Nepali migrants, only 35 percent of international migrants in our sample are in India; instead, the majority share (around 60 percent) are in Malaysia or the Gulf countries.

Characteristics of the men and women remaining in rural areas

Table 2 displays the characteristics of the men and women remaining in rural areas. For each sample, we differentiate whether the individuals live in a household with or without a current international migrant. While our analysis is based at the individual level, we assign each of the individuals some of their household characteristics.

The characteristics of women vary little based on whether they live in a household with or without a migrant. There are significantly more daughters-in-law in households with a current migrant and the married men are likely to be the ones who have migrated.

Households with migrants include more adults, both men and women. This may be because larger households are more able to send migrants or that smaller households combine with others when they send a migrant, as also indicated by the larger share of daughters-in-law in households with an international migrant.

The relationship between wealth and migration is complex, especially when simply considering a single moment in time. Wealthier households may not need to send a migrant if they have other means to diversify income. On the other hand, migration requires substantial initial costs, so the poorest households may not be able to send a migrant. In addition, households with migrants may receive remittances and use them to invest in their land and dwelling; their current wealth may not reflect the wealth at the time of the migration.

The household wealth index is created using principal component analysis and information about the characteristics of the dwelling, the type of toilet, access to electricity and sources of water for drinking and domestic use. Households without a migrant have a higher wealth index than those with a current international migrant. There are no differences in patterns of land ownership, the size of cultivated farm and livestock ownership based on whether the household has a migrant. There are also no statistically significant differences in the levels of non-labor income (such as from pensions or social security) between those living without a migrant and those living with a migrant; but the annual amounts are also relatively low.

Table 2. Characteristics of the men and women remaining in rural communities, by migration status of the household (full and A-WEAI samples)

	WOMEN, full sample					MEN, full sample					WOMEN, A-WEAI sample				
	Migrant HH		Nonmigrant		ttest	Migrant HH		Nonmigrant		ttest	Migrant HH		Nonmigrant		ttest
	Mean	SE	Mean	SE		Mean	SE	Mean	SE		Mean	SE	Mean	SE	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	
Age (years)	36.61	0.80	37.38	0.62		39.74	1.03	38.81	0.54		37.52	1.24	38.45	0.92	
A daughter-in-law†	0.26	0.02	0.17	0.01	***						0.22	0.03	0.13	0.03	*
Never married†	0.14	0.02	0.16	0.02		0.35	0.03	0.21	0.02	***	0.00	0.00	0.00	0.00	
Married†	0.78	0.02	0.73	0.02		0.61	0.02	0.75	0.02	***	0.96	0.01	0.91	0.02	***
Widowed/divorced†	0.08	0.01	0.10	0.01	*	0.04	0.01	0.03	0.01		0.03	0.01	0.09	0.02	***
No education†	0.44	0.03	0.44	0.03		0.21	0.03	0.19	0.02		0.49	0.05	0.49	0.05	
Primary education†	0.12	0.01	0.16	0.01	**	0.23	0.02	0.24	0.03		0.14	0.02	0.18	0.03	
Secondary education†	0.44	0.04	0.40	0.04		0.56	0.04	0.57	0.04		0.37	0.06	0.33	0.05	
High caste†	0.43	0.07	0.42	0.08		0.45	0.06	0.44	0.09		0.40	0.06	0.38	0.08	
Low caste†	0.17	0.05	0.10	0.03		0.14	0.04	0.09	0.03		0.19	0.04	0.10	0.03	**
Muslim†	0.03	0.02	0.01	0.01		0.04	0.03	0.02	0.02	*	0.04	0.03	0.01	0.01	
# children <5 years	0.49	0.05	0.38	0.05	*	0.41	0.07	0.35	0.04		0.42	0.04	0.45	0.04	
# children 5-10 years	0.56	0.05	0.53	0.07		0.38	0.05	0.50	0.08		0.60	0.05	0.50	0.05	*
# males 11-14 years	0.20	0.03	0.22	0.04		0.19	0.04	0.21	0.04		0.21	0.03	0.21	0.03	
# females 11-14 years	0.18	0.03	0.18	0.03		0.16	0.04	0.18	0.03		0.19	0.03	0.18	0.02	
# males 15-17 years	0.19	0.03	0.17	0.02		0.28	0.04	0.21	0.02	**	0.17	0.02	0.18	0.03	
# females 15-17 years	0.19	0.04	0.24	0.02		0.16	0.05	0.19	0.03		0.14	0.02	0.21	0.04	
# female adults	2.11	0.07	1.81	0.04	***	2.07	0.07	1.66	0.04	***	1.76	0.06	1.55	0.04	***
# male adults	2.15	0.07	1.65	0.04	***	2.75	0.06	1.82	0.04	***	1.96	0.07	1.50	0.04	***
Household wealth index	0.42	0.35	0.75	0.29	**	0.65	0.34	0.76	0.29		0.43	0.35	0.71	0.33	*
Own Land†	0.82	0.03	0.83	0.03		0.88	0.03	0.84	0.03		0.79	0.04	0.80	0.04	
Total cultivated land (hectares)	0.99	0.09	1.02	0.09		1.07	0.10	1.03	0.09		0.91	0.08	0.92	0.09	
TLU	1.26	0.13	1.16	0.11		1.29	0.19	1.17	0.11		1.11	0.11	1.10	0.10	
Distance nearest road (km)	9.53	2.18	6.95	1.48	**	8.35	2.06	6.93	1.45		9.32	2.05	7.08	1.56	**
Distance nearest transport station (km)	6.32	1.26	6.07	0.99		5.53	1.10	5.91	0.95		6.49	1.24	6.39	0.97	
Distance nearest financial service facility (km)	15.45	2.64	11.91	2.02	***	13.80	2.75	11.70	1.96	*	14.93	2.48	12.51	2.02	***
Non-labour income (USD)‡	38.98	6.94	58.25	17.41		41.94	11.56	53.89	16.67		30.68	5.58	47.93	13.65	
Remittances (USD) ‡	2056	244.2	129	36.85	***	1975	204.4	97.43	24.76	***	2030	225.3	208	62.54	***
Obs.	763		904			418		825			421		305		

Note: Authors' estimates. * The difference is significant at the 10% level; ** -- at the 5%; *** -- at the 1% level. † A dummy variable. SE = standard error. ‡ The values are winsorized at the top and bottom 1 percent.

