Indian Journal of Agricultural Economics 79: 2 (2024):256-270
DOI:10.63040/25827510.2024.02.006

Economic Dynamics of Household Income, Consumption Expenditure and Poverty among Agricultural Households in Mountainous States of India

H. R. Sharma,[1] Shakir Hussain Malik[2] and Rajeev Sharma[2]

ABSTRACT

The study, using unit level data from two latest nationally representative surveys, examines changes in the levels and sources of household income, consumption expenditure, and incidence of poverty among agricultural households in mountainous states of India. It also identifies factors affecting household income and the probability of an agricultural household falling below the poverty line in each state. The results show that a significant decrease in the per cent share of income from cultivation is accompanied by a significant increase in the share of income from wages and salary. The results also show that the average annual income of such households is higher than their average annual consumption expenditure in most states and a significant decrease in poverty among them.

Keywords: Income, consumption, poverty, growth rates, rural non-farm income.

JEL Codes: O13, O18, Q12, Q18

I

INTRODUCTION

The rising disparities between wage earnings in the agricultural and non-agricultural sectors and slow growth in farmers' income have recently engaged the attention of both scholars and policymakers (Chand, 2008). Consequently, policymakers are paying increasing attention to raise farmers' income besides boosting the production and productivity of various crops. A number of studies based on survey data in the non-mountainous states of the country and also in African and Asian countries have documented, *inter alia*, increasing diversification of sources of income of agricultural households coupled with increasing contribution of non-farm sector towards their total income (Rawal *et al.*, 2008; Judit *et al.*, 2017; Khatun and Roy, 2016; Saha and Bahal, 2014; Michler, 2020; Choithani *et al.*, 2021; Datta *et al.*, 2014). Similarly, the studies using NSSO situation assessment survey data of different rounds confined to twenty-one major states excluding mountainous states have shown that a decrease in the contribution of income from cultivation towards the total income of agricultural households is accompanied by an increase of varying degrees in the contribution of income from wages & salary (Narayanamoorthy and Sujitha, 2021; Sharma *et al.*,2024). However, a thorough review of the literature shows that not many studies have examined changes in household income, consumption expenditure, and

[1] Former Professor of Economics, Central University of Himachal Pradesh, Dharamshala, [2] Assistant Professors, Amity School of Liberal Arts, Amity University Jaipur, Rajasthan.

incidence of poverty among agricultural households in the mountainous states of the country. As a matter of fact, we have not come across any study that has explored issues such as changing levels and importance of different sources of income, consumption expenditure, the incidence of poverty, and determinants of income and poverty among agricultural households in the mountainous states of the country. It is against this background that the present study, using unit level data from the 70th (2012-13) and the 77th (2018-19) NSS rounds of Situation Assessment Surveys, is an attempt to fill this conspicuous gap in the literature by addressing the issues mentioned above for each of the eleven mountainous states of India which include Jammu & Kashmir, Uttarakhand, Himachal Pradesh, Sikkim, Arunachal Pradesh, Manipur, Meghalaya, Mizoram, Nagaland, Tripura, and Assam. The paper is structured in six sections. Section I provides the background of the study. Section II briefly discusses the data and the econometric tools employed to quantify factors affecting household income and poverty. The changes in the amount of nominal and real income and relative contribution of different sources towards total household income between 2012-13 and 2018-19 and compound growth rates in nominal and real income during this period have been discussed in Section III. Section IV discusses state-wise changes in consumption expenditure, adequacy of household income to meet household consumption expenditure, and incidence of poverty among agricultural households. The determinants of household income and the probability of a household falling below the poverty line in different states are discussed in Section V. Section VI summarises the main conclusions of the study.

II

DATA AND METHODS

The paper draws on the unit level data available from the 70th NSS round (2012-13) and the 77th NSS round (2018-19) situation assessment surveys. A comparison of the definitions and concepts used in the two surveys reveals that data from these two rounds is broadly comparable. In the 70th round, an agricultural household is defined as an 'agricultural production unit' that produces field crops, horticultural crops, livestock, and the products of any of other specified agricultural activities with or without possessing and operating any land receiving value of produce more than Rs.3000/- from agricultural activities and having at least one member self-employed in agriculture either in the principal status or in the subsidiary status during the last 365 days. There is no change in the definition of an agricultural household in the 77th round except that the value of the produce received from agricultural activities by an agricultural household has been increased to Rs. 4000/- to account for inflation during the period. The data of the two rounds is broadly comparable as Rs. 4000/-, which has been used as a cut-off to select agricultural households in 2018-19, amounts to Rs. 3120/- at 2012-13 prices. Regarding the data, in the 70th round, these are available from four sources: income from cultivation, farming of animals, wages and salary, and

income from non-farm business. However, in the 77th round, the data for two other sources of income (remittances and pension, and rent from leasing out land) were also collected. However, we have not considered data from these two sources as their contribution to household income is negligible in most states. Compound growth rates have been computed to estimate changes in total income and income from different sources. The incidence of poverty has been estimated for 2012-13 using the Tendulkar Committee's formula (Sharma and Malik, 2022). The poverty lines for different states are multiplied by the average household size in each respective state to arrive at monthly poverty line equivalent income. Since the poverty line for different states is not available for 2018-19, we have used the poverty line of 2012-13 to estimate the incidence of poverty in 2018-19.

To identify the factors affecting household income, the log linear multiple regression model was applied to the pooled data. The model is expressed below.

$$ln\ Y_i = a + b_1 lnX_1 + b_2 lnX_2 + \ldots\ldots + b_k lnX_k + u_i \qquad for\ i = 1, 2, \ldots\ldots n.$$

Where Y_i is the dependent variable, X_i*'s* are independent variables and a, b_1, b_2 and b_k are parameters, and u_i is a stochastic disturbance term.

