Journal of Forestry Research and Management. Vol. 23 (2). 113-123; 2026, ISSN 0189-8418

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CONTRIBUTION OF NON-TIMBER FOREST PRODUCTS TO RURAL LIVELIHOODS IN SELECTED COMMUNITIES OF LAFIA AND DOMA LOCAL GOVERNMENT AREAS, OF NASARAWA STATE, NIGERIA.

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ABSTRACT

Non-timber forest products (NTFPs) play a vital role in sustaining the livelihoods of rural households in sub-Saharan Africa; however, empirical information on their contribution remains limited in many parts of Nigeria, including Nasarawa South Senatorial Zone. This study assessed NTFP utilization patterns, livelihood contributions and associated challenges among 79 respondents from 40 sampled households in selected communities of Lafia and Doma Local Government Areas, Nasarawa State, Nigeria.The data were extracted from a larger statewide multistage study, with 79 complete respondent records from 40 sampled households in the selected communities used for the present analysis. Primary data were collected using a semi-structured questionnaire administered through the KoboCollect application and data were analyzed using descriptive statistics, Likert scaling and Poisson regression.The most frequently collected NTFPs were medicinal plants (78.5%), edible insects (60.8%) and nuts (50.6%).Fuelwood supply recorded the highest livelihood contribution (WMS = 4.71), while the largest proportion of respondents (31.6%) earned ₦101,000–₦150,000 annually from NTFP sales.Poisson regression showed that none of the selected socioeconomic variables significantly influenced the number of NTFP types collected at the 5% level ($p > 0.05$), although annual income showed a negative but non-significant association ($B = -0.052$, $p = 0.061$).Overexploitation and depletion (WMS = 4.51), poor storage and processing facilities (WMS = 4.48) and lack of market access (WMS = 4.38) were among the highest-rated challenges.The study concludes that NTFPs remain important livelihood assets in the sampled communities and recommends sustainable harvesting, improved processing and storage facilities, and strengthened market and resource-management systems.

Keywords: Non-timber forest products, Rural livelihoods, Household income, Lafia, Doma

Introduction

Forest resources provide indispensable ecological, economic and social benefits that support human well-being and sustainable development. In addition to timber, forests supply a wide range of non-timber forest products (NTFPs), including medicinal plants, fuelwood, fruits, nuts, fibers, honey and bushmeat, which contribute substantially to food security, healthcare, household energy and income generation. These products serve as livelihood safety nets, particularly among rural households in developing countries where dependence on natural resources remains high (Mamo *et al.*, 2007; Appiah *et al.*, 2009; Kalaba *et al.*, 2013).

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In Nigeria, NTFPs constitute an important component of rural livelihood systems by supplementing agricultural income, providing domestic energy, improving household nutrition and supporting healthcare needs. Previous studies have demonstrated their significant contributions to poverty reduction, livelihood diversification and household resilience (Jimoh and Haruna, 2007; Opaluwa and Onuche, 2011; Abdulrahaman *et al.*, 2021). However, the extent of dependence on NTFPs varies across ecological zones because of differences in vegetation, resource availability, socioeconomic conditions and market access. Although studies such as Opaluwa and Onuche (2011) in Kogi State and Falana *et al.* (2023) in Oyo State have generated valuable evidence on NTFP utilisation, empirical information on NTFP utilisation and livelihood contributions in selected communities of Lafia and Doma Local Government Areas remains limited.

The limited location-specific information on NTFP utilisation, livelihood contributions, socioeconomic determinants and associated challenges constrains evidence-based interventions for improving rural livelihoods and sustainable forest management in the study area.

Therefore, this study assessed the contribution of non-timber forest products to rural household livelihoods in selected communities of Lafia and Doma Local Government Areas, Nasarawa State, Nigeria, with emphasis on utilisation patterns, livelihood contributions, socioeconomic determinants and challenges associated with NTFP utilisation.

Materials and Methods

Study Area

This study was conducted in Nasarawa South Senatorial Zone of Nasarawa State, North-Central Nigeria. The zone comprises five Local Government Areas (LGAs), namely Lafia, Doma, Awe, Keana and Obi. The area lies within the Guinea Savanna ecological zone and experiences a tropical wet and dry climate characterized by distinct rainy and dry seasons. Annual rainfall ranges between 1,100 mm and 1,500 mm, while mean annual temperature ranges from 27°C to 32°C (NG Climate Zone, 2023). The vegetation is predominantly Guinea Savanna woodland interspersed with grasses, shrubs and riparian forests. Farming, livestock production and forest resource utilization constitute the major livelihood activities of the inhabitants.

