



Effects of Forest Resource Exploitation on Economic Well-Being of Farming Households in Bebeji Local Government Area, Kano State, Nigeria

^{*1}Assedeeq Y. A., ²Umar S. and ¹Halliru M.

¹Department of Agricultural Economics and Extension, Bayero University, Kano, Nigeria

²Bilyaminu Usman College of Agriculture, Hadejia, Jigawa State, Nigeria

*Corresponding Author: ayassedeeq.ext@buk.edu.ng

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This study analyzed the effects of forest resources exploitation on the economic well-being of farming households in Bebeji Local Government Area, Kano State, Nigeria. The study identified socioeconomic characteristics and commonly harvested forest products and their uses. It also determined the socio-economic factors influencing household income from forest resources and the constraints in accessing and utilization of forest resources among rural household. A multi-stage sampling procedure was employed. Baguda, Damau, Gargai, and Gwarmai council wards were randomly selected. Simple random sampling of ten farming households per ward were selected, yielding a total of 40 respondents. Primary data were collected using a structured questionnaire and analyzed using descriptive statistics, linear regression and T-test. Results showed that forest resource harvesting was the dominant occupation, largely led by male headed households (72.5%) with large family sizes (mean of 10.27 persons) and considerable experience (mean of 16.48 years). Average annual household income was ₦159,425, with forest income averaging ₦90,400, representing approximately 42% of total household income. Commonly harvested products included fuelwood, herbs, fruits, firewood, tamarind, and tree bark, which served as sources of income, food, medicine, construction material, and cooking energy. Annual income from non-forest sources was the only variable with a statistically significant positive effect on forest income ($\beta = 0.080$, $t = 7.429$, $p < 0.000$), indicating that as overall household income rises, dependence on forest harvesting declines. Key constraints to forest resource access and utilization were excess exploitation (47.5%), poor road access (40.0%), unfavorable government policy (10.0%), and poor shelf life (2.5%). The therefore, study demonstrates that forest resources are a vital economic pillar for farming households.

Keywords: Forest, Livelihood, Regression, Exploitation, Household.

INTRODUCTION

According to Food and Agriculture Organization (2018), a forest can be defined as a land with a tree canopy cover of more than 10%, area of more than 0.5ha and a minimum tree height of 5m. It also includes unstocked areas, forest used for purposes of production, protection, or conservation, forest stand on agricultural lands and rubber plantations and cork oak stands (FAO, 2010). Forests cover almost a third of the earth's land surface 'providing many environmental benefits including its major role in the hydrologic cycle, soil conservation, and prevention of climate change and preservation of

biodiversity (Sheram, 2012). Forest resources can provide long-term national economic benefits. For example, at least 145 countries of the world are currently involved in wood production (Anon., 2012). Sufficient evidence is available that the whole world is facing an environmental crisis on account of heavy deforestation. Forest degradation occurs when the ecosystem functions of the forest are degraded but where the area remains forested rather cleared (Anon., 2010). Forests serve as habitats and shelters to millions of species. However, the trees on our planet are being depleted at a very fast rate. According to some

estimates, more than 50 percent of the tree cover has disappeared due to human activity. Amadi (2021). This removal of forest or tree from a land and converting it for non-forest use is called deforestation (Barraclough and Ghimire, 2010). However, stands of trees established primarily for agricultural production are not included as forest (FAO, 2010). This removal of forest or tree from a land and converting it for non-forest use is called deforestation (Barraclough and Ghimire, 2010). However, stands of trees established primarily for agricultural production are not included as forest (FAO, 2010).

