Original Research Article

Income Sufficiency Assessment of Rural Households: A case study of Malda District in West Bengal

ABSTRACT

The study investigated the income sufficiency of rural households in Malda district of West Bengal. The primary data of 60 randomly selected farmers was collected through survey method during 2023-24.The findings revealed that on an average rural household earns Rs. 2,60,555.47 per annum (Rs. 21,713/month) and spends Rs. 207448 annually (Rs. 17,287.35/month).Field crops (85.34 %), Agricultural labour (72.60%) and business earnings (34.75%)occupies the highest share in the farm, off-farm and non-farm income sources, respectively. Family size and annual income had a significant positive effect on both farm household annual food and non-food expenditure. The result further revealed that large farmers have significant level of financial sufficiency with highest income-expenditure ratio (1.64) followed by medium farmers (1.35), non-cultivators (1.19) and small and marginal farmers (1.16). Average propensity to consume was highest for small and marginal farmers (0.86) and lowest for large farmers (0.61). However, farm income sufficiency revealed thatfarm income is insufficient to cover expenses of small and marginal farmers.Although agriculture remained the primary source of income, engagement in non-farm activities significantly contributed to households' income sufficiency.Additionally, small land holdings and low wage rates are the major constraints in the region.Thus, policymakers should focus on an integrated strategy to enhance off and non-farm income opportunities along with capacity building programsin rural areas.

***Keywords*:**Non-farm income, Average Propensity to Consume, Income sufficiency, Rural household, Income-expenditure ratio

1. INTRODUCTION

Secondly India's identity as a primarily rural nation is underscored by the fact that over two-thirds of its population consisting of 17.97 crore households lives in rural areas.Nearly 70per cent of rural households primarily depend on agriculture for their livelihood, with 80per cent consisting of marginal and small-scale farmers (Anonymous 2019). The sustainability of land-based livelihoods for small and marginal farmers is increasingly compromised, necessitatingdiversification of their

income sources to ensure food security and avoidpoverty (Singh 2013, Birthal et al. 2014,Gururajet al.2017,Chuang2019,Arifin et al. 2021, Sharma et al. 2022, Abraham et al. 2023, Munjam et al. 2024).During periods of agricultural inactivity, marginal farmers and landless households often engage in off and non-farm activities like agricultural labour, casual labour, petty jobs etc. to supplement their income (Hemalatha et al. 2013, Singh 2013, Sharma et al. 2017). In West Bengal, the contribution of the primary sector to the gross state domestic product (at constant prices)has been gradually decreasing, currently standing at 19.91per cent in the fiscal year 2020-2021. The share of men and women employed in agriculture had dropped to 56.8per centand 41.6per cent, respectively in 2011-12 underscoring a critical shift away from agriculture towards other sectors of the economy.

Malda is one of the economically and agriculturally least developed regions in West Bengal with about 87per cent of its population living in rural areas and approximately 92 per cent relying directly or indirectly on agriculture and related activities (Anonymous 2014). However, significant changes have been reported in occupational patterns with rise in the proportion of the workforce engaged in non-agricultural sectors (Adhikary and Banerjee 2023). The workforce engaged in agriculture as primary operators has declined from 66.06per cent in 1961 to 23.93per cent in 2011whereas the workforce in non-agricultural sector has increased from 12.77per cent in 1961 to 34.95per cent in 2011. But the proportion of hired agricultural labourers has increased significantly from 21.17per cent in 1961 to 41.12per cent in 2011.This shift reflect changes in land ownership patterns, challenges of maintaining viable farming operations as well as diversification of livelihoods to other sectors outside of traditional agriculture (Roy, 2018).Household income and consumption expenditure are two direct financial indicators used to evaluate the economic well-being of a population(Lin et al. 2023).Analyzingrural household income from various sources and tracking consumption expenditure on different items is essentialbut assessing whether income is sufficient to cover expenses is a more accurate indicator of the financial stability of households in a given region. Itis crucial for policy formulation, as it providesbasic information that is essential to determine the requirements for planning rural livelihood diversification programmes.The demography of Maldawith rural dominance makes it relevant for this study.The following objectives were formulated to fulfil the aim of the study:

