

SOCIO-ECONOMIC EMPOWERMENT OF TRIBAL WOMEN THROUGH MAHUA-BASED FOREST ENTERPRISES: A CASE STUDY OF BASTAR

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ABSTRACT

*The Mahua tree (*Madhuca longifolia*) occupies a central role in the livelihood ecosystem of tribal communities in Bastar, Chhattisgarh. This empirical study investigates the economic empowerment of tribal women through the collection, processing, and commercialisation of Mahua forest produce. Drawing on primary survey data collected from 300 tribal women across six blocks of Bastar district during 2022–2023, the study employs descriptive statistics, chi-square tests, and regression analysis to assess income contribution, livelihood diversification, and socio-economic mobility. Findings reveal that Mahua-related activities contribute approximately 38% of annual household income for respondent households, with women exercising significant control over earnings in over 62% of cases. However, structural constraints including market access barriers, exploitation by middlemen, limited processing infrastructure, and low financial literacy continue to impede the full realisation of economic potential. The study identifies statistically significant correlations between participation in Mahua-based enterprises and improvements in nutritional outcomes, children's school enrolment, and women's financial decision-making autonomy. Comparative analysis with non-Mahua-dependent households confirms a measurable empowerment differential. The paper concludes with evidence-based policy recommendations centred on cooperative formation, value chain integration, and targeted skilling programmes. These findings carry direct implications for forest-based livelihood policy, tribal welfare schemes, and gender-inclusive rural development strategies in central Indian states.*

Keywords: *Mahua¹, tribal women², economic empowerment³, Bastar⁴, forest-based livelihoods⁵, *Madhuca longifolia*⁶, non-timber forest products (NTFPs)⁷.*

1. INTRODUCTION

1.1 Contextual Background: Tribal Livelihoods and Forest Dependency in Bastar

Bastar division in southern Chhattisgarh is one of the most densely forested regions in peninsular India, with forest cover exceeding 44% of the total geographical area. The region is home to a substantial concentration of

Scheduled Tribe (ST) populations, including the Gond, Halba, Bhatra, and Muria communities, many of whom rely extensively on non-timber forest products (NTFPs) for sustenance and economic survival. Among the wide spectrum of forest-derived resources available to these communities, the Mahua tree (*Madhuca longifolia* Koenig J.F. Macbr.) holds unparalleled cultural, nutritional, and economic significance. Every part of the Mahua tree serves a distinct purpose: the flowers are collected for food and fermentation into a traditional beverage, the seeds are pressed for edible and industrial oil, the fruit pulp provides nutritional value, and the timber is used for construction. The cyclical availability of Mahua during the spring season marks one of the most economically intensive periods in the tribal agricultural calendar. Women are disproportionately engaged in Mahua collection, drying, storage, and sale, making them both the primary producers and principal custodians of this forest resource. Despite this central role, tribal women in Bastar remain structurally marginalised within the formal market economy, frequently receiving suboptimal prices from intermediaries and lacking access to institutional credit, storage infrastructure, and market intelligence. Understanding the degree to which Mahua activities translate into tangible economic empowerment for tribal women is therefore not merely an academic exercise but a matter of urgent developmental policy relevance.

1.2 RESEARCH PROBLEM AND SIGNIFICANCE

While considerable scholarly attention has been directed towards NTFPs as livelihood resources in India, empirical investigations specifically focused on the gender dimensions of Mahua-based economic activity in Bastar remain sparse. Existing literature tends to treat tribal forest communities as undifferentiated units, thereby obscuring the differentiated experiences of women within these households. The feminisation of Mahua collection labour has been noted in ethnographic accounts, yet quantitative assessments of its income contribution, the distribution of economic control within households, and the barriers women face in extracting maximum value from their labour remain inadequately documented. This study seeks to address this gap by generating primary empirical evidence on the scope and quality of economic empowerment that Mahua activities afford tribal women. The significance of this inquiry extends to policy design: Chhattisgarh's Minor Forest Produce (MFP) policy under the Forest Rights Act 2006 and associated support price mechanisms directly affect tribal women's earning potential, yet impact assessments from a gender-empowerment lens remain limited. Furthermore, with national missions such as Van Dhan Vikas Kendras (VDVKs) seeking to add value to tribal forest produce, there is an urgent need for baseline empirical data to evaluate programme effectiveness and identify improvement pathways.

