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Socio-economic correlates of livelihood security: Insights from the tribal dairy community of eastern Rajasthan

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Abstract

Livelihood security remains a critical dimension of rural development, particularly among tribal communities dependent on agriculture and allied sectors. The present study investigates the influence of socio-economic characteristics on livelihood security among tribal households engaged in dairy-based farming systems in Eastern Rajasthan. Primary data were collected through structured interviews with 360 respondents selected using multistage random sampling. A composite Livelihood Security Index was constructed to assess the livelihood security of tribal farmers. Socio-economic variables such as age, education, herd size, income, landholding, experience in dairying, occupation, mass media exposure, and extension contact were examined for their influence on overall livelihood security. The findings revealed that education, herd size, income, mass media exposure, and extension contact exhibited a strong positive association with livelihood security.

Keywords: Livelihood security, socio-economic factors, tribal dairy farmers, eastern Rajasthan

Introduction

India is characterized by remarkable indigenous diversity, with a substantial tribal population that continues to live largely on the margins of mainstream socio-economic development. According to Census (2011) [6], the country is home to approximately 104 million tribal people, accounting for 8.6 per cent of the total population, making India the second-largest repository of tribal communities globally. Despite this demographic significance, a considerable proportion of Scheduled Tribes (STs) remain economically deprived, with 45.30 per cent of the rural and 24.10 per cent of the urban ST population living below the poverty line. Nearly two-thirds (about 66%) of the tribal population depends on agriculture and allied sectors for their livelihood, primarily as cultivators and agricultural labourers (MoTA, 2018) [23]. Tribal communities, often concentrated in geographically isolated and ecologically fragile regions, continue to experience persistent social and economic marginalization, reflected in their poor performance across key development indicators. In Rajasthan, the tribal population is estimated at 9.20 million (Census, 2011) [6] and constitutes one of the most socio-economically disadvantaged groups in the state. The predominance of arid and semi-arid agro-climatic conditions covering nearly 61 per cent of India's total arid zone combined with recurrent droughts, erratic rainfall, and high climatic variability, renders crop-based agriculture highly uncertain and risky. These challenges further exacerbate livelihood insecurity among tribal households. Against this backdrop, dairy farming has emerged as a vital livelihood alternative with the potential to enhance socio-economic resilience among tribal communities. Unlike crop cultivation, which is largely seasonal and climate-dependent, dairying provides a more stable and continuous source of income, improves household nutrition, and offers a buffer against climatic shocks. In addition, dairy farming supports the preservation of traditional knowledge and cultural practices associated with livestock rearing. The dairy sector serves as a major livelihood source and contributes significantly to nutritional security for millions of rural households (Abhishek *et al*., 2023) [2]. Dairy farming accounts for 25.90 per cent of total household income among farmers owning less than 0.01 ha of land, underscoring its critical role in sustaining the livelihoods of marginal and landless farmers (Mandal *et al*., 2020) [22].

Livelihood and Livelihood Security

Livelihood refers to the availability of adequate stocks and flows of food and cash required to fulfill basic human needs, while "security" denotes assured ownership of, or access to, resources and income-generating activities, including savings and assets that help individuals manage risks, cope

with shocks, and meet unforeseen contingencies (Chambers, 1988) [7]. Livelihood security is thus understood as sustained and sufficient access to income and resources necessary to meet essential needs, encompassing food, safe drinking water, healthcare, education, housing, and opportunities for social participation and community integration (Frankenberger, 1996, Garai *et al*., 2021) [11, 12]. The key dimensions of livelihood security include economic, food, educational, health, habitat, and social network security. In essence, livelihood security signifies the capacity of individuals or households to maintain adequate income and resources to ensure nutrition, health services, shelter, education, and meaningful engagement within the social and community environment (Chauhan *et al*., 2022) [8].

Although several studies have examined livelihood security, dairy farming practices, and socio-economic characteristics of farm households in India, most have focused on general rural populations or non-tribal dairy farmers. Empirical evidence specifically linking socio-economic characteristics with livelihood security among tribal dairy farmers, particularly in the context of eastern Rajasthan, remains limited. Existing studies often analyze individual components of livelihood security in isolation and lack a comprehensive, multidimensional assessment that integrates socio-economic correlates such as education, landholding, herd size, income, extension contact, and mass media exposure. Moreover, region-specific dynamics such as climatic vulnerability, resource constraints, and institutional access unique to tribal communities in eastern Rajasthan are inadequately addressed. Therefore, there is a clear need for a systematic and context-specific investigation to identify the socio-economic correlates influencing livelihood security among tribal dairy farmers in this region, which can provide evidence-based insights for targeted policy and extension interventions**.**

