ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/25jul536

Contribution of Non-Timber Forest Products as a Subsidiary Source of Livelihood among Forest Dependent Households in Kwara State, Nigeria

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Publication Date: 2025/07/17

Abstract: This study examines the contribution of non-timber forest products as a subsidiary source of livelihood among forest-dependent households in Kwara State, Nigeria. The study employed a descriptive survey design. A multi-stage sampling technique was used to select 300 forest-dependent households. At the first stage, 6 major forest communities in Kwara State; Ekan Meje, Idofin Igbana, Osi, Odo-Owa, Oke-Onigbin, Oro-Ago were also purposively chosen, considering their high concentration and dependency on NTFPs. In the final stage, a simple random sampling method was employed within these communities to select 50 forest-dependent households each from the six communities making a total of 300 households as respondents. Data collection was conducted using a structured questionnaire titled "Questionnaire on Contribution of NTFPs as Subsidiary Source of Livelihood among Forest-dependent Households in Kwara State". Data were analyzed using descriptive statistics, Pearson's Product Monument Correlation and Probit regression model. The findings revealed that most of the households were below 30 years of age (66.0%), male (54.0%), married (56.0%), possessed primary education (52.0%), access to extension contact (54.0%), cooperative membership (34.0%). The mean and standard deviation of the household size were 5±2 persons; farming experience 12±5 while the monthly income was ₦60,910±₦12,459 respectively. PPMC showed a significant relationship between NTFPs contribution and livelihood of forest-dependent households in the study area (r = 0.73; p<0.05) and another significant relationship among the factors influencing contribution of NTFPs as a subsidiary source of livelihood among forest-dependent households in the study area (r = 1.62; p<0.05). Probit **regression results clearly established that age (β=1.580, p<0.001), sex (β=0.972, p<0.001), marital status (β=4.865, p<0.001), farming experience (β=2.990, p<0.001), monthly income (β=2.429, p<0.001), membership of cooperative (β=0.605, p<0.001) and extension contact (β=3.658, p<0.001) strongly associated and increased the contribution of NTFPs as a subsidiary source of livelihood among forest-dependent households,** while a **negative correlation between education (β=-0.897, p<0.001) and household size (β=-3.730, p<0.001) denoting a reducing effect on the level of contribution of NTFPs as a subsidiary source of livelihood among forest-dependent households in the study area. However, among the 12 factors influencing contribution of NTFPs as a subsidiary source of livelihood among forest-dependent households were** lack of good roads hinders the efficient collection and access to NTFPs was ranked 1st, loss and extinction of beneficial natural NTFPs pose a challenge was ranked 2nd and NTFPs reduced by forest encroachment brought by population growth was ranked 3rd **respectively. It is concluded that households with no formal education, higher household size and did not belong to cooperative societies earned lower income and lower livelihood. The study, therefore, recommended that household should form or join cooperative societies, accessible credit facilities and supportive government policies should be in place to stop encroachment and careless woodlot harvesting, the government ought to provide local securities, training programs to educate forest-community members on sustainable harvesting techniques, value addition, post-harvest handling, and market opportunities for NTFPs in Kwara State.**

Keywords: *Non-Timber Forest Products (NTFPS), Livelihood, Forest-Dependent Households.*

How to Cite: Jolayemi, J. O.; Olawumi, A. T.; Akinsulu, A.A.; Abiala, A. A; Afolayan, F. O. (2025). Contribution of Non-Timber Forest Products as a Subsidiary Source of Livelihood among Forest Dependent Households in Kwara State, Nigeria. *International Journal of Innovative Science and Research Technology*, 10(7), 1033-1040. https://doi.org/10.38124/ijisrt/25jul536

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/25jul536

I. INTRODUCTION

Forests are indispensable ecosystems that support ecological balance and enhance human livelihoods, especially for communities that rely heavily on forest resources. One of the essential contributions of forests is the provision of Non-Timber Forest Products (NTFPs) a diverse category of biological materials excluding timber, which includes fruits, nuts, seeds, leaves, roots, bark, resins, oils, honey, fibers, and medicinal plants. These resources play a vital role in the sustenance and income generation of millions of people, particularly in developing regions (Food and Agricultural Organization (FAO), 2020). In Nigeria, commonly used NTFPs such as Irvingia gabonensis (bush mango), kola nuts, bitter kola, bamboo, rattan, and various medicinal herbs serve purposes ranging from food and health remedies to cultural and economic activities (Arowosoge & Oladele, 2022). Beyond their economic and social significance, NTFPs also contribute to biodiversity preservation and climate adaptation strategies. When harvested responsibly, these resources are renewable, meaning they can be continually available without exhausting the ecosystem. However, their long-term sustainability is at risk due to practices such as excessive harvesting, environmental degradation, increased commercialization, and inadequate policy support (FAO, 2023).

