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Rural Employment Diversification in Eastern India: Trends and Determinants

Anjani Kumar
National Centre for Agricultural Economics and Policy Research, New Delhi – 110 012

Abstract

The trends in rural employment diversification, especially within agriculture in the eastern states of India have been studied. The employment potential of different sub-sectors of agriculture has been assessed to provide succour to the ever increasing problem of unemployment. Several socio-economic factors affecting rural employment diversification towards non-farm sector and horticultural activities have been examined by using logit models. The contribution of different socio-economic variables on employment to non-farm sector and horticultural crops has been quantified by computing marginal effects of each variable. The study has suggested that for reducing entry barriers to non-farm employment opportunities, education and skill development will have to be strengthened. The tailor-made training programmes should be arranged to enhance the probability of getting employed in non-farm activities. The participation in high-value agriculture can be ensured by improving the knowledge and technical levels of the rural households in the eastern India.

Introduction

In the farm economies that are typically characterized by increasing population pressures, declining land-man ratio, small and fragmented holdings, highly iniquitous land distribution structures, etc., the traditional form of agriculture can not provide a viable solution to the problem of rural unemployment and under-employment. Therefore, diversification in rural employment has gained significant importance over time. The nature, extent and speed of rural employment diversification in India have been studied by several researchers over the past two decades (Basant and Kumar, 1989; Visaria, 1995; Chaddha, 1993; Chaddha and Sahu, 2002; Mukhopadhyay and Rajaraman, 2007). Most of them have concluded that the share of non-farm sector was increasing over time and the capacity of the farm sector to absorb additional labour had almost reached its upper limit. However, some studies[1] have shown that there are strong possibilities of enhancing labour absorption in the agricultural sector itself through introduction of appropriate technological, institutional and organizational innovations promoting agricultural diversification. It is against this background that this paper has studied the trends and patterns in employment diversification within the agriculture, especially in the eastern states of India and has assessed the employment potential of different sub-sectors of agriculture, which can provide succour to the rising problem of unemployment. The factors affecting rural employment diversification towards non-farm sector and horticultural activities have also been examined.

Methodology and Data

Methodology

Employment diversification is the shifting of labourforce from one sector to the other for employment. The proportion of this workforce

[1] For example, see Ishikawa, S. (1978) Labour *Absorption in Indian Agriculture*, ILO/ARTEP, Bangkok, June.

engaged in different sectors of the economy constitutes the structure of employment. In India, agriculture is the single largest employment providing sector, which employs approximately 58 per cent of the total workforce. Over the years, there has been considerable inter-sectoral movement of workforce, which has somewhat declined the importance of agriculture in providing employment to labourforce. 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 sectors. At the second level, proportions of shifting of workforce to different sub-sectors 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) fruits and vegetables, (iii) plantation crops, and (iv) agricultural services.

The pace and pattern of rural employment diversification has been studied in the eastern states of India during the past two decades, separately for two sub-periods, viz. 1983 to 1993-94 (pre-reform period) and 1993-94 to 2004-05 (post-reform period). Though variations during post- and pre-reform periods in rural employment diversification in the eastern states of India have been discussed, no attempt has been made to ascertain which element of change has been caused by which particular policy change.

To analyze the determinants of rural employment diversification towards non-farm sector and horticultural crops, and to attribute weights to these determinants, separate logit models have been used for employment in non-farm sector and horticultural crops. Since the dependent variable was a binary variable, and the independent variables were a mix of qualitative and quantitative variables, the multivariate logistic regression given in Equation (1) was used:

$$Y = \ln[p/(p-1)] = \beta_o + \sum \beta_i X_i \qquad \ldots(1)$$

where, *p* represented the probability that the persons were engaged in the non-farm/horticultural activities and β_s were the regression coefficients estimated by the maximum likelihood method. The explanatory variables used in the model included gender, age, education, technical education, household size, land size, monthly expenditure, state, and caste dummies. The specification and measurement of these variables have been explained in the following section on results and discussions.

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 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):

$$\frac{\delta p(y)}{\delta X_i} = \frac{\beta_i * \exp[Z]}{[1+\exp(Z)]^2} \qquad \ldots(2)$$

where, Z was the sum of coefficients multiplied by the means of the respective variables plus the constant-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 three quinquennial rounds of the NSSO, pertaining to the years 1983 (38th round), 1993-94 (50th round) and 2004-05 (61st 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, data were required at least at the four-digit level of the NIC classification. For making a comparison of the proportion of sectoral employment across three time periods, viz. 1983, 1993-94, and 2004-05, the concordance design of the NIC

classifications[2], as developed by the Central Statistical Organization (CSO), was followed. However, within the crop sub-sector, some adjustments were made with the CSO-designed concordance[3] to compare the selected five sub-groups across the years.

