RESEARCH ARTICLE

Forest Reliance in a Modern Era: Examining the Socioeconomic Conditions of NTFP-Dependent Tribal Communities in Tripura

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Abstract

Non-timber forest products (NTFPs) are crucial for the livelihoods of forest-dwelling communities. This study investigates the socioeconomic status of tribal communities in Tripura, India, that depend on NTFPs. Data was collected from four districts (Dhalai, Gomati, South Tripura, and West Tripura) to analyze factors such as age, family structure, education level, land ownership, and livestock possession. The findings reveal that the average age of NTFP collectors is around 42.8 years, with a majority belonging to the older age category. Nuclear families are more prevalent, and the average family size is small. Literacy rates are low, with limited educational attainment. Land ownership is primarily for agriculture, with most communities classified as marginal farmers. Poultry farming is the most common livestock activity across all districts. Overall, the study highlights the challenges faced by these communities due to limited education, low income, and marginal land holdings. The research suggests the need for development initiatives focused on education, alternative income generation, and sustainable NTFP management practices.

Highlights

Ageing Workforce: The study suggests a potential challenge for the future of NTFP collection in Tripura. With a majority of collectors belonging to older age groups, there might be a decline in the workforce as younger generations seek different opportunities.

Limited Education and Skills: Low literacy rates and limited education may hinder the communities' ability to manage NTFP resources sustainably and adapt to changing circumstances.

Livelihood Strategies: Small family sizes, restricted land ownership, and an emphasis on farming and raising poultry raise the possibility that these communities are expanding their means of subsistence in order to augment revenue from NTFPs.

Keywords: Tribal communities, Non-timber forest products, Socioeconomic status, Livelihoods, Sustainable forest management.

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Introduction

Non-timber forest Products (NTFPs) are essential income-generating sources for tribal communities living near forests, playing a crucial role in their livelihoods (Viet & Nam, 2006). These products, encompassing a diverse range of items like bamboo, mushrooms, medicinal plants, and resins, provide crucial sources of food, income, and raw materials for various handicraft industries (Hussain *et al*., 2019). In India, tribal communities residing near forests have a long history of utilizing NTFPs, and their dependence on these resources remains significant (Tejaswi, 2008). Tripura, a northeastern state in India with rich forest cover, is home to several indigenous tribal communities that heavily rely on NTFPs for their sustenance (Shively & Pagiola, 2004). Understanding the socioeconomic status of these communities and their relationship with NTFPs is crucial for developing sustainable forest management practices and ensuring their wellbeing. The socioeconomic status of these communities, including factors such as age, education, family structure, and economic conditions, directly influences their reliance on and management of forest resources. Previous studies have highlighted the importance of NTFPs in enhancing the economic security and cultural heritage of tribal populations (Shackleton *et al*., 2011; Belcher & Schreckenberg, 2007). However, the socioeconomic dynamics within these communities can vary significantly based on local conditions, such as access to education, market connectivity, and government support programs (Mahapatra & Mitchell, 2001; Newton, 2016).

Despite the recognized importance of NTFPs for the livelihoods of tribal communities, there are notable gaps in the existing literature, particularly concerning the detailed socioeconomic profiles of NTFP-dependent communities in specific regions. The northeastern state of Tripura, home to diverse tribal populations, remains underrepresented in comprehensive socioeconomic studies related to NTFP dependence. While broader studies have explored the role of NTFPs in economic development and poverty alleviation (Shackleton *et al*., 2011; Belcher & Schreckenberg, 2007), there is a lack of granular data on how these dynamics play out in the

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distinct socio-cultural and economic contexts of Tripura's tribal communities. With this drawback, the objective of the research work is to study the socioeconomic status of the selected tribal communities of Tripura depending on non-timber forest products. By focusing on these objectives, the study seeks to contribute to the body of knowledge on the socioeconomic conditions of tribal communities in Tripura and provide insights for policymakers and development practitioners to formulate effective strategies for sustainable development and poverty alleviation.

Materials and methods

Identification of the study area

The study was conducted in the state of Tripura, India, located in the northeastern part of the subcontinent. It is bordered to the north, west, and south by Bangladesh, to the east by the state of Mizoram, and to the northeast by the state of Assam. The latitude and longitude coordinates are 23.745127 and 91.746826, respectively. The state comprises eight districts and 59.96% of the area is occupied by forest Fig. 1. (Chanda *et al*., 2014).

Sampling design and sample size

The state of Tripura has 6199.678 sq. km of forest area with a rural tribal population of 1117616 (Directorate of Economics & Statistics Government of Tripura, 2022). The study was conducted by following a multistage simple random sampling method. For the selection of the study area, purposive sampling techniques were used based on the forest area and rural tribal population, and four districts of Tripura, namely Dhalai District, Gomati District, South Tripura, and West Tripura, were selected. Dhalai District, Gomati District, South Tripura was selected (Table 1), based on the maximum forest area and tribal population where most tribal people gather NTFP products from the forest area. West Tripura district is selected for the study based on the higher concentration of the tribal population compared to the other districts and as the study is associated with the economy of the tribal population. Moreover, the West Tripura district is selected purposefully to check the wide marketing practice overview as it constitutes the capital of the state.