Global development frameworks like the United Nations Sustainable Development Goals (SDGs) have emphasized sustainable resource use that promotes poverty reduction, food security, and environmental health (UNEP, 2021). NTFPs align with several goals, including SDG 1 (No Poverty), SDG 2 (Zero Hunger), SDG 12 (Responsible Consumption and Production), and SDG 15 (Life on Land). Therefore, promoting the sustainable utilization of NTFPs supports not just ecological conservation but also inclusive development and resilience within forest-reliant populations (Bamwesigye *et al.*, 2024). Additionally, there is a growing acknowledgment of the role of indigenous and community-based knowledge systems in the sustainable governance of forest products. Local methods of harvesting and conservation, when reinforced by research, extension services, and supportive policies, can ensure the regeneration and productive use of NTFPs (Awodoyin *et al.*, 2023; Lemenih *et al.*, 2022).

Renewable resources are those natural assets capable of self-replenishment through biological or ecological processes, making them available for continuous use if managed effectively. This category includes solar energy, wind, water, forests, and biological products like NTFPs provided that extraction does not exceed their natural regenerative capacity (FAO, 2023). UNEP (2021) defines renewable resources as those replenished at a pace equal to or faster than their consumption. Yet, their renewability is not absolute; it relies on sustainable human practices, ecosystem health, and governance mechanisms that prevent exploitation (IUCN, 2020). NTFPs are recognized as renewable only when ecological balance is maintained during harvesting. This depends on species characteristics, the methods and intensity of harvesting, and the integrity of the environment (FAO & CIFOR, 2023; Shackleton & Pandey, 2020). Factors such as overharvesting, habitat destruction, and climate change can compromise regeneration. For instance, Irvingia gabonensis and Garcinia kola are under stress in parts of Nigeria due to unsustainable practices (Awodoyin *et al.*, 2023; Lemenih *et al.*, 2022). Sustainable management and effective policy implementation are essential to ensure these resources remain renewable (Bamwesigye *et al.*, 2024). NTFPs like fruits, nuts, honey, and medicinal herbs can only be considered renewable when harvesting is carried out in a way that allows for ecological recovery and continued resource availability (Lemenih *et al.*, 2022). This study explores the role of NTFPs as renewable resources, evaluates their management in forest-reliant regions, and discusses pathways for sustainable utilization. It also examines implications for community livelihoods, biodiversity, and sustainable development initiatives in sub-Saharan Africa and beyond (FAO & CIFOR, 2023).

➢ *Objectives*

- Describe the socio-economic characteristics of the forest-dependent households in Kwara State
- Determine the contributions of NTFPs as a subsidiary source of livelihood among forest-dependent households in Kwara State?
- Identify the factors influencing contribution of NTFPs as a subsidiary source of livelihood among forest-dependent households in Kwara State?

➢ *Hypotheses*

- *$H0_1$:*

There is no significant relationship between NTFPs contribution and livelihood of forest-dependent households in the study area.

- *$H0_2$:*

There is no significant relationship among the factors influencing contribution of NTFPs as a subsidiary source of livelihood among forest-dependent households in the study area.

II. METHODOLOGY

Kwara is a state in Western Nigeria, bordered to the east by Kogi State, to the north by Niger State, and to the south by Ekiti, Osun, and Oyo states, while its western border makes up part of the international border with Benin. Its capital is the city of Ilorin and the state has 16 local government areas. Kwara is the ninth largest in area but the sixth least populous with an estimated population of about 3.2 million as of 2016. Kwara State was created on 27 May 1967, when the Federal Military Government of General Yakubu Gowon broke the four regions that then constituted the Federation of Nigeria into 12 states. Located at an elevation of 286.86 meters (941.14 feet) above sea level, Kwara has a Tropical wet and dry or savanna climate. The city's yearly temperature is 29.54 °C (85.17 °F) and it is 0.08% higher than Nigeria's averages. Kwara typically receives about 101.45 millimeters (3.99 inches)

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/25jul536

of precipitation and has 148.38 rainy days (40.65% of the time) annually. It is located at 4.3874051 longitude and 8.9668961 latitude. Economically, Kwara state is largely based around agriculture, mainly of coffee, cotton, groundnut, cocoa, oil palm, and kola nut crops. Other key industries are services, especially in the city of Ilorin, and the livestock herding and ranching of cattle, goats, and sheep. Kwara state has the joint-twentieth highest Human Development Index in the country and numerous institutions of tertiary education (Kwara State Diary, 2025).