Deforestation is the conversion of forest to an alternative permanent non-forested land use such as agriculture, grazing or urban development. FAO (2010) considers a plantation of trees established primarily for timber production to be forest and therefore does not classify natural forest conversion to plantation as deforestation (but still records it as a loss of natural forests). The importance of forests cannot be overemphasized. They provide numerous contributions directly and indirectly to sustainable livelihood and well-being of billions of people across the world through the provision of ecosystem services including environmental services, wild food, fodder, fiber, wood and medicine (Katerere *et al.*, 2009). This is particularly so in Sub-Saharan Africa where most countries have large rural populations that depend directly or indirectly on natural resources and small-scale farming for their livelihood (Katerere *et al.*, 2009; Agwu *et al.*, 2008). It also contributes to economic and social development through environmental services, formal trade in timber, and Non-Timber Forest Products (NTFPs), as well as through their safety net, spiritual, cultural, and aesthetic values (Katerere *et al.*, 2009). It is estimated that about 1 billion of the world's poorest people, especially those who live adjacent to forests rely on forests for their livelihoods (Agrawal *et al.*, 2013; Arnold *et al.*, 2011). Indigenous population in Nigeria have benefited historically from forest resources. On the average, forest resources make up about 39% of the livelihoods of rural populations in Nigeria (Onyekuru and Marchant, 2014).

Some forest products that improves the rural economies of Nigeria and Kano State in particular include vegetables, mushroom, palm fruit, locust bean, mango fruit, chewing-stick, fuelwood, timber, ginger, alligator pepper, ropes, honey, palm wine, bamboo and grasses and various species of animal including snails, bee products (honey, beewax and pollen), grass cutter (Olaniyi *et al.*, 2013; Eboh *et al.*, 2009; Nzeh and Eboh, 2008). Due to the limited livelihood opportunities in the rural areas, rural dwellers continuously exploit forest resources as a way to economically benefit from their natural resources. The availability and accessibility of forest products determine the prospects for forest-based livelihoods options. However, the growing demand for ecosystem services from forests in Kano State has led to overexploitation of forest resources and ultimately, scarcity of forest products, thereby raising fears about the livelihood of forest dependent rural communities. Although utilization of forest resources can be sustainable if appropriate forest management systems are put in place (Clark, 2001). Due to the limited livelihood opportunities in the rural areas, rural dwellers continuously exploit forest resources as a way to economically benefit from their natural resources. The availability and accessibility of forest products determine the prospects for forest-based livelihoods options. Hence the study aims to assess the impacts of forest resource exploitation on the economic well-being of farming households in Kano State. The specific objective of the study is to describe the socioeconomic characteristics of the respondents, identify commonly harvested forest products and their uses, determine the socio-economic factor influencing household income from forest resources, ascertain the constraints in accessing and utilization of forest resources among rural household.

METHODOLOGY

Study Area

Bebeji Local Government Area (LGA) located in the southern part of Kano State, Nigeria situated within the Sudan Savannah zone. It lays on latitude 11.6661° N and longitude

8.2714° E covering a total area of approximately 717 km² (277 sq mi) (Figure 1). Bebeji experiences a tropical semi-arid climate characterized by distinct wet and dry seasons. It has an annual average temperature range between 54°F and 100°F. The hottest period is from March to May, with April being the warmest month (highs of 99°F). A milder season occurs from late November to late January. The average annual rainfall is approximately 825.5 mm, with the bulk occurring between June and September. According to the 2006 Census, the population was 191,916. Projections for 2022 estimated it at approximately 315,600 (KNSG 2026). High humidity levels are prevalent during the wet season (May–September), while the dry season is marked by low humidity and dusty Harmattan winds and vegetation consists of short grasses and scattered, drought-resistant trees such as *Vachellia nilotica* (Acacia), *Adansonia digitata* (Baobab), *Vitellaria paradoxa* (Sheanut), and *Azadirachta indica* (Neem) (Ibrahim 2020). The primary economic activity. Major crops grown include maize, millet, sorghum, groundnuts,