Sampling Procedure and Sample Size

The study employed a multistage sampling procedure in which Nasarawa State was first stratified into its three senatorial zones. Two Local Government Areas (LGAs) were selected from each senatorial zone, giving six LGAs. One council ward was selected from each LGA, two communities from each selected ward, and 10 households from each community. This resulted in 12 communities and 120 households across the State. Two adult members (aged =18 years) were targeted in each household, giving a planned Statewide sample of 240 respondents.

For the present paper, data from the Nasarawa South stratum were extracted, comprising Lafia and Doma LGAs. One council ward was selected from each LGA and two communities from each selected ward, resulting in four sampled communities. Ten households were randomly selected from each community, giving 40 households, while two adult members were targeted per household, giving a planned sample of 80 respondents for the stratum. Following verification and

cleaning of the original dataset, 79 complete respondent records were available and used for the present analysis.

The allocation of 10 households per community formed part of the fixed sampling structure of the original statewide study and was not derived from a separate sample-size calculation for Nasarawa South. Consequently, the present paper is treated as a zone-specific analysis of the sampled communities rather than as a statistically representative survey of all households in Nasarawa South Senatorial Zone. The findings should therefore be interpreted within the context of the selected communities in Lafia and Doma LGAs.

Data Collection

Primary data were collected using a semi-structured questionnaire administered through the KoboCollect application installed on Android mobile devices. The questionnaire was designed to obtain information on respondents' socioeconomic characteristics, types and availability of non-timber forest products, livelihood contributions, factors influencing NTFPsutilization, and challenges associated with NTFPs utilization. The use of KoboCollect enhanced the efficiency and accuracy of field data collection by minimizing data entry errors and facilitating real-time electronic data capture.

A five-point Likert scale, as employed by Dagba (2017), was adapted to measure NTFPs contribution to livelihoods and challenge severity. The weighting scale was: Very High = 5, High = 4, Moderate = 3, Low = 2, Very Low = 1. The weighted mean score (WMS) was computed as:

$$WMS=\sum(f\times x)/N \quad \ldots\ldots(1)$$

Where: f = frequency, x = Likert scale point, N = total respondents.

Data Analysis

Data were analysed using IBM SPSS Statistics Version 25. Descriptive statistics, including frequencies, percentages, means and weighted mean scores, were used to summarise respondents' socioeconomic characteristics, NTFPs utilisation patterns, livelihood contributions and associated challenges.

To determine the influence of socioeconomic characteristics on the extent of NTFP utilisation, the dependent variable was re-specified as the number of different NTFP types collected by each respondent. This count was obtained by summing the individual NTFP types reported as collected by each respondent in the questionnaire. The resulting dependent variable ranged from 1 to 8 NTFP types per respondent. Poisson regression was subsequently employed because the dependent variable represents count data. The explanatory variables included age, years of schooling, household size, estimated annual income, years of residence and distance from home to the forest. Estimated annual income was scaled in units of ₦100,000 for ease of interpretation, while distance to forest was represented by the ordered distance categories recorded in the dataset.

Results

Respondents' Socioeconomic Characteristics and NTFPs Utilization

The socioeconomic characteristics of the respondents are presented in Table 1. The majority were male (70.9%), while respondents aged 31–40 years constituted the largest age category (40.5%). Most respondents were married (77.2%) and farming was the predominant occupation (49.4%). The largest proportion of

respondents earned an estimated annual income of ₦251,000–₦500,000 (39.2%), while slightly over half (51.9%) resided 7–9 km from the forest.

All respondents reported that non-timber forest products were available within their communities. Based on the individual NTFP items recorded in the questionnaire, medicinal plants (78.5%), edible insects (60.8%) and nuts (50.6%) were the most frequently collected NTFPs, followed by wild fruits (38.0%) and bushmeat (31.6%) (Table 2).

Annual income from NTFP sales was highest among respondents earning between ₦101,000 and ₦150,000 annually (31.6%), followed by those earning ₦51,000–₦100,000 (30.4%) (Table 3).