Similarly, a logit regression model has been estimated for each of the eleven states by pooling the unit level data of both years to identify factors affecting the probability of a household being poor. In a logistic regression model, the dependent variable is binary or dichotomous, taking the value 1 or 0. In our model, it takes the value 1 for households below the poverty line and '0' otherwise. The functional form of the logistic regression equation is given below:

$$Logit(p) = a_0 + a_1 x_1 + a_2 x_2 + \ldots\ldots + b_k x_i,$$ where x_i are independent variables.

III

CHANGES IN HOUSEHOLD INCOME

Table 1 presents the nominal annual income of agricultural households from different sources in 2012-13 and 2018-19 across mountainous states. The table shows wide variations in the income levels of agricultural households across these states. For instance, in 2018-19, the annual household income of these households from all sources varied from Rs. 95308 in Nagaland to Rs. 344835 in Meghalaya. Among different sources, income from cultivation varies from Rs 13925 in Nagaland to as high as Rs.248450 in Meghalaya. Further, while income from farming animals across states is the lowest in Meghalaya (Rs. 8243) and the highest in Arunachal Pradesh (Rs 41367), income from wages & salary among these states varies from Rs. 35733 in Arunachal Pradesh to Rs. 142431 in Jammu & Kashmir. Income from non-farm business across these states is as low as Rs. 961 in Nagaland and as high as Rs. 68944 in Arunachal Pradesh.

TABLE 1. SOURCE WISE AVERAGE ANNUAL NOMINAL INCOME OF AGRICULTURAL HOUSEHOLDS ACROSS MOUNTAINOUS STATES: 2012-13 TO 2018-19

(Rs.)

State/Source of Income	Cultivation		Farming of animals		Wages & salary		Non-farm business	
	2012-13	2018-19	2012-13	2018-19	2012-13	2018-19	2012-13	2018-19
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Arunachal Pradesh	80020	61853	14948	41367	24895	35733	10892	68944
Assam	50455	38906	9187	10414	17167	66972	3084	8071
Himachal Pradesh	35017	34389	12812	17922	48285	76809	9784	14896
Jammu & Kashmir	36671	61944	9415	17304	88181	142321	18084	29593
Manipur	35074	37346	16005	25644	45631	49795	6845	13470
Meghalaya	77720	248450	8144	8243	45379	83255	10837	4887
Mizoram	54766	54633	10447	17265	43845	78678	314	11510
Nagaland	38458	13925	16757	32857	64784	47565	739	961
Sikkim	20373	46481	11832	9664	37365	77591	12010	5596
Tripura	33380	34661	3804	9008	26262	59567	1976	12972
Uttarakhand	30367	62202	9990	32199	12877	44822	2950	12867
All India	36840	45950	9324	15601	24807	68947	6213	7707

The annual household income at constant prices in these states is given in Table 2. The table shows that it is highest in Meghalaya (Rs. 36298), followed by Jammu & Kashmir (Rs. 26438) and Arunachal Pradesh (Rs. 21884), and lowest in Nagaland (Rs. 10032). Among different sources of income, while income from cultivation varies from a low of Rs. 1466 in Nagaland to a high of Rs. 26153 in Meghalaya, income from farming of animals is the highest in Arunachal Pradesh (Rs. 4354) followed by Nagaland (Rs. 3459) and Uttarakhand (Rs.3389) and the lowest in Meghalaya (Rs. 868). Annual household income from wages & salary varies hugely from Rs. 3761 in Arunachal Pradesh to Rs. 14981 in Jammu & Kashmir. Annual income from the non-farm business is less than rupees one thousand in four states, namely, Nagaland, Meghalaya, Sikkim, and Assam, whereas, in the remaining states, it varies between rupees one thousand to two thousand except for Arunachal Pradesh and Jammu & Kashmir where it is comparatively high at Rs.7257 and Rs.3115, respectively. In

TABLE 2 SOURCE WISE AVERAGE ANNUAL REAL INCOME OF AGRICULTURAL HOUSEHOLDS ACROSS MOUNTAINOUS STATES: 2012-13 TO 2018-19

(Rs.)

State/Source of Income	Cultivation		Farming of animals		Wages & salary		Non-farm business	
	2012-13	2018-19	2012-13	2018-19	2012-13	2018-19	2012-13	2018-19
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Arunachal Pradesh	10814	6511	2020	4354	3364	3761	1472	7257
Assam	6818	4095	1241	1096	2320	7050	417	850
Himachal Pradesh	4732	3620	1731	1887	6525	8085	1322	1568
Jammu & Kashmir	4956	6520	1272	1821	11916	14981	2444	3115
Manipur	4740	3931	2163	2699	6166	5242	925	1418
Meghalaya	10503	26153	1101	868	6132	8764	1464	514
Mizoram	7401	5751	1412	1817	5925	8282	42	1212
Nagaland	5197	1466	2264	3459	8755	5007	100	101
Sikkim	2753	4893	1599	1017	5049	8167	1623	589
Tripura	4511	3649	514	948	3549	6270	267	1365
Uttarakhand	4104	6548	1350	3389	1740	4718	399	1354
All India	4978	4837	1260	1642	3352	7258	840	811

comparison to all-India averages, the data for different states presented in these two tables show a mixed pattern. For example, total annual household income and income from different sources in these states is higher than the all-India average in Arunachal Pradesh, Himachal Pradesh, Jammu & Kashmir, Meghalaya, Mizoram, Sikkim, and Uttarakhand and lower in Assam, Manipur, Nagaland, and Tripura. Further, inter-state comparison of income levels of agricultural households shows that these are higher in three western Himalayan states (Himachal Pradesh, Jammu & Kashmir, and Uttarakhand) as compared to most of the eastern Himalayan states (Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, and Tripura). The variations in the income levels from cultivation could largely be explained in terms of diversity in climate because of altitude, rainfall, and soil types along with latitudes and longitudes, which manifests itself into a bewildering variety of agro-climatic niches. Some of these variations in the income levels across these states can also be explained in terms of variations in the availability of irrigation facilities, agricultural land, gross sown area under fruits and vegetables, and cropping intensity (Sharma *et al.*, 2023).

