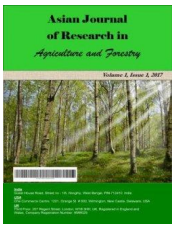

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Determinants of the Quantity of Non-timber Forest Products Collected from Forests of the International Institute of Tropical Agriculture in Ibadan, Nigeria

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Authors' contributions

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

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ABSTRACT

The study was carried out to access the determinants of the quantity of non- timber forest products collected from Block A and Golf course forests of International Institute of Tropical Agriculture (IITA). Samples of one hundred and five respondents were randomly selected and interviewed using well structured interview schedules. Data collected were analysed using descriptive statistics and multiple regressions. The study showed that all the respondents involved in the collection of NTFPs were female and native of the area with the average age of 51 years. Majority were not educated, were married with 5-7 household size, 11-20 years of experience and are closer to forest by 2-5 km. The study further revealed that eight types of NTFPs which includes firewood, bamboo,

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palm kernel, water leaf, pseudocolocynth, gum tree, Oil bean seed and drum tree were collected with the total weight of 12,385 kg. Firewood formed the highest quantity of NTFP collected. There was significant relationship between the quantity of NTFPs collected and the factors that are affecting it. Labour cost, transportation cost and extent of sales were significant at 1%, cost of tools and household size were significant at 5% while years of experience was significant at 5% probability level thus play a crucial role in the quantity of NTFPs collected. The problems militating against the collection of NTFPs were cost of transportation, restricted access to the forest, seasonality and perishability of the NTFPs. Thus, it can be concluded that IITA forest serves as a reservoir of NTFPs which are useful for food, medicine, cooking and wrapping or preservation of food items. The study therefore recommends that studies should be conducted on the domestication and conservation of NTFPs that are useful especially for medicinal purposes and for food to reduce pressure on the forest and ensured continuous supply and availability to the people that needs them.

Keywords: IITA forests; NTFPs; determinants; descriptive statistics; multiple regression; respondents; randomly.

1. INTRODUCTION

Non-Timber Forest Products (NTFPs) are an important source of livelihoods for the rural populations all over the world. Rural communities depend on forest for fulfilling subsistence needs like food, fodder, litter, and fuel wood. Different studies done by different organizations reveal that a significant proportion of the world rural population is highly dependent upon forest resources. For instance, according to an estimate by World Commission of Forestry and Sustainable Development, 350 million depend almost entirely for their subsistence needs on forests, and another 1 billion depend on forests and trees for fuel wood, food, and fodder [1]. Similarly, the [2] reports that 1.6 billion depend to varying degrees on forest for their livelihoods, with 350 million living in or near dense forests depending on them to a high degree. In the same line, the Food and Agriculture Organization (FAO) estimates that 80 percent of the population in the developing countries relies on NTFPs for nutritional and health needs [3]. Though the numbers estimated by different organizations may vary, these studies suggest that there is quite a significant proportion of population living in or nearby the forests and depending upon it to some degree. Forest products act as buffers during the times of hardships and are often used as safety nets where the rural community depends on these resources to bridge the hunger gaps [4,5,6,7]. The products could be also noncommercial such as plantation [8].

Non-Timber Forest Products (NTFPs) consist of goods of biological origin derived from the forest, other wooded land and trees outside the forest [9]. [10] referred to all products obtained from plants of forest origin and host plant species yielding products in association with insect and animals or they are parts and items of mineral origin except timber as Minor Forest Products (MFP) or Non-Wood Forest Products(NWFPs) or Non-Timber Forest Products (NTFPs). Non-timber forest products (NTFPs) are wild plant and animal products harvested from forests, such as wild fruits, nuts, edible roots, honey, palm, medicinal plants, snails, and so on. Nigerians collect these products daily and many according to [11] engage in collection and selling of these NTFPs as a means of livelihood. [12] stated that a large proportion of the rural population earn their livelihoods from the collection or extraction and sale of Non-Timber Forest Products thereby improving the quality of life and standard of living of rural population living near forest lands. In addition, a large proportion of rural household depend on forest products to meet some of their nutritional needs, and a considerable number obtain part of their income from the sale of tree products.

Non- Timber Forest Product (NTFPs) contributes significant to the livelihood of Nigeria's fast growing population. Research carried out by [13] pointed out that there was a heavy dependence on NTFPs in the western part of Nigeria while in the southern part, women depend heavily on NTFPs. For many women this is the only way to earn an independent income [14]. Generally, many Nigerians depend on NTFPs for food, fibre and herbal medicines. In recent times there has been a reasonable and noticeable shift from the earlier preference in favour of orthodox medicine to greater acceptance of traditional (herbal) medicines in Nigeria as in many other countries

worldwide [15]. Over 90% of Nigerians in rural areas and 40% in urban areas depend partly or wholly on traditional medicine [16]. It has gained global attention due to its contribution to the household economies and food security. [17] asserted that about 80 percent of the population of developing countries use NTFPs to fill health and nutritional needs.

The Block A forest and Golf forest of the International Institute of Tropical Agriculture (IITA) is a repository of useful timber and non-timber forest products [18] and is serving as a source of livelihood for villagers living in adjoining villages of the perimeter fence of IITA for over forty years. The villagers are allowed into the forest to collect non- timber forest products (NTFPs) such as water leaf, vegetables, palm products, fire wood, medicinal plants and other forest products.

However, despite the importance of non-timber forest products in sustaining livelihood and poverty smoothening in rural communities, especially those living on the forest fringes of Nigeria. There has been little or no empirical research on the determinants of quantity of non-timber forest products collected from the forest especially Block A and Golf course forests of International Institute of Tropical Agriculture (IITA), Ibadan, Oyo state, Nigeria.

1.1 Objectives of the Study

The broad objective of this study was to access the determinants of the quantity of non- timber forest products collected from Block A and Golf course forests of International Institute of Tropical Agriculture (IITA), Ibadan, Oyo state, Nigeria.

The specific objectives are to:

i. Describe the socio-economic characteristics of the respondents.
ii. Identify the types, parts, quantity and uses of non- timber forest product collected.
iii. Assess the determinants of the quantity of non- timber forest products collected.
iv. Identify the problems facing the collectors of non timber forest products.

1.2 Hypothesis of the Study

The hypothesis of the study was stated in the null form as follows:

Ho: There was no significant relationship between the quantity of non- timber forest products collected and the factors that are affecting it.

2. METHODOLOGY

2.1 The Study Area

The study area was International Institute of Tropical Agriculture (IITA) forests, Ibadan, Oyo State, Nigeria. IITA is located at longitude 7°30' 8''N, latitude 3°54' 37''E and 243m above sea level [19]. In 1965, the Federal Government of Nigeria allocated some 1000 hectares of land for the establishment of the main IITA campus. By 1987, the clearing of land for research plots, housing and other facilities was largely completed and it was decided to preserve the remaining land as an informal forest and nature reserve. Today the forest and nature reserve at IITA covers nearly 300 hectares and are in three locations. The first is found at west bank area and the size of the forest is about 150 ha, the second is located at Block A and the size is about 50 ha, the third is at golf course area covering about 100 ha. The forest at west bank area is under active protection by the rangers while forest at Block A and Golf area serves as extractive reserves where rural women who once lived in the villages where IITA is presently located are allowed to collect forest resources (NTFPs) such as firewood, water leaf, bitter leaf, palm (nuts, fruits, fronds) etc.

2.2 Land Use History

Prior to the acquisition of land by IITA through the Federal Government of