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Profile Characteristics of Khasi Tribal Farmers Engaging in Collection and Management of Non-Timber Forest Products in Meghalaya, India

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Authors' contributions

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

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ABSTRACT

Tribal farmers belong to indigenous communities and engage in agricultural activities, agroforestry or even non-timber forest product harvesting as their primary livelihood. These farmers are part of ethnic groups with distinct traditions, languages and social structures. Therefore, studying the profile characteristics of these farmers is essential for understanding their unique socio-economic and cultural contexts. This study was conducted on 160 tribal farmers from East Khasi Hills and Ri Bhoi district of Meghalaya, primarily engaged in the collection and management of non-timber forest products. The research, utilized an ex post facto design. Findings revealed that most

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respondents were young or middle aged, with diverse educational backgrounds. Housing was mainly wooden or concrete with asbestos sheets. Material possession ranged from low to medium, and family sizes were typically medium to large, with nuclear families prevailing. Social and political participation varied, while income distribution skewed towards the low to medium range. Local and regional markets were preferred by over two-thirds of respondents. Livestock ownership, landholding sizes and indebtedness patterns demonstrated diversity. Engagement with mass media, cosmopoliteness, extension contact, participation and opinion leadership varied, with many falling into low to medium categories. Awareness of development schemes was significant, indicating a connection to broader societal initiatives. Tribal farmers displayed diverse levels of scientific orientation, risk and economic motivation, market orientation, and fatalistic attitudes. These findings offer valuable insights for policymakers, researchers and development practitioners, facilitating tailored interventions to address the unique needs and aspirations of this farming community.

Keywords: Tribal farmers; economic conditions; social participation; extension; psychological factors.

1. INTRODUCTION

Tribals are frequently referred to as "sons of the forest" or "the king of the forest." Former Indian Prime Minister Pandit Jawaharlal Nehru famously declared that he would rather be a nomad in the hills. He noted that the tribal people had greater discipline and democracy. According to a quote by Dorothy Stang, "the death of the forest is the end of our life.". According to Census 2011, the Scheduled tribe population in India is 10,42, 81, 034 i.e., 8.60 percent of the total population. In India, Meghalaya ranked 3rd in the percentage of tribal population residing in the region with 86.15 percent after Mizoram (94.44%) and Nagaland (86.46 %). In Meghalaya, 42.68 percent of the population belonged to Khasi Tribes which is one of the major tribes in the state. A tribe is a community of people sharing a common racial background, customs, language and religious beliefs, residing in a specific geographic area and often led by a chief or leader [1]. It comprises of families or groups of families that share a common name and inhabit the same territory, using a common language and adhering to specific cultural norms, including marriage practices and occupational traditions. Typically, tribes are associated with secluded regions like hills and forests [2].

Meghalaya is known for its diverse, extensive, and luxuriant forests, ranking fifth in the country with a forest cover of 76.00 percent [3]. Since time immemorial, forests have been a vital source of sustenance and income for tribal communities, serving as essential support system during difficult times. NTFPs have been used by humans since ancient times [4] for various purposes like food, fodder, fiber, traditional medicine, agricultural amenities, construction materials and domestic items [5]. Therefore, to know the profile characteristics of the Khasi tribal farmers engaging in the collection and management of NTFPs, this study was conducted. Knowing the profile characteristics of tribal farmers is essential for tailoring interventions to their unique needs. It provides insights into demographics, socio-economic conditions, educational backgrounds, family dynamics, economic indicators and psychological traits. This comprehensive understanding enables the development of targeted programs that align with cultural norms, promote sustainable resource management, and address the specific challenges and aspirations of tribal farming communities, ultimately contributing to their well-being and development.

2. METHODOLOGY

2.1 Study Area

The present study was carried out in East Khasi Hills and Ri Bhoi Districts of Meghalaya (Fig. 1). These districts were purposively chosen using criterion sampling [6] based on six distinct criteria: language, geographical proximity, the presence of the Autonomous District Council, the substantial population of Khasi tribes, significant forest cover and the noteworthy production of major Non-Timber Forest Products (NTFPs) such as Bamboo, Broomgrass, Bay Leaf and Wild Pepper. Both East Khasi Hills and Ri Bhoi Districts fall under the jurisdiction of the Khasi Hills Autonomous District Council (KHADC). As per the 2011 census data, the Khasi tribe population in East Khasi Hills accounted for 92.77 percent (5,99,025 individuals), while in Ri Bhoi District, it was 84.76 percent (1,89,766 individuals), with 66.32 percent (397,279

individuals) residing in rural areas of East Khasi Hills and 91.00 percent (172,819 individuals) in Ri Bhoi district, respectively. Furthermore, the forest cover in East Khasi Hills and Ri Bhoi District was found to be 62.45 percent and 87.35 percent of the geographical area [3].

2.2 Sampling Technique and Sample

Two Blocks were purposively selected from each district. Two villages that were in close vicinity to the forest and had the concentration of NTFPs were selected from each block based on consultation with staff from the block office. From each village, 20 tribal farmers were selected using a simple random technique at 95 percent confidence level making up a sampling size of 160 tribal farmers. Ex-post facto research design was followed for the study. Khasi tribal farmers refer to tribal farmers belonging to Khasi Tribes as per the Khasi Social Custom of Clan Administration Bill, 2020 were treated as the respondents.

2.3 Data Collection

The primary data on profile characteristics of tribal people were collected through field surveys and interactions with people in person through structured interviews and personal observations.

