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RESEARCH PAPER

Economic Contribution of NTFPs to Tribal Livelihoods and Income Inequality in Gurez Valley of Kashmir Himalaya

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ABSTRACT

The study investigated the non-timber forest products (NTFPs) extracted, consumed and traded; their economic value; livelihood contribution; income inequality mitigation; and determinants of NTFP income in the *Shina* tribe in Gurez Himalaya. The survey used a random sampling procedure in multiple stages to select subdivisions (03), villages (18), and households (337). The methods used for the household survey included non-participant observations, structured interviews, focus group discussions, and rapid market assessments. Data analysis was carried out using descriptive statistics and OLS multiple regression. Total economic value of NTFPs extracted was ₹ 30733.4/household/year, including subsistence (61.63%) and cash (38.37%). NTFP income was dominated by herbal medicines, which accounted for 44.68%, while incense was the lowest (0.33%). Household average annual income was ₹ 92811.24, of which NTFP is the 3rd major contributor (20.41%) of the tribal economy. Gini coefficients, with (0.2873) and without (0.3539) NTFP income, indicated that NTFP income exerted a stronger (6.66%) equalizing effect on income distribution. The regression analysis revealed that the variables, namely, main occupation, herd size, annual income, proximity to forests, family forestry, and forest visits, had a significant impact on NTFP income. R^2 (0.920) implies that all the factors jointly explained 92.00% of variation on the NTFP income.

HIGHLIGHTS

- The *Shina* tribe extracts diverse NTFPs from forests to secure their livelihoods.
- NTFPs contributes substantially to the tribal economy, and NTFP income exerts a stronger equalizing effect on income distribution.
- Findings can facilitate the development of specific strategies for strengthening forest conservation, NTFP-based livelihoods, and inequality mitigation.

Keywords: NTFPs, livelihoods, inequality mitigation, *Shina* tribe, Gurez, Kashmir

Forest dwellers and other fringe communities across the world have relied on NTFPs for their socioeconomic well-being, security of livelihood, and even existence from time immemorial (Talukdar *et al.* 2021). According to estimates, 20% of the world's population depends on NTFPs to meet their basic requirements (Chaudhury *et al.* 2021). About 50 million people in India rely on NTFPs for their livelihoods (Dinda *et al.* 2020). Studies (Islam *et al.* 2015; Peerzada *et al.* 2022) conducted worldwide have emphasized the significance of the NTFPs for tribal people's livelihoods. Forest inhabitants are fully reliant on NTFPs for their basic supplies, such as food, energy, shelter, medicine, employment, and income; thus, for tribal development, the contributions of NTFPs are immense (Rahman *et al.* 2021). Extraction of NTFPs for subsistence, cash

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income, and safety nets is a prominent strategy to deal with the stresses and shocks (Lepcha *et al.* 2020). Understanding NTFPs status and usage is an important subject for scientists, researchers, policymakers, and development agencies, largely to promote sustainable management, biodiversity conservation, livelihood security, and socioeconomic development (Talukdar *et al.* 2021).

The Gurez Himalaya offers countless NTFPs, which are essential to the maintenance of food security, livestock production, agricultural support, bioenergy security, housing, cottage industry, health care, socio-cultural aspects, income, and employment—all of which contribute to livelihood security (Atta *et al.* 2018). Acute poverty, unemployment, migration, food insecurity, and malnutrition were all exacerbated by the extreme livelihood stress (Atta *et al.* 2018). The NTFPs have become a viable choice because they provide *Shina* people with an alternative to maintain their sustainable livelihoods and sustain a secure quality of life. The systematic attempts to evaluate the livelihood potential of NTFPs are being seriously considered globally as a critical medium of socioeconomic development and economic diversification (Garg *et al.* 2021; Panda *et al.* 2024). Further, reliable data about the forest reliance is essential for the formulation of national policy and programme planning, which is highly dubious (Atta *et al.* 2023). Although numerous studies have explored various facets of NTFPs in the region, there is a lack of documentation regarding NTFP extraction for livelihood security. Considerting these facts, this study aims to quantify the collection, consumption, and trade of NTFPs; estimate their economic worth; assess how NTFPs contribute to livelihoods and reduce income inequality; and identify the socioeconomic variables influencing the NTFP income of the *Shina* tribe in the Gurez Himalaya.

