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Socio-economic analysis of farming households in the North-Western Himalayan region of India

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ABSTRACT

The socio-economic characteristics of farmers is essential for designing effective and sustainable agricultural development strategies in mountain regions. So, the present study aimed to analyze the socio-economic profile of farmers in the North-Western Himalayan Region of India. The study was conducted in selected districts of Jammu and Kashmir and Uttarakhand using a multistage sampling technique. A total of 347 farmers were selected through the Probability Proportionate to Size method at a ten percent precision level. Descriptive statistical tools, including frequencies and percentages, were employed for data analysis. The findings revealed that a majority of the respondents were middle-aged, moderately educated and possessed high levels of farming experience. Most farmers belonged to nuclear families and operated marginal and small landholdings. The predominance of smallholder farming highlights both constraints related to resource availability and opportunities for promoting agroecological and sustainable agricultural practices. The study concludes that socio-economic factors significantly influence farmers' decision-making and adoption potential. The results provide valuable insights for policymakers and extension agencies to design context-specific interventions aimed at enhancing agricultural sustainability and improving livelihoods in the North-Western Himalayan Region.

Keywords: Socio-economic characteristics, Mountain agriculture, Smallholder farmers, Sustainable agriculture, North-Western Himalayan Region

Introduction

Agriculture plays a central role in sustaining rural livelihoods in the North-Western Himalayan Region, where farming is closely intertwined with social, economic and ecological systems. The region is characterized by diverse agro-climatic conditions, fragile ecosystems, mountainous terrain and limited infrastructural development, all of which shape agricultural practices and livelihood strategies (Aryal *et al.*, 2020) [1]. Farming systems in this region are predominantly smallholder-based and depend heavily on natural resources and traditional knowledge developed to cope with complex and heterogeneous environments (Pretty *et al.*, 2018) [2]. Farmers in the North-Western Himalayan Region face multiple socio-economic and environmental challenges including small and fragmented landholdings, limited access to markets and extension services and increasing climate variability. These constraints significantly influence agricultural productivity, livelihood security, and farmers' capacity to adopt sustainable and climate-resilient practices (FAO, 2017; Rana *et al.*, 2021) [3, 4]. Socio-economic characteristics such as age, education, family structure, farming experience and landholding size play a crucial role in shaping farmers' decision-making behavior and their ability to respond to emerging risks and opportunities.

A socio-economic analysis of farmers is therefore essential for understanding agricultural development in mountain regions. Education enhances farmers' access to information and improves their engagement with extension services, while farming experience contributes to context-specific knowledge that is particularly valuable in ecologically sensitive environments (Meena *et al.*, 2018) [5]. Similarly, family structure influences labor availability and resource management and landholding size determines production potential and investment capacity. In mountainous regions, where mechanization and economies of scale are limited, these socio-economic dimensions assume greater importance (Rana *et al.*, 2021) [4]. Despite the significance of agriculture in the North-Western Himalayan Region, empirical studies examining farmers' socio-economic characteristics remain limited. The present study addresses this gap by conducting a systematic socio-economic analysis of farmers in the region with the aim of generating evidence to inform policy formulation, extension strategies and sustainable agricultural development in fragile mountain ecosystems.

Material and Method

The research was carried out in the North-Western Himalayan region of India, encompassing Jammu and Kashmir, Himachal Pradesh and Uttarakhand. To obtain representative coverage of the study area, a multi-stage sampling design was adopted. Among the three state/UT, Jammu and Kashmir and Uttarakhand were purposively selected due to their substantial area under rice-wheat-vegetable based cropping systems which

are a defining feature of the regional agroecosystem. Within each selected state, two districts were chosen purposively based on their prominence in production system. Accordingly, Jammu and Kathua districts were selected from Jammu and Kashmir, while Udham Singh Nagar and Nainital districts were selected from Uttarakhand. Further, two blocks were randomly selected from each district and one village was randomly chosen from each selected block. This procedure resulted in the selection of a total of eight villages for the study. The final sample comprised 347 respondents which was determined using the Probability Proportionate to Size method at a precision level of ten percent.

Primary data were collected through face-to-face interviews using a pre-tested and structured interview schedule designed to capture farmers' capacity needs related to agroecology and sustainable agricultural systems. The collected data were systematically coded and organized using Microsoft Excel. Descriptive statistical techniques were employed to summarize the responses, while frequencies and percentages were used to analyze the socio-economic characteristics of the respondents in the North-Western Himalayan Region. In addition to primary data, secondary information was obtained from government publications and reliable online databases to support, corroborate and validate the study findings.

Result and Discussion

Socio-demographic characteristics of respondents

The socio-demographic profile of the respondents from the North-Western Himalayan Region showed notable variation across age categories, education levels, family type, farming experience and landholding size. These characteristics are important because they influence how farmers perceive, decide on and adopt sustainable agricultural practices.

