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Assessing the impact of forest proximity on household economic well-being in rural Nigeria

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Abstract

Forests are essential to the welfare of rural households living in areas adjacent to forested regions. This study examines the factors influencing forest resource utilization and their subsequent impact on household welfare. This study examines households in Southwestern Nigeria, offering valuable insights into the relationship between forest resources and rural household well-being. A multistage sampling technique, supported by a structured questionnaire, was employed. Three states with the highest concentration of forests in Southwestern Nigeria were purposively selected. Twenty-five villages—Ogun (15), Ondo (5), and Osun (5)—were randomly chosen in proportion to the size of the forest areas, and 430 households were randomly selected. Descriptive statistics and multiple regression analysis were used to interpret the data. The findings reveal that 92% of the household heads were male, with a mean age of 48 years and a mean household size of 6.92 members. Farming was the primary occupation of 65.30% of the household heads, while 17.90% relied on forest resources as their primary occupation, and 40.70% engaged in forest activities as a secondary source of income. The regression analysis yielded an R^2 of 0.58, indicating that the explanatory variables accounted for 58% of the variation in per capita expenditure, which serves as a proxy for welfare. Key factors influencing household welfare included education status (0.47), duration of residence (0.12), farm size (0.15), village group membership (0.59), and age (-0.25), with varying levels of statistical significance. This study underscores the critical role of socioeconomic characteristics in shaping household expenditure and, by extension, rural household welfare. Based on the findings, it is recommended that awareness campaigns be launched to promote the sustainable management of forest resources and to encourage their responsible utilization and domestication to prevent resource depletion.

Introduction

Forests and environmental resources provide significant direct benefits to rural populations in various developing regions. Rural households extensively harvest forest products, such as timber, fuelwood, fodder, game, fruits, and medicinal plants, which contribute substantially to their livelihoods. In many cases, the total value of these resources constitutes 20% or more of a household's overall income (Ahmed et al., 2024; Idumah et al., 2021). Forests also serve as a vital source of diverse foods that complement those obtained through

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agriculture, alongside a wide array of medicines and other health-related products. Typically, forests are heavily utilized to supplement household income during specific seasons, particularly when agricultural products are in short supply. Many agricultural communities face seasonal food shortages, especially when stored food reserves are depleted and newly harvested crops are still scarce. During such periods, forest and tree-based foods become increasingly vital. Similarly, income-generating activities reliant on marketable forest products may be seasonal, year-round, or occasional, particularly when supplementary cash is needed (Chama et al., 2023). Numerous farm households sell forest products part-time to ensure food self-sufficiency throughout the year, with this being one of the few income-generating opportunities available.

Forests play a significant role in the livelihoods and well-being of populations living within and near forested areas, providing food, medicinal resources, materials, and employment opportunities, especially during challenging times. Historically, forests have been a crucial economic resource, benefiting local communities and contributing to national economies (Ntiyakunze & Stage, 2022). For thousands of years, forests, woodlands, and trees have provided land for settlement and cultivation, building materials, biomass for energy, and essential food and nutrition sources (Chama et al., 2023). The ongoing benefits of forests in sustaining global biodiversity, enhancing agricultural land fertility, and supporting dependent populations underscore their critical role in fostering sustainability. Income generated from forest-based enterprises is especially important for lower-income households that rely on low-value forest products. In contrast, wealthier households tend to pursue more lucrative economic activities (Makoudjou et al., 2017).

Forests, as vital environmental assets, are primarily classified as terrestrial ecosystems and are spread across much of the Earth's surface. The Food and Agriculture Organization (FAO) of the United Nations defines a forest as "land spanning over 0.5 hectares with trees exceeding 5 meters in height and a canopy cover of over 10 percent, or trees that have the potential to reach these thresholds." Forests exclude areas predominantly used for agricultural or urban purposes. According to FAO (2020a), more than 1.6 billion people depend on forests for essential resources such as food or fuel, and approximately 70 million people, including numerous Indigenous communities, consider forests their home. Forests offer considerable economic benefits to human society. Every part of a tree—its leaves, branches, stem, bark, fruits, seeds, and roots—holds value. Forests produce wood, timber, raw materials, vegetables, and fruits, which are economically significant (Ahmed et al., 2022; Makoudjou et al., 2017). The use of forest resources has been integral to human history, and their role in everyday life and human well-being remains irreplaceable.