1. To estimate the sources of income across different groups of farmers

2. To evaluate the expenditure by various groups of farmers with varied income sources
3. To estimate sufficiency of income to cover expenditure of rural households
4. To analyse the obstacles hindering income and employment generation

Hypothesis:

H01: For farm households, agriculture serves a major source of income as compared to non-farm activities.

H02: The proportion of income derived from agriculture rises with the increase in landholding size.

H03: Households income is sufficient to cover their expenditures.

H04: As income increases, larger proportion of it is allocated to non-food items.

2. MATERIAL AND METHODS

The study is based on primary data collected using survey method. A sample of 60 farmers was selected randomly from six randomly selected villages, two from each block across three randomly selected blocks (Kaliachak, Manickchak, and English Bazar) of Malda district during 2023-24. Households were categorized into marginal, small, medium, large farmers, and non-farm households. A comprehensive analysis of rural livelihoods focusing on income diversification, expenditure patternsand the adequacy of income to sustain rural households was done using following tools.

Multiple Linear Regression Analysis was used to study factors affecting annual food and non-food expenditure. The following regression equation was utilized for this analysis:

$$Y = a + b_1X_1 + b_2X_2 + b_3X_3 + e$$

Where,

Y = Annual food expenditure of farm households/Annual non-food expenditureof farm households (Rs.)

X_1 = Size of the family members

X_2 = Structure of the family, 1 for joint family and 0 for nuclear family

X_3 = Annual income of farm households (Rs.)

b = Regression coefficients (Production elasticities)

e = Random disturbance term

To determine if the income is sufficient to cover expenses, both income and expenditure were analysed and the income-consumption ratio was calculated as follows:

$$\text{Income-Consumption Ratio} = \frac{Average\ Annual\ Income\ (Rs.)}{Average\ Annual\ Expenditure\ (Rs.)}$$

An income-consumption ratio greater than one indicates that the income is sufficient to meet the expenditure and vice versa.

Similarly, the farm income-consumption ratio was calculated to assess whether farm income alone is sufficient to cover the expenses (Singh, 2013):

$$\text{Farm Income-Consumption Ratio} = \frac{Average\ Annual\ Farm\ Income\ (Rs.)}{Average\ Annual\ \ Expenditure\ (Rs.)}$$

For farm households, if the agriculture income-consumption ratio is greater than one, it indicates that agricultural income alone is adequate to meet their expenditure.

Average propensity to consume measures the fraction of income that is spent by an individual out of his disposable income instead of saving. It was worked out using the following formula:

$$\text{Average propensity to consume} = \frac{Total\ Consumption\ (Rs.)}{Total\ Disposable\ Income\ (Rs.)}$$

Garret's ranking technique: To analyse the obstacles hindering income and employment generation, Garret ranking technique was used. The technique arranges the constraints based on their perceived importance from the respondents' perspectives. Garret's formula for converting ranks into percent position is given by,

$$\text{Percent position} = 100*(R_{ij} - 0.5)/N_j$$

Where,

R_{ij} = rank given for ith factor by jth individual

N_j = number of factors ranked by jth individual

The percentage position of each rank was converted into scores using the table provided by Garret and Woodworth (1969). For each factor, the scores from individual respondents were summed and then divided by the total number of respondents whose scores were included. These average scores for all factors were then organized in descending order, assigned ranks, and the most important factors were identified.