MATERIALS AND METHODS

Study area

Gurez Valley is located between latitudes 34°23′ and 34°41′ N and longitudes 74°37′ to 74°46′ E at 2370 m amsl in the Gurez Valley of Bandipora district in J&K UT. The valley in the Himalayas has a total area of 57842 hectares and consists of mountain ranges, flat meadows, and abundant dense broad-leaved and coniferous forests. The area has a four-season temperate climate with heavy winter snowfall. The valley is home to 31912 people, majoring in the *Shina*-speaking tribe of the Dards. Agriculture, raising livestock, and gathering NTFPs are the main subsistence activities of the inhabitants in the research area.

Sampling design

Prior to designing the experiment, a reconnaissance survey of the entire research region was conducted to identify the sampling units. A random sampling procedure at multiple stages was administered in the selection of subdivisions, villages, and households. For the first stage, three subdivisions were chosen: Dawar, Gulshanpora, and Tilail. Eighteen villages—four from the Dawar subdivision, two from the Glushanpora subdivision, and twelve from the Tilail subdivision—were sampled in the second stage. In the third stage, 337 households with a 10% sampling intensity were withdrawn from the sample villages (Table 1).

Table 1: Sampling frame and size of the samples

Sl. No.	Sub-division	Village	Sampling frame	Sample size	Percentage
1	Gulshanpora	Gulshanpora	347	35	10%
2	Gulshanpora	Nail-Kanzalwan	196	20	10%
3	Dawar	Mastaan-khopri	97	10	10%
4	Dawar	Dawar	506	51	10%
5	Dawar	Markoot	261	26	10%
6	Dawar	Shahpora	373	37	10%
7	Tilail	Kalshipain	241	24	10%
8	Tilail	Dangithal	75	7	10%
9	Tilail	Purana-tilail	107	11	10%
10	Tilail	Manzgund	66	7	10%
11	Tilail	Wazirithal	35	4	10%
12	Tilail	Niru	194	19	10%
13	Tilail	Saradab	178	18	10%
14	Tilail	Gundgul-sheikh	64	6	10%
15	Tilail	Husangam	72	7	10%
16	Tilail	Gujran	192	19	10%
17	Tilail	Abdullan	88	9	10%
18	Tilail	Forestblock	266	27	10%
Total	03	18	3358	337	10%

Data collection

The data were collected employing structured interviews, non-participant observations, focus group discussions and rapid market assessments. The interview schedule was developed to record data pertaining to socioeconomic and biophysical characteristics (Table 2), NTFPs extraction and usage for subsistence and cash income. The non-participant observations were carried out to have personal on-the-scenes contacts with the informants in natural situation. The focus group discussions were conducted with 8-12 knowledgeable participants to cross check and validate the data generated. To comprehend the market dynamics and trade mechanism, a rapid market assessment of NTFPs was carried out.

Computation of household income

Household NTFP income (₹/household/year) was estimated by the following formula:

$$NTFP\ Income = \sum_{i=1}^{n} Q_i \times P_i$$

Where, *NTFP Income* is total income derived from NTFPs; Q_i is the quantity of collected NTFPs; and P_i is the market price of NTFPs (₹/kg); i = number of NTFPs.

The total household annual income (₹/household/year) was calculated given below.

$$Total\ income = \sum_{i=1}^{n} Y_i$$

Where, *Total income* is the sum of all revenues procured from all sources; Y_i = revenue from i^{th} source of income; i = number of income source.

Data analysis

Descriptive statistics were used to summarize the socioeconomic and biophysical characteristics, estimate the economic value of collection, consumption, and marketing of NTFPs, and calculate the contribution of NTFP income to the household economy. OLS multiple regression model was developed to explain household NTFP income as a function of household variables of the forest-dependent *Shina* tribe. The regression function-based conceptual model is provided as:

$$Y = a + b_1x_1 + b_2x_2 + \ldots\ldots\ldots\ldots + b_{10}x_{11} + e$$

Where, Y = NTFP income (₹/household/year)

a is the intercept or constant, $b_1 - b_{11}$ are the regression co-efficients, $X_1 - X_{11}$ are the household characteristics and 'e' is the error term.

