

Rural Employment Diversification in India: Trends, Determinants and Implications on Poverty

Anjani Kumar^{a1}, Sant Kumar^a, Dhiraj K. Singh^b and Shivjee

^aNational Centre for Agricultural Economics and Policy Research (NCAP), Pusa, New Delhi-110 012

^bInternational Livestock Research Institute (ILRI), NASC Complex, Pusa, New Delhi-110 012

Abstract

This paper has studied rural employment diversification in India and across major states using NSSO data at household level for the period 1983 and 2009-10. Factors affecting rural employment diversification towards non-farm sector have also been studied. Analysis has shown that the non-farm sector has consistently grown over time and employed nearly one-third of the rural workforce in 2009-10, as compared to merely one-fifth in 1983 at all-India level. The similar trend is seen across major states as well, though the pace and pattern varied widely. In providing employment to rural workforce, increasing dominance of crop production, followed by animal husbandry was observed across major states during 2009-10. The share of fishery and forestry was negligible in providing employment to the rural workforce. The study has revealed that the increasing rural non-farm employment has positive and significant effect on reducing rural poverty at all-India level. A positive link between income and employment has also been observed in diversifying towards horticultural activities. A well designed area-specific programme should be evolved to help improve skill of rural workforce, which in turn would benefit in getting employment in the non-farm sector.

Key words: Rural employment, Employment diversification, Crop sector

JEL Classification: J21, J23, O15, O18.

Introduction

One of the major failures of economic development in post-Independent India remained its inability to significantly reduce the dependence of workforce on agriculture. While the share of gross domestic product (GDP) originating from agriculture has gone down from over 50 per cent at the time of Independence to nearly 14 per cent currently, the share of workforce engaged in agriculture, which was about 70 per cent in 1951, still remains at over 50 per cent. This has led to widening of gap between incomes in agricultural and non-agricultural sectors, which is perceived to be one of the major reasons for persistence of poverty in the country. The gap between the number of new rural workers and the number of new job opportunities created in agriculture is enlarging. Therefore, the rural

employment diversification towards non-agricultural sector has gained critical importance over time. The Government of India is deeply concerned with the widespread poverty and unemployment in the rural areas and has taken several initiatives including the implementation of Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS). The rural sector in India is undergoing a transformation and the contribution of rural non-farm sector to the rural income and employment is growing. Several studies on rural employment diversification in India (Kumar, 2009; Mukhopadhyay and Rajaraman, 2007; Chadha and Sahu, 2002; Visaria, 1995; Basant and Kumar, 1989) have concluded that the share of non-farm sector in rural employment has significantly grown over time and the capacity of the farm sector to absorb additional labour force has almost reached a plateau. On the other hand, some scholars argue that with the implementation of large-scale employment programmes even the

* Author for correspondence,
Email: anjani@ncap.res.in

agricultural sector is facing scarcity of farm-labour. It is with this background that this paper has studied the trends and patterns of rural employment diversification, alongwith the implications of growing rural non-farm sector on rural poverty. It has also examined the factors affecting rural employment diversification towards non-farm sector and the role of high-value horticultural activities in it.

Methodology and Data

Employment diversification is the shifting of workforce from one sector to the other for employment. The proportions of this workforce engaged in different sectors of the economy constitute the structure of employment. The present study has measured the extent of rural employment diversification at different levels. At the first level, it has been measured in terms of shifting of workforce to the non-farm sector. At the second level, proportions of shifting of workforce to different sub-sector of agriculture have been measured and finally, estimation has been made of shifting of workforce within the crop sub-sector. The crop sub-sector has been sub-divided into (i) foodgrains (cereals and pulses), (ii) horticulture, (iii) cash crops, and (iv) agricultural services.

The pace and pattern of rural employment diversification has been studied at all-India level and across major states for the period 1983 to 2009-10. To analyze the determinants of employment diversification towards non-farm sector and horticultural crops, and to attribute weights to these determinants, a multinomial logit model was applied. Multinomial logit models have been used in the case of a dependent variable with more than two categories (Jobson, 1992; Lesschen *et al.*, 2005; Kumar *et al.*, 2007). This type of regression is similar to logistic regression, but is more general because the dependent variable is not restricted to two categories. Each category is compared to a reference category. The household level data from the 66th Round, *Employment and Unemployment Survey*, conducted by the National Sample Survey Organization (NSSO), Ministry of Statistics and Programme Implementation, Government of India, were used in the estimation of multinomial logit model. The factors that were supposed to influence the choice of employment included age, sex, education, household size, operational landholding, caste, etc. The multinomial logistic regression functions can be expressed as per Equation (1):

$$P(Y_i = j) = \frac{e^{\beta_j X_i}}{\sum_{k=0}^2 e^{\beta_k X_i}}, \quad j = 0, 1, 2 \quad \dots(1)$$

where, Y_i represents the probability that the persons are engaged in the non-farm/ horticultural activities, X_i denote the vector of explanatory variables and β_s are the regression coefficients estimated by the maximum likelihood method. The specification and measurement of these explanatory variables have been explained in the section on results and discussion.

