Short Communication _____ *Chapter – 4*

ROLE OF NON-TIMBER FOREST PRODUCTS (NTFPS) IN INCOME AND EMPLOYMENT IN KINNAUR DISTRICT OF HIMACHAL PRADESH

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Abstract

Non-Timber Forest Products (NTFP) can fulfill community needs and improve rural livelihood in Kinnaur forest division although its importance has not been fully introduced within government frameworks and rural development policies and programs. Therefore this study deals with the role of NTFPs in income and employment in the study area. A multistage random sampling technique was employed for the study area; where four beats were taken randomly, 25 samples from each block *viz.* a sample of 100 households were taken in the study area. Results revealed that the average family size of examined area comprised of 5.21, out of whom 48 percent were males and 52 per cent were females. Literacy situation revealed that nearly 82.74 percent family members were literate at overall level with a literacy index of 3.91, indicating good quality of education in the study area. However in the occupational structure of sampled households agriculture (72.08%) was found to be the primary activity done by the sampled households followed by services (20.74%) and business activity (7.18%). NTFPs' contributed about 13.24 percent to the total farm income. On an overall level average land holding of the study area was found to be 1.81 hectare where orchard land were sharing maximum area (1.20 ha) in the study area. NTFPs collection generated on an average 44.83 mandays of employment to sampled households. Moreover, inclusion of NTFPs' income in the farm income resulted in reducing the income inequalities as Gini coefficient with NTFPs income was 0.20 and without NTFPs income was 0.41.

Keywords: NTFPs, Income, Employment, Gini coefficient, Kinnaur

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Introduction

Non-Timber Forest Products (NTFP) can fulfill important community needs and improve rural livelihood. NTFPs are products of biological origin other than timber that are derived from forests, other wooded land, and trees outside forests (FAO, 1999). Although timber is still considered the main forest product used for subsistence and income, interest in NTFP management has increased over the last few decades(Belcher et al., 2005; Chamberlain and Predny, 2004).

About 80 per cent of people in developing countries are observed to use plants for nutritional security and traditional medicine. More than two billion people in the world use biomass-based fuels, mostly fuelwood for cooking and heating (FAO, 2020). NTFPs comprise a significant component of food security in the developing countries and communities as they consume them more for subsistence (Dash et al., 2016).The global market for non-timber forest products, including medicines, health supplements, and herbal beauty and toiletry products is growing at a rate of seven per cent per annum(Nagpal and Karki, 2004). Some species are used for medicine, some for aromatic purposes, and many for both medicinal and aromatic purposes (Malla et al., 1997;Schippmann et al., 2006).According to reports, the use of NTFPs in income generation accounts for 20–60 per cent of the rural household income in forest fringe communities worldwide (Dash et al., 2016; Naguyen et al., 2020).

In India, the annual contribution of NTFPs to income corresponds to US$2.7 billion,supporting more than 55 per cent of the total employment in the forest area. One third of India's rural population is reported to derive considerable household incomes from NTFPs (Pandey et al., 2016). Out of 275 million poor rural people, 27 per cent of the total population depend on NTFPs for at least part of their sustenance and cash livelihoods (Malhotra and Bhattacharya, 2010; Bhattacharya and Hayat, 2009). This dependency isintense for half of

India's 89 million tribal people, the most destitute section of society, who live in forest fringed areas; NTFP sector alone is able to create about 10 million workdays annually in the country (Planning Commission, 2011).

Himachal Pradesh is a small north western Himalayan state with total forest of 37,948 square kilometres, which is 68.16 per cent of total geographical area and forest cover of around 27.73 per cent (ISFR, 2021). Himachal Pradesh is fortunate to have a wealth of this gift from nature, which is housed in its diverse forests dispersed across its four main agro-climatic zones. It is well understood how important NTFPs are to the state's citizens' day-to-day existence, whether they are used in households or serve as a source of income. However, this priceless resource is in danger because the NTFPs' natural habitats are being harmed by biotic and developmental pressures. The rural poor, who must spend an increasing amount of time collecting wild things, are the group that will suffer the most immediately as a result of this degradation.

Forest geographical area of Kinnaur district is 6,401 square kilometre and falls in high hill temperate wet zone of the state with forest covers about 10.09per cent of the total geographical (ISFR, 2021). Keeping in view the significance of NTFPs in the economy of households, present study "Role of Non-Timber Forest Products (NTFPs) in Kinnaur district of Himachal Pradesh" was conducted to study the contribution of NTFPs in the total

income and employment pattern of the households.The main objectives of the study are to analyse the socio-economic characteristics of sampled forest dwellers, income and employment employed from NTFPs in the study area.