1.3 OBJECTIVES OF THE STUDY

The study is guided by the following specific objectives: (i) to quantify the contribution of Mahua-related forest activities to the annual household income of tribal women respondents in Bastar; (ii) to assess the extent of women's economic control and decision-making autonomy in Mahua-based livelihoods; (iii) to identify structural barriers that limit income realisation and market participation of tribal women in the Mahua value

chain; (iv) to examine correlations between Mahua income participation and indicators of socio-economic empowerment including education, nutrition, and financial inclusion; and (v) to compare the empowerment status of Mahua-active households with non-Mahua-dependent tribal households in the same geographic area. The overarching aim is to provide a robust, data-driven account of how the Mahua economy functions as a mechanism of economic empowerment for tribal women in Bastar, and to identify actionable interventions that can strengthen this function.

2. REVIEW OF RELATED LITERATURE

Research on non-timber forest products as livelihood assets has a rich tradition in South Asian development economics. Shiva and Bandyopadhyay [1] provided early foundational analysis on how forests constitute living economic systems for tribal and forest-dependent communities, emphasising that the commodification of NTFPs without adequate institutional support often leads to exploitation of primary collectors. Specifically concerning Mahua, Bhattacharya et al. [2] documented its multifaceted utility across tribal belts of central India and demonstrated that Mahua flower collection alone could account for between 20% to 45% of seasonal cash income for landless tribal households in Madhya Pradesh and Chhattisgarh. However, their study did not disaggregate findings by gender, a gap that subsequent researchers began to address.

Sinha and Prasad [3] examined the gendered division of labour in NTFP collection in Jharkhand and found that women undertook over 68% of collection hours for major forest products including Mahua, tendu leaves, and sal seeds, yet controlled less than 40% of the resulting income. This income leakage was attributed to the predominant role of male household members and male-dominated cooperatives in the final sale of produce. Singh [4] extended this analysis to the Bastar region, finding similar patterns of feminised labour with limited female economic agency, and drew attention to the role of informal credit obligations to middlemen (often called mahajans) as a mechanism that further eroded women's income gains. Roy and Chatterjee [5] contributed a value chain analysis of Mahua in Chhattisgarh and identified significant value capture at the aggregation and processing stages, stages from which tribal women collectors were largely excluded owing to capital constraints and limited market access.

From the empowerment literature, Kabeer's [6] framework of agency, resources, and achievements has been widely applied to assess women's economic empowerment in forest-dependent contexts. Applying this framework to tribal women in Odisha, Pattanaik and Mishra [7] found that NTFP income, when under women's direct control, significantly improved household expenditure on food and children's education. Mahapatra and Shackleton [8] similarly identified a positive relationship between women's control over forest income and nutritional diversity in tribal households. These studies underscore the importance of not merely measuring income but assessing control over earnings as the operative variable in empowerment research.

Government policy frameworks have increasingly recognised the importance of MFPs to tribal livelihoods. The Minimum Support Price (MSP) mechanism for MFPs launched by the Government of India and administered through TRIFED has been assessed by Tiwari and Saxena [9] as having mixed outcomes, with coverage gaps and awareness deficits limiting reach particularly among women collectors. The Forest Rights Act of 2006 and its provisions for community forest rights have been discussed by Springate-Baginski et al. [10] as carrying transformative potential for tribal forest economies, though implementation has been uneven across states. In Chhattisgarh, Roy and Singh [11] documented that while the state government's MFP procurement policy improved floor prices, the benefits reached women primarily in areas where self-help groups (SHGs) were active and connected to procurement centres, highlighting the importance of institutional intermediation.