Table 2: Descriptive statistics of household variables (N = 337)

Variables (Code)	Measurement	Mean±S.D.	Minimum-Maximum
Age (X_1)	Respondent's age in years	41.40±14.20	20-81
Education (X_2)	Illiterate = 0, <primary = 1, primary = 2, middle = 3, high school = 4, intermediate = 5, graduate & over = 6	1.90±0.85	0-6
Family size (X_3)	≤ 5 members = 1, >5 members = 2	1.73±0.43	1-2
Land holding (X_4)	Landless = 0, marginal (upto 1.0 ha) = 1, small (1.1 to 2.0 ha) = 2, medium (2.1 to 4.0 ha) = 3, large (> 4.0 ha) = 4	1.48±0.73	0-3
Herd size (X_5)	No livestock = 0, ≤5 livestock = 1, 6 to 10 livestock = 2, >10 livestock = 3	1.82±0.36	0-3
Main occupation (X_6)	Wage labour = 1, caste profession = 2, cultivation = 3, business = 4, service = 5, any other = 6	3.23±1.28	1-6
Family labour (X_7)	1 worker = 1, 2 workers = 2, 3 workers = 3, >3 workers = 4	3.38±1.00	2-6
Annual income (X_8)	Annual income from all sources (₹/year)	92811.24± 70467.79	30000-420000
Proximity to forests (X_9)	Household distance from forests (km)	3.14±2.84	0.5-18
Forest visits (X_{10})	Never = 0, occasionally (half yearly/yearly) = 1, frequently (fortnightly/monthly) = 2, very frequently (daily/weekly) = 3	2.57±0.88	0-3
Family forestry (X_{11})	Land allocated to agroforestry/homestead/woodlot plantations (ha)	0.10±0.11	0-0.51

RESULTS AND DISCUSSION

Household socioeconomic and biophysical characteristics

According to the household survey, respondents were mostly middle-aged (41.40), were low-literate up to the primary level (1.90) and belonged to large-sized families (1.73). The average size of landholding was marginal (1.48), and the herd size ranged from six to ten animals (1.82). The households had more than three workers (3.38), were mainly engaged in business or farming activities (3.23), and earned income between ₹ 90001 and ₹ 120000 annually (92811.24). The households were within 5 km proximate to the forests (3.14), and they visited there very frequently (2.57). Among the sampled households, family forestry covered less than 0.10 hectares.

The analysis of the *Shina* people's household socioeconomic variables reflected that they are in an underprivileged position due to their low socioeconomic conditions. Hence, there is an urgent need to improve the quality of their lives through the intervention of alternative livelihood options that exploit existing resources. Conversely, the favourable biophysical factors make it easier for *Shina* people to choose forestry-based livelihood options. Thus, the main objective must be to improve livelihoods through NTFPs. The household socioeconomic and biophysical variables of the *Shina* people are assumed to be key determinants of forest dependence for resource collection, consumption, and trade (Atta *et al.* 2018; Mushi *et al.* 2020). NTFPs also have a substantial effect on the household livelihood asset status and are associated directly or indirectly with household employment prospects, income diversification, and poverty reduction strategies (Bisui *et al.* 2023).

Collection and consumption of NTFPs

The collection (Cl) and consumption (Cn) of NTFPs were recorded as fuelwood (Cl = 902.55 q/year, Cn = 535.19 q/year), herbal medicines (Cl = 44.38 q/year, Cn = 16.64 q/year), wild vegetables (Cl = 37.91 q/year, Cn = 16.78 q/year), edible fruits (Cl = 28.71 q/year, Cn = 10.41 q/year), fodder (Cl = 168.10 q/year, Cn = 82.23 q/year), beverages (Cl = 8.29 q/year, Cn = 3.13 q/year), spices (Cl = 11.59 q/year, Cn = 5.36 q/year), incense (Cl = 4.38 q/year, Cn = 2.22 q/year), edible nuts (Cl = 32.52 q/year, Cn = 11.06 q/year), cottage industry materials (Cl = 32.52 q/year, Cn = 7.68 q/year) and shilajeet (Cl = 0.337 q/year, Cn = 0.00 q/year) (Table 3).