This study employed a descriptive survey research design to assess the contribution of NTFPs as a subsidiary source of livelihood among forest-dependent households in Kwara State. A multi-stage sampling technique was adopted to ensure a representative sample of forest-dependent households across Kwara State. In the first stage, six major forest communities in Kwara State; Ekan Meje, Idofin Igbana, Osi, Odo-Owa, Oke-Onigbin, Oro-Ago were also purposively chosen, considering their high concentration and dependency on NTFPs. In the final stage, a simple random sampling method was employed within these communities to select 50 forest-dependent households each from the six communities making a total of 300 households as respondents. Data collection was conducted using a structured questionnaire titled "Questionnaire on Contribution of NTFPs as Subsidiary Source of Livelihood Among Forest-dependent Households in Kwara State". The instrument was designed to capture socio-economic characteristics, contributions of NTFPs and factors influencing contribution of NTFPs as a subsidiary source of livelihood among forest-dependent households. To ensure validity, the questionnaire was subjected to face and content review by professionals in forestry economics, forest management and agricultural extension to confirm that the items adequately covered the study objectives. A pilot study was also conducted among 50 randomly selected forest-dependent households in Ogun State outside Kwara State to refine ambiguous questions and improve clarity. The instrument's reliability was tested using Cronbach's alpha, yielding coefficient of 0.83, indicating a high level of internal consistency and dependability of the responses. Descriptive statistics such as frequency, percentage, mean and standard deviation were employed to describe the objective of the study while Pearson's Product Monument Correlation (PPMC) was used to test hypotheses. The Probit regression model was applied to examine the determinants influencing the contribution of NTFPs as a subsidiary source of livelihood among forest-dependent households in Kwara State.

III. RESULTS AND DISCUSSIONS

- *Objective 1:*
  Describe the socio-economic characteristics of the forest-dependent households in Kwara State

Table 1 Socio-Economic Characteristics of the Forest-Dependent Households (n=300)

Variables	Frequency	Percentage	Mean	SD
Age (years)			30	5
< 30	198	66.0		
31 - 40	84	28.0		
41 – 50	18	6.0		
Sex				
Male	162	54.0		
Female	138	46.0		
Marital status				
Single	78	26.0		
Married	168	56.0		
Separated	24	8.0		
Divorced	24	8.0		
Widowed	6	6.0		
Educational status (years)				
No Formal	120	40.0		
Primary	156	52.0		
Secondary	14	4.7		
Tertiary	10	3.3		
Household size (persons)			5	2
1 - 4	162	54.0		
5 - 8	102	34.0		
9 - 12	36	12.0		
Farming experience (years)			12	5
1 - 10	126	42.0		
11 - 20	156	52.0		
21 - 30	18	6.0		

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/25jul536

Monthly Income (₦)				
0 - 20,000	6	2.0	60,910.00	12,459.31
20,001 - 40,000	-	-		
40,001 - 60,000	222	74.0		
60,001 – 80,000	60	20.0		
> 80,001	12	4.0		
Membership of cooperative				
Yes	102	34.0		
No	198	66.0		
Extension contact				
Regularly	36	12.0		
Occasionally	162	54.0		
Never	102	34.0		

Source: Field Survey, 2025

Results on Table 1 reveal the socio-economic characteristics of the forest-dependent households in Kwara State, Nigeria. The mean age of the rural households was 30±5 years. The implication of the result is that the majority of the forest-dependent households in Kwara State, Nigeria are still young and within their productive age. This suggests that these households have the physical capacity to gather NTFPs. The majority (54.0%) of the households was male in the study area. The majority (52.0%) of the households had primary education. The average household size was 5±2 persons. The implication is that the majority of the forest-dependent households have ample experience about NTFPs and this may have a positive influence on their decision of NTFPs as a subsidiary livelihood. The average monthly income was ₦60,910.00±12,459. The implication is that most of the households realized a fair income from the sales of NTFPs and this may have a positive influence on their livelihood status. This result supports the finding of Belachew (2022) on achieving food security through forest products. The result reveals that the majority (54.0%) of the households opined that extension agents visit them occasionally. This implies that extension visitations in the areas are not frequent and this may have a negative influence on the gathering of NTFPs as a subsidiary source of livelihood in the study area. This result is in agreement with the findings of Barret (2019) on food security measurement in a global context, who found out those farmers who belong to various cooperative societies hardly run out of food or money.