2.4 Measurement of Variables

The variables were measured as follows: age (chronological age in years); educational status (0 to 6, ranging from illiterate to college education); type of house (scored from 1 to 5 based SES scale, encompassing Mudwall + thatched shed to RCC (Reinforced Cement Concrete); and material possession, scored based on household goods and materials using the SES scale; family size (small (up to 4 members), medium (5 to 7 members) and big (more than 7 members)); family type (1= joint family and 2=nuclear family); social participation (0, 1 and 2 for never, occasionally and regularly); political participation, scored based on voting, canvassing and opinions about elections (1=Yes and 0=No); annual income, (low, medium and high based on mean and standard deviation); marketing pattern (1 to 4 based on the preferred market); livestock possession (scored based on the types of animals owned); land holding (marginal, small and big farmers based on land size in acres); indebtedness and loan repayment behavior (scored based on borrowing status and regularity of loan repayment); mass media use (0, 1 and 2 for never, occasionally and regularly); cosmopoliteness (scored based on the frequency and purpose of visits to nearby towns); extension contact (0, 1 and 2 for never, occasionally and regularly); extension participation

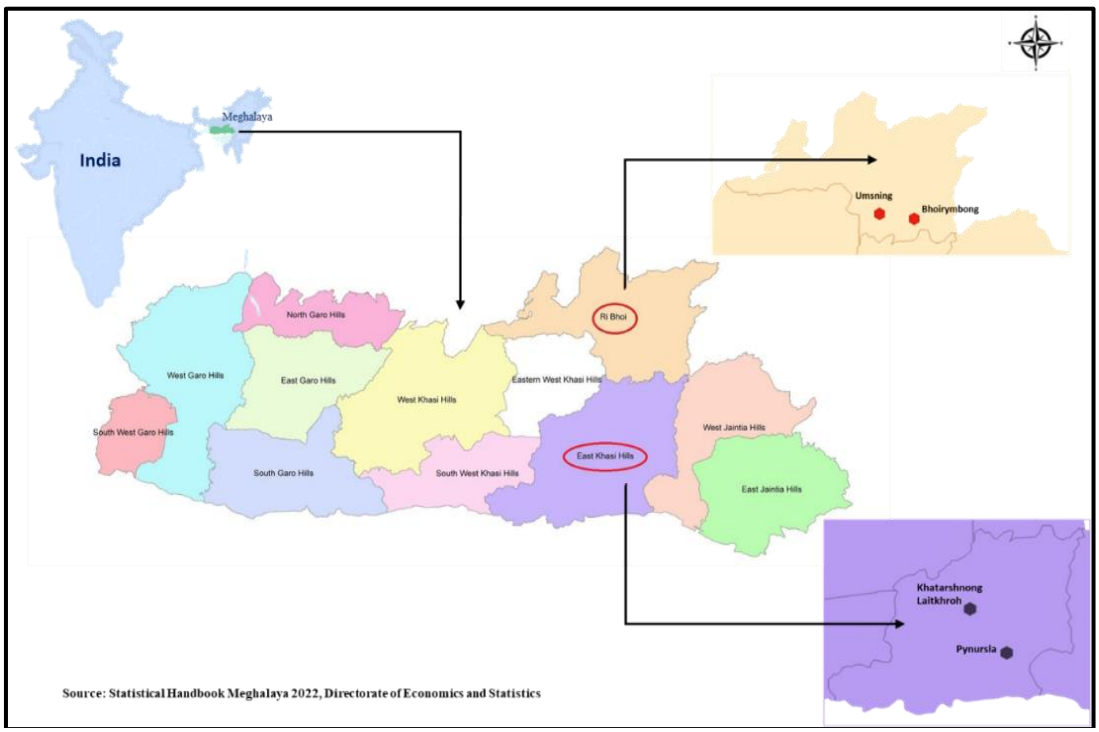

Fig. 1. Geographical location of the study area

(0, 1 and 2 for never, occasionally and regularly); opinion leadership (scored as low, medium or high based on the self-designating opinion leadership scale); awareness of development programs (0, 1, or 2 for not aware, aware, and aware with benefits); scientific orientation, risk orientation, economic motivation, market orientation and fatalism (5=strongly agree, 4=agree, 3=undecided, 2=disagree and 1=strongly disagree for positive statements and reverse scoring for negative statements). The data were processed and tabulated using simple frequencies and parameters like percentage, mean and standard deviation as required for comprehensive analysis.

3. RESULTS AND DISCUSSION

3.1 Personal Characteristics of the Tribal Farmers

3.1.1 Age

The age distribution (Table 1 and Fig. 2) was crucial for understanding the composition of the workforce engaged in NTFPs activities among tribal farmers. Nearly half (46.25%) of the tribal farmers were in the middle age group between 36 to 55 years, followed by 32.50 belonging to the young age group (up to 35 years) and 21.25 percent belonging to the old age group (above 56 years). The prevalence of farmers in the middle age group suggested an actively engaged workforce that contributed to economic activities, including sustainable practices related to NTFPs. The presence of younger farmers implied a potential for the transfer of inter-generational knowledge, essential for maintaining traditional practices [7,8].

3.1.2 Educational status

The educational status (Table 1 and Fig. 2) served as a key determinant of tribal farmers' capacity for adopting modern and sustainable agricultural practices, including those related to NTFPs collection and management. Over a quarter of tribal farmers (28.13%) in the studied area had middle school education, 23.13 percent completed secondary school, 22.50 percent attained primary school education and 5.63 percent finished higher secondary school, while only 5.00 percent received college education [7,8]. The results showed a notable presence of middle and secondary school facilities in rural Meghalaya, though the limited availability of higher education infrastructure posed a challenge. Understanding educational status was relevant to the processing and collection of NTFPs, suggesting a significant portion of farmers possessed foundational literacy and numeracy skills, potentially supporting engagement in value-added processing activities. However, the dearth of higher education opportunities constrained the adoption of advanced processing techniques. Addressing this educational gap is crucial for empowering this tribal community.