Age distribution

The age distribution revealed that 41.21 per cent of respondents fell within the middle age category (46–59 years), 32.85 per cent were 45 years and below and 25.94 per cent were 60 years and above. This pattern suggested that a majority of the farming population in the study area consists of middle-aged individuals who are likely to possess both practical experience and capacity for engaging in agricultural activities. Research on climate-smart and sustainable agriculture adoption has shown that middle-aged farmers are often more active in farm decision-making and may be more open to adopting sustainable innovations compared with older farmers, who may rely more on traditional agricultural practices (Msweli and Mgwenya, 2024) [6].

Educational status

Regarding educational attainment, 29.68 per cent of respondents had completed high school, 24.78 per cent had intermediate education and 24.50 per cent had middle school education. Smaller proportions were graduates (7.49%) and postgraduates (4.61%), while only 1.44 per cent were illiterate. These findings indicated that most farmers in the sample had at least basic formal education. Education level has been identified as a significant socio-demographic factor influencing farmers' adoption of sustainable practices in which higher education enhances farmers' capacity to access information, interpret extension advice and implement innovative farming techniques (Madin et al., 2025) [7].

Family type

The family type of respondents in North-Western Himalayan region stated that, slightly more than half of the respondents (51.87%) came from nuclear families, while 48.13 per cent belonged to joint families. This nearly balanced distribution suggested that traditional joint family systems persist alongside increasingly common nuclear family structures in the study area. Family type can affect the availability of household labor and collective decision-making processes which in turn can influence the adoption of resource-intensive sustainable prac-

tices with joint families sometimes having an advantage due to greater pooled labor resources (Ellis, 2000) [8].

Farming experience

The results further revealed that a large proportion of respondents possessed substantial farming experience. About 42.07 per cent of the farmers had high farming experience of more than 36 years followed by 36.60 per cent with medium experience ranging from 28 to 35 years. Only 21.33 per cent of the respondents had low farming experience of less than 27 years. The predominance of highly experienced farmers indicated that agriculture in the region is largely managed by seasoned practitioners with deep knowledge of local agro-ecosystems. Such experiential knowledge is particularly valuable in fragile mountain environments, where farming systems are closely linked to ecological conditions. However, high farming experience may also be associated with adherence to traditional practices which underscores the importance of participatory and experiential learning approaches in promoting sustainable agricultural transitions (Pretty, 2008; Msweli and Mgwenya, 2024) [6, 9].

Table 1. Distribution of respondents based on socio-economic characteristics in the North-Western Himalayan region

S.No.	Category	North-Western Himalayan Region (n = 347)	
		f	%
		Age	
1.	Young (45 years and below)	114	32.85
2.	Middle (46-59 years)	143	41.21
3.	Old (60 years and above)	90	25.94
Education			
1.	Illiterate	5	1.44
2.	Primary school	26	7.49
3.	Middle school	85	24.50
4.	High school	103	29.68
5.	Intermediate	86	24.78
6.	Graduate	26	7.49
7.	Post graduate	16	4.61
Family Type			
1.	Nuclear	180	51.87
2.	Joint	167	48.13
Farming Experience			
1.	Low (< 27)	74	21.33
2.	Medium (28-35)	127	36.60
3.	High (> 36)	146	42.07
Land Holding			
1.	Marginal (> 1ha)	193	55.62
2.	Small (1-2ha)	99	28.53
3.	Medium (2-4ha)	32	9.22
4.	Semi- medium (4-10ha)	17	4.90
5.	Large (> 4ha)	6	1.73

f= Frequency, %= Percentage

Landholding size

Landholding analysis showed that the majority of respondents were small and marginal farmers. More than half of the respondents, representing 55.62 per cent, owned marginal landholdings of less than one hectare followed by 28.53 per cent with small landholdings ranging from one to two hectares. Medium landholders constituted a much smaller proportion with 9.22 per cent owning two to four hectares and

4.90 per cent owning four to ten hectares, while only 1.73 per cent belonged to the large landholding category. This skewed distribution toward marginal and small landholdings reflected the typical agrarian structure of mountainous regions, where land fragmentation is common due to topographical constraints and inheritance patterns. Small landholdings often limit economies of scale but simultaneously encourage diversification, mixed farming and low-external-input agriculture which align well with agroecological principles (Altieri, 2002, Madin *et al.*, 2025) ^[10]

Conclusion

The study provides a comprehensive socio-economic profile of farmers in the North-Western Himalayan Region which highlighted the predominance of middle-aged and experienced farmers operating on small and marginal landholdings within diverse family structures. The findings indicated that education, farming experience and landholding size play a significant role in shaping farmers' agricultural practices and capacity to adopt agroecological and sustainable farming approaches. Despite possessing rich experiential knowledge, farmers face structural constraints such as limited land resources, fragmented holdings and restricted access to extension and market services. These insights underscore the need for location-specific policy interventions, strengthened extension support and targeted capacity-building programs that consider the unique socio-economic and ecological context of mountain farming systems. Promoting farmer-centered strategies that integrate traditional knowledge with scientific innovations will be essential for enhancing agricultural sustainability, livelihood resilience and long-term development in the North-Western Himalayan Region.

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