Material and Methods

Study Site Description

Himachal Pradesh is a hilly state that is located between latitudes 300 22' and 330 13' N and longitudes 750 23' to 790 4' E. A north-western Himalayan state with 1.7% of India's landmass has a sizable potential for NTFP wealth. The majority of people in the State and the Kinnaur district live in rural areas, where the forest and its resources play an important role in their social, cultural, and economic lives.

Sampling Procedure

The multistage random sampling technique has been used to select the ultimate respondents. In the first stage, the Kinnaur forest division of Rampur circle has been selected purposively to conduct the present study. This forest division has eight ranges out of which one range i.e. Kalpa range has been selected randomly for the second stage. Thereafter, in the third stage, out of the selected range, two blocks i.e. Kalpa and Shongtong has been selected randomly. In the fourth stage, out of these selected blocks, 4 beats has been selected randomly i.e. two beats from each block. In the fifth stage 25 samples has been taken from respective 4 beats randomly. Therefore total sample of 100 households has been selected for the study.

Tabular analysis

Simple tabular analysis was used to examine socio-economic status of the respondents, their resource structure, income pattern and opinions about the collection of NTFPs. Simple statistical tools like averages and percentages were used to compare, contrast and interpret the results.

The literacy rate and index were calculated using the following formula:

$$\text{Literacy rate} = \frac{\text{Total number of literate persons}}{\text{Total population}} \times 100$$

$$\text{Literacy Index} = \frac{\sum W_i X_i}{\sum X_i}$$

Where,

W_i = weights (0, 1, 2, 3 and 4) for illiterate, primary, middle, matriculation, senior secondary and degree and above respectively

X_i = Number of persons in respective category

$$\text{Dependency ratio w.r.t. total workers} = \frac{\text{No. of dependents in a family}}{\text{Total workers}}$$

$$\text{Dependency ratio w.r.t. average size of family} = \frac{\text{No. of dependents in a family}}{\text{Average size of family}}$$

$$\text{Cropping intensity} = \frac{\text{Gross cropped area}}{\text{Net sown area}} \times 100$$

Gini concentration ratio (CGR)

To estimate the quantity inequality both exclusive and inclusive NTFPs Gini coefficient developed by Deaton (1997) was used. The value of CGR ranges from 0 to 1. If the value is 0 it denotes perfectly equal distribution, while 1 denotes inequalities. The Lorenz curve was generated in MS Excel by drawing a line chart with cumulative per cent of the collectors on the horizontal axis and cumulative per cent of quantity collected on the vertical axis. In order to analyze if NTFPs has an equalizing effect on total quantity distribution the following specification was used:

$$G = 1 - \sum_{i=1}^{n-1} (Y_{i-1} + Y_i)(X_{i+1} + X_i)$$

Where,

G = Gini coefficient

n = Sample size of NTFPs collectors

X_i = Cumulative per cent of quantity collected in i^{th} interval of quantity Collected

Y_i = Cumulative per cent of the collectors in i^{th} interval of quantity Collected

Results and Discussion

Socio-Economic Characteristics of Sampled Households

The socioeconomic traits of the sampled households become more important in order to have a complete profile of the farm households. Social traits like family size and composition, literacy levels and occupational distribution in farm households, dependency rates, and literacy have an impact on economic conditions, which in turn have an impact on social conditions.

The average family size at an overall level is 5.21; however, the average family size was higher among medium families (5.30) than among marginal families (5.21) and lower in the case of small families (5.19). The proportion of females (52%) was found to be more than males (48%) as presented in Table 1. The percentage of nuclear families (59%) was found to be more than the joint families (41%) in the three categories of households.

Education among NTFPs collectors also improves the chances of alternative employment and reduced dependency of people on forest (Gunatilake, 1998; Hegde and Enters, 2000; Tessema, 2003; Xu et al., 2006); therefore, literacy is a significant factor that influences an individual's socioeconomic status. Literacy status in the study area revealed that at an overall level 82.74 per cent of persons were literate in the midst of which 79.45 per cent, 84.78 per cent and 79.25 per cent of persons were literate among marginal, small and medium tribal families of the sampled household respectively. The literacy index varied from 3.81 to 3.95 among the three categories of the farms with an overall index of 3.91. However, the literacy index was higher (3.95) among the small tribal households and lower (3.81) in the case of marginal tribal households.

Occupational distribution at the overall level showed that around 72.08 per cent of the sampled population was engaged in agriculture which was the major constituent of livelihood. On the other hand 20.74 per cent of households were engaged in services in private/public sectors followed by business as the secondary occupation in which only 7.18 per cent persons were engaged.

