Working Paper IV

MIGRATION FOR LABOUR AND ITS IMPACT ON FARM PRODUCTION IN NEPAL

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Support for this publication was made available by the Open Society Foundations, New York.

ISBN: 978 9937 2 6648 2

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Printed in Nepal by Variety Printers, Kuleshwor, Kathmandu.

Abstract

Even though Nepal is predominantly an agrarian country, migration is increasingly becoming an important livelihood strategy for farm households in rural Nepal. Migrants head out to various destinations, which, for the purpose of this study, have been broadly categorised into India and elsewhere. Despite the rise in this phenomenon, little is understood about the impact of migration on farm production. Using primary data generated through a household survey, this paper attempts to contribute towards a better understanding of the impact of migration on the labour and non-labour inputs used and production outputs in rural farm families in Syangja and Baitadi districts in the hills of Nepal. While the impact of migration on farm production differed between the two regions, the findings suggest that most farm households tend to neglect subsistence farming altogether when there are alternative sources of income. Additionally, when the household income is insufficient farmers show more interest in livestock farming than in crop farming. The results of the study also indicate the increasing feminisation of the agricultural sector in the hills of Nepal.

CONTENTS

1. INTRODUCTION[1]

Although agriculture is a major contributor to Nepal's GDP (33 per cent) and the largest employer (engaging 75 per cent of the working population), it is still a subsistence-based activity.[2] The agricultural sector suffers from low productivity due to constraints of credit, labour and insurance. Subsistence-oriented farming, together with declining farm sizes, makes it difficult for farming households to meet their basic requirements. The stagnating industrial sector does not provide sufficient opportunities for the rural population to earn a living in Nepal either. Hence, rural farming households are increasingly looking for opportunities away from the agriculture sector and relying on labour migration as a livelihood strategy to meet their basic requirements and enhance their income levels.

Whether migration will improve or worsen conditions in these farm households and their communities in the long run is a debate that will not be resolved anytime soon. While some argue that migration can reduce farm labour and subsequently lower agricultural production, others point out that migration can address the critical problem of under-employment faced by many, and, hence, not necessarily lead to a reduction in farm labour input. It is also argued that remittances from migrant workers can be used for labour and non-labour inputs in the farming sector to offset any labour losses. However, when remittances are not invested in farming, the net impact of migration on farm production can be negative, particularly when farming is subsistence based and has low returns on investment. Further, the desire of farm household members to escape from the back-breaking work of subsistence farming can also act as an important deterrent to investing remittances in agriculture.

As one more contribution to these ongoing debates, the focus of this paper is to analyse the impact of international migration on farm production in the mid-hills of Nepal. More specifically, it explores:

i. the extent to which the loss of farm labour resulting from migration is mitigated in some other manner, in particular, by the use of remittances to hire outside labourers; and
ii. whether migration helps increase farm production and, subsequently, leads to commercialisation of the otherwise subsistence-farming sector in the hills of Nepal.

The analysis in this paper is based on primary data collected from migrant and non-migrant households in two districts, Syangja and Baitadi, in the mid-hills of Nepal.

1 This paper is based on the PhD research by Amina Maharjan.
2 CBS 2009.

Preliminary research revealed that the most popular destinations for labour migrants from Nepal are India, the Gulf countries and Malaysia. These destinations can be classified into two groups based on the costs and returns of migration—India and overseas—with remittances from India in general being lower than those from overseas.[3] This study covers both the patterns of migration and their impact on farm production.

3 Maharjan 2010.

2. MIGRATION-FARMING LINKAGE: STATE OF RESEARCH

International migration and remittances can act as a catalyst in transforming the subsistence farming sector into a more productive and commercial one by removing some of the constraints it faces. However, despite its policy relevance, there is a scarcity of studies on the impact of migration on agriculture in Nepal with the one exception of Adhikari (1996), which revealed how remittances, particularly from foreign labour migration to the British and Indian armies, increased the practice of renting land and made possible the creation of wage labour employment in agriculture. That study was based on research conducted in 1989-90, with follow-up studies in 1994 and 1999,[4] when migrant destinations had expanded to other countries, particularly the Gulf, showing drastic changes in that pattern. With greater migration opportunities, villages were beginning to face labour shortages and farmers were losing interest in subsistence farming altogether. There have also been some new studies such as the one by Jha (2010), which showed that migration leads to reduction in both production and productivity in agriculture. In contrast, recent anecdotal evidences suggest that migration and remittances are being invested in commercial agriculture, particularly vegetable cultivation and livestock farming, although the extent of such investment seems rather limited.

Studies from other parts of the world that explore the linkage between migration and farming support the argument that migration undermines the agricultural sector. The lost labour is not replaced by remittances; in fact remittances are seldom invested in land or other capital inputs needed to improve the agricultural sector.[5] Rozelle et al (1999) found that, in China, even though overall remittance has a positive impact the loss of labour had negative impacts on maize yields. The negative impact through labour loss is not sufficiently replaced by remittance investment in farming, thereby leading to an overall negative impact on maize yield. Azam and Gubert (2002), Germenji and Swinnen (2004), and Low (1986) also support this view. Low (1986) and Germenji and Swinnen (2004) report that the major reason for the lower crop output can be attributed to changes in the type of labour involved in farming, with less family labour and more hired labour, leading to a reduction in labour efforts.

In contrast, there are other studies that have found that migration leads to an improvement in agricultural production.[6] In one such study, Gray (2009) reports that migration and remittance positively influence smallholder agriculture in the Southern Ecuadorian Andes. The study reports that 'outmigration has lost-labour effects but international remittances have investment-promotion effects that result in increased

4 Adhikari 2001.

5 Black 1993; Mines and Janvry 1982; Hyden et al. 1993; Francis and Hoddinott 1993.

6 Murray 1981; Dwayne and Brandt 1998; Taylor et al. 1996; Taylor and Wyatt 1996; De Brauw et al. 2001; Mochebelele and Winter-Nelson 2000; Taylor and Lopez-Feldman 2007.

maize production'. Similarly, Nonthakot and Villano (2008) reported that, in Thailand, migration led to an enhancement in the productive capacity of maize farmers.

