



Constraints to Non-timber Forest Products Supply in Ago-Owu Forest Reserve of Osun State, Nigeria

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Authors' contributions

This work was carried out in collaboration between both authors. Author AFA designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Authors AAA and AFA managed the analyses of the study. Author AAA managed the literature searches. Both authors read and approved the final manuscript.

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ABSTRACT

Non-Timber Forest Products (NTFPs) are products or services other than timber that is produced in a forest and of course, are indispensable parts of the livelihood strategy of the forest's adjoining communities. Their economic potentials necessitated the need for research to be carried out on its production and constraints facing its supply in the study area. Therefore, constraints to NTFPs' supply in Ago-Owu forest reserve and its environment were investigated. Three communities (Mokore, Ajegunle and Alabameta) were randomly selected out of the six (Mokore, Ajegunle, Alabameta, Elewe, Alaguntan and Okodowo) identified communities in the study area. Their populations were sought for and samples were drawn in proportionate to their sizes: Mokore (50), Ajegunle (40) and Alabameta (20). This gave a total number of 110 respondents from which 105 questionnaires were derived for the investigations. A set of questionnaire was used to obtain data on source of NTFPs, commonly sourced NTFPs and constraints facing its supply in the study area. Data were analyzed using descriptive statistics and logit regression at $\alpha_{0.05}$. Majority of the respondents were male (69.1%) and 64.8% of them were within the age of 30-50 years. Also, most of the respondents were married (78.1%) and less than half of them (41%) had no formal education, but were predominantly farmers (72.4%). The major source of NTFPs in the study area was forest reserve (70.5%), while a total of seventeen (17) different NTFPs commonly sourced

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were documented. Constraints facing the supply of NTFPs included Climate change, Lack of finance for smooth running of the activities involved in the products' supply and price fluctuation with odds-ratio of 9.87, 5.66 and 1.92 respectively. The study established the significance of the Ago-Owu forest reserve to the livelihood of the forest dwellers. However, there is need for the establishment of new plantations to fostering production of the products as well as serving as adaptation strategies against climate change. There is also an urgent need for the State Forestry Service/government to address their areas of concern pointed out in this study for bio-prospecting, economic well-being of forest dwellers and great advantage of boost in revenue propensity of Osun State.

Keywords: NTFPs; source; constraints; forest dwellers.

1. INTRODUCTION

Non-Timber Forest Products (NTFPs) are biological products and services derived mainly from forests as well as marginal lands. Over the years, forest and its products have contributed immensely to the economic development of Nigeria [1]. Forest products can be classified into two: Timber, which constitutes the bulk of forest-based materials used for economic purposes, and Non-timber forest products. During the 1960s and 1970s, forest products earned large amounts of foreign exchange and the sector was ranked highest in employment generation. According to the World Bank [2] forestry sector earned annual foreign exchange of between 308 million to 412 million naira or about 4.2 percent of GDP, however, the situation turned around between 1970 and 1985, due to the discovery of oil.

NTFPs have been studied by researchers from many different academic fields and each field used a slightly different definitions. NTFPs include any product or service other than timber that is produced in a forest [3]. They include fruits, nuts, vegetables, fish medicinal plants, resins, essences, a range of barks and fibers, bamboo, rattans, honey, insects, animals, fodder, fertilizers, medicinal extracts, construction materials, cosmetic and cultural products, natural dyes, tannin, gums, latex and other exudates, essential oils, spices, edible oils, decorative articles, horns, tusks, bones, pelts, plumes, hides and skins, non-wood ligno-cellulosic products, phytochemicals and aroma chemicals.

NTFPs are indispensable part of the livelihood strategy of communities living in and near forests. They constitute an important source of livelihood for millions of people across the globe. The term non-timber forest product preferably called Non-Wood Forest Products in some regions of the world has been used (of recent) to replace minor forest products as it was formerly

particularized. The regional expert consultation on NTFPs for Africa held in Arusha Tanzania, defined NTFPs as all vegetal and fauna products (other than wood) derived from forests, excluding industrial round wood, wood used for energy, horticultural and livestock products [4]. Rijsoort [5] defined NTFPs as all tropical forest products plants and animals or parts thereof other than industrial timber, which are (or can be) harvested for human use at the level of self-support or for commercial purposes. The use of NTFPs is as old as human existence.