Table 3 shows that the share of income from cultivation has decreased significantly in eight out of eleven states (Arunachal Pradesh, Assam, Himachal Pradesh Manipur, Mizoram, Nagaland, Tripura, and Uttarakhand) while it has remained nearly unchanged in Jammu & Kashmir and increased in Meghalaya and Sikkim.

TABLE 3 SHARE OF DIFFERENT SOURCES OF INCOME TOWARDS TOTAL INCOME OF AGRICULTURAL HOUSEHOLDS ACROSS MOUNTAINOUS STATES: 2012-13 TO 2018-19

(*per cent*)

State/Source of Income	Cultivation		Farming of animals		Wages & salary		Non-farm business		Farm income		Non-farm income	
	2012-13	2018-19	2012-13	2018-19	2012-13	2018-19	2012-13	2018-19	2012-13	2018-19	2012-13	2018-19
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Arunachal Pradesh	61.20	29.75	11.43	19.90	19.04	17.19	8.33	33.16	72.63	49.65	27.37	50.35
Assam	63.15	31.28	11.50	8.37	21.49	53.85	3.86	6.49	74.65	39.65	25.35	60.35
Himachal Pradesh	33.07	23.88	12.10	12.44	45.60	53.33	9.24	10.34	45.17	36.32	54.83	63.68
Jammu & Kashmir	24.07	24.66	6.18	6.89	57.88	56.67	11.87	11.78	30.25	31.55	69.75	68.45
Manipur	33.87	29.58	15.46	20.31	44.06	39.44	6.61	10.67	49.33	49.89	50.67	50.11
Meghalaya	54.70	72.05	5.73	2.39	31.94	24.14	7.63	1.42	60.43	74.44	39.57	25.56
Mizoram	50.07	33.71	9.55	10.65	40.09	48.54	0.29	7.10	59.62	44.36	40.38	55.64
Nagaland	31.85	14.61	13.88	34.47	53.66	49.91	0.61	1.01	45.73	49.08	54.27	50.92
Sikkim	24.97	33.36	14.50	6.94	45.80	55.69	14.72	4.02	39.47	40.30	60.53	59.70
Tripura	51.02	29.83	5.81	7.75	40.14	51.26	3.02	11.16	56.83	37.58	43.17	62.42
Uttarakhand	54.05	40.90	17.78	21.17	22.92	29.47	5.25	8.46	71.83	62.07	28.17	37.93
All India	47.73	33.25	12.08	11.29	32.14	49.89	8.05	5.58	59.81	44.54	40.19	55.46

Source: Computed by the authors using data from the source mentioned in Table 1.

Note: Farm income includes income from cultivation and animal farming and non-farm income includes income from wages and salary and non-farm business

Consequently, in 2018-19, the share of income from cultivation across these states varies from 14.61 per cent in Nagaland to around 41 per cent in Uttarakhand, with the notable exception of Meghalaya, where it is as high as 72 per cent. The contribution of income from farming animals has increased in Arunachal Pradesh, Manipur, Nagaland, Tripura, and Uttarakhand, decreased in Assam, Meghalaya, and Sikkim, and has remained almost unchanged in Himachal Pradesh and Jammu & Kashmir. Similarly, the per cent share of income from wages & salary has increased in six states (Assam, Himachal Pradesh, Mizoram, Sikkim, Tripura, and Uttarakhand) and decreased in the remaining five states (Arunachal Pradesh, Jammu & Kashmir, Manipur, Meghalaya, and Nagaland).The contribution of income from non-farm business towards total household income has increased during the period by varying degrees in most states except Jammu & Kashmir and Meghalaya where it has remained constant in the former and decreased in the latter. In brief, the per cent share of non-farm income, which includes income from wages & salary and non-farm business between 2012-13 and 2018-19, has increased significantly in seven states, namely, Arunachal Pradesh, Assam, Himachal Pradesh, Jammu & Kashmir, Manipur, Tripura, and Uttarakhand and varies from around 50 per cent to as high as around 70 per cent. It is also important to mention that the contribution of non-farm income sources in two Western Himalayan states, Himachal Pradesh and Jammu & Kashmir, is very high as compared to the eastern Himalayan states, which account for around 64 per cent and 68 per cent, respectively. These changes in the relative importance of different sources of income and the increase in the per cent share of non-farm income are consistent with the changes in the relative importance of different sources of income in other states of India (Narayanamoorthy and Sujitha, 2021; Sharma *et al.*, 2024) and also with the findings of several survey-based village studies conducted in other states of India and African and Asian countries. As mentioned above, these village-level studies have reported that there has been a huge diversification of income sources for agricultural households and that non-farm income sources contribute more than half of the total income of such households. The increase in the per cent share of non-farm income sources has been attributed to factors such as falling returns from cultivation, rise in employment opportunities in the non-farm sector, increase in the density of rural roads, emergence of small towns and increase in the migration of rural households (Rawal *et al.*, 2008; Himanshu *et al.*, 2013; Datta, 2016; Choithani, 2017; Choithani*et al.*, 2021; Datta *et al.* 2014; Alha, 2020; Judit *et al.*, 2017; Michler, 2020; Bryceson, 2002; Rigg, 2006).