There are also studies that aim to address these disparities by providing different conditions under which migration may improve or reduce agricultural production. Quinn (2009) argues that while migration has a positive impact on agricultural investment as it reduces credit and risk constraints faced by the farming household; this positive impact depends on the amount of remittances received by the household. Similarly, even though Mendola (2008) finds a positive relation between international migration and the adoption of high-yielding variety (HYV) rice in Bangladesh, she also points towards the negative impact of internal migration on the adoption of HYV rice. In the same way, Wouterse (2008) asserts that the impact of migration on agricultural production is contingent on the destination of international migration, with a positive relationship between continental migration (i.e., within Africa) and technical efficiency and a negative relationship between intercontinental migration and technical efficiency. Recent studies in rural Albania by both Miluka et al (2007) and McCarthy et al (2006) revealed that out-migration negatively affects traditional agricultural activities but positively affects livestock activities.

Existing literature emphasises the importance of considering the various dimensions of migration and the situations within the migrants' community. Hence, the study presented here looks at crop and livestock production as well as other aspects of farming such as family and hired labour use and non-labour input use and output. Furthermore, since studies from elsewhere show that migration destination will have an impact on the amount of remittance received and can therefore be expected to have an impact on any changes in agricultural production, this study takes into consideration the different migration destinations common in Nepal.

3. METHODOLOGY, STUDY AREA AND DATA BASE

Though international migration is common to almost all the regions of Nepal, there appear to be clearly two hot spots, the Western and the Far-Western regions.[7] Two mid-hills districts—Syangja (Western region) and Baitadi (Far-Western region)—were selected for this study based on intensity of migration (i.e., the number of people migrating) as well as predominance of migration destination. In Baitadi, people migrate almost exclusively to India, whereas, in Syangja the destination is more diverse and more people go to countries other than India. Of those going to India, the majority from Baitadi are engaged in low-paying, informal sectors while migrants from Syangja work in both formal and informal sectors. These districts also differ distinctly in terms of many developmental indicators: Baitadi stands 62nd among the 75 districts of Nepal whereas Syangja ranks 9th in the overall development index.[8] Likewise, poverty is more widespread and access to road and means of communication much lower in Baitadi than in Syangja. This study of these two districts with quite different socio-economic status as well as migration patterns will hopefully add to the growing literature on the impact of migration in the country as a whole while also contributing to the debate of whether migration is a boon or bane for the agricultural sector.

A total of eight village development committees (VDCs) were selected for the study: four from each district. The selection was based on the high and moderate incidence of labour out-migration as calculated from the raw data of the 2001 census. From each VDC, 10 per cent of the households (as per the 2001 census) were selected for interviews. In selecting the households, the caste/ethnicity and economic class of the households were also considered. From each VDC, efforts were made to have an equal number of migrant and non-migrant households. A household was classified as a migrant household if, at the time of the survey, it had at least one member involved in international migration for labour work and who had been absent for at least the six preceding months.

Primary data from a total of 509 migrant and non-migrant households in the two districts was collected from June to December 2007. Help was sought from local NGOs and CBOs in data collection[9] and this collaboration proved highly fruitful in building rapport and gaining the confidence of the respondent households in a short span of time. As the study area for the research consisted of two districts in two separate development regions, a team of enumerators was employed to assist with the survey.

A structured questionnaire was developed for the household survey, covering a wide

7 CBS 2003. According to the 2001 census, the Western and Far-Western regions account for the highest and second highest number of migrants in foreign countries, 43.5 and 13.9 per cent respectively. That is also true for migrants to India with the two regions supplying 44.7 and 17.8 per cent.

8 CBS 2007.

9 The collaborating organisations were: Suryodaya Club and Community Development and Resource Conservation in Syangja, and Social Awareness and Development Association in Baitadi.

range of topics such as demography, economic wellbeing, agriculture, livestock and migration. A preliminary questionnaire was field tested before the actual survey. For in-depth information on the villages, small workshops, focus group discussions and key informant interviews were carried out. Additionally, discussions with government officials such as the District Agriculture Development Officer and the District Livestock Development Officer were also held.

4. EMPIRICAL STRATEGY

Decisions about international migration as well as farm organisation are taken at the household level and household resources are, therefore, expected to influence both these decisions. This brings the problem of endogeneity[10] in analysing the impact of migration on farm production, and so, it is necessary to consider the problem of endogeneity in the empirical analysis of the impact of migration on farm production and the application of a suitable econometric approach is also essential. In this study, the effect of migration on farm production is estimated by using a two-stage least-square regression with instrumental variables (IVs). This econometric approach overcomes the problem of endogeneity associated with the analysis on hand. In the first stage, the migration decision is estimated by the equation:

$M_i = \mu + \gamma * I_i + \lambda X_i + \varepsilon_i$ ..... (7.1)

where,

M_i = number of migrants in the household

X_i = household and community characteristics

ε_i = error term

I_i = vector of regressors excluded from the outcome equation.

In other words, the decision to migrate is seen as a dependent variable which is a function of household and community characteristics, and other factors that have been excluded from the outcome with adjustments made for error. However, in this case, the causality between migration and household characteristics cannot be determined as it could very well be that both are determined by household resources which has not been factored into this equation, and hence, would be included in the error term (ε_i).

In the second stage, the predicted migration variable is included as an independent variable in the regression:

$Outcome_i = \alpha + \beta \widehat{M}_i + \delta X_i + v_i$ ..... (7.2)

where,

$\widehat{M}_i$ = predicted fitted values from the first stage regression

X_i = same vector of explanatory variables

v_i = error term

β = is the unbiased and consistent estimation of the average effect of migration on the outcome of choice.

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10 'Endogeneity' here refers to a situation where a similar set of variables influence both migration decision and farm production decision. This creates a simultaneous bias problem, making it difficult to figure out how these variables influence each decision.

In IV estimation, several variables are included as instruments to identify the system and eliminate the statistical problems associated with endogeneity of M in equation (7.2). One of the most difficult parts in IV estimation is the identification of the IVs themselves. The 'IVs must be relevant (correlated with the explanatory variable) and exogenous (not correlated with the dependent variable other than through the explanatory variable)'.[11] Only when the instrument satisfies this condition, is it considered to be a valid instrument.

Selection of Instrumental Variables

Many studies have used the migration network as an instrument since it is expected to influence the migration decision but not the outcome variables.[12] Migration networks, both family and community, have been reported as having a significant impact on migration-related decisions in Nepal.[13] The presence of migrants, current or returnees, in the extended family or community results in the formation of social networks at the origin and the destination alike, thus further promoting migration by providing better access to information and lowering the costs of migration. Therefore, the variables 'family migration network' and 'community migration network' have been selected as instruments in this study.

Apart from endogeneity of the migration regressor, the other problem that arises from the cross-equation correlation in the error terms is in the outcome equations for male and female labour use in crop farming.