Results and Discussions

Pattern of Rural Employment Diversification

The rural non-farm sector is being increasingly viewed as an important alternative for reducing rural poverty levels as well as providing employment by absorbing surplus labour from the agricultural sector (Nayyar and Sharma, 2004). However, the sectoral diversification of employment in India has not been commensurate with income diversification. The proportion of workforce dependent on agriculture has declined over time, but less than expected. After the independence, while the share of national income originating from agriculture has dropped considerably, from over 50 per cent during the 1950s to about 21 per cent in 2004-05, the share of labourforce engaged in agriculture, which was 70 per cent in 1951, still remains at over 52 per cent. However, the trends have not been uniform across different states.

Table 1 based on the National Sample Survey (NSS) data from the 50th, 55th and 61st rounds, provides a snap shot for over two decades of growing importance of non-farm sector in rural employment for the eastern states of India. 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, and further to about 27 per cent in 2004-05. In the eastern region also, the share of non-farm sector in rural employment has increased, from 21 per cent in 1983 to 30 per cent in 2004-05. It is explicitly clear from Table 1 that there was a shift in employment from farm to non-farm sector during the period 1983 to 1993-94 and this pace of shifting accelerated during the period 1993-94 to 2004-05. However, within these national and regional trends, stark variations are discernible across different eastern states of India. The wide variations in employment of rural workers in these states during the two selected periods are quite apparent. For instance, there has been acceleration in shifting of rural workforce towards non-farm sector in the eastern states of India, except West Bengal, during the post-reform period as compared to that during the pre-reform period (Table 2). West Bengal had witnessed the highest proportional shifting of rural workers towards non-farm sector during the 1980s, much higher than that was observed at the national level. But, during the post-reform period, this shifting almost stagnated in

Table 1. Share of rural non-farm employment in eastern states of India: 1983 to 2004-05

(in per cent)

States	Periods								
	1983			1993-94			2004-05		
	Males	Females	Total	Males	Females	Total	Males	Females	Total
Bihar	16.77	12.15	15.49	15.70	7.40	13.98	24.25	13.61	22.03
Jharkhand	23.85	11.22	18.44	25.82	9.67	20.88	38.52	14.68	30.00
Orissa	21.78	18.97	20.82	21.22	14.94	18.98	34.07	25.41	30.96
West Bengal	26.86	24.99	26.38	35.24	40.47	36.49	36.12	41.14	37.28
Eastern India	22.22	17.19	20.69	25.04	20.73	23.90	32.00	25.40	30.23
All-India	22.24	12.25	18.50	26.01	13.78	21.62	33.50	16.66	27.35

[2] 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)

[3] For comparing the sectoral employment within the crop production sector, we required concordance between four-digit level of NIC-98 and three-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 the NIC-1998.

Table 2. Change in rural non-farm sector employment in the eastern states of India: 1983 to 2004-05

(in per cent)

States	1983 to 1993-94			1993-94 to 2004-05			1983 to 2004-05		
	Males	Females	Total	Males	Females	Total	Males	Females	Total
Bihar	-1.07	-4.75	-1.51	8.55	6.21	8.05	7.48	1.46	6.54
Jharkhand	1.97	-1.56	2.45	12.70	5.01	9.12	14.66	3.46	11.56
Orissa	-0.57	-4.02	-1.84	12.85	10.46	11.98	12.28	6.44	10.14
West Bengal	8.38	15.47	10.11	0.88	0.68	0.79	9.26	16.15	10.90
Eastern India	2.82	3.54	3.21	6.96	4.67	6.33	9.77	8.21	9.54
All-India	3.78	1.53	3.13	7.49	2.88	5.72	11.27	4.42	8.85

West Bengal. It needs to be investigated further, as it has raised some pertinent questions. Was there a spurt in agricultural growth in West Bengal which provided an impetus to rural employment diversification towards non-farm sector during the 1980s? Or was it that the non-farm sector could not provide employment to the incremental rural workforce during the subsequent periods? Or was it because of the comparatively better performance of agricultural sector that the rural workers remained stuck to it? Or was it lack of non-farm employment opportunities that compelled them to remain with the agricultural sector?

During the pre-reform period, reverse trends have been observed in some eastern states. In both Bihar and Orissa, the proportion of non-farm employment in rural employment had declined and dependence for employment on agriculture had increased. In Jharkhand also, only a meager proportion (2.45%) of rural labour had shifted away from agriculture during this period (Table 2). However, during the post-reform period, dependence on agriculture as a source of livelihood had declined in these states as the base of non-farm employment expanded in this region. Nevertheless, dependence of rural workforce on agriculture continues to be higher in the eastern states. The maximum shift towards non-farm employment was recorded in Orissa, followed by Jharkhand and Bihar during the post-reform period. The shift in these three states was even higher than that at the national level.