According to the Directorate of Economics & Statistics Government of Tripura, 2022, the total household population in the study area was 180768. Over 50% of the block, i.e., four blocks from each selected district, were selected randomly for the study. The list of selected blocks is presented in Table 2.

The sample size was determined by Yamane's (1967) formula. The formula for computing sample size is mentioned below: Based on the precision level of ±5%, a confidence level of 95%, and the present population of 180768, the Yamane formula helps to calculate the ideal sample size.

$$n = \frac{N}{1 + N(e)^2}$$

Where, n is the sample size, N is the population size, and e is the level of precision.

$$n = \frac{180768}{1 + 180768(0.05)^2} = 399 \approx 400$$

According to Yamane (1967), a 400 sample size has been determined for the present study. From the block-level rural tribal households, proportionate simple random sampling was done. Based on the population size of the tribal households

Table 1: District-wise forest area (sq.km) and rural tribal population (no)

Sl. No	*District*	*Forest area (sq.km)*	*Rural tribal population*
	West Tripura	285.412	149897
	Khowai	422.785	138104
	Shepahijala	344.056	118385
	Gomati	1125.133	184007
	South Tripura	940.618	151329
	Dhalai	1859.368	205637
	Unokoti	376.739	60561
	North Tripura	845.567	109696
	Total	6199.678	1117616

Source: Directorate of Economics & Statistics Government of Tripura, 2022

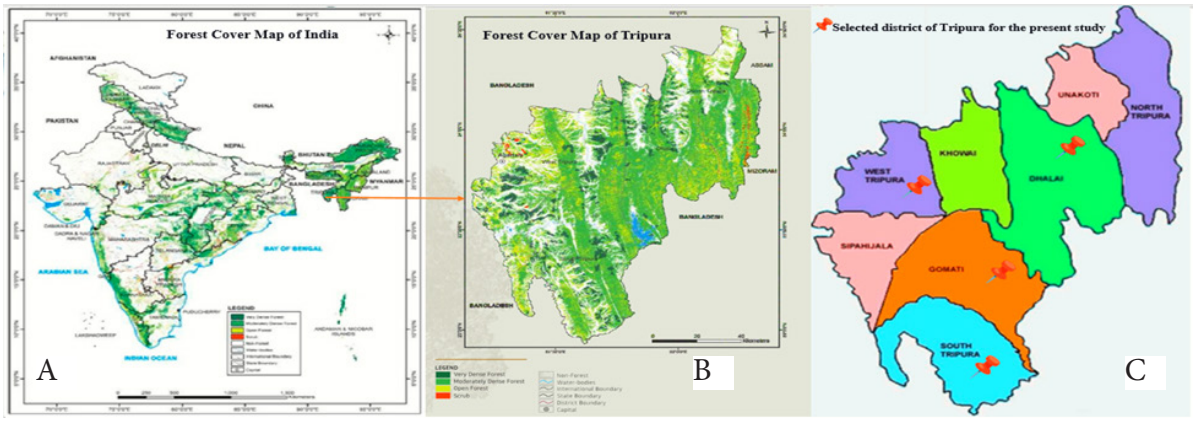

Fig.1: Maps of Forest cover and study location (Source: Forest Survey of India (FSI), 2022)

Table 2: Details of selected district, blocks and sample size (no)

Sl No	*Selected district*	*Selected blocks*	*Rural tribal household*	*Sample size*	*Sub total*
1.	Dhalai district	Ambassa	13202	29	132
		Salema	20518	46	
		Dumbur Nagar	13713	30	
		Manu	12186	27	
2.	Gomati district	Silachari	13119	29	105
		Amarpur	14427	32	
		Ompi	10110	22	
		Karbook	10085	22	
3.	South tripura district	Bharat Chandra Nagar	8449	19	78
		Bokafa	8905	20	
		Jolaibari	8529	19	
		Rupaichari	9096	20	
4.	West Tripura District	Mandwai	10531	23	85
		Jirania	9421	21	
		Hezamara	9356	21	
		Lefunga	9121	20	

Source: Directorate of Economics & Statistics Government of Tripura, 2022

in different districts, proportionately sample respondents, i.e., 132 from Dhalai District, 105 from Gomati District, 78 from South Tripura District and 85 from West Tripura District, were selected using the simple random sampling method. Group discussions and meetings with the PRI body and market functionaries were conducted to select the respondents, with these interactions also aiding in compiling the list of collectors for random sampling. Therefore, a total of four hundred sample households and market functionaries were investigated by the personal interviewing method with the help of a semi-structured interview schedule. Sample households and market functionaries were investigated during 2021-2022.

Operationalization of Variables and their Measurements

Based on literature review and consultation with the experts, certain relevant variables that may be adequately able to address the purposes and scopes of the various objectives of the study have been identified. Socio-economics characteristics such as age, gender, education qualification, marital status, family size, land holding size, types of ration cards, source of income, participation of people in NTFPs, distance and the relative incidence encountered by the NTFPs collectors were obtained and analyzed (Idowu, 2018; Tejaswi, 2008).

