

International Journal of Agriculture Extension and Social Development

Volume 9; Issue 5; May 2026; Page No. 317-321

Received: 07-03-2026

Accepted: 14-04-2026

Indexed Journal

Peer Reviewed Journal

Analysis of sustainable livelihood patterns among forest dwellers in Chhattisgarh

¹Shubham Kumar, ²ML Sharma and ³PK Pandey

¹Ph.D. Scholar, Department of Agricultural Extension Education, Indira Gandhi Krishi Vishwavidyalaya, Raipur, Chhattisgarh, India

^{2,3}Professor, Department of Agricultural Extension Education, Indira Gandhi Krishi Vishwavidyalaya, Raipur, Chhattisgarh, India

DOI: <https://www.doi.org/10.33545/26180723.2026.v9.i5d.3591>

Corresponding Author: Shubham Kumar

Abstract

Non-timber forest products (NTFPs) play a vital role in the livelihood security of forest-dependent households in Chhattisgarh. This study, conducted during 2024–2025, examined and compared sustainable livelihood patterns among forest dwellers in the Raipur, Kanker, and Surguja forest circles. An ex-post facto research design was employed, and 315 respondents were selected through multistage random sampling from 21 Van Dhan Kendras. Data were collected using a structured interview schedule and analyzed using frequency, percentage, mean, standard deviation, and Z-test. Sustainable livelihood was assessed across six capitals: human, physical, natural, social, financial, and informational.

Findings revealed that most respondents had low to medium levels of livelihood capital. Human capital was predominantly low across all circles, while physical capital was generally moderate. Natural capital was relatively weak, particularly in Raipur and Kanker, whereas social capital remained moderate. Financial capital was the weakest component, with most respondents in the very low category. Informational capital was also low, especially in Surguja. Overall, livelihood status was mostly medium, followed by low, indicating a moderately stable yet vulnerable condition.

Z-test results showed no significant differences in human and social capital among the circles. However, significant differences were observed in physical, natural, financial, informational, and overall livelihood status. Raipur performed better in several dimensions, while Surguja showed higher natural capital but lagged elsewhere. The study highlights the need to strengthen financial inclusion, information access, and NTFP-based interventions to enhance livelihood sustainability.

Keywords: Sustainable livelihood, NTFPs, forest dwellers, livelihood capitals, Z-test, Chhattisgarh

Introduction

The term Non-timber forest products (NTFPs) encompasses all biological materials other than timber, which are extracted from forests for human use (De Beer and McDermott, 1989) ^[6]. Utilization of NTFPs has been contributing much to the local livelihood (Sarmah and Arunachalam, 2011) ^[9] and it may contribute as much as 20–25 percent of income to rural people (Vedeld *et al.*, 2007) ^[10]. NTFPs like fuel-wood, medicinal plants, wild edible vegetables, house building materials etc., are an integral part of day-to-day livelihood activities, especially for tribal people (Sarmah *et al.*, 2006; Saha and Sundriyal, 2013) ^[9,8]. In almost all tropical countries, the collection of NTFPs is a major economic activity (Chopra, 1993; Ambrose-Oji, 2003) ^[5, 1]. NTFPs provide important products for local, national and international markets. These markets are growing rapidly and steadily (Wilkinson and Elivitch, 2000) ^[11].

The Recorded forest cover in Chhattisgarh is 59,816 sq. km which is 44.25 percent of its geographical area in which 43.30 percent are reserve forest 41.04 percent are protected forest and 15.66 percent are unclassified forests (Anonymous, 2023) ^[3]. In Chhattisgarh where 658 villages

out of total 20619 are forest villages and 421 forest villages convert into revenue villages (Anonymous 2017) ^[2]. NTFPs contribute significantly to rural livelihoods, with household income shares ranging from 5.4 percent to 55 percent. In Odisha's tribal areas, forest income accounts for 15 percent to 50 percent of annual income, and NTFPs provide about 1.6 million person-years of employment in India.

In development research, sustainable livelihood analysis has received significant amount of attention as a multifaceted method for comprehending poverty, vulnerability, and rural well being. Sustainability is the ability of these systems to endure shocks and return back without compromising the foundation of natural resources, whereas livelihood refers to the skills, resources, and activities necessary for a means of subsistence. The Sustainable Livelihood Framework (SLF) has been extensively used in this context as an analytical tool to look at how various types of capital interact to affect livelihood outcomes.