The working forces in any study area aredefined as people who are between the age of 15 and 65 years and are actively engaged in specific activity or enterprise. The distribution of average number of workersat an overall level, worked out to be 3.76. Out of which 3.64, 3.82 and 3.70 workers were in marginal, small and medium farm categories respectively. The average number of dependents at an overall was found to be 1.44. The overall dependency ratio concerning total workers was found to be 1:1.38. The Dependency ratio w.r.t workers indicate that on an average one worker has to support more than one member of the family in the study area.

The study of land use patterns is essential to understand production behaviour as well as to determine the type of farming in the study area.On an overall basis, the average size of landholding was 1.81 hectare of which 1.20 hectare was under orchard area, 0.33 hectare was cultivated area, 0.16 hectare of area was under NTFPs use; however land under barren land and non-agriculture uses were 0.06 hectare. The average size of holding on marginal, small and medium farms was found to be 0.63, 1.88 and 4.69 hectares, respectively. Medium tribal households hold maximum area where share of orchard area was found to be maximum (3 ha) followed by cultivated area (1 ha) and land under NTFPs use (0.49 ha).

NTFPs form a major source of income in forest dwellers, especially those having less than two hectares of land. Marginal tribal farmers generally exploit more forests than small and medium farmers. People in the Kinnaur district support themselves on the five bighas (1 bigha=0.08 hectare) of forest lands that were allotted to them in the 1980s which they found insufficient to raise their family. However, these forest lands were generally used by them for the collection of NTFPs as these provide additionalsubstantial income for them.

Table 1. Socio-economic analysis of forest dwellers in the study area

Sr. No.	Particulars	Farm size			
		Marginal	Small	Medium	Overall
1.	Average size of the Family (number)	5.21	5.19	5.30	5.21
2.	Number of males (%)	47.52	47.68	51.28	48.00
3.	Number of Females (%)	52.48	52.32	48.72	52.00
4.	Joint Families (%)	42.86	38.71	50.00	41.00
5.	Nuclear Families (%)	57.14	61.29	50.00	59.00
6.	Literacy rate (%)	79.45	84.78	79.25	82.74
7.	Literacy index	3.81	3.95	3.93	3.91
8.	**Occupational structure**				
i.	Services (%)	18.63	22.78	13.51	20.74
ii.	Business (%)	5.88	8.02	5.41	7.18
iii.	Agriculture (%)	75.49	69.20	81.08	72.08
9.	Average no. of workers	3.64	3.82	3.70	3.76
10.	Average no. of dependents	1.57	1.37	1.50	1.44
11.	Dependency ratio w.r.t. workers	1.43	1.36	1.41	1.38
12.	Total holding (ha)	0.63	1.88	4.69	1.81
13.	Cultivated area ((ha)	0.15	0.30	1.00	0.33
14.	Orchard land (ha)	0.35	1.30	3.00	1.20
15.	Barren land (ha)	0.05	0.06	0.07	0.06
16.	Land put to non-agriculture use (ha)	0.03	0.07	0.13	0.06
17.	Land put to NTFPs use (owned land) (ha)	0.05	0.15	0.49	0.16

Farm incomes of sampled households

Source-wise breakdown of farm income in various categories of farms was evaluated and shown in Table 2 to help examine the pertinent role of various crops and NTFPs in the economy of sampled households. It is evident from the Table 2 that fruit

crops estimated the most money in the sampled households, accounting for a sizeable portion of the annual basis income. Cultivation of fruit crops is more preferred and popular farm activity among tribal people since they significantly meet their food, health, and nutritional demands (Islam and Quli, 2015). The contribution of fruit crops to total household income was around 71.13 per cent, with highest percentage in the medium farm households (79.84%) and lowest in the marginal farm category (60.99%). However at an overall level kharif crops and rabi crops contributed only 1.25 and 0.57 per cent respectively to the total household income in the study area.

NTFPs offer viable livelihood support for the forest dwellers subsistence, cash income, and safety net due to the scarcity of alternative options, the small size of land holding for agriculture and marginal agricultural returns (Maske et al., 2011;Langat et al., 2016). Though NTFPs provide little amount of income, the trade has historically given the tribes a sense of dignity, self-worth, and sovereignty (Usman et al., 2016). Since NTFPs income is closely correlated with labour force and workforce availability, it varies across forest dwellers households.