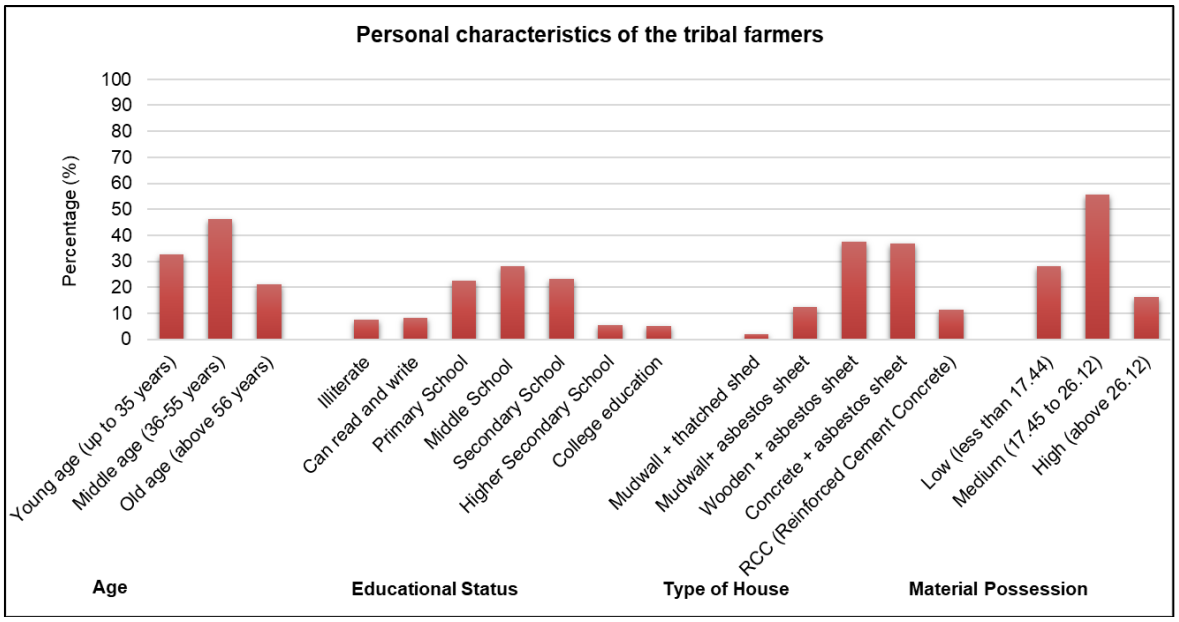

Fig. 2. Illustration of personal characteristics of the tribal farmers

Table 1. Personal characteristics of the tribal farmers (n=160)

Characteristics	Category	No.	%
Age	Young age (up to 35 years)	52	32.50
	Middle age (36-55 years)	74	46.25
	Old age (above 56 years)	34	21.25
Educational Status	Illiterate	12	7.50
	Can read and write	13	8.13
	Primary School	36	22.50
	Middle School	45	28.13
	Secondary School	37	23.13
	Higher Secondary School	9	5.63
	College education	8	5.00
Type of house	Mudwall + thatched shed	3	1.88
	Mudwall+ asbestos sheet	20	12.50
	Wooden + asbestos sheet	60	37.50
	Concrete + asbestos sheet	59	36.88
	RCC (Reinforced Cement Concrete)	18	11.24
Material Possession (Mean=21.78 and ½ SD=4.34)	Low (less than 17.44)	45	28.13
	Medium (17.45 to 26.12)	89	55.63
	High (above 26.12)	26	16.25

3.1.3 Type of house

Understanding the types of houses (Table 1 and Fig. 2) among tribal farmers is crucial for holistic development and sustainable resource management. Nearly three-fourths (74.38%) of tribal farmers had houses constructed with wooden + asbestos sheet and concrete + asbestos sheet, followed by 12.50 percent with Mudwall + asbestos sheet houses, 11.25 percent with RCC houses and 1.88 percent with Mudwall + thatched shed houses. This prevailing use of construction materials suggests a predominant reliance on certain elements, likely influenced by local building norms, economic feasibility and resource availability. The choice of construction materials in the past may have directly impacted the availability of NTFPs, particularly those derived from wood, for local communities. Therefore, sustainable NTFPs management interventions should consider the ecological impact of housing construction and advocate for alternatives that balance traditional practices with modern, environmentally friendly materials. This insight emphasizes the need for present housing policies to align with both community needs and sustainable resource management, ensuring that development initiatives contribute positively to the well-being of tribal farmers and the ecosystems they depend on.

3.1.4 Material possession

Material possession (Table 1 and Fig. 2) among tribal farmers is crucial as it provides valuable insights into their economic conditions, resource accessibility and living standards. In this study, the majority (83.76%) of tribal farmers were categorized as having low and medium possession levels, while 16.25 percent were classified as having high possession [9]. Understanding material possessions is relevant to NTFPs as it directly influences the communities' reliance on forest resources for their livelihoods. Higher possession levels may indicate improved economic conditions, potentially leading to reduced dependency on NTFPs for sustenance. On the other hand, lower possession levels may imply a greater reliance on these forest products for income and subsistence, poverty, low literacy, lack of knowledge, lack of exposure, infrastructural insufficiency etc. [10]. Addressing disparities in material possessions involves implementing targeted economic development programs, such as promoting local industries and creating job opportunities. This approach aims to uplift the economic situation of tribal farmers and may contribute to a more sustainable and diversified livelihood strategy, reducing the pressure on NTFPs and promoting conservation efforts.

3.2 Social Characteristics of the Tribal Farmers

3.2.1 Family size

Family size (Table 2 and Fig. 3) significantly impacted various aspects of tribal lives, including

livelihoods, socio-economic dynamics, and resource utilization. The distribution of family sizes in the study, with more than half (51.25%) belonging to medium-sized families (5 to 7 members), 28.70 percent to small-sized families (up to 4 members), and 20.00 percent to big-sized families (more than 7 members), reflected demographic patterns observed in other studies. The preference for medium and big-sized families in the past might have been influenced by cultural perceptions of children as valuable contributors through labor and limited awareness of the advantages associated with smaller family sizes. In the present context, family size continues to be relevant, especially in the context of Non-Timber Forest Products (NTFPs) and resource management, as it directly impacts the demand for and consumption of forest resources. Larger families in the present may still have higher resource needs, potentially leading to increased reliance on NTFPs for sustenance. Understanding family size remains crucial for designing targeted interventions and family planning programs that align with the socio-cultural context, promoting awareness of the benefits of smaller families, and contributing to sustainable resource management within tribal communities.