Various plant and animal parts often provide multiple products either simultaneously or at different intervals. Approximately 80% of the population in developing countries relies on non-timber forest products (NTFPs) for their primary health and nutritional needs (Interreg Europe, 2024). Ntiyakunze and Stage (2022) found that rural women earned between ₦1,115 and ₦1,500 per day from gathering fruits and selling NTFPs. It is paradoxical that despite their real and potential economic value, most NTFPs are still considered minor forest products. These products are seldom reflected in statistics and are rarely the subject of research or analysis. Forest management in Nigeria has traditionally focused on timber production since the early days of formal forestry practices (Olaitan & Nosiru, 2020). Income generated from forest-related activities plays a crucial role for low-income households that rely on low-value forest products, while wealthier households generally engage in more lucrative enterprises (Bwalya, 2011; Tokede et al., 2021). Additionally, the significant economic impact of forests, both in monetary and non-monetary forms, continues to enhance human well-being. Notably, non-cash income often plays a more substantial role than cash income, particularly for rural households (Makoudjou et al., 2017).

Globally, over 1.6 billion people rely on forests in various capacities to sustain their livelihoods (United Nations Environment Programme [UNEP], 2020), with approximately 10 million individuals employed directly in forest management or conservation. Forests account for roughly 1% of the global gross domestic product (GDP) through the production of both timber and non-timber resources. Notably, non-timber products alone support as much as 80% of the population in several developing nations. According to L'Roe and Wilkie (2023), various economic valuation methods estimate the worth of ecosystem services provided by forests to be in the hundreds of billions. FAO (2019) reported that industries reliant on forest resources contributed more than US$ 450 billion to the global GDP in 2018, representing nearly 1% of the world economy, and providing formal employment to approximately 0.4% of the global workforce.

In Nigeria, from 2005 to 2014, the contribution of the forestry sector to agricultural GDP ranged from 1.2% to 1.5% annually, as reported by the Central Bank of Nigeria (2015). According to FAO (2020b), forests created employment for approximately 2 million people in fuelwood, poles, and charcoal production, as well as 80,000 in the log processing industries in Nigeria. The significance of forests for humanity cannot be overstated.

Ntiyakunze and Stage (2022) noted that forests and forest products are vital throughout human life, from birth to death. They are essential for the well-being of individuals and the provision of various products, services, and functions. Forests are among the most biologically rich terrestrial ecosystems. There is growing recognition of the benefits of incorporating indigenous knowledge of forests and forest products, as well as the sustainable usage systems that local communities have historically developed (Chama et al., 2023). It has been suggested that these benefits can only be fully realized if communities have legally recognized and secure rights to manage their forest resources. The World Bank (2025) reported that in 2015, Nigeria's forest area constituted 7.67% of its total land area, covering 69,930 km². While this is relatively high compared to West African countries like Niger (0.9% of 11,420 km²) and Togo (3.5% of 1,880 km²), it is considered average when compared to countries such as Cameroon (39.8% of 188,160 km²) and Ghana (41.0% of 93,370 km²). As reported by the National Bureau of Statistics (NBS, 2023), the forestry subsector within agriculture experienced a growth of 3.95% in Q3 2017, an increase from 3.89% in Q2 2017 and 2.08% in Q3 2016. However, this growth remains relatively small, suggesting that the forestry subsector has not been performing optimally.

According to Idumah and Awe (2017), Nigeria was a major timber exporter in the 1960s. However, the country has since become a net importer of wood, grappling with serious challenges related to its forest resources and environmental conditions. Currently, Nigeria is losing approximately 351,000 square kilometers of land to desertification, which is advancing southward at a rate of 0.6 kilometers annually. The sector's low productivity and growth, coupled with the alarming rates of deforestation and forest degradation, have raised significant concerns about policy and underscore the urgent need to explore the link between the forestry sector and economic growth. Forests provide both timber and non-timber forest products (NTFPs), and have the potential to drive economic growth without depleting forest resources. Sustainable and responsible forest management is crucial for fostering the development of Nigeria's forestry sector.

