Research note

Factors affecting non-farm diversification among farm households in Jammu and Kashmir

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Abstract This article assesses the importance of non-farm activities and identifies factors that influence farm households' participation in these activities in the Indian state of Jammu and Kashmir on the basis of a survey of 630 farm households in 2016-2017. The findings show that a majority of farm households are simultaneously engaged in non-farm activities, particularly in labour market and government services. Furthermore, the participation in non-farm activities is found to be positively influenced by education, family size, and dependency ratio, but negatively by farm size.

1 Introduction

The subsistence producers and small-wage farm labourers in the low-income countries account for two-thirds of the global poor and food insecure populations (IFAD 2010; FAO et al. 2014). These people often confront structural or transitory environmental and institutional shocks, and thus they even fall below the subsistence thresholds (Eakin 2005; Morton 2007; Tschakert 2007). Agriculture alone cannot provide them an adequate livelihood; hence, there is a need to empower them to diversify their livelihoods. Livelihood diversification is defined as the process by which rural families construct a diverse portfolio of activities and social support capabilities in order to survive and to improve their standards of living (Ellis 1998). More than 50% of the rural income in developing countries comes from non-farm sources (IFAD 2010). In the context of various risks, diversification is primarily a risk management strategy,

ex ante and *ex post* risks, and therefore households compromise to choose a portfolio of activities that provide them a stable livelihood (Ellis 2000).

Several studies have reported that diversification towards non-farm activities is a safer choice, rather than solely relying on subsistence farming for livelihood. This enables the households to have better incomes, and thereby enhanced food security and also increased agricultural production owing to the smooth capital flow. The participation of rural households in non-farm activities could be due to either "push" factors (e.g., risk reduction, land constraints, response to a crisis) or "pull" factors (e.g., complementarities with existing income activities and thus higher profitability) (Barrett et al. 2001), or both. Several factors like education, skills, social affiliation (caste and religion), asset ownership, household size, and access to credit influence a household's decision to participate and extent of participation in a particular non-farm activity (Reardon et al. 2007; Jatav 2010; Jatav & Sen 2013). Hence, understanding the relationship between

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participation in rural non-farm sector and well-being of households as well as the relationship between non-farm sector expansion and macroeconomic indicators is important for devising feasible strategies for improving the livelihoods of poor farming communities. In this article, we make an attempt to understand (i) how the farm households in the state of Jammu and Kashmir (J&K) meet their daily basic needs, and (ii) what drives them to participate in non-farm activities.

2 Data and method

2.1 Study area

Situated on the northernmost extremity of the country, Jammu and Kashmir lies between 32°17′ N and 36°58′ N latitudes and 73°26′ E and 80°30′ E longitudes. The total area of J&K is 2,22,236 km², which constitutes 6.8% of the country's total geographical area. The state has considerable diversity in topography, agro-climatic conditions (subtropical, intermediate, temperate and cold arid), and socio- economic activities that speak volumes about its vast agricultural potential. Agriculture remains the mainstay of the state economy, with more than 65% of its population being dependent on it; agriculture contributes around 27% to the state's net domestic product.

The subtropical zone of the state is characterized by concentration of precipitation, hot spells of summer, relatively dry but pronounced winters, and preponderance of alluvial soils. It comprises Jammu, lower parts of Kathua, Udhampur, Poonch, and Rajouri districts. The mean height above sea level ranges from <300 m to ~1350 m.

The intermediate zone is subtropical-temperate transition zone that comprises mid and high altitude areas of the Peer Panjal trap. It encompasses all the areas of outer hills, including the districts of Doda, Poonch, parts of Rajouri, Udhampur, and Kathua. The elevation varies from 800 to 1500 masl (metres above sea level) in mid-altitudes and upto 4000 masl at higher altitudes. This zone is characterized by higher annual rainfall, relatively more wet and cold winters, and sodic soils. River Chenab and its tributaries constitute the major drainage base. The intermediate zone is the first to experience the south-west monsoon in summer and the north-west disturbance in winter. In summer, the zone receives more rainfall than the other zones.