$LHM/FM = \alpha + \beta M + \delta X + e_1$ ..... (7.3)
$LHF/FM = \alpha + \beta M + \delta X + e_2$ ..... (7.4)
where,
L_{HM}/L_{HM} = hired/family male labour
L_{HF}/L_{HM} = hired/family female labour
M = number of migrants in the household
X = vector of household and community characteristics
e_1 and e_2 = respective error terms

The error terms in equations 7.3 and 7.4, e1 and e2, are likely to be correlated. In the Nepali context, with the changing socio-cultural and economic situations, the traditional gender division of labour in farming is crumbling, making male and female labour highly substitutable. Under such conditions, Seemingly Unrelated Regression (SUR) would be a better estimator. However, as there are no estimators that consider

11 McKenzie and Sasin 2007.
12 Rozelle et al. 1999; Taylor et al. 2003; Taylor and Feldman 2007; McCarthy et al. 2006.
13 Thieme 2006.

both endogeneity and the cross-equation error correlation simultaneously, this analysis is focused on dealing with the problem of endogeneity first and then the cross-equation error correlation.

Outcome/Dependent variables

In order to analyse the impact of migration on crop production, the most important crops cultivated by the households were first identified: paddy, wheat, maize and millet. Then, labour and non-labour input use on these four cereal crops were analysed, together with total production of these crops. However, in the case of livestock, labour use was not analysed since in rural Nepal shortages in family labour in the rearing of livestock is not usually compensated by hiring labour; either the household reduces its livestock holding or opts for the adhiya system, in which a household's livestock is cared for by another household and the livestock output is shared between the two households. Thus, in the present analysis, only purchased input used in livestock keeping (i.e., livestock medical expenditure) and the livestock output (i.e., earnings from sale of livestock and livestock products) has been used.

Table 1: Dependent Variables with Their Unit of Measurement

Variables	Unit per measurement
Hired male and female labour	Person days per household per year
Family male and female labour	Person days per household per year
Fertiliser use	NPR per household per annum
Total household crop output	NPR per household per annum
Livestock medical expenditure	NPR per household per annum
Livestock output	NPR per household per annum

Explanatory Variables

The explanatory variables with their symbols and units of measurement are shown in Table 2.

Table 2: Explanatory Variables with Their Unit of Measurement

Variables	Unit of measurement
Number of migrants in household	Number of persons
Age of household head	Years
Caste of household	0 = high caste 1 = low caste
Number of economically active males (15-60 years)	Number of persons
Number of economically active females (15-60 years)	Number of persons
Number of very young dependents (<6 years)	Number of persons
Number of other dependents (6 to <15 years & >60 years)	Number of persons
Number of adults with higher education	Number of persons
Log of total agricultural land holding	Hectare
Total livestock holding	Tropical Units
Log of value of asset holding	Nepali Rupee
Household indebtedness	1 = Indebted 0 = Not indebted
Family migration network	1 = yes, 0 = no
Community migration network	Percentage

5. RESULTS AND DISCUSSION

Descriptive Results

Of the total migrant households in Syangja, 73 per cent had only one member involved in international labour migration, 20 per cent had two, 5 per cent had three, and 1 per cent had four. In Baitadi, 61 per cent had one migrant in their household, 36 per cent had two, and 2 per cent had three.

Table 3 presents the descriptive statistics of the variables used in the econometric analysis, by district and migration status in the two districts.

Table 3: Descriptive Statistics of Selected Variables

Variables	Syangja		Test co-efficient	Baitadi		Test co-efficient
	Migrant	Non-migrant		Migrant	Non-migrant	
Outcome variables						
Hired male labour	24.81	10.62	-5.545***	6.77	5.18	-0.875
Hired female labour	36.11	17.40	-5.021***	6.52	5.49	-0.580
Family male labour	29.65	43.56	4.348***	58.34	54.53	-1.137
Family female labour	57.21	88.52	5.646***	69.01	56.21	-3.446***
Fertiliser use (kg per ha)	26.94	38.71	1.549	10.35	5.29	-2.07**
Crop output	11530	15602	3.611***	11186	8866	-1.970*
Livestock medical expenditure	1037	735	1.808	550	250	1.00
Livestock output	950	4867	5.121**	996	1916	3.863*
Predictor variables						
Age of household head	51	50	-0.448	48	44	-2.304**
Caste of household						
High caste	38	38		78	77	
Low caste	61	61		22	23	
Economically active male	2.27	1.66	-4.70***	2.61	1.77	-6.01***
Economically active female	1.77	1.64	-1.13	2.33	1.70	-4.82***
Young dependants	0.51	0.42	-1.08	1.33	1.15	-1.088
Other dependants	1.35	1.28	-0.578	1.78	1.88	0.550
Higher education	0.67	0.80	0.854	0.52	0.47	-0.415
Land holding	0.47	0.54	NS	0.48	0.48	NS
Livestock holding	1.72	1.83	0.720	2.61	2.96	2.24**
Asset holding	19249	25228	NS	6767	4867	NS
Household debt (% of total households)	45	53	NS	82	84	NS

Note: *** - significant at 1%, ** - at 5%, and * - at 10%

Source: Authors' calculations

Demography: No significant differences are seen in the age of the household head, the caste, the number of dependants and number of people with higher education between migrant and non-migrant households in either district. However, in general, there are significantly more economically active people in migrant households in both.

Labour use: In Syangja, migrant households use significantly more hired labour and less family labour than non-migrant households. Furthermore, the use of female labour (hired and family) is much higher compared to male labour. It is also interesting to note that non-migrant households use significantly more female family labour while migrant households hire more female labour. In Baitadi, however, there is no significant difference in the use of hired and family labour between migrant and non-migrant households while less hired labour is used in general compared to Syangja. Furthermore, (hired and family) female labour use in farming is higher in migrant households than in non-migrant ones, particularly in the case of female family labour.

Use of fertiliser: There is no significant difference in the use of fertiliser between migrant and non-migrant households in the two districts, even though there is a significantly higher use of fertiliser in Syangja than in Baitadi.

Asset and livestock: No significant difference is seen in land and asset holding or household debt between migrant and non-migrant households in either district. The number of livestock per household is much larger in Baitadi than in Syangja. And, while, in Syangja, there is no significant difference in livestock holdings between migrant and non-migrant households, in Baitadi, non-migrant households have more livestock holdings than migrant households.