The apprehension expressed by several scholars, particularly on the basis of NSSO survey conducted in 1999-00, that the economic reforms have slowed down the pace of rural employment diversification was not borne out by the facts based on 2004-05 NSSO data. However, the challenges still remain to diversify them further towards non-agricultural sector, as the share of agricultural sector in national income has been shrinking relatively at a faster pace.

Gender Aspects of Rural Employment Diversification

In rural employment, the gender dimension is more important because it is the female workers that are more concentrated in agriculture. Unfortunately, the female workers could not witness the similar rising trends as witnessed by their male counter parts either at the national level or in eastern states of India. Their dependence on agriculture though witnessed a steady decline, its magnitude was very low and even in 2004-05 it engaged 83 per cent of the rural workforce at the national level (Table 1). In the eastern states of India, agriculture accounted for about 75 per cent of female rural workforce in 2004-05. The share of non-farm sector in total rural female employment was found to vary considerably across different states in the eastern region. It varied from as low as 13.61 per cent in Bihar to as high as 41.14 per cent in West Bengal. In Jharkhand and Orissa, the non-farm sector engaged 14.68 per cent and 25.41 per cent, respectively of rural female workforce in 2004-05.

During the pre-reform period, the shifting of rural female workforce away from agriculture witnessed a negative trend in Bihar, Jharkhand and Orissa (i.e. in three out of four states) (Table 2). The decline was sharper in both Bihar (-4.75%) and Orissa (-4.02%). In West Bengal, unlike other eastern states, 15.47 per cent of rural female workforce

Table 3. Pattern of rural employment within agricultural sector in the eastern states of India: 1983 to 2004-05

(in per cent)

States	Males				Females				All workers			
	Crops	Forestry	Animal husban-dry	Fishing	Crops	Forestry	Animal husban-dry	Fishing	Crops	Forestry	Animal husban-dry	Fishing
						1983						
Bihar	96.25	0.11	3.33	0.32	85.45	0.13	14.43	0.00	93.13	0.12	6.53	0.22
Jharkhand	93.71	0.85	5.14	0.30	95.52	1.63	2.85	0.00	94.56	1.21	4.07	0.16
Orissa	95.17	0.69	2.38	1.76	94.78	1.84	2.19	1.18	95.04	1.09	2.31	1.56
West Bengal	93.91	0.41	4.66	1.01	53.92	1.07	44.16	0.85	83.50	0.58	14.95	0.97
Eastern India	94.95	0.41	3.79	0.84	81.79	1.09	16.63	0.49	90.76	0.63	7.88	0.73
All-India	92.87	0.36	6.17	0.61	82.62	0.36	16.82	0.20	88.74	0.36	10.46	0.44
						1993-94						
Bihar	98.34	0.02	0.87	0.78	99.52	0.00	0.25	0.22	98.60	0.01	0.73	0.66
Jharkhand	98.79	0.57	0.51	0.13	99.06	0.81	0.13	0.00	98.88	0.65	0.38	0.09
Orissa	94.88	1.11	1.50	2.51	94.68	2.27	2.73	0.31	94.81	1.54	1.96	1.69
West Bengal	95.63	0.52	2.58	1.27	75.96	1.36	19.82	2.86	91.20	0.71	6.47	1.63
Eastern India	96.78	0.47	1.51	1.24	92.11	1.22	5.81	0.86	95.49	0.68	2.70	1.14
All-India	95.44	0.42	3.34	0.80	87.30	0.40	12.12	0.18	92.23	0.41	6.80	0.56
						2004-05						
Bihar	97.68	0.14	1.93	0.25	93.18	0.09	6.73	0.00	96.64	0.13	3.04	0.19
Jharkhand	97.06	0.85	1.94	0.15	96.91	1.39	1.68	0.02	97.00	1.08	1.82	0.09
Orissa	95.01	2.00	2.36	0.64	92.47	5.06	2.20	0.28	94.02	3.18	2.30	0.50
West Bengal	96.30	0.17	1.30	2.23	80.50	5.63	10.94	2.93	92.87	1.35	3.40	2.38
Eastern India	96.66	0.57	1.80	0.98	90.73	3.09	5.41	0.77	94.96	1.29	2.83	0.92
All-India	95.35	0.44	3.54	0.67	83.21	0.67	15.94	0.18	90.26	0.54	8.74	0.46

shifted away from agriculture during this period. During the post-reform period, the trend got reversed in all the states, except West Bengal. The proportion of rural female workforce shifting away from agriculture was higher during the post-reform than pre-reform period. A similar trend was observed at the national level also. During the post-reform period, the shifting of rural female workforce was highest in Orissa (10.46%), followed by Bihar (6.21%) and Jharkhand (5.01%). These results suggest that the employment-base of rural female workers remained heavily tagged with agriculture and a number of reasons could be put forth for their continuing dependence on it.

