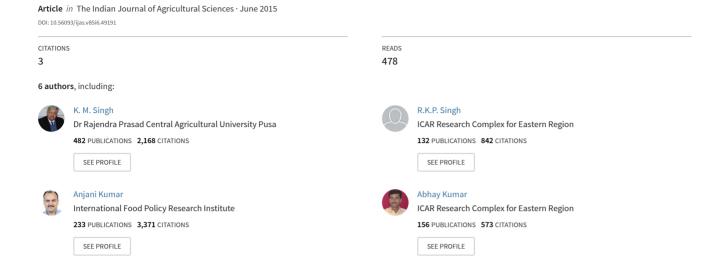# Implications of labour migration for rice production and household economy:Evidences from eastern India

Implications of labour migration for rice production and household economy: Evidences from eastern India

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ABSTRACT

The study evaluates the extent, impact and determinants of labour migration in Bihar. Data were collected in 2011 from four hundred households (200 migrants and 200 non-migrants) four villages, each of rainfed ecosystem (Madhubani district) and partially irrigated ecosystem (East Champaran district). Non–linear model (Cobb-Douglas) was used to find out impact of migration on input efficiencies in rice production. Regression coefficients (β) were computed for major factors of production. Probit model employed to measure the determinants of migration. Study reveals that youngsters are more prone to migration to urban centers for non-farm activities. Migration helped in rational use of two critical inputs, i.e. labour and irrigation in rice production. Judicious use of human labour was also observed at native place due to migration of surplus labour. However, potential of land and capital (seeds, fertilizers and agricultural chemicals) are still to be exploited on both categories of households. Migrants remittance utilized for meeting consumption need, better education to children, improved housing and better health care facilities. Remittances helped in improving livelihoods of migrant households. Migration also inculcated saving habits amongst migrants. It emerged as risk-coping strategy for weaker sections of society. Allocation of remittances on agricultural inputs could have increased if proper infrastructure facilities were made available in rural areas for faster dissemination of modern agricultural technologies. Male member of lower caste having large land size and dependents is more prone to migration. Caste barrier in migration has weakened in Bihar but still persist, however, size of farm is no more taboo.

Key words: Eastern India, Household economy, Labour migration, Rice production

Migration has been a recurrent phenomenon since the dawn of human history. Economy is one of the important factors for inducing migration. The two sectors growth model (Lewis 1994) states that the surplus labour from low productive agriculture in rural areas is transferred to highly productive industrial sector in urban areas for providing needed manpower for the urban industrial growth. But this theory fails to explain an increasing rural to rural migration which increased during last two decades in India, particularly from Bihar. The most effective theory for explaining migration is push and pulls theory (Bague 1969) which states that the migration generally takes place when the positive pull factors at the place of destination are outnumbered by push factors at the place of origin. No matter what theory lies behind migration but the phenomenon is considered socially beneficial since the human resources were being shifted from areas where their social marginal products were assumed to be zero to places where their marginal products are not only positive but also rapidly growing as a result of capital accumulation and technological progress. The new economics of migration explains that the decision to migrate is taken by larger association of related people, household or families rather than autonomous individuals (Stark 1986).

There is no doubt that migration and remittances have improved the standard of living. However, migration has had some other social impacts too and in the destination states, local labour faces increased unemployment (Singh 2012). Many researchers have described migration as a trigger of change particularly in Bihar state but feel that despite some social progress, economic progress and transformation remains low (Rodgers and Rodgers 2011). In Bihar, migration is an old phenomenon but destination of migration was mainly to tea garden of Asom and industrial areas of West Bengal during pre green revolution period. The rate of labour out migration increased and pattern also

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changed (Choudhary 1998 and Singh *et al.* 2012). There is no doubt that migration and remittances have improved the standard of living and most migrants and their families agree that they have benefited from migration on the whole (Deshingkar *et al.* 2006). Migration will have far reaching social and economic consequences in Bihar. Keeping in view the anticipated consequences of migration in place of origin, this study has been undertaken to examine the extent, impact and determinants of labour out migration on rice productivity and livelihood in Bihar state.

MATERIALS AND METHODS

The study is based on a survey of 400 households (200 migrants and 200 non-migrants) from four villages each of rainfed ecosystem (Madhubani district) and partially irrigated ecosystem (East Champaran district) of Bihar. A sample of 100 migrant households and matching sample of 100 non-migrant households were selected from both ecosystems to undertake a comparative analysis of differences in agricultural productivity parameters. The survey was conducted in 2011 and detailed information on household characteristics, agricultural production and employment for both categories of households were collected. However, migration related information including pattern, incidence, remittance and their use were collected from migrant households. In each household, more detailed information was gathered for two largest rice plots, including information on inputs, outputs and other characteristics of these plots. In this study, unit of analysis was restricted to two plots on which rice was cultivated. Non–linear model (Cobb-Douglas) has been used to find out impact of migration on input efficiencies in production of rice on migrant and non-migrant households.