Comparative studies across tribal regions offer further contextual grounding. Patel et al. [12] conducted a cross-state analysis of Mahua economies in Madhya Pradesh, Chhattisgarh, and Odisha, finding that the degree of women's empowerment through Mahua income was highest in areas where cooperative infrastructure existed, training in value addition was available, and financial literacy programmes had been implemented. Their regression analysis showed that membership in a women's cooperative multiplied Mahua income by a factor of 1.8 on average, compared to non-member households. Xaxa [13] provided a broader political economy perspective on tribal development in India, cautioning against reducing tribal livelihood questions to market integration alone, and emphasising the need for culturally embedded, community-led approaches to economic development. The present study builds on this cumulative body of knowledge by generating Bastar-specific primary data and applying robust statistical methods to provide an updated empirical account of the Mahua economy as a driver of women's economic empowerment.

3. RESEARCH METHODOLOGY

This study adopts a descriptive-cum-analytical research design combining quantitative survey methods with field-based observation. The research is empirical in nature, with primary data collected through structured household interviews across six administrative blocks of Bastar district, namely Bastar, Tokapal, Jagdalpur, Darbha, Narayanpur, and Kondagaon. These blocks were selected through purposive sampling to ensure coverage of varying degrees of forest proximity, market accessibility, and SHG penetration. The study population comprises tribal women between the ages of 18 and 60 years who are engaged in Mahua collection, processing, or trading as a primary or secondary livelihood activity. A stratified random sampling technique was employed, with strata defined by block and settlement type (village, hamlet, and forest fringe habitation). The final sample consisted of 300 respondents distributed proportionally across the six blocks, with 50 respondents per block. Additionally, a control group of 60 tribal women households with no significant engagement in Mahua activities was identified for comparative analysis. Data collection was conducted between October 2022 and March 2023 using pre-tested, bilingual (Hindi–Gondi) questionnaires administered by trained enumerators with tribal community affiliations.

The primary data instrument captured information across six broad thematic domains: (i) household demographic and socio-economic profile; (ii) Mahua collection activities including volume, duration, and labour input; (iii) income from Mahua across different product categories (flowers, seeds, oil, processed products); (iv) market and sale patterns including sale channel, price received, and distance to market; (v) financial control and decision-making autonomy indicators; and (vi) socio-economic empowerment proxies including nutritional diversity, children's schooling, and access to formal financial services. Secondary data sources consulted include census records, district statistical handbooks, Chhattisgarh State MFP Mission reports, TRIFED annual reports, and published research in peer-reviewed journals. The instrument was validated through a pilot study of 30 respondents in Bastar block, and reliability was assessed using Cronbach's Alpha ($\alpha = 0.81$), indicating acceptable internal consistency. Informed consent was obtained from all participants and ethical clearance was secured from the institutional review board. Data analysis was conducted using SPSS version 26. Descriptive statistics including frequency distributions, means, standard deviations, and percentages were used to characterise the sample and profile Mahua income patterns. Chi-square tests of independence were applied to assess the relationship between categorical variables such as market access type and income adequacy, and cooperative membership and empowerment outcomes. A Pearson correlation matrix was constructed to examine associations between Mahua income share, women's financial control, and empowerment indicators. Multiple linear regression was employed to identify predictors of women's economic empowerment score, which was computed as a composite index derived from five sub-dimensions: income level, income control, market participation, financial inclusion, and social capability. The control group comparison was conducted using independent samples t-tests. Results are presented in tabular form with accompanying narrative analysis, and significance is assessed at the $p < 0.05$ level throughout.

4. DATA COLLECTION, ANALYSIS, AND RESULTS

The following five tables present the core empirical findings of the study, addressing income contribution, market access patterns, women's financial decision-making, empowerment indicators, and comparative analysis between Mahua-active and non-Mahua households.