Employment Diversification within Agriculture and Allied Sectors

The increasing employment intensity within the agricultural sector can be explained in terms of diversification of activities within this sector. Table 3 gives a picture of rural employment structure within agriculture during pre- and post-reform periods. It clearly depicts the continuance of high dependence of rural workers on the crop sector. This national phenomenon seems to be applicable to the eastern states almost in totality. In 1983, agricultural employment was highly concentrated in the crop sector in this region, ranging from 83 per cent in West Bengal to 95 per cent in Orissa, with an average of 91 per cent for the eastern region. In 1993-94, the importance of crop sector in providing employment increased further with its share of more than 95 per cent in this region. During the pre-reform period (1983-93), the share of crop sector in agricultural employment increased, while that of non-crop sector declined drastically in the eastern states, except Orissa. The case of West Bengal was slightly different, where the share in agricultural employment was about 83 per cent of crops and about 15 per cent of animal husbandry in 1983. In 1993-94, the share of crops rose to about 91.2 per cent, while that of animal husbandry dropped to 6.8 per cent. This

Table 4. Gender-wise share of allied sub-sectors in total agricultural employment in eastern India: 1983 to 2004-05

(in per cent)

States	Males			Females			All workers		
	1983	1993-94	2004-05	1983	1993-94	2004-05	1983	1993-94	2004-05
Bihar	3.75	1.66	2.32	14.55	0.48	6.82	6.87	1.40	3.36
Jharkhand	6.29	1.21	2.94	4.48	0.94	3.09	5.44	1.12	3.00
Orissa	4.83	5.12	4.99	5.22	5.32	7.53	4.96	5.19	5.98
West Bengal	6.09	4.37	3.70	46.08	24.04	19.50	16.50	8.80	7.13
Eastern India	5.05	3.22	3.34	18.21	7.89	9.27	9.24	4.51	5.04
All-India	7.13	4.56	4.65	17.38	12.70	16.79	11.26	7.77	9.74

rise in employment share of crops was attributed to the joining of green revolution club by West Bengal during the 1980s. During the post-reform period, though there was a slight decline in employment for crops, the shift of workforce to allied activities like, forestry, animal husbandry, fishing, etc. was highly limited. Even in 2004-05, the crop sector accounted for 95 per cent of rural agricultural employment in the eastern region, ranging from 93 per cent in West Bengal to 97 per cent in Bihar. This trend of continuance of rural workers' excessive dependence on field crops has been highlighted by Chadha (2003) also.

The gender-wise trends (Table 4) in rural employment diversification within agriculture sector exhibited a striking feature. A perusal of Table 4 reveals that the share of allied activities (forestry, animal husbandry and fishing) within the agriculture sector in eastern region in 1983 was 5.05 per cent for males and 18.21 per cent for females, which came down to 3.22 per cent and about 7.89 per cent, respectively in 1993-94. During the subsequent period, there was an increase in the share of allied sectors in rural agricultural employment in eastern India except West Bengal. These trends suggest that in the post-reform period the allied sectors like animal husbandry, fisheries, and forestry contributed in absorption of incremental rural labourforce.

Employment Diversification within Crop Sub-sector

The break-up of NSSO employment data at three- and four-digit levels helped us to understand the pattern of employment within the crop sub-sector. The pre- and post-reform scenario of employment within the crop sub-sector has been depicted in Table 5. In 1983, foodgrains accounted for more than 98 per cent of employment in crop sub-sector in the eastern region, which varied from about 94 per cent in West Bengal to almost 100 per cent in the other three states, the figure for the country being about 94 per cent.

The share of foodgrains in crop sub-sector employment remained high at about 98 per cent in the estearn region, while it went down to 92 per cent at the national level in 1993-94. The situation depicted a change during the next decade, and a restructuring of employment within the crop sub-sector was evident. The importance of non-foodgrains in crop sub-sector employment became higher at the national than eastern states level. In 2004-05, the non-foodgrains accounted for less than 5 per cent employment within the crop sub-sector in the eastern region as against the national figure of 15 per cent. Thus, it was again evident that the eastern region was not able to restructure its crop sub-sector employment even during the post-reform period so as to shift the rural workforce from foodgrains to high-value non-foodgrains production. It could not tap the opportunities thrown open by the economic reforms initiated in the country. However, the non-crop sector like horticulture, cash crops and agricultural services, has started to blossom in the eastern states. Employment within the crop sub-sector has been found more diversified in West Bengal than other states in the region.

Gender-wise crop sector employment had depicted similar trends for male and females (Table 5). However, in 2004-05 a higher proportion of female workforce was engaged in non-foodgrain production than their male counterparts.