Human, physical, natural, social, and financial capital is the five fundamental elements into which the SLF divides livelihood assets. The resources that households have at their disposal are represented by these capitals, which also define their capacity to pursue a variety of livelihood

strategies. Empirical research has recently placed a strong emphasis on the incorporation of informational capital, acknowledging the vital role that knowledge systems, communication technologies, and information access play in improving adaptive capacity and decision making processes. These capitals are frequently unevenly distributed and accessible across regions, which results in varying livelihood outcomes and contribute to socioeconomic disparities.

In the context of this, the current study compares the livelihood capitals of respondents from three different circles: Raipur, Kanker, and Surguja. The study aims to provide empirical insights into the distribution and structure of livelihood assets by using statistical tools to investigate inter regional disparities in various livelihood capitals and overall livelihood status. It is anticipated that the results would aid in the development of evidence based policies targeted at bolstering sustainable livelihood systems, especially in rural and forest dependent communities.

Methodology

The study was conducted in Chhattisgarh state during the year of 2024-2025 using an ex-post facto research design. The forest area of Chhattisgarh state is administratively divided into 6 forest circles. Out of six forest circle 50 percent (i.e., three forest circles) were selected through purposive sampling to ensure representation of all three agro climatic zones. One forest circle predominantly representing each agro climatic zone was selected to ensure adequate geographical and ecological representation of the state. Accordingly, Raipur circle was chosen from Chhattisgarh Plains, Kanker circle from the Bastar Plateau and Surguja circle from the Northern Hills. Out of the 17 forest divisions in the three selected forest circles approximately 50 percent (total 9) forest division were randomly selected from each forest circle. Out of the 42 Van Dhan Kendras in the selected forest division, approximately 50 percent (total 21) Van Dhan Kendras were randomly selected from each forest division. From each selected Van Dhan Kendra, 15 respondents were chosen by using simple random sampling technique. Thus, 105 respondents were selected from Raipur circle, 95 respondents were selected from Kanker circle and 120 respondents were selected from Surguja circles.

Sustainable livelihood was measured using the Sustainable Livelihood Framework across six capitals (suggested by Department of International Development DFID, 1999) [7]: human (health, nutrition, education, family labour), physical (transport, housing, water, energy, possessions), natural (irrigation, livestock), social (trust, participation), financial (indebtedness, loan terms, savings), and informational (media/ICT ownership and utilization).

Scores for indicators were aggregated per capital, then combined into a Sustainable Livelihood Index (SLI) and classifying respondents into very low to very high categories (20% intervals).

Sustainable Livelihood Index

$$SLI = \frac{\text{Total score}}{\text{Maximum score}} \times 100$$

The data was collected using interview schedule; Statistical tools like mean, standard deviation, frequency, percentage

were used. To understand the variation of livelihood pattern of forest dwellers, a comparative statistical analysis was conducted among the different forest circles. The mathematical formula for conducting a z test is,

$$Z = \frac{\bar{x}_1 - \bar{x}_2}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}}$$

Where

$\bar{x}_1, \bar{x}_2$ = mean of the two groups

S_1, S_2 = Standard deviation of two groups

n_1, n_2 = Sample size of two groups

Results and Discussion

Distribution of Respondents According to Different Livelihood Capitals

The table 1 presents the distribution of respondents across different livelihood capitals human, physical, natural, social, financial, and informational reveals a generally moderate yet uneven livelihood structure among tribal households in Raipur, Kanker, and Surguja forest circles. The findings indicate that a substantial proportion of respondents are concentrated in the lower and middle categories across most capitals, highlighting both resource constraints and partial resilience within the livelihood system.

Human capital was predominantly low in all three circles, with 67.62 per cent of respondents in Raipur, 66.67 per cent in Kanker, and 66.67 per cent in Surguja falling into the low category. At the aggregate level, 66.98 per cent of respondents were categorized under low human capital, followed by 32.38 per cent in the medium category, while only 0.63 per cent was in the very low category and none in the high or very high groups. This distribution reflects limited access to education, skill development opportunities, and health services, which are critical for enhancing productivity and livelihood diversification.

In contrast, physical capital exhibited a relatively better status. A majority of respondents were placed in the medium category, accounting for 78.10 per cent in Raipur, 64.44 per cent in Kanker, and 60.83 per cent in Surguja. Overall, 67.62 per cent of respondents fell in the medium category, followed by 19.68 per cent in the low and 8.57 per cent in the high categories. This suggests that basic infrastructure and physical assets such as housing, tools, and transportation are moderately available, contributing to a certain level of livelihood stability.