The role of NTFPs in the daily life and welfare of people all over the world cannot be over-emphasized. Different parts of a plant or animal often provide different products simultaneously and or at different times. About 80% of the population of the developing world depends on NTFPs for their primary health and nutritional needs [4]. Rural women were found to be making between ₦115 and ₦500 in fruit gathering and sale of NTFPs. It is therefore paradoxical that in spite of their real and potential value, most NTFPs remain grouped as minor forest products. These products rarely feature in statistics and are hardly studied or researched. Forest management in Nigeria has been largely focused on timber production ever since the beginning of organized forestry. However, in the recent time, there has been increasing recognition of the fact that this approach to forest management is neither conducive to sustainable management of the forests particularly of the tropical moist forest nor is it in the best economic interest of the predominantly rural societies in the tropics [6]. Due to the relative scarcity of most of the NTFPs as a result of deforestation and the present awareness of their importance, more value is being added which has made the NTFPs highly marketable.

Research at a global scale has identified that rural households draw from a diversity of income sources, adopt a range of livelihood strategies in

order to achieve and maintain a sustainable livelihood. These include the use of NTFPs both for household consumption and for sale.

In view of the above, this paper revealed the major source and commonly sourced NTFPs viz-a-viz the constraints facing its supply in Ago-Owu forest reserve and its environs, with a view to suggesting mitigations in the study area.

2. METHODOLOGY

2.1 Area of Study

The study was carried out in Ago-Owu forest reserve. It is located between latitude $7^{\circ}9'37.8144''$ N – $7^{\circ}14'0.8376''$ N and longitude $4^{\circ}4'22.728$ E – $4^{\circ}10'6.3264''$ E. Ago-Owu forest reserve is in thick forest zone and it consists of 32,116 hectares in the high forest area. There are forest adjoining communities in and around the reserve. These included Mokore, Ajegunle, Alabameta, Elewe, Alaguntan and Okodowo, in which majority of the dwellers are farmers.

2.2 Data Collection and Analysis

Three communities (Mokore, Ajegunle and Alabameta) were randomly selected out of the six (Mokore, Ajegunle, Alabameta, Elewe, Alaguntan and Okodowo) identified communities in the study area with the projected populations of 998, 201 and 801 respectively [7].

Diaw et al. [8] was adopted for the study. Hence, 10% sampling intensity was used to sample respondents in the communities where the population is less than 500, 5% for population between 500 and 1000 and 2.5% for population over 1000.

Therefore, 50 respondents were reached in Mokore, 40 in Ajegunle and 20 in Alabameta. Therefore a total of 110 questionnaires were administered while only 105 were retrieved from the field which represents 95.45% returns. Data collected were subjected to descriptive statistics and Logit regression analysis.

3. RESULTS AND DISCUSSION

3.1 Socio-economic Characteristics of the Respondents

Table 1 shows the socio-economic characteristics of the respondents in the study

area. It was revealed that 69.1% of the respondents were male while 38.1% were female. Forest reserve's environment is notable for diverse economic activities and this may be the reason why the area is dominated by male. Men strive hard to fend for their families and this may not be unconnected to the fact that men are mainly household head and the major controller of household resources, as confirmed by Edey and Mbam [9]. Hence, they tend to engage in diverse economic activities than female so as to be in financial control of their family.

In terms of age distribution, majority of the respondents (42.9%) were within the ages of 30-41 years, followed by respondents within the ages 41-50 years (21.9%) while those within the ages of 50 years and above recorded the least percentage (15.2%). It could be inferred that most of the respondents were in their economical active age. This shows that majority of the respondents were physically and economically active to engage in various production activities, including collection of NTFPs. As a matter of fact, venturing to any economic activity requires consideration of one's agility. This is in tandem with the work of Dolisca et al. [10] and Tazeze et al. [11] who reported that age is significantly related to farmer's decisions during adoption strategies.

Information on marital status of the respondents revealed that 78.21% of them were married, 11.4% were single and 10.5% were widow. Since most of the respondents were married, it is expected that they should have more responsibilities than singles. This in turn has tendency of raising their level of commitment. This agrees with the finding of Akinbile [12], who reported that marriage confers responsibility.

