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SOCIO-ECONOMIC FACTORS INFLUENCING KNOWLEDGE OF TRIBAL MILLET FARMERS

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ABSTRACT

The present study examined the influence of profile characteristics of tribal farmers on their knowledge of processing and value addition of minor millets in Mandla and Dindori districts of Madhya Pradesh. A total of four blocks and eight villages were purposively selected and 734 respondents (367 male and 367 female) were identified using Yamane's formula. The results revealed that among male respondents, knowledge showed a highly significant and positive correlation with information-seeking behaviour (r = 0.599), awareness (r = 0.330), age (r = 0.304), annual income (r = 0.297), landholding (r = 0.277), and area under millet cultivation (r = 0.296) at the 1% level. Education, training received, social participation, decision-making ability, crops grown, and market orientation were significant at the 5% level. For female respondents, knowledge was significantly associated with information-seeking behaviour (r = 0.263), landholding (r = 0.232), area under millet cultivation (r = 0.262), risk orientation (r = 0.181), age (r = 0.172), and family size (r = 0.165) at the 1% level. Training received, awareness, education, social participation, crops grown, and annual income showed significance at the 5% level. Overall, communicational and socio-economic variables were found to strongly influence the knowledge level of tribal farmers. The findings highlight the critical role of socio-economic and communicational variables in determining farmers' knowledge. Strengthening extension services, training opportunities and awareness programmes is essential to enhance millet processing and value addition, thereby supporting sustainable livelihoods among tribal farming communities.

Keywords: *knowledge, millets, tribal farmers, processing and value addition*

INTRODUCTION

India remains a predominantly agrarian nation where agriculture continues to shape socio-economic development (Mallappa et al., 2023). Traditionally, Indian diets were highly diverse, incorporating cereals such as wheat, barley, lentils, and various millets, complemented by vegetables and dairy products. However, the Green Revolution, with its emphasis on rice and wheat cultivation, significantly altered consumption patterns. This shift contributed to a decline in dietary diversity and has been associated with rising nutritional deficiencies, under-nutrition, and malnutrition, despite the proven health benefits of millets (Bantupall and Saini, 2025).

Tribal population are scattered all over the hilly and forest regions of the country, majority of them inhabitants in Central India, high concentration of tribal's live in Madhya Pradesh, Chattisgarh, Orissa, Andhra Pradesh, Jharkhand (Rajan *et al*.,2015 and 2016). With a population of 72.60 million, Madhya Pradesh is the sixth-most populous state in the country. Out of the total population in India, about 72.40 percent live in rural areas and living in and around forest areas (Payasi et. al., 2023). In tribal-dominated districts like Mandla and Dindori in Madhya Pradesh, millets especially Kodo and Kutki are widely cultivated using indigenous knowledge systems passed down through oral traditions. (More et al., 2025).

Millets; often termed '*Nutri-cereals'* or '*Shree Anna',* are among the earliest domesticated crops, valued for their high nutritional quality, resilience to harsh environments, and low ecological footprint (Rafi et al., 2024). India is currently the world's largest millet producer, accounting for nearly 41% of global output, with Madhya Pradesh being one of the leading states in cultivation. For tribal communities, millets have long served as staple foods grown under rainfed, low-input conditions (Jaybhaye et al., 2014). Beyond their role in food security, millets contribute to livestock fodder, traditional medicine, and income diversification (Dileep and Nair, 2015). These small-seeded, nutrient-rich grains are well-adapted to harsh climatic conditions and low-input agriculture, making them essential for ensuring food and livelihood security in rainfed and resource-poor regions (Dar

et al., 2018, More et al., 2024). One of the most important aspects of nutritional security is value addition (Srivani et. al., 2022).Challenges such as limited landholdings, poor access to modern technology, lack of market linkages and inadequate extension services continue to hinder millet cultivation and commercialization (Rana et al., 2021).

Women play a central role in Indian agriculture, which remains the principal livelihood source for much of the rural population, even as its share in the national GDP continues to decline (Kumari et al., 2025). Although their contributions to agricultural modernization and farm mechanization are often under-recognized, women remain indispensable to millet production (Patel et al., 2024, Konani et al., 2024 & Jatav et al., 2023). Understanding these gendered dimensions is essential when assessing opportunities and challenges in millet farming.