Table 5. Distribution of workers within crop sub-sector in the eastern states of India: 1983 to 2004-05

(in per cent)

States	Males					Femals					All workers				
	Food-grains	Cash crops	Fruits & vegeta-bles	Planta-tion crops	Agricul-tural services	Food-grains	Cash crops	Fruits & vegeta-bles	Planta-tion crops	Agricul-tural services	Food-grains	Cash crops	Fruits & vegeta-bles	Planta-tion crops	Agricul-tural services
1983															
Bihar	99.75	0.11	0.05	0.10	0.00	99.89	0.07	0.04	0.00	0.00	99.79	0.10	0.04	0.07	0.00
Jharkhand	99.80	0.16	0.00	0.00	0.04	99.81	0.00	0.11	0.00	0.09	99.80	0.08	0.05	0.00	0.06
Orissa	99.73	0.11	0.06	0.03	0.07	99.94	0.06	0.00	0.00	0.00	99.80	0.09	0.04	0.02	0.05
West Bengal	95.83	0.20	1.63	2.27	0.07	87.90	0.75	2.33	8.73	0.29	94.50	0.29	1.75	3.36	0.11
Eastern-India	98.45	0.14	0.57	0.80	0.04	97.88	0.17	0.43	1.46	0.07	98.28	0.15	0.53	0.99	0.05
All-India	93.64	2.87	2.06	1.33	0.10	93.86	3.08	1.69	1.28	0.09	93.72	2.95	1.92	1.31	0.10
1993-94															
Bihar	99.98	0.00	0.00	0.02	0.00	100.00	0.00	0.00	0.00	0.00	99.98	0.00	0.00	0.02	0.00
Jharkhand	100.00	0.00	0.00	0.00	0.00	100.00	0.00	0.00	0.00	0.00	100.00	0.00	0.00	0.00	0.00
Orissa	94.42	0.04	0.15	0.03	5.36	90.21	0.06	0.56	0.00	9.17	92.85	0.05	0.30	0.02	6.79
West Bengal	98.91	0.03	0.84	0.13	0.09	98.92	0.00	0.92	0.00	0.16	98.91	0.03	0.86	0.10	0.11
Eastern-India	98.46	0.02	0.30	0.05	1.17	96.37	0.02	0.38	0.00	3.24	97.91	0.02	0.32	0.04	1.72
All-India	92.50	3.35	2.09	1.33	0.73	91.74	4.49	1.67	1.23	0.86	92.21	3.78	1.94	1.29	0.78
2004-05															
Bihar	97.92	0.00	0.63	0.01	1.45	96.65	0.00	0.85	0.00	2.50	97.64	0.00	0.68	0.00	1.68
Jharkhand	99.82	0.00	0.18	0.00	0.00	99.36	0.00	0.64	0.00	0.00	99.62	0.00	0.38	0.00	0.00
Orissa	97.15	0.80	1.95	0.06	0.04	97.00	0.55	2.39	0.05	0.00	97.09	0.71	2.12	0.06	0.02
West Bengal	92.09	0.32	3.90	3.39	0.30	82.69	0.00	5.14	12.17	0.00	90.32	0.26	4.14	5.04	0.24
Eastern-India	96.00	0.26	1.93	1.16	0.66	94.42	0.16	2.16	2.54	0.72	95.57	0.23	1.99	1.54	0.67
All-India	85.22	8.62	4.09	1.61	0.46	82.94	10.94	3.99	1.67	0.46	84.34	9.51	4.05	1.63	0.46

Growth of Employment in Agriculture

A synoptic view of growth in rural employment in farm and non-farm sectors in the eastern states of India for two sub-periods; viz. 1983 to 1993-94 and 1993-94 to 2004-05, can be obtained from Table 6. The overall rates of growth in this employment remained almost same during the two sub-periods, in both the estern states and at national level. For rural males in the eastern states, it marginally declined from 2.20 per cent during the pre-reform period to 1.76 per cent during the post-reform period, while for rural females it increased from a low of 0.43 per cent to 1.85 per cent during this period. Further, the growth of rural employment in the non-farm sector in the eastern states increased to 3.97 per cent during the post-reform period from 3.22 per cent during the pre-reform period. But, the rate of growth of employment in the farm sector witnessed a marginal decline from 1.33 per cent to 0.97 per cent during these two periods. During the post-reform period, the growth rate for employment was remarkably higher for rural female than male workers. However, within the farm sector, mixed trends emerged (Table 7). The growth in employment decelerated in crops in the eastern states, except Jharkhand, and accelerated in animal husbandry (for both males and females). The fisheries exhibited a mixed trend in employment growth and by and large, it decelerated. This poses questions like 'Is the growth in fisheries capital-intensive and technology-driven?' or 'Does the current format do not properly account for the employment in fisheries?' These issues need a separate in-depth empirical investigation. The growth in employment in forestry increased in all the eastern states, except West Bengal, during the post-reform period.