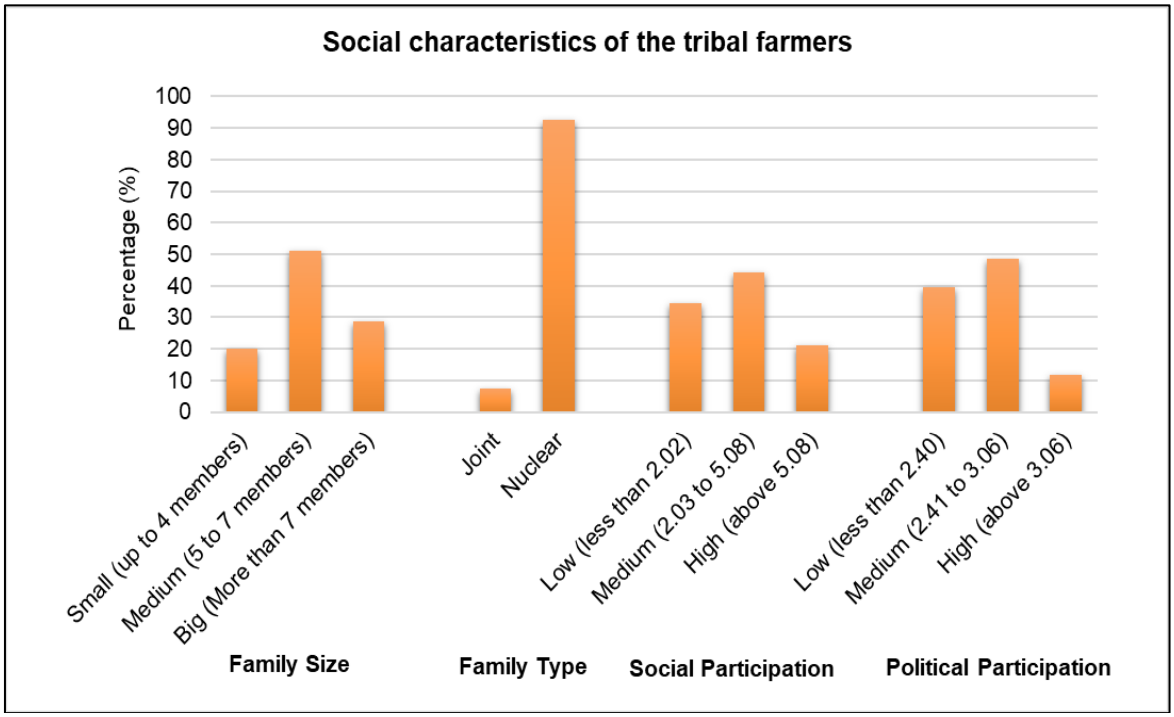

Fig. 3. Illustration of social characteristics of the tribal farmers

Table 2. Social characteristics of the tribal farmers (n=160)

Characteristics	Category	No.	%
Family Size	Small (up to 4 members)	32	20.00
	Medium (5 to 7 members)	82	51.25
	Big (More than 7 members)	46	28.75
Family Type	Joint	12	7.50
	Nuclear	148	92.50
Social Participation (Mean:3.55 and ½ SD: 1.53)	Low (less than 2.02)	55	34.38
	Medium (2.03 to 5.08)	71	44.37
	High (above 5.08)	34	21.25
Political Participation (Mean:2.73 and ½ SD:0.33)	Low (less than 2.40)	63	39.38
	Medium (2.41 to 3.06)	78	48.75
	High (above 3.06)	19	11.87

3.2.2 Family type

Table 2 and Fig. 3 represents the categorization of respondents based on their family type. A majority (92.50%) of the tribal farmers belonged to nuclear families, while only 7.50 percent were part of joint families [11]. Due to the increasing emphasis on individualism, there is a tendency for people to opt for autonomous lives with personal possessions and adequate housing within nuclear family structures [12].

3.2.3 Social participation

More than two-fifth (44.37%) of the tribal farmers (Table 2 and Fig. 3) had medium participation followed by 34.38 percent low participation and 21.25 percent high participation indicating a significant level of interest and eagerness among tribal individuals to engage with diverse formal and informal groups and organizations [13,14]. However, to improve the participation of tribal farmers in social activities proper awareness about available activities, culturally sensitive engagement initiatives, community-driven events and educational efforts highlighting the benefits of social engagement is crucial.

3.2.4 Political participation

Nearly half (48.75%) of the tribal farmers (Table 2 and Fig. 3) had medium political participation followed by 39.38 percent low participation and 11.87 percent had high participation. The subdued participation could arise from a disinterest in political matters coupled with the priority given to farming, consuming much of their time and energy [15]. Despite the significant roles women hold within the matrilineal structure of the Khasi tribes, their representation in political spheres remains notably minimal. This discrepancy sharply contrasts with societal norms, confining women within traditional boundaries and restricting their active involvement in politics and governance.

3.3 Economic Characteristics of the Tribal Farmers

3.3.1 Annual income

More than half (55.00%) of the tribal farmers (Table 3 and Fig. 4) are in medium-income (Rs. 1.07 to Rs. 2.39 lakh) followed by 31.88 percent belonged to low income (less than Rs. 1.07 lakh) and 13.12 percent belonged to high income category (more than Rs. 2.39 lakh) highlighting significant economic challenges within this community [16,8]. This income distribution signifies the need for extension professionals to encourage income diversification through promoting non-farm activities, small businesses, or cottage industries, considering the financial constraints faced by a considerable portion of tribal farmers in both districts.