Table 1: Annual Income Contribution of Mahua Activities by Product Category (n=300)

Product Category	% of Respondents Engaged	Mean Annual Income (₹)	SD (₹)	% Share of Total HH Income
Mahua Flowers (Fresh)	96.3%	8,420	2,310	18.4%
Dried Mahua Flowers	89.7%	6,150	1,840	13.4%
Mahua Seeds (Toli)	74.3%	5,780	1,650	12.6%
Mahua Oil (Processed)	28.7%	4,960	2,100	10.8%
Mahua-Based Food Products	19.0%	3,240	1,290	7.1%
Traditional Brew (Household use, imputed)	67.0%	2,310	980	5.0%
Total Mahua Income	100%	17,450	4,780	38.2%

Table 1 demonstrates that Mahua flowers both fresh and dried constitute the largest income sub-category, collectively accounting for 31.8% of total household income contribution from Mahua. The mean total annual Mahua income of ₹17,450 per household represents 38.2% of the estimated mean total household income of ₹45,600 across the sample. The standard deviation values indicate moderate variability, reflecting differences in forest access, household labour availability, and proximity to collection zones. The relatively lower engagement in oil processing (28.7%) and food product preparation (19.0%) suggests that value addition activities remain limited, constraining income potential at higher nodes of the Mahua value chain.

Table 2: Market Access Patterns and Price Realisation by Sale Channel (n=300)

Sale Channel	% of Respondents	Mean Price: Flower (₹/kg)	Mean Price: Seed (₹/kg)	Adequacy of Price Satisfied (%)
Village-Level Middleman	54.3%	18.40	22.10	21.5%
Weekly Haat (Local Market)	28.7%	24.60	29.50	48.3%
Govt. Procurement (TRIFED/VDVKs)	9.0%	32.00	38.00	76.2%
SHG/Cooperative Aggregation	6.3%	30.50	36.20	71.4%
Direct Urban/Online Sale	1.7%	45.00	55.00	91.7%

Table 2 reveals a stark pricing disparity across sale channels, with village-level middlemen used by the majority of respondents (54.3%) offering the lowest prices at ₹18.40/kg for flowers and ₹22.10/kg for seeds. In contrast, government procurement channels and SHG/cooperative aggregation consistently delivered prices 60–74% higher than middlemen rates. However, these higher-value channels remain accessible to only 15.3% of respondents combined. A chi-square test of independence confirmed a statistically significant association between sale channel type and price satisfaction ($\chi^2 = 84.3$, $df = 4$, $p < 0.001$), underscoring that market channel access is a critical determinant of income quality for tribal women collectors.

Table 3: Women's Financial Decision-Making and Control Over Mahua Income (n=300)

Decision-Making Indicator	Women Decide Independently (%)	Joint Decision (%)	Male-Dominated Decision (%)
Where to sell Mahua produce	41.0%	38.3%	20.7%
Pricing negotiation at point of sale	35.7%	28.0%	36.3%
Retention of sale proceeds	62.3%	24.0%	13.7%
Reinvestment of Mahua income	38.3%	41.0%	20.7%
Access to SHG/credit facilities	55.7%	27.7%	16.7%
Expenditure on children's education	58.0%	32.7%	9.3%
Household food/nutrition purchases	71.3%	22.7%	6.0%

Table 3 reveals nuanced patterns of financial control. Women demonstrate the highest autonomy in household food and nutrition decisions (71.3% independent) and retention of sale proceeds (62.3%), suggesting that Mahua income, once received, tends to remain under women's control. However, autonomy in pricing negotiation remains relatively low (35.7%), pointing to the intersection of gender and market confidence as a barrier. Chi-square analysis indicates a significant relationship between SHG membership and women's independent decision-making across all seven indicators ($p < 0.01$), confirming that collective institutions enhance women's financial agency. Respondents who reported participation in Van Dhan Vikas Kendras exhibited 22 percentage points higher scores on independent decision-making compared to non-participants.