3. RESULTS AND DISCUSSION

Source wise average farm income: Field crops occupies the lion's share (85.34per cent) in the farm income sources (Table 1). Non-cultivators have minimal farm income, averaging only Rs. 11,706.67 as they do not engage in crop cultivation activities. Small and marginal farmers rely significantly on farm income, with an average of Rs. 67,968. Their primary source of farm income is from field crops (75.55%) followed by livestock (17.76%). Medium and large farmers on an average earn Rs. 177,417 & Rs. 348,755.5. Their major income source is field crops (~90%) reflecting their extensive land resources and investment in high-yield crops.

Table1: Source wise average farm income of sample households(Rs. /farmer/annum)

Particulars	Non-cultivators	Small and marginal farmers	Medium farmers	Large farmers	Total
Field Crops	0.00 (0.00)	51353.00 (75.55)	158910.00 (89.57)	314695.50 (90.23)	109294.40 (85.34)
Horticulture	0.00 (0.00)	4602.50 (6.77)	11750.00 (6.62)	29135.00 (8.35)	9327.50 (7.28)
Livestock	11706.67 (100.00)	12012.50 (17.67)	6757.00 (3.80)	4925.00 (1.41)	9440.92 (7.37)
Total farm income	11706.67 (100.00)	67968.00 (100.00)	177417.00 (100.00)	348755.50 (100.00)	128062.80 (100.00)

Note: figures in the parentheses indicate the percentages

Source wise average off-farm income. Non-cultivators earn an average off-farm income of Rs. 44,393.33, highest in all the categories (Table 2). This income primarily comes from agricultural labour (95.19%), indicating that while they do not own farms, they still engage in farm-related work. Small and marginal farmers earn 56.58 percent and 43.15 per cent of their off-farm income from labour and from trading agricultural commodities, respectively. Medium farmers receive modest off-farm earnings (Rs. 6366.67/annum) entirely from trading agricultural commodities, showing least reliance on off-farm activities among all the categories. Large farmers earn 70.34 percent and 29.66 percent of their off-farm from trading agricultural commodities and labour, respectively.

Table2: Source wise off-farm Income of Sample households (Rs. /farmer/annum)

Particulars	Non-cultivators	Small and marginal farmers	Medium farmers	Large farmers	Total
Tradingof Agriculture Commodities	2133.33 (4.81)	4175.00 (43.15)	6366.67 (100.00)	8300.00 (70.34)	4900.00 (27.40)
Agricultural Labour	42260.00 (95.19)	5500.00 (56.85)	0.00 (0.00)	3500.00 (29.66)	12981.67 (72.60)
Total off-farm income	44393.33 (100.00)	9675.00 (100.00)	6366.67 (100.00)	11800.00 (100.00)	17881.67 (100.00)

Note: figures in the parentheses indicate the percentages

Source wise average non- farm income: On an average businesses and jobs occupies the major share in non-farm income (Table 3). Business earnings contributes the major share in non-farm income for non-cultivators (51.63%) and medium (40.57%) farmers. Small and marginal farmers earn 53.04 percent of their non-farm income from non-agricultural labourunderscoring the importance of income diversification. Large farmers have the highest non-farm income at Rs. 194,066, with substantial earnings from business ventures and job income, reflecting their ability to leverage resources beyond farming.

Table3: Source wise non-farm income of sample households (Rs. /farmer/annum)

Particulars (AverageIncome)	Non-cultivators	Small and marginal farmers	Medium farmers	Large farmers	Total
Non-agricultural Labour	25240.00 (23.69)	47750.00 (53.04)	8800.00 (8.61)	27200.00 (14.08)	29127.00 (25.41)
Business	55000.00 (51.63)	8900.00 (9.89)	41466.67 (40.57)	75600.00 (39.13)	39827.67 (34.75)
Job	16000.00 (15.01)	25800.00 (28.66)	32800.00 (32.09)	75600.00 (39.13)	33400.00 (29.14)
Petty Shop	5040.00 (4.73)	1500.00 (1.67)	9200.00 (9.00)	4200.00 (21.7)	4760.00 (4.15)
Rental Income	2050.00 (1.92)	375.00 (0.42)	5535.71 (5.42)	7600.00 (3.93)	3195.83 (2.79)
Transfer Payment	3200.00 (3.00)	5700.00 (6.33)	4400.00 (4.31)	3000.00 (1.55)	4300.00 (3.75)
Total non-farm income	106530 (100.00)	90025.00 (100.00)	102202.38 (100.00)	193200.00 (100.00)	114611 (100.00)