Table 4 shows that fuelwood supply recorded the highest livelihood contribution (WMS = 4.71), followed by food supply (WMS = 4.52), medicine (WMS = 4.16), income generation (WMS = 4.08) and crafts (WMS = 3.93). These results indicate that NTFPs contribute to multiple dimensions of rural livelihoods among respondents in the sampled communities.

Table 1: Socioeconomic Characteristics of Respondents in Selected Communities of Lafia and Doma LGAs

Characteristic	Category	Frequency (F)	Percentage (%)
Sex	Male	56	70.9
	Female	23	29.1
Age	<21 years	2	2.5
	21–30 years	7	8.9
	31–40 years	32	40.5
	41–50 years	30	38.0
	>50 years	8	10.1
Education	Non-formal	25	31.6
	Primary	10	12.7
	Secondary	30	38.0
	Tertiary	14	17.7
Marital status	Married	61	77.2
	Single	9	11.4
	Divorced	3	3.8
	Widow	3	3.8
	Widow(er)	3	3.8
Major occupation	Farming	39	49.4
	Civil service	13	16.5
	Trading	15	19.0

Characteristic	Category	Frequency (F)	Percentage (%)
	Forest product gathering	4	5.1
	Schooling	8	10.1
Annual income (₦)	<251,000	4	5.1
	251,000–500,000	31	39.2
	501,000–750,000	26	32.9
	751,000–1,000,000	13	16.5
	>1,000,000	5	6.3
Years of residence	1–10 years	2	2.5
	11–20 years	7	8.9
	21–30 years	34	43.0
	31–40 years	24	30.4
	41–50 years	8	10.1
	>50 years	4	5.1
Distance to forest	1–3 km	3	3.8
	4–6 km	27	34.2
	7–9 km	41	51.9
	>9 km	8	10.1

Table 2: Utilization Pattern of Non-Timber Forest Products

NTFP Type	Frequency (F)	Percentage (%)
Medicinal plants	62	78.5
Edible insects	48	60.8
Nuts	40	50.6
Wild fruits	30	38.0
Bushmeat	25	31.6
Grasses	21	26.6
Seeds	21	26.6
Honey	15	19.0
Palm wine	15	19.0
Charcoal	13	16.5
Mushroom	10	12.7
Beeswax	2	2.5
Bamboo	1	1.3
Climbers	1	1.3

Table 3: Annual Income from NTFPs Sales

Amount Earned Annually (₦)	Frequency (F)	Percentage (%)
<50,000	8	10.1
51,000–100,000	24	30.4
101,000–150,000	25	31.6
151,000–200,000	11	13.9
201,000–250,000	11	13.9
>250,000	0	0.0
Total	**79**	**100.0**

Table 4: Respondents' Rating of the Contribution of NTFPs to Rural Livelihoods

NTFP Contribution	Valid responses (n)	WMS	Remark	Rank
Fuelwood supply	76	4.71	VHC	1
Food supply	79	4.52	VHC	2
Medicine	68	4.16	VHC	3
Income generation	73	4.08	VHC	4
Crafts	27	3.93	VHC	5
Cultural/religious practices	9	3.78	VHC	6
Fodder	3	3.67	VHC	7
Construction materials	19	3.11	VHC	8
Cosmetics	4	3.00	MC	9
Furniture making	23	3.00	MC	9
Ecotourism	4	2.75	LC	11
Textiles	2	2.50	LC	12

VHC = Very High Contribution; MC = Moderate Contribution; LC = Low Contribution. WMS was calculated using valid responses for each contribution item.

Reasons for NTFPs Collection

The reasons for collecting NTFPs varied according to product type (Table 5). Income generation was the predominant reason for collecting bushmeat (67.9%), edible insects (71.4%), honey (89.5%), nuts (60.0%), palm wine (92.9%), beeswax (100.0%) and charcoal (53.3%). Medicinal plants were collected mainly for medicinal purposes (39.1%), while grasses were predominantly collected for livestock feed (90.5%). Direct home consumption was also important for wild fruits (48.1%) and seeds (38.1%)

Journal of Forestry Research and Management. Vol. 23 (2). 113-123; 2026, ISSN 0189-8418
www.jfrm.org.ng