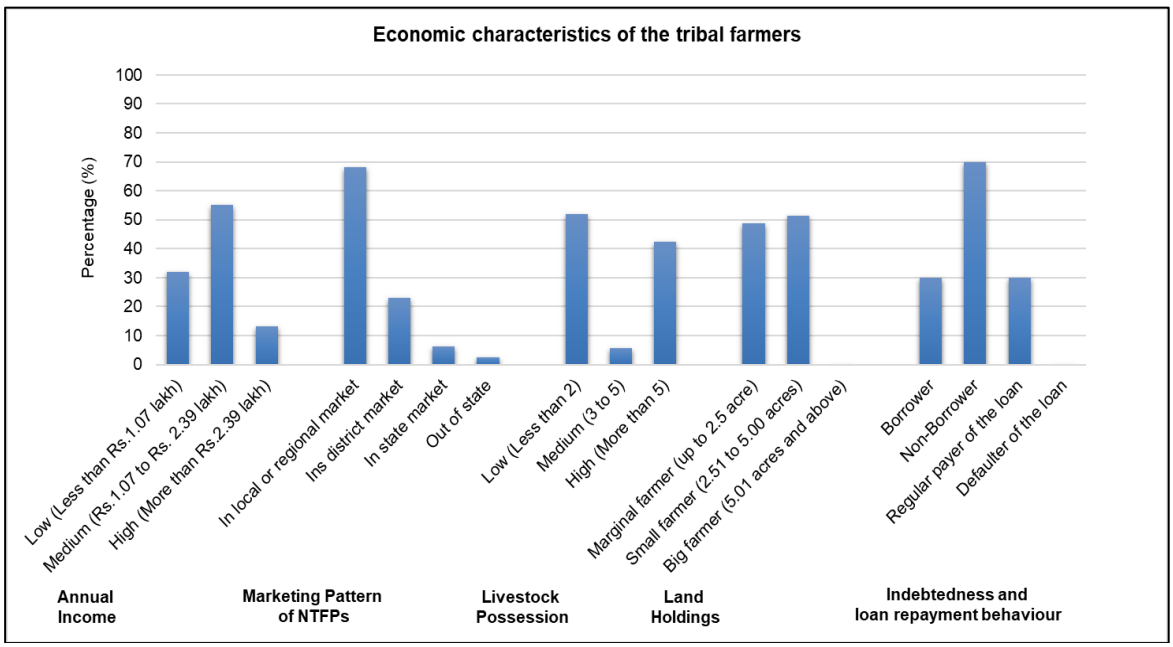

Fig. 4. Illustration of economic characteristics of the tribal farmers

Table 3. Economic characteristics of the tribal farmers (n=160)

Characteristics	Category	No.	%
Annual Income (Mean: 1.73 lakh and ½ SD: 0.66 lakh)	Low (Less than Rs.1.07 lakh)	51	31.88
	Medium (Rs.1.07 to Rs. 2.39 lakh)	88	55.00
	High (More than Rs.2.39 lakh)	21	13.12
Marketing pattern of NTFPs	In local or regional market	109	68.13
	Ins district market	37	23.12
	In state market	10	6.25
	Out of state	4	2.50
Livestock Possession (Mean: 3.51 and ½ SD: 1.70)	Low (Less than 2)	83	51.88
	Medium (3 to 5)	9	5.62
	High (More than 5)	68	42.50
Land Holdings	Marginal farmer (up to 2.5 acre)	78	48.75
	Small farmer (2.51 to 5.00 acres)	82	51.25
	Big farmer (5.01 acres and above)	0	0.00
Indebtedness and loan repayment behaviour	**Indebtedness**		
	Borrower	48	30.00
	Non-Borrower	112	70.00
	Loan repayment behaviour		
	Regular payer of the loan	48	30.00
	Defaulter of the loan	0	0.00

3.3.2 Marketing pattern of NTFPs

More than two-third (68.13%) of the tribal farmers (Table 3 and Fig. 4) favours local or regional markets followed by 23.12 percent that favours district market, 6.25 percent state markets and 2.50 percent out-of-state markets [17]. This inclination towards local markets could stem from accessibility issues, limited infrastructure for larger markets and the absence of support for the local economy [18]. The majority engage in local or district-level transactions due to transportation constraints, familiarity with local markets and immediate needs. To enhance market patterns for Non-Timber Forest Products (NTFPs), the government should invest in infrastructure, provide market information, establish linkages, encourage value addition, offer training and certifications and advocate for support.

3.3.3 Livestock possession

More than half (51.88%) of the tribal farmers (Table 3 and Fig. 4) had low possession, while 42.50 percent had high possession, a minimal percentage 5.62 percent had medium possession [19]. The low category involves raising pigs and cows, the medium involves goats and fisheries and the high category mainly comprises poultry farmers, both for personal use and in contractual agreements with companies available is the state. Tribal farmers make strategic livestock choices based on economic considerations and diversification prospects [20]. Additionally, holding good number of livestock could be attributed to the fact that livestock rearing was the most preferred secondary occupation [13].

3.3.4 Land holdings

Over half (51.25%) of the tribal farmers (Table 3 and Fig. 4) are small farmers (2.51 to 5.00 acres) and 48.75 percent are marginal farmers (up to 2.5 acres). None of the farmers belonged to big farmers category (5.01 acres and above). The prevalence of small and marginal landholdings in Meghalaya is shaped by historical, socio-economic and geographical factors. The hilly terrain limits arable land availability, fostering subsistence farming practices. Inherited through the female line in the matrilineal system, land division over generations has led to smaller plots.

3.3.5 Indebtedness and loan repayment behaviour

Nearly one-third (30.00%) of the tribal farmers (Table 3 and Fig. 4) have borrowed loan and all of them consistently fulfill their repayment obligations. The results indicates that since majority of the loan borrowed were from an informal source such as Self-Help Groups (SHGs), the tribal farmers often exhibit regular repayment behavior due to the unique structure and dynamics of SHGs. SHGs operate on

principles of mutual trust, cooperation and shared responsibility. Members within SHGs often have social connections and close-knit relationships, fostering a strong sense of accountability and solidarity. Moreover, SHGs typically offer smaller loans with manageable repayment terms, making it easier for borrowers to adhere to repayment schedules.

3.4 Extension and Communication Characteristics of Tribal Farmers

3.4.1 Mass media use

More than half (50.62%) of the tribal farmers (Table 4 and Fig. 5) fell under medium category of mass media use, 28.13 percent under low category and 21.25 percent fell under high category of mass media use. This arises from limited access to TV, radio and the internet in remote regions, compounded by language barriers and differing cultural approaches to media engagement. Infrastructure issues, such as unreliable connectivity and the preference for local communication methods, further hinder usage. To enhance media utilization, it is crucial to improve internet connectivity and ensure consistent electricity supply while delivering tailored content in local languages. Workshops can play a pivotal role in teaching farmers how to effectively use available devices, connecting them with experts, scientists and fellow farmers to share valuable farming insights and information.