Eighty-seven percent of households with international migrants received remittances in the last 12 months prior to the survey. A few households (6 percent) with no current migrants also report having received remittances, perhaps from relatives or friends abroad. Households typically receive remittances every three months and 86 percent of the households who receive remittances receive them at least twice per year. On average, households with a current international migrant received nearly US\$ 2000 USD in the 12 months prior to the survey.⁵ This is a significant amount given that the GDP per capita in 2016 was only US\$ 729. About 30 percent of households use remittances for household farming activities, including for purchasing land. Households with international migrants live in more remote areas than households without migrants.⁶

Labor outcomes of the individuals who remain

Full sample

In our analysis, we focus on *work*, rather than on *employment* following the recommendations from the 19th International Conference on Labor Statistics (ILO, 2013b). While *employment* narrowly focuses on work for pay or profit only, the new definition of *work* includes all forms of productive activities including own-use production, unpaid work and volunteer work. Women's unpaid work in agriculture is often missed in analyses of rural employment. Thus, we use the broader definition and ensure that we ask about a range of agricultural activities.

⁵ This is about 203,000 Nepali rupee. The median amount in the same period was similar (around 200,000 Nepali rupees). The exchange rate in August 2017 was around 102 Nepalese rupees = 1 USD.

⁶ These are not self-reported statistics; they were obtained mapping the GPS coordinates of the households and measuring the distance using GIS tools.

Table 3. Labor outcomes of men and women, by migration status of the household for the full and the A-WEAI samples

	1) Household with a current international migrant		2) Household with no current international migrant		P-value
	Mean	SE	Mean	SE	
A. Working-age WOMEN only					
Any work†	0.89	0.02	0.89	0.02	
Unpaid domestic work	0.02	0.01	0.02	0.01	
Farm self-employed†	0.32	0.02	0.20	0.01	***
Farm contributing family workert	0.56	0.03	0.68	0.02	***
Agricultural laborer†	0.05	0.01	0.07	0.01	
Processing and/or trading (agricultural products)†	0.05	0.02	0.07	0.03	
Nonagricultural employment†	0.04	0.01	0.05	0.01	
Professional †	0.02	0.01	0.02	0.01	
Obs.	763		904		
B. Working-age MEN only					
Any work†	0.87	0.03	0.90	0.02	
Unpaid domestic work	0.00	0.00	0.00	0.00	
Farm self-employed†	0.43	0.03	0.48	0.02	*
Farm contributing family workert	0.41	0.04	0.37	0.02	
Agricultural laborer†	0.05	0.01	0.11	0.02	**
Processing and/or trading (agricultural products)†	0.08	0.03	0.07	0.02	
Nonagricultural employment†	0.15	0.02	0.29	0.04	***
Professional†	0.02	0.01	0.05	0.01	***
Obs.	418		825		
C. Working-age women (A-WEAI sample)					
# of work activities	2.75	0.09	2.92	0.09	*
# of agriculture activities	2.63	0.09	2.72	0.11	
Staple grain farming†	0.95	0.02	0.94	0.02	
High value crop farming†	0.07	0.02	0.06	0.02	
Large livestock raising†	0.65	0.05	0.63	0.06	
Small livestock raising†	0.61	0.05	0.65	0.04	
Poultry and small animal raising†	0.34	0.03	0.42	0.04	***
Fish pond culture†	0.01	0.00	0.02	0.01	
Non-farm activity†	0.04	0.01	0.09	0.02	**
Wage & salary employment†	0.08	0.01	0.11	0.03	
Minutes spent on work	592.49	16.68	585.64	13.94	
Worked less than 10.5 hrs in previous 24 hrs†	0.49	0.06	0.55	0.05	
Obs.	421		305		

Note: Authors' estimates. * The difference is significant at the 10% level; ** -- at the 5%; *** -- at the 1% level. † A dummy variable. SE = standard error. Note that examples of small livestock raising include sheep, goats and pigs; poultry and small animal raising includes chickens, ducks, turkeys, rabbits and other small animals.

Nearly 90 percent of Nepali men and women are engaged in productive activities most of which are farm-based (see Table 3).⁷ There is little difference in the probability of employment based on whether the household has a migrant, lending no support for the notion that individuals remaining in rural areas reduce employment in response to the migration of family members. However, the types of work that women do vary. Women in households with a migrant are significantly more likely to be self-employed⁸ in agriculture compared to women in households without a migrant (Table 3). Women in households with a migrant are less likely to be contributing family workers than women in households without a migrant. Family farming continues to be subsistence-oriented with the majority of production intended for home consumption rather than for the market. Less than half of those who are self-employed report that they sell more than 50 percent of their agricultural production.

While both men and women engage in some work off of the family farm, it is relatively limited and fewer than 4 percent of all adults employed as wage workers report that they are employed on a regular, full-time basis for the whole year; most are seasonal, short-term or casual employees. There are more opportunities for men off the family farm than for women. Men in households without migrants are more likely to work as agricultural laborers or in nonagricultural employment. It may be that these are the men who have migrated in households with migrants.

⁷ In the survey, respondents are asked whether they are engaged in seven broad types of activities: (i) self-employed, employer, or contributing family member; (ii) agricultural worker; (iii) processing of agricultural products; (iv) trader/seller of agricultural products; (v) nonagricultural worker, nonagricultural artisan, or worker engaged in commerce; (vi) professional (private and public sector); and (vii) other. A detailed list of activities/professions was included in each category so that enumerators could easily classify the economic activity of the surveyed individuals. For each activity, respondents were further asked whether it was done as self-employment or as an employee, whether it was market-oriented, the number of months it was performed in the last 12 months, number of days per month, and average number of hours per day. The survey also collected information on earnings and on whether the activity was regular employment.

⁸ Self-employed include employers, own-account workers, members of producer cooperatives and contributing family workers (ILO, 2013a). In this study, we separate contributing family workers from the other three categories.