Crop output: In Syangja, non-migrant households show higher crop output than migrant households, while the reverse holds in the case of Baitadi with a statistically significant difference. The survey also reveals that the cultivation of non-cereal crops is rare in both districts and almost non-existent at a commercial level; farming households are almost exclusively involved in subsistence farming.

Empirical Results and Discussion

Testing of Instruments

The analysis of the impact of migration on agricultural production was initiated by testing the instruments. The selected instrumental variables (IVs) were tested for over-identification using the 'ivreg2' command in STATA. The Hansen J statistic and Sargan test was generated to 'test for the joint hypothesis that the model is correctly specified and the orthogonality condition is satisfied'.[14] The Hansen J test is used to test for over-

14 Miluka et al 2007

identification when heteroskedasticity is observed; otherwise the Sargan test is used.[15] A rejection of the null hypothesis indicates that either the instruments are wrongly excluded from the regression analysis or the orthogonality condition is violated. The results are presented in Table 4. The p values (<0.5) show that the selected instruments are valid in all cases except for fertiliser use and livestock output in Syangja, as the hypothesis holds at 5 per cent or less. The low p value for these two equations indicates some problems with the instrument.

Table 4: Identification and Endogeneity Test Results

Dependent variables	District	Hansen J test P Value	DWH test P Value
Hired male labour use	Baitadi	0.9528	0.60770
	Syangja	0.8454	0.11607
Hired female labour use	Baitadi	0.9741	0.71932
	Syangja	0.5372	0.01722
Family male labour use	Baitadi	0.5253	0.14569
	Syangja	0.1708	0.46835
Family female labour use	Baitadi	0.2242	0.46390
	Syangja	0.3962	0.31626
Fertiliser use	Baitadi	0.9372	0.74419
	Syangja	0.0000	0.05300
Crop Output	Baitadi	0.1802	0.08798
	Syangja	0.0879	0.72671
Livestock medical expenditure	Syangja	0.8360	0.00107
Livestock output	Baitadi	0.8316	0.06782
	Syangja	0.0037	0.10562

Source: Authors' calculations

It became clear that the instrument 'community migration networks' was correlated with the interest variables 'fertiliser use' and 'livestock output' (Table 5), and, hence, wrongly excluded from the regression analysis. As a result, in the cases of 'fertiliser use' and 'livestock output', the variable 'community migration' was dropped as an instrument and included in the second equation. In other words, the IV estimation was carried out with only one instrument, namely, 'family migration network'.

15 Test for heteroskesdacity was conducted using 'ivhettest' in STATA and it revealed the problem of heteroskesdacity in equations relating to crop farming. However, there was homoskesdacity in livestock equations.

Table 5: Influence of IVs on the Outcomes of Interest

Variables	Coef.	Std. Err.	T	P>t
Fertiliser use				
Family migration network	.121	.391	0.31	0.757
Community migration network	-.125	.012	-10.36	0.000
Constant	10.431	.687	15.19	0.000
F test (P value)	58.74 (0.0000)			
R square	0.34			
Livestock output				
Family migration network	.918	.654	1.40	0.161
Community migration network	-.090	.020	-4.37	0.000
Constant	8.870	1.179	7.52	0.000
F value (P value)	12.88 (0.0000)			

Source: Authors' calculations

Testing for Endogeneity

In IV estimation, endogeneity is tested by using the Durbin-Wu-Hausman (DWH) test for endogeneity using the 'ivendog' command in STATA. Applying IV estimation when the regressor is uncorrelated with the error term would result in a loss of efficiency (Wooldridge 2006). The test statistics as well as the p-value are listed in Table 4. The p-values failed to reject the null hypothesis, with the exceptions of 'hired female labour' use and 'livestock output' in Syangja, and crop output in Baitadi. Furthermore, in the case of 'fertiliser expenditure' in Syangja, the DWH test p-value of 0.05300 suggests endogeneity. These results contradict the earlier findings of Miluka et al (2007) and Mendola (2008), among others, where in all cases the migration variable was found to be endogenous. Wherever endogeneity holds, two-stage least square IV estimation is used, and in cases where endogeneity does not hold, other forms of estimation are applied.

Correlation of Cross-Equation Error Terms

A high degree of substitutability between male and female labour use in crop farming brings the problem of cross equation correlation between the error terms in the outcome equations of these two dependant variables. In order to address this, the correlation matrix of residual and the Breusch-Pagan test of independence were conducted as presented in Table 6. The results demonstrate the problem of cross-equation correlation of residuals. Therefore, Seemingly Unrelated Regression (SUR) analysis was estimated using the 'sur' command in STATA and applied where relevant.

Table 6: Cross Equation Residual Correlation Tests

Tests	District	Co-efficients
Correlation between residuals of Lnhiredmalelab and Lnhiredfemalelab	Baitadi	0.9981
	Syangja	0.7452
Breusch-Pagan test of independence	Baitadi	Chi sq. = 225.152 P value = 0.0000
	Syangja	Chi sq. = 128.282 P value = 0.0000
Correlation between residuals of Lntotmalefamilylab and Lntotfemalefamilylab	Baitadi	0.8138
	Syangja	0.7261
Breusch-Pagan test of independence	Baitadi	Chi sq. = 149.673 P value = 0.0000
	Syangja	Chi sq. = 121.783 P value = 0.0000

Source: Author's calculations

Impact on Farm Production

The impact of migration on farm production is presented separately for each district since the two districts represent two different migratory patterns.

Syangja District

The estimation results for the labour and non-labour input use in farming and the total output produced in Syangja is given in Table 7a and 7b. SUR was applied in estimating the impact of migration on 'hired male labour' use, 'hired female labour' use, and 'family male labour' use; IV (2SLS) for estimating 'family female labour' use, 'fertiliser use', and 'livestock medical expenditure'; and OLS for total 'crop and livestock output'. The test of goodness of fit of the model is presented in the respective tables and the first stage results of IV (2SLS) are presented in Annex 1.

Labour: In Syangja, migration has led to a decline in the use of male as well as female family labour in crop farming. This could be due to the increase in the leisure time of family members resulting from increased household income. There may not be the need for family members to work as hard either as they receive sufficient money from remittance or they may now have the financial capacity to hire labourers. In fact, the findings above suggest that lost family labour is replaced by hired labour as we see that the magnitude of hiring-in of labour is higher than the family labour lost. But, it is also true that in rural households, typically, all the members of the household are already working to their full capacity. Hence, when family members migrate and their work responsibilities are distributed to other members of the family, it strains the already occupied labour. This leads to a reduction in the general availability of family labour, and, consequently, a reduction in family labour in farming.