3.4.2 Cosmopoliteness

More than one-third (39.38%) of the tribal farmers (Table 4 and Fig. 5) fell under low cosmopoliteness category followed by 38.75 percent under medium category and 21.87 percent under high category. This is due to geographical and cultural isolation in remote regions limits exposure to diverse cultures and ideas, fostering a focus on preserving their own traditions. Language barriers and limited proficiency in other languages might hinder interactions with outsiders, while economic constraints could restrict travel and engagement with cosmopolitan influences [21]. Additionally, a strong attachment to their cultural identity and traditional way of life may prioritize maintaining their own customs over embracing cosmopolitan attitudes, collectively contributing to the observed levels of cosmopoliteness within the Khasi tribal farming communities.

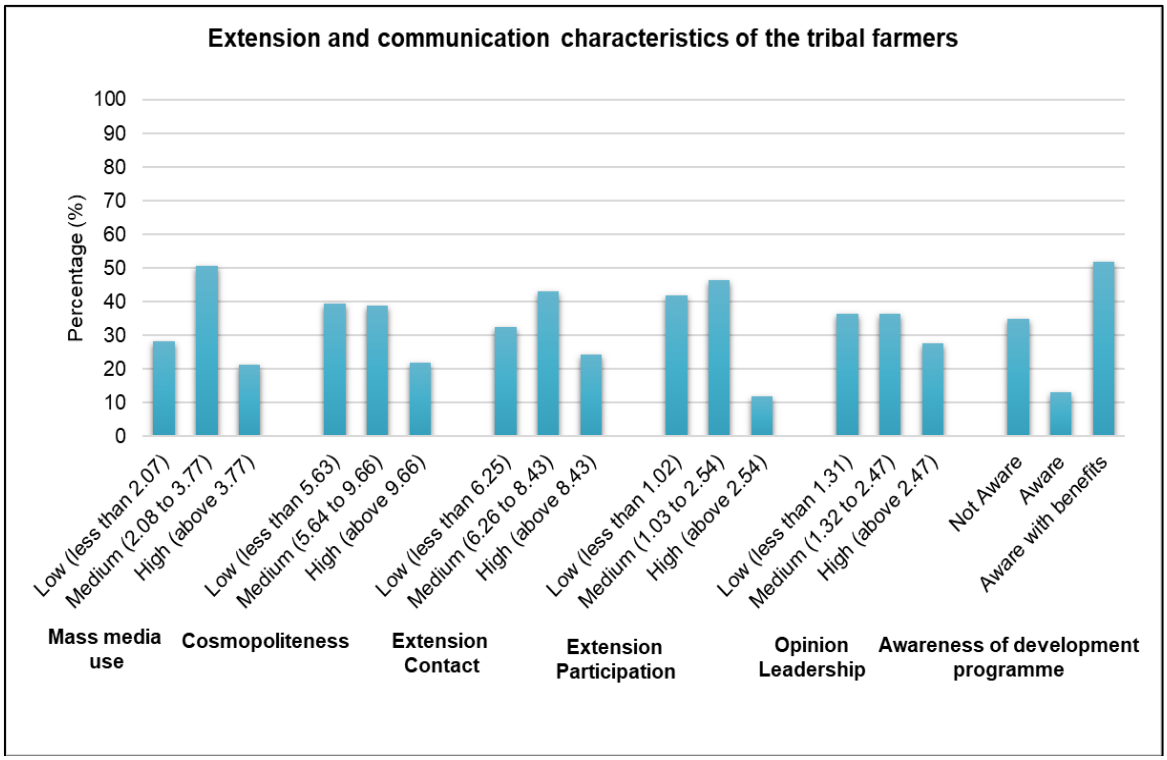

Fig. 5. Illustration of extension and communication characteristics of the tribal farmers

Table 4. Extension and communication characteristics of the tribal farmers (n=160)

Characteristics	Category	No.	%
Mass media use	Low (less than 2.07)	45	28.13
(Mean:2.92 and ½ SD: 0.85)	Medium (2.08 to 3.77)	81	50.62
	High (above 3.77)	34	21.25
Cosmopoliteness	Low (less than 5.63)	63	39.38
(Mean: 7.51 and ½ SD: 2.15)	Medium (5.64 to 9.66)	62	38.75
	High (above 9.66)	35	21.87
Extension Contact	Low (less than 6.25)	52	32.50
(Mean:7.34 and ½ SD: 1.09)	Medium (6.26 to 8.43)	69	43.13
	High (above 8.43)	39	24.37
Extension Participation	Low (less than 1.02)	67	41.88
(Mean:1.78 and ½ SD: 0.76)	Medium (1.03 to 2.54)	74	46.25
	High (above 2.54)	19	11.87
Opinion Leadership	Low (less than 1.31)	58	36.25
(Mean:1.89 and ½ SD:0.58)	Medium (1.32 to 2.47)	58	36.25
	High (above 2.47)	44	27.50
Awareness of development programme	Not Aware	56	35.00
	Aware	21	13.13
	Aware with benefits	83	51.87

3.4.3 Extension contacts

More than two fifth i.e., 43.13 percent of the tribal farmers (Table 4 and Fig. 5) had medium extension contact followed by 32.50 percent low contact and 24.37 percent had high extension contact. The observed distribution of extension contacts levels among tribal farmers, with a significant proportion having medium and low contacts [16], may be attributed to limited accessibility to extension services, inadequate infrastructure, lack of awareness among farmers and challenges related to communication and transportation. Therefore, to address these challenges and enhance extension contacts in tribal areas, there should be efforts to improve the accessibility of extension services by establishing more outreach centers and utilizing technology, such as mobile platforms, to disseminate information. Training and capacity-building programs for local extension workers can empower them to effectively communicate with and understand the needs of tribal farmers. Conducting extension activities in local languages, incorporating culturally relevant examples and adapting strategies to the specific socio-economic context of rural areas can increase the effectiveness of outreach. Furthermore, community-based initiatives, such as forming local cooperatives or groups, can foster a sense of ownership and collective participation, making extension services more relevant and accessible to rural communities.