The temperate zone essentially covers the valley of Kashmir, comprising Anantnag, Pulwama, Srinagar, Budgam, Baramulla, and Kupwara districts. This zone experiences wet and often severe winters with frost, snow and rain, and relatively dry and warm summer. Snowfall, an important form of precipitation, helps maintain adequate moisture during summers when rainfall is scanty. The plain valleys have an altitude of 1560 masl, which rises to 1950 masl in low-altitude to 2400–3000 masl in the upper belts, and 4200 masl in the snow-bound areas. The salient meteorological feature of the temperate zone is that it receives annual rainfall of around 680 mm, of which nearly 70% is received in winter and spring seasons (from December to May). The overall average temperature across months varies from 1.2 to 24.5°C. The cold arid zone mainly comprises of Ladakh in the Western Himalayas. It lies at the northernmost tip of Asian subcontinent between Karakoram and greater Himalayan ranges and is interwoven with nude and rugged mountains.

2.2 Data

A multi-stage random sampling technique was used for data collection. All those blocks falling within a single agro-climatic zone were identified for the purpose of sampling and all other blocks where two or more agro-climatic conditions persist were deleted. Accordingly, 15 blocks from subtropical, 21 from intermediate, 89 from temperate, and 18 from cold arid zones were retained, and then 6 blocks each from subtropical, intermediate, and temperate zones and 3 blocks from cold arid zone were selected using random sampling method without replacement. From each selected block, a list of villages was obtained from the block office. Then from each block, three villages were selected using simple random sampling without replacement. Thus, a total of 63 villages were selected. For each selected village, a list of farm families was prepared, and from each village about 10 households were selected using simple random sampling method without replacement. Thus, a total of 180 farm households each from the subtropical, temperate, and intermediate zones and 90 farm households from cold arid zone were selected for investigation. The information was collected in a pretested well-structured questionnaire.

2.3 Empirical method

Logistic regression: Logistic regression deals with situations in which the dependent variable has only two possibilities; 0 and 1.

A binary logistic regression model was applied to identify factors influencing the participation in non-farm activities. This can be expressed as follows:

$$Ln[p/1\text{-}p] = b_0 + b_1x_1 + b_2x_2 + b_3x_3 \ldots b_kx_k \qquad \ldots(1)$$

Here, p is the probability of participation, b_0 is the intercept and x_1 to x_k represent the independent variables.

The Nagelkerke's R^2 was used as measure of determination of variation caused by the predictor variables. For validation, the chi-square and Hosmer–Lemeshow goodness-of-fit tests were used.

3 Results and discussion

On average, the age of the sampled household-heads was 50.13±14.04 years, majority of them were adults (56%), and most of them were males (table 1). So far education is concerned, it was found that about one-fourth of the household-heads had received education upto middle school while one-third were illiterate. On average, household-heads had schooling of 6.25 years. The average farming experience of the sample farm household-heads was 30.22 years. The average family size was the highest in cold arid zone (6.38) followed by the intermediate (6.12), temperate (6.07), and subtropical (5.76) zones. On the whole, the average family size was 6.04. The families were further classified as nuclear and joint families. In all the agro-climatic zones, both the nuclear and joint family

Table 1. Demographic profile of the sample households' head

Variable	Agro-climatic zones				Total
	Subtropical (*n*=180)	Intermediate (*n*=180)	Temperate (*n*=180)	Cold arid (*n*=90)	(*n*=630)
Mean age (in years)	53.29±13.97	50.23±13.70	46.56±13.48	50.74±14.53	50.13±14.04
Age group (in %)					
Adolescent (11–17 years)	0	0	0	0	0
Young adults (18–40 years)	22	27	39	34	30
Adults (41–65 years)	58	61	53	49	56
Old (>66 years)	20	12	8	17	14
Average formal schooling (in years)	7.03±4.64	6.36±4.95	5.53±4.97	5.99±4.97	6.25±4.89
Illiterate (%)	26	29	39	35	33
Literate (%)	74	71	61	65	67
Level of education (%)					
Lower Primary (class 1st - 5th)	2	6	3	6	4
Primary (class 5th -7th)	8	13	7	4	8
Middle (class 8th – 9th)	25	25	24	21	24
Matriculate (class 10th – 11th)	29	13	16	21	20
Higher Secondary (12th)	6	8	7	9	7
Graduate and above	4	6	4	4	4
Average farming experience (in years)	30.02 ±14.21	30.52±14.32	27.99±14.43	34.51±15.47	30.22±14.6
Average family size (No.)	5.76	6.12	6.07	6.38	6.04
Gender of the household head (%)					
Male	96	95	93	99	95
Female	4	5	7	1	5
Average landholding size (ha)	0.95±0.82	0.76±0.66	0.59±0.66	0.49±0.58	0.73±0.72
Average number of fragments	2.80±2.87	1.43±1.89	2.28±2.75	2.88±2.99	2.27±2.67