The nature of forest dependency is highly variable in *Shina* households in terms of subsistence consumption and cash income. While some NTFPs are collected in sizeable quantities in a considerable number of households, others are collected in small amounts from a small number of households. Similarly, while some NTFPs were chiefly collected for domestic subsistence consumption, others were primarily collected for cash income. Due to limited livelihood opportunities, the *Shina* people are forced to collect NTFPs more for their household basic

Table 3: Collection and consumption of NTFPs (*N* = 337)

NTFP	Involvement in collection (%)	Total collection (q/year)	Average collection (kg/hh/year)	Total consumption (q/year)	Average consumption (kg/hh/year)
Fuel wood	98.51	902.55	267.82	535.19	158.81
Herbal medicines	62.27	44.38	13.17	16.64	4.94
Wild vegetables	65.41	37.91	11.25	16.78	4.98
Edible fruits	67.32	28.71	8.52	10.41	3.09
Fodder	95.55	168.10	49.88	82.23	24.40
Beverages	49.03	8.29	2.46	3.13	0.93
Spices	48.07	11.59	3.44	5.36	1.59
Incense	32.34	4.38	1.30	2.22	0.66
Edible nuts	54.15	32.52	9.65	11.06	3.28
Cottage industry materials	44.81	27.83	8.26	7.68	2.28
Shilajeet	8.60	0.337	0.10	0.00	0.00

Note: *hh= household.*

needs than to earn cash income. Several studies (Islam *et al.* 2015; Chaudhury *et al.* 2021; Dinda *et al.* 2020) across the world revealed that tribal people collect NTFPs for survival as opposed to earnings.

Economic valuation of NTFPs and trade

The total economic value of NTFPs extracted was ₹ 10357156/year, including both subsistence (₹ 3973887.58/year) and cash income (₹ 6383268.65/year) in the sample households. Of the total NTFP income, herbal medicines contributed highest share (45.32%) followed by cottage industry materials (23.04%), spices (12.74%), wild vegetables (8.22%), fuel wood (3.59%), edible nuts (2.39%), shilajeet (1.80%), fodder (1.40%), edible fruits (0.74%), beverages (0.49%) and incense (0.27%) (Table 4).

In the *Shina* tribe, gathering and selling NTFPs is a significant side business; practically every household gathers, consumes, and sells various types of NTFPs. The cash income from NTFP sales is substantially skewed because the NTFPs that remain leftover after meeting their subsistence needs are solely sold in the local market. Additionally, the vendors find it challenging to sell NTFPs in a profitable manner due to their remote location and unorganized marketing. Price discovery through negotiation is a common informal marketing strategy for NTFPs. Most NTFPs vendors either approach the local NTFPs traders or vehicles at the checking points along the roads to sell their NTFPs. As a result, they receive a price that is insufficient to compensate them for their labour. In addition, the vendors find it difficult to secure reasonable prices for t household/year) he NTFPs because of a lack of value addition, price determination procedures, quality control, and transportation facilities. The more isolated and remote the area is, the higher the NTFPs non-cash income for local people (Bisui *et al.* 2023). The findings are in confirmation with the studies (Lepcha *et al.* 2020; Peerzada *et al.* 2022), which reported NTFPs collection, consumption, and marketing as integral parts of livelihoods, the economy, and well-being.

Contribution of NTFPs to the household economy

Findings revealed that the average annual household revenue from off-farm and on-farm sources was ₹ 92811.24, which is differentiated as agriculture (30.62%), livestock (22.68%), NTFPs (20.41%), service (12.44%), business (9.96%), wage labour (2.80%), and others (1.09%) (Fig. 1). Therefore, the tribal economy's third major component is NTFP.