A-WEAI sample

Self-reports to the A-WEAI module provide a more detailed account of the different types of agriculture and non-agriculture activities in which women engage. As in the full sample, women in the A-WEAI sample report high participation in productive activities. Nearly all participate in staple grain farming and few participate in high value crop production. Around two-thirds of women raise large livestock and a similar share raise small livestock (such as sheep, goats and pigs). But women in households without migrants are also significantly more likely to raise poultry and other small animals (42 percent compared to 34 percent). Women in households without a current migrant are also more likely to engage in off-farm self-employment than are women in migrant-sending households. Thus, women in households without a migrant appear to hold a more diversified portfolio of income-generating activities, perhaps because they cannot rely on remittances to cushion the negative effects of poor harvests.

Although women in households without a migrant report engaging in a larger number of activities than do women in households with a current migrant, the former actually report slightly lower work burdens than do the latter. A time-use recall of activities over the 24-hour period before the survey suggests that 49% of women in households with a current international migrant report working less than 10.5 hours in the last 24 hours, which is the A-WEAI threshold for adequacy in time use, compared to 55% of women in households without a migrant. This difference in time use, however, is not statistically significant at conventional levels and is not as large as between women and men. Women worked on average 125 minutes more per day in the last 24 hours than men. Only 51% of women compared to 79% of men worked less than 10.5 hours in the past 24 hours.

5. Methodology

In order to assess how migration affects the work of the men and women who remain in rural areas, we model individuals' engagement in work as a function of whether they live in a household with or without a current international migrant, and their individual, household, and community characteristics, X_{ih} :

$$1. Y_{ih} = \alpha + \beta M_h + \gamma X_{ih} + \varepsilon_i.$$

Y_{ih} includes a set of indicators capturing whether individual i is self-employed or an own account worker in agriculture; a contributing family worker in agriculture; an agricultural laborer on others' farms; in processing and/or trading of agricultural products; in non-agricultural work (such as non-agricultural laborers, artisans, traders and others); a professional or higher skilled worker (such as teachers, nurses, doctors, lawyers, etc.), and any of the above.

The explanatory variable of interest is M_h , which indicates a household with at least one international migrant. Households with no migrants or only internal migrants form the base category.⁹ X includes the individual and household characteristics included in Table 2. We also include controls for the four out of the five sampled districts (Achham, Rolpa, Nawalparasi, and Makwanpur, with Jhapa as the base). ε_i is the error term in all equations. We run separate regressions for all labor participation indicators.

We use the same model for the A-WEAI sample but with a different set of labor indicators. The labor indicators for the A-WEAI sample differentiate between different types of agricultural activities and capture participation in: a) staple grain farming; b) high value crop farming; c) large livestock raising; d) small livestock raising (such as sheep, goats and pigs); e) poultry and small animal raising (such as chickens,

⁹ As a robustness check, we compared the results using three approaches to dealing with internal migrations: (i) including them in the base category, (ii) including them separately as a control, or (iii) completely dropping them from the analysis. The estimates were not sensitive to how domestic migrants were included in the model because their share in the sample is extremely low.

ducks, turkeys, rabbits); f) non-farm activity; and g) wage and salary employment.¹⁰ For the A-WEAI sample we also analyze how migration affects labor outcomes focusing on time use and work burden, including total minutes spent on all work activities in the last 24 hour and an indicator for whether the respondent has worked less than 10.5 hours in the previous 24 hours. The last two indicators are based on a 24-hour time use recall.

Migration is simultaneously determined together with the labor supply decisions of the family members who remain. Both observable and unobservable individual and household level characteristics are likely to influence the decision to migrate. This decision may be based on the same factors that affect the employment outcomes of the family members who remain—this is a classic omitted variable problem. Moreover, reverse causality may be important. For example, Nepali women occasionally use their own savings to finance the migration of a family member, implying that households that send a migrant may be more likely to include women who earn incomes.

Given that we have only one cross-section of data, we employ an instrumental variable approach to deal with potential endogeneity. The ideal instrument must be correlated with the decision to migrate and uncorrelated with the error term. We use three instrumental variables. Two are metrics of historic weather variability: the (positive)¹¹ percentage deviation of the monsoon rainfall and the (positive) percentage deviation of the winter rainfall in the three years before the year of migration relative to the long-run average (over the last 30 years). For households without migrants, we use the median value of the instrumental variable at the ward level. To construct the weather variables, the high-resolution (0.05 degrees) rainfall data from the Climate Hazards Group InfraRed Precipitation with Station data (CHIRPS) for the last three decades were merged with the GPS locations of the households.¹² Historic weather variability is expected to have

¹⁰ Participation in fish pond culture is omitted because too few individuals engage in it.

¹¹ We run models with both negative and positive derivations but the coefficient on the negative deviation was not statistically significant and for simplicity we stick to a model positive deviation only.

¹² A detailed description of the climate data is available in (Arslan et al., 2020). More details on the CHIRPS data are available at <http://chg.geog.ucsb.edu/data/chirps/>.

influenced the household decision to send a migrant, but should not have a direct effect on the current labor market decisions of the remaining family members, except through the migration of a family member. Climate change, through both slow onset events (such as a higher weather variability and increasing temperatures) and extreme events (such as droughts and floods), increases the insecurity of agricultural livelihoods and pushes some households to diversify livelihoods through migration (Arslan, Egger, Mane, & Slavchevska, 2020; Baez, Caruso, Mueller, & Niu, 2017; Bohra-Mishra et al., 2017; Bohra-Mishra, Oppenheimer, & Hsiang, 2014; Dallmann & Millock, 2017; Thiede, Gray, & Mueller, 2016).

The third instrument is a proxy for social norms around remittances. Following Taylor, Rozelle, and de Brauw (2003), we construct the proxy at the ward level by taking the average remittance amount received by all households in the ward excluding the remittances of the particular household. The community norm to remit is expected to influence the household decision to send a migrant and the level of remittances received by the household, but it is not expected to influence the household members' current labor market outcomes.