cotton, and rice. The primary economic activity. Major crops grown include maize, millet, sorghum, groundnuts, cotton, and rice. The area is drained by seasonal rivers and streams that flow during the rainy season. Notably, the Kano River and its tributaries provide vital water sources for the Bagauda Dam and irrigation projects in the region (Oyebande, L. (1990). Common tree species found in the forests include *Vitellaria paradoxa*, *Parkia biglobosa*, *Tamarindus indica*, *Adansonia digitata*, *Khaya senegalensis*, *Prosopis Africana*. These forests provide timber, fuelwood, fruits, fodder and other non-timber forest products which are exploited by local communities (Suleiman *et al.*, 2017). However, unsustainable exploitation of the forest resources through activities such as uncontrolled logging, grazing and expanding farms has led to environmental degradation including deforestation, loss of biodiversity and land degradation. This has threatened the livelihoods and economic well-being of many farming households who depend on the forests.

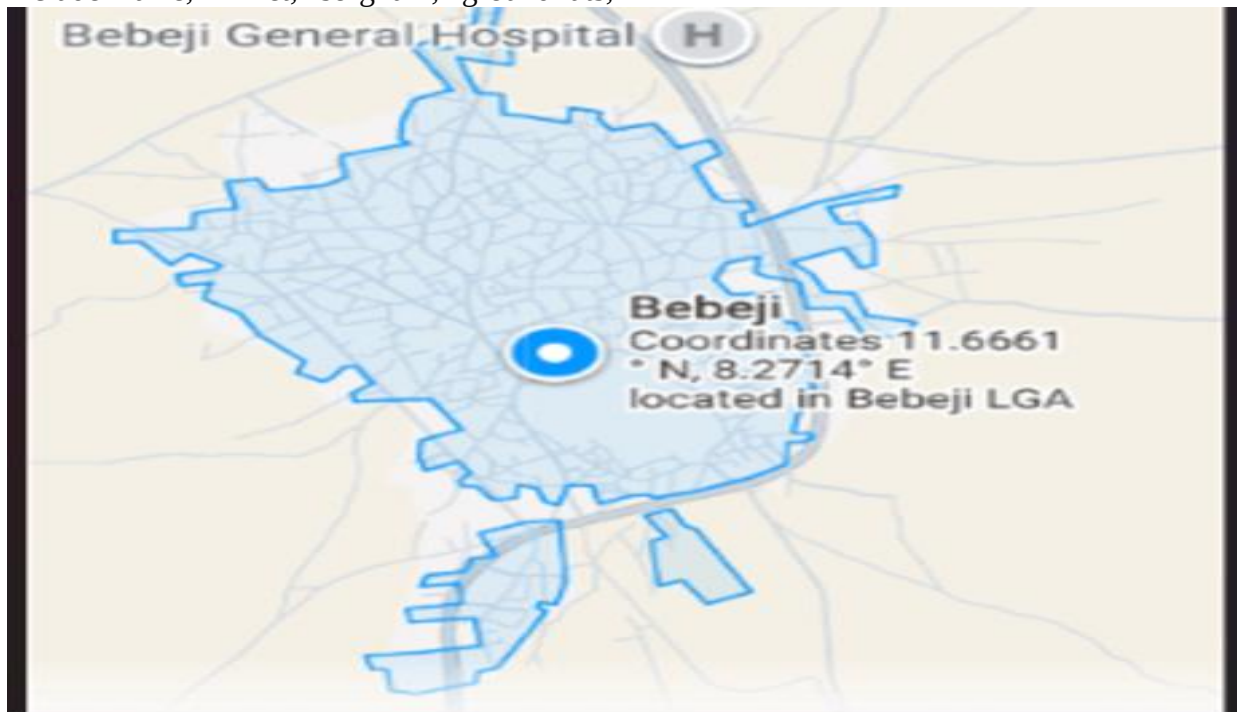


Figure 1: [Map of Bebeji LGA of Kano State, Nigeria.](#)
Source: Geo Countries (2026).