Data collection and Database management

The study is based on primary as well as secondary data. The primary data was collected from May 2021 to January 2022 from the sample households and market functionaries by personal interview through a semi-structured interview schedule. Secondary data was collected from different published and unpublished Government Reports. After the completion of the field survey, the responses were coded using a unique code list for each survey, and the data were then placed into pre-designed Microsoft Access Databases so that they could be easily accessed. Citation management software (Mendeley) was used for handling bibliographic content, like recording and utilizing bibliographic citations (Basak, 2014; Kaur & Dhindsa, 2017)

Selected NTFPs database was created based on the response and every district and block had a special identification code, which made it easier to compare data across them. Some of the data were gathered from databases using IBM SPSS v. 20.0, which also uses an investigation strategy similar to that of Microsoft; however, IBM SPSS has limited scope in comparison (Miller *et al*., 2002).

Data Analysis Techniques

The primary source data underwent thorough analytical procedures to derive significant conclusions. A range of statistical analysis methods were utilized to address the main research question using SPSS-21 and MS Excel. Data subsets extracted through queries were imported from MS Access into SPSS and Excel. Various statistical tools and techniques were applied to answer the specific research questions aligned with the study's objectives, ultimately addressing the central research question.

This study used tabular representation, based on a statistical analysis of the survey data, to analyze the socioeconomic status, manpower characteristics, employment and share of household income from non-timber forest products of tribal households. The reason why variables of these aspects were chosen was that a large number of previous studies had been referred to, such as Li *et al*., (2011), Mulenga *et al*., (2011) and Dash *et al*., (2016).

Results and discussions

Socioeconomic status of the NTFPs Collectors

In this section, information related to the socioeconomic status, such as age, education, and type of family, family size of selected tribal communities of Tripura dependent upon non-timber forest products has been interpreted, analyzed, and discussed point-wise in the following:

Socioeconomic status of NTFP Collectors of Dhalai District

The socioeconomic status of NTFP collectors in the Dhalai district is depicted in Table 3, which shows that the respondent's average age was 43.33, which varies maximum up to 73 and a minimum of up to 18. Out of the total NTFP collectors, 53.79% of the population belongs to the age category of old age, 25.76% belongs to the middle age category and 20.45% belongs to the young age category. Looking at the type of family, it was found that 73.48% constituted nuclear families and 26.52% were Joint Families. The average size of the family was 3.40, in which both men and women had an equal average number, i.e., 1.70, and the average children's number was 1.00. The male household head constitutes 77.27% of the total NTFP collectors, while only 22.73% were female households. Maximum household head

continued their education till middle school with 36.36% of total household heads, 28.03% of them completed primary school, 15.15% of them completed secondary school, only 3.03% of them have done their degree, and the remaining 17.42% of them was found to be illiterate. 62.12% of the total NTFP collectors families hold BPL ration cards, 12.88% of them hold APL ration cards and 25.00% hold Antyodaya ration cards. The average number of laborers in a household was 1.53. NTFP collector's homestead distance to the metallic road ranges from 0.1 to 8.5 km. In the case of participation in the activity of NTFPs 59.85% of the total NTFP collectors while only 40.15% were female.

Socioeconomic status of NTFPs Collectors of Gomati district

Table 3 shows the socioeconomic status of the NTFP Collectors of Gomati District. The average age of the respondents was 45.26, which ranges from a maximum up to 68 and a minimum of up to 18. Maximum respondents, i.e., 57.14%, belong to the age category of more than 45 years, 25.71% belong to the age category of more than 35 to 45 years, and 17.14% belong to the age category of 18 to 35 years. 72.38% of total NTFP collectors belong to the nuclear type of family and the remaining 27.62% belong to the joint family type. The average size of the respondent family was 3.54, in which the average male number was 1.72, whereas the average size of female members was 1.82, and the average size of children was 1.18. Among the total respondents, 69.52% of them were male and 30.48% of them were female. Maximum respondents, i.e., 33.33%, were found to have completed their education till middle school, followed by 28.57% of the total household head who were found to be illiterate. This was because the education facility was not available in rural areas and backward regions of the district. A total of 23.81% of them completed secondary schooling, 13.33% were found to have completed primary school, and the remaining 0.95% of the respondents completed their degree. Maximum ration card holders belong to the BPL category with 83.81% of total respondents, 3.81% were APL ration card holders, and the remaining 12.38% were Antyodaya ration card holders. The average laborers in the household were found to be 1.68, which ranges from 1 to 4.

Socioeconomic status of NTFPs Collectors of South Tripura

The socioeconomic status of the NTFP collectors in South Tripura is portrayed in Table 3 above. The average age of the respondents was 41.06, which ranged from a maximum of 80.00 and a minimum of 11.00. Maximum respondents, i.e., 47.44% of them, belong to the age category of more than 45 years, 37.18% belong to the age category of more than 35 to 45 years, and 15.38% belong to the age category of 18–35 years. 43.59% of total NTFP collectors belong to the nuclear type of family and the remaining 56.41% belong to the Joint Family type. The average size of the respondent's family was 4.40, in which the average male member was 1.67, the average size of female members was 1.72, and the average size of children was 1.04. Among the total respondents, 69.23% were male and 30.77% were female. Maximum respondents, i.e., 34.62%, were found to be illiterate due to the absence of education facilities, followed by 33.33% of the total household heads who were found to have completed their education till primary level. A total of 15.38% of them completed secondary schooling, 14.10% were found to have completed middle school, and the remaining 2.56% of total respondents completed their degree. Maximum ration card holders belong to the BPL category, with 70.51% of the total respondents, 6.41% being APL ration card holders and the remaining 23.08% being Antyodaya ration card holders. The average laborers in the household were found to be 1.63, which ranges from 1 to 5. The NTFP collector's homestead distance to the metallic road ranges from 0.01 to 5 km. In the case of participation in the activity of NTFPs, 67.95% of involvement was from males and 32.05% from females.