The compound growth rates of income of agricultural households between 2012-13 and 2018-19 at current and constant prices are presented in Table 4. A perusal of the table shows that the income of these households at current prices across these states has recorded rates of growth varying from 3.36 per cent in Manipur to as high as around 18 per cent in Uttarakhand, with the sole exception of Nagaland, where the rate of growth is negative. The rate of growth at constant prices also varies widely from a low of 0.97 in Assam to as high as 13.24 per cent in Uttarakhand, with the exceptions of Manipur and Nagaland, where the growth rates are negative. Among different sources

of income, income from cultivation across most of the states has recorded either negative or negligible growth rates both at current and constant prices except in Jammu & Kashmir, Meghalaya, Sikkim, and Uttarakhand, where rates of growth are comparatively very high. However, income from farming animals has recorded positive and relatively high growth rates in most states except Sikkim, where these are negative, and Assam, which is negative at constant prices. The rates of growth in the income from wages & salary in most of the states are positive and high both at current and constant prices, with the notable exception of Nagaland, where these are negative

TABLE 4. COMPOUND GROWTH RATE OF NOMINAL AND REAL INCOME FROM DIFFERENT SOURCES OF AGRICULTURAL HOUSEHOLDS ACROSS MOUNTAINOUS STATES: 2012-13 TO 2018-19

(*per cent/annum*)

State/Source of Income	Cultivation		Farming of animals		Wages & salary		Non-farm business		Total income	
	Current prices	Constant prices	Current prices	Constant prices	Current prices	Constant prices	Current prices	Constant prices	Current prices	Constant prices
	2012-13 to 2018-19	2012-13 to 2018-19	2012-13 to 2018-19	2012-13 to 2018-19	2012-13 to 2018-19	2012-13 to 2018-19	2012-13 to 2018-19	2012-13 to 2018-19	2012-13 to 2018-19	2012-13 to 2018-19
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Arunachal Pradesh	-4.20	-8.11	18.49	13.66	6.21	1.88	36.01	30.46	8.04	3.63
Assam	-4.24	-8.14	2.11	-2.05	25.47	20.35	17.39	12.60	7.65	3.26
Himachal Pradesh	-0.30	-4.37	5.75	1.44	8.04	3.64	7.26	2.88	5.26	0.97
Jammu & Kashmir	9.13	4.68	10.68	6.16	8.31	3.89	8.55	4.13	8.69	4.26
Manipur	1.05	-3.07	8.17	3.76	1.47	-2.67	11.94	7.38	3.36	-0.86
Meghalaya	21.37	16.42	0.20	-3.88	10.64	6.13	-12.43	-16.00	15.93	11.20
Mizoram	-0.04	-4.12	8.73	4.30	10.24	5.74	82.26	74.83	6.78	2.42
Nagaland	-15.58	-19.02	11.88	7.31	-5.02	-8.89	4.47	0.21	-3.87	-7.79
Sikkim	14.74	10.06	-3.32	-7.26	12.95	8.35	-11.95	-15.54	9.33	4.87
Tripura	0.63	-3.47	15.45	10.74	14.63	9.95	36.84	31.26	10.05	5.56
Uttarakhand	12.69	8.10	21.54	16.58	23.11	18.09	27.82	22.61	18.05	13.24
All India	3.75	-0.48	8.96	4.51	18.57	13.74	3.66	-0.57	10.20	5.70

Source: Computed by the authors using data from the source mentioned in Table 1.

at both the prices and Manipur where it is negative at constant prices. Regarding income from non-farm business, growth rates vary hugely across states. For example, while some states like Arunachal Pradesh, Assam, Mizoram, and Uttarakhand have recorded exceptionally high rates of growth, Meghalaya and Sikkim have registered negative growth rates at current and constant prices. As compared to the all-India average, the rates of growth in the total household income, both at current and constant prices, are lower in all the states, with the notable exceptions of Jammu & Kashmir, Meghalaya, and Uttarakhand. The inter-state comparison further shows that rates of growth in the total household income, both at current and constant prices, are comparatively higher in Arunachal Pradesh, Assam, Jammu & Kashmir, Meghalaya, Sikkim, Tripura, and Uttarakhand.

IV

CONSUMPTION EXPENDITURE AND INCIDENCE OF POVERTY

Figures 1 to 4 present the average annual consumption expenditure of agricultural households across eleven states at current and constant prices for 2012-13 and 2018-19, while the growth rates between these two points of time are presented in Table 5. As seen from the Table and Figures, the average annual consumption expenditure across these states, at current and constant prices, is the highest in Jammu & Kashmir. Uttarakhand and Nagaland had the lowest consumption expenditure at current prices in 2012-13, while Sikkim and Nagaland had the lowest consumption expenditure at constant prices in 2012-13 and 2018-19 respectively. As compared to the all-India average, the data shows that consumption expenditure in 2012-13 is higher in most of the states except Assam, Sikkim, and Uttarakhand, while in 2018-19, it is lower than all-India average in as many as seven states (Arunachal Pradesh, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, and Tripura) which could be explained in terms of their lower growth rates vis-a-vis other states of the country. Regarding rates of growth between 2012-13 and 2018-19, Table 5 shows that both at current and constant prices, the rates of growth are either negligible or negative in most of the states and are also lower than the all-India average in seven out of eleven states, namely, Arunachal Pradesh, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, and Tripura. The percentage of agricultural households below the poverty line in different states is given in Table 6. The table shows that poverty among these households between 2012-13 and 2018-19 has decreased across states, and in 2018-19, it varied from a low 9.63 per cent in Meghalaya to around 47 per cent in Manipur and Mizoram. However, in comparison to the all-India average, the proportion of households below poverty is higher in as many as eight out of eleven states (Arunachal Pradesh, Himachal Pradesh, Manipur, Mizoram, Nagaland, Sikkim, Tripura, and Uttarakhand). Further, the incidence of poverty in two of the three western Himalayan states (Jammu & Kashmir and Uttarakhand) is comparatively low compared to most of the eastern Himalayan states. It is, however, important to mention that the average annual household income of agricultural households in both the years and both at current and constant prices, is significantly higher than the average annual household consumption expenditure across all these states except for Tripura and Uttarakhand where the average annual household income at current prices in 2012-13 is lower than average annual household consumption expenditure (Figure 1 to Figure 4).