Sampling techniques

Multi-stage sampling procedure was used. In the first stage, Bebeji L.G.A was purposively selected due to its exploitation of forest resources. Suleiman et al. (2017), followed by the second stage where four council wards were randomly selected from the L.G.A. The selected council were Baguda, Damau, Gargai and Gwarmai. In the third stage, simple random sampling technique was used to select ten (10) farming households in each council ward. in each council ward. A total of 40 farming households were selected for the study.

Data Collection and Analysis

Data collection

Questionnaires were administered to head of the sampled households administered to heads of the sampled households to obtain information on forest resource exploitation and use. Forest products of interest in the study included herbs and fruits and fuel wood.

Descriptive analysis

Descriptive statistics such as means, frequency distributions. and percentages were used to determine the socio-economic characteristics of the respondents and identified the commonly harvested forest products with their uses and to determine the constraints in accessing and utilization of forest resources among rural households. Simple linear regression was used to determine the socio-economic factors influencing household income from forest resources.

Inferential analysis

The regression analysis was also used to compare the effects of forest resources exploitation and economic well-being of farming households.

The mathematical representation used in simple linear regression analysis is shown below as adopted by Inoni (2008):

$$\text{Forest } t = B_0 + B_1X_t \quad 1$$

Where:

B_0 = Regression constant

Y_1 = Described relationship between independent and dependent variable

X_t = Independent variables (such as age, income of the household, level of education, gender, household size and years of experience).

RESULTS AND DISCUSSION

Quantitative Socioeconomic Characteristics of Respondents in the Study Area

The socioeconomic characteristics of the respondents in Table 1 revealed that the household heads have an average age of 44.28 years with a minimum of 25 years and a maximum of 60 years. Majority (32.5%) of the respondents are within the age bracket of 43-51 years, followed by those at the age of 34-42 years which constitute 30.0%. This indicates that middle-aged men and women dominate forest product activities in the study area. These are economically active people who can still move around to source for forest products. Those at the age of 52-60 years were the third highest category in forest activities with 22.5% of the proportion. The small proportion (15.0%) of the respondents within the age range of 25-33 years suggests that the youth are uninterested in forest product activities. This is in agreement with the findings of Nzeh *et al.* (2008) and Akanni (2013) who reported that those engaged in harvesting of forest products were older people who have various family responsibilities.

The results in Table 1 also showed that the average household size was 9.18 persons with a minimum of 1 person and a maximum of 20 persons. Majority (47.5%) of the respondents had family size of 6-10 persons, 22.5% had a family size of 1-5 persons, while 20.0% had family size of 16-20 persons and 10.0% had family size of 11-15 persons. The relatively large household size observed in this study is in agreement with Ajake and Enang (2012) who reported that increasing household population accelerates the dependence and use of forest resources. Though, a very large family size may constitute a social burden, larger families use their labour resources to an advantage in farming and harvesting of forest resources.

The average years of experience in harvesting forest products was 16.48 years with a minimum of 2 years and a maximum of 37 years. A larger proportion (35.0%) of the respondents had between 2 and 10 years of experience in harvesting forest products, followed by 25.0% who had between 11 and 19 years of experience, and another 25.0% with 20 to 28 years of experience. The smallest proportion (15.0%) of the respondents had between 29 and 37 years of experience in

harvesting forest products. This implies that the respondents were experienced forest resources harvesters, which could translate to better knowledge of sustainable harvesting practices and market dynamics. Abubakar *et al.* (2016) supports the finding that forest product harvesters possess significant experience, with an average of 17.5 years, strengthening claims regarding sustainable practice knowledge. Similarly, findings from Adedayo *et al.* (2010) indicate that extensive experience in forest resource utilization functions as a traditional educational, which enhances market dynamics understanding.