Source: Authors' calculations

Table 2. Credit availed by the farm households during 2016/17 (in %)

Components	Agro climatic zones				
	Subtropical (*n*=180)	Intermediate (*n*=180)	Temperate (*n*=180)	Cold arid (*n*=90)	Total (*n*=630)
Credit availed	28	16	22	6	19.50
Sources of credit*	(*n*=50)	(*n*=29)	(*n*=39)	(*n*=5)	(*n*=123)
Commercial bank	34	17	40	40	32
Private moneylender	0	24	0	0	7
Kisan Credit Card (KCC)	50	28	54	60	44
Non-government organizations (NGOs)	2	0	0	0	1
Neighbours	0	10	0	0	3
Relatives	22	21	15	20	20

Source: Authors' calculations
Note: *= Multiple responses.

systems were present but the nuclear system was predominant (58%).

The average landholding size was 0.95 ha in subtropical zone, followed by intermediate (0.76 ha), temperate (0.59ha), and cold arid (0.49ha) zones. The average landholdings are consistent with that reported in Agricultural Census 2010-11.

Table 2 shows the proportion of households accessing credit from different sources. About one-fifth of the farm households had availed credit, of which 32% availed credit from commercial banks, and of these 44% availed through Kisan Credit Card (KCC). A small proportion of the households availed credit from the non-government organizations (NGOs) and neighbours. About one-fifth of the farm households had also sought credit from their relatives.

The number of different livestock species maintained by the farm households is shown in table 3. The average number of goats and sheep possessed by households was 6.58 and 6.03, respectively. Farm households also owned on average two cows and two buffaloes. They

Table 3. Average number of livestock per household

Type of livestock	Agro-climatic zones				
	Subtropical (*n*=180)	Intermediate (*n*=180)	Temperate (*n*=180)	Cold arid (*n*=90)	Total (*n*=630)
	Average animal per household	Average animal per household	Average animal per household	Average animal per household	Average animal per household
Milch animals					
Cow	1.5±0.62	2±0.88	1.70±0.89	1.5±0.57	1.67±0.96
Buffalo	1.52±0.72	2±0.80	2.04±2.15	10.91±7.18	1.7±1.34
Livestock					
Goat	2.3±1.70	5±10.28	5.44±6.65	8.04±5.84	6.58±8.10
Sheep	3.12±3.75	6±9.45	5.35±5.38	2.23±4.72	6.03±6.37
Poultry birds	3.33±2.51	8±8.18	3.80±2.04	6±4.06	5.77±5.78
Draft animals					
Mule	1.5±0.89	1.85±0.83	1.6±0.96	2.7±1.33	1.90±1.14
Other	0.00	0.00	2.01±1.48	1.25±0.5	13±27.93

Source: Authors' calculations

Table 4. Household occupation (%)

Parameter	Agro-climatic zones				Total (*n*=630)
	Subtropical (*n*=180)	Intermediate (*n*=180)	Temperate (*n*=180)	Cold arid (*n*=90)	
Households exclusively dependent on agriculture	9	5	4	10	7
Households having other source of income also	91	95	96	90	93

Source: Authors' calculations

also possessed a few poultry birds (5.77/ household) in their backyards.

Overall, 7% farm households were exclusively dependent on agriculture, whereas 93% were simultaneously engaged in non-farm activities (table 4). The sole dependence on agriculture was highest in the cold arid zone and lowest in the temperate zone.

Table 5 shows household income obtained from different sources annually, namely, incomes from cultivation of crops, rearing livestock, and non-farm sources such as business remittances and pension. On average, the income from non-farm sector (Rs. 117,643) was more than that obtained from agriculture (Rs. 77,623). It indicates significance of participation in non-farm activities by farmers (table 6). Furthermore, the results in table 7 reveal that income obtained from government services was higher than that from other non-farm activities. Empirical evidences from the sub tropics of Jammu and Kashmir

Table 5. Households' average annual income obtained from different sources (Rs./annum)