The income from NTFPs in the sampled householdscontributed about 13.24 per cent to the total farm income at an overall level and was found highest (18.80%) for marginal tribal people and lowest (9.33%) for medium tribal people. Hence NTFPs form an additional source of income for the respondents of the study area.NTFPs monetary values in the study area were computed by using local market rates (Islam and Quli, 2017). On an overall basis average income generated from NTFPs was Rs. 320608.10 per quintal; however average income generated by marginal, small and medium households were Rs. 317483.55 per quintal, Rs. 320021.79 per quintal, Rs. 332991.99 per quintal respectively. The individual share of selected NTFPs in total NTFPs income has also been presented in Table 2. The share of *Chilgoza* was maximum (66.09 %) followed by *Karoo* (16.95%) in the overall category. The minimum share (1.53 %) was contributed by *Dhoop.* It was concluded from the foregoing analysis that *Chilgoza* and *Karoo* were major contributors to NTFPs income in the study area.

The off-farm income activities, which include business, government and private services, rentals and others, contributed 11.16 per cent to the total income overall with the highest (15.36 %) being for the marginal farms and the lowest 10.95 per cent, 6.50 per cent for the small and medium farms respectively.

Table 2. Source wise breakdownfarm incomes of sampled households (Rs/HH/ha)

Particulars		Farm size			
		Marginal	**Small**	**Medium**	**Overall**
1	**Kharif crop**	10212.57 (0.60)	34000.00 (1.32)	64022.00 (1.79)	30341.72 (1.25)
2	**Rabi crops**	9000.00 (0.53)	15000.00 (0.58)	19000.00 (0.53)	13720.00 (0.57)
3	**Fruits**	1029830.00 (60.99)	1852983.87 (72.19)	2849000.00 (79.84)	1722102.40 (71.13)
4	**Dairy**	62678.57 (3.71)	63798.39 (2.49)	71550.00 (2.01)	64260.00 (2.65)
5	**NTFP**	317483.55 (18.80)	320021.79 (12.47)	332991.99 (9.33)	320608.10 (13.24)
i.	***Chilgoza***	195569.80 (61.60)	213812.76 (66.81)	245701.20 (73.79)	211893.58 (66.09)
ii.	***Kalajeera***	50474.34 (15.90)	42991.40 (13.43)	32014.64 (9.61)	43988.95 (13.72)
iii.	***Dhoop***	5026.97 (1.58)	4912.42 (1.54)	4538.24 (1.36)	4907.08 (1.53)
iv.	***Karoo***	60157.74 (18.95)	53127.16 (16.60)	45706.84 (13.73)	54353.69 (16.95)
v	***Kuth***	6254.70 (1.97)	5178.05 (1.62)	5031.07 (1.51)	5464.81 (1.70)
6	**Off-farm**	259285.71 (15.36)	281161.29 (10.95)	232000.00 (6.50)	270120.00 (11.16)
	Total	1688490.40 (100.00)	2566965.34 (100.00)	3568563.99 (100.00)	2421152.22 (100.00)

Figures in parentheses indicate the percentage to total

Employmentfrom selected NTFPs in the study area

The labor-intensive task of contributing NTFPs gives the forest dwellers a sufficient amount of alternative employment. In the study area, 44.83 mandays were produced on average as shown in Table 3. On marginal, small, and medium farms, 44.22, 43.87, and 52.50 mandaysrespectively were produced per household annually. The main source of employment for NTFPs was *Chilgoza*, which contributed 12.95 mandays per HH annually to total employment. Due to the numerous steps involved in harvesting of *Chilgoza*, including the collection of a cone, drying of a cone in the sun, and separating *Chilgoza* seed from a cone by beating a cone with a stick or over a hard surface, therefore the collection of *Chilgoza* was a time-consuming process.

The next significant source of employment was found to be *Kalajeera* collection, provided 10.54 mandays per HH per year of employment, followed by *Dhoop* (8.73 mandays/ HH/

year of employment). The employment of all NTFPs by the collection of *Karoo* and *Kuth* was 6.89 and 5.64 mandays per HH per year, respectively. Regarding employment from NTFPs, Paloti and Hiremath (2005), Maske et al. (2011), and Kumar (2014) also reached similar conclusions. According to Gubbi and Millan's (2008) research, collecting NTFPs can help collectors with their financial situation and provide them with good returns, but if agricultural alternatives are available, collectors will not continue to collect NTFPs.