The efficiencies of factors of production have been estimated by the following form of function:

$$\ln Y = \alpha + \beta_1 \ln X_1 + \beta_2 \ln X_2 + \beta_3 \ln X_3 + \beta_4 \ln X_4 + \beta_5 \ln X_5 + \beta_6 \ln X_6 + U$$

where, Y, Rice production (in quintal); X_1, area under rice (in hectare); X_2, labor used in rice production (in man days); X_3, variable capital in ₹ (for seeds, fertilizer and pesticides); X_4, cost of bullock labour in ₹ (owned and hired); X_5, expenses on use of machineries in rice production in ₹ (owned+hired); X_6, irrigation cost in ₹ (owned+hired).

Ordinary Least square estimates of Regression Coefficients (β) were computed to identify the variables in migrant and non-migrant households which had significant contribution in rice production (Y). Probit model was used to find out determinants of migration, analyses qualitative (dichotomous or polytomous) dependent variables within regression framework. Many response variables were binary by nature (yes/no) while others were measured ordinally rather than continuously. The following specification of independent and dependent variables was used in the model:

$$Y = \beta X_i + e$$

where, Y, Probability of being migrant household (migrant=1 and non-migrant=0); β, vectors of parameters to be estimated.

X_i's are: X_1, Ecosystem (Rainfed=1, partially irrigated=0); X_2, caste (Forward=1, otherwise=0); X_3, farm size (ha); X_4, family size (Number); X_5, number of dependents (Numbers); X_6, education of head (Score).

RESULTS AND DISCUSSION

Migration pattern

The incidence of migration was 20% in surveyed villages, however, youngsters constituted 68% of total migrants in the villages under study. Among the various factors of migration, pull factor of urban and metropolitan cities is important for youngsters who like to get blue collar jobs in urban centers. About 72% of migrants of villages under study migrated to urban centers and 54% of them migrated for long period (more than a year). Rural to rural migration is still prevalent in Bihar. In villages under study, 28% migrants had rural area of their destination and almost all of them were employed as agricultural labours for short period and they come back to native place in peak agricultural seasons. The majority of migrants (78%) were employed in non-farm activities at destination place. Transport work (14.11%), contractual job (13.14%), unskilled work (12.90%), sales man (12.90%) and construction work (10.95%) were important employment opportunities for migrants at destination place.

In Bihar, migration is said to be a survival strategy to meet the consumption needs of household members left at home. It still holds true but family members of 5.5% of medium size of households (>2 ha) also migrated in search of better livelihood opportunities. Migration was observed from forward caste households also. About 16% migrants belonged to forward caste community in villages under study. Hence, it may be said that the migration process crossed the barriers of caste and class in Bihar.

Impact on rice production

The impact of migration on input use, employment, productivity and input efficiency in rice cultivation was studied as 80% of working adults were engaged in production of rice being the principal crop. Analysis has been done for migrant and non-migrant households separately. Rice covers 46% and 43% of respective gross cropped area of migrant and non-migrant households. Level of adoption of modern rice varieties was almost identical on migrant and non-migrant households, i.e. 60% on migrant and 58% on non-migrant households. The production cost of modern rice varieties on migrant and non-migrant households was examined. In the input–output analysis, only operational cost and main product of rice were considered for comparison of economics of both categories of households under study. About 69% of migrant households and 93% of non-migrant households cultivated modern rice varieties on average area of 0.43 ha on migrant and 0.57 ha on non-migrant households, respectively.

Per hectare operational cost of cultivation of modern

rice varieties was comparatively higher on non-migrant households (₹ 15 353) than migrant households (₹ 13 776).The higher operational cost on non-migrant households was only due to more use of human and machine labours in rice production. Ownership of tractor by 12.5% of non-migrant households was responsible for more use of agricultural machineries on these households. Migrant households used larger quantity of fertilizers due to increase in their liquidity through remittances but they used less labour in rice cultivation due to migration of active male members of the household. Despite less expenditure in rice cultivation, migrant households produced comparatively higher paddy per hectare (32.5 q) than paddy produced on non-migrant households (31.6 q). It might be due to comparatively high level adoption of improved technology (quality seeds and more fertilizers). As evident, per hectare net income (surplus over operational cost) in cultivation of modern rice was higher on migrant households (₹ 13 382) than in non-migrant households (₹ 11 033), indicating higher efficiency of migrant households in cultivation of modern rice varieties (Table 1).