The instrumental variable regressions are estimated by two-stage least squares (2SLS)¹³. In the first stage, we model the decision for the household to send a migrant abroad as a function of the weather variability in the two seasons in the three years preceding the migration, social norms around remittances, and the same household and village characteristics as in equation 1. The results from the first stage regressions are available in Table A1 in the Annex. In the second stage, each dependent variable is regressed on the predicted value of M_h and on the variables in vector X . The test for weak instruments (Cragg-Donald Statistic) show that the instruments are strongly correlated with the decision to migrate. The p-values of the Hansen statistic for over identifying restrictions are high in all models, confirming that the selected instruments are valid.

¹³ We also apply the instrumental variable limited information maximum likelihood (LIML); the estimates LIML are similar to the 2SLS estimates.

6. Results

Full sample

Whether or not a woman undertakes any work does not change when a household member migrates internationally (Table 4). The type of work, however, does change. When a family member migrates, women take on additional responsibilities on the farm and they are 28.6 percentage points more likely to be reported as self-employed in agriculture and less likely to be reported as contributing family workers compared to women in households without current international migrants.¹⁴ Women in households with a migrant do not seem to reallocate labor across other employment activities, such as agricultural wage employment or non-agricultural wage or self-employment, suggesting strong substitutability between women's labor and the migrant's labor. This may also capture the limited decent employment opportunities for rural women off the family farm.

The effects of migration on the labor supply of men remaining in rural areas are noticeably different from those of women. As some male family members migrate, men remaining in rural areas significantly reduce participation in nonagricultural and higher skilled work. They appear to increase their participation in processing and trading of agricultural products, but this is not sufficient to compensate for their lower participation in nonfarm and professional employment resulting in an overall reduction in men's labor supply to any activity by nearly seven percentage points.

¹⁴ Both the 2SLS and the OLS estimates are statistically significant at the 1 percent level, but the OLS are smaller (result available upon request)

Table 4. The impact of migration on the work of women and men in sending communities, full sample, 2SLS

	Any work	Unpaid domestic work	Farm self-employed	Farm contributing family workers	Agricultural (wage) laborers	Processing and/or trading (agricultural products)	Nonagricultural workers	Professional
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
A. WOMEN								
International migrant in HH	0.0173	-0.0139	0.286***	-0.255***	-0.0150	-0.0191	-0.00144	-0.000613
	(0.0198)	(0.00863)	(0.0297)	(0.0269)	(0.0169)	(0.0312)	(0.0213)	(0.0141)
Observations	1,633	1,633	1,633	1,633	1,633	1,633	1,633	1,633
R-squared	0.289	0.057	0.280	0.236	0.094	0.129	0.048	0.051
Cragg-Donald Stat.	880.8	880.8	880.8	880.8	880.8	880.8	880.8	880.8
P-value Hansen test	0.310	0.638	0.189	0.215	0.772	0.495	0.421	0.920
B. MEN								
International migrant in HH	-0.0657**	-0.0034	0.0551	-0.0644	-0.0177	0.0483*	-0.144***	-0.0488***
	(0.0310)	(0.00247)	(0.0462)	(0.0653)	(0.0334)	(0.0278)	(0.0484)	(0.0182)
Observations	1,225	1,225	1,225	1,225	1,225	1,225	1,225	1,225
R-squared	0.230	0.032	0.487	0.287	0.133	0.160	0.173	0.081
Cragg-Donald Stat.	521.2	521.2	521.2	521.2	521.2	521.2	521.2	521.2
P-value Hansen test	0.418	0.436	0.498	0.493	0.917	0.810	0.162	0.422

Note: Authors' estimates. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

2SLS = two-stage least squares. All models also include the following controls: age; age squared; marital status; educational attainment; whether the individual is high caste or low caste; whether she is Muslim; household demographic structure (the number of children under 5, children 5-10 years old, male and female children 11-14 years old, males and females 15-17 years old, number of adult men and adult women in the household); a wealth proxy measured by a wealth index; land ownership and the area of land under cultivation; livestock (in TLU); the amount of non-earned income; distance to main road, distance to a transport station, distance to financial services and district dummies. A binary control for whether the woman is a daughter-in-law is included in the regressions for the women sample.

A-WEAI sample

The analysis of the full sample shows that women in households with a migrant take on more responsibilities on the farm, while the A-WEAI sample allows us to analyze the types of agricultural and non-agricultural work in which women engage (Table 5). Women in a household with a current migrant report a significant reduction in the total number of productive activities they engage in. They are less likely to raise poultry and other small animals and significantly more likely to grow staple grains. They are also significantly less likely to participate in non-farm work and wage or salary employment. The latter effects – the reallocation of women’s labor supply from non-farm work to farm work – was not visible in the full sample analyses in Table 4, so we explore this further.

We re-estimate the model in Table 4 restricting the sample to the sub-set of women who are the respondents to the full household questionnaire as well as to the A-WEAI module, thus providing self-responses in both cases (Table 6). For this sub-set of women, the effects of the migration of a family member are stronger and they do seem to reallocate labor from non-farm and professional occupations to the family farm. Thus, the migration of a family member may affect women’s ability to seek off-farm employment, especially for the women who are the household head or the spouse of the household head. These women may have to shoulder the tasks and responsibilities for the family farm, which includes ensuring food security through staple grain production. At the same time, women in households with an international migrant often receive remittances and may not need to diversify incomes further through non-farm and salaried employment. But the results also suggest that remittances are not invested in the household farm or in diversifying farm productions into higher value agriculture, raising questions about the sustainability and resilience of farm households, especially in the face of shocks to migration and remittances.

For the A-WEAI sample, we are also able to assess how outmigration of a family member affects women’s time spent working based on a 24-hour recall (Table 5, columns 10 and 11). The coefficients are not statistically significant at conventional significance levels, suggesting no increases in women’s work burden.