OBJECTIVE

To ascertain the influence of socio-economic and other variable on knowledge of tribal farmers concerning processing and value addition of minor millets.

METHODOLOGY

The investigation was carried out in Mandla and Dindori districts of Madhya Pradesh, selected purposively due to their predominantly tribal population and widespread cultivation of minor millets, particularly *kodo* (*Paspalum scrobiculatum*) and *kutki* (*Panicum sumatrense*). Within these districts, four blocks were chosen based on the highest area under millet cultivation: Bajag and Dindori in Dindori district and Mawai and Niwas in Mandla district. From each block, two villages were purposively selected, resulting in a total of eight study villages: Chanda, Tantar, Kudwari, Madhopur, Parsatola, Anjani Mal, Gundlai, and Masoor Ghughari.The sample size was determined using Yamane's (1967) formula at a 5% margin of error, yielding 734 respondents, equally distributed between male (n = 367) and female (n = 367) farmers. The study adopted a deductive research approach, beginning with established theories and concepts from extension and rural development literature and testing them empirically through quantitative analysis. A quantitative methodological design was employed, using a survey research strategy to collect data from a large, representative sample of respondents. A proportionate stratified random sampling technique was employed to ensure adequate representation from each village. Knowledge related to processing and value addition of minor millets was considered as the dependent variable. A specific knowledge test was developed to assess respondents' understanding of processing and value addition aspects of minor millets.

The independent variables included socio-personal, economic, psychological, and communicational characteristics of the respondents. Data were collected using a structured and pre-tested interview schedule. The collected information was analysed through descriptive and inferential statistical techniques such as frequency, percentage, mean, standard deviation, correlation, and regression analysis to assess the relationship between farmers' profiles and their knowledge of millet processing and value addition.Statistical analysis was performed using Statistical Package for the Social Sciences (SPSS) version 26.0.

RESULTS AND DISCUSSION

Table 1 clearly reveals that knowledge of male respondents regarding processing and value addition of minor millets had a positive and highly significant relationship with age (r=0.30), family size (r=0.22), landholding (r=0.27), area under millet crop (r=0.29), annual income (r=0.29), awareness regarding processing and value addition of minor millet (r=0.33), and information seeking behaviour (r=0.59) at 1 per cent level of probability. Similarly, risk bearing ability (r=0.15) was also found to be positively and significantly related to knowledge at 1 per cent level. Further, education (r=0.13), millet crop grown (r=0.11), decision making (r=0.12), market orientation (r=0.10), social participation (r=0.13) and training received on processing and value addition of minor millets (r=0.12) showed a positive and significant association at 5 per cent level of probability with male respondents' knowledge. However, occupation (r=-0.04) and practices regarding processing and value addition of minor millet (r=-0.00) were found to be non-significant.

In the case of female respondents, the knowledge level had a positive and highly significant relationship with age (r=0.17), family size (r=0.16), landholding (r=0.23), area under millet crop (r=0.26), risk bearing ability (r=0.18), information seeking behaviour (r=0.26) and training received (r=0.14) at 1 per cent level of probability. On the other hand, education (r=0.12), millet crop grown (r=0.11), annual income (r=0.10), awareness regarding processing and value addition (r=0.13) and social participation (r=0.12) were positively and significantly correlated at 5 per cent level. Variables like occupation (r=0.05), practices regarding processing and value addition (r=0.05), decision making (r=-0.00) and market orientation (r=0.00) did not show any significant relationship with knowledge of female respondents.