Materials and Methods

The research was carried out in the eastern region of Rajasthan, India. The present study employed an ex-post-facto research design with a mixed sampling approach, combining purposive sampling and multistage random sampling to select the respondents for the study. Purposively, three districts (Dausa, Karauli and Bharatpur) were selected having high population of tribals (second highest coverage of districts with 26.50, 22.30 and 2.10 per cent of ST population) in eastern region of Rajasthan. At the first stage, one block from each of the three purposively selected districts were chosen based on the highest tribal population density. At the second stage, two village clusters (each village along with its hamlets) were selected from each block. At the third stage, 60 respondents were chosen from each village, resulting in a total sample of 360 respondents for the study. The combined use of stratification and randomization ensured that the sample accurately reflected the broader target population in the study area. Additionally, a multistage random sampling method was employed to select tribal farmers who had been engaged in dairy farming for at least five years and owned at least one milch animal at the time of the study. Farmers were randomly chosen to obtain the final sample for collecting the required data and information. The livelihood security of the farmers was calculated by developing a Livelihood Security Index. This was developed based on different dimensions and its indicators of livelihood security of the respondents. Primary data were gathered from the respondents using a carefully designed pre tested interview schedule through personal interviews. In addition, correlation was used to calculate r-values to know the relationship between livelihood security and independent variables.

Results and Discussion

Socio-Economic Profile of the respondents

Age plays a pivotal role in the functioning of the dairy sector, as younger farmers are generally associated with greater physical strength and adaptability to modern technologies, whereas older farmers contribute valuable experience and facilitate knowledge transmission. The results presented in table 1 reveal that a majority of the respondents (51.39%) belonged to the older age group (above 50 years), followed by 42.78 per cent in the middle-age category (36-50 years), while only a small proportion fell within the younger age group (up to 35 years). Similar age distributions have been reported by Timba (2023) [29], Kimavath (2022) [19], Jhamb (2021) [16], Kumar *et al*., (2016) [20], and Bashir *et al*., (2013) [5], who observed that most respondents were in the middle-age bracket of 35-50 years. The growing preference of younger and middle-aged household members for employment in the service sector may partly explain their reduced inclination toward adopting farming as a primary occupation. Additionally, family size analysis showed that most respondents (70.00%) belonged to the small family category (up to five members), followed by 19.17 per cent with medium-sized families (6-17 members), while only a small proportion had large families (above 18 members). The findings are in lined with the studies conducted by Abhishek, (2022) [1], Kimavath, (2022) [19] and Eqbal (2015) [10].

The results further indicated that a larger proportion of respondents (41.11%) possessed relatively low experience in dairy farming (up to 25 years), followed by 36.67 per cent with medium-level experience (26-40 years), while only 22.22 per cent had high experience exceeding 40 years. Comparable findings have been reported by Kimavath (2022) [19] and Swathi *et al*., (2016) [28]. With respect to educational attainment, the highest proportion of respondents (35.56%) had completed middle school education, whereas a substantial share (25.56%) had no formal schooling. Notably, only a small fraction of the surveyed tribal farmers (8.89%) had attained graduation or higher levels of education. This low educational attainment may be attributed to factors such as early school dropouts, early involvement of children in household and agricultural activities, limited access to higher educational institutions, inadequate infrastructural facilities, financial constraints, and poor awareness regarding government scholarship and fellowship schemes for tribal students. These findings are consistent with earlier studies by Timba (2023) [29], Jodha and Dahiya (2018) [17], and Eqbal (2015) [10].

The findings revealed that the largest proportion of tribal dairy farmers (38.61%) belonged to the small landholding category, possessing 1-2 hectares of land. This was followed by semi-medium farmers (26.39%) with landholdings ranging from 2-4 hectares and marginal farmers (26.11%)

owning up to 1 hectare of land. Only a small fraction of respondents (8.89%) had landholdings exceeding 4 hectares, falling under the medium or large landholding categories. Given that dairying can be effectively practiced with relatively smaller land resources compared to crop cultivation, it remains a suitable enterprise for such farmers. Regarding occupational pattern, the predominant livelihood combination among tribal dairy farmers was dairying combined with crop farming and wage labour, adopted by 46.67 per cent of respondents, followed by 40.00 per cent who were engaged in dairying along with crop farming.