Data on educational status indicated that less than half of the population of the respondents (41%) had no formal education, while a substantial population had at least basic education (38.0% - primary, 23% - secondary and 3% - adult education). Proper education of the people living in forest's adjoining communities is of sinequanon if sustainability of forest resources is to be achieved. This is in line with the report of Kajembe and Luoga [13] who argued that increase in education tend to increase people's awareness on the importance of natural resources conservation for sustainable production.

Table 1. Socio-economic characteristics of the respondents in the study area

Socio-economic characteristics	Frequency	Percentage
Gender		
Male	65	61.9
Female	40	38.1
Total	105	100
Age		
20-30 years	21	20
30-41 years	45	42.9
41-50 years	23	21.9
Above 50 years	16	15.2
Total	105	100
Marital status		
Single	12	11.4
Married	82	78.1
Widows	11	10.5
Total	105	100
Educational status		
No formal education	41	39
Secondary education	23	21.9
Primary education	38	36.2
Adult education	3	2.9
Total	105	100
Occupation		
Trading	29	27.6
Farming	76	72.4
Total	105	100

Source: Federal College of Forestry Field Survey, 2019

Table 2. Sources of NTFPs collected by the respondents

Response	Frequency	Percentage
Reserve	74	70.5
Free areas	31	29.5
Total	105	100

Source: Federal College of Forestry Field Survey, 2019

Finally, data gathered on the occupation of the respondents showed that they are predominantly farmers (72.4%). This implies that farming was the main economic activity in the study area.

3.2 Sources of NTFPs

Table 2 shows that majority of the respondents (70.5%) sourced the products from the forest reserve while only 29.5% of them sourced theirs from the free areas. It could therefore be inferred that forest reserve is highly significant to the livelihood of the forest dwellers in the study area and this agrees with the finding of Zugma [14], who observed that people will use the forests to

provide for their needs; how they use these forests positively or negatively will depend on economic development.

3.3 Commonly Sourced NTFPs

Table 3 revealed the commonly sourced NTFPs in the study area. The study indicated that a total of seventeen (17) different NTFPs are commonly sourced from the study area. It was further observed that fuel wood had the majority percentage which accounted for 19.05%, followed by fruit (7.6%), medicinal plants (7.6%) and palm fruit (7.6%) while the least was charcoal with 1.90%. This agrees with the work of [15]; [16] who observed in their studies that

Table 3. Commonly sourced NTFPs in the study area

Common name	Frequency	Percentage %
Bamboo	7	6.7
Bush-meat	7	6.7
Charcoal	2	1.9
Fruit	8	7.6
Fuel wood	20	19.1
Honey	3	2.9
Locust bean	3	2.9
medicinal plant	8	7.6
Mushroom	5	4.8
Vegetable	5	4.8
wrapping leaf	5	4.8
Bark	7	6.7
Gum	3	2.9
Snail	7	6.7
Insect	4	3.8
Seed	3	2.9
Palm fruit	8	7.6
Total	105	100

Source: Federal College of Forestry Field Survey, 2019

many of NTFPs are being used by locals for the improvement of their livelihood status; these include leaves, flowers, fruits, branches, gum/resins, roots etc.

3.4 Constraints Facing the Supply of NTFPs

Logit regression model for constraints facing the supply of NTFPs in the study area.

3.5 The Binary Model

Table 4 presents binary regression obtained for the constraint facing NTFPs in the study area.

$$CFNTFPs = 0.67 + 2.29CCHA + 1.73LFIN - 1.53LDA - 0.67IPF - 0.58EFLA - 0.88HCT - 0.67PRNE - 0.67ISF - 0.65PFL \text{ ---- (1)}$$

N = 105, Final Loss = 34.86, Chi-Square (df, 9) = 19.90, P = 0.0185

Odd ratio (Unit Change): Constant (5.53); CCHA (9.87); LFIN (5.66); LDA (0.22); IPF (0.51); EFLA (0.56); HCT (0.42); PRNE (0.51); ISF (0.51); PFL (1.92).