The interpretation of coefficients is less straightforward in the logit than OLS model. Usually, a positive coefficient for an independent variable increases the probability of a household being upwardly mobile. However, the marginal effects of the explanatory variables on the probabilities are not equal to the coefficients. Further calculations were required to estimate the marginal effects of each explanatory variable. The marginal effect of a variable was computed by using Equation (2):

$$\delta p(y) / \delta X_i = \beta X_i * \exp [Z] / [1+\exp(z)]^2 \quad \dots(2)$$

where, Z was the sum of coefficients multiplied by the means of the respective variables plus the constant-term.

Further, the impact of non-farm sector in rural poverty was examined by using the log-linear regression model. The log linear model was chosen based on the significance of the regression coefficients and goodness of fit. The regression model used is given in Equation (3):

$$\ln R_p = \alpha + \beta \ln X_i + \varepsilon_i \quad \dots(3)$$

where, R_p is the rural poverty in percentage, X_i s are the explanatory variables which include total factor productivity, share in non-farm employment (%), share of non-agricultural sector in national income (%), rural wages (₹/day) and rural literacy (%), α is a constant term and ε_i is the error-term.

Data

Different rounds of surveys conducted by the National Sample Survey Organization (NSSO) on employment /unemployment constituted the database of this study. The data were taken mainly from the four quinquennial rounds of the NSSO, pertaining to the years 1983 (38th round), 1993-94 (50th round), 2004-

05 (61st round), and 2009-10 (66th round). However, instead of culling information from the published NSSO reports, the unit level data were extracted from the CD of NSSO. The analysis at the unit level was particularly important because the employment estimates at more than one digit level of the NIC classification of industries were not available in the published reports. To estimate employment across the sub-sectors of agriculture and different components of crop sub-sector, NIC classification has been used. For making a comparison of the proportion of sectoral employment across different time periods, viz. 1983, 1993-94, 2004-05 and 2009-10, the concordance design of the NIC classifications¹, as developed by the Central Statistical Organization (CSO), was followed. However, within the crop sub-sector, some adjustments were made with the CSO-designed concordance² to compare the selected four sub-groups across the selected years.

Results and Discussion

Rural Transformation in India: Accelerating albeit Slow

In India, rural employment has undergone significant changes during the past two and half decades. The share of agriculture in the labour force remained stagnant for a long time, but started declining in mid-1970s and has been declining since then. On the other hand, the share of rural non-farm sector has been increasing, and it now employs nearly one-third of India's rural workforce (Table 1), which amounts engaging of about 110 million rural people in the non-farm activities. Table 1, incorporating National Sample Survey (NSS) data from the 38th, 50th, 61st and 66th rounds, provides a snap shot of the growing importance of non-farm sector in rural employment. At the all-India level, the share of non-farm sector in total workforce has increased consistently over time, from 19 per cent in 1983 to 22 per cent in 1993-94, to about

27 per cent in 2004-05 and further to 32 per cent in 2009-10.

A perusal of Table 1 reveals that the non-farm sector has emerged as the sole source of additional employment opportunities in the rural areas. Between 1983 and 1993-94, of the nearly 47 million additional rural jobs created, the majority (6 out of every 10) were in the farm sector. But, this trend was reversed subsequently. Between 1993-94 and 2004-05, the growth in non-farm employment surpassed agriculture when about 50 million new job opportunities were created in rural areas and 6 out of every 10 new jobs were in the non-farm sector. But in recent years, between 2004-05 and 2009-10, though the total rural employment has declined by 5 million, about 13 million additional rural jobs were created in the non-farm sector (Figure 1).

In fact during this period, workforce of nearly 20 million rural people departed the farm sector. The decline in job opportunities in the farm sector may be attributed to several factors including the implementation of schemes like MGNREGS. The decline in the farm employment was likely to be, at least partly, driven by distress in the agricultural sector which prompted households to seek employment more actively in the non-farm sector.

The share of non-farm sector in providing employment has been growing across all the states. But, the pace and pattern of rural non-farm employment did exhibit stark regional variations. In 1983, the share of non-farm sector in rural employment varied from 7 per cent in Chhattisgarh to 37 per cent in Kerala. In 1983, the states where more than 20 per cent of the rural workforce was employed in the non-farm sector included West Bengal (26.4%), Tamil Nadu (25.6%), Haryana (23.1%), Assam (21%), Odisha (20.9%), Jammu & Kashmir (20.3%) and Andhra Pradesh (20.0%). In remaining of the states, the share of non-farm sector in rural employment was less than 20 per cent in 1983. The share of non-farm sector in rural employment increased in all the states over time. In 2009-10, about 64 per cent of the rural workforce in Kerala was engaged in the non-farm sector. Also, in majority of states, non-farm sector employed more than one-third of the total rural workforce. It is clear that the process of structural transformation of the rural workforce that was steadily tilting in favour of non-farm is still continuing. Structural transformation of

¹ Concordance Table II of the NIC -1998 suggests the method for concordance between 2-digit level of NIC-87 and appropriate level of NIC-98 (for converting NIC-98 based data in terms of NIC-87).