Influence of socio-personal and economic factors on knowledge

The socio-personal and economic variables examined in this study included age, education, landholding,

Table 1: Relationship of attributes of tribal millet growers with their knowledge level (n=734)

Sr. No.	Independent variable	Knowledge of male respondents (n_1=367)		Knowledge of female respondents (n_2=367)	
		Correlation coefficient 'r' values	t-values	Correlation coefficient 'r' values	t-values
A	**Socio-personal and economical variables**				
X_1	Age	0.30**	6.10	0.17**	3.34
X_2	Education	0.13*	2.52	0.12*	2.39
X_3	Family Size	0.22**	4.31	0.16**	3.20
X_4	Occupation	-0.04	-0.90	0.05	1.01
X_5	Landholding	0.27**	5.51	0.23**	4.56
X_6	Area under millet crop	0.29**	5.94	0.26**	5.19
X_7	Millet crop grown	0.11*	2.25	0.11*	2.19
X_8	Annual income	0.29**	5.94	0.10*	2.06
X_9	Awareness regarding processing and value addition of minor millet	0.33**	6.68	0.13*	2.56
X_{10}	Practices regarding processing and value addition of minor millet	-0.00	-0.13	0.05	1.07
B	**Psychological variables**				
X_{11}	Decision making	0.12*	2.37	-0.00	-0.11
X_{12}	Market Orientation	0.10*	2.08	0.00	0.15
X_{13}	Risk bearing ability	0.15**	2.98	0.18**	3.52
C.	**Communicational variables**				
X_{14}	Information seeking behaviour	0.59**	14.29	0.26**	5.21
X_{15}	Social Participation	0.13*	2.56	0.12*	2.35
X_{16}	Training received about processing and value addition of minor millet	0.12*	2.49	0.14**	2.74

**Significant at 0.01 level of probability *Significant at 0.05 level of probability

area under millet cultivation, annual income, family size, occupation, and type of millet crops grown (Table 1).

The correlation between age and knowledge revealed a positive and significant association among both male (r = 0.30**) and female (r = 0.17**) respondents, indicating that older farmers possessed higher knowledge regarding processing and value addition of minor millets. This may be due to their longer farming experience and greater familiarity with traditional millet processing methods. Similar findings were reported by Gayathri and Manimozhi (2024), who observed that age contributes positively to knowledge acquisition in agricultural activities.

Education showed a positive and significant relationship with the knowledge of male (r = 0.13*) and female (r = 0.12*) respondents, implying that higher education levels were associated with greater knowledge of millet processing and value addition. Educated farmers are more receptive to new information and better able to comprehend extension messages. These findings are in line with those of Chapke (2022), who stated that education enhances the capacity to understand and apply improved agricultural practices.

A positive and significant correlation was observed between family size and knowledge level of male (r = 0.22**) and female (r = 0.16**) respondents. Larger families often contribute more labour and shared learning experiences, which facilitate better understanding of millet processing activities. The results agree with the findings of Sarkar *et al*. (2016), who reported that family size enhances mutual learning and collective participation in farm activities.

Occupation exhibited a non-significant correlation with the knowledge level of both male (r = –0.04) and female (r = 0.05) respondents, indicating that occupational status had no substantial influence on knowledge levels. This might be because most respondents were primarily engaged in agriculture, leading to limited variation across occupational categories.

A positive and highly significant relationship was found between landholding and knowledge among male (r = 0.27**) and female (r = 0.23**) respondents. Farmers possessing larger landholdings are likely to have more resources, frequent contact with extension agencies, and exposure to improved technologies, contributing to higher

knowledge levels. This finding is supported by Gayathri and Manimozhi (2024) and Chapke (2022) who highlighted the influence of land size on access to agricultural information.

The correlation between area under millet cultivation and knowledge level was positive and significant for both male (r = 0.29**) and female (r = 0.26**) respondents. Those cultivating larger millet areas tend to be more involved in post-harvest handling and processing, leading to higher knowledge. These results are consistent withChapke (2022), who found that greater cropping area enhances farmers' technical knowledge.

The number of millet crops grown was positively and significantly correlated with knowledge among male (r = 0.11*) and female (r = 0.11*) respondents. Cultivating multiple millet varieties allows farmers to gain broader practical experience in different processing and value addition methods.

Annual income showed a positive and significant relationship with knowledge among male (r = 0.29**) and female (r = 0.10*) respondents. Farmers with higher income have greater access to extension services, tools, and trainings, which enhances their knowledge level. This is in agreement with Ali et al. (2004), who reported that income positively influences technological adoption.