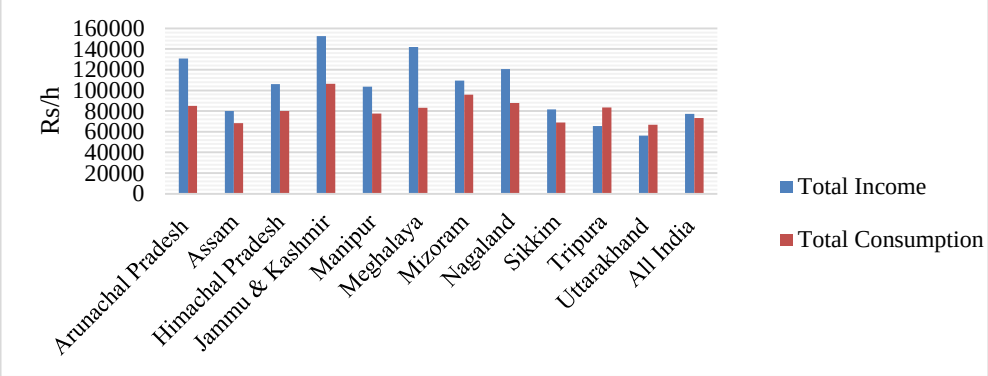

Figure 1. Average Annual Nominal Total Income and Consumption Expenditure of Agricultural Households,Mountainous States; 2012-13

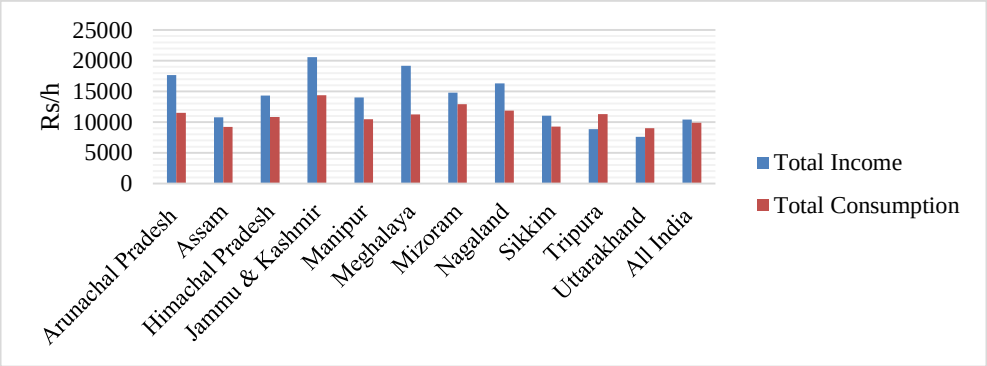

Figure 2. Average Annual Real Total Income and Consumption Expenditure of Agricultural Households, Mountainous States; 2012-13

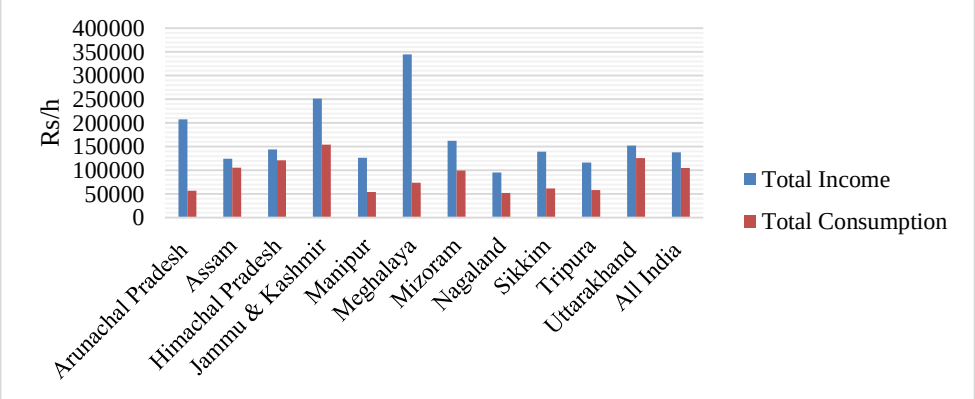

Figure 3. Average Annual Nominal Total Income and Consumption Expenditure of Agricultural Households, Mountainous States; 2018-19

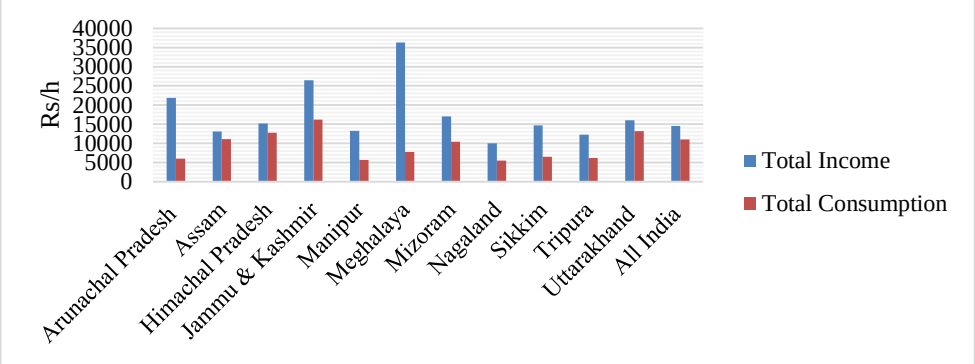

Figure 4. Average Annual Real Total Income and Consumption Expenditure of Agricultural Households, Mountainous States; 2018-19

TABLE 5 COMPOUND GROWTH IN CONSUMPTION EXPENDITURE OF AGRICULTURAL HOUSEHOLDS AT CURRENT AND CONSTANT PRICES ACROSS MOUNTAINOUS STATES: 2012-13 AND 2018-19

(Rs.)

State	CAGR (per cent) (2012-13 to 2018-19)	
	Current prices	Constant prices
(1)	(2)	(3)
Arunachal Pradesh	-6.52	-10.33
Assam	7.53	3.14
Himachal Pradesh	7.18	2.81
Jammu & Kashmir	6.37	2.03
Manipur	-5.79	-9.63
Meghalaya	-1.91	-5.91
Mizoram	0.61	-3.49
Nagaland	-8.30	-12.04
Sikkim	-1.82	-5.83
Tripura	-5.80	-9.64
Uttarakhand	11.14	6.61
All India	6.17	1.84

Source: Computed by the authors using data from the source mentioned in Table.