Table 7a: Estimation Results for Input Use and Output in Syangja

Variables	Family male labour	Family female labour	Hired male labour	Hired female labour
	SUR	SUR	SUR	IV (2SLS)
Number of migrants	-.448***	-.345***	.871***	1.663***
	(0.125)	(0.119)	(0.129)	(0.384)
Age of household head	.006	.003	-.015**	-.020**
	(0.007)	(0.007)	(0.008)	(0.008)
Caste (1= low, 0=High)	-.386**	-.532***	-.281	-.424**
	(0.177)	(0.169)	(0.183)	(0.211)
Economically active male	.155	-.019	-.474***	-.812***
	(0.096)	(0.092)	(0.099)	(0.186)
Economically active female	.104	.113	-.132	-.357***
	(0.097)	(0.093)	(0.100)	(0.129)
Very young dependants	.008	.092	-.104	-.262**
	(0.122)	(0.117)	(0.126)	(0.129)
Other dependants	-.081	.062	-.088	-.285***
	(0.085)	(0.081)	(0.088)	(0.108)
No. of members with higher education	-.010	.148*	.379***	.631***
	(0.082)	(0.078)	(0.084)	(0.106)
Log of agricultural land	.064***	.054**	.089***	.102***
	(0.022)	(0.021)	(0.023)	(0.026)
Total livestock	.305***	.313***	.168**	.305***
	(0.075)	(0.072)	(0.078)	(0.099)
Log of value of asset holding	-.079	-.077	.218***	.158**
	(0.057)	(0.054)	(0/059)	(0.071)
Household debt (1=Yes, 0=No)	.252	.319*	.079	.220
	(0.176)	(0.169)	(0.182)	(0.208)
Constant	1.54***	2.63***	1.153**	2.177***
	(0.461)	(0.441)	(0.477)	(0.537)
Community migration network				
Total observation	231	231	231	231
Chi sq.	86.52	100.57	135.03	
(P value)	(0.000)	(0.000)	(0.000)	
F value				11.98
(P value)				(0.000)
R square	0.2725	0.3033	0.3689	
Centred R2				0.2845
Uncentred R2				0.7053

Note: *** - significant at 1%, ** - at 5%, and * - at 10%

Source: Author's calculations

Table 7b: Estimation Results for Input Use and Output in Syangja (continued)

Variables	Fertiliser use	Crop Output	Livestock medical expd.	Livestock output
	IV (2SLS)	OLS	IV (2SLS)	OLS
Number of migrants	.712	-.115***	-1.782**	-.579
	(0.705)	(0.038)	(.699)	(.430)
Age of household head	-.009	.003	-.004	.019
	(0.016)	(0.003)	(.017)	(.027)
Caste (1= low, 0=High)	-.789*	-.097	-1.812***	-2.408***
	(0.424)	(0.068)	(.428)	(.677)
Economically active male	-.444	-.019	.375	.273
	(0.334)	(0.031)	(.343)	(.338)
Economically active female	-.184	.022	.403	.739**
	(0.216)	(0.038)	(.250)	(.360)
Very young dependants	-.160	-.046	-.531**	-.509
	(0.275)	(0.042)	(.277)	(.414)
Other dependants	-.446**	-.038	.307	-.109
	(0.186)	(0.024)	(.206)	(.292)
No. of members with higher education	-.037	.021	.145	-.776**
	(0.181)	(0.025)	(.219)	(.303)
Log of agricultural land	.196***	.075***	-.008	.463
	(0.057)	(0.011)	(.307)	(.465)
Total livestock	.144	.110***	.106	-.342
	(0.187)	(0.025)	(.186)	(.279)
Log of value of asset holding	-.058	-.011	.353***	.128
	(0.137)	(0.018)	(.137)	(.190)
Household debt (1=Yes, 0=No)	.310	.117*	0.499	-0.930
	(0.391)	(0.064)	(.408)	(.627)
Constant	10.187***	8.561***	3.124***	7.304***
	(1.150)	(0.156)	(1.122)	(1.855)
Community migration network	-0.108***			-0.055**
	(0.014)			(.022)
Total observation	231	231	261	261
Chi sq. (P value)				
F value (P value)	21.99 (0.0000)	24.05 (0.000)	23.62 (0.0000)	4.29 (0.0000)
R square		0.5355		0.1841
Centred R2	0.3768			
Uncentred R2	0.7541			

Note: *** - significant at 1%, ** - at 5%, and * - at 10%

Source: Author's calculations

It is also interesting to note the gender dimension of the impact of migration on farm labour. The findings show that more female labourers than males are hired. This could be due to the larger scale of male out-migration, which means that female labourers are more easily available. Another reason could be the fact that, in Syangja, women labourers are cheaper than men since the wage rate of female labour is lower (NPR 87 compared to NPR 114 for males[16]). Regardless, these transformed gender roles due to male out-migration hints at the end of the gender division of labour in crop farming and an increasing feminisation of agriculture.

It is also found that the use of female family labour is in general likely to be higher in cases of higher household debt and also where more household members have higher levels of education. When a household has a standing debt, it cannot afford to hire labour and has to depend more heavily on the family for farming labour. Also, given the patriarchal structure of society in Syangja as elsewhere in Nepal, education of males is given greater priority, reducing their involvement in agriculture and to compensate for which female members have to take on a bigger share of the farming activities.

The findings suggest that a bigger household means less likelihood of outside labour being hired, whereas wealthier households and those with higher land and livestock holdings as well as education are more likely to hire labour. But higher land and livestock holdings also means that greater use of both male and female family labour is likely. Further, belonging to lower caste means hired labour is less likely to be used, which is probably because lower caste groups in general have lower landholdings.

Crop farming: Migration has no significant impact on total household expenditure on fertilisers, indicating that remittances are hardly used to purchase capital inputs for farming. Instead, the presence of a large community-level migration network shows a large degree of negative impact on fertiliser use which suggests that migration results in a reduction in investment in crops. A household's decision to opt for migration also has a significant negative impact on crop output. Fertiliser use is also affected by other variables. For instance, larger-sized landholdings mean greater likelihood of the use of fertilisers but being a member of a lower caste or having a household with more elderly dependants decreases the likelihood.

Livestock: Migration is also likely to mean lower livestock medical expenditures as well as reduced total livestock output, albeit to a lower degree. There is also a significant negative impact of a community migration network on livestock output, indicating that livestock production in general is lower in locations with high migration. This could be because household labour loss due to migration, particularly in livestock raising and livestock produce, is difficult to replace. Further, this labour-intensive activity has become even more so with the spread of community forests and the concurrent restriction on livestock grazing in the forests.