Natural capital, however, remained weak and unevenly distributed. In Raipur and Kanker, the highest proportion of respondents (40.00% and 42.22%, respectively) belonged to the very low category, whereas in Surguja, 42.50 per cent were in the low category. At the overall level, 34.29 per cent each were in the very low and low categories, with only 3.81 per cent in the high category. This indicates restricted access to land, forests, and other natural resources, which are vital for NTFP-based livelihoods.

Social capital showed a relatively moderate status. In Raipur, 44.76 per cent of respondents were in the medium category, whereas in Kanker and Surguja, the majority were in the low category (43.33% and 41.67%, respectively). Overall, 36.51 per cent were in the low category, 34.92 per

cent in medium, and 21.27 per cent in high category, suggesting that while community networks and group participation exist, their effectiveness and reach remain limited.

Financial capital emerged as the weakest component across all livelihood capitals. A large majority of respondents, particularly in Kanker (66.67%) and Surguja (76.67%), were in the very low category. At the aggregate level, 64.13 per cent of respondents fell into the very low category, indicating poor financial stability, minimal savings, and inadequate access to credit facilities and formal financial services.

Similarly, informational capital was found to be critically

low. Nearly half (48.57%) of the respondents were in the very low category and 24.76 per cent in the low category, while only 5.71 per cent reached the medium level. Notably, no respondents were found in the high or very high categories. This reflects limited access to extension services, communication channels, and awareness regarding improved livelihood practices.

The overall sustainable livelihood status revealed that 57.78 per cent of respondents were in the medium category and 40.63 per cent in the low category, indicating a moderately stable yet vulnerable livelihood system. Only 0.32 per cent was in the high category.

Table 1: Distribution of respondents according to extent of sustainable livelihood capitals

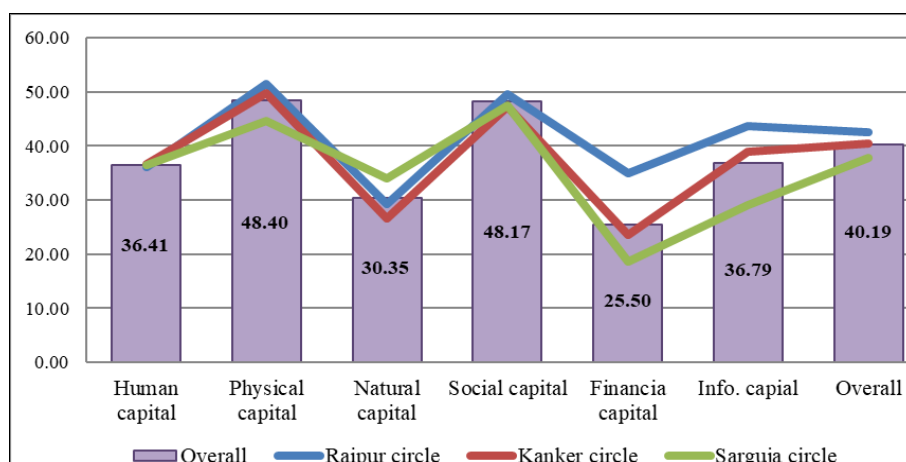
Category	Raipur circle (C ₁) (n=105)		Kanker circle (C ₂) (n= 90)		Surguja circle (C ₃) (n=120)		Overall (n=315)	
	F	P	F	P	F	P	F	P
Human capital								
Very Low (up to 20.00)	0	0.00	0	0.00	2	1.67	2	0.63
Low (20.01 to 40.00)	71	67.62	60	66.67	80	66.67	211	66.98
Medium (40.01 to 60.00)	34	32.38	30	33.33	38	31.67	102	32.38
High(60.01 to 80.00)	0	0.00	0	0.00	0	0.00	0	0.00
Very High (Above 80.00)	0	0.00	0	0.00	0	0.00	0	0.00
Physical capital								
Very Low (up to 20.00)	0	0.00	0	0.00	11	9.17	11	3.49
Low (20.01 to 40.00)	12	11.43	22	24.44	28	23.33	62	19.68
Medium (40.01 to 60.00)	82	78.10	58	64.44	73	60.83	213	67.62
High(60.01 to 80.00)	11	10.48	8	8.89	8	6.67	27	8.57
Very High (Above 80.00)	0	0.00	2	2.22	0	0.00	2	0.63
Natural capital								
Very Low (up to 20.00)	42	40.00	38	42.22	28	23.33	108	34.29
Low (20.01 to 40.00)	33	31.43	24	26.67	51	42.50	108	34.29
Medium (40.01 to 60.00)	27	25.71	27	30.00	33	27.50	87	27.62
High(60.01 to 80.00)	3	2.86	1	1.11	8	6.67	12	3.81
Very High (Above 80.00)	0	0.00	0	0.00	0	0.00	0	0
Social capital								
Very Low (up to 20.00)	4	3.81	1	1.11	3	2.50	8	2.54
Low (20.01 to 40.00)	26	24.76	39	43.33	50	41.67	115	36.51
Medium (40.01 to 60.00)	47	44.76	28	31.11	35	29.17	110	34.92
High(60.01 to 80.00)	24	22.86	17	18.89	26	21.67	67	21.27
Very High (Above 80.00)	4	3.81	5	5.56	6	5.00	15	4.762
Financial capital								
Very Low (up to 20.00)	50	47.62	60	66.67	92	76.67	202	64.13
Low (20.01 to 40.00)	5	4.76	3	3.33	3	2.50	11	3.49
Medium (40.01 to 60.00)	24	22.86	6	6.67	13	10.83	43	13.65
High(60.01 to 80.00)	14	13.33	13	14.44	4	3.33	31	9.84
Very High (Above 80.00)	12	11.43	8	8.89	8	6.67	28	8.89
Informational capital								
Very Low (up to 20.00)	10	9.52	14	15.56	42	35.00	66	20.95
Low (20.01 to 40.00)	44	41.90	51	56.67	58	48.33	153	48.57
Medium (40.01 to 60.00)	37	35.24	22	24.44	19	15.83	78	24.76
High(60.01 to 80.00)	14	13.33	3	3.33	1	0.83	18	5.71
Very High (Above 80.00)	0	0.00	0	0.00	0	0.00	0	0
Overall Sustainable livelihood								
Very Low (up to 20.00)	0	0.00	0	0.00	4	3.33	4	1.27
Low (20.01 to 40.00)	32	30.48	35	38.89	61	50.83	128	40.63
Medium (40.01 to 60.00)	73	69.52	54	60.00	55	45.83	182	57.78
High(60.01 to 80.00)	0	0.00	1	1.11	0	0.00	1	0.32
Very High (Above 80.00)	0	0.00	0	0.00	0	0.00	0	0.00