Table 5. The impact of migration on women's participation and time in various agriculture and non-agriculture productive activities, A-WEAI sample, 2SLS

	# of work activities	# of agricultural activities	Staple grain farming	High value crop farming	Large livestock raising	Small livestock raising	Poultry and small animal raising	Non-farm activity	Wage & salary employment	Minutes spent on work	Worked less than 10.5 hrs in previous 24 hrs
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
International migrant in HH	-0.233* (0.125)	-0.0816 (0.123)	0.0668** (0.0259)	0.0196 (0.0233)	0.0243 (0.0432)	-0.0573 (0.0587)	-0.103** (0.0446)	-0.0542* (0.0299)	-0.097** (0.0402)	19.60 (17.16)	-0.104 (0.0643)
Observations	716	716	716	716	716	716	716	716	716	716	716
R-squared	0.195	0.222	0.130	0.153	0.347	0.168	0.131	0.069	0.076	0.264	0.219
Cragg-Donald Stat.	272.6	272.6	272.6	272.6	272.6	272.6	272.6	272.6	272.6	272.6	272.6
P-value Hansen test	0.394	0.431	0.0662	0.349	0.830	0.468	0.218	0.921	0.0716	0.299	0.0669

Note: Authors' estimates. *** p<0.01, ** p<0.05, * p<0.1. Standard errors clustered at the ward in parentheses

2SLS = two-stage least squares. All models also include the following controls: age; age squared; marital status; educational attainment; whether the individual is high caste or low caste; whether she is Muslim; household demographic structure (the number of children under 5, children 5-10 years old, male and female children 11-14 years old, males and females 15-17 years old, number of adult men and adult women in the household); a wealth proxy measured by a wealth index; land ownership and the area of land under cultivation; livestock (in TLU); the amount of non-earned income; distance to main road, distance to a transport station, distance to financial services and district dummies. A binary control for whether the woman is a daughter-in-law is included in the regressions for the women sample.

Table 6. The impact of migration on women's work, focusing on the same indicators as in the full sample but restricting the sample to the subset of women who completed both the A-WEAI and the full HH survey

	Any work	Unpaid domestic work	Farm self-employed	Farm contributing family workers	Agricultural (wage) laborers	Processing and/or trading (agricultural products)	Nonagricultural workers	Professional
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
International migrant in HH	0.0233 (0.0194)	-0.0106 (0.0142)	0.473*** (0.0555)	-0.421*** (0.0616)	-0.0470 (0.0358)	-0.0475 (0.0571)	-0.0551 (0.0395)	-0.0228** (0.0114)
Observations	595	595	595	595	595	595	595	595
R-squared	0.161	0.115	0.298	0.299	0.118	0.247	0.087	0.113
Cragg-Donald Stat.	262.4	262.4	262.4	262.4	262.4	262.4	262.4	262.4
P-value Hansen test	0.0133	0.0602	0.262	0.127	0.101	0.412	0.661	0.715

Note: Authors' estimates. *** p<0.01, ** p<0.05, * p<0.1. Standard errors clustered at the ward in parentheses

2SLS = two-stage least squares. All models also include the following controls: age; age squared; marital status; educational attainment; whether the individual is high caste or low caste; whether she is Muslim; household demographic structure (the number of children under 5, children 5-10 years old, male and female children 11-14 years old, males and females 15-17 years old, number of adult men and adult women in the household); a wealth proxy measured by a wealth index; land ownership and the area of land under cultivation; livestock (in TLU); the amount of non-earned income; distance to main road, distance to a transport station, distance to financial services and district dummies. A binary control for whether the woman is a daughter-in-law is included in the regressions for the women sample.

7. Sensitivity of the results to alternative model specifications

In this section, we examine the sensitivity of the results to model specifications. We start by considering the role of remittances. As mentioned in the introduction, migration impacts family members who stay behind through two main channels: the loss of the migrant labor and the receipt of remittances. The two may have opposite effects. The loss of migrant labor may induce some members to supply their own labor in agriculture, but households that receive remittances may hire labor instead. Thus, labor decisions may depend on whether the household receives remittances. A number of studies on the impacts of migration on sending communities differentiate between the labor effect and the remittance effect (Mendola & Carletto, 2012; Rozelle, Taylor & de Brauw, 1999; Taylor et al., 2003). In our sample, the two migration variables (whether the household has an international migrant and the amount of remittances received) are highly correlated (87% of migrant households received remittances in the last year) and including them in the same equation leads to inconsistent estimates. Thus, we re-run the models controlling for the (log) amount of remittances received by the household (Table A4 and Table A5 in the Annex). The results are qualitatively very similar to our original results.

Second, in addition to looking at men and women's *participation* in any work, we also examine how migration affects *the hours* spent working for the full samples of men and women. Table A6 in the Annex reports the results from the IV tobit estimates with hours of work per month in the last 12 months as the outcome variable of interest. We look at both total hours worked per month and hours in certain work activities. We use a tobit model because many men and women do not participate in some of the activities and thus report zero hours in those activities. Women in migrant households are not only more likely to be primary farmers rather than contributing family workers, but they are also working longer hours as primary farmers, leading to a significant increase in the total hours worked in any activity.¹⁵ Men, however, work

¹⁵ The models for hours worked in the different types of work are estimated by maximum likelihood using the command `ivtobit`, which does not allow for binary endogenous regressors. For that reason and because migration and remittances

less. Their time in agricultural work remains unchanged, but they reduce hours in nonagricultural work. These results reinforce the results from the time use modules for the A-WEAI sample; women spend more time working in response to the migration of a family member.

We consider whether the destination country of the migrant influences the labor allocation of those remaining. Table A7 and A8 in the Annex report the results from the OLS estimates, as we do not have good instrumental variables for migration by destination.

Compared to migration to the Gulf countries and Malaysia, migration to India has lower returns and is often undertaken in the absence of capital to finance migration to other countries. Yet, regardless of destination, women are more likely to be self-employed and less likely to be contributing family members. Finally, the linkages between migration and women's employment are not strongly dependent on the migration duration. Information about the timing of the first migration episode of the current migrants was used to create a proxy for the duration of migration. We do not find significantly different effects between migration duration and the employment outcomes of women and men who remain.¹⁶

Our results are also robust to limiting the analyses to the working age sample (i.e. excluding women and men who may be at the age of retirement). The robustness of the results confirms that the concept of retirement is often blurred in rural areas, as many women and men may continue to farm and engage in productive activities long after reaching retirement age. Moreover, unlike some earlier studies, which find that the effects of migration on labor differ for women of different age groups (Mendola & Carletto, 2012; Mu & van de Walle, 2011), we do not find strong evidence for that in our data.

are highly correlated, hours worked are modeled as a function of the amount of remittances received (in log). All other control variables are the same.