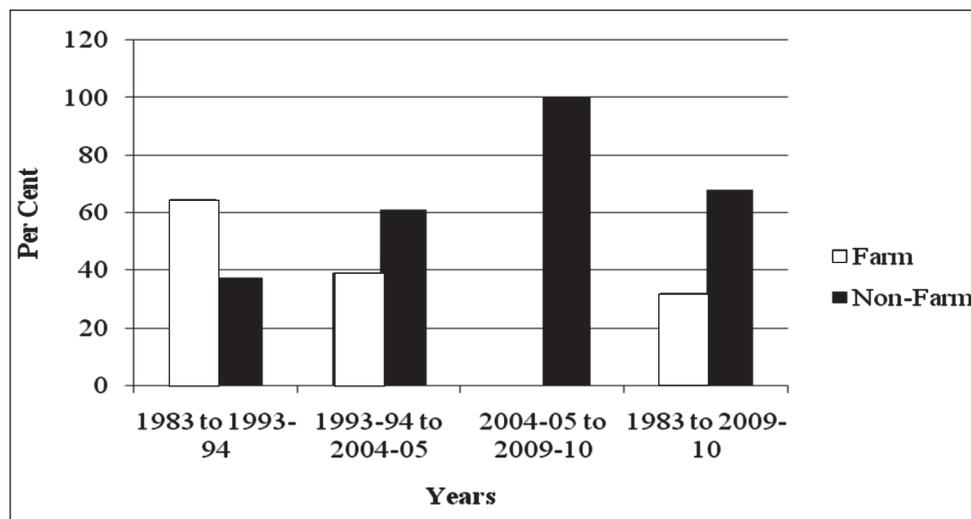
² For comparing the sectoral employment within the crop production sector, we required concordance between 4-digit level of NIC-98 and 3-digit level of NIC-87 (for converting NIC-87 based data in terms of NIC-98), the methods are outlined in E-1 concordance Table of NIC-1998.

Table 1. State-wise share of non-farm sector in rural employment

(per cent)

State	1983	1993-94	2004-05	2009-10	CAGR(%)		
					1983 to 1993-94	1993-94 to 2009-10	1983 to 2009-10
Andhra Pradesh	20.0	22.7	28.3	31.3	2.5	2.8	2.7
Assam	21.0	21.3	25.8	29.5	6.3	3.2	4.4
Bihar	15.6	16.9	22.1	33.1	0.2	7.1	4.4
Chhattisgarh	7.0	9.4	13.9	15.1	4.9	3.6	4.1
Gujarat	15.2	20.7	22.8	21.7	6.0	0.9	2.8
Haryana	23.1	28.6	36.0	40.2	0.6	3.9	2.6
Himachal Pradesh	12.9	22.8	30.6	37.1	8.0	4.8	6.0
Jammu & Kashmir	20.3	28.0	36.2	40.3	-5.6	10.6	4.1
Jharkhand	18.6	23.9	30.1	45.2	0.2	5.9	3.7
Karnataka	15.7	18.3	19.1	24.3	4.2	1.9	2.8
Kerala	37.2	42.3	58.0	64.3	1.3	3.9	2.9
Madhya Pradesh	11.0	13.8	17.5	17.6	2.0	4.6	3.6
Maharashtra	14.3	20.3	20.1	20.6	4.0	1.8	2.7
Odisha	20.9	21.9	31.0	32.4	1.6	3.5	2.8
Punjab	17.8	22.7	33.2	38.2	3.2	3.3	3.3
Rajasthan	13.5	19.2	27.2	36.7	5.8	5.6	5.7
Tamil Nadu	25.6	31.3	34.7	36.3	3.8	0.5	1.7
Uttar Pradesh	17.9	20.7	27.4	33.1	3.1	4.2	3.8
Uttarakhand	18.1	34.9	21.8	30.5	1.1	5.4	3.7
West Bengal	26.4	26.9	37.3	43.7	5.5	2.0	3.4
All-India	18.6	21.7	27.4	32.1	3.4	3.2	3.4

Source: Authors' estimates based on NSSO unit level data (38th, 50th, 61st and 66th rounds)

**Figure 1. Sources of new jobs in rural India: 1983 to 2009-10**

Source: Authors' estimates based on NSSO unit level data (38th, 50th, 61st and 66th rounds)

Table 2. Trends and patterns of rural employment in agriculture sector, 1983 to 2009-10

Period	Crops	(per cent)		
		Animal husbandry	Forestry	Fishery
1983	88.8	10.4	0.4	0.4
1993-94	92.2	6.8	0.4	0.6
2004-05	90.3	8.7	0.5	0.5
2009-10	93.2	6.1	0.2	0.5

Source: Authors' estimates based on NSSO unit level data (38th, 50th, 61st and 66th rounds)

employment in rural areas was not visible only in a few states like Chhattisgarh (15.1%), Gujarat (21.7%), Karnataka (24.3%), Madhya Pradesh (17.6%) and Maharashtra (20.6%). Besides Kerala, the non-farm sector contributed about two-fifths to the rural employment in West Bengal (43.7%), Jharkhand (45.2%), Jammu & Kashmir (40.3%), Haryana (40.2%), Punjab (38.2%), Rajasthan (36.2%), Tamil Nadu (36.3%), and Himachal Pradesh (37.1%).

Employment Diversification within Agriculture Sector

A glimpse of shift in employment within the agriculture sector during the past 25 years (1983 to 2009-10) at all-India level can be obtained from Table 2. The dependence on crop production not only continued but even accentuated during this period. At all-India level, 89 per cent of the agricultural workers were concentrated in crop production in 1983, which increased to 93 per cent in 2009-10. The animal husbandry sector employed 10.4 per cent of the agricultural workers in 1983, but its share in rural employment declined to 6.1 per cent in 2009-10, despite its higher growth in value of output. Forestry and fishery continued to account for engaging negligible proportions in rural workforce.