The growth trends in rural employment in the eastern India within the crop sub-sector exhibited an interesting picture. During the post-reform period, the growth in employment in the foodgrains production either decelerated or stagnated, it was tremendous (19.2%) in the production of fruits and vegetables (Table 8), ranging from 17.3 per cent in West Bengal to 184 per cent in Bihar. The

Table 6. Growth of rural employment in farm and non-farm sectors in eastern states of India: 1983 to 2004-05

(in per cent)

States	Sector	1983 to 1993-94			1993-94 to 2004-05			1983 to 2004-05		
		Males	Females	All workers	Males	Females	All workers	Males	Females	All workers
Bihar	Farm	2.74	-0.18	2.12	0.72	1.22	0.85	1.68	0.55	1.45
	Non-farm	1.93	-5.51	0.90	5.81	7.66	6.05	3.94	1.18	3.57
	Total	2.61	-0.70	1.94	1.71	1.86	1.76	2.14	0.63	1.84
Jharkhand	Farm	1.21	-3.18	-0.57	0.54	3.47	1.64	0.86	0.25	0.58
	Non-farm	2.28	-4.78	0.99	6.06	8.04	6.22	4.24	1.73	3.69
	Total	1.47	-3.35	-0.26	2.27	4.01	2.78	1.89	0.44	1.32
Orissa	Farm	1.57	2.80	2.03	-0.09	0.18	-0.02	0.70	1.42	0.95
	Non-farm	1.23	-0.11	0.86	6.01	6.39	6.06	3.71	3.25	3.55
	Total	1.50	2.30	1.80	1.54	1.38	1.45	1.52	1.82	1.61
West Bengal	Farm	1.12	-0.81	0.64	1.61	1.13	1.49	1.37	0.20	1.08
	Non-farm	5.17	6.52	5.51	1.96	1.38	1.80	3.48	3.80	3.55
	Total	2.35	1.51	2.14	1.73	1.23	1.60	2.03	1.36	1.86
Eastern-India	Farm	1.83	0.00	1.33	0.87	1.29	0.97	1.32	0.67	1.14
	Non-farm	3.43	2.33	3.22	4.06	3.75	3.97	3.76	3.07	3.61
	Total	2.20	0.43	1.75	1.76	1.85	1.77	1.97	1.17	1.76
All-India	Farm	1.36	1.12	1.28	0.61	1.44	0.94	0.97	1.29	1.10
	Non-farm	3.48	2.51	3.27	3.96	3.52	3.83	3.73	3.04	3.56
	Total	1.87	1.30	1.67	1.59	1.75	1.64	1.72	1.54	1.65

Table 7. Growth of employment in different sub-sectors of agriculture: 1983 to 2004-05

(in per cent)

States	Males				Females				All workers			
	Crops	Forestry	Animal husban-dry	Fishing	Crops	Forestry	Animal husban-dry	Fishing	Crops	Forestry	Animal husban-dry	Fishing
1983 to 1993-94												
Bihar	2.96	-14.61	-10.19	12.44	1.35	-56.30	-33.36	145.48	2.70	-17.62	-17.97	13.64
Jharkhand	1.74	-2.77	-19.71	-6.77	-2.83	-9.66	-28.98	1.71	-0.12	-6.52	-21.65	-6.55
Orissa	1.54	6.55	-3.02	5.23	2.79	4.98	5.09	-9.97	2.01	5.64	0.36	2.85
West Bengal	1.30	3.52	-4.69	3.46	2.65	1.58	-8.45	12.01	1.53	2.63	-7.45	6.01
Eastern-India	2.02	3.12	-7.13	5.86	1.19	1.12	-9.98	5.74	1.84	2.06	-8.98	5.90
All-India	1.64	3.01	-4.67	4.23	1.68	2.06	-2.14	0.35	1.67	2.64	-2.99	3.66
1993-94 to 2004-05												
Bihar	0.66	21.92	8.33	-9.33	0.62	107.68	36.36	-55.39	0.67	23.91	14.82	-9.95
Jharkhand	0.38	4.24	13.56	1.61	3.27	8.61	30.71	76.11	1.46	6.40	17.35	2.39
Orissa	-0.08	5.41	4.13	-11.81	-0.04	7.74	-1.78	-1.00	-0.09	6.79	1.43	-10.56
West Bengal	1.67	-8.34	-4.53	6.92	1.66	15.05	-4.19	1.36	1.66	7.65	-4.29	5.05
Eastern-India	0.85	2.62	2.48	-1.31	1.15	10.23	0.64	0.28	0.92	7.09	1.43	-0.97
All-India	0.60	1.07	1.15	-1.07	1.00	6.35	4.00	1.11	0.74	3.43	3.26	-0.79
1983 to 2004-05												
Bihar	1.75	2.90	-0.92	0.46	0.97	-1.13	-3.04	0.48	1.63	2.02	-2.17	0.60
Jharkhand	1.03	0.84	-3.72	-2.47	0.32	-0.51	-2.24	35.60	0.70	0.04	-3.19	-1.97
Orissa	0.69	5.95	0.66	-4.07	1.30	6.42	1.43	-5.38	0.90	6.24	0.92	-4.41
West Bengal	1.49	-2.87	-4.61	5.26	2.13	8.43	-6.24	6.30	1.60	5.23	-5.80	5.51
Eastern-India	1.41	2.86	-2.21	2.04	1.17	5.80	-4.57	2.84	1.36	4.66	-3.67	2.24
All-India	1.09	1.99	-1.66	1.42	1.32	4.28	1.03	0.75	1.18	3.05	0.24	1.30