Table 5: Reasons for Collecting NTFPs

NTFP	Direct home consumption	Source of income	Other reasons*	Total responses (n)
Medicinal plants	19 (27.5%)	19 (27.5%)	31 (44.9%)	69
Edible insects	13 (23.2%)	40 (71.4%)	3 (5.4%)	56
Nuts	14 (35.0%)	24 (60.0%)	2 (5.0%)	40
Wild fruits	13 (48.1%)	11 (40.7%)	3 (11.1%)	27
Bushmeat	8 (28.6%)	19 (67.9%)	1 (3.6%)	28
Grasses	1 (4.8%)	0 (0.0%)	20 (95.2%)	21
Seeds	8 (38.1%)	12 (57.1%)	1 (4.8%)	21
Honey	0 (0.0%)	17 (89.5%)	2 (10.5%)	19
Charcoal	6 (40.0%)	8 (53.3%)	1 (6.7%)	15
Palm wine	0 (0.0%)	13 (92.9%)	1 (7.1%)	14

*Other reasons include medicine, safety net, cultural significance, financial savings and livestock feed, as applicable. Percentages are based on valid reason responses for each NTFP.

Socioeconomic Factors Influencing the Number of NTFPs Collected

The Poisson regression results showed that none of the selected socioeconomic variables significantly influenced the number of NTFP types collected at the 5% level (Table 6). Age (B = 0.011, p = 0.244), household size (B = -0.001, p = 0.964), years of residence (B = 0.002, p = 0.778) and distance to forest (B = 0.074, p = 0.366) were not statistically significant. Years of schooling also showed no significant effect (B = -0.002, p = 0.871). Annual income exhibited a negative association with the number of NTFPs collected (B = -0.052; IRR = 0.950), but the relationship was not statistically significant at the 5% level (p = 0.061). Overall, the results indicate that the selected socioeconomic characteristics did not significantly explain variation in the number of NTFP types collected among respondents.

Table 6: Poisson Regression Analysis of Socioeconomic Factors Influencing the Number of NTFP Types Collected

Variable	B	S.E.	z-value	p-value	IRR	95% CI for IRR
Age	0.011	0.009	1.166	0.244	1.011	0.993–1.030
Years of schooling	-0.002	0.011	-0.163	0.871	0.998	0.978–1.019
Household size	-0.001	0.028	-0.045	0.964	0.999	0.945–1.056
Annual income[1]	-0.052	0.027	-1.874	0.061	0.950	0.900–1.002
Years of residence	0.002	0.008	0.282	0.778	1.002	0.987–1.018

Distance to forest[2]	0.074	0.082	0.903	0.366	1.076	0.917–1.263

[1]Annual income expressed per ₦100,000. [2]Distance to forest represented by ordered categories. IRR = Incidence Rate Ratio. Number of observations = 79.

Challenges Associated with NTFPs Utilization

The respondents' ratings of challenges associated with NTFP utilisation are presented in Table 7. Overexploitation and depletion ranked highest (WMS = 4.51), followed by poor storage and processing facilities (WMS = 4.48), lack of market access (WMS = 4.38), bush burning (WMS = 4.17) and lack of regulation (WMS = 4.02). These findings indicate that both resource depletion and constraints relating to processing, markets and resource governance constitute important challenges to NTFP utilisation in the sampled communities.

Table 7: Challenges Associated with NTFPs Utilization

Challenge	Valid responses (n)	WMS	Remark	Rank
Overexploitation and depletion	47	4.51	Strongly Agree	1
Poor storage and processing facilities	21	4.48	Strongly Agree	2
Lack of market access	8	4.38	Strongly Agree	3
Bush burning	47	4.17	Strongly Agree	4
Lack of regulation	51	4.02	Strongly Agree	5
Low prices	16	3.94	Strongly Agree	6
Seasonality of NTFPs	25	3.92	Strongly Agree	7
Climate change	32	3.84	Strongly Agree	8
Land-use change	33	3.82	Strongly Agree	9
Competition for resources	2	3.50	Strongly Agree	10
Limited knowledge and skills	13	3.46	Strongly Agree	11
Cultural and religious beliefs	12	3.00	Undecided	12

WMS = Weighted Mean Score. WMS was calculated using valid responses for each challenge item.

Discussion

The predominance of male respondents (70.9%) and the concentration of respondents within the economically active age groups indicate substantial involvement of working-age adults in NTFP-related livelihood activities. Farming was the predominant occupation (49.4%), suggesting that NTFP collection may complement agriculture as part of diversified rural livelihood strategies. The predominance of married respondents (77.2%) may also reflect the importance of household livelihood responsibilities in decisions relating to forest-resource use. These findings are consistent with Onucheyo *et al.* (2020) and Nwosu *et al.* (2022), who reported substantial participation of economically active adults in natural-resource-dependent livelihood activities in Nigeria. The relatively high participation of men observed in the

present study may be associated with the labour requirements of accessing, collecting and transporting some forest products, although the involvement of women should not be overlooked because NTFP utilisation encompasses diverse collection, processing and marketing activities.