TABLE 6 INCIDENCE OF POVERTY AMONG AGRICULTURAL HOUSEHOLDS ACROSS MOUNTAINOUS STATES: 2013 AND 2019

State/source of income	Households below poverty line (Per cent)		Poverty line equivalent monthly income (Rs.)	Estimated number of agricultural households (00)	
	2012-13	2018-19		2012-13	2018-19
(1)	(2)	(3)	(4)	(5)	(6)
Arunachal Pradesh	40.70	30.59	5580	2159	3046
Assam	49.54	21.62	4140	68461	61996
Himachal Pradesh	54.96	38.10	4565	17622	20623
Jammu & Kashmir	49.11	22.79	5346	22566	19140
Manipur	55.06	47.17	6708	3524	4820
Meghalaya	34.60	9.63	5328	7087	7293
Mizoram	52.86	47.56	5330	1516	1522
Nagaland	45.69	42.41	6350	5242	3835
Sikkim	48.05	28.51	4650	1349	1304
Tripura	55.93	29.54	3990	4889	5782
Uttarakhand	69.94	28.68	4400	21216	19678
All India	50.18	25.12	4080	1804050	1858524

Source: Computed by the authors using data from the source mentioned in Table.

V

DETERMINANTS OF HOUSEHOLD INCOME AND POVERTY

As mentioned above, the multiple log linear regression model is estimated by pooling unit level data of both the years, i.e., 2012-13 and 2018-19 for each of the eleven states, to quantify factors affecting household income. A logit regression model has also been estimated for each state to quantify factors affecting the probability of a household falling below the poverty line. To begin with, all plausible variables expected to affect household income and incidence of poverty on which data is available are considered for estimating these models. However, models for different states have been re-estimated by dropping variables that are insignificant and have unexpected signs. As expected, the variables having a positive and significant effect on household income should have a negative and significant effect on the probability of a household falling below the poverty line. The results of the log linear multiple regression and logit models are respectively presented in Table 7 and Table 8.

Table 7 presents the results of the log linear models estimated separately for each of the eleven states to quantify the factors affecting the income of agricultural households. The table shows that the coefficients of most of the variables such as household size, age of the head of the household, head of the household being literate, head of the household engaged in wages & salary as a regular employee, head of the household engaged in non-farm business, head of the household engaged in livestock farming, farm size and head of the household aware of MSP have a positive and statistically significant effect on the income of a household in all states. However, the results are mixed insofar as other variables are concerned. For example, while the head of the household being male has a positive and statistically significant effect on household income in Himachal Pradesh, Manipur, and Uttarakhand, it has a negative and significant effect in Arunachal Pradesh, Assam and Sikkim. Similarly, the head of the household belonging to the general category has a positive and significant effect on household income in Meghalaya and Sikkim and a negative and significant effect in Uttarakhand and Manipur. Access to technical advice has a positive and significant effect on household income across all states except Mizoram, where it has a negative and significant effect.

The results of the logit regression model estimated to quantify the probability of an agricultural household falling below the poverty line for each of the eleven states are presented broadly consistent with the signs and statistical significance of the variables in the log linear regression model discussed above (Table 8). For instance, variables like household size, age of the head of the household, household being literate, head of the household being male, occupation as a regular salaried/wage worker, income from cultivation, household engaged in livestock farming, household engaged in non-farm business, awareness of MSP, access to technical advice have a negative and statistically significant effect on the probability of a household falling

TABLE 7 FACTORS AFFECTING INCOME OF AGRICULTURAL HOUSEHOLDS ACROSS MOUNTAINOUS STATES: RESULTS OF LOG REGRESSION ANALYSIS

State/ independent variables	Dependent variable: Household income from all sources												
	Household size	Age of head of the family	Gender: Male=1, else-0	Social category: General=1, else-0	Education: Literate=1, else=0	Occupation: Worked as regular salaried/wage employee=1, else-0	Engaged in non-farm business=1, else-0	Engaged in livestock=1, else-0	Farm-size (ha)	Awareness about MSP: Yes=1, else-0	Access to technical advice: Yes=1, else -0	R-squared	No. of observations
Arunachal Pradesh	0.4818*** (5.51)	1.1541*** (7.52)	-0.3326** (-2.40)	-	0.5041*** (6.65)	-0.6238*** (-6.89)	1.1840*** (11.68)	0.2352*** (3.26)	0.1874*** (7.19)	0.3410** (2.32)	0.8060*** (8.91)	0.3000	1444
Assam	0.2027*** (6.15)	0.1106** (2.10)	0.1309** (2.55)	-	0.1762*** (5.80)	-0.4840*** (-15.08)	0.2471*** (6.95)	0.0458* (1.71)	0.3755*** (29.54)	0.4184*** (7.45)	-	0.1702	7512
Himachal Pradesh	0.4283*** (8.62)	-0.2169** (-2.33)	0.3603*** (5.81)	-0.1439*** (-2.87)	-	-0.1836*** (-3.55)	0.6063*** (10.73)	0.5663*** (7.37)	0.2736*** (11.00)	0.4360*** (6.63)	0.1754*** (3.61)	0.2000	3180
Jammu & Kashmir	0.5510*** (11.24)	0.2764*** (3.07)	0.2396*** (2.64)	-	0.2890*** (6.33)	-0.1999*** (-4.47)	0.2419*** (4.94)	-	0.1980*** (9.28)	-	0.5101*** (11.18)	0.1386	3841
Manipur	0.2714*** (4.09)	-	0.5857*** (6.65)	-0.1430** (-2.11)	0.1406** (2.22)	-0.9950*** (-17.29)	0.3148*** (5.59)	0.2015*** (4.04)	0.3802*** (10.89)	0.5515* (1.82)	0.3866*** (7.23)	0.1968	2744
Meghalaya	0.4761*** (11.24)	-	-	0.3824*** (5.18)	0.1580*** (3.32)	-0.3306*** (-7.65)	0.2162*** (4.52)	-0.3707*** (-10.25)	0.3052*** (12.10)	0.3200*** (4.62)	0.3702*** (9.46)	0.1953	2718
Mizoram	0.5136*** (6.77)	-	-	-	0.6503*** (4.05)	-1.0931*** (-10.41)	1.0505*** (9.22)	0.1167** (2.07)	0.1578*** (4.63)	0.4202** (2.12)	-	0.1606	1867
Nagaland	0.1317 (1.16)	0.1404 (0.75)	-	-	-	-1.5317*** (-16.11)	-	0.2926*** (3.88)	0.1626*** (5.92)	0.7242*** (3.05)	-	0.2052	1272
Sikkim	0.4628*** (8.64)	0.1961** (2.24)	-0.1524** (-2.12)	0.7733** (2.09)	0.1641*** (3.13)	-0.6779*** (-13.62)	0.4400*** (7.93)	-	0.3182*** (12.66)	0.7611*** (6.78)	0.5894*** (8.45)	0.2592	2348
Tripura	0.2852*** (6.54)	0.1150* (1.67)	0.1809*** (2.60)	-	0.1605*** (4.06)	-0.3951*** (-8.78)	0.3129*** (6.77)	0.1171*** (3.38)	0.3610*** (19.40)	0.4445*** (11.92)	0.0968*** (2.97)	0.2322	3477
Uttarakhand	0.5128*** (9.56)	-	0.3713*** (5.02)	-0.2576*** (-4.93)	0.1288** (2.22)	-0.6176*** (-9.68)	0.3600*** (4.55)	0.2205*** (3.60)	0.4591*** (20.07)	0.6650*** (9.02)	-	0.4378	1735
All India	0.3192*** (50.14)	0.1489*** (13.11)	0.1644*** (14.14)	0.0773*** (11.62)	0.1989*** (29.57)	-0.3822*** (-48.72)	0.4729*** (53.70)	0.1367*** (21.39)	0.4097*** (134.42)	0.1935*** (26.91)	0.2033*** (33.35)	0.2001	160029