Socioeconomic status of NTFPs Collectors of West Tripura

Table 3 depicts the socioeconomic status of the NTFP collectors of West Tripura, in which it was observed that the respondent's average age was 42.02, which varies maximum of up to 73.00 and a minimum up to 18.00. Out of the total NTFP collectors, 52.94% belonged to the old age category (> 45 years), 40.00% belonged to the middle age category (>35–45 years) and 7.06% belonged to the young age category (18 ≤ 35 years). Looking at the type of family, it was found that 72.94% constitute nuclear families and 27.06% were joint families. The average size of the family was 3.45, in which the average number of males, females, and children was 1.73, 1.72, and 0.97, respectively. The male household head constitutes 84.71% of total NTFPs collectors and the female household head covers 15.29%. Maximum household heads continued their education till primary school with 36.47% of total household heads, 31.76% of them completed middle school, 11.76% of them completed secondary school, only 3.53% of them have done their degree, and the remaining 16.47% of them was found to be illiterate. The education facilities in West Tripura were found to be better, which is why the illiteracy rate of this particular district was very low as compared to other districts. 68.24% of the total NTFP collectors families hold BPL ration cards, 2.35% of them hold APL ration cards and 29.41% hold Antyodaya ration cards. The average number of laborers in a household was 1.96, which varies from 1 to 4.

Overall Socioeconomic status of NTFP Collectors

After finding the observation from all the districts i.e., Dhalai, South, Gomati, and West Tripura, the overall socioeconomic status of NTFP Collectors has been depicted in Table 3 and Fig. 2. It was observed that the respondent's average age was 42.79, which varied maximum up to 80.00 and minimum up to 15.00. 53.25% of the total NTFP collectors belong to the old age category (> 45 years), 31.00% belong to the middle age category (>35-45 years), and 15.75% belong to the young age category (18 ≤ 35 years). The tribes in the old age group are found to be more involved in the NTFP activities than the younger generation, as they are engaged in farming and other allied activities. Looking at the type of family, it was found that 67.25% constituted nuclear families and 32.75% were in Joint Families. The average size of the family was 3.65, in which the average number of males, females, and children was 1.71, 1.74, and 1.05, respectively. They live unconventionally by forming

Table 3: District wise Socioeconomic status of NTFPs Collectors of Tripura (n = 400)

Sl No	Particulars	*Dhalai District (n=132)*					*Gomati District (n=105)*					*South Tripura (n=78)*					*West Tripura (n=85)*					*Overall (n=400)*				
		f	*Min*	*Max*	*Mean*	*SD*	*f*	*Min*	*Max*	*Mean*	*SD*	*f*	*Min*	*Max*	*Mean*	*SD*	*f*	*Min*	*Max*	*Mean*	*SD*	*f*	*Min*	*Max*	*Mean*	*SD*
1	*Average Age*		*18*	*73*	*43.3*	*12.1*		*18*	*68*	*45.3*	*12.4*		*15*	*80*	*41.1*	*14.8*		*18*	*70*	*42*	*12.8*		*15*	*80*	*42.8*	*13*
a	18 ≤ 35 years (young age)	27 (20.45)					18 (17.14)					12 (15.38)					6 (7.06)					63 (15.75)				
b	>35-45 years (middle age)	34 (25.76)					27 (25.71)					29 (37.18)					34 (40)					124 (31)				
c	> 45 years (old age)	71 (53.79)					60 (57.14)					37 (47.44)					45 (52.94)					213 (53.25)				
2	Family type					0.44					0.44					0.49					0.44					0.5
a	Nuclear	97 (73.48)					76 (72.38)					34 (43.59)					62 (72.94)					269 (67.25)				
b	Joint	35 (26.52)					29 (27.62)					44 (56.41)					23 (27.06)					131 (32.75)				
3	Average size of the family		2	7	3.4	1.08		2	10	3.54	1.16		2	12	4.4	2.25		2	8	3.45	1.51		2	12	3.7	1.5
a	Male		1	5	1.7	0.73		1	5	1.72	0.74		0	5	1.67	0.93		1	4	1.73	0.8		0	5	1.7	0.8
b	Female		1	4	1.7	0.73		1	5	1.82	0.81		1	4	1.72	83		0	4	1.72	0.94		0	5	1.7	0.8
c	Children		0	4	1	0.95		0	5	1.18	0.87		0	4	1.04	1.03		0	4	0.97	0.94		0	0	1.1	0.9
4	Gender of household head					0.42					0.46					0.44					0.36					0.4
a	Male	102 (77.27)					73 (69.52)					54 (69.23)					72 (84.71)					301 (75.25)				
b	Female	30 (22.73)					32 (30.48)					24 (30.77)					13 (15.29)					99 (24.75)				
5	Education status of household head					1.12					0.97					0.72					1.11					1.2