Livestock is also affected by other household factors. Asset holding has a highly

16 These rates were mentioned during a focus group discussion.

significant positive influence on livestock medical expenditure, probably because asset holding indicates greater household wealth and, consequently, availability of more resources to invest in livestock. Similarly, more economically active females in the household has a significantly positive impact on livestock output, indicating that perhaps women are more likely to invest in livestock.

On the other hand, lower caste status also means less likelihood of livestock holdings. This could be because lower-caste groups usually encompass a lower wealth demographic and, hence, have limited capacity to keep livestock. There is also the fact that because of the persistence of caste-based discrimination,[17] lower-caste households find it difficult to sell dairy products, making livestock-rearing unprofitable for this sub-group. Similarly, the number of small children is seen as having a negative impact on livestock. The time and money spent on childcare increases if there are more children, thereby reducing the time and resources available for the care of livestock. Higher education levels among household members also show a significant negative impact on livestock output since farming becomes less attractive when education makes possible other income opportunities.

These findings indicate that overall migration has a negative impact on the farming sector—in both crop production and livestock output. This suggests that migration alone is not enough to overcome the constraints faced by subsistence farming to make the jump to more profitable commercial farming. Instead, farming households are more likely to use the remittances earned from migration to move out of subsistence farming altogether.

Baitadi District

The estimation results for Baitadi are given in Table 8. In Baitadi, SUR is applied in estimating the impact of migration on labour use in farming; OLS in estimating fertiliser use, and IV (2SLS) in estimating crop and livestock output. The first stage results of IV (2SLS) are presented in Annex 1.

Labour: Migration reduces the use of both family male labour and hired male labour but increases family female labour, probably because the majority of migrants are male. However, the positive and negative coefficients of effect on these variables are not statistically significant. In Baitadi, migration is more seasonal or circular in nature and migrants generally return home at least once every year. Their return coincides with the peak agricultural period, and, hence, the loss of labour is not as total or severe as in the case of Syangja.

As in Syangja, there are other factors that affect labour in Baitadi and these will be briefly discussed here. Hiring of labour in crop farming, both male and female, is

17 Although caste norms have become weaker over the years, some taboos such as those on milk and milk products produced by households belonging to 'low castes' are still found to be observed.

Table 8: Estimation Results for Labour and Non-Labour Input Use in Crop Production and Total Household Crop Output in Baitadi

Variable	Family male labour	Family female labour	Hired male labour	Hired female labour	Fertiliser use	Crop Output	Livestock output
	SUR	SUR	SUR	SUR	OLS	IV (2SLS)	IV (2SLS)
No. of migrants	-0.114 (0.075)	0.023 (0.061)	-0.058 (0.131)	-0.081 (0.132)	0.035 (0.253)	0.317* (0.192)	3.490** (1.870)
Age of household head	-0.0003 (0.004)	-0.0008 (0.003)	0.005 (0.007)	0.005 (0.007)	-0.014 (0.015)	-0.0002 (0.003)	0.0006 (.029)
Caste (1=Low, 0= High)	-0.180 (0.124)	-0.241** (0.100)	-0.567*** (0.216)	-0.578*** (0.217)	-0.629 (0.389)	-0.242* (0.124)	-0.423 (1.104)
Economically active male	0.152*** (0.058)	0.067 (0.047)	-0.070 (0.100)	-0.056 (0.101)	0.114 (0.201)	-0.043 (0.071)	-0.889 (.722)
Economically active female	0.028 (0.057)	0.049 (0.046)	0.065 (0.099)	0.070 (0.099)	-0.131 (0.197)	-0.017 (0.059)	-0.663 (.535)
Very young dependants	0.012 (0.040)	-0.0005 (0.032)	-0.079 (0.070)	-0.079 (0.070)	-0.097 (0.131)	-0.043 (0.032)	0.518 (.316)
Other dependants	0.028 (0.036)	0.027 (0.029)	-0.017 (0.063)	-0.017 (0.063)	0.009 (0.135)	-0.015 (0.026)	-0.140 (.270)
No. of members with higher education	-0.057 (0.055)	-0.023 (0.045)	-0.284*** (0.096)	-0.291*** (0.097)	-0.572*** (0.156)	0.005 (0.044)	0.292 (.457)
Log of agricultural land	0.087*** (0.009)	0.077*** (0.008)	0.046*** (0.016)	0.048*** (0.016)	0.042 (0.040)	0.062*** (0.007)	-0.810 (.617)
Total livestock	0.094** (0.048)	0.062 (0.039)	-0.230*** (0.083)	-0.231*** (0.084)	-0.125 (0.176)	0.136*** (0.046)	0.783 (.486)
Log of value of assets	-0.009 (0.048)	0.014 (0.039)	0.139* (0.084)	0.138 (0.084)	0.167 (0.161)	0.047 (0.038)	-0.435 (.368)
Household debt (1=Yes, 0=No)	-0.114 (0.135)	-0.136 (0.109)	-1.168*** (0.234)	-1.116*** (0.236)	-2.270*** (0.626)	-0.449*** (0.082)	1.810** (.996)
Constant	2.262*** (0.305)	2.869*** (0.246)	1.744*** (0.529)	1.667*** (0.533)	3.849*** (1.155)	8.336*** (0.237)	7.276*** (2.523)
Total observation	226	226	226	226	226	226	225
Chi sq. (P value)	165.88 (0.0000)	226.91 (0.0000)	84.68 (0.0000)	81.55 (0.0000)			
F value					3.42 (0.0000)	16.41 (0.0000)	10.18 (0.0000)
R square	0.4233		0.2726	0.2652	0.1858		
Centred R2		0.4731				0.5044	
Uncentred R2		0.9666				0.9963	

Note: *** - significant at 1%, ** - at 5%, and * - at 10%

Source: Author's calculations

less likely for people of lower caste status and also for households with better educated members, higher household debt and greater livestock holdings. The influence of higher education and livestock holdings contrasts with the findings in Syangja.

Among the other households characteristics considered, more family male labour use

is highly probable in crop farming in households with a higher number of economically active males and with higher land holdings. But the use of family male labour is prone to be lower if the number of other dependants is higher in the household or if livestock holdings are greater. In the case of family female labour having higher landholdings means a higher likelihood of being involved in farming but the reverse is true among lower castes.