To have precise information on input efficiency in cultivation of modern rice varieties on migrant and non-migrant households, non–linear model (Cobb-Douglas) was used. The values of R^2 are worked out to be 0.9130 and 0.8750 which indicate that the variables included in analysis explain 91.30% and 87.50% variations in output (Y) on migrant and non-migrant households, respectively. Regression Coefficient of land and capital are positive and statistically significant at one percent level of significance on both categories of households, indicating that the potential of these factors of production are still to be exploited on migrant and non-migrant households (Table 2).

On the other hand, regression coefficients of labour and irrigation are positive and statistically significant on migrant households but regression co-efficient of these two factors were negative on non-migrant households. Hence, it may be inferred that the migrant households have utilized human

Table 1 Per hectare operational costs and output of cultivation of modern rice varieties on migrant and non-migrant households (in rupees).

Particulars	Migrant households	Non-migrant households
Seeds	2 100	2 032
Labour	6 020	6 743
Manures, fertilizers and other agricultural chemicals	3 373	3 183
Machine	1 696	2 668
Bullock	210	150
Irrigation	377	577
Total operating cost	13 776	15 353
Paddy production (in quintal)	32.5	31.6
Value of main product	27 138	26 386
Net income*	13 362	11 033

*Value of main product *minus* operating cost

Table 2 Regression co-efficients of main factors of production in rice cultivation in Bihar, India.

Variable	Migrant households		Non-migrant households	
	Regression coefficient	Standard error	Regression coefficient	Standard error
Intercept	4.5716***	0.5943	5.5874***	0.7524
Land (ha.)	0.681***	0.0796	0.6436***	0.0950
Labor (prepays)	0.1177*	0.0706	–0.0264	0.0662
Capital (₹)	0.3531***	0.0797	0.3157***	0.0710
Bullock (₹)	0.0005	0.0045	0.0033	0.0054
Machinery (₹)	0.0042	0.0042	0.0075*	0.0044
Irrigation cost (₹)	0.0102**	0.0042	–0.0243	0.0092
Number of observations	136		183	
R^2	0.91		0.87	

***, **, * denote 1%, 5% and 10% level of significance.

labour and irrigation resources more judiciously than non-migrant households in rice cultivation. The observations suggest that the migration might have helped in judicious use of human labour at native place due to migration of surplus labour force for gainful employment to destination places. Migrant households were also found rational in use of irrigation resource since more than 90 per cent migrant households purchased irrigation water from fellow farmers at an exorbitant rate (₹ 60 to 80/hr). Moreover, the higher input efficiency of inputs in rice cultivation on migrant households has been attributed to modern agricultural technologies brought by migrant labours particularly improved seeds, transplanting technique (two to three rice seedlings *in situ*).

Remittances

Remittance is, no doubt, an important source of income on migrant households since it contributed 45% of total income of migrant households which was more than the income generated through crop production on these households (Table 3). It is worth pointing out that the annual average income of migrant households (₹ 41.15 thousand) was higher than the income of comparable non-migrant households (₹ 28.56 thousand) in study villages. Income through crop production constituted about 77% of total income on non-migrant households. Migrant households could not generate much income through livestock production because some of them sold their dairy animals after migration of active male member of the household. Off-farm employment also adversely affected due to migration of male member of households. Per migrant monthly remuneration/wage was worked out to be ₹ 4 539 but they sent monthly remittances of ₹ 1 790 to their native place which accounted to about 39% of their total earnings in a month.

An examination on the use of remittances in different activities which ultimately affects the livelihood of migrant households, revealed that a substantial amount of remittances

Table 3   Income through different sources on migrant and non-migrant households (in 000'₹).

Income source	Migrant households		Non-migrant households	
	Amount (in ₹)	% of total income	Amount (in ₹)	% of total income
Crop production	17.51	42.56	22.09	77.35
Livestock	0.82	1.99	1.68	5.88
Off-farm sources	2.34	5.69	2.32	8.12
Service	0.76	1.85	0.76	2.66
Remittances	18.33	44.54		
Rent of bullock and machine	1.39	3.37	1.71	5.99
Total income	41.15	100.00	28.56	100.00

were used for food (31%) (Table 4). In the study area, food security is threatened due to recurrent flood, small size of holdings and larger proportion of low land and deep water area which are responsible for low productivity of food grains. The second important item of expenditure was construction and repair of residential houses (17%). The area is flood prone and every flood year it is almost necessary to repair the house in the study villages. In case of surplus money over routine expenses, the construction, repair and modification of houses was the first priority, as maintaining a good house was considered status symbols in rural area.