contribution of fruits and vegetables to the agricultural GDP has been found increasing steadily in recent years and agricultural diversification towards fruits & vegetables is being advocated as a viable option for income and employment augmentation. The evidence observed in the study lends credence to the fact that horticulture can trigger agricultural growth and augment employment in the region. The growth in employment in agricultural services was also notable, particularly during the post-reform period. The growth trends were found similar for male and female workers.

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 influences the possibility of being employed in RNF activities negatively. The elder farm workers may not be able to shift from farm to non-farm work. 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-producing 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 participating 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

Table 8. Growth in employment within crop sub-sector in eastern states of India: 1983 to 2004-05

States	Males					Femals					All workers				
	Food-grains	Cash crops	Fruits & vegeta-bles	Planta-tion crops	Agricul-tural services	Food-grains	Cash crops	Fruits & vegeta-bles	Planta-tion crops	Agricul-tural services	Food-grains	Cash crops	Fruits & vegeta-bles	Planta-tion crops	Agricul-tural services
1983 to 1993-94															
Bihar	2.98	-59.43	-55.86	-11.63	1.08	1.37	-53.17	-49.84	1.64	1.64	2.72	-60.22	-56.87	-11.40	1.35
Jharkhand	1.76	-56.28	63.73	1.22	-49.55	-2.81	1.71	-53.79	1.71	-52.70	-0.10	-56.17	-25.43	1.45	-54.69
Orissa	0.99	-8.31	11.74	3.40	55.79	1.74	1.68	168.98	0.01	255.77	1.28	-5.04	25.67	3.47	67.25
West Bengal	1.62	-15.73	-5.20	-24.02	4.42	3.87	-60.80	-6.51	-69.33	-3.17	2.00	-20.39	-5.49	-28.27	1.55
Eastern-India	2.02	-17.02	-4.49	-21.94	42.15	1.04	-18.36	-0.06	-69.23	48.60	1.80	-17.38	-3.25	-26.06	45.03
All-India	1.51	3.25	1.81	1.61	23.82	1.45	5.58	1.58	1.31	27.26	1.50	4.22	1.75	1.51	25.13
1993-94 to 2004-05															
Bihar	0.47	-0.63	175.67	-10.42	197.39	0.31	-0.56	153.11	-0.56	179.29	0.45	-0.60	184.10	-10.39	208.61
Jharkhand	0.36	-0.43	40.89	-0.43	52.35	3.21	-0.86	138.52	-0.86	-0.86	1.43	-0.64	58.74	-0.64	52.03
Orissa	0.18	31.41	26.12	5.89	-36.34	0.62	23.21	14.08	98.17	-68.47	0.31	28.24	19.21	9.88	-40.36
West Bengal	1.01	25.62	16.88	36.95	13.00	0.02	-0.15	18.94	214.22	-52.12	0.82	25.59	17.31	44.67	9.58
Eastern-India	0.62	28.21	19.58	33.10	-4.31	0.96	22.91	18.50	213.91	-11.74	0.70	26.92	19.23	40.56	-7.32
All-India	-0.15	9.61	6.91	2.36	-3.43	0.07	9.50	9.31	3.82	-4.55	-0.08	9.56	7.73	2.90	-3.89
1983 to 2004-05															
Bihar	1.66	-35.14	15.23	-11.00	77.89	0.81	-30.52	17.10	0.48	72.59	1.53	-35.73	15.78	-10.87	81.61
Jharkhand	1.03	-32.71	51.34	0.35	-9.99	0.30	0.35	9.17	0.35	-30.30	0.70	-32.71	10.77	0.35	-14.58
Orissa	0.57	10.72	19.05	4.70	-2.51	1.16	12.44	71.63	43.09	-0.03	0.77	11.15	22.24	6.78	-2.55
West Bengal	1.30	3.87	5.79	3.45	8.83	1.83	-36.03	6.05	3.76	-33.04	1.38	1.08	5.84	3.59	5.68
Eastern-India	1.29	4.22	7.44	3.23	15.54	1.00	1.15	9.27	3.87	13.11	1.22	3.45	7.94	3.52	14.71
All-India	0.64	6.53	4.45	2.00	8.70	0.73	7.62	5.56	2.62	9.46	0.67	6.99	4.84	2.24	8.98

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 variables used in the model with descriptive statistics have been summarized in Annexure I. The final estimation results of multinomial logit models have been presented in Table 9. The gender had 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 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.