Components	Average annual income				
	Subtropical (*n*=180)	Intermediate (*n*=180)	Temperate (*n*=180)	Cold arid (*n*=90)	Overall (*n*=630)
Average annual on-farm income (Rs. per household)	160,751	45,922	48,581	50,572	77,623
Field crops	19,241	7,477	6,661	7,258	11,329
Maize	6,781	6,897	5,683	5,895	6,722
Rice	31,610	7,260	10,770	0	21,164
Wheat	18,647	8,693	7,506	7,837	12,490
Mustard	5,649	2,583	2,803	781	2,995
Bajra	15,916	1,000	0	0	9,950
Barley	0	0	1,078	7,061	6,536
Dairy cum livestock products	45,632	3,3205	4,718	15,683	34,823
Milk	47,435	36,288	3,942	32,009	40,042
Milk product	64,800	24,086	3,040	23,700	23,903
Animal sales	30,000	21,333	18,000	4,000	19,538
Wool	213	1,828	1,009	1,801	1,386
Vegetables	15,444	21,684	46,239	14,369	22,609
Horticulture	0	3,397	14,178	21,200	13,814
Apricot	0	0	0	20,000	16,700
Walnut	0	3,082	14,550	3,500	11,539
Apple	0	4,500	11,083	37,000	19,156
Average non-farm income (in Rs. per households)	139,446	98,767	85,248	356,057	117,643

Source: Authors' calculations

Table 6. Share (%) of households' participation in different farm and non-farm activities

Activities*	Agro-climatic zones				Total
	Subtropical (*n*=180)	Intermediate (*n*=180)	Temperate (*n*=180)	Cold arid (*n*=90)	(*n*=630)
On-farm economic activities					
Crop production	100	100	100	100	100
Horticulture	00	12	31	46	32
Vegetables	3	11	6	34	11
Dairy	84	77	70	73	77
Poultry	00	3	5	0	3
Milk products	1	2	1	8	2
Wool	2	4	17	22	10
Sale of animals	6	4	8	1	5
Others (bee-keeping, cattle rearing, and sericulture)	1	0	1	0	1
Non-farm activities (dummy variables)					
Labour	41	46	55	20	43
Government service	33	33	23	58	34
Private job	26	11	11	9	15
Business	6	12	12	8	10
Skilled labour	3	7	7	2	5
Daily wage labour	1	2	2	2	2
Paying guest	0	0	0	4	1
Other	4	4	3	7	4
Exclusively agriculture	9	5	5	9	7

Source: Authors' calculations
Note: *= Multiple responses.

shows that more than 70% of the farm households are involved in nonfarm economic activities (Peshin et al. 2013; Bano et al. 2016; Peshin et al. 2018).

The average on-farm income was Rs. 77,623 from different enterprises, including crops and animal husbandry. Overall, the income from milk was Rs. 40,042, followed by milk products (Rs. 23,904), vegetables (Rs. 2,609), rice (Rs. 21,164), animal sales (Rs. 19,538), apple (Rs.19,156), wheat (Rs. 12,490), and apricot (Rs. 16,700). Average annual income from bajra (Rs. 9,950), barley (Rs. 6,536), rapeseed mustard (Rs. 2,995), and wool (Rs. 1,386) did not contribute much to the on-farm income.

The factors that determine participation in non-farm activities are shown in table 8. Logistic regression was estimated with the forward conditional method. The explanatory variables include landholding size, credit availed, family type, persons involved in agriculture in the family, educational status, animals possessed, distance from road, and the number of land fragments. From the selected explanatory variables, the coefficient of educational level was found positive and significant at 5% level. Each additional year of schooling increases participation in non-farm activities by almost 1%. This is because higher education improves skills that may act as a pull factor to diversify towards non-farm activities. The operational landholding had a negative impact on participation in non-farm activities. These results are in line with the studies of Apind et al. (2015) and Eshetu and Mekonnen (2016) who indicated that farm size had negative effect on non-farm works. It implies that the increase in operational landholding decreases the participation in non-farm activities.

The coefficient of family size was also found to be positive and significant at 1% level. This implies that

Table 7. Contribution of income from different components towards total income (%)

Components	Agro-climatic zones				Total (n=630)
	Subtropical (n=180)	Intermediate (n=180)	Temperate (n=180)	Cold arid (n=90)	
Non-farm income					
Labour	16	17	26	2	20
Government service	66	66	51	42	59
Private job	13	5	11	1	9
Business	3	6	7	3	5
Skilled labour	1	4	3	1	2
Daily wage labour	0	1	1	0	1
Paying guest	0	0	0	0	0
Other	0	2	1	50	8
On-farm income					
Crop production	50	32	25	18	33
Livestock	49	65	58	51	57
Horticulture	1	3	12	31	6
Subsidiary*	0	0	5	0	1

Source: Authors' calculations
*Note: Subsidiary includes vegetable farming, poultry, animal wool, sale of animals