About one-tenth of remittances were allocated on medicines, indicating poor health of family members of the migrant households since a large proportion of population is malnourished. A substantial proportion of remittances (9%) were allocated to clothing and dress materials. Allocation of remittances on education, medicines and clothing indicates that the migration is directly influencing the education level of children, health and standard of living in study villages. Despite the inadequate remittances, about one-fifth of remittances were either invested in long-term assets or saved for future to meet the uncertainties. Hence, they prefer to save for unforeseen requirements due to natural calamities, unemployment, and illness. Migration is

Table 4   Use of remittances for different purposes, Bihar, India

Allocation of remittances	Purpose of expenditure (in'000 ₹)	Percent to total remittances
Food	5.68	31
Education of children	0.73	4
Medicines	1.47	8
Social functions	1.10	6
Household construction/maintenance	3.12	17
Farm inputs	1.28	7
Clothing	1.65	9
Credit repayments	0.73	4
Savings and investment	2.57	14
Total	18.33	100

a part of risk coping strategy for the weaker sections of the society. Hence, it may be said that the migration might have developed the habit of savings on migrant households. There are evidences that migrant households of weaker sections invested their remittances on purchase of small piece of homestead land, livestock, and household durables. The remittances are also used for repayment of loan but the amount allocated for this purpose was small (8%). The migration through remittances was influencing positively the children education, food security, living conditions and standard of living in study villages.

Determinants of migration

Several theories have been propounded to explain the occurrence of migration. These are social, economic, spatial and demographic factors but it has been reported that male migration is mostly due to economic reasons followed by socio-political and other reasons (Kohli and Kothari 1998). For measuring the migration determinants, agro-ecological variable (ecosystem) and socio-economic variables (caste, size of land holding, size of family, number of dependents and education level) were taken as independent variables in the analysis. Caste, size of land holding, family size and number of dependents emerged as significant factors for migration of male members of households (Table 5).

The estimate of caste is negative but significant, indicating that the hierarchy of caste has negative impact on labour migration. The finding suggests that an increase in caste hierarchy (from lower to forward caste) may decline probability to migrate. Male members of lower caste were more prone to migration. The estimate of size of land holdings was positive and statistically significant, meaning thereby that an increase in size holding increase the probability to migrate. The general beliefs that the poor households are more prone to migrate does not hold true, particularly for the villages under study.

In recent years, it has been observed that the flow of migration from landowning households increased for non-farm activities in urban centers, whereas migration from labour households declined due to availability of manual

Table 5   Probit co-efficient and calculated *t*-value of different socio-economic factors determining migration.

Particulars	Estimate	Asymptotic 't' value
Intercept	0.5948	0.1232
Ecosystem (Rainfed-1, Partially irrigated-0)	−0.0831	0.5859
Caste (Forward-1, Otherwise-0)	0.2629**	0.0392
Size of land holding (hectare)	0.2005***	0.0001
Family size (Number of family member)	−0.1500***	0.0001
Number of dependents	0.2088*	0.0661
Education of head	0.0174	0.0340

***Significant at 1% level, **Significant at 5% level, *Significant at 10% level

work in different government programmes and construction work. The estimate of family size is negative and significant. It indicates that the incidence of migration is likely to decline with increase in family size because the family members can support each other emotionally and financially in larger family (joint family). The estimate of number of dependent is positive and statistically significant. It implies that the migration is likely to increase with increase in number of dependent per worker in household which may be termed as survival strategy. This may be due to the fact that size of family and number of dependents do not always vary in same direction. Two large size families with identical number of family members may have different number of dependents.

Study revealed that youngsters are more prone to migration moving to urban centers for non-farm activities. Migration helped in rational use of two critical inputs, i.e. labour and irrigation in rice production. Migration seems to have helped in judicious use of human labour at native place due to migration of surplus labour. However, potential of land and capital (seeds, fertilizers and agricultural chemicals) are still to be exploited on both categories of households. Remittances utilized for meeting the consumption needs, better education to children, improved housing and better health care facilities which helped in improving the livelihoods of migrant households. Migration inculcated saving habits amongst migrants and emerged as risk-coping strategy for weaker sections of society. Allocation of remittances on agricultural inputs could have increased if proper infrastructure facilities were made available in rural areas for faster dissemination of modern agricultural technology for increase production. Male member of lower caste having large land size and dependents is more prone to migration. The caste barriers to migration has weakened but it still persist in Bihar, however, size of farm is no more barriers for migration here. It may be due to the reason that size of land holding is a symbol of social status in rural Bihar and large land holders are not always engaged in wage employment while in Bihar, however, when they migrate they do take up wage employment as a means of income in the places of migration (Singh *et al.* 2012).

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