The income distribution of tribal dairy farmers indicated that the highest proportion of respondents (38.89%) fell within the medium annual income category, followed closely by 36.11 per cent with low income, while about one-fourth of the respondents belonged to the high-income group. These findings are in line with earlier studies by Abhishek (2022) [1] and Girish *et al*., (2020) [15]. With respect to herd composition, a majority of farmers (66.39%) maintained small herd sizes comprising 1-3 standard animal units (SAUs), followed by 20.56 per cent who owned large herds exceeding 7 SAUs, while the remaining 13.06 per cent had medium herd sizes of 4-6 SAUs.

The results indicated that a majority of dairy farmers (57.22%) exhibited a medium level of mass media exposure, while 33.33 per cent and 9.44 per cent had low and high levels of exposure, respectively. This pattern may be attributed to the increasing penetration of mass media in rural areas, which has enhanced awareness and stimulated information-seeking behaviour among farm households to support their agricultural and dairy-related activities. (Abhishek, 2022, Kimavath, 2022) [1, 19]. In contrast, extension contact was generally limited, with most respondents (57.78%) reporting a low level of interaction with extension agencies, followed by 30.00 per cent with a medium level and only 12.22 per cent having high extension contact. This limited engagement may be due to factors such as the remoteness of the study area, restricted access to extension services, cultural barriers, and low levels of trust in extension personnel. Every effort should be made to ensure effectively delivery of extension services. There is greater responsibility for extension functionaries to provide technical assistance, appropriate technologies, and encouraging farmers to adopt the new technology (Pradhan *et al*., 2021) [24].

Table 1: Socio- economic profile of the respondents (n=360)

S. N.	Particulars	Frequency	Percentage (%)
1	**Age (Years)**		
	Young (up to 35)	21	5.83
	Middle (36-50)	154	42.78
	Old (above 50)	185	51.39
	Mean: 42.50, SD: 7.13		
2	**Family Size**		
	Small (up to 5)	252	70.00
	Medium (6-17)	69	19.17
	Large (above 18)	39	10.83
	Mean: 11.75, SD: 5.89		
3	**Experience in dairy farming**		
	Less (≤25 years)	148	41.11
	Medium (26-40 years)	132	36.67
	High (≥41 years)	80	22.22
	Mean: 32.96, SD: 7.89		
4	**Education**		
	No Schooling	92	25.56
	Up to primary	19	5.28
	Middle school	128	35.56
	Secondary school	71	19.72
	Sr. Secondary	18	5.00
	UG	25	6.94
	PG	7	1.94
5	**Land holding**		
	Marginal (≤1 ha)	95	26.39
	Small (1-2 ha)	139	38.61
	Semi-medium (2-4 ha)	94	26.11
	Medium (4-10 ha)	27	7.50
	Large (>10 ha)	5	1.39
6	**Occupation**		
	Dairying + crop farming	147	40.83
	Dairying + crop farming + labour	168	46.67
	Dairying + crop farming + service	15	4.17
	Dairying + labour	30	8.33

7	**Annual Income**		
	Low (Up to ₹ 98,698)	130	36.11
	Medium (₹ 98, 699 to ₹ 1,74,145)	140	38.89
	High (more than ₹ 1,74,146)	90	25.00
	Mean: 135864, SD: 38282		
8	**Herd Size**		
	Small (1-3 SAUs)	239	66.39
	Medium (4-6 SAUs)	47	13.06
	Large (more than 7 SAUs)	74	20.56
9	**Mass Media exposure**		
	Low (≤8.18)	120	33.33
	Medium (8.18-17.29)	206	57.22
	High (≥ 17.30)	34	9.44
	Mean: 12.74, SD: 4.56		
10	**Extension contact**		
	Low (≤ 7.56)	208	57.78
	Medium (7.57-12.17)	108	30.00
	High (≥ 12.18)	44	12.22
	Mean: 9.87, SD: 2.31		