Further analysis of sustainability extent in Fig. 2 indicated that physical capital had the highest sustainability (48.40%), followed by social (48.17%), informational (36.79%),

human (36.41%), natural (30.35%), and financial capital (25.50%). The highest sustainability gap was observed in financial capital, particularly in Surguja (81.37%), followed

by natural and human capitals. Overall livelihood sustainability averaged 40.19 per cent, with a significant gap of 59.81 per cent, emphasizing the need for targeted interventions in financial inclusion, resource access, and information dissemination.

These findings are consistent with Gupta (2015), who also reported higher sustainability in social and human capital compared to other components, thereby reinforcing the importance of strengthening weaker capitals for achieving sustainable livelihoods.



Comparison of Livelihood Capitals among Different Circles (Z-test Analysis)

The table 2 presents the comparison of livelihood capitals across Raipur, Kanker, and Sarguja circles using Z-test revealed distinct patterns. Human and social capital showed no significant differences across the three regions,

indicating uniformity. In contrast, physical capital was significantly lower in Sarguja compared to Raipur and Kanker, though Raipur and Kanker did not differ significantly. Natural capital was significantly higher in Sarguja than in the other two circles, while the difference between Raipur and Kanker was non-significant.

Table 2: Z- test comparison of sustainable livelihood capital component among Raipur circle, Kanker circle and Sarguja circle

S. N.	Component	Raipur circle (n = 105)	Kanker circle (n = 90)	Surguja circle (n =120)	Z value								
					Raipur Vs Kanker	Decision	Interp.	Raipur Vs Surguja	Decision	Interp.	Kanker Vs Surguja	Decision	Interp.
1	Human capital												
	Mean	36.19	36.62	36.46	-0.38	H ₀ accepted	No significant difference	-0.27	H ₀ accepted	No significant difference	0.14	H ₀ accepted	No significant difference
	SD	7.05	8.66	7.84									
2	Physical capital												
	Mean	51.47	49.81	44.65	1.04	H ₀ accepted	No significant difference	4.36**	H ₀ Rejected	significant difference	2.76**	H ₀ Rejected	significant difference
	SD	8.86	12.75	14.26									
3	Natural capital												
	Mean	29.29	26.72	33.96	0.92	H ₀ accepted	No significant difference	-1.98*	H ₀ Rejected	significant difference	-2.98**	H ₀ Rejected	significant difference
	SD	19.67	19.08	14.91									
4	Social capital												
	Mean	49.68	47.41	47.5	1.04	H ₀ accepted	No significant difference	1.06	H ₀ accepted	No significant difference	-0.04	H ₀ accepted	No significant difference
	SD	14.8	15.58	15.97									
5	Financial capital												
	Mean	34.88	23.61	18.65	2.54*	H ₀ Rejected	significant difference	4.22**	H ₀ Rejected	significant difference	1.22	H ₀ accepted	No significant difference
	SD	30.75	31.04	26.43									
6	Informational capital												
	Mean	43.77	39.07	29.03	2.41*	H ₀ Rejected	significant difference	7.46**	H ₀ Rejected	significant difference	4.91**	H ₀ Rejected	significant difference
	SD	13.58	13.55	16.06									
	Over all												
	Mean	42.63	40.57	37.79	1.96*	H ₀ Rejected	significant difference	5.36**	H ₀ Rejected	significant difference	2.56*	H ₀ Rejected	significant difference
	SD	5.46	9.1	8.44									