Table 8. Regression results for participation in non-farm activities

	Dependent variable = participation in non-farm activities				
Independent variables	B	S.E.	Wald	p-value	Modal statistic
Education	0.097	0.038	6.597	0.010	R-square = 0.172 (17%)-2 log-
Operational landholding	-0.464	0.224	4.285	0.038	likelihood= 265.072Chi-square=
Farm machinery possession	-0.515	0.190	7.325	0.007	43.402, p= 0.001Predicted
Family size	0.528	0.104	25.842	0.001	percentage = 93.3
Constant	0.096	0.520	0.034	0.854	

Source: Authors' calculations

larger the family size, greater the participation in non-farm activities. This might be due to the fact that increase in family size with a limited farm size compels households to diversify into other income-generating activities. The farm machinery was found negatively impacting the participation in non-farm activities.

4 Conclusion

The present study was conducted to analyse participation of farm households in non-farm activities in Jammu and Kashmir state of India. The nonfarm activities were categorized into different types, namely, non-farm labour, government services, private job,

business, skilled labour, daily wage labour, and paying guests and others. The results indicate that non-farm labour is the most common non-farm activity, while the government service is the second-most important activity. Education has significant influence on participation in nonfarm activities. Furthermore, the households with large family size are involved more in non-farm activities.

References

Apind, B. O., Lagat, J. K., Bett, H. K., & Kirui, J. K.(2015). Determinants of small-holder farmers' extent of market participation: case of rice marketing in Ahero irrigation

scheme, Kenya. Journal of Economics and Sustainable Development, 6(2), 154–160.

Bano, F., Peshin, R., Wali V. K., & Sharma, L.K.(2016). How policy intervention impacted adoption of mango (*Mangifera indica*) cultivation in subtropics of Jammu, India? Indian Journal of Ecology, 43, 552-556.

Barrett, C., Bezuneh, M., & Aboud, A.(2001). Income diversification, poverty traps and policy shocks in Côte d'Ivoire and Kenya. Food Policy, 26(24), 367–384.

Eakin, H.(2005). Institutional change, climate risk, and rural vulnerability: cases from central Mexico. World Development,33(11), 1923–1938.

Ellis, F.(1998).Household strategies and rural livelihood diversification. Journal of Development Studies,35(1), 38.

Ellis, F.(2000).The determinants of rural livelihood diversification in developing countries. Journal of Agricultural Economics, 51(2), 289–302.

Eshetu, F., & Mekonnen, E. (2016). Determinants of off farm income diversification and its effect on rural household poverty in GamoGofa Zone, Southern Ethiopia. Journal of Development and Agricultural Economics, 8(10),215–227.

FAO, IFAD, WFP(2014). The state of food insecurity in the world. FAO, Rome.

IFAD(2010). Rural Poverty Report 2011.International Fund for Agricultural Development, Rome.

Jatav, M. (2010).Casualisation of workforce in rural non-farm sector of India: a regional level analysis across industries. The Indian Journal of Labour Economics, 53(3), 501–516.

Jatav, M., &Sen, S. (2013).Drivers of non-farm employment in rural India: evidence from the 2009-10 NSSO Round. Economic and Political Weekly, 48(26–27),14–21.

Morton, J.F. (2007). The impact of climate change on smallholder and subsistence agriculture. Proceedings of the National Academy of Sciences,104(50),19680–19685.

Peshin, R. Sharma, R., Gupta, V. and Ajrawat, B. (2013).Impact evaluation of the government intervention in procurement of rice: Project report. Division of Agricultural Extension Education, Sher-e-Kashmir University of Agricultural Sciences and Technology of Jammu, India.

Peshin, R., Sharma, R., Kumar, R., Sharma, L.K., Dwivedi, S., Nanda, R., Gupta, V., &Risam, Kernel S. (2018).Technology adoption by small-scale full-time and part-time family farm households in the subtropics of Jammu & Kashmir. Agricultural Economics Research Review 2018, 31(2), 259-269.

Reardon, T., Berdegue, J., Barrett, C.B., &Stamoulis, K. (2007).Household income diversification into rural nonfarm activities. In: Transforming the rural non-farm economy: opportunities and threats in the developing world (S. Haggblade, P. Hazell, &T. Reardon, eds.). Johns Hopkins University Press, Baltimore.

Tschakert, P. (2007). Views from the vulnerable: understanding climatic and other stressors in the Sahel. Global Environmental Change, 17(3), 381–396.