¹⁶ The results are available upon request.

8. Conclusion

Migration has the potential to be a transformative factor for rural households and communities. This study analyses how rural outmigration, which is largely driven by young, able-bodied men, affects the work of those who remain. The migration of a family member indeed changes women's roles and responsibilities on the farm. As women substitute their own labor for the migrant's labor, they shift from being contributing family members to being self-employed on the farm. The analysis of the time use module of the A-WEAI indicates higher work burdens for women, but the coefficients are not statistically significant at conventional levels. The IV tobit estimates for the average hours worked per month over the past 12 months do, however, point to an overall increase in women's time working. This is driven by their higher responsibilities on the farm.

We find no evidence, however, that women in households with a family member who is currently abroad reallocate labor to higher value activities on the farm or outside the family farm. Women are not increasing participation in higher value activities such as trading and processing (full sample) and or cash crops and livestock (A-WEAI sample) which raises questions as to whether these changes contribute to women's economic empowerment and their ability to build sustainable and resilient livelihoods to wean off the reliance on migrant remittances in the future.

Similar concerns could be raised about men remaining in rural areas. Men withdraw from non-farm and professional work when a family member migrates, but do not engage in new activities (except for a slight increase in their participation in trading and processing of agricultural products), leading to a drop in their overall participation in any work. They reduce hours worked off-farm, but do not increase the hours worked on the farm proportionally, leading to a reduction in the total labor hours too. Using the same data set but exploring the linkages between climate change, migration and agricultural productivity, Arslan et al. (2020) find that rural outmigration may lead to a significant reduction in agricultural productivity on the farm. The decreasing productivity of agriculture and the high reliance on international

remittances raises serious concerns about the economic vulnerability and vitality of rural areas.

Several factors could be at play. A lack of decent off-farm wage or self-employment opportunities in rural areas may make off-farm employment less attractive for the men and women who remain. At the same time, as agriculture in Nepal remains labor-intensive and not mechanized, the outmigration of young, able-bodied men from rural areas means that households have to draw on other family members' labor to continue the operation of the household farms. Thus, high labor demands on the farm to maintain food security, which cannot be met entirely by hiring labor and agricultural services, may impinge on women's and men's ability to seek higher value activities on and off the farm. Therefore, more research is needed to understand the opportunities to support the men and women who remain in rural areas to build more resilient rural livelihoods through improved agricultural productivity, commercialization, diversified incomes, and reduced dependence on remittances.

One caveat is that we focus on the people who remain in rural areas. The presence of an international migrant abroad and the access to remittances may enable some family members, especially young mothers with school-age children, to move to urban and peri-urban areas in order to access better health and education services for their children. The current cross-sectional data does not allow us to assess whether this happens and the magnitude of this issue. More research on how migration impacts secondary migration of other family members would greatly complement the current analyses and help paint a more comprehensive picture of how rural outmigration impacts rural labor.

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Annex

Table A1. First Stage Regressions

	WOMEN, full sample	MEN, full sample	WOMEN, A-WEAI sample
	(1)	(2)	(3)
Instrumental variables:			
Positive % deviation of 3year winter CoV from LR	0.006*** (0.002)	0.008*** (0.002)	0.006*** (0.002)
Positive % deviation of average 3year monsoon rain from LR average	-0.005** (0.002)	-0.004 (0.003)	-0.007*** (0.002)
Log average remittances at ward level	0.087*** (0.003)	0.078*** (0.004)	0.083*** (0.003)
Observations	1,633	1,225	716

Note: Note: Authors' estimates. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1
First Stage Regression obtained from the ivreg2 command in STATA. Dependent variable: Having a current international migrant in HH. All models also include the following controls: age; age squared; marital status; educational attainment; whether the woman is high caste or low caste; whether she is Muslim; household demographic structure (the number of children under 5, children 5-10 years old, male and female children 11-14 years old, males and females 15-17 years old, number of adult men and adult women in the household); a wealth proxy measured by a wealth index; land ownership and the area of land under cultivation; the amount of non-earned income; distance to main road, distance to a transport station, distance to financial services and district dummies.

Table A2. The impact of migration on the work of women and men in sending communities, full sample, OLS

	Any work	Unpaid domestic work	Farm self-employed	Farm contributing family workers	Agricultural (wage) laborers	Processing and/or trading (agricultural products)	Nonagricultural workers	Professional
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
WOMEN								
International migrant in HH	-0.00895 (0.0148)	-0.00921 (0.00750)	0.180*** (0.0230)	-0.183*** (0.0228)	-0.000152 (0.0140)	-0.0159 (0.0201)	-0.00382 (0.0126)	0.000623 (0.0119)
Observations	1,667	1,667	1,667	1,667	1,667	1,667	1,667	1,667
R-squared	0.290	0.068	0.291	0.245	0.094	0.141	0.051	0.051
MEN								
International migrant in HH	0.0109 (0.0336)	0.00418 (0.00425)	0.102*** (0.0284)	-0.0407 (0.0553)	0.00118 (0.0251)	0.00839 (0.0151)	-0.0831** (0.0333)	-0.0430*** (0.0100)
Observations	1,243	1,243	1,243	1,243	1,243	1,243	1,243	1,243
R-squared	0.251	0.044	0.489	0.289	0.136	0.169	0.183	0.083

Note: Authors' estimates. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

OLS = Ordinary Least Squares. All models also include the following controls: age; age squared; marital status; educational attainment; whether the individual is high caste or low caste; whether she is Muslim; household demographic structure (the number of children under 5, children 5-10 years old, male and female children 11-14 years old, males and females 15-17 years old, number of adult men and adult women in the household); a wealth proxy measured by a wealth index; land ownership and the area of land under cultivation; livestock (in TLU); the amount of non-earned income; distance to main road, distance to a transport station, distance to financial services and district dummies. A binary control for whether the woman is a daughter-in-law is included in the regressions for the women sample.