a	Degree	4 (3.03)					1 (0.95)					2 (2.56)					3 (3.53)					10 (2.5)				
b	Secondary school	20 (15.15)					25 (23.81)					12 (15.38)					10 (11.76)					67 (16.75)				
c	Middle school	48 (36.36)					35 (33.33)					11 (14.1)					27 (31.76)					121 (30.25)				
d	Primary school	37 (28.03)					14 (13.33)					26 (33.33)					31 (36.47)					108 (27)				
e	Illiterate	23 (17.42)					30 (28.57)					27 (34.62)					14 (16.47)					94 (23.5)				
6	Wellbeing status					0.6					0.4					0.52					0.49					0.5
a	APL	17 (12.88)					4 (3.81)					5 (6.41)					2 (2.35)					28 (7)				
b	BPL	82 (62.12)					88 (83.81)					55 (70.51)					58 (68.24)					283 (70.75)				
c	Antyodaya	33 (25)					13 (12.38)					18 (23.08)					25 (29.41)					89 (22.25)				
7	No of labourers in household		1	4	1.53	0.78		1	4	1.68	0.78		1	5	1.63	0.89		1	4	1.96	0.91		1	5	1.7	0.8
8	Distance from homestead to district town(km)		0.5	33	13	1.6		2	21	10.4	4.73		0.5	28	10.5	5.22		6	27	14.4	5.05		0.5	33	12	5.6
9	Distance from homestead to metallic road(km)		0.1	8.5	2.3	2		0.01	5	1.17	1.2		0.01	5	1.21	1.35		0.1	7	3.52	1.95		0	8.5	2.1	1.9
10	Participation in the activity of NTFPs																									
a	Male	79 (59.85)					77 (73.33)					53 (67.95)					54 (63.53)					263 (65.75)				
b	Female	53 (40.15)					28 (26.67)					25 (32.05)					31 (36.47)					137 (34.25)				

Source: Based on primary data, 2021-22]

a nuclear family. This might be the reason why the average family size is quite small. Similar findings reported by Hegde and Suryaprakash 1996 & Suryaprakash and Girish (1999). This nucleus nature was the major determining factor in the composition of the tribal families. However, the development of nuclear families is influenced by employment and education levels (Parvathamma, 2004).

Among the respondents, the male household head constitutes 75.25% of the total NTFP collectors, while the female household head constitutes 24.75%. In the case of participation in the different activities of NTFPs, 65.75% of involvement was from males and 34.25% was from females. The contribution in the NTFP activities female was less involved that may be the cause of social restriction and safety region (Tejaswi, 2008).

Maximum household head continued their education till middle school with 30.25% of total household heads, 27.00% of them completed primary school, 16.75% of them completed secondary school, only 2.50% of them have done their degree, and the remaining 23.50% of them was found to be illiterate. Literacy was highest because of encouragement from the government through free educational programs and support from parents. Higher education would result in fewer forest products being extracted because education opens up new career alternatives (Shively and Pagiola 2004; Newton 2016). It was also observed that the distance from the homestead of collectors to the district town ranged from 0.5 to 33 km with an average of 12.21 km and NTFP collector's homestead distance to the metallic road ranged from 0.01 to 8.5 km with an average of 2.06 km. It can be revealed that the respondents are well connected with the road connectivity, which may make it easier to market the forest products.

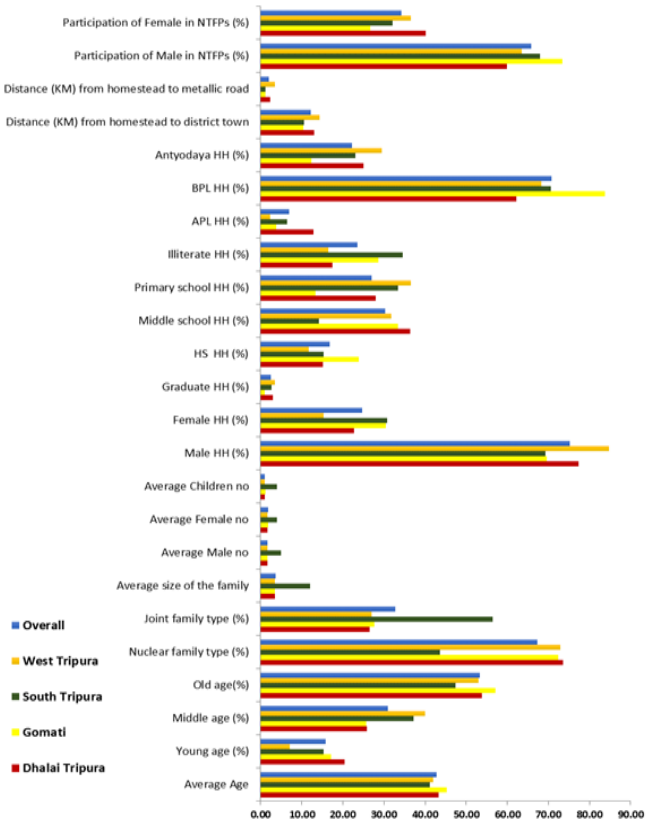

Fig. 2: District-wise Socioeconomic status of NTFP collectors

Types of land of NTFP collectors in the study area

Table 4 represents the type of land of NTFP collectors in the study area. It was determined that Dhalai district has the maximum irrigated land owned by the respondents, i.e., a total of 74.58% of irrigated land was found in the district followed by South Tripura with a total owned irrigated land of 73.81%.