The pattern of employment diversification within agriculture sector has depicted a similar trend across different states of India. In 1983, in all major states, except for Jammu & Kashmir, Kerala, and Punjab, agricultural employment was heavily concentrated in the crop sector, ranging from 81 per cent in Rajasthan to 98.8 per cent in Chhattisgarh. In fact, inasmuch as 11 of the 20 states being studied, employment in crop production accounted for more than 90 per cent share.

The overall employment scenario did not change much and the excessive dependence on crop production continued across states even in 2009-10. Yet, considerable restructuring of agricultural employment was visible in a number of states. For instance, during the period 1983 to 2009-10, Haryana has depicted a remarkable increase (from 17.7% to 28.6%) and Gujarat a small increase (from 8.9% to 10.5%) in employment in the animal husbandry sub-sector (Table 3). On the other side, Andhra Pradesh, Karnataka, Kerala, Tamil Nadu and West Bengal have depicted a significant decline in employment in animal husbandry during this period. In fact, most states have shown a decline in employment in animal husbandry during this period.

The contribution of forestry and fishery sub-sectors to employment in agriculture sector continued to be small; even this small has become smaller in most of the states. The states which have depicted a rise in employment are Kerala, Andhra Pradesh, West Bengal, Tamil Nadu and Karnataka in the fishery sector and Kerala and Uttarakhand in the forestry sub-sector. To sum-up, the overbearing importance of the crop sub-sector continued in the agriculture.

Diversification within Crop Sub-sector

The breakup of NSSO employment data at three and four digit levels helped in understanding the pattern of employment within the crop sub-sector. The scenario of employment within the crop sub-sector has been depicted in Table 4. In 1983, foodgrains had accounted for 93.7 per cent of employment in the crop sub-sector, which got reduced to 84.3 per cent by 2004-05. But after 2004-05, the trend of decline was reversed and the share of foodgrains in crop sub-sector employment increased to 86.2 per cent in 2009-10. The cash crops accounted for only 4.3 per cent of the crop sector employment in 1983. Between 1983 and 1993-94, its share increased slightly to 5.1 per cent. But during the next decade (1993-94 to 2004-05), the share of cash crops increased substantially and rose to 11.1 per cent. After 2004-05, a slight decline was observed in its share in the crop sector employment. The horticulture sub-sector has emerged as one of the growth engines of Indian agriculture. However, the share of horticulture in crop sector employment did not witness increase as witnessed in its share in the agricultural income. The share of horticulture in crop sector employment was

Table 3. Trends and pattern of rural employment within agriculture sector across states: 1983-2009-10

(per cent)

State	1983				2009-10			
	Crops	Animal husbandry	Forestry	Fishery	Crops	Animal husbandry	Forestry	Fishery
Andhra Pradesh	90.9	8.1	0.3	0.7	94.3	4.5	0.0	1.2
Assam	97.6	1.3	0.3	0.8	97.8	1.3	0.0	0.9
Bihar	93.2	6.4	0.1	0.2	98.4	1.5	0.1	0.0
Chhattisgarh	98.8	0.7	0.4	0.1	99.7	0.2	0.2	0.0
Gujarat	90.4	8.9	0.4	0.3	89.0	10.5	0.1	0.4
Haryana	82.3	17.7	0.0	0.0	71.4	28.6	0.1	0.0
Himachal Pradesh	91.7	8.2	0.1	0.0	91.5	8.0	0.3	0.1
Jammu & Kashmir	71.8	26.8	1.1	0.3	74.4	24.8	0.7	0.1
Jharkhand	94.6	3.8	1.5	0.2	96.7	2.0	0.2	1.1
Karnataka	88.4	11.4	0.2	0.0	96.2	2.8	0.0	0.9
Kerala	74.4	22.7	0.6	2.3	77.8	16.9	1.9	3.4
Madhya Pradesh	96.6	2.8	0.6	0.1	99.2	0.5	0.1	0.1
Maharashtra	92.6	6.3	0.3	0.7	96.2	3.4	0.1	0.3
Odisha	95.0	2.2	1.1	1.6	96.3	2.8	0.8	0.1
Punjab	58.2	41.8	0.0	0.0	59.6	40.1	0.3	0.0
Rajasthan	81.3	18.4	0.3	0.0	87.1	12.8	0.0	0.0
Tamil Nadu	87.7	11.0	0.7	0.6	92.7	4.9	1.3	1.0
Uttar Pradesh	88.1	11.7	0.1	0.1	92.0	7.9	0.1	0.0
Uttarakhand	91.4	8.6	0.0	0.0	93.8	5.3	0.9	0.0
West Bengal	83.7	14.7	0.6	1.0	95.2	2.4	0.2	2.2

Source: Authors' estimates based on NSSO unit level data (38th and 66th rounds)

1.9 per cent and it continued to remain at that level till 1993-94. In 2004-05, the share of horticulture in crop sub-sector employment increased to 4.1 per cent, but in the subsequent period of 2004-05 to 2009-10, it declined slightly to 3.5 per cent.