Furthermore, the results in Table 1 revealed that the average annual income of the respondents was ₦159,750 with a minimum of ₦100,000 and a maximum of ₦263,000. Majority (40.0%) of the respondents earned between ₦100,000 and ₦140,000 annually, 27.5% earned between ₦141,000 and ₦181,000, while 17.5% earned between ₦182,000 and ₦222,000, and 15.0% earned between ₦223,000 and ₦263,000. This income distribution indicates that most households engaged in forest product harvesting operate within the low to medium income bracket, suggesting the need for interventions to improve their economic status. The majority percentage of the annual income in the study is in agreement with Sulaiman *et al.* (2017) which stated that NTFP income accounts for 20–60% of total income of households.

Finally, Table 1 showed that the average income from forest products was ₦89,375 with a minimum of ₦50,000 and a maximum of ₦176,000. The majority (42.5%) of the respondents earned between ₦50,000 and ₦75,000 from forest products, 30.0% earned between ₦76,000 and ₦101,000, while 22.5% earned between ₦127,000 and ₦151,000. Only 2.5% each earned between ₦102,000–₦126,000 and ₦152,000–₦176,000 respectively. These results imply that income from forest products contribute significantly to the total household income, representing an average of 55.9% of the annual income, which underscores the importance of forest resources to the livelihoods of rural households in the study area. These is in line with Nzeh and

Ugwu (2014) which stated that forest resources represent an average of 55.9% of the annual income of the rural household.

Socioeconomic Characteristics of the Respondents (Qualitative)

As presented in Table 2, a greater proportion (72.5%) of the sampled households were headed by males, while 27.5% were female-headed households. Although male-headed households were higher than female-headed households, it could be said that households who harvested forest resources in the study area were predominantly male, having a frequency of 29 compared to 11 for females. This suggests that forest product harvesting is a male-dominated activity in the study area, possibly due to the physical demands and cultural expectations associated with the activity. This finding confirms by Sunderland (2014) which stated that men play a significantly more diverse and dominant role in the collection and contribution of forest products to rural livelihoods.

The result in Table 2 revealed that the majority (87.5%) of the household heads were married, few (5.0%) were single, while 7.5% were headed by widows. The high proportion of married respondents may be connected to the findings of Bwalya (2011) and Olaniyi *et al.* (2013) who reported that married households tend to have relatively more labour to devote to forest gathering and marketing of forest products. Married households support a larger number of dependents, their own children and children from extended family, and as a result exhibit greater dependence on forests and woodlands to meet their dietary needs and to earn extra income to meet educational and health needs of their children and dependents.

Table 1: Socioeconomic Characteristics of the Respondents (Quantitative)

Variables	Frequency	Percentage (%)	Mean	Min.	Max.
Age (years)			44.28	25	60
25–33	6	15.0			
34–42	12	30.0			
43–51	13	32.5			
52–60	9	22.5			
Total	40	100.0			
Household size			9.18	1	20
1–5	9	22.5			
6–10	19	47.5			
11–15	4	10.0			
16–20	8	20.0			
Total	40	100.0			
Years of experience			16.48	2	37
2–10	14	35.0			
11–19	10	25.0			
20–28	10	25.0			
29–37	6	15.0			
Total	40	100.0			
Annual income (₦)			159,750	100,000	263,000
100,000–140,000	16	40.0			
141,000–181,000	11	27.5			
182,000–222,000	7	17.5			
223,000–263,000	6	15.0			
Total	40	100.0			
Income from forest products (₦)			89,375	50,000	176,000
50,000–75,000	17	42.5			
76,000–101,000	12	30.0			
102,000–126,000	1	2.5			
127,000–151,000	9	22.5			
152,000–176,000	1	2.5			
Total	40	100.0			