Table A3. The impact of migration on women's participation and time in various agriculture and non-agriculture productive activities, A-WEAI sample, OLS

	# of work activities	# of agricultural activities	Staple grain farming	High value crop farming	Large livestock raising	Small livestock raising	Poultry and small animal raising	Non-farm activity	Wage & salary employment	Minutes spent on work	Worked less than 10.5 hrs in previous 24 hrs
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
International migrant in HH	-0.187** (0.0783)	-0.0968 (0.0692)	0.0203 -0.0179	-0.00545 (0.0207)	-2.47e-06 (0.0342)	-0.0360 (0.0325)	-0.0608 (0.0402)	-0.0558** (0.0219)	-0.0346 (0.0292)	1.435 (12.55)	-0.0424 (0.0507)
Observations	726	726	726	726	726	726	726	726	726	726	726
R-squared	0.190	0.216	0.136	0.145	0.345	0.169	0.132	0.070	0.088	0.268	0.224

Note: Authors' estimates. *** p<0.01, ** p<0.05, * p<0.1. Standard errors clustered at the ward in parentheses
 OLS = Ordinary Least Squares. All models also include the following controls: age; age squared; marital status; educational attainment; whether the individual is high caste or low caste; whether she is Muslim; household demographic structure (the number of children under 5, children 5-10 years old, male and female children 11-14 years old, males and females 15-17 years old, number of adult men and adult women in the household); a wealth proxy measured by a wealth index; land ownership and the area of land under cultivation; livestock (in TLU); the amount of non-earned income; distance to main road, distance to a transport station, distance to financial services and district dummies. A binary control for whether the woman is a daughter-in-law is included in the regressions for the women sample.

Table A4. The impact of remittances on women's and men's work, full sample, 2SLS

	Any work	Unpaid domestic work	Farm self-employed	Farm contributing family workers	Agricultural (wage) laborers	Processing and/or trading (agricultural products)	Nonagricultural workers	Professional
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
WOMEN								
Remittance amount (in log)	0.00202 (0.00199)	-0.00156* (0.000823)	0.0288*** (0.00289)	-0.0253*** (0.00287)	-0.00144 (0.00170)	-0.00237 (0.00339)	0.000120 (0.00226)	-2.11e-05 (0.00146)
Observations	1,633	1,633	1,633	1,633	1,633	1,633	1,633	1,633
R-squared	0.290	0.058	0.313	0.249	0.095	0.129	0.048	0.051
Cragg-Donald Stat.	15703	15703	15703	15703	15703	15703	15703	15703
P-value Hansen test	0.389	0.789	0.0974	0.0977	0.740	0.483	0.361	0.908
MEN								
Remittance amount (in log)	-0.00636** (0.00298)	-0.000284 (0.000203)	0.00535 (0.00432)	-0.00603 (0.00619)	-0.00178 (0.00341)	0.00491* (0.00234)	-0.0137*** (0.00458)	-0.00422*** (0.00165)
Observations	1,225	1,225	1,225	1,225	1,225	1,225	1,225	1,225
R-squared	0.244	0.037	0.483	0.288	0.134	0.168	0.180	0.078
Cragg-Donald Stat.	11540	11540	11540	11540	11540	11540	11540	11540
P-value Hansen test	0.375	0.357	0.496	0.406	0.933	0.934	0.104	0.299

Note: Authors' estimates. Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. 2SLS = two-stage least squares. All models also include the following controls: age; age squared; marital status; educational attainment; whether the woman is high caste or low caste; whether she is Muslim; household demographic structure (the number of children under 5, children 5-10 years old, male and female children 11-14 years old, males and females 15-17 years old, number of adult men and adult women in the household); a wealth proxy measured by a wealth index; land ownership and the area of land under cultivation; the amount of non-earned income; distance to main road, distance to a transport station, distance to financial services and district dummies. A binary control for whether the woman is a daughter-in-law is included in the regressions for the women sample.

Table A5. The impact of remittances on women's participation in various agriculture and non-agriculture productive activities, A-WEAI sample, 2SLS

	# of work activities	# of agriculture activities	Staple grain farming	High value crop farming	Large livestock raising	Small livestock raising	Poultry and small animal raising	Non-farm activity	Wage & salary employment	Minutes spent on work	Worked less than 10.5 hrs in previous 24 hrs
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Remittance amount (in log)	-0.0195 (0.0133)	-0.00495 (0.0132)	0.0076*** (0.00276)	0.00135 (0.00250)	0.00286 (0.00506)	-0.00528 (0.00597)	-0.00854 (0.00654)	-0.00529* (0.00310)	-0.00924** (0.00405)	2.258 (1.643)	-0.0110* (0.00581)
Observations	716	716	716	716	716	716	716	716	716	716	716
R-squared	.0193	0.221	0.147	0.156	0.348	0.169	0.134	0.065	0.095	0.267	0.221
Cragg-Donald Stat.	4771	4771	4771	4771	4771	4771	4771	4771	4771	4771	4771
P-value Hansen test	0.209	0.377	0.0912	0.543	0.882	0.329	0.204	0.796	0.0101	0.348	0.162

Note: Authors' estimates. *** p<0.01, ** p<0.05, * p<0.1. Standard errors clustered at the ward in parentheses

2SLS = two-stage least squares. All models also include the following controls: age; age squared; marital status; educational attainment; whether the individual is high caste or low caste; whether she is Muslim; household demographic structure (the number of children under 5, children 5-10 years old, male and female children 11-14 years old, males and females 15-17 years old, number of adult men and adult women in the household); a wealth proxy measured by a wealth index; land ownership and the area of land under cultivation; livestock (in TLU); the amount of non-earned income; distance to main road, distance to a transport station, distance to financial services and district dummies. A binary control for whether the woman is a daughter-in-law is included in the regressions for the women sample.