The study showed that the collection, consumption, and marketing of NTFPs are essential for securing enormous income and employment prospects for the *Shina* people in Gurez. Agriculture is practiced for a limited period between May and October, and only a few agricultural crops are cultivated during this period. Furthermore, the productivity

Table 4: Economic valuation and trade of NTFPs (*N* = 337)

NTFP	Involvement in marketing (%)	Sale (q/year)	Subsistence income (₹/year)	Cash income (₹/year)	Total income (₹/year)	Income share (%)
Fuel wood	52.46	367.36	333435.41	228873.55	562308.96	5.43
Herbal medicines	58.75	27.74	1735227.24	2892740.60	4627967.84	44.68
Wild vegetables	34.66	21.13	416912.78	524992.08	941904.86	9.09
Edible fruits	53.41	18.30	26819.28	47146.30	73965.58	0.71
Fodder	62.90	85.87	85790.47	89588.08	175378.55	1.69
Beverages	41.98	5.16	19068.34	31435.36	50503.70	0.49
Spices	50.44	6.23	699822.87	813413.53	1513236.40	14.61
Incense	26.11	2.16	17508.55	17035.35	34543.90	0.33
Edible nuts	41.54	21.46	78834.35	152964.30	231798.65	2.24
Cottage industrial materials	53.23	20.15	560468.29	1470499.50	2030967.79	19.61
Shilajeet	8.60	0.337	0.00	114580.00	114580.00	1.12
Total	—	—	3973887.58	6383268.65	10357156.00	100
Average	—	—	11791.95	18941.45	30733.40	—

Note: *hh = household*

and profitability of agriculture are decreased by marginal landholding, insufficient irrigation facilities, and undulating topography. The livestock rearing of nondescript bovines, combined with the unavailability of grazing land and the low quality and quantity of fodder, procures only household needs and fetches little income. Further, small shops, businesses, wage labour, service, caste occupation, and other professions accrue limited employment and earnings. Previous studies (Hussain *et al.* 2019; Rahman *et al.* 2021; Bisui *et al.* 2023; Panda *et al.* 2024) across the world confirm that the NTFP is the main component of employment and income security in tribal households.

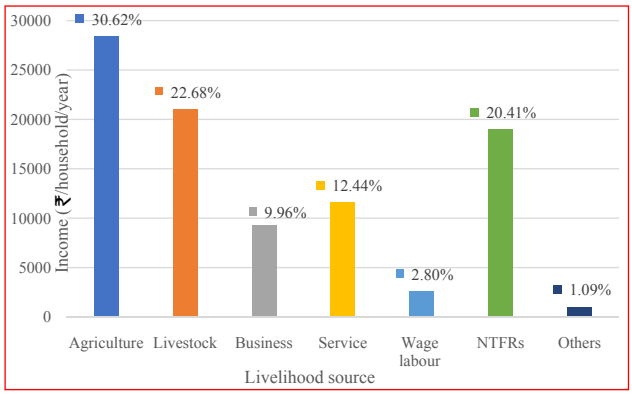

Fig. 1: Contribution of NTFPs to the household economy (*N* = 337)

Inequality mitigation by NTFP income

The Lorenz curve (Fig. 2) showed that Gini coefficients, considering NTFP income (0.2873) and excluding NTFP income (0.3539), have a stronger (6.66%) equalizing effect on local income distribution. As indicated by the values of the Gini coefficients or the departure of Lorenz curves from the line of equality, the NTFP income considerably decreased the income inequalities among the NTFPs sellers. Since NTFPs serve as a financial buffer for tribal people, income diversification by NTFP income equalizes the distribution of overall income (Peerzada *et al.* 2022).