Table 3. Employment generated through the collection of selected NTFPs (mandays)

Name of species	Farm size			
	Marginal	**Small**	**Medium**	**Overall**
Chilgoza	13.93 (31.50)	12.17 (27.74)	15.00 (28.57)	12.95 (28.87)
Kala jeera	10.85 (24.53)	9.98 (22.74)	13.13 (25.00)	10.54 (23.50)
Dhoop	9.64 (21.80)	8.11 (18.49)	10.00 (19.05)	8.73 (19.47)
Karoo	7.66 (17.32)	6.54 (14.90)	6.88 (13.10)	6.89 (15.36)
Kuth	2.14 (4.85)	7.08 (16.13)	7.50 (14.29)	5.74 (12.80)
Total	**44.22 (100.00)**	**43.87 (100.00)**	**52.50 (100.00)**	**44.83 (100.00)**

Figures in parentheses indicate the percentage to total

Income inequality alleviation by NTFPs

The Lorenz curve was used to estimate the ability of NTFPs to reduce income inequality. The study showed that the Lorenz curve of the total household income was more closely aligned with the line of equality than the household income without NTFPs as represented in Figure 1.

The Gini coefficient for households with NTFP income was 0.21 and for those without it was 0.40, which means that NTFP income contributed to mitigating income inequalitiesamong the households by 19.76 per cent. This indicates that NTFP income made a significant contribution to reduce income disparities among the households in the study area. Therefore, it is evident from the values of the Gini coefficient and the Lorenz curve's departure from the line of equality that the NTFPs reduced income inequality among the sampled household.

The Lorenz curve shows that NTFPs are important in mitigating income inequality and providing a safety net for impoverished forest fringe communities. Therefore, if recognised and properly managed, the transition to an NTFP-based economy has the potential to raise the socioeconomic standing of the area. Household consumption of NTFPs in communities on the edges of forests has not been fully taken into account. They are much more

valuable than NTFPs bought and sold in the neighbourhood markets. Despite making such a significant contribution to the local economy, the authorities in study area have never deemed NTFPs' contributions sufficient to be taken into account (Ahenkan and Boon, 2008; Bennett, 1992).

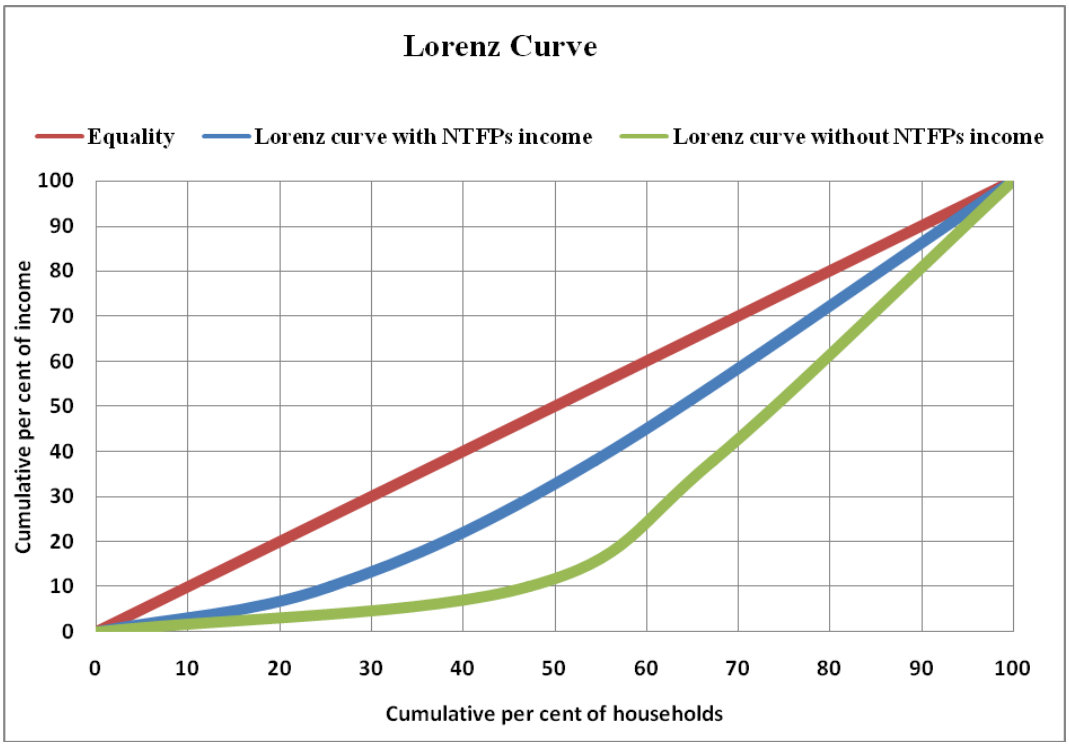

Figure1. Income inequality alleviation by NTFPs

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