The state level data have been more revealing and the engagement of agricultural workers in foodgrains production, by and large, declined in all the states, except in Assam and West Bengal between 1983 and 2009-10 (Table 5). However, the magnitude of percentage

decline depicted a contrasting picture across states. The decline in agricultural workers engaged in foodgrains production activities was noticeable in Andhra Pradesh (16.4%), Chhattisgarh (21.2%), Haryana (26.7%), Himachal Pradesh (22.1%) and Kerala (18.4%). The share of cash crops in providing employment to agricultural workers increased significantly in Andhra Pradesh (12%), Gujarat (17%), Kerala (28%) and Maharashtra (17%). The increase in the share of horticulture in agricultural labour

Table 4. Pattern of employment diversification within crop sub-sector

(per cent)

Period	Cereals & pulses	Cash crops	Horticulture	Agricultural services
1983	93.7	4.3	1.9	0.1
1993-94	92.2	5.1	1.9	0.8
2004-05	84.3	11.1	4.1	0.5
2009-10	86.2	9.8	3.5	0.5

Source: Authors' estimates based on NSSO unit level data (38th, 50th, 61st and 66th rounds)

Table 5. State-wise pattern of employment diversification within crop sector

(per cent)

State	1983				2009-10			
	Cereals and pulses	Cash crops	Horticulture	Agricultural services	Cereals and pulses	Cash crops	Horticulture	Agricultural services
Andhra Pradesh	92.0	6.1	1.6	0.3	75.6	18.1	5.9	0.4
Assam	81.6	16.4	2.0	0.0	88.6	9.6	1.7	0.1
Bihar	99.8	0.2	0.0	0.0	98.7	0.0	0.4	1.0
Chhattisgarh	99.8	0.1	0.1	0.0	99.9	0.0	0.0	0.1
Gujarat	82.8	16.6	0.6	0.1	61.6	33.4	1.4	3.6
Haryana	99.8	0.1	0.0	0.1	95.5	2.9	1.1	0.5
Himachal Pradesh	98.6	0.4	0.9	0.0	71.9	0.0	28.0	0.1
Jammu & Kashmir	99.2	0.1	0.4	0.3	77.1	0.3	22.5	0.1
Jharkhand	99.7	0.1	0.1	0.1	96.9	0.0	2.3	0.8
Karnataka	92.4	5.4	2.0	0.2	82.6	8.5	8.9	0.1
Kerala	34.0	15.5	50.2	0.2	15.6	43.2	40.7	0.5
Madhya Pradesh	99.2	0.4	0.3	0.0	90.3	9.2	0.3	0.2
Maharashtra	87.2	11.3	1.3	0.2	68.2	28.2	3.5	0.0
Odisha	99.8	0.1	0.0	0.0	99.3	0.1	0.6	0.0
Punjab	99.6	0.3	0.0	0.1	98.0	0.9	0.9	0.3
Rajasthan	99.7	0.1	0.2	0.0	98.7	1.0	0.1	0.2
Tamil Nadu	96.5	1.8	1.5	0.1	87.3	4.1	6.4	2.2
Uttar Pradesh	96.8	2.5	0.6	0.0	95.5	3.8	0.6	0.1
Uttarakhand	99.9	0.1	0.0	0.0	96.7	1.1	2.1	0.1
West Bengal	94.5	3.6	1.7	0.1	94.8	2.2	2.9	0.1

Source: Authors' estimates based on NSSO unit level data (38th and 66th rounds)

employment was more visible in Himachal Pradesh (27%) and Jammu & Kashmir (22%). The increase in the share of agricultural labour services was visible only in Gujarat (3.5%) and Tamil Nadu (2.1%).

Impact of Non-farm Sector on Poverty

The association of poverty with agricultural and non-agricultural output growths and agricultural wages has been documented widely in the literature (Himanshu, 2005 and 2008; Singh, 1990; Lanjouw and Stern, 1998; Sharma, 2001; Sundaram, 2001). Some studies have also argued that growth in the non-farm sector was the key factor behind the decline in poverty during the 1990s. Foster and Rosenzweig (2004) have argued that non-farm expansion has not only been the prime driver of rural incomes, but its growth has also been especially pro-poor. The historical evidence also suggests that rural poverty reduction has been closely associated with agricultural growth.

In past one and a half decade (1993-94 and 2009-10), real agricultural wages grew at the rate of 2.9 per cent per year. The rate of growth was higher during 2004-05 to 2009-10 than in 1993-94 to 2004-05 (Table 6). The rate of rural poverty reduction declined along with agricultural wage growth and agricultural GDP. The decline of rural poverty has remarkably been consistent over the past one and a half decade at an average rate of about 2.5 per cent per year.

Different sets of determinants have emerged during different periods to influence poverty. While numerous variables could influence rural poverty directly or indirectly, AgNSDP per capita of rural person, rural literacy, real rural wages, non-farm sector employment, and commercialization of economy, have been included to understand the determinants for rural poverty reduction in the analysis undertaken in this paper.