Forests can play a significant role in driving economic growth through ecotourism (Adejumo, 2017). While the infrastructure and frameworks required for ecotourism are not yet fully developed, the potential benefits should not be overlooked. Ecotourism can create employment opportunities for rural communities, offer recreational options, enhance rural infrastructure, and contribute to foreign exchange earnings. Forests are home to a wide variety of animals, trees, and shrubs, which could attract international researchers interested in studying Nigeria's tropical ecosystem. To facilitate access to these forests, local employment is crucial, which can help reduce rural unemployment and potentially improve the standard of living and overall development in these areas. Additionally, the government could generate revenue and foreign exchange by issuing licenses to research organizations conducting studies in Nigeria's forests (Ahmed et al., 2021). Beyond their direct economic contributions, both monetary and non-monetary, forests also offer significant employment opportunities. More than 13 million people are employed in the formal forestry sector, while between 40 and 60 million individuals are estimated to be involved in small and medium-sized forest enterprises within the informal sector. The non-monetary economic advantages of forests to households and national economies are believed to be three to five times larger than the recognized monetary contributions (Agrawal et al., 2013).

However, the absence of comprehensive data makes it difficult to accurately determine the number of individuals employed in the forest sector. Estimates of the people benefiting directly and indirectly from forests, through employment, forest products, and their contributions to livelihoods and income, range from 1 billion to 1.5 billion people. Unlike many other industries, forests also provide essential ecosystem services that humans depend on, even though these services are not traded and their economic value is challenging to assess. Various economic valuation approaches suggest that the economic worth of these ecosystem services provided by forests could reach hundreds of billions of dollars. The future growth of the forest sector's economic contributions will depend on the extent to which decision-makers address four key issues: first, improving the understanding and recognition of forest benefits that are not currently captured; second, deploying new technologies to increase value-added processing, manufacturing, and exchange within the sector; and third, understanding how forests contribute to other sectors, particularly tourism, industry, health, water management, and agriculture (Agrawal et al., 2013).

Poverty and lack of awareness have also contributed to the low productivity of the forestry subsector and the depletion of forest resources. Forests are typically located in rural areas, where they provide energy, food, and income for local residents, which leads to overexploitation and illegal use of these resources. Furthermore, the improper use of forest products, such as using wood for chewing sticks or wooden electric poles, can result in decreased forest productivity and overall sector performance (Adeniyi, 2016; Olaitan et al., 2021). Recently,

Nigeria's forests have also become havens for criminals, contributing to security concerns, which has led to the avoidance of many forests for safety reasons. This insecurity has further exacerbated the country's security challenges (Olaitan & Nosiru, 2020). Insecurity poses a major obstacle to the growth and development of businesses. Other challenges include the lack of adequate data on forest resource conditions, deforestation, and illegal logging activities. The absence of comprehensive data undermines the effectiveness of government policies in the forestry sector. If these issues persist and forests are not properly managed, their productivity will continue to diminish, worsening the deforestation problem (Ahmed et al., 2021).

Despite the crucial role that forests play in generating income, their contribution to enhancing well-being has been explored in only a limited number of studies (Ntiyakunze & Stage, 2022; Okang & Effiom, 2019). Households situated at the forest peripheries are often exposed to greater vulnerability due to limited assets (L'Roe & Wilkie, 2023), restricted access to essential social services, and a strong dependence on agriculture (Dokken & Angelsen, 2015). Chama et al. (2023) examined the monetary contributions of forest products to household income as a strategy to improve the livelihoods of low-income rural communities in South Ethiopia. Similarly, Idumah et al. (2021) assessed income-generating activities among communities living on the edges of forests in Cross River State, Nigeria. Andrew and Mulder (2022) conducted a study on forest income and livelihoods on Pemba Island through quantitative ethnographic methods. In another study, Azeez et al. (2018) explored the determinants of income for forest-dependent households and their involvement in forest-based enterprises in Southwestern Nigeria. Traditionally, only the marketed portion of forest resources was included in household income calculations, while income derived from freely accessible forests—those not under conservation—was often overlooked. This omission has resulted in an underestimation (Vedeld et al., 2007) or miscalculation (Mcelwee, 2008) of rural household income.