Table A6. The impacts of remittances on hours worked of men and women in sending communities, full sample, IV Tobit

	Total hours worked (any)	Farm self-employed	Farm contributing family workers	Agricultural (wage) laborers	Nonagricultural workers
	(1)	(2)	(3)	(4)	(5)
WOMEN					
Remittance amount (in log)	16.48**	186.3***	-56.56***	-10.56	-0.506
	(8.044)	(20.15)	(9.498)	(11.97)	(46.61)
Observations	1,633	1,632	1,633	1,633	1,633
MEN					
Remittance amount (in log)	-34.57***	7.812	-10.86	-21.64	-103.1***
	(13.25)	(17.74)	(10.39)	(21.69)	(34.08)
Observations	1,225	1,223	1,225	1,225	1,225

Note: Authors' estimates. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1
The models are estimated by maximum likelihood estimator using the command ivtobit in STATA. All models also include the following controls: age; age squared; marital status; educational attainment; whether the woman is high caste or low caste; whether she is Muslim; household demographic structure (the number of children under 5, children 5-10 years old, male and female children 11-14 years old, males and females 15-17 years old, number of adult men and adult women in the household); a wealth proxy measured by a wealth index; land ownership and the area of land under cultivation; the amount of non-earned income; distance to main road, distance to a transport station, distance to financial services and district dummies. A binary control for whether the woman is a daughter-in-law is included in the regressions for the women sample.

Table A7. The impact of migration on women's and men's participation in work activities based on the destination of migrants, full sample, OLS

	Any work	Unpaid domestic work	Farm self-employed	Farm contributing family workers	Agricultural (wage) laborers	Processing and/or trading (agricultural products)	Nonagricultural workers	Professional
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
WOMEN								
International migrant in HH - Other destinations	0.00141 (0.0168)	-0.0174** (0.00681)	0.184*** (0.0244)	-0.179*** (0.0248)	-0.00478 (0.0147)	-0.0251 (0.0231)	-0.00103 (0.0151)	0.00596 (0.0132)
International migrant in HH - India	-0.0277 (0.0341)	0.0127 (0.0134)	0.114*** (0.0423)	-0.132*** (0.0458)	0.0148 (0.0227)	0.0196 (0.0184)	-0.0129 (0.0131)	-0.0172* (0.00928)
Observations	1,667	1,667	1,667	1,667	1,667	1,667	1,667	1,667
R-squared	0.283	0.067	0.288	0.237	0.093	0.130	0.048	0.052
Wald test p-value	0.452	0.022**	0.123	0.358	0.432	0.028**	0.523	0.061*
MEN								
International migrant in HH - Other destinations	0.0171 (0.0381)	0.00347 (0.00364)	0.0750** (0.0286)	-0.0124 (0.0690)	-0.0142 (0.0269)	0.0152 (0.0162)	-0.0848** (0.0345)	-0.0340*** (0.00713)
International migrant in HH - India	0.00576 (0.0432)	0.00665 (0.0116)	0.181** (0.0853)	-0.115 (0.0724)	0.0625* (0.0341)	-0.00323 (0.0268)	-0.0690 (0.0465)	-0.0793*** (0.0256)
Observations	1,243	1,243	1,243	1,243	1,243	1,243	1,243	1,243
R-squared	0.244	0.038	0.489	0.288	0.136	0.162	0.173	0.083
Wald test p-value	0.816	0.784	0.251	0.331	0.033**	0.519	0.706	0.072*

Note: Note: Authors' estimates. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

OLS = Ordinary Least Squares.

Wald test p-values report the results from whether *International migrant in HH_Other destinations* = *International migrant in HH_India*.

All models also include the following controls: age; age squared; marital status; educational attainment; whether the individual is high caste or low caste; whether she is Muslim; household demographic structure (the number of children under 5, children 5-10 years old, male and female children 11-14 years old, males and females 15-17 years old, number of adult men and adult women in the household); a wealth proxy measured by a wealth index; land ownership and the area of land under cultivation; livestock (in TLU); the amount of non-earned income; distance to main road, distance to a transport station, distance to financial services and district dummies. A binary control for whether the woman is a daughter-in-law is included in the regressions for the women sample.

Table A8. The impact of migration on women's and men's participation and time in different farm and non-farm activities based on the destination of migrants, A-WEAI sample, OLS

	# of work activities	# of agricultural activities	Staple grain farming	High value crop farming	Large livestock raising	Small livestock raising	Poultry and small animal raising	Non-farm activity	Wage & salary employment	Minutes spent on work	Worked less than 10.5 hrs in previous 24 hrs
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
International migrant in HH - Other destinations	-0.164	-0.0844	0.0279	0.00971	-0.0104	-0.0317	-0.0667	-0.0431*	-0.0362	14.66	-0.0629
	(0.100)	(0.0867)	(0.0181)	(0.0187)	(0.0335)	(0.0414)	(0.0453)	(0.0243)	(0.0303)	(14.77)	(0.0559)
International migrant in HH - India	-0.263*	-0.193	-0.0113	-0.0326	0.0513	-0.0963	-0.0895*	-0.0740***	0.00456	-11.76	-0.0286
	(0.148)	(0.147)	(0.0258)	(0.0476)	(0.0668)	(0.0808)	(0.0502)	(0.0184)	(0.0333)	(13.85)	(0.0550)
Observations	726	726	726	726	726	726	726	726	726	726	726
R-squared	0.191	0.217	0.138	0.147	0.346	0.171	0.134	0.069	0.088	0.270	0.225
Wald Tests' P-value	0.628	0.575	0.116	0.366	0.359	0.535	0.705	0.132	0.231	0.163	0.599

Note: Authors' estimates. *** p<0.01, ** p<0.05, * p<0.1. Standard errors clustered at the ward in parentheses

OLS = Ordinary Least Squares.

Wald test p-values report the results from whether *International migrant in HH_Other destinations* = *International migrant in HH_India*. All models also include the following controls: age; age squared; marital status; educational attainment; whether the individual is high caste or low caste; whether she is Muslim; household demographic structure (the number of children under 5, children 5-10 years old, male and female children 11-14 years old, males and females 15-17 years old, number of adult men and adult women in the household); a wealth proxy measured by a wealth index; land ownership and the area of land under cultivation; livestock (in TLU); the amount of non-earned income; distance to main road, distance to a transport station, distance to financial services and district dummies. A binary control for whether the woman is a daughter-in-law is included in the regressions for the women sample.

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