Table 6. Trends in rural poverty, GDP and agricultural wages

Period	(per cent)				
	Rural poverty	Agricultural wages	Non-farm employment	GDP	AgGDP
1993-94 to 2004-05	-1.3	2.6	3.6	5.9	2.3
2004-05 to 2009-10	-5.0	3.4	2.8	8.9	3.9
1993-94 to 2009-10	-2.5	2.9	3.4	6.6	2.6

Source: Authors' estimates based on NSSO unit level data (50th, 61st and 66th rounds)

Finally, the log-linear regression models were chosen based on the overall significance of the regression equation (F-statistics and R²), and the stability and significance of the coefficients of the explanatory variables (Tables 7 and 8). At the national level, TFP growth, non-farm employment, commercialization of economy, rural wages and rural literacy turned out to be significant determinants of rural poverty reduction. Based on pooled cross-sectional and time-series data at state level, AgNSDP per person, rural wages and rural literacy have emerged as the significant determinants of rural poverty reduction.

All the included variables are significant and have the expected plausible signs. The significant negative coefficient of AgNSDP per capita suggests that the improvement in agricultural performance has been associated with substantial reduction in rural poverty, indicating that the benefits of growth in agriculture have trickled down to the rural poor and the growth has been inclusive. Agricultural productivity, an indicator of real agricultural growth, has played an important role in poverty reduction in the rural areas, as indicated by its higher elasticity for poverty reduction. With one per

cent growth in per capita agricultural output, the poverty would be reduced by 0.97 per cent. The agricultural growth can be achieved through strategic and accelerated public investment in infrastructure and education (Kumar *et al.*, 2004). However, agricultural growth alone will not be sufficient to substantially reduce the incidence of poverty particularly among the landless households. Diversification towards rural non-farm sector is critical to reduce poverty in India. With one per cent increase in the share of rural non-farm employment (RNFE), the rural poverty would be reduced by 0.5 per cent. The significant poverty reduction in China was achieved through the method of increasing RNFE opportunities.

The share of non-farm sector in the economy also plays a significant role in rural poverty reduction. This indicates the complementary roles of agriculture and non-agriculture sectors to significantly reduce rural poverty in India and efforts should be made to improve the rural-urban linkages. The wages constitute a major component of household income for the majority of rural households and therefore improvement in wages

Table 7. Determinants of rural poverty based on time series data at all-India

Exploratory variables	Dependent variable: Rural poverty (%)	
	Coefficient	Standard error
Total factor productivity (TFP)	-0.1452**	0.0526
Non-farm employment	-0.5105*	0.1610
Commercialization of economy	-0.4149*	0.1590
Rural wages	-0.6282 *	0.2204
Rural literacy	-0.6215 *	0.0823
Constant	0.2100	0.0117
R ²	0.9898	

Note: * and ** denote significance at 1 per cent and 5 per cent levels, respectively.

Source: Authors' estimates based on data from NSSO and CSO, GoI

Table 8. Determinants of rural employment diversification towards non-farm and horticultural sectors in India

Variable	Multinomial coefficients		Marginal effects	
	Coefficients	Standard error	dy/dx	Standard error
Non-farm sector				
Sex of household-head (male=1, otherwise=0)	0.0338	0.0581	0.0075	0.0122
Age of household-head (years)	-0.0026*	0.0014	-0.0007**	0.0003
Education of household-head (years)	0.1084***	0.0043	0.0227***	0.0009
Technical education of household-head (yes=1, otherwise=0)	1.6391***	0.3673	0.3825***	0.0749
Household size (15-59 years)	0.0971***	0.0126	0.0214***	0.0027
Landholding (ha)	-1.1356***	0.0444	-0.2417***	0.0082
Caste dummy				
SC=1, otherwise=0	0.5676***	0.0613	0.1279***	0.0143
OBC=1, otherwise=0	0.5728***	0.0560	0.1226***	0.0122
Others=1, otherwise=0	0.6366***	0.0609	0.1391***	0.0141
Constant	-1.1672***	0.0981		
Horticulture sector				
Sex of household-head (male=1, otherwise=0)	-0.0510	0.1809	-0.0014	0.0041
Age of household-head (years)	0.0185***	0.0044	0.0004***	0.0001
Education of household-head (years)	0.0656***	0.0131	0.0007***	0.0003
Technical education of household-head (yes=1, otherwise=0)	0.6146	0.6531	-0.0043	0.0100
Household size (15-59 years)	-0.0942***	0.0386	-0.0027***	0.0008
Landholding (ha)	-0.1682***	0.0370	0.0042***	0.0009
Caste dummy				
ST=1, otherwise=0	-0.0546	0.2329	-0.0052	0.0043
OBC=1, otherwise=0	0.2037	0.1851	0.0003	0.0040
Others=1, otherwise=0	0.4718***	0.1845	0.0057	0.0045
Constant	-4.2786***	0.3314		
log likelihood	-10190			
Number of observation	55874			
Chi ²	1503.05			
R ²	0.1157			

Note: ***, **, and * denote significance at 1 per cent, 5 per cent and 10 per cent levels, respectively.

is also significant in reducing the poverty of these households. Hence, the rural development programmes that have direct or indirect influence on the living conditions of the farmers and landless labourers should be accorded importance in the forthcoming Twelfth Five-Year Plan to ensure inclusive growth.

Literacy helps the people in many ways. Better education and skill up-gradation enable the individuals to take advantage of labour market opportunities and

income generating prospects. Education also increases awareness and enhances skills to explore opportunities in the more lucrative sectors and thus helps in reducing rural poverty. The significant negative association between poverty and literacy suggests that education plays an instrumental role in rural poverty reduction, asserting for greater investment in human resource development activities in the rural areas for inclusive growth.