While many studies acknowledge the contribution of forests to household welfare, most previous research has been limited to analyzing forest products that are traded or included in household budget surveys. Many forest products consumed directly by households, such as fuelwood, building materials, and non-timber forest products (NTFPs), are often excluded from the calculation of economic contributions. However, these non-timber products play a critical role in supporting food security, health, and overall welfare in rural households. As a result, there is a significant research gap in terms of a comprehensive approach to measuring the contribution of all types of forest resources—both traded and directly consumed—to household welfare and rural economies in a holistic manner.

Moreover, previous research has often failed to thoroughly examine the socio-economic factors that influence the use of forest resources. Factors such as educational level, farm size, and membership in community groups—elements that can mediate the relationship between forest resource utilization and household welfare—have been insufficiently discussed. This study aims to address this gap by providing a more comprehensive understanding of how the socio-economic characteristics of households influence forest resource use and their impact on household welfare. Focusing on households in the vicinity of forest areas in Southwestern Nigeria will offer new insights into the relationship between forest resources and rural household welfare.

Methods

The study area

The research was conducted in the forested regions of rural southwest Nigeria (Table 1), which are characterized by the highest forest density in the country. This region was selected to ensure a diverse range of forest resources and activities across multiple communities. Southwest Nigeria spans a geographical area between latitudes 20°N and 6°S, and is bounded by longitudes 4°W and 6°E. It covers a land area of 114,271 km², representing 12% of Nigeria's total landmass, and consists of six states: Oyo, Osun, Ondo, Ekiti, Ogun, and Lagos. The population of the region is approximately 35.2 million (Central Intelligence Agency [CIA], 2012), with an agrarian economy, and more than 96% of its inhabitants are of Yoruba descent. The region experiences a typical equatorial climate, marked by distinct wet and dry seasons. The primary agricultural season lasts for nine months, with peak periods occurring in July and September. Rainfall varies, ranging from 2,600 mm in the coastal areas of Lagos and Ogun states to nearly 1,200 mm in the northern parts of Ondo, Ekiti, Oyo, and Osun states. The average annual rainfall is 1,480 mm, with mean monthly temperatures ranging from 24°C during the wet season to 35°C during the dry season.

Table 1. Southwestern states of Nigeria and their land area

State	Total Land Area (Km²)	Number of Forest Reserves	Area of Forest Reserves (Ha)	Forest Reserve–Land Ratio (%)	Number of Local Government Areas
Osun	9,491	11	91,268	9.62	30
Ondo	15,500	17	303,422	14.94	18
Ogun	16,086	9	275,362	17.12	20
Oyo	27,848	18	169,173	6.06	33
Lagos	3,939	3	6,873	0.30	20

Source: (field data, 2023)

Sampling technique

A multi-stage sampling approach was utilized to select participants for this study. In the initial stage, three states—Ogun, Osun, and Ondo—were purposively chosen due to their dense forest coverage and the vital role that forests play in the livelihoods of rural households within these regions. These states were selected for their high concentration of forests in Southwestern Nigeria.

In the second stage, twenty-five villages were randomly selected from the three states: Ogun (15 villages), Ondo (5 villages), and Osun (5 villages). The selection of villages was proportional to the size of the forest areas, ensuring that villages with larger forest areas had a higher likelihood of being selected. In the third stage, a total of 430 households were randomly chosen from these 25 villages, with Ogun state having 272 households, Ondo state 89 households, and Osun state 69 households. In the final stage, descriptive statistics, such as frequency, percentage, and multiple regression analysis, were used to analyse the data collected from the respondents (Table 2). Multiple regression analysis was employed to examine the relationship between forest proximity and household economic well-being, while controlling for other socioeconomic variables.