Awareness exhibited a positive and significant correlation with knowledge for both male (r = 0.33**) and female (r = 0.13*) respondents. Awareness acts as the foundation for knowledge gain, as better-informed farmers are more likely to understand and adopt improved processing and value addition practices.

A non-significant correlation was observed between practices and knowledge among male (r = –0.00) and female (r = 0.05) respondents, indicating that actual practices did not necessarily translate into higher technical knowledge. Many tribal farmers continue traditional practices without deep understanding of the scientific basis.

Influence of psychological factors on knowledge

The psychological variables included risk orientation, market orientation, and decision-making ability (Table 1).

Decision-making ability showed a positive and significant association with knowledge among male respondents (r = 0.12*), while it was non-significant among females (r = –0.00). Male farmers, being primary decision-makers in farm operations, may have greater opportunities to gain and apply knowledge. These results align with Chapke (2022).

Market orientation exhibited a positive and significant relationship with knowledge among male respondents (r = 0.10*), whereas it was non-significant among females (r = 0.00). The result indicates that market-oriented male farmers, having more exposure to marketing channels, gain better insights into value addition. Similar findings were reported by Devi (2022).

Risk bearing ability showed a positive and significant relationship with the knowledge level of both male (r = 0.15**) and female (r = 0.18**) respondents. Farmers willing to take risks are more likely to experiment with innovative processing and value addition methods. The result supports the findings of Gayathri and Manimozhi (2024).

Influence of communicational variables on knowledge

The communicational variables considered were information seeking behaviour, social participation, and training received (Table 1).

Information-seeking behaviour exhibited a strong positive and highly significant correlation with the knowledge of male (r = 0.59**) and female (r = 0.26**) respondents. This indicates that respondents who frequently seek agricultural information through extension agencies, media, and progressive farmers possess higher knowledge. The finding is consistent with Kiran (2007) and Chapke (2022), who reported that active information seeking enhances technical competence.

Social participation was positively and significantly related to knowledge among both male (r = 0.13*) and female (r = 0.12*) respondents. Active participation in social and community organizations provides opportunities for knowledge exchange and collective learning. Similar findings were observed by Chapke (2022); Dangi et al. (2024); Rathod et al. (2024); Pratik and Vinaya (2022); Pratik and Vinaya (2023); Mallappa et al. (2023).

Training received showed a positive and significant correlation with knowledge among male (r = 0.12*) and female (r = 0.14**) respondents. Farmers who participated in training programs gained better practical and theoretical understanding of millet processing and value addition. These results align with the findings of Megha *et al*. (2024), emphasizing the role of training in capacity building.

CONCLUSION

This study highlights the challenges faced by tribal millet farmers, particularly knowledge gaps, gender-based disparities, and restricted access to resources. A clear

shift is evident toward sustainable millet cultivation and processing, reducing dependence on traditional and less efficient practices. The findings emphasize that variables such as training, decision-making ability, risk orientation, market orientation, social participation, and information-seeking behavior, significantly enhance farmers' knowledge of processing and value addition.

Gender-specific roles, division of labour, experiential learning and access to infrastructure were also identified as critical determinants shaping farmers' participation and knowledge. These insights underscore the need for integrated policy interventions by government, private, and non-governmental organizations. Strengthening gender-inclusive strategies, improving training and infrastructure, and promoting knowledge dissemination can empower tribal communities especially women while enhancing livelihoods. Ultimately, fostering improved millet processing and value addition practices will contribute to more sustainable, resilient, and nutrition-oriented farming systems.

RECOMMENDATIONS

- Formation of women-led and mixed SHGs/FPOs to promote collective millet processing, value addition and marketing.
- Provision of subsidies, low-interest credit and low-cost millet processing equipment for cooperative ownership, especially prioritizing women.
- Skill development and entrepreneurship training for women in millet-based enterprises, including packaging, branding and value-added products.
- Development of storage, packaging infrastructure to extend shelf life and reduce post-harvest losses.
- Formulation of gender-sensitive policies to ensure equal participation of men and women in cultivation, processing, and marketing activities.

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CONFLICT OF INTEREST

The authors hereby declare that they have no conflicts of interest related to this study.

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