Table 4: Pearson Correlation Matrix Mahua Income Variables and Empowerment Indicators (n=300)

Variable	Mahua Income Share	Women's Income Control	SHG Membership	Nutritional Diversity	Child School Enrolment
Mahua Income Share	1.00	0.63**	0.47**	0.52**	0.44**
Women's Income Control	0.63**	1.00	0.58**	0.61**	0.54**
SHG Membership	0.47**	0.58**	1.00	0.49**	0.57**
Nutritional Diversity Score	0.52**	0.61**	0.49**	1.00	0.48**
Child School Enrolment	0.44**	0.54**	0.57**	0.48**	1.00
Financial Inclusion Index	0.39**	0.56**	0.62**	0.43**	0.51**

(** $p < 0.01$, two-tailed). Table 4 presents the Pearson correlation matrix for key Mahua income and empowerment variables. Mahua income share shows a moderate-to-strong positive correlation with women's income control ($r = 0.63$, $p < 0.01$), indicating that higher Mahua income proportionately increases women's economic agency. Income control, in turn, correlates strongly with nutritional diversity ($r = 0.61$) and child school enrolment ($r = 0.54$), suggesting a developmental multiplier effect. SHG membership demonstrates consistent moderate correlations across all empowerment outcomes, reinforcing its role as a facilitating institution. All correlations are statistically significant at the 1% level, supporting the study's hypothesis that Mahua participation operates as a meaningful pathway to economic empowerment when women retain control over earned income.

Table 5: Comparative Empowerment Profile Mahua-Active vs. Non-Mahua Households (Independent Samples t-test)

Empowerment Indicator	Mahua-Active HH Mean (n=300)	Non-Mahua HH Mean (n=60)	t-value	p-value
Annual Household Income (₹)	45,600	31,200	9.42	< 0.001
Women's Income Control Score (0–10)	6.8	4.1	12.17	< 0.001
Dietary Diversity Score (0–12)	7.4	5.6	6.83	< 0.001
Children's School Enrolment (%)	82.3%	64.7%	4.56	< 0.001
Access to Formal Finance (%)	58.7%	37.2%	5.91	< 0.001
Composite Empowerment Index (0–100)	61.4	42.8	10.34	< 0.001

Table 5 presents the most compelling evidence in support of the study's central thesis. Across all six empowerment indicators, Mahua-active households record statistically significantly higher scores compared to non-Mahua households ($p < 0.001$ in all cases). The composite empowerment index differential of 18.6 points (61.4 vs. 42.8 on a 100-point scale) represents a substantial empowerment gap attributable, at least in part, to Mahua livelihood engagement. Annual household income is 46.2% higher in Mahua-active households, and children's school enrolment rates exceed those in control households by 17.6 percentage points. The consistency of differences across economic, nutritional, educational, and financial inclusion dimensions strengthens the argument that Mahua-based livelihoods constitute a multidimensional empowerment pathway for tribal women in Bastar.

5. DISCUSSION

The empirical evidence presented in this study provides a multidimensional account of Mahua as an economic empowerment resource for tribal women in Bastar, while simultaneously revealing the structural constraints that limit its potential. The finding that Mahua activities contribute approximately 38.2% of annual household income (Table 1) substantially reinforces and refines prior estimates. Bhattacharya et al. [2] had reported a range of 20–45%, and the present study's mean of 38.2% falls within this range while providing greater granularity through disaggregation by product category. Notably, the contribution of processed products (oil, food items) remains low at 17.9% of the Mahua income share, consistent with Roy and Chatterjee's [5] observation that value addition stages of the Mahua chain remain largely inaccessible to primary collectors. This represents a significant opportunity cost: the differential between processed and raw Mahua prices documented in Table 2 suggests that even modest engagement in oil extraction or food product preparation could meaningfully increase household income.

The market access findings (Table 2) present perhaps the most troubling evidence in this dataset. The dominance of village-level middlemen as the primary sale channel for 54.3% of respondents, and the

corresponding price gap of ₹13.60/kg for flowers compared to government procurement channels, indicates persistent value leakage at the base of the Mahua supply chain. This aligns closely with the findings of Tiwari and Saxena [9], who documented awareness gaps and logistical barriers to MSP procurement access among tribal collectors. The extremely low uptake of government procurement channels (9.0%) despite their significantly better prices (₹32.00/kg vs. ₹18.40/kg) points to systemic failures in outreach, transport, and awareness that policy interventions must urgently address. The chi-square result ($\chi^2 = 84.3$, $p < 0.001$) confirming the association between channel type and price satisfaction provides statistical confirmation of what qualitative fieldwork by Singh [4] had earlier described through ethnographic narration.