Note: figures in the parentheses indicate the percentages

Sources of Income of Sample Farmers: Each group exhibits distinct patterns in how they generate income from farm activities, off-farm work, and non-farm engagements (Table 4). On an average farmer earns Rs. 2,60,555.47 per annum (Rs. 21,713/month). Across all sources, farm income averages at Rs. 1,28,062.80, being the major contributor (49.15%) followed by non-farm income (43.99%). Non-farm income was the major income source for non-cultivators (65.64%) aa well as small and marginal farmers (53.69%). Whereas for medium and large farmers income from the farm constitutes the major portion, 62.04 per cent and 62.98 per cent respectively due to their extensive resources and investment in high-return enterprises.

Table 4: Various Sources of Income of Sample households (Rs. /farmer/annum)

Particulars	Non-cultivators	Small and marginal farmers	Medium farmers	Large farmers	Total
Farm Income	11706.67 (7.17)	67968 (40.53)	177417 (62.04)	348755.5 (62.98)	128062.80 (49.15)
Off-farm Income	44393.33 (27.19)	9675 (5.78)	6366.67 (2.22)	11800 (2.13)	17881.67 (6.86)
Non-Farm Income	106530 (65.64)	90025 (53.69)	102202.38 (35.74)	193200.00 (34.89)	114611 (43.99)
Total	162630 (100.00)	167668 (100.00)	285986.10 (100.00)	553756 (100.00)	260555.47 (100.00)

Note: figures in the parentheses indicatethe percentages

Foodexpenditure pattern: Cereals and millets account for a significant portion of food expenditure across all household categories (35.62%), with large farmers spending the most both in absolute terms and in percentage (38.14%) (Table 5). Pulses show a relatively stable expenditure share across all groups. Milk and milk products see varying expenditure patterns with maximum expenditure done by medium farmers in relative terms (5.50%) followed non-cultivators (452%). Fruit and vegetable expenditure decrease in percentage as farm size increases, with small and marginal farmers spending 16.28% of income followed by medium (15.84%) and large farmers (13.46%). Large farmers spend the most on meat and eggs in absolute terms (Rs. 20547/annum) followed by medium farmers but in relative terms small and marginal farmers spend the most of their expenditure on meat and eggs (14.82%).

Table 5: Food expenditure pattern across different categories of rural households(Rs. /farmer/annum)

Particulars	Non-Cultivators	Small and marginal	Medium farmers	Large farmers	Total
Cereals & Millets	24976 (32.67)	25302 (33.18)	36536.04 (35.68)	61286.4 (38.14)	37025.1 (35.62)
Pulses	5850 (7.65)	5897.4 (7.73)	8328 (8.13)	12549 (7.81)	8156.1 (7.85)
Milk & Milk product	3459 (4.52)	2778 (3.64)	5627.52 (5.50)	6247.8 (3.89)	4528.08 (4.36)
Fruits and vegetables	12447.96 (16.28)	12641.88 (16.58)	16222.44 (15.84)	21621.6 (13.46)	15733.47 (15.14)
Meat & Eggs	11171 (14.61)	11300.4 (14.82)	11706.96 (11.43)	20574 (12.81)	13688.1 (13.17)
Others	18555.96 (24.27)	18342 (24.05)	23979 (23.42)	38388 (23.89)	24816.24 (23.87)
Totals	76459.9 (100.00)	76261.7 (100.00)	102400 (100.00)	160667 (100.00)	103947.1 (100.00)

Note: figures in the parentheses indicate the percentages
Others include sugar, edible oil, spices etc.