Crop farming: Migration does not have any significant impact on any of the inputs used in crop production, both labour and non-labour. While fertiliser use seems to be positively influenced, it is not statistically significant. Remittances in Baitadi average NPR 24,693 per annum,[18] which is a lot lower compared to Syangja's average of NPR 152,006.[19] This amount is low even by national standards, and, therefore, chances of their money being used to hire labour or purchase fertiliser to the extent of having a substantial impact are very low.

Livestock: Migration shows a highly significant positive influence on household livestock output which can be attributed to the migration pattern, remittances earned as well as the resource endowment of the district. In Baitadi, the forests are more widespread than in Syangja and the population density is lower, meaning livestock-rearing in Baitadi is less labour intensive and resources are plentiful. Livestock is an important source of income for Baitadi farmers and remittances from migration are not high enough to forego local income opportunities. Furthermore, livestock is considered an important liquid asset in Baitadi due to lower access to groups and co-operatives for savings and credit. Of the total households covered in Baitadi only six were found to be using non-traditional medical facilities, hence, no analysis was carried out for livestock medical expenditure.

Given that livestock holdings reflects the status of household wealth in Baitadi, the negative impact of education and livestock holdings on hiring of labour is rather surprising. However, this could be due to the bonded labour system, the haliya, existing in the study areas which reduced the need to hire labour.[20]

18 Although seasonal in nature, migrants from Baitadi were usually away from Nepal for work for 10 months or more in a year.

19 These figures are based on the field survey.

20 Haliya is a form of debt bondage wherein the borrower works in the land of the money-lender to pay off the interest on the debt, and not the principle. As there are no daily wages paid for their work, the chances of the borrower paying off the debt are almost nil, thus transferring the debt to the next generation and setting up the haliya system. In this system not only the borrower but his entire family has to work for the landlord at minimum wages, usually a meal. At the time of the fieldwork, most well-off households had haliya working in their land and the hiring of agriculture labour was not common. The Government of Nepal abolished the haliya system in September 2008.

6. CONCLUSIONS AND POLICY IMPLICATIONS

The impact of migration on agricultural production in the two districts is quite dissimilar and probably reflects differences in migration patterns and the resulting remittances. The impact of family labour loss is significant in Syangja but less so in Baitadi. In both districts, the use of purchased agriculture inputs is not significantly influenced by household migration status. The results indicate that when remittance is relatively high, farmers do not invest in low-productivity subsistence crop farming and livestock, and prefer the non-farm sector or use remittances for more leisure and consumption goods. However, when remittances are low, farm households use the extra funds to supplement income from their subsistence farming to meet their basic food and non-food requirements, and also to expand their livestock activity as it is more profitable than subsistence cereal farming. The results also suggest that there is an increasing feminisation of the agricultural sector resulting from a shortage of male labourers and perhaps existing wage inequalities.

The differences in the impact of international migration on migrant households in the two districts is a consequence of the disaggregated nature of this investigation and are accounted for by the different patterns of migration and the specific situations of the origin households and communities. However, the impact of migration on subsistence farming is univocal—migration and remittances alone are not sufficient to convert subsistence farming into commercial farming. Whenever remittances are high enough to substitute income from subsistence farming, the farm households are more likely to neglect farming than be engaged in commercial farming.

The findings of the study have some highly relevant policy implications. Although the population moving out of the agricultural sector is a natural process, the stagnating agricultural sector is a matter of concern that seeks immediate policy attention. Agriculture is still the major sector of employment and a major source of livelihood for rural farm households and improving this sector is of the utmost importance for the development of rural areas with little to no non-agricultural income-earning opportunities. Disinvestment in the poorly performing farming sector can add to the food production constraints already faced by the nation and lead to negative consequences in the overall food security situation of the country. Migration provides opportunities to make significant contributions to improve the agricultural sector, and farming households unwilling to invest in subsistence farming can be motivated to shift to commercial farming if a suitable environment were to be created.

The feminisation of the agricultural sector is also another area requiring policy attention. With the men migrating in great numbers, the bulk of the work load and responsibilities fall upon women who are not adequately prepared for these new responsibilities. Therefore, there is an urgent need for a socio-political framework within which women can be empowered with the relevant skills and technologies to undertake this new role more efficiently.

REFERENCES

Adhikari, Jagannath. 1996. *The Beginnings of Agrarian Change: A Case Study in Central Nepal*. Kathmandu: TM Publication.

Adhikari, Jagannath. 2001. 'Mobility and Agrarian Change in Central Nepal.' *Contributions to Nepalese Studies* 28(2):247-267.

Azam, Jean-Paul and Flore Gubert. 2002. 'Those in Kayes: The Impact of Remittances on Their Recipients in Africa.' *IDEI Working Paper 308*, University of Toulouse.

Black, R. 1993. 'Migration, Return and Agricultural Development in Serra de Alvao, Northern Portugal.' *Economic Development and Cultural Change* 41:563-585.

Central Bureau of Statistics (CBS). 2003. *Population Monograph of Nepal 2003 – Volume I and II*. Kathmandu: Central Bureau of Statistics, National Planning Commission Secretariat.

Central Bureau of Statistics (CBS). 2007. *District Profiles*. Kathmandu: Central Bureau of Statistics, National Planning Commission Secretariat.

Central Bureau of Statistics (CBS). 2009. *Report on the Nepal Labour Force Survey 2008*. Kathmandu: Central Bureau of Statistics, National Planning Commission Secretariat.

De Brauw, A., J. Edward Taylor and Scott Rozelle. 2003. 'Migration and Incomes in Source Communities: A New Economics of Labour Migration Perspective from China.' *Economic Development and Cultural Change* 52:75-101.

Dwayne, Benjamin and Loren Brandt. 1998. 'Administrative Land Allocation, Nascent Labor Markets, and Farm Efficiency in Rural China.' *Working Paper*, University of Toronto.

Francis, Elizabeth and John Hoddinott. 1993. 'Migration and Differentiation in Western Kenya: A Tale of Two Sub Locations.' *Journal of Development Studies* 30:115-145.

Gray, Clark Langston. 2009. 'Rural Out-Migration and Smallholder Agriculture in the Southern Ecuadorian Andes.' *Population and Environment* 30:193-217.

Germenji, E. and J. Swinnen. 2004. 'Impact of Remittances on Household-based Farms in Rural Albania.' Paper presented at conference on 'New Perspectives on Albanian Migration and Development', September, Korce, Albania.