Source: Field Survey, 2026

These is in accordance with Suleiman *et al.* (2017), confirm that educational levels among forest-dependent communities are generally low, with very few individuals reaching tertiary education. This demographic reality is consistent with the religious and cultural background of Northern Nigeria, where traditional Qur'anic literacy often precedes or accompanies formal Western education. Although the respondents sampled were those whose dominant occupation was harvesting of forest resources, the result in Table 2 indicates that they also engaged in other

activities like farming, business, civil service, and housewife duties to support their major source of livelihood. Majority (67.5%) of the respondents engaged in farming, 12.5% were involved in business activities, 10.0% were exclusively engaged in forest resource exploitation, while 7.5% were housewives and 2.5% were civil servants. This diversification of income sources is in line with Ajani (2012) who reported that people living in rural areas diversify their sources of income in order to empower themselves economically to meet family responsibilities.

Table 2: Socioeconomic Characteristics of the Respondents (Qualitative)

Variables	Frequency	Percentage (%)
Gender		
Male	29	72.5
Female	11	27.5
Total	40	100.0
Marital status		
Single	2	5.0
Married	35	87.5
Widowed	3	7.5
Total	40	100.0
Educational level		
Qur'anic education	8	20.0
Primary education	18	45.0
Secondary education	12	30.0
Tertiary education	2	5.0
Total	40	100.0
Occupation		
Farming	27	67.5
Business	5	12.5
Forest resource exploitation	4	10.0
Housewife	3	7.5
Civil servant	1	2.5
Total	40	100.0

Source: Field Survey, (2026)

Commonly Harvested Forest Products and their Uses

The forest products in Table 3 were identified by the respondents as the most commonly harvested and most often used or marketed products. Majority (12%) harvested charcoal, firewood, herbs and wood, 10.0% harvested fruit, 5.0% harvested grass, trunk and mango, 2.5% harvested animal feed, dorawa, dry trees, fuel wood, hibiscus, orange, sugar cane, tamarind and tree back, these products were used for different purposes including as a

source of income, food, medicine, construction material, cleaning material, preservation material and cooking energy. As presented in Table 3, majority of the products collected were used as food and source of income. And also, major uses of the forest product to the household in order to support their living and generate income are business, medicine, selling, juice, animal feed, construction and also domestic use, (Gambo, 2023).

Table 3: Commonly Harvested Forest Products and their Uses

Forest product	Percentage (%)	Use(s)
Charcoal	12.5	Business
Fire wood	12.5	Selling
Herbs	12.5	Medicine
Wood	12.5	Selling
Fruit	10.0	Juice
Grass	5.0	Animal feed
Trunk	5.0	Domestic use
Mango Tree	5.0	Consumption
Animal feed	5.0	Selling
African Locust Bean tree	5.0	Business
Dry tree	5.0	Selling
Fuel wood	5.0	Selling
Hibiscus	5.0	Business
Orange	5.0	Selling
Sugar cane	5.0	Business
Tamarind	5.0	Selling
Tree bark	5.0	medicine

Constraints Faced by Rural Households in Accessing and Utilizing Forest Resources

Table 4 presents the constraints faced by rural households in accessing and utilizing forest resources in the study area. The results indicated that excess exploitation was the most dominant constraint, accounting for 47.5% of responses. This reflects the unsustainable harvesting practices common in many rural communities where forest resources serve as the primary livelihood safety net. Poor road access was cited by 40.0% of respondents as a significant barrier, limiting households' ability to reach forest areas and transport products to markets efficiently. Government policy constraints were identified by 10.0% of respondents, suggesting that existing regulatory frameworks are perceived as restrictive rather than enabling. Poor shelf life of forest products was the least cited constraint at 2.5%, though it remains relevant for perishable items such as fruits and herbs. These findings are consistent with observations from comparable studies.