Note: (i) *, **, and *** denotes level of significance at 10, 5 and 1 per cent respectively; (ii) Figures in parentheses are 't' values.

Activate Windows

TABLE 8 FACTORS AFFECTING PROBABILITY OF AN AGRICULTURAL HOUSEHOLD BEING POOR ACROSS MOUNTAINOUS STATES: RESULTS OF LOGISTIC REGRESSION

State/ independent variables	Dependent variable: Household being poor=1; otherwise=0												
	Household size	Age of head of the family	Gender: Male=1, else-0	Social category: General=1, else-0	Education: Literate=1, else=0	Occupation: Worked as regular salaried/wage employee=1, else-0	Engaged in non-farm business=1, else-0	Engaged in livestock=1, else-0	Farm-size (ha)	Awareness about MSP: Yes=1, else-0	Access to technical advice: Yes=1, else -0	Pseudo R^2	No. of observations
Arunachal Pradesh	-0.5346*** (-3.57)	-1.6625*** (-6.10)	0.5539*** (2.28)	-0.3552* (-1.94)	-0.7716*** (-5.87)	1.2359*** (7.03)	-1.6389*** (-7.71)	-0.6294*** (-5.27)	-0.2951*** (-6.36)	-0.6261* (-2.40)	-1.1024*** (-6.56)	0.1855	1557
Assam	-0.3647*** (-5.36)	-	-0.2330* (-2.09)	-	-0.2090*** (-3.40)	0.8895*** (11.88)	-0.4899*** (-6.10)	-	-0.6211*** (-20.43)	-0.5524*** (-4.01)	-	0.0851	7694
Himachal Pradesh	-0.7444*** (-8.61)	0.3545* (2.30)	-0.5789*** (-5.40)	-	-	0.2978*** (3.47)	-1.1774*** (-11.81)	-0.3955*** (-3.02)	-0.2850*** (-7.12)	-0.6291*** (-5.50)	-0.2629*** (-3.28)	0.1205	3335
Jammu & Kashmir	-0.5394*** (-6.55)	-	- 0.6730*** (-4.49)	-	-0.2225*** (-3.08)	0.3556*** (4.74)	-0.6244*** (-7.37)	-	-0.3118*** (-9.12)	-	-0.7286*** (-9.82)	0.0735	4045
Manipur	-0.1056 (-0.86)	-	-0.8726*** (-5.26)	0.2274* (1.80)	-	1.3784*** (12.02)	-0.5618*** (-5.43)	-0.3163*** (-3.56)	-0.8458*** (-12.54)	-1.1809** (-1.99)	-0.5662*** (-5.83)	0.1186	2831
Meghalaya	-1.1778*** (-9.70)	-	-	-1.2715*** (-4.33)	-0.3733*** (-2.82)	0.6992*** (5.08)	-	1.1107*** (9.96)	-0.3914*** (-5.43)	-1.8133*** (-5.24)	-1.0538*** (-8.27)	0.1230	2756
Mizoram	-0.6620*** (-4.75)	-	-	-	-1.4989*** (-4.40)	1.3985*** (6.13)	-1.6883*** (-6.38)	-0.2285** (-2.24)	-0.4769*** (-6.19)	-0.9674** (-2.36)	0.4906*** (4.80)	0.0988	1910
Nagaland	-0.5129*** (-2.74)	-	-	2.4320* (2.06)	-	2.3863*** (13.62)	-	-0.8451*** (-6.46)	-0.1816*** (-3.59)	-1.3752*** (-2.95)	0.2979* (1.93)	0.1700	1470
Sikkim	-1.0430*** (-8.47)	-0.3394* (-1.95)	-	-	-	1.2762*** (9.76)	-0.5793*** (-4.32)	-	-0.3951*** (-6.81)	-1.5612*** (-4.46)	-1.1227*** (-5.68)	0.1236	2403
Tripura	-0.6541*** (-5.77)	-	-0.3247* (-1.83)	-0.1605* (-1.72)	-0.1871* (-1.89)	0.6012*** (4.97)	-1.0554*** (-7.20)	-0.1889** (-2.06)	-0.7568*** (-14.41)	-1.0427*** (-9.35)	-0.1591* (-1.88)	0.1332	3495
Uttarakhand	-0.6450*** (-5.14)	-	-0.5871*** (-3.42)	0.3954*** (3.34)	-	0.8397*** (5.83)	-0.9596*** (-5.63)	-	-0.6226*** (-11.17)	-1.4156*** (-7.87)	-	0.1985	1824
All India	-0.5708*** (-49.47)	-0.1923*** (-9.57)	-0.2091*** (-10.18)	-0.0356*** (-2.98)	-0.2658*** (-22.48)	0.5463*** (37.52)	-0.7248*** (-41.98)	-0.1654*** (-14.77)	-0.4756*** (-83.20)	-0.3156*** (-23.87)	-0.2941*** (-27.33)	0.0884	169858