Hyden, Goran, Robert W. Kates and B.L Turner II. 1993. 'Beyond Intensification'. In *Population Growth and Agricultural Change in Africa*, edited by B.L. Turner II, Goran Hyden, and Robert W. Kates, 401-439. Gainesville: University of Florida Press.

Jahnke, H.E., G. Tacher, P. Kiel and D. Rojat. 1987. 'Livestock Production in Tropical Africa with Special Reference to the Tsetse-afferent Zone.' Accessed 13 June 2013. http://www.ilri.cgiar.org/InfoServ/Webpub/fulldocs/X5443E/X5443E04.HTM.

Jha, Hari Bansh. 2010. *Impact of Migration and Remittances on Agriculture*. Kathmandu: Food and Agriculture Organization.

Low, Allan. 1998. *Agricultural Development in Southern Africa: Farm-Household Economics and the Food Rises*. London: James Currey.

Maharjan, Amina. 2010. *Labour Out-Migration and its Impact on Farm Families in the Mid Hills of Nepal*. Weikersheim: Margraf Publishers.

McCarthy, Nancy, Gero Carletto, Benjamin Davis and Irini Maltsoglou. 2006. 'Assessing the Impact of Massive Out Migration on Agriculture.' *ESA Working Paper* 06-14, Food and Agriculture Organisation, United Nations.

McKenzie, David and Marcin J. Sasin. 2007. 'Migration, Remittances, Poverty, and Human Capital: Conceptual and Empirical Challenges.' *Policy Research Working Paper* 4272, World Bank.

Mendola, Mariapia. 2008. 'Migration and Technological Change in Rural Households: Complements or Substitutes.' *Journal of Development Economics* 85(1-2):150-175.

Miluka, Juna, Calogero Carletto, Benjamin Davis and Alberto Zezza. 2007. 'The Vanishing Farms? The Impact of International Migration on Albanian Family Farming.' *Policy Research Working Paper* 4367, World Bank.

Mines, Richard and Alain de Janvry. 1982. 'Migration to the United States and Mexican Rural Development: A Case Study.' *American Journal of Agricultural Economics* 64:444-454.

Mochebelele Motsamai T. and Alex Winter-Nelson. 2000. 'Migrant Labour and Farm Technical Efficiency in Lesotho.' *World Development* 28(1):143-153.

Murray, Colin. 1981. *Families Divided: The Impact of Migrant Labour in Lesotho*. Cambridge: Cambridge University Press.

Quinn, Micheal A. 2009. 'Estimating the Impact of Migration and Remittances on Agricultural Technology.' *The Journal of Developing Areas* 43(1):199-216.

Rozelle, Scott, J. Edward Taylor and Alan deBrauw. 1999. 'Migration, Remittances and Agricultural Productivity in China.' *The American Economic Review* 89(2):287-291.

Taylor, J. Edward, Joaquin Arango, Graeme Hugo, Ali Kouaouci, Douglas S. Massey and Adela Pellegrino. 1996. 'International Migration and Community Development.' *Population Index* 62(3):397-418.

Taylor, J. Edward and Alejandro Lopez-Feldman. 2007. 'Does Migration make Rural Households more Productive? Evidence from Mexico.' *ESA Working Paper* 07-10, Food and Agriculture Organization, Italy.

Taylor, J. Edward, Scott Rozelle and Alan de Brauw. 2003. 'Migration and Incomes in Source Communities: A New Economics of Migration Perspective from China.' *Economic Development and Cultural Change* 52:75-101.

Taylor, J. Edward and T.J. Wyatt. 1996. 'The Shadow Value of Migrant Remittances, Income and Inequality in a Household-Farm Economy.' *Journal of Development Studies* 32(6):899-912.

Thieme, Susan. 2006. *Social Networks and Migration: Far West Nepalese Labour Migrants in Delhi*. Berlin: LIT Verlag.

Wooldridge, Jeffrey M. 2006. *Introductory Econometrics: A Modern Approach*. Ohio: Thomson South-Western.

Wouterse, Fleur S. 2008. 'Migration and Technical Efficiency in Cereal Production - Evidence from Burkina Faso.' *IFPRI Discussion Paper* 00815, International Food Policy Research Institute.

Wouterse, Fleur S. and J. Edward Taylor. 2008. 'Migration and Income Diversification: Evidence from Burkina Faso.' *World Development* 36:625-640.

Annex I
First Stage Regression Result

Variables	Number of migrants			
	Crop production		Livestock production	
	Syangja	Baitadi	Syangja	Baitadi
Age of household head	0.001 (0.003)	0.002 (0.004)	-0.0003 (0.004)	0.0008 (0.003)
Caste (1=Low, 0= High)	-0.003 (0.088)	-0.296*** (0.103)	-0.095 (0.093)	-0.282 (0.111)
Economically active male	0.341*** (0.054)	0.317*** (0.055)	0.336*** (0.041)	0.318 (0.044)
Economically active female	0.107** (0.049)	0.184*** (0.050)	0.112** (0.049)	0.183 (0.048)
Very young dependants (<6 years)	0.087 (0.062)	0.054 (0.034)	0.067 (0.056)	0.049 (0.035)
Other dependants	0.120*** (0.039)	0.033 (0.032)	0.108*** (0.039)	0.031 (0.031)
Number of members with higher education	-0.050 (0.046)	-0.095* (0.055)	-0.056 (0.043	-0.103 (0.048)
Log of agricultural land holding (ha)	-0.021** (0.009)	0.0009 (0.008)	-0.067 (0.063)	0.019 (0.073)
Total livestock (TLU)	-0.041 (0.046)	-0.165*** (0.038)	-0.043 (0.038)	-0.154 (0.042)
Log of value of asset holding	0.066** (0.028)	0.056 (0.043)	0.063** (0.026)	0.035 (0.042)
Household debt	0.004 (0.084)	0.036 (0.104)	0.048 (0.087	0.041 (0.118)
Family migration network	0.624*** (0.086)	0.699*** (0.127)	0.623*** (0.096)	0.703 (0.172)
Community migration network	0.009*** (0.003)	0.003** (0.001)	0.012*** (0.003)	0.003 (0.001)
Constant	-0.979*** (0.259)	-0.452* (0.271)	-1.051*** (0.260)	-0.383 (0.292)
Total observation	231	226	261	225
F test of excluded instruments (P value)	Family female labour: 28.06 (0.0000) Fertiliser use: 52.86 (0.0000)	16.41 (0.0000)	23.62 (0.0000)	10.18 (0.0001)

Note: *** - significant at 1%, ** - at 5%, and * - at 10%

Source: Author's calculations

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