3.4.4 Extension participation

The results revealed that, 46.25 percent of the farmers (Table 4 and Fig. 5) fell into the category of medium extension participation, followed by 41.88 percent exhibited low participation, while 11.87 percent demonstrate high participation. The low to medium extension participation among tribal farmers [22] may stem from various factors such as limited access to extension services, inadequate awareness of available programs, challenges in communication and outreach, as well as socio-economic and cultural disparities. Additionally, the relevance of the information provided in extension services may not align with the specific needs and practices of tribal communities, leading to lower participation. Hence, to address these issues and enhance extension participation among tribal farmers, several strategies may be considered. Firstly, there should be an emphasis on improving the accessibility of existing extension services through the establishment of local outreach centers and leveraging technology for remote communication. Training and capacity-building programs for extension workers should focus on the specific needs and practices of tribal farmers, incorporating indigenous knowledge and local context.

3.4.5 Opinion leadership

Nearly two-fifth i.e., 36.25 percent of the tribal farmers (Table 4 and Fig. 5) fell under low and

36.25 percent under medium category and 27.50 percent under high category. The low to medium opinion leadership among tribal farmers may be due to limited exposure to information, communication barriers and socio-economic constraints. To address this, it is recommended to state agriculture department, NGOs and rural institutions to implement targeted awareness campaigns and capacity-building programs aimed at enhancing the leadership qualities of tribal farmers. These initiatives could involve workshops, training sessions and community-based programs to empower farmers with knowledge and skills. Additionally, fostering community networks and encouraging peer-to-peer communication can help amplify the impact of opinion leaders within the community, facilitating the dissemination of information and promoting a more influential role for tribal farmers.

3.4.6 Awareness of development programme

More than half i.e., 51.87 percent of the tribal farmers (Table 4 and Fig. 5) fell under the aware with benefits category meaning they are aware as well as beneficiary of the development programme, while 13.13 percent fell under the aware category and 35.00 percent are not aware of the development programmes offered by the government. Despite most tribal farmers being aware of development programs and some benefiting from them, there remains a subset still unaware [23]. Therefore, to enhance the awareness among these farmers, it is necessary to employ community-based communication strategies. Utilizing local languages, involving community leaders and leveraging traditional channels such as meetings, storytelling or radio broadcasts will effectively disseminate information. Tailored educational campaigns, using visual aids, workshops and demonstrations would also be pivotal in engaging and informing the farmers about the program's benefits. Moreover, forging partnerships with local NGOs, community groups and government agencies will significantly amplify awareness campaigns and bridging gaps for those who might have previously missed out on these opportunities.

3.5 Psychological Characteristics of the Tribal Farmers

3.5.1 Scientific orientation

Over half (51.25%) of the tribal farmers (Table 5 and Fig. 6) showed medium scientific orientation followed by 25.63 percent low orientation and 23.12 percent demonstrated high orientationThe findings suggest that there is diversity among tribal farmers in terms of their adoption and inclination towards modern scientific practices in agriculture. A moderate to high scientific orientation [9] may be advantageous for those involved in sustainable harvesting and management of NTFPs, enabling an understanding of ecological principles and conservation practices. Additionally, value addition and market-oriented activities may benefit from a reasonable level of scientific knowledge for quality control and compliance. To elevate the scientific orientation of tribal farmers, it is recommended to implement targeted training programs and workshops tailored to their local context, emphasizing sustainable agricultural practices and the specific nuances of NTFPs. Collaborations with research institutions, incentives for adopting scientific practices, and fostering peer learning within the community are vital. Likewise, leveraging mobile and digital technologies can further contribute to an overall improvement in the scientific orientation of tribal farmers, empowering them with knowledge for sustainable and resilient agricultural practices.

3.5.2 Risk orientation

Close to two-fifth (37.50%) of the tribal farmers (Table 5 and Fig. 6) had low risk orientation followed by 36.25 percent high orientation and 26.25 percent medium risk orientation. The prevalence of low to medium risk orientation [16] among majority of the tribal farmers reflects that tribal communities prioritize stability and consistency over embracing higher risk strategies. This may be because of limited access to financial and technological resources and focus only on subsistence farming. Additionally, a lack of exposure to risk mitigation tools and limited education and information about modern farming practices could also be the reason. To enhance the risk orientation among the tribal farmers, the concern authorities must conduct training that focus on risk management strategies.

3.5.3 Economic motivation

Half (50.00%) of tribal farmers (Table 5 and Fig. 6) exhibited a medium level of economic motivation, while 38.75 percent had low motivation and 11.25 percent showed high motivation. The prevalence of low to moderate economic motivation [8] in tribal farmers can be

ascribed to their concentration on subsistence farming, limited access to markets, risk aversion, insufficient resources and technology and lack of entrepreneurial skills. To address these challenges, the state government as well as state development departments need to enhance market access through infrastructure development and market linkages, promote the adoption of modern farming technologies and implement entrepreneurship development programs aimed at enhancing the business skills of tribal farmers.

3.5.4 Market orientation

More than half (55.00%) of the tribal farmers (Table 5 and Fig. 6) demonstrated a medium market orientation, with 28.13 percent exhibiting low orientation and 16.87 percent showing high orientation [24]. Given that majority of the tribal farmers fall into the low and medium categories of market orientation, it suggests limited involvement with contemporary markets, indicating a likelihood of selling surplus produce locally or through intermediaries. To enhance the market orientation of tribal farmers, it is imperative for relevant authorities such as state government, agricultural extension services and local cooperatives to formulate a comprehensive strategy. This should encompass improving market infrastructure, timely sharing of market information with tribal farmers, creating cooperative groups for collective bargaining, promoting value addition and facilitating connections between farmers and larger market players.