*Significant at 0.05% level of probability, **Significant at 0.01% level of probability, SD = Standard deviation

Financial capital was significantly higher in Raipur compared to both Kanker and Sarguja, with no significant

difference between the latter two. Informational capital showed a clear gradient, with Raipur highest, followed by

Kanker and Surguja, and all pair wise differences were significant.

Overall livelihood scores differed significantly across all circles, with Raipur performing the best, followed by Kanker, and Surguja ranking lowest. These findings highlight regional disparities, particularly in physical, financial, informational, and overall livelihood status.

Highlights

- Forest dwellers mainly possessed low to medium sustainable livelihood status across all circles.
- Financial and informational capitals were the weakest livelihood components among the respondents.
- Significant regional disparities existed in livelihood capitals among Raipur, Kanker and Surguja circles.

Conclusion

The study reveals that forest dwellers in the three circles have a moderate yet fragile livelihood base, with most respondents falling in low to medium categories. Physical and social capital was relatively stronger, while financial and informational capitals remained weak. Significant regional disparities were observed, with Raipur performing better and Surguja lagging in key aspects. The findings highlight the need for focused interventions in financial inclusion, information access, and sustainable resource management to strengthen livelihood security and resilience among forest-dependent communities.

Acknowledgment

I would like to express my heartfelt gratitude to Dr. M. L. Sharma sir for his voluble guidance, constant encouragement and kind support throughout the research work. I am sincerely thankful to Dr. P. K. Pandey for his constructive suggestions, cooperation and motivation during the preparation of research article. Their guidance and support played an important role in the successful completion of this work.

References

1. Ambrose-Oji B. The contribution of NTFPs to the livelihoods of the forest poor: evidence from the tropical forest zone of south-west Cameroon. *International Forestry Review*. 2003;5(2):106-117.
2. Anonymous. Forest villages and conversion into revenue villages. New Delhi: Ministry of Tribal Affairs, Government of India; 2017.
3. Anonymous. Indian State Forest Report (ISFR) 2023. Vol. 1. Dehradun: Ministry of Environment, Forest and Climate Change, Government of India; 2023. p. 256.
4. Behera D, Kanugo AP, Das SS, Parngya S. Non-timber forest products (NTFPs) for sustainable livelihood of Indian tribals. *Futuristic Trends in Agriculture Engineering and Food Sciences*. 2024;3(10):75-81.
5. Chopra K. The value of non-timber forest products: an estimation for tropical deciduous forests in India. *Economic Botany*. 1993;47(3):251-257.
6. De Beer JH, McDermott M. The economic value of non-timber forest products in South East Asia. Amsterdam: The Netherlands Committee for IUCN; 1989.
7. DFID. Sustainable livelihoods guidance sheets.

Numbers 1-8. London: Department for International Development; 2001.

8. Saha D, Sundriyal RC. Perspectives of tribal communities on NTFP resource use in a global hotspot: implications for adaptive management. *Journal of Natural Sciences Research*. 2013;3(4):125-169.
9. Sarmah R, Arunachalam A. Contribution of non-timber forest products (NTFPs) to livelihood economy of the people living in forest fringes in Changlang district of Arunachal Pradesh, India. *Indian Journal of Fundamental and Applied Life Sciences*. 2011;1(2):157-169.
10. Vedeld P, Angelsen A, Bojo J, Sjaastad E, Berg GK. Forest environmental incomes and the rural poor. *Forest Policy and Economics*. 2007;9(7):869-879.
11. Wilkinson MK, Elivitch RC. Non-timber forest products for Pacific Islands: an introductory guide for producers. Honolulu (HI): Permanent Agriculture Resources; 2000.