Where,

CFNTPs = Constraints facing the supply of NTFPs (Dependent variable)

While independents variables includes:

- CCHA = Climatic Change
- LFIN = Lack of Finance
- LDA = Low Demand
- IPF = Inadequate Processing Facilities
- EFLA = Enforcement of Forest Law
- HCT = High Cost of Transportation
- PRNE = Poor Road Network
- ISF = Inadequate Storage Facilities
- PFL = Price Fluctuation

Model presented above for Ago-Owu Forest Reserve and its environs gave overall significant fit to the data judging from χ^2 value that was significant at $p < 0.05$. Climate Change (CCHA) had the highest odd-ratio of 9.87, followed by Lack of Finance (LFIN) with the odd-ratio of 5.66 and Price Fluctuation (PFL) with the odd-ratio of 1.92 respectively.

Therefore, the factors identified to be responsible for inadequate supply of NTFPs in the study area were climate change (CCHA), Lack of finance (LFIN) for smooth running of the various activities involved in the products supply and Price fluctuation (PFL). There was sufficient evidence that the estimated coefficients for the factors were not zero. This implies that the regression parameters in the model were statistically significant. In other words, the higher the value of odds-ratio the more likelihood these factors responsible for inadequate supply of NTFPs in the study area. Hence, it clearly indicated the variable(s) i.e factors that mostly influence the supply of NTFPs in the study area.

Table 4. Logit binary of constraints facing the supply of NTFPs in the study area

Dependable Variable (CFNTFPs) = Constraints Facing NTFPS (Yes = 1. No = 0)

Independent variables	Coefficient	Odd ratio
Whether presence of (CCHA) is responsible for inadequate supply of NTFPs	2.29	9.87*
Whether presence of (LFIN) is responsible for inadequate supply of NTFPs	1.73	5.66*
Whether presence of (LDA) is responsible for inadequate supply of NTFPs	-1.53	0.22
Whether presence of (IPF) is responsible for inadequate supply of NTFPs	-0.67	0.51
Whether presence of (EFLA) is responsible for inadequate supply of NTFPs	-0.58	0.56
Whether presence of (HCT) is responsible for inadequate supply of NTFPs	-0.88	0.42
Whether presence of (PRNE) is responsible for inadequate supply of NTFPs	-0.67	0.51
Whether presence of (ISF) is responsible for inadequate supply of NTFPs	-0.67	0.51
Whether presence of (PFL) is responsible for inadequate supply of NTFPs	0.65	1.92*
Model χ^2 (df, 9) = 19.90; Final Loss = 34.86; P<0.05		

*Significant at $p<0.05$; ns = Not Significant

The implication was corroborated by Deeks [17]; Bland and Altman [18] that the logit model provides information on the consequences of one variable on the other. Therefore, existence of these factors poses serious challenges to adequate supply of NTFPs in the study area.

4. CONCLUSIONS AND RECOMMENDATIONS

The study established the fact that Ago-Owu forest reserve is highly significant to the livelihood of people living in and around the reserve, since most of the NTFPs collected are sourced from there. The study also revealed the huge potentials of the reserve in terms of diverse NTFPs production which are notable for high economic value. Constraints facing the supply of NTFPs in the study area were climate change, lack of finance for the smooth running of the various activities involved in the products' supply and price fluctuation.

Therefore, it is suggested that establishment of privately and community-owned plantations stocked with both the exotic and indigenous tree species should be encouraged by the Osun forestry service in the study area so as to enhancing the production of NTFPs to the social, environmental and economic benefit of the community dwellers and even beyond. Since some of the implications of climate change

effects are reduction in yield, undefined season, pest and disease outbreak etc., afforestation should be adopted by forest dependent farmers in the study area as an adaptation measure against climate change. It may even be in form of Agro-forestry since it has a particular role to play in mitigation of atmospheric accumulation of greenhouse gases, because it has potential for carbon sequestration, improve soil nutrient uptake, water percolation, aeration, water recharge and soil water balance. For the smooth running of the various activities involved in the products' supply, government of Osun State should try as much as possible to empower the forest dwellers by giving them some financial incentives (Credit facilities) to enhancing the supply of the products. It is understandable that price fluctuation may be seasonal dependent, but nevertheless NTFPs' collectors should always try to fix reasonable prices so as to ease the evacuation and supply of the products to the end users.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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