Determinants of Rural Employment Diversification

Non-farm Sector

A multinomial logit model was applied to identify the factors that determine the possibility of employment in the rural non-farm (RNF) sector. The variables included in the best-fit models and the related hypotheses have been discussed below. It was hypothesized that the age of decision-maker in a household influences the possibility of being employed in RNF activities negatively. The elder members of a farm household may not be able to shift from farm to non-farm sector. Female-headed households were hypothesized to have less access to RNF activities. Education improves individuals' skills and prospects for non-farm jobs as well as increases ability to work efficiently for income-providing activities. Therefore, education level was hypothesized to influence the participation of workers in the RNF activities positively. The household-size also affects participation in the rural non-farm employment. The expected relationship between the household-size and possibility of a household being engaged in rural non-farm employment (RNFE) was positive. The households with a larger farm-size had less probability of participation in RNFE.

Several occupations are linked to caste in the Indian context. Therefore, it was considered worthwhile to find the effect of caste on RNFE. The households' per capita income may affect its members' decision on engagement in non-farm activities. The per capita monthly consumption expenditure was treated as a proxy for the per capita income of a household. A higher income enables the household-members to acquire necessary skills and training to participate in the RNF activities. Further, the surplus money enables the households to acquire assets and equipments necessary to be involved in the RNFE. Therefore, a positive relationship between income and RNFE was perceived. State dummies were included to assess the role of state-specific factors on RNFE.

The estimation results of multinomial logit models have been presented in Table 8. Gender was found to have a significant positive impact on RNFE, confirming a clear gender divide. Its marginal effect on RNFE was also quite high. With one unit change, it increased the probability of being in RNFE by 20 per cent. The effect of age on the probability of being employed in

RNFE was negative and significant, indicating rigidity in shifting of activities for the elder persons. The marginal effect of age on probability of being employed in the RNF was not significant. With one unit increase in the age, the probability of being employed in RNF decreased by 0.13 per cent. The relationship between education and probability of working in RNF sector was positive and significant. Higher the level of education, higher was the probability of being engaged in the RNF sector. The education makes the workers capable of exploring opportunities outside agriculture and loosens the barrier in access to RNFE. Technical education, which was used as a proxy of skills, had a significant effect on RNFE. The marginal effect of technical education on RNFE was observed to be the highest. With an increase of one year in technical education, the probability of access to RNFE increased by about 14 per cent. It was found that the skill facilitated entry into a wider market place and increased the probability of being engaged in the RNF sector.

A bigger household-size was found to increase the probability of being engaged in the RNF sector. The bigger size of a household could spare a member to pursue non-farm activities without adversely affecting the agricultural operations. The coefficient of landholding was negative, implying a negative correlation between the size of land and the probability of being involved with RNFE. The marginal effect of a unit increase in landholding on non-farm employment at the means of all variables was 0.1695, implying that if landholding decreased by one hectare, the employment in non-farm activities would increase by 17 per cent. The negative relationship between farm-size and non-farm employment suggested that the employment diversification in rural areas was often under distress. However, there was a multivariate effect of farm-size. Higher levels of production from ownership of large holdings may lead to higher consumption, which in turn, may increase the likelihood of non-farm employment (Mecharla, 2002). The bigger households may have less probability of joining RNFE, but create non-farm employment opportunities for other households.

The production linkages between farm and non-farm sectors were strong. Unlike landholding, a positive link between household income and non-farm employment was found. However, its coefficient was much smaller and its marginal effect on non-farm

employment was negligible. Though the coefficients of caste dummies had the expected sign, the dummy of only scheduled tribes (STs) was found significant and negative, indicating that ST households were in a disadvantageous position vis-à-vis general caste households in getting non-farm employment in the rural areas of eastern India. If a household belonged to a scheduled tribe category, the probability of non-farm employment decreased by 10 per cent. The effect of state dummies was mixed. As compared to Jharkhand, the probability of being employed in RNF activities was lower in Bihar and West Bengal and higher in Orissa. This implies that the probability of being engaged in RNFE decreased with increase in the level of agricultural development in a state, again pointing towards 'distress diversification' in the rural areas of eastern India.

Horticultural Crops

To identify the factors for employment in horticultural crops, a separate logit model was estimated and the results have been summarized in Table 8. Results have revealed that gender, education, household-size, landholding-size and monthly per capita income had a significant influence on employment in the horticultural sub-sector in eastern India. The male-headed households had a higher probability of getting engaged in the cultivation of horticultural crops. The effect of education was negative; implying that with increase in education, the probability of getting engaged in growing of horticultural crops got reduced. It may be attributed to the fact that with increase in education, people have higher propensity of leaving agriculture and getting employed in high-value non-farm sector. The bigger household-size had a higher probability of being engaged in the cultivation of horticultural crops because of more resource of labour needed in cultivation of these crops.

The relationship between farm-size and employment in horticulture was negative, implying that smallholders had a higher probability of diversifying their activities towards horticultural sub-sector. It has been argued by several scholars that agricultural diversification towards high-value commodities may bypass the smallholders. However, the empirical evidence proved to be contrary. There was a positive link between income and employment in the horticultural crops. The cultivation of horticultural crops is capital-intensive and labour-intensive. The higher-income

households have higher propensity to take up this enterprise. The caste dummies were non-significant. State dummies were, by and large significant, indicating the role of state level emphasis and priorities for development and growth of the horticultural sub-sector.