Non-foodexpenditure pattern: The overall expenditure pattern shows that education constitutes a major portion in the non-food expenditure (24.39%), highest for the medium famers (31.61%) followed by small and marginal farmers (Table 6). The second major category is the expenditure on gas/fuel and petrol which constitutes 20.82 per cent of the total non-food expenditure highest for small and marginal farmers (23.56 %) followed by non-cultivators. Medical expenditure is 13.99% of the total non-food expenditure with all the sample households spend significant amount varying from 12 to 16per cent of the total. Clothing and entertainment are the next major expenditure categories constituting 11.60 percent and 11.69 percent with non-cultivators being the highest spender in all categories. Expenditure on consumer durables exhibits significant variation in the spending pattern where the large farmers spends 13 per cent whereas other categories spend less than 5 percent of the total non-food expenditure.

Table 6: Non-food expenditure pattern across different categories of rural households(Rs. /farmer/annum)

Particulars Expenditure	Non-Cultivators	Small and marginal	Medium farmers	Large farmers	Total
Education	13771.6 (22.50)	16029 (23.68)	34184.04 (31.61)	36990 (20.90)	25243.65 (24.39)
Clothing	7512 (12.28)	8196 (12.11)	11424 (10.57)	20880 (11.80)	12003 (11.60)
Medical	9960 (16.28)	9756 (14.41)	16680 (15.43)	21504 (12.15)	14475 (13.99)
Gas/Fuel/Petrol	13560 (22.16)	16080 (23.76)	21288 (19.69)	35256 (19.92)	21546 (20.82)
Electricity	3060 (5.00)	3324 (4.91)	5116.8 (4.73)	10369.2 (5.86)	5467.5 (5.28)
Entertainment	9535.92 (15.58)	9720 (14.36)	11816.4 (10.93)	17340 (9.80)	12103.08 (11.69)
Consumer Durables	2073.96 (3.39)	2724 (4.02)	5384.04 (4.98)	23160 (13.09)	8335.5 (8.05)
Miscellaneous	1719.96 (2.81)	1857.6 (2.74)	2235.96 (2.07)	11496 (6.50)	4327.38 (4.18)
Total	61193.4 100.00	67686.6 (100.00)	108129.2 (100.00)	176995 (100.00)	103501.1 (100.00)

Note: figures in the parentheses indicate the percentages

Household expenditure of rural households: On an average farmer spends Rs. 207448 annually (Rs. 17,287.35/month) (Table 7). The overall data shows that the total food expenditure share decreases as the size of the farm increases with non-cultivators spending 55.55 per cent followed by small and marginal farmers(52.98%), medium (48.64%) and large framers (47.58%), although their absolute expenditure is highest. This suggests that as households become more affluent (with larger farms), they allocate a smaller proportion of their income to food. Whereas as household size and wealth increase, the percentage of total expenditure on non-food items also increases, as larger farmers spend 52.42per cent and non- cultivators spend 44.45per cent of their total expenditure (Figure 1). This shows a diversification of spending priorities among more affluent households.

Table 7:Household expenditure across different categories of rural households (Rs. /farmer/annum)

Particulars	Non-Cultivators	Small and marginal	Medium farmers	Large farmers	Total
Food Expenditure	76459.9 (55.55)	76261.7 (52.98)	102400 (48.64)	160667 (47.58)	103947 (50.11)
Non-food Expenditure	61193.4 (44.45)	67686.6 (47.02)	108129 (51.36)	176995 (52.42)	103501 (49.89)
Total Expenditure	137653.3 (100.00)	143948.3 (100.00)	210529.2 (100.00)	337662 (100.00)	207448.2 (100.00)