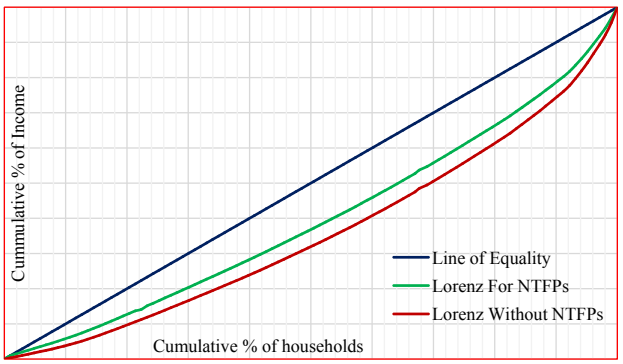

Fig. 2: Lorenz curve of household income with and without NTFP revenue (*N* = 337)

Household determinants of NTFP income

The coefficient of determination (R^2) of 0.920 (p = 0.00) for the OLS multiple regression model implies that all the factors jointly explained 92.00% of variation on the NTFP income. The model's F value of 95.06 showed that the R^2 is statistically significant ($p < 0.05$) in explaining the variations in the household NTFP income. Among the eleven explanatory variables, herd size (2.423), main occupation (5.288), annual income (8.525), proximity to forests (3.005) and forest visits (8.179) had positive significant coefficients in the model, while

Table 5: OLS regression of NTFP income against household variables (*N* = 337)

Household variables (Code)	Coefficient (b)	SE of 'b'	't' value	p-value
Age (X_1)	-4.019	11.68	-0.344	0.832^{NS}
Education (X_2)	204.86	112.47	1.821	0.407^{NS}
Family size (X_3)	433.37	472.53	0.917	0.317^{NS}
Land holding (X_4)	-158.09	289.88	-0.545	0.545^{NS}
Herd size (X_5)	154.07	63.58	2.423	0.028*
Main occupation (X_6)	830.29	158.80	5.288	0.032*
Family labor (X_7)	398.91	234.23	1.703	0.503^{NS}
Annual income (X_8)	0.030	0.01	8.525	0.022*
Proximity to forests (X_9)	155.74	51.83	3.005	0.015*
Forest visit (X_{10})	2161.59	264.28	8.179	0.034*
Family forestry (X_{11})	-7394.15	1730.24	-4.273	0.036*
a = 7401.43 F = 95.06*	R^2 = 0.920	*Multiple R* = 0.959	*Adjusted* R^2 = 0.910	

**= Significant at 5% level of probability, NS = non-significant.*

family forestry (-4.273) had a negative significant coefficient in influencing the NTFP income (Table 5).

The positive coefficient of herd size indicates that households with a larger herd size were likely to gather more NTFP compared to those with a smaller herd size (Mendako *et al.* 2022). Livestock possession provides *Shina* people with an important source of food security in addition to employment and income opportunities. Hence, the NTFP demands for livestock management grow as the size of the herd increases (Islam *et al.* 2015). The *Shina* people work mainly in on-farm occupations, which depend heavily on NTFPs to support their respective financial businesses. Hence, with more on-farm occupations, there's a higher probability of NTFPs dependence, both for subsistence and cash income (Garg *et al.* 2021). Higher-income families were more reliant on the NTFPs because families with higher yearly earnings could procure additional NTFPs from their neighbours collectors, forest depots, and local markets by purchase, besides their own NTFPs collection (Hussain *et al.* 2019). Households' reliance on NTFPs was positively impacted by proximity to forests and frequency of forest visits; this suggests that the more proximate to forests and frequent the forest visits, the greater the quantity of NTFPs the household collects (Rahman *et al.* 2021). Family forestry had a negative influence on the household's reliance on the NTFPs, indicating that the larger the possession of the family forestry, the less the household will depend on the NTFPs. This is because families with greater ownership of family forestry can arrange for a large quantity of NTFPs (Lepcha *et al.* 2020; Mushi *et al.* 2020).

CONCLUSION

The *Shina* people have traditionally depended on NTFPs for their subsistence, financial income, and safety nets, owing to their accessibility, affordability, isolated location, and lack of alternative options. NTFPs' supportive role in the lives, livelihoods, and income inequality of the *Shina* tribe makes them a valuable source for coping strategies for livelihood stress. Household characteristics, including herd size, main occupation, annual income, proximity to forests, forest visits, and family forestry, have a substantial effect on NTFP dependence for livelihood security. The enormous need for NTFPs among the *Shina* people necessitates the proper implementation of sustainable forest development plans so as to keep up with current developments and future problems. The outcomes of our study can be used to formulate policy perspectives that will improve tribal peoples' livelihood strategies, NTFPs security and forest conservation.

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