- *Objective 2:*

Determine the contributions of NTFPs as a subsidiary source of livelihood among forest-dependent households in Kwara State.

Table 2 Mean Ratings of Responses on Contributions of NTFPs as a Subsidiary Source of Livelihood among Forest-dependent Households

Items	Mean	SD	Remarks
NTFPs fruits and medicinal herbs are commonly harvested locally.	3.85	0.62	Agree
Harvesting of NTFPs can be done using manual and mechanical methods.	3.40	0.71	Agree
NTFPs is another source of livelihood for me and my households.	3.25	0.83	Agree
NTFPs contribute significantly to household income in my community.	3.78	0.65	Agree
NTFPs are collected mainly for consumption and commercial uses.	3.10	0.70	Agree
Collection and marketing of NTFPs are very easy.	3.55	0.67	Agree
NTFPs are natural products with high quality and quantity.	3.32	0.74	Agree
NTFPs provide a vital fallback income during periods of crop failure.	3.61	0.69	Agree
Some NTFPs are processed into products like medicines, cosmetics etc.	3.20	0.76	Agree
Market demand for NTFPs has increased over recent years.	3.50	0.71	Agree

Source: Field Survey, 2025. *Mean > 2.5 indicates agreement.*

The results presented in the table 2 indicate that forest-dependent households of Kwara State Nigeria strongly agree that NTFPs fruits and medicinal herbs are commonly harvested locally with the highest mean score (3.85). This result aligns with prior findings by Awodoyin et al. (2023) and Arowosoge & Oladele (2022), who reported that the centrality of these products in rural diets and economies improve their standard of living and income earnings. Harvesting of NTFPs can be done using manual and mechanical methods by forest-dependent households (mean = 3.40). NTFPs is another source of livelihood for me and my households (mean = 3.25). This finding is in line with the findings of Lemenih et al. (2022) who found out that NTFPs remain vital for both ecological sustainability and livelihood security in forest-dependent communities in southwestern Nigeria.

- *Objective 3:*

Identify the factors influencing contribution of NTFPs as a subsidiary source of livelihood among forest-dependent households in Kwara State.

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Table 3 Mean Ratings of the Responses on Factors Influencing Contribution of NTFPs as a Subsidiary Source of Livelihood among Forest-dependent Households in Kwara State

Factors	Mean	Std.	Rank	
Lack of good roads hinders the efficient collection and access to NTFPs.	3.75	0.50	1st	
Inadequate NTFP credit availability which deters their use.	2.96	0.92	5th	
Desertification made it impossible to consume NTFPs.	3.13	0.94	4th	
High rate of kidnapping or missing people when gathering NTFPs	2.47	1.28	10th	
Fearful of culture, myth and believe about forest ghosts and spirits.	2.60	1.16	8th	
Conflicts between the crop and pastoral farmers induce fear in people.	2.62	0.89	7th	
Loss and extinction of beneficial natural NTFPs pose a challenge	3.48	0.74	2nd	
NTFPs reduced by forest encroachment brought by population growth.	3.40	0.71	3rd	
It is frightening to learn about the spread of animal diseases to humans.	2.01	1.12	12th	
NTFPs' seasonality renders both sales and consumption unreliable.	2.86	1.03	6th	
The use of herbicide on NTFPs reduced its natural quality and quantity.	2.05	1.12	11th	
Lack of government support	2.59	0.95	9th	

Source: Field Survey, 2025. Mean > 2.5 indicates agreement.