Note: figures in the parentheses indicate the percentages

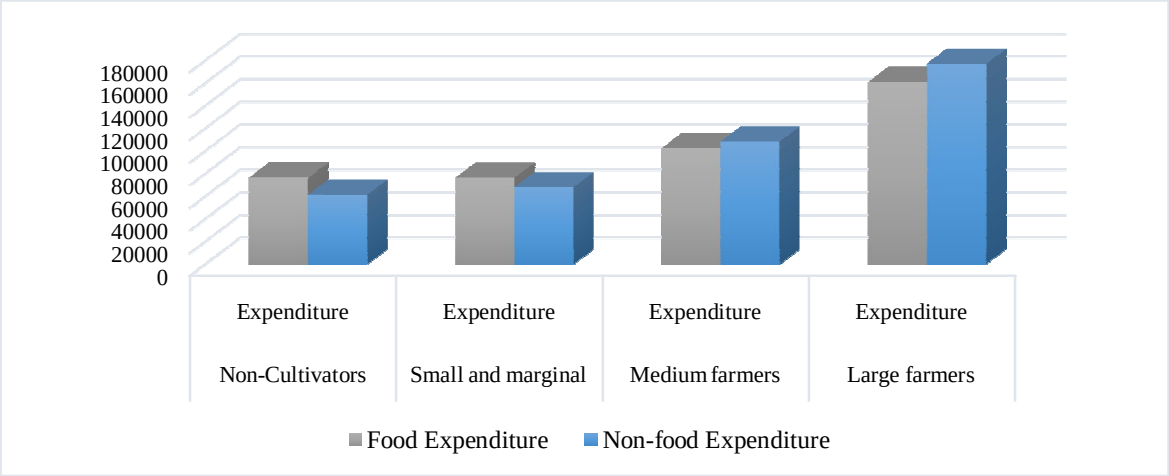

Figure1:Household expenditure across different categories of rural households

Factor affecting farm household annual food and non-food expenditure: Family size and annual income had a significant positive effect on both farm household annual food and non-food expenditure. The value of adjusted coefficient of multiple determination (R^2) is 0.89 (Table 8)and 0.87 (Table 9), respectively, indicating that the model explains 89and 87 percent of the variation in annual food and non-food expenditure, respectively.

Table 8: Variables Influencing Farm Household Annual Food Expenditure

Variables	Coefficients	Standard Error	t-value	Adjusted R^2
Intercept	10887.11	5612.46	1.94	
Family size (X_1)	10707.85**	1389.05	7.71	
Family type (X_2) (0= nuclear family, 1= joint family)	2460.66	6395.02	0.38	0.89
Annual Income in Rupees (X_3)	0.07**	0.02	4.51	

Note: * significance at 5 % and ** significance at 1 % levels

Table 9: Variables Influencing Farm Household Annual Non-Food Expenditure

Variables	Coefficients	Standard Error	t-value	Adjusted R^2
Intercept	141.88	8323.02	0.02	
Family size (X_1)	4767.74*	2059.90	2.31	
Family type (X_2) (0= nuclear family, 1= joint family)	6867.27	9483.52	0.72	0.87
Annual Income in Rupees (X_3)	0.24**	0.02384	10.00	

Note: * significance at 5 % and ** significance at 1 % levels

Sufficiency of total income to cover the expenditure: The income expenditure ratio is highest for large farmers that is 1.64 indicating that their income is 64per cent higher than their expenditure, indicating a significant level of financial sufficiency and stability (Table 8). For non-cultivators, income-expenditure ratio of 1.19indicating a reasonable level of financial sufficiency. For medium farmers income-expenditure ratio is 1.35, indicating a 35 percent surplus of income over expenditure which suggests a more comfortable financial situation compared to non-cultivators. Small and marginal farmers have an income-expenditure ratio of 1.16 lowest in all categories.Thus, all categories of rural households have incomes that exceed their expenditures, with larger farm households exhibiting greater financial sufficiency relatively which underscores the economic advantage of larger farming operations.