The bigger household-size increased the probability of being engaged in RNF sector. The bigger size of a household could spare a member to pursue non-farm activities without adversely affecting the agricultural activities. The coefficient of landholding was negative, implying negative correlation between the size of land and the probability of being involved with non-farm employment. 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 increased 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 larger 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 were strong and an increase in consumption implied more work for other households. 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 ST was found significant and negative, indicating 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 scheduled tribe (ST) category, the probability of its 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 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, the results of which have also been

Table 9. Determinants of rural non-farm employment in eastern states of India

Explanatory variables	Non-farm		Vegetable/Horticulture		Marginal effects	
	Coefficient	Standard error	Coefficient	Standard error	dy/dx	Standard error
Sex of household- head (male=1, otherwise=0)	0.85517***	0.06515	0.60638*	0.33247	0.20329***	0.01407
Age of household-head (years)	-0.00526***	0.00142	-0.00004	0.00608	-0.00131***	0.00036
Education of household-head (years)	0.07734***	0.00487	-0.05121**	0.02118	0.01933***	0.00122
Technical education of household-head (years)	0.55644***	0.17382	0.47163	0.61774	0.13647***	0.04082
Household size (No.)	0.19569***	0.00865	0.11661***	0.02865	0.04890***	0.00216
Landholding (ha)	-0.67839***	0.02646	-0.23206**	0.10942	-0.16953***	0.00660
Household income (Rs/capita/month)	0.00103***	0.00008	0.00045**	0.00021	0.00026***	0.00002
Caste dummy						
ST=1, otherwise=0	-0.42116***	0.06591	0.39590	0.27068	-0.10388***	0.01589
OBC=1, otherwise=0	-0.00922	0.05058	0.04021	0.25426	-0.00230	0.01264
Others=1, otherwise=0	0.02392	0.05117	0.23105	0.20434	0.00598	0.01279
State dummy						
Bihar=1, otherwise=0	-0.61997***	0.05758	-0.09526	0.39959	-0.15259***	0.01378
West Bengal=1, Otherwise=0	-0.15908***	0.05993	1.57559***	0.33812	-0.03970**	0.01493
Orissa=1, Otherwise=0	0.10003*	0.05759	1.05393***	0.33915	0.02500*	0.01439
Constant	-1.76186***	0.11119	-6.66291***	0.54887		
log likelihood	-9419.7723		-938.0064			
Number of observations	15282		15282			
Chi^2	2345.62		116.14			
R^2	0.1107		0.0583			

Source: Unit level data of NSSO, 61st Round, Survey on Employment and Unemployment.

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

summarized in Table 9. It has been revealed from Table 9 that gender, education, household-size, landholding and monthly per capita income had a significant influence on employment in the horticultural sub-sector in the eastern India. The male households had 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 small holders. 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

It has clearly emerged from the study that the role of non-farm sector in providing rural employment in one of the poverty-struck regions of India has increased. It may be one of the potential pathways for generating employment opportunities and alleviating poverty in the rural areas. It has also been revealed that diversification within the agricultural sector towards allied activities is not conspicuously apparent but the diversification within the crop sub-sector is explicity evident, indicating the possibility of generating gainful employment opportunities by diversifying towards high-value crop cultivation. However, the employment growth trends witnessed in the agricultural sector have not been able to inspire confidence. The liberalization initiated in early-1990 does not seem to have any adverse affect on employment generation, as argued in several quarters. Of late, the empirical evidence connotes the positive impact of liberalization on employment in the rural areas of eastern states of India.

Several factors have been observed to have a significant effect on rural employment in the non-farm and horticultural activities. For removing entry barriers to the non-farm employment opportunities, education and skill development have been found helpful. The tailor-made training programmes can be arranged for rural workers to enhance the probability of getting employment in the non-farm activities. The participation in high-value agriculture can also be ensured by improving educational and technological skills of the rural households in the eastern states of India.

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Annexure I

Descriptive statistics of the variables

Variables	Mean	Standard deviation
Non-farm households employment	0.4987	0.5000
Horticultural employment	0.0120	0.1087
Sex of household-head (male=1, otherwise=0)	0.9022	0.2971
Age of household-head (years)	45.2086	13.2926
Education of household-head (years)	4.1316	4.3947
Technical education of household-head (years)	0.0160	0.1255
Household size (No.)	5.0840	2.5639
Land size (ha)	0.6389	1.2603
Income (Rs/capita/month)	529.1667	311.8214
Caste		
Schedule tribes	0.1256	0.3314
Schedule castes	0.2087	0.4064
Other backward castes	0.3537	0.4781
Other castes	0.3120	0.4633