The irrigated owned land in the other two districts i.e., Gomati District and West Tripura, were 59.62 and 64.19%, respectively. On the other hand, owned unirrigated land was observed maximum in Gomati District with a total of 28.12% of unirrigated land, followed by West Tripura with a total unirrigated land of 23.61%. Dhalai Tripura and Gomati Tripura constitute total owned unirrigated land of 18.47 and 19.79%, respectively. The leased-in irrigated land of Dhalai Tripura, Gomati Tripura, South Tripura, and West Tripura was 2.57, 2.38, 3.78, and 0.57%, respectively, whereas leased-out irrigated land of Dhalai Tripura, Gomati Tripura, South Tripura, and West Tripura was 2.57, 3.46, 2.605, and 8.758%, respectively. The leased-in un-irrigated land of Dhalai Tripura, Gomati Tripura, and West Tripura was 0.51, 2.09, and 2.862%, respectively. South Tripura has no leased-in un-irrigated land owned by the respondents,

Table 4: Types of land distribution of NTFP collectors in the study area (ha)

Sl. No	*Particulars*	*Dhalai*	*Gomati*	*South*	*West*	***Overall***
1	Owned Irrigated land	0.29 (74.58)	0.276 (59.62)	0.312 (73.81)	0.264 (64.19)	0.285 (67.74)
2	Leased in irrigated land	0.01 (2.57)	0.011 (2.38)	0.016 (3.78)	0.002 (0.57)	0.01 (2.33)
3	Leased out irrigated land	0.01 (2.57)	0.016 (3.46)	0.011 (2.60)	0.036 (8.75)	0.018 (4.33)
4	Owned Un-irrigated land	0.072 (18.47)	0.13 (28.12)	0.084 (19.79)	0.097 (23.61)	0.096 (22.70)
5	Leased in un-irrigated land	0.002 (0.51)	0.01 (2.09)	0 (0)	0.012 (2.86)	0.006 (1.39)
6	Leased out un-irrigated land	0.005 (1.29)	0.02 (4.33)	0 (0)	0 (0)	0.006 (1.48)
	Total Land	0.39 (100)	0.46 (100)	0.42 (100)	0.41 (100)	0.42 (100)

Source: Based on primary data, 2021-22]

whereas leased-out owned un-irrigated land of Dhalai Tripura and Gomati Tripura were 1.29 and 4.33, respectively. It was observed that the respondents of South Tripura and West Tripura owned no leased-out un-irrigated land. The overall owned irrigated land in the study area was 67.748%, followed by owned unirrigated land with a total of 22.706%. The overall leased-in irrigated land and overall leased-out irrigated land was 2.336 and 4.334%, respectively. The overall leased-in un-irrigated land and overall leased-out un-irrigated land were 1.392 and 1.484%, respectively.

Distribution of land holding of NTFP collectors in the study area

Table 5 shows the distribution of land holding of NTFPs collectors in the study area in which it is observed that land under agriculture was found maximum in West Tripura with 72.52%, followed by Dhalai Tripura with 71.50% of total land used for agriculture. In South Tripura and Gomati Tripura, the land under agriculture was 64.42 and 54.98%, respectively. Gomati district has the least land used for agriculture. The land area under forest in Dhalai Tripura, Gomati Tripura, South Tripura, and West Tripura was 5.14, 3.49, 2.417, and 5.44%, respectively. West Tripura was observed with maximum land under forest at 5.44% compared to other districts. The land under fishery in Dhalai Tripura, Gomati Tripura, South Tripura, and West Tripura were 7.71, 10.58, 15.86, and 0.92%, respectively.

The land under fallow in Dhalai Tripura, Gomati Tripura, South Tripura, and West Tripura as 5.39, 19.91, 7.106, and 12.82%, respectively. The land under *Batsu* in Dhalai Tripura, Gomati Tripura, South Tripura, and West Tripura were 10.27, 11.04, 10.18, and 8.27%, respectively. It was observed that the overall land usage by the respondents with a total of 65.45% was under agriculture, followed by land under fallow (11.62%), *bastu* (9.97%), fishery (8.88%), and forestry (4.08%). In the study area, it was found that all the NTFP collectors were marginal farmers. As the collectors did not have sufficient land for farming activities, they relied on NTFP-related activities to sustain their livelihood. Land under fishery contributed a very low proportion in their total land holding, which reflects less dependency on fishery activity. The outcome was consistent with the findings from Dash *et al*., 2016.