Results in Table 3 show that among the 12 factors influencing contribution of NTFPs as a subsidiary source of livelihood among forest-dependent households in Kwara State; Lack of good roads hinders the efficient collection and access to NTFPs was ranked 1st (mean = 3.75), loss and extinction of beneficial natural NTFPs pose a challenge was ranked 2nd (mean = 3.48), NTFPs reduced by forest encroachment brought by population growth was ranked 3rd (mean = 3.40) and Desertification made it impossible to consume NTFPs was ranked 4th (mean = 3.13) while Inadequate NTFP credit availability which deters their use was ranked 5th (mean = 2.96). These results are in agreement with the findings of Lemenih *et al.* (2022), who contend that integrating indigenous knowledge into policy development can greatly improve conservation effectiveness. However, the continuity of such traditional practices is under threat due to modernization, urban migration, and a lack of formal documentation. This is in line with earlier research by Awodoyin *et al.* (2023) and Bamwesigye *et al.* (2024), which emphasized the importance of NTFPs as a coping strategy for rural poverty and food scarcity. During times of agricultural disruption caused by erratic weather or crop failure, these forest resources act as essential fallback options and observation supported by the sustainable livelihoods framework.

➢ *Testing of Hypotheses*

- *Hypothesis 1:*

There is no significant relationship between NTFPs contribution and livelihood of forest-dependent households in the study area.

Table 4 Correlation Analysis on NTFPs Contribution and Livelihood of Forest-dependent households in the study area

Variables	r value	p value	Decision
NTFPs contribution Livelihood	**0.73**	**0.01**	**Significant**

Source: Field Survey, 2025 Significant at $p<0.05$

Results in Table 4 revealed that there is a significant relationship between NTFPs contribution and livelihood of forest-dependent households in the study area ($r = 0.73$; $p<0.05$). This finding supports the findings of Eze & Okeke (2023) that the role of indigenous knowledge and community participation in the sustainable management of non-timber forest products in southeastern Nigeria significantly contributed to their livelihoods.

➢ *Hypothesis 2:*

There is no significant relationship among the factors influencing contribution of NTFPs as a subsidiary source of livelihood among forest-dependent households in the study area.

Table 5 Correlation Analysis on factors influencing contribution of NTFPs as a subsidiary source of livelihood among forest-dependent households in the study area

Variables	r value	p value	Decision
Factors influencing NTFPs Livelihood	**1.62**	**0.02**	**Significant**

Source: Field Survey, 2025 Significant at $p<0.05$

Results in Table 5 showed that there is a significant relationship among the factors influencing contribution of NTFPs as a subsidiary source of livelihood among forest-dependent households in the study area ($r = 1.62$; $p<0.05$). This finding is in agreement with the findings of Adebayo et al. (2024) who found out that the policy frameworks and grassroots involvement in forest resource conservation should be critically looked into in order to alleviate the challenges encountered by forest-dependent farmers.

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Table 6 Probit Regression Analysis on the Contribution of NTFPs as a Subsidiary Source Of Livelihood among Forest-Dependent Households

Variables	Coefficient (β)	Std Error	Z statistics	P-value
Age	1.580	1.412	1.12	0.050
Sex	0.972	0.363	2.69	0.132
Marital status	4.865	2.525	1.93	0.045
Education	-0.897	0.507	-1.78	0.049
Household size	-3.730	2.930	-1.27	0.011
Farming experience	2.990	1.652	1.81	0.010
Monthly Income	2.429	1.691	1.43	0.012
Membership of cooperative	0.605	0.562	1.07	0.010
Extension contact	3.658	2.517	1.45	0.216
Constant	-2.972	0.729	-2.25	0.001
Log-likelihood	-49.62			
LR chi^2 (9)	81.41			
Prob > chi^2	0.000			
Number of observation	300			
Pseudo R^2	0.610			
Correctly Predicted Cases	94.7%			