Livelihood Security of tribal dairy farmers

Based on the overall livelihood security scores, the respondents were grouped into three categories: low, medium, and high. The distribution of respondents across different levels of livelihood security can be explained in the context of the existing socio-economic and production conditions prevailing in the study area. The predominance of dairy farmers in the low livelihood security category (45.56%) may be attributed to their dependence on small and marginal landholdings, limited herd size, and low productivity of dairy animals, which together restrict regular and adequate income generation. Moreover, rising costs of feed and fodder, limited access to timely veterinary and extension services, and exposure to climatic and market-related risks further undermine their economic stability and overall livelihood security. The presence of 35.83 per cent of respondents in the medium livelihood security category indicates a relatively better resource position, including moderate herd size, partial adoption of improved dairy management practices, and the availability of supplementary income sources. However, factors such as fluctuating milk prices, seasonal scarcity of fodder, and limited opportunities for value addition appear to have constrained these farmers from attaining a higher level of livelihood security. Only 18.61 per cent of the dairy farmers were found to have a high level of livelihood security, which may be attributed to their stronger asset base, higher milk productivity, better access to institutional and extension support, and diversified livelihood strategies. These farmers were more likely to adopt scientific dairy farming practices and improved breeds, enabling them to cope more effectively with economic and production-related uncertainties. Overall, the concentration of respondents in the low and medium livelihood security categories reflects the structural challenges faced by smallholder dairy farmers and emphasizes the need for policy and extension interventions aimed at enhancing productivity, promoting income diversification, strengthening institutional support systems, and improving risk management to ensure sustainable livelihood security. The findings of the study is consistent with studies conducted by Singh *et al*., (2025) [26], Gautam and Jha (2023) [14] and Chauhan *et al*., (2022) [8].

Table 2: Distribution of respondents according to overall livelihood security (n=360)

Overall Livelihood Security	Frequency	Percentage	Mean
Low (<0.52)	164	45.56	0.49
Medium (0.52-0.73)	129	35.83	
High (>0.73)	67	18.61	

Correlation between socio-economic characteristics and livelihood security

Table 3 indicates a positive and significant relationship between age and livelihood security (r = 0.352), suggesting that older farmers tend to exhibit higher levels of livelihood security. This may be attributed to the fact that elderly farmers are more deeply engaged in farming activities and largely depend on agriculture for their sustenance, thereby strengthening the association between age and livelihood security (Eqbal, 2015, Gautam and Jha, 2023) [10, 14]. Education also showed a positive and significant association with livelihood security (r = 0.425), highlighting its critical role in enhancing knowledge, improving awareness of improved technologies, fostering confidence in adopting innovations, and strengthening technical competence. Educated individuals are generally more skilled and better equipped to make informed decisions related to farm and livelihood management (Kumar *et al*., 2019, Kademani *et al*., 2020) [21, 18].

Family size exhibited a negative but non-significant relationship with livelihood security, indicating that an increase in family members may place additional pressure on household resources, potentially reducing livelihood security, although the association was not statistically significant (Eqbal, 2015) [10]. Similarly, farming experience was found to have a non-significant association with livelihood security (r = 0.085), suggesting that livelihood security is influenced more by access to income, assets, and support services than by the number of years spent in farming. Occupation, particularly engagement in diversified livelihood activities, demonstrated a positive association with livelihood security, underscoring the importance of

income diversification in minimizing livelihood risks. Annual income showed a positive and significant correlation with livelihood security (r = 0.344), as higher income levels enable households to invest in productive activities, adopt improved practices, and build savings, thereby strengthening economic resilience. These findings are in agreement with those reported by Sunanda *et al*., (2014) [27] and Ramya *et al*., (2017) [25].

Mass media exposure was positively and significantly associated with livelihood security (r = 0.254), indicating that access to information plays a vital role in improving awareness and decision-making among farmers (Pradhan *et al*., 2021) [24]. Likewise, extension contact exhibited a positive and significant relationship with livelihood security (r = 0.214), as interactions with extension agencies enhance farmers' knowledge, skills, and access to timely information, enabling them to strengthen, diversify, and sustain their livelihood systems. These results are consistent with earlier studies by Gautam and Jha (2023) [14] and Ramya *et al*., (2017) [25].

Table 3: Correlation between independent variables and livelihood security

Sl. No	Variables	Correlation coefficient (r)
1.	Age	0.352*
2.	Education	0.425**
3.	Family size	-0.172^{NS}
4.	Experience in dairying	0.085^{NS}
5.	Occupation	0.252*
6.	Land holding	0.312**
7.	Herd Size	0.202*
8.	Annual income	0.344**
9.	Mass media exposure	0.254*
10.	Extension contact	0.214*

** $p<0.01$, * $p<0.05$, NS: Non significant

Conclusion

Based on the findings of the study, a substantial proportion of the respondents belonged to the older age group, were educated up to the middle school level, and exhibited a medium level of mass media exposure. The majority of farmers in the study area had small-sized families, landholdings ranging between 1-2 hectares, and a medium level of annual income. The analysis further revealed that age, education, herd size, landholding, occupation, annual income, and mass media exposure were positively and significantly associated with the livelihood security of the respondents. This indicates that improvements in these socio-economic factors are likely to enhance the overall livelihood security of tribal dairy farmers in the study area.

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