Distribution of Livestock of NTFP collectors in the study area

Table 6 depicts the distribution of livestock of NTFP collectors in the study area. It was found that in the Dhalai district, the maximum number of respondents was engaged in Poultry farming with 38.06% of total livestock engagement compared to other livestock for income generation, followed by piggery with 18.25%. The rate of respondents' engagement with other livestock, such as cattle, goats, and ducks was 12.73, 16.45, and 14.53%, respectively.

The livestock distribution in Gomati Tripura for Cattle, Poultry farms, Piggery, Goats, and Ducks was 8.53, 37.73, 14.79, 19.95, and 19.00%, respectively. The livestock distribution in South Tripura for Cattle, Poultry farms, Piggery, Goats, and

Table 5: District-wise distribution of land holding of NTFPs collectors in the study area (ha)

Sl. No	*Particulars*	*Dhalai*	*Gomati*	*South*	*West*	*Overall*
1	Land under agriculture	0.278 (71.5)	0.254 (54.98)	0.272 (64.424)	0.298 (72.529)	0.276 (65.45)
2	Land under forest	0.02 (5.14)	0.016 (3.49)	0.01 (2.417)	0.022 (5.44)	0.017 (4.08)
3	Land under fishery	0.03 (7.71)	0.049 (10.58)	0.067 (15.869)	0.004 (0.927)	0.037 (8.887)
4	Land under fallow	0.021 (5.39)	0.092 (19.91)	0.03 (7.106)	0.053 (12.828)	0.049 (11.62)
5	Land under *Bastu*	0.04 (10.27)	0.051 (11.04)	0.043 (10.185)	0.034 (8.275)	0.042 (9.97)
	Total Land	0.39 (100)	0.46 (100)	0.42 (100)	0.41 (100)	0.42 (100)

Source: Based on primary data, 2021-22

Table 6: District-wise distribution of livestock of NTFPs collectors in the study area

Sl. No	*Particulars*	*Dhalai*	*Gomati*	*South*	*West*	*Overall*
1	Cattle	0.8 (12.73)	1.2 (8.53)	1.08 (12.09)	1.29 (11.32)	1.09 (10.74)
2	Poultry farm	2.4 (38.06)	5.33 (37.73)	3.26 (36.38)	4.25 (37.4)	3.81 (37.39)
3	Piggery	1.15 (18.25)	2.09 (14.79)	1.58 (17.6)	2.68 (23.56)	1.87 (18.39)
4	Goats	1.04 (16.45)	2.82 (19.95)	2.07 (23.06)	1.55 (13.64)	1.87 (18.33)
5	Duck	0.92 (14.53)	2.68 (19)	0.98 (10.88)	1.6 (14.08)	1.54 (15.15)
	Total Average	6.31 (100)	14.13 (100)	8.96 (100)	11.36 (100)	10.19 (100)

Source: Based on primary data, 2021-22

Ducks was 12.09, 36.38, 17.60, 23.06, and 10.88%, respectively. The livestock distribution in West Tripura for Cattle, Poultry farms, Piggery, Goats, and Ducks was 11.32, 37.40, 23.56, 13.64, and 14.08%, respectively. The overall distribution of livestock i.e. cattle, poultry farm, piggery, goats, and duck was 10.74, 37.39, 18.39, 18.33, and 15.15%, respectively.

The reason for the large number of livestock is due to the practice of agriculture and the availability of free fodder in the forest lands. The poultry reared per household was quite high since this is considered a common livestock component among the tribals. Most of the households own poultry because of easy maintenance and ready cash if they sell to the local market. In general, having animals is a kind of economic security for forest dwellers. A similar outcome was observed in the study conducted by Hussain *et al*., 2019.

Conclusion

A comprehensive examination of the evolving socio-economic landscape of tribal communities in Tripura, who continue to depend heavily on non-timber forest products (NTFPs) for their daily sustenance. Despite wider socio-economic changes in the region, these communities remain deeply rooted in forest-based livelihoods. Their circumstances, however, are shaped by multiple factors, including age demographics, educational attainment, household structure, and economic constraints.

The study inferred that older members of the community are more actively engaged in NTFP collection, while younger individuals are increasingly shifting towards agriculture and alternative income sources. This trend suggests that forest-based occupations may hold diminishing appeal for younger generations, possibly due to greater awareness of opportunities beyond traditional practices. In light of this, there is a pressing need to promote sustainable and more rewarding NTFP initiatives that can meaningfully engage youth participation.

Most families were nuclear in nature, typically consisting of 3 to 4 members—reflecting a departure from earlier joint family systems. Educational levels among household heads were generally low, with many having little or no formal schooling. Although districts such as West Tripura exhibit relatively better literacy rates, access to education remains uneven across the state.

Economically, the majority of households fall under the Below Poverty Line (BPL) category. Limited landholdings and a small number of active laborers per family pose substantial barriers to financial improvement. Livestock—particularly poultry—serves as a crucial source of supplementary income and nutrition. While infrastructure such as road connectivity facilitates NTFP trade to some extent, women's involvement remains controlled by socio-cultural norms and safety-related concerns.