The prominence of medicinal plants (78.5%), edible insects (60.8%) and nuts (50.6%) demonstrates the diverse subsistence and economic roles of NTFPs in the sampled communities. The high collection of medicinal plants may reflect their importance in traditional healthcare, particularly where households maintain knowledge of plant-based remedies. The substantial collection of edible insects and nuts also highlights the contribution of forest resources to food supply and household livelihood diversification. These findings generally support Abdulrahaman *et al.* (2021) and Falana *et al.* (2023), who reported that NTFPs provide important livelihood and income-support functions for rural households. The livelihood ratings further showed that fuelwood supply (WMS = 4.71), food supply (WMS = 4.52), medicine (WMS = 4.16) and income generation (WMS = 4.08) were highly rated contributions. This pattern indicates that NTFPs perform multiple functions that extend beyond cash income to household energy, food and healthcare needs. However, livelihood-contribution items with very few valid responses should be interpreted cautiously because their mean ratings may not reflect the experience of the broader sample.

Poisson regression showed that none of the selected socioeconomic variables significantly influenced the number of NTFP types collected at the 5% level. Age, years of schooling, household size, years of residence and distance to forest showed no statistically significant associations with the number of NTFPs collected. Annual income exhibited a negative association (B = -0.052; IRR = 0.950) and was the variable closest to statistical significance (p = 0.061), although it remained non-significant at the 5% level. The incidence rate ratio suggests that, holding the other variables constant, a ₦100,000 increase in annual income was associated with an estimated 5.0% decrease in the expected number of NTFP types collected. This may suggest a tendency for respondents with higher incomes to depend on a narrower range of NTFPs; however, this interpretation should be treated cautiously because the relationship was not statistically significant. Overall, the absence of significant socioeconomic predictors suggests that variation in the number of NTFPs collected among respondents may be influenced by factors not captured by the variables included in the model, such as resource availability, household preferences, market opportunities or traditional knowledge.

Overexploitation and depletion emerged as the highest-rated challenge (WMS = 4.51), indicating concern about the sustainability of the NTFP resource base in the sampled communities. Poor storage and processing facilities (WMS = 4.48), bush burning (WMS = 4.17) and lack of regulation (WMS = 4.02) were also highly rated, highlighting both livelihood and resource-management constraints. These findings generally agree with Amusa *et al.* (2020), Haile *et al.* (2020) and Akinmoladun and Olajide (2020), who reported that unsustainable harvesting, inadequate processing facilities and weaknesses in resource management can constrain the benefits derived from NTFPs. Overexploitation may reduce the long-term availability of economically and socially important forest products, while inadequate

processing and storage can contribute to post-harvest losses and limit opportunities for value addition. Consequently, sustainable harvesting practices, improved processing and storage facilities, community-based resource management and stronger regulation are important for maintaining the livelihood benefits of NTFPs while conserving the resource base.

Conclusion

This study demonstrated that non-timber forest products constitute important livelihood resources among households in the sampled communities of Lafia and Doma Local Government Areas, Nasarawa State. Medicinal plants, edible insects and nuts were the most frequently collected NTFPs, while fuelwood supply, food supply, medicine and income generation were among the major livelihood contributions. Poisson regression showed that none of the selected socioeconomic variables significantly influenced the number of NTFP types collected at the 5% level, although annual income showed a negative but non-significant association.

Overexploitation and depletion, inadequate storage and processing facilities, bush burning and lack of regulation were among the major challenges identified. The study recommends the promotion of sustainable harvesting practices, improved storage and processing facilities, community-based resource management and strengthened regulation to sustain the livelihood benefits of NTFPs while conserving the resource base. Given the sampling design, the findings should be interpreted within the context of the sampled communities and should not be generalized to all households in Nasarawa South Senatorial Zone.

Acknowledgement

The authors appreciate the respondents who participated in this study and provided valuable information during data collection. Appreciation is also extended to the Department of Social and Environmental Forestry, Joseph Sarwuan Tarka University, Makurdi, for providing academic guidance and support during the conduct of this research.

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