Labour out migration from rice based cropping system: A case of Bihar, India

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Abstract

Migration has been a recurrent phenomenon since the dawn of human history. Though its form has changed but it remains a dominant event in the global social system. In modern days also people migrate from underdeveloped areas to the developed ones in search of better opportunities. A number of social, cultural, economic, spatial, climatic, demographic factors induce migration, however, the economic factors are considered as the primary reasons for inducing migration. Migration of male labour force from Bihar has increased during last two decades. It was observed that the youngsters are more prone to migration and most of them are migrating to urban centers for non-farm work. Migration helped more rational use of two critical inputs, labour and irrigation in rice production on migrant households.

The migration seems to have helped in judicious use of human labour at native place due to migration of surplus labour force for gainful employment to destination of migration. Remittances have been utilized for meeting consumption needs, improved livelihood, better education to children and better health care facilities. Migrant households also preferred to save money to meet their requirements in unforeseen situations. It can thus be inferred that migration may be one of risk-coping strategies for the weaker sections of the society and has inculcated the saving habits among migrant households. The allocation of remittances on agricultural inputs could have increased if proper infrastructure facilities were present in rural areas for faster dissemination of modern agricultural technology for increasing agricultural production. Analysis of determinants of migration revealed that a male member of lower caste with larger size of land and larger number of dependents is more prone to migration in Bihar. The caste barrier for migration has weakened but still persists; however, size of farm is no more taboo for migration.

Key words: Migration, Rice production, Labor migration, Remittances, Bihar

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Introduction

Migration of population has been a recurrent phenomenon since the dawn of human history. Though its form has changed over time; it remains a dominant event in the global social system. Modern days also witness considerable migration of people from underdeveloped to the developed areas in search of better opportunities. Several theories have been propounded to explain the occurrence of migration. A number of social, cultural, economic, spatial, climatic, and demographic factors induce migration. Among them, the economic factors are considered as the primary reasons for inducing migration.

According to the two sectors growth model (Lewis, 1994), 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 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 (Bague, 1969).

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). It is rather a type of risk management, done in order to supplement income, through inter-sectoral movement, even in the absence of wage differentials.

The relationship between migration and technological change and production can be viewed in context of two conflicting hypotheses. The first being that out-migration stimulates development of the origin area through remittances and by inducing technological changes which ultimately results in higher output and income in the area. Another hypothesis on the contrary, states that it leads to labour shortages and decline in the average quality of labour which adversely affects output and productivity in native place. Research on migration becomes of utmost priority as its impact both to place of origin and destination has been undermined. The migration from an underdeveloped state like Bihar has increased tremendously in recent years, which are supposed to have far reaching implications on social and economic dimensions of the state. There is dearth of studies which examine labour migration to agriculture sector from place of origin angle. There are far reaching consequences of migration of male labour force on their place of origin. Keeping in view the anticipated consequences of migration in place of origin, this study has been undertaken to examine the extent/incidence of migration, impact of male labour out-migration on rice productivity, and livelihood. An attempt has also been made to identify determinants of labour out migration from Bihar

Data and Methodology

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 districts) 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 2010-11 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 and outputs and other characteristics of these plots. In the present study, we restrict our unit of analysis 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 following form of function:

$$lnY = \alpha + \beta_1 lnX_1 + \beta_2 lnX_2 + \beta_3 lnX_3 + \beta_4 lnX_4 + \beta_5 lnX_5 + \beta_6 lnX_6 + U$$

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 USD (for seeds, fertilizer and pesticides)

X_4 = Cost of bullock labour in USD (owned and hired)

X_5 = Expenses on use of machineries in rice production in USD (owned +hired)

X_6 = Irrigation cost in USD (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 is used to find out determinants of migration. Probit model analyses qualitative (dichotomous or polytomous) dependent variables within the regression framework. Many response variables are binary by nature (yes/no) while others are measured ordinally rather

than continuously. The following is the specification of independent and dependent variables used in the model:

$$Y = \beta X_i + e$$

Where,Y= Probability of being migrant household (1 for migrant and 0 for non migrant) and β is 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 in hectare

X_4 = Family size (Number)

X_5 = Number of dependents

X_6 = Education of head (Score)

Results and Discussion

Migration Pattern

In Bihar, migration is an old phenomenon but destination of migration was mainly to tea garden of Assam and industrial areas of West Bengal during pre-green revolution period. The rate of labour out migration increased and pattern also changed (Choudhary, 1998 and Singh et al. 2012). The incidence of migration was 20 per cent in surveyed villages however youngsters constituted 68 per cent 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 per cent of migrants of villages under study migrated to urban centers and 54 per cent of them migrated for long period (more than a year).

Rural to rural migration is still prevalent in Bihar. In villages under study, 28 per cent 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%) and 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 per cent 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 percent 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

Agriculture was the main occupation of migrant households since more than 80 percent of their working adults were engaged in agricultural activities. Keeping in view the importance of agriculture, the present study examines the impact of migration on input use, employment, productivity and input efficiency in rice cultivation which was principal crop in all the sample households under study. Analysis has been done for migrant and non-migrant households separately. Rice covers 46 per cent and 43 per cent 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 per cent on migrant and 58 per cent on non-migrant households.

An attempt has been made to examine the cost incurred and production of modern varieties of rice on migrant and non-migrant households. In the input–output analysis, only operational cost and main product of rice were considered for comparison of economics of rice production on both categories of households under study. About 69 per cent of migrant households and 93 percent of non-migrant households cultivated modern rice varieties which were grown on average area of 0.43 hectare on migrant and 0.57 hectare on non-migrant households.