3.5.5 Fatalism

Slightly half (50.63%) of the tribal farmers (Table 5 and Fig. 6) had low fatalism followed by high (40.00%) and medium (9.37%) fatalism which is similar to Vijayakumar [25]. Fatalism is a mindset that the tribal farmers believed that their outcomes and success is beyond their control. The results reveal varying degrees of fatalistic attitudes among tribal farmers engaged in the collection and management of NTFPs. A significant proportion displays low fatalism, indicating a proactive mindset with an acknowledgment of control over outcomes. Conversely, a substantial percentage expresses high fatalism, suggesting potential challenges in embracing change and innovation due to a perceived lack of agency. The minority holding a medium fatalistic mindset implies a nuanced perspective where farmers recognize external factors beyond their control while maintaining a certain level of determination. Understanding these variations in fatalism is crucial for tailoring interventions that cater to the diverse attitudes within the tribal farming community and promoting sustainable practices in NTFPs collection and management.

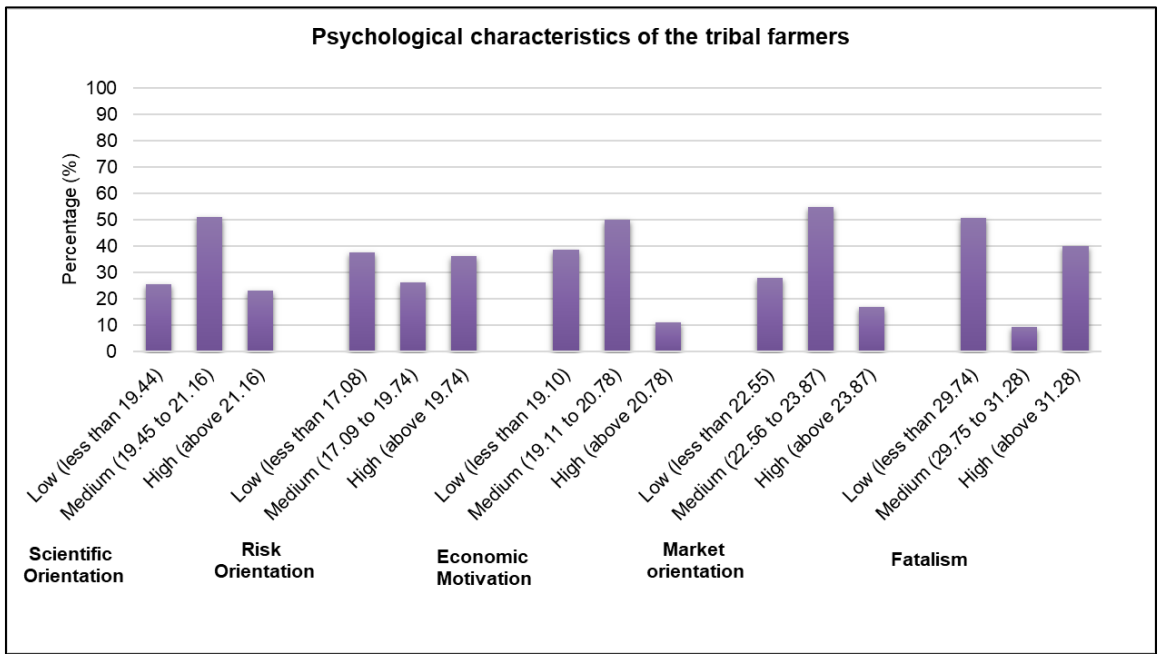

Fig. 6. Illustration of psychological characteristics of the tribal farmers

Table 5. Psychological characteristics of the tribal farmers (n=160)

Characteristics	Category	No.	%
Scientific orientation	Low (less than 19.44)	41	25.63
(Mean:20.30 and ½ SD:0.86)	Medium (19.45 to 21.16)	82	51.25
	High (above 21.16)	37	23.12
Risk Orientation	Low (less than 17.08)	60	37.50
(Mean:18.41 and ½ SD: 1.33)	Medium (17.09 to 19.74)	42	26.25
	High (above 19.74)	58	36.25
Economic Motivation	Low (less than 19.10)	62	38.75
(Mean:19.94 and ½ SD:0.84)	Medium (19.11 to 20.78)	80	50.00
	High (above 20.78)	18	11.25
Market orientation	Low (less than 22.55)	45	28.13
(Mean:23.21 and ½ SD: 0.66)	Medium (22.56 to 23.87)	88	55.00
	High (above 23.87)	27	16.87
Fatalism	Low (less than 29.74)	81	50.63
(Mean:30.51 and ½ SD:0.77	Medium (29.75 to 31.28)	15	9.37
	High (above 31.28)	64	40.00

4. CONCLUSION

The study provides a comprehensive understanding of tribal farmers engaged in Non-Timber Forest Products (NTFPs) activities, revealing a predominantly middle-aged workforce contributing to sustainable practices. Educational gaps necessitate tailored interventions, while economic conditions influence reliance on forest resources. Family dynamics impact resource demand, requiring targeted family planning programs. Social and political participation trends highlight community engagement importance. Economic characteristics underscore challenges and opportunities, emphasizing the need for sustainable NTFPs management strategies. Extension and communication challenges call for improved accessibility and culturally sensitive engagements. Psychological factors, including scientific orientation, risk and market orientation and fatalism, emphasize diverse community attitudes. Therefore, implementation of strategic interventions, community engagement and partnerships must involve a collaborative effort from various stakeholders. Governmental agencies, particularly the state agriculture department, should play a crucial role in providing resources, policy support and infrastructure for targeted interventions. Non-governmental organizations (NGOs) can contribute by designing and implementing community engagement programs that are culturally sensitive and tailored to the needs of tribal farmers. Research institutions can offer expertise, conduct studies to identify effective strategies and provide technical support for sustainable practices. Local community leaders and institutions should actively participate in community engagement efforts, ensuring that initiatives align with cultural norms and are well-received by the tribal community. Additionally, farmers themselves can actively engage in the process, contributing valuable insights into their needs and preferences. A collaborative and participatory approach involving all these stakeholders is essential to create a comprehensive and effective framework for empowering tribal farmers and promoting sustainable practices for the overall well-being of the community.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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