Average propensity to consume: Average propensity to consume is highest for small and marginal farmers (0.86) means indicating 86per cent of their income is spent on expenditure and only 14 percent goes to their savings (Table 10). Whereas large farmers have the lowest ratio of 0.61, indicating they spend 61 percent and save 39 percent of their income. For non-cultivators and medium farmers APC is 0.84 and 0.74, respectively. Overall, rural households spend an average of 80per centand save only 20 percent of their income. Thus, increase in income decreases the propensity toconsume as largehouseholds save or invest more of their income compared to non-cultivators and small farmers.

Table 10: Sufficiency of total income to cover the expenditure of rural households

Sl. No.	Type of Household	Average Annual Income (₹)	Average Annual Household Expenditure (₹)	Income-expenditure Ratio	APC
1	Non-cultivators	163296.7	137653.32	1.19	0.84
2	Small and marginal	167668	143948.28	1.16	0.86
3	Medium farmers	285617	210529.20	1.35	0.74
4	Large Farmers	554621.5	337662.00	1.64	0.61
	Total	260554.67	207448.20	1.26	0.80

Sufficiency of farm income to cover the expenditure: Small and marginal farmers have an income-expenditure ratio of 0.47 indicating a significant financial deficit as their farm income covers less than half of their annual expenditure, pointing to a challenging economic situation that likely depends on additional income sources (off firm & non-firm income) to sustain their livelihoods (Table 11). Medium farmers show an improved but still insufficient income-expenditure ratio of 0.84. Their income is closer to covering their expenditure but still falls short, covering only 84per cent of their annual costs. Large farmers exhibit a more stable financial status with income-expenditure ratio of 1.03 enabling them to cover their costs and even generate a small surplus.

Table11: Sufficiency of farm income to cover the expenditure of sample households

Sl. No.	Type of Household	Average Annual Farm Income (₹)	Average Annual Household Expenditure (₹)	Income-expenditure ratio
1	Small and marginal	67968.00	143948.28	0.47
2	Medium farmers	177417.00	210529.20	084
3	Large Farmers	348755.50	337662.00	1.03

Constraints: Table 12 presents various constraints that hinder income and employment opportunities in the agricultural sector, along with their respective scores and ranks. The primary constraint identified is small land holdings, indicating that the limited availability of land for cultivation significantly restricts income and employment generation. This is followed by low rates of wages, highlighting the inadequacy of remuneration as a major barrier to attracting and retaining labour in agriculture. The seasonal nature of agriculture, reflecting the irregular and often unpredictable nature of agricultural work that affects employment stability followed by lack of relevant skills among the workforce.

Table 12: Garret Scores and Ranks for limitations in income and employment generation

Constraints	Scores	Rank
Small land holding	61.13	1
Low rates of wages	57.16	2
The seasonal nature of agriculture	55.85	3
Absence of skills or skill deficiency	55.41	4
Difficulty in migration	41.48	5
Farmers' lack of motivation to work	28.95	6

4. CONCLUSIONS

The results showed thatfarm income significantly contributes to the household income of large farmers attributed to their extensive resources and investment in profitable farm enterprises. Whereas non-cultivators and small/marginal farmers rely heavily on non-farm income for their livelihood.Off-farm income plays a supplementary role for all groups with agricultural labour and trading agricultural commodities being common sources. Education and fuel-related expenditures are notably higher in medium and large farming householdswhile basic needs like clothing and medical expenses remain relatively stable across all categories. Thus, it is recommended that policymakers should aim to enhance non and off-farm income opportunities for small/marginal farmers and non-cultivators by creating non-farm employment opportunities. Along with this an integrated strategy of promoting agricultural and non-agricultural activities in the rural areas with major focus on capacity building will enhance the income prospects for rural households in general.

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

Author(s) hereby declarethat No generative Altechnologies such as Large Language Models (ChatGPT, COPILOT, etc.) and text-to-image generators have been used during writing or editing of this manuscript.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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