Note: (i)*, **, and *** denotes level of significance at 10, 5 and 1 per cent respectively; (ii) Figures in parentheses are 'z' values.

below poverty in the logit model estimated separately for each of the states. Similarly, the effect of the head of the households being male increases the probability of a household falling below the poverty line in Arunachal Pradesh, Assam, Mizoram, Nagaland, and Sikkim and decreases it in Himachal Pradesh, Jammu &Kashmir, and Manipur. Again, a household belonging to the general category increases the probability of a household being poor in Manipur and reduces in Uttarakhand.

VI

CONCLUDING REMARKS

Rural India is undergoing a huge transformation in terms of diversification of income sources and changes in the relative importance of different sources of income of agricultural households. The data presented in this paper shows that mountainous states are no exceptions to this broad trend. The significant decrease in the importance of cultivation as a source of income is accompanied by an equally significant increase of varying degrees in the share of rural non-farm income, including income from wages & salary across all the mountainous states. The net effect of these changes has been a significant increase in the average annual income of these households, which is more than their annual household consumption expenditure in practically all the states, both in 2012-13 and 2018-19. This has resulted in a significant increase in the consumption expenditure of agricultural households and a decrease in the incidence of poverty. The underlying message that follows from the findings of this study and several other empirical studies conducted in some of the non-mountainous states of India and some Asian and African countries cited in the text is that the share of income from cultivation is becoming less and less important in sustaining the livelihoods of rural people. The broad policy implications which follow from this study and similar studies conducted in other states is that efforts should be made to speed up the mobility of rural households across sectors, regions, and states through the provision of basic infrastructural facilities like rural roads, promotion of rural towns, empowering rural people through skills and education, provision of micro credit and promotion of rural non-farm enterprises.

Received May 2024. *Revision accepted June 2024.*

REFERENCES

Alha, A. (2020). Non-farm diversification and agrarian change: The story of a semiarid village in Rajasthan, *Social Change*, 50(2), 254-271.

Bryceson, D. F. (2002). The scramble in Africa: Reorienting rural livelihood, *World Development*, 30(5), 725-739.

Chand, R. (2008). The state of Indian agriculture and prospects for future, in Kanchan Chopra and C. H. Hanumantha Rao (Eds.), *Growth, equity, environment and population: economic and sociological perspectives*, (133-148). New Delhi: Sage.

Choithani, C. (2017). Understanding the linkages between migration and household food security in India, *Geographical Research, 55*(2), 192-205.

Choithani, C., van Duijne, R. J. & Nijman, J. (2021). Changing livelihoods at India's rural-urban transition, *World Development*,146,1-17.

Datta, A. (2016). Migration, remittances and changing sources of income in rural Bihar (1999-2011): Some findings from a longitudinal study, *Economic and Political Weekly*,*51*(31),85-93.

Datta, A., Rodgers, G., Rodgers, J. & Singh, B. (2014). Contrasts in development in Bihar: A tale of two villages, *The Journal of Development Studies*,50(9),1197–1208.

Himanshu, Lanjouw, P.,Murgan R. & Stern, N. (2013). Non-farm diversification, poverty, economic mobility, and income inequality: A case study in village India, *Agricultural Economics*,44(4-5),461-473.

Judit, J., Wichmann, B. & Brent, M. S. (2017). Characterizing social networks and their effects on income diversification in rural Kerala, India. *World Development*, 94, 375-392.

Khatun, D. & Roy, B. C. (2016). Rural livelihood diversification in West Bengal, *Agricultural Economics Research Review*, 25(1),115-124.

Michler, J. D. (2020). Agriculture in the process of development: A micro-perspective. *World Development*, 129, 1-17.

Narayanamoorthy, A. & Sujitha, K. S. (2021). Trends and determinants of farmer household income in India: A comprehensive analysis of sas data, *Indian Journal of Agricultural Economics*,76(4), 620-642.

Rawal, V., Swaminathan, M. & Dhar, N. S. (2008). On diversification of rural incomes: A view from three villages of Andhra Pradesh, *The Indian Journal of LabourEconomics*,51(2), 229–248.

Rigg, J. (2006). Land, farming, livelihood and poverty: Rethinking the links in rural south, *World Development*,34 (1), 180-202.

Saha, B. & Bahal, R. (2014). Livelihood diversification pattern among the farmers of West Bengal, *Economic Affairs*,59(3), 395-409.

Sharma, H. R. & Malik, S. H. (2022). Farm Size and Farmers' Income, Consumption, and Poverty in India: Statewise Estimates of Direct Income Support to Farmer Households, *Economic and Political Weekly*, 57(26 & 27), 15-22.

Sharma, H. R., Malik, S. H. & Sharma, R. (2023). *Agricultural development in mountainous states of India Patterns, sources and determinants*, Keynote Paper presented in the International Conference on Agriculture in Hill and Mountain Landscape: An Interdisciplinary Perspective held on November 22-24, 2023 at Umiam, Meghalaya.

Sharma, H. R., Malik, S. H. & Bhatia, A. (2024). Understanding and explaining recent changes in income, consumption and poverty among agricultural households across major states of India, *Indian Economic Journal*, Forthcoming.