Conclusions

The study has shown the increasing importance of non-farm sector in offering employment to rural workforce across major states of India. This could be viewed as one of the potential options to generate employment opportunities, and increase food and nutritional security and thereby reducing poverty in the rural areas of the country. Rural employment within agriculture has shown a mixed trend (of both high and low pace) across states. For example, animal husbandry employed a large percentage of rural workers in Punjab (40%), Jammu and Kashmir (25%) and Kerala (17%), while it was below 5 per cent in 11 out of 20 states studied in this paper. However, rural employment diversification within the crop sub-sector has been visible, indicating the possibility of generating gainful employment opportunities by shifting towards cultivation of horticulture (fruits and vegetables) and cash crops.

Diversification in rural employment towards high-value crops (HVC) means their increasing role in agricultural production, which will boost rural income and therefore, generate more employment in the rural areas. In the animal husbandry enterprise, dairy and other livestock are considered more pro-poor than the crop sub-sector. Basically, it is the landless, marginal and small farmers that own livestock and development of this sector will help them in generating employment and engaging themselves gainfully. However, the policies needed for higher growth in agriculture are increasing public investment, removing domestic and external controls, simplifying land leasing, etc.

A number of factors have been observed affecting rural employment significantly in both non-farm and horticultural sectors. A well-designed technical programme based on the local conditions of the area can help in strengthening their skills which would benefit and provide better possibility of getting employment in non-farm sector. Knowledge gaining/ skill development may also help in motivating the local people to become enterprising. The per capita income of a household may affect the decision of its members on engagement with RNF activities.

References

- Basant, R. and Kumar, B.L. (1989) Rural non-agricultural activities in India: A review of available evidence. *Social Scientist*, **17** (1-2): 13-17.
- Chadha, G.K. (2003) Rural employment: Current situation, challenges and potential for expansion: Issues in employment and poverty. *A Discussion Paper*; Recovery and Reconstruction Department, International Labour Office, Geneva.
- Chadha, G.K. and Sahu, P.P. (2002) Post-reforms setbacks in employment: Issues and need for further scrutiny. *Economic and Political Weekly*, **37** (21): 1998-2026.
- Foster, A. and M. Rosenzweig (2004) Agricultural productivity growth, rural economic diversity, and economic reforms: India, 1970-2000. *Economic Development and Cultural Changes*, **52**: 509-542.
- Himanshu (2005) Wages in rural India: Sources, trends and comparability, *Indian Journal of Labour Economics*, **48** (2).
- Himanshu (2008) Agriculture and non-farm employment: Exploring the inter-linkages in rural India. *Background paper prepared for India Poverty Assessment Report*. New Delhi, Jawaharlal Nehru University.
- Jobson, J. D. (1992) *Applied Multivariate Data Analysis*, Springer, New York, USA.
- Kumar, P., Kumar, Anjani and Mittal, Surabhi (2004) Total factor productivity of the crop sector in the Indo-Gangetic Plains of India: Sustainability issues revisited. *Indian Economic Review*, **39** (1): 169-201.
- Kumar, Anjani (2009) Rural employment diversification in eastern India: Trends and determinants. *Agricultural Economics Research Review*, **22** (1): 47-60.
- Kumar, Anjani and Elumalai, K. (2007) Agricultural growth and productivity in India: An inter-state variations. In: *Economic Growth and Regional Balance: Recent Experiences and Implications in India*. Eds: T.S. Papola, and Alakh N. Sharma, Institute for Human Development, New Delhi.
- Lanjouw, Peter and Stern, Nicholas (1998) *Economic Development in Palampur over Five Decades*, Powell's Bookstores, Chicago, USA, 668 p.
- Lesschen, J. P., Verburg, P. H. and Steven, J.S. (2005) Statistical methods for analyzing the spatial dimension of changes in land use and farming systems. *LUCC Reports Series No. 7*. The International Livestock Research Institute, Nairobi, Kenya and LUCC Focus 3 Office Wageningen University, the Netherlands.
- Mukhopadhyay, Abhiroop and Rajaraman, Indira (2007) Rural unemployment 1999-2005: Who gained, who lost? *Economic and Political Weekly*, **37** (21): 3116-3120.
- Prasada Rao, Mecharla (2002) The determinants of rural non-farm employment in two villages of Andhra Pradesh (India), *PRUS Working Paper No. 12*, University of Sussex, Brighton.
- Sharma, H.R. (2001) Employment and wage earnings of agricultural labourers: A state-wise analysis. *The Indian Journal of Labour Economics*, **44** (1):27-38.
- Singh, I. (1990) *The Great Ascent: The Rural Poor in South Asia*. Johns Hopkins University Press, Washington, D.C., USA.
- Sundaram, K. (2001) Employment and poverty in 1990s: Further results from NSS 55th Round *Employment-Unemployment Survey*, 1999-2000. *Economic and Political Weekly*, **36** (32): 3039-3049, August.
- Visaria, P. (1995) Rural non-farm employment in India: Trends and issues for research. *Indian Journal of Agricultural Economics*, **50** (3): 398-409.