Per hectare operational cost of cultivation of modern rice varieties was comparatively high on non-migrant households (256 $) than migrant households (230 $). 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 per cent 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 large quantum of per hectare paddy (32.5 quintals) than paddy produced on non-migrant households (31.6 quintals). It might be due to comparatively high level of adoption of improved technology (better seeds and more fertilizers). As evident, per hectare net income (surplus over operational cost) in cultivation of modern rice was higher on migrant households (223 $) than in non-migrant households (184 $), 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 labour and irrigation resources more judiciously than non-migrant households in rice cultivation. The observation suggests that the migration might have helped 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 percent migrant households purchased irrigation water from fellow farmers at an exorbitant rate ($ 1.0 to 1.5/ hr). Moreover, the higher input efficiency of inputs in rice cultivation on migrant households has been attributed to modern agricultural technologies also which were brought by migrant labours particularly improved seeds of rice, 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 percent 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 households of migrant households (686 $) was higher than the income of comparable non migrant households (476 $) in study villages. Income through crop production constituted about 77 per cent 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 household. Off-farm employment also adversely affected due to migration of male member of households. Per migrant monthly remuneration/wage is worked out to be 76 $ but they sent monthly remittances of 30 $ to their native place which accounted to about 39 per cent 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 (31%) are used for food (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%). It was expected also because 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 is the first priority, because maintaining a good house is one of status symbols in rural area. Moreover, the residential facility is much poor in study villages and it seems to be a necessity to have good residential facility in these villages.

Remittances was also utilized on education of children and about one-tenth of remittances was allocated on medicines, indicating poor health of family members of the migrant households since a large proportion of population is malnourished in study villages. 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 to meet their requirements in unforeseen situation arises due to natural calamities, unemployment, and illness. Hence, migration is 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 is 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). An attempt has been made to find out determinants of male migration in context of Bihar. 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 out migration of male members of households under study (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. Hence, male member of lower caste is more prone to migration. The estimate of size of land holdings is positive and statistically significant, meaning thereby that an increase in size land holding of households may 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 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.

Conclusions

Migration of male labour force from Bihar has increased during last two decades which prompted us to analyze its consequences on efficiency of input in agricultural production, livelihood through remittances and also the determinants of migration. It was observed that the youngsters are more prone to migration and most of them are migrating to urban centers for non-

farm work. Migration helped more rational use of two critical inputs (labour and irrigation) in rice production on migrant households in Bihar.

The migration seems to have helped in judicious use of human labour at native place due to migration of surplus labour force for gainful employment to destination place. However, potential of land and capital (seeds, fertilizers and agricultural chemicals) are still underexploited on both categories of households under study. Remittances have been utilized for meeting consumption needs, better education to children, improved housing and better health care facilities which must have helped in improving the livelihood on migrant households in Bihar. Migrant households also preferred to save money to meet their requirements in unforeseen situations. Thus, migration inculcated saving habits among migrant households and emerged as risk-coping strategy for the weaker sections of the 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 enhancing agricultural production.

Analysis of determinants of migration leads to conclusion that a male member of lower caste with larger size of land and larger number of dependents is more prone to migration in Bihar. The caste barrier for migration has weakened but still persist however size of farm is no more taboo for migration from Bihar.

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Table 1: Per hectare various operational costs and output of cultivation of modern rice varieties on migrant and non migrant households

(in $)

Particulars	Migrant households	Non migrant households
Seeds	35.0	33.9
Labour	100.3	112.4
Manures, fertilizers and other agril. chemicals	56.2	53.1
Machine	28.3	44.5
Bullock	3.5	2.5
Irrigation	6.3	9.6
Total operating cost	229.6	255.9
Paddy production(in quintal)	0.5	0.5
Value of main product	452.3	439.8
Net income*	222.7	183.9

*Value of main product *minus* Operating cost

Table 2: Regression coefficients of main factors of production in Rice cultivation in Bihar, India

	Migrant households		Non-migrant households	
Variable	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 (Rs.)	0.3531***	0.0797	0.3157***	0.0710
Bullock (Rs.)	0.0005	0.0045	0.0033	0.0054
Machinery (Rs.)	0.0042	0.0042	0.0075*	0.0044
Irrigation cost (Rs.)	0.0102**	0.0042	- 0.0243	0.0092
Number of observations	136		183	
R^2	0.91		0.87	

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

Table 3: Income through different sources on migrant and non-migrant households

Income source	Migrant households		Non migrant households	
	Amount (in $)	% of total income	Amount (in $)	% of total income
Crop production	291.8	42.56	368.2	77.35
Livestock	13.7	1.99	28.0	5.88
Off- farm sources	39.0	5.69	38.7	8.12
Service	12.7	1.85	12.7	2.66
Remittances	305.5	44.54	Nil	Nil
Rent of bullock and machine	23.2	3.37	28.5	5.99
Total income	685.8	100.00	476.0	100.00

Table 4: Use of Remittances for different purposes, Bihar, India

Allocation of remittances	Purpose of expenditure (in $)	Percent to total remittances
Food	94.7	31
Education of children	12.2	4
Medicines	24.5	8
Social functions	18.3	6
Household construction/ maintenance	52.0	17
Farm inputs	21.3	7
Clothing	27.5	9
Credit repayments	12.2	4
Savings and investment	42.8	14
Total	305.5	100

Table 5: Probit coefficient and calculated t-value of different socio-economic factors determining migration from study villages

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