Source: Field Survey, 2025 Significant at p<0.001

The probit regression results (Table 6) clearly established that age (β=1.580, p<0.001), sex (β=0.972, p<0.001) and marital status (β=4.865, p<0.001) strongly associated and increased the contribution of NTFPs as a subsidiary source of livelihood among forest-dependent households. This finding corroborate the findings of Nwaogu & Okorie (2021), who discovered that married persons were more likely to farm and embrace new technology, are likewise consistent with this. It also concurs with Kiros & Meshasha (2022), who believe that married youths are more likely to engage in rural agriculture. They attribute this to the fact that males, who are heirs, own land resources, that they are more concerned with household welfare and food security after marriage, and that they have grown to believe that agriculture is essential to rural livelihood. This aligns with the assertion of recent studies by Adeyongo et al. (2022) that found out that farmers' adoption of agricultural innovations and advances was significantly influenced by their age. World Bank (2021) research studies conducted in Africa have demonstrated that women are more likely to replace men when forest products are seen as highly commercial and useful. This also explains Chandio et al. (2020) results that gender influences smallholder farmers' loan demands and adoption of new rice production technologies. Additionally, farming experience (β=2.990, p<0.001), monthly income (β=2.429, p<0.001), membership of cooperative (β=0.605, p<0.001) and extension contact (β=3.658, p<0.001) positively influenced the contribution of contribution of NTFPs as a subsidiary source of livelihood among forest-dependent households. This finding is in agreement with the conclusions drawn from earlier research by Adeyongo et al. (2021), which showed that the more money invested in farming, the greater the predicted yield and revenue.

The negative correlation between education (β=-0.897, p<0.001) and household size (β=-3.730, p<0.001) denoting a reducing effect on the level of contribution of NTFPs as a subsidiary source of livelihood among forest-dependent households who did not have education and those with higher household size. This finding also supports the findings of Adebayo et al. (2024), who emphasize the significance of education among youths, that a greater understanding of the necessity of farming and the provision of supplementary services to parents through farm activities to help pay school fees and meet other family financial obligations could encourage participation. Findings from this study support some of the earlier studies that could not establish any significant relationship between sex, age and income while Yusuf *et al.* (2022) found out that income, farm size, membership of cooperative, dependency ratio, age and household size were major drivers of food security among cassava out-growers. R^2 was 0.61 which means that 61% level of variation in the contribution of NTFPs as subsidiary source of livelihood among forest-dependent households in Kwara State, Nigeria.

IV. CONCLUSION

This study affirms the contribution of Non-Timber Forest Products (NTFPs) as a subsidiary source of livelihoods among forest-dependent households in Kwara State. Findings revealed that most of the forest-dependent households were male, young adults with primary education and higher household size with reasonable monthly income realized from the sales and consumption of NTFPs. Most NTFPs fruits and medicinal herbs are commonly harvested locally or manually. Among the 12 factors influencing contribution of NTFPs as a subsidiary source of livelihood among forest-dependent households; lack of good roads hinders the efficient collection, loss and extinction of beneficial natural NTFPs pose a challenge while NTFPs reduced by forest encroachment brought by population growth. A significant relationship existed between NTFPs contribution and livelihood of forest-dependent households in the study area. Also, a significant relationship further existed among the factors influencing contribution of NTFPs as a subsidiary source of livelihood among forest-dependent households in the study area. The probit regression analysis clearly established that age, sex, marital status, farming experience, monthly income, membership of cooperative and extension

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/25jul536

contact strongly associated and increased the contribution of NTFPs as a subsidiary source of livelihood among forest-dependent households while a negative correlation existed between education and household size denoting a reducing effect on the level of contribution of NTFPs as a subsidiary source of livelihood among forest-dependent households who did not have education and those with higher household size.

RECOMMENDATIONS

➢ *Based on the Findings of this Study, the Following Recommendations were Made:*

- Government agencies should prioritize the effective enforcement of existing forestry laws and policies, ensuring that regulations protect NTFPs without disenfranchising local communities.
- Implement training programs to educate forest-community members on sustainable harvesting techniques, value addition, post-harvest handling, and market opportunities for NTFPs.
- Extension services should be adequately resourced to support these initiatives**.**
- Adequate provision of basic infrastructures such as good roads and health centres etc.
- Credit facilities and subsidies should be made available and accessible for forest-dependent households and they should form or join cooperative societies.
- Adequate provision of security personnel and gadgets to curb high rate of kidnapping or missing people when gathering NTFPs.
- Proper policies and regulations should be implemented to curb conflicts between crop and pastoral farmers induce fear in people.
- NTFPs activities should be checked to avoid forest encroachment brought by population explosion.
- To stop encroachment and careless woodlot harvesting, the government ought to provide local security organizations greater authority, like forest guards. Both the government and non-governmental organizations must act quickly to control NTFP exploration through user education and extension in order to avoid "empty forest syndrome."
- To encourage young people to take advantage of livelihood activities that can reduce poverty and the numerous opportunities for NTFP utilization, advocacy and sensitization campaigns should be implemented.

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