Women's financial decision-making patterns (Table 3) reveal a nuanced picture that partially contradicts simplistic narratives of either complete female disempowerment or full economic agency. The high autonomy in food and nutrition expenditure decisions (71.3%) and proceeds retention (62.3%) suggests that Mahua income, once in women's hands, does tend to remain there and is directed towards household welfare. However, the low autonomy in pricing negotiation (35.7%) represents a critical interface failure: women who do most of the labour are not positioned to negotiate on its value at the point of exchange. This resonates with Sinha and Prasad's [3] finding that feminised collection labour does not automatically translate into economic bargaining power. The data also confirms Kabeer's [6] theoretical insight that income alone is insufficient for empowerment; the agency dimension here measured by decision-making control is a distinct and equally important component. The 22-percentage-point advantage in independent decision-making for Van Dhan Vikas Kendra participants over non-participants is particularly significant and aligns with the positive cooperative-multiplier effect documented by Patel et al. [12].

The correlation matrix (Table 4) provides quantitative support for the empowerment pathways that have been theorised in the literature. The strong correlation between Mahua income share and women's income control ($r = 0.63$) confirms the importance of income magnitude as a precondition for control, but the fact that the correlation is moderate rather than perfect underscores that income alone does not guarantee control, as institutional and social factors mediate the relationship. The downstream correlations of income control with nutrition ($r = 0.61$) and child schooling ($r = 0.54$) are consistent with the developmental multiplier effect documented by Pattanaik and Mishra [7] and Mahapatra and Shackleton [8] in comparable NTFP contexts. Notably, SHG membership exhibits the strongest single correlation with financial inclusion ($r = 0.62$), reinforcing the policy significance of SHG promotion as a complementary intervention to Mahua income support.

The comparative analysis (Table 5) provides the most direct evidence of Mahua's empowerment contribution. The composite empowerment index differential of 18.6 points between Mahua-active and control households is substantial and statistically highly significant ($t = 10.34$, $p < 0.001$). The 46.2% income differential, the 17.6-percentage-point schooling gap, and the 21.5-percentage-point financial inclusion differential collectively suggest that Mahua engagement functions as a meaningful and multidimensional empowerment differentiator.

While causality cannot be definitively established in a cross-sectional design it remains possible that inherently more empowered women are more likely to engage in Mahua activities the consistency of differentials across six independent indicators, combined with the process evidence from Tables 2 and 3, provides persuasive support for the empowerment interpretation. Future longitudinal studies and natural experiment designs exploiting policy variation in MFP procurement would be valuable for establishing stronger causal claims. Compared to the findings of Roy and Singh [11], who documented empowerment gains primarily in SHG-connected areas, the present study finds that even without SHG mediation, Mahua activity generates measurable empowerment advantages, though these are substantially amplified by institutional support structures.

6. CONCLUSION

This empirical study provides robust evidence that Mahua-based forest livelihoods constitute a significant and multidimensional economic empowerment pathway for tribal women in Bastar district, Chhattisgarh. The forest resource contributes approximately 38% of annual household income, and Mahua-active households demonstrate significantly higher performance across income, nutritional, educational, and financial inclusion indicators compared to non-Mahua households. Women in Mahua-active households exercise considerable control over earned income, particularly in downstream expenditure decisions on food and children's education, generating a developmental multiplier effect that extends empowerment beyond the economic domain.

Simultaneously, the study documents persistent structural barriers including middlemen exploitation, limited access to government procurement channels, and low engagement in value-added processing that prevent tribal women from realising the full economic potential of the Mahua resource. Institutional participation particularly SHG membership and Van Dhan Vikas Kendra engagement emerges as a powerful amplifier of empowerment outcomes. These findings carry clear policy implications: expanding government MFP procurement reach, investing in rural processing and storage infrastructure, promoting women-led cooperatives, and integrating Mahua into financial literacy and skilling programmes are priority interventions. With appropriate institutional support, the Mahua economy can serve as a foundational pillar of a forest-rights-based women's economic empowerment agenda in central India.

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