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Author's Contribution

Conceptualization and designing of the research work (SH, MK); Execution of field/lab experiments and data collection (SH); Analysis of data and interpretation (SH); Preparation of manuscript (SH, MK).

Conflict of interest

The authors declare no competing interests. With the submission of this manuscript, we would like to confirm that the above-mentioned manuscript has not been published elsewhere, accept for publication elsewhere, or under editorial review for publication elsewhere.

References

Basak, S. K. (2014). A comparison of researcher's reference management software: Refworks, Mendeley, and EndNote. *Journal of Economics and Behavioral Studies*. *6*(7), 561–568. https://doi.org/10.22610/jebs.v6i7.517

Belcher, B., & Schreckenberg, K. (2007). Commercialisation of non-timber forest products: A reality check. *Development Policy Review*, 25(3), 355-377.

Chanda, A. K., Manu, S., Das, B., Smti, I., Roy, S., Khan, I. M. M., Pradip, S., & Roy, K. (2014). *Statistical abstract*.

Dash, M., Behera, B., & Rahut, D. B. (2016). Determinants of household collection of non-timber forest products (NTFPs) and alternative livelihood activities in Similipal Tiger Reserve, India. *Forest Policy and Economics*, *73*, 215–228. https://doi.org/10.1016/j.forpol.2016.09.012

Directorate of Economics & Statistics Government of Tripura. (2022). Economic Review of Tripura 2022-23. Agartala, Tripura: Government of Tripura

Forest Survey of India. (2022). India state of forest report 2022. Dehradun, India: Ministry of Environment, Forest and Climate Change.

Hegde, R., S. Suryaprakash, A. Lalith and K. S. Bawa, 1996. Contribution to Rural Income in 'Extraction of Non-Timber Forest Products in the Forests of Biligiri Rangan Hills, India. *Economic Botany. 50* (3): 243-252.

Hussain, J., Zhou, K., Akbar, M., Zafar khan, M., Raza, G., Ali, S., Hussain, A., Abbas, Q., Khan, G., Khan, M., Abbas, H., Iqbal, S., & Ghulam, A. (2019). Dependence of rural livelihoods on forest resources in Naltar Valley, a dry temperate mountainous region, Pakistan. *Global Ecology and Conservation*, *20*, e00765. https://doi.org/10.1016/J.GECCO.2019.E00765

Idowu, D. S. (2018). Gross Margin Analysis of Trade in Non-Timber Forest Products (NTFPs) in Ogun State, Nigeria. *Advances in Forestry Science*, *2*, 289–292. https://periodicoscientificos.ufmt.br/ojs/index.php/afor/article/view/5086

Kaur, S., & Dhindsa, K. S. (2017). Comparative study of citation and reference management tools: Mendeley, Zotero and Read Cube. *Proceedings of 2016 International Conference on ICT in Business, Industry, and Government, ICTBIG 2016*. https://doi.org/10.1109/ICTBIG.2016.7892715

Li, Y.H., Chen, X.N., Zhu, H., Wang, Y.H., 2011. Analysis on factors that impact farmers' willingness to develop under-forest economics—based on a household survey in Anhua, Hunan. For. Econ. 9, 76–82.

Mahapatra, A., & Mitchell, C. P. (2001). Sustainable development and NTFPs. *International Forestry Review*, 3(2), 123-132.

Miller, R.L., Acton, C., Fullerton, D.A. & Maltby, J. (2002). *SPSS for social scientist*. Palgrave Macmillan, Hampshire and New York.

Mulenga, B.P., Richardson, R.B., Mapemba, L., Tembo, G., 2011. The contribution of non-timber forest products to rural household income in Zambia. Food Security Collaborative Policy Briefs, pp. 1–19.

Newton, P. (2016). Academic integrity: A quantitative study of confidence and understanding in students at the start of their higher education. *Assessment & Evaluation in Higher Education*, *41*(3), 482-497.

Parvathamma, C. (2004). Reservation: A pie in the sky, development through education. Hunsur, Karnataka, India.

Shackleton, C. M., Shanley, P., & Ndoye, O. (2011). Non-timber forest products: Concept and definitions. In C. M. Shackleton, S. E. Shackleton, & P. Shanley (Eds.), Non-timber forest products in the global context (pp. 3-21).

Shively, G., & Pagiola, S. (2004). Agricultural intensification, local labor markets, and deforestation in the Philippines. *Environment and Development Economics*, *9*(2), 241-266.

Suryaprakash, S., & Girish, M. R. (1999). *An economic analysis of non timber forest products in tribal economic in the Western ghat Region of Karnataka.*

Tejaswi, P. B. (2008). *Non-Timber Forest Products (NTFPs) for Food and Livelihood Security: An Economic Study of Tribal Economy in Western Ghats of Karnataka, India*. Ghent University.

Viet Quang, D., & Nam Anh, T. (2006). Commercial collection of NTFPs and households living in or near the forests: Case study in Que, Con Cuong and Ma, Tuong Duong, Nghe An, Vietnam. *Ecological Economics*, *60*(1), 65–74. https://doi.org/10.1016/J.ECOLECON.2006.03.010

Yamane, Taro. 1967. Statistics, an Introductory Analysis, 2nd Ed., New York: Harper and Row.