Ogundele *et al.* (2012) similarly reported that over-harvesting and restricted access were among the foremost challenges facing non-timber forest product (NTFP) collectors in Akwa Ibom State, Nigeria. Onuche (2011) also noted that excessive exploitation of forest resources significantly undermines the income and food security of rural households dependent on NTFPs in Nigeria. Furthermore, Sunderlin *et al.* (2005) in a global comparative analysis highlighted that poor rural infrastructure, including inadequate roads, is a recurring impediment to forest-based livelihood systems in developing countries, a finding that aligns closely with the 40.0% road access constraint observed in this study. The relatively low weight placed on government policy (10.0%) may reflect limited awareness of existing forestry regulations among respondents, as observed by Onwubuya *et al.* (2013), who found that many rural farmers in Nigeria have little knowledge of state-level forest legislation. Collectively, these constraints suggest that interventions targeting sustainable

harvesting practices, rural road development, and community-level policy sensitization are critical to improving forest

resource access and utilization in the study area.

Table 4: Constraints faced by Rural Households in Accessing and Utilizing Forest Resources

Variable	Frequency	Percentage (%)
Road access	16	40.00
Excess exploitation	19	47.50
Shelf lives	1	2.50
Government policy	4	10.0
Total	40	100.00

Socioeconomic Factors Influencing Household Income from Forest Resources

To identify socioeconomic factors influencing household income from forest resources, linear regression analysis was carried out. The in Table 5 result of the socioeconomic characteristic of the respondent did not show any significant effect on the income from the forest due to their other actives to generate income, but annual income of the household had a positive significant effect on the forest income due to their engagement in other activities that generate income to the household. Household annual income from other sources of income order than forest resources was another variable that had statistically significant effect on forest

income. Its coefficient was 0.080 and t-ratio was 7.429 and was significant ($P < 0.000$). Although the parameter estimates for annual income from other sources order than forest resources was significant, the lower the income earned from forest resources extraction. As income grows the dependency of rural households on harvesting forest products falls. This is so because with rising income, rural dwellers take 41 advantages of other economic opportunities, in order to improve their well-being. This is in agreement with the work of Baland *et al.* (2004) who found that poor households with little income earning alternatives tend to spend more time collecting forest products.

Table 5: Socioeconomic Factors influencing Household Income from Forest Resources

Model	Unstandardized coefficient B	Std Error	standardized coefficient Beta	T	Sig
Constant	4.57688	4.460063		1.309	0.200
Age	2.148723	2.754604	0.035	0.248	0.806
Gender	3.99455	3.882428	0.127	1.295	0.204
Education level	3.520785	3.671108	0.079	0.719	0.477
Household level	3.527785	3.671108	0.121	0.718	0.478
Years of experience in exploitation of forest	20.734	775.242	0.005	0.027	0.979
Annual income	0.592	0.080	0.795	7.429	0.000

CONCLUSION

The study concludes that forest resources constitute a critical livelihood strategy in the study area, contributing substantially to household

economic well-being, though excessive exploitation and poor infrastructure continue to threaten this resource base. This study demonstrates that forest resources are a vital economic pillar for farming households in Bebeji,

Kano State, contributing a significant 42% (₦90,400) of the total average annual income of ₦159,425. The data reveals a high level of forest dependency among male-headed households (72.5%), who manage large families (averaging 10.27 persons) and possess extensive harvesting experience (16.48 years). While these resources provide essential food, medicine, and energy, the findings indicate a critical economic shift: as non-forest income increases, the direct reliance on forest exploitation significantly declines ($p < 0.000$). Ultimately, to protect the environment and improve rural well-being, policymakers must address the primary constraints of excess exploitation (47.5%) and poor road access (40.0%) by promoting diversified income sources and sustainable harvesting practices.

RECOMMENDATIONS

Implement sustainable forest management practices to ensure the long-term availability and conservation of forest resources, Invest in improving road access and transportation infrastructure to facilitate better access to forest resources and markets, encourage livelihood diversification by promoting alternative income-generating activities, such as small-scale enterprises or agriculture-based initiatives, Explore opportunities for value addition to forest products through processing, packaging, and branding and Strengthen community awareness and extension services on sustainable forest management and existing government forest policies

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