Table 2. Sampling technique description

State	Forest Reserve	Land Mass (Km²)	Estimated Number of Villages	Sampled Number of Villages	Number of Households Sampled	Number of Valid Samples
Ogun	Omo	134,720	98	12	223	213
Ogun	Olokemeji	58,880	26	3	59	59
Ondo	Akure	7,870	15	2	34	32
Ondo	Idanre	56,092	25	3	57	57
Osun	Shasha	30,834	20	3	46	37
Osun	Ago-Owu	24,847	14	2	32	32
Total	–	–	198	25	450	430

Source: (field data, 2023)

Factors influencing household welfare

This study utilized the consumption expenditure on both food and non-food items as a measure of rural household welfare, as it reflects the means through which households can achieve welfare (Azeez et al., 2018). A multiple regression analysis, specifically the double-log model, was employed to determine the effect of changes in the explanatory variables on expenditure. The functional form is expressed as: $\text{Log}(Y) = \beta_0 + \beta_1 \text{Log}(X_1) + \beta_2 \text{Log}(X_2) + \beta_3 \text{Log}(X_3) + \beta_4 \text{Log}(X_4) + \beta_5 \text{Log}(X_5) + \ldots + \beta_j \text{Log}(X_j) + \varepsilon$, where:

Y	Total Expenditure	X_6	Primary Occupation
β_1–β_{10}	Estimated Coefficients	X_7	Credit Facility
X_1	Age (years)	X_8	Farm Size
X_2	Sex (Dummy: Male = 1, Female = 0)	X_9	Member of Village Group
X_3	Education Level (years)	X_{10}	Asset Ownership (Dummy: Yes = 1, Otherwise = 0)
X_4	Household Size	ε	Error Term
X_5	Duration of Settlement		

Result and discussion

Socioeconomic characteristics of rural household heads

The socioeconomic characteristics of rural household heads provide essential background information about the respondents, including factors such as age, marital status, gender, household size, education, and primary and secondary occupations. These variables were analyzed using descriptive tools, including frequency and percentage. The analysis revealed that the proportion of male-headed households was higher than that of female-headed households. Specifically, 92% of the households were male-headed, while 7.9% were female-headed (Table 3).

This finding reflects the typical rural household structure, particularly in Southwestern Nigeria, where both men and women are primarily engaged in farming. This is consistent with Teshome et al. (2015) study in Southern lowland Ethiopia, where 90.7% of household heads were male and 9.3% were female. Additionally, this suggests that men are more likely to be involved in labor-intensive forest extraction activities, such as timber harvesting, as well as activities like snail harvesting and hunting, which are typically conducted at night and are more difficult for women to engage in (Adedigba et al., 2024; Kalaba et al., 2013).

Table 3. Distribution of households by their socioeconomic status

Variable	Category	*f*	%	Mean	Std. Deviation
Sex	Male	396	92.10		
	Female	34	7.90		
	Total	430	100.00		
Marital Status	Married	385	89.50		
	Single	24	5.60		
	Widowed	15	3.50		
	Divorced	6	1.40		
	Total	430	100.00		
Age Group (years)	Less than 25	13	3.00	47.63	11.65
	26–35	64	14.90		
	36–45	113	26.30		
	46–55	142	33.00		
	55 and above	98	22.80		
	Total	430	100.00		
Household Size	1–5	160	37.20	6.92	3.639
	6–10	218	50.10		
	Above 11	52	12.70		
	Total	430	100.00		
Education Level	No Education	84	19.50	2.38	5.016
	Primary Education	152	35.30		
	Secondary Education	150	34.90		
	Tertiary	44	10.20		
	Total	430	100.00		
Years of Residency	1–10	141	32.80	19.89	14.86
	11–20	137	31.90		
	Above 21	152	35.30		
	Total	430	100.00		

Primary Occupation	Farming	281	65.30
	Forest Activity	77	17.90
	Artisanal Activity	24	5.60
	Wage/Salary	12	2.80
	Trading	22	5.11
	Transfer	14	3.25
	Total	430	100.00

Source: (field data, 2023)

A deeper examination of Table 3 shows that most household heads were married, comprising 89.5% of the sample. In contrast, 5.6% were single, 3.5% were widowed, and 1.4% were divorced. This suggests that married households were more prevalent in forest areas, providing more support in terms of labor for various household occupations. Regarding the age distribution of household heads, 33.0% were between 46 and 55 years old, and 22.8% were aged 56 years or older. Only 3.0% of household heads were 25 years or younger. The mean age of household heads in the study area was 47.63 years (± 11.65), suggesting that the majority of household heads were within the economically active age group, making them capable of engaging in forest-based activities. This is consistent with the findings of Yemiru et al. (2010), where the average age of household heads in the Bale forest area in Ethiopia was 46.6 years.

Household size, defined as the number of individuals residing within the same household and sharing resources, was also examined. About 37.2% of households had between 1 and 5 members, 50.1% had between 6 and 10 members, and 12.8% had more than 10 members. The average household size was 6.92, which is larger than the 6.2 found by Nwera (2014) in the Ngong forest area in Nairobi. Larger household sizes ensure an adequate labor supply for production activities and offer additional income opportunities through multiple income-generating activities. Table 3 presents the distribution of respondents based on educational attainment. Approximately 19.5% of the household heads had no formal education, 35.3% completed primary education, 34.9% had secondary education, and 10.2% had tertiary education. The average number of years of schooling for the household heads was 2.38 years (± 5.02). This suggests that the majority of household heads had only a primary level of education, which may increase their dependence on forest resources. This finding aligns with the study by Yemiru et al. (2010), which found that the average number of years of education for household heads in forest areas was 1.31 years.

The length of residence in the study area varied among respondents. Approximately 32.8% of household heads had lived in the area for 1 to 10 years, 31.9% had resided there for 11 to 20 years due to migration or livelihood-seeking, while 35.3% had lived there for more than 21 years, either due to being born in the area or through inheritance. The average length of residence in the area was 19.89 years (± 14.86), which is comparable to the findings of Garekae et al. (2017), who studied socioeconomic factors influencing forest dependency in Botswana, where the average length of residency was 40.26 years (± 20.73).

The distribution of primary occupations in the study area reveals that farming was the predominant occupation among household heads, accounting for 65.3% of the respondents. These households primarily engaged in the cultivation of crops such as cocoa, kola nut, yam, cassava, palm trees, bitter kola, plantain, and bananas. Approximately 17.9% of households listed forest resource extraction as their main occupation, while 5.6% worked as artisanal laborers, 2.8% earned a wage or salary, and 8.4% were involved in trade. This indicates that relatively few individuals in the rural areas rely on artisanal work, wage employment, or trading as their primary source of income. Forest activities, however, were more common as a secondary occupation, with 40.7% of respondents engaging in these activities. This further supports the notion that forest resources act as economic safety nets during times of economic hardship, drought, seasonal food shortages, and off-farming periods.

Factors influencing household welfare

The socioeconomic factors influencing the welfare of forest-dependent households in southwest Nigeria were examined, revealing several key determinants of household economic well-being. The study found that households living near forests heavily depend on forest resources, emphasizing the vital role of forests in supporting rural livelihoods. Expenditure on food and non-food items was used as a proxy to capture the total welfare of the households. A double-log multiple regression model was estimated to examine the relationship

between socioeconomic variables as independent variables and per capita expenditure as the dependent variable, serving as a proxy for household welfare. The coefficient of determination (R^2) was 0.58.

Table 4. Regression results of socioeconomic variables influencing household welfare

Variables	Coefficient	Standard Error	p-value
Age	-0.2328***	0.0103	0.0051
Sex	-0.0314	0.0837	0.617
Educational Level	0.4732***	0.0361	0.0001
Household Size	0.0123	0.0671	0.941
Duration of Settlement	0.1239**	0.0142	0.011
Primary Occupation	0.0621	0.0210	0.435
Credit Access	-0.5414	0.0264	0.755
Farm Size	0.1543**	0.0531	0.013
Member of Village Group	0.5932*	0.0871	0.041
Owing Asset: Bicycle	0.4228	0.0763	0.214

Note: $p < 0.10$ (*), $p < 0.05$ (**), $p < 0.01$ (***)
Source: field data, 2023

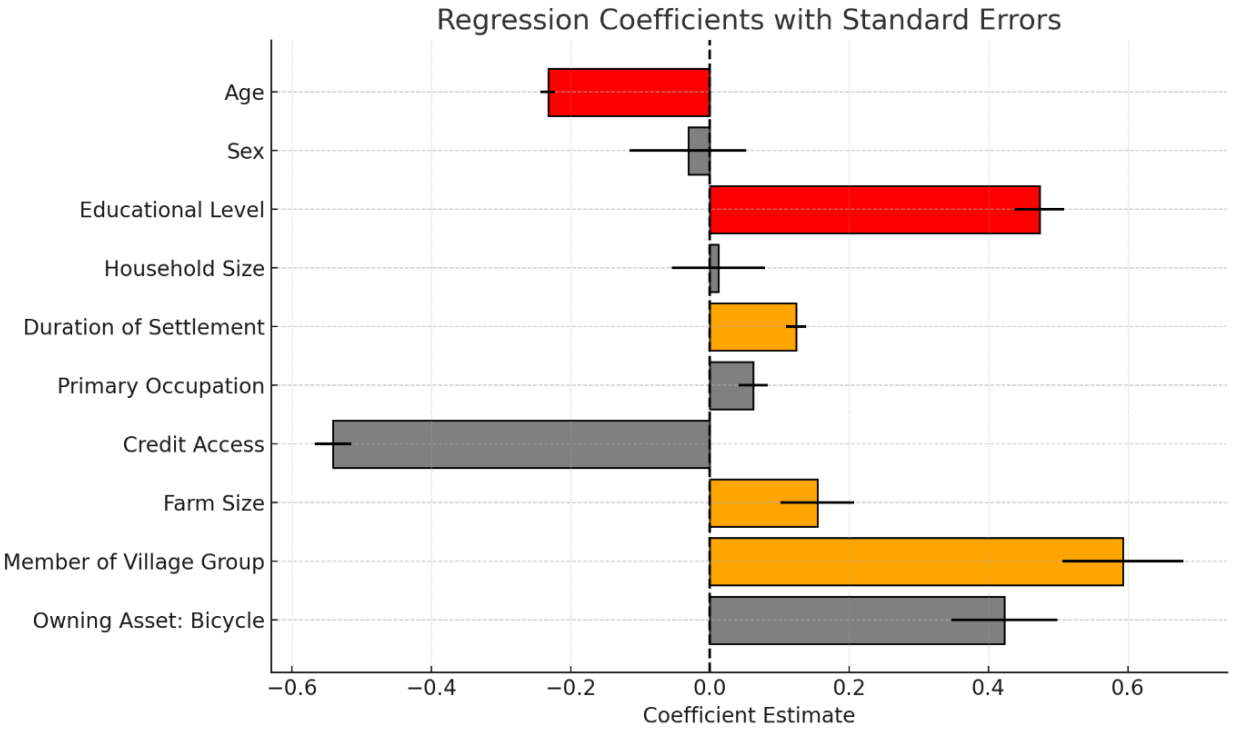

Figure 1. Regression results of socioeconomic variables influencing household welfare

Based on the results presented in Table 4 and Figure 1, the regression analysis indicates several key factors that significantly influence household welfare. First, the level of education was found to have a significant ($p < 0.01$) and positive effect on household welfare (coefficient = 0.47), indicating that higher educational attainment is associated with improved economic well-being. This finding aligns with previous research, which suggests that education enhances individuals' ability to access information, make informed decisions, and engage in income-generating activities (Adebayo et al., 2024; Yemiru et al., 2010). The duration of settlement (coefficient = 0.12) was also found to be positively significant ($p < 0.05$), suggesting that households that have resided in forest areas for longer periods tend to have acquired more knowledge of forest resources, thereby utilizing them more effectively. This underscores the importance of local knowledge and experience in forest management.

Farm size was another significant factor ($p < 0.05$), with larger farms being linked to higher household incomes and improved welfare (coefficient = 0.15). This suggests that agricultural development programs aimed at increasing farm productivity and income could positively impact household economic well-being. Membership in village groups (coefficient = 0.59) was also positively significant ($p < 0.1$), indicating that social capital and collective action play essential roles in supporting household welfare. Many forest-related activities, such as hunting and gathering, require collective effort and cooperation, underscoring the importance of social networks and community-based initiatives.

In contrast, the study found that household welfare tends to decline with increasing age (coefficient = -0.23). This suggests that older adults may face challenges in maintaining their economic well-being, potentially due to declining physical strength and the ability to work. This highlights the need for policies and programs that support older adults and promote their economic security. Overall, the study's findings emphasize the critical role of socioeconomic factors in shaping household economic well-being in forest-dependent communities. The results suggest that investments in education, agricultural development, and social capital can positively influence household welfare, while also highlighting the need for policies and programs to support older adults and promote their economic security (Table 4 and Figure 1).

However, sex was found to have a negative (coefficient = -0.031) but statistically insignificant impact on household welfare. This suggests that male-headed households were more actively engaged in forest-related activities than female-headed households, which subsequently influenced household welfare (Kabir et al., 2021). On the other hand, household size had a positive (coefficient = 0.012) relationship with welfare, indicating that larger households were more involved in forest activities, leading to improved welfare. Primary occupation also had a positive effect (coefficient = 0.062) on household welfare, as household heads relied on forests as both a safety net and an additional source of income (Nwera, 2014).

Accessibility to credit, however, was negatively associated (coefficient = -0.54) with welfare, implying that greater access to alternative sources of income reduced reliance on forest resources. Furthermore, owning a mobile asset, such as a bicycle (coefficient = 0.423), was positively related to welfare. This suggests that mobility enhances access to forests, facilitates the transportation of forest products, and supports forest-based activities (Bolaji-Olutunji & Oke, 2019). Thus, while variables such as sex, household size, primary occupation, access to credit, and asset ownership influence household welfare, they do not show statistical significance at conventional levels.

Conclusions

In conclusion, this study underscores the critical role of proximity to forests in shaping the economic well-being of rural households in Nigeria. The results highlight that forests are a crucial source of livelihood for these households, with many relying on forest resources to supplement their income. A significant proportion of household heads were male, married, and within the economically active age range. Most of the household heads had attained primary education, and farming was identified as the predominant occupation. The findings further reveal that socioeconomic factors, such as education level, duration of settlement, farm size, and membership in village groups, play a crucial role in determining household welfare.

However, the study faced several limitations, including difficulties in obtaining prices for some forest products during the analysis and limited access to roads leading to the forest communities. Additionally, the research was self-financed, which may have constrained the scope of the study. To advance understanding, future research should also explore the poverty levels among forest dwellers.

Building on these findings, sustainable forest management should be promoted through the sustainable use and domestication of forest resources to support the rural economy and improve welfare. This can be achieved through community-led forest management initiatives, agroforestry practices, and the sustainable harvesting of forest products. Moreover, investing in education and skills development programs focused on sustainable agriculture, forestry, and entrepreneurship can significantly enhance household economic well-being.

Community development programs that encourage village group membership, cooperative farming, and social support networks should also be implemented to strengthen household welfare. Supporting sustainable agricultural practices, such as agroforestry and permaculture, can improve farm productivity and increase household income. Furthermore, developing age-sensitive policies that address the needs of older adults in rural Nigeria, such as social support programs, healthcare services, and income-generating activities, is essential.

By implementing these policy recommendations, the Nigerian government and development partners can help improve household economic well-being, reduce poverty, and foster sustainable development in rural areas.

Statement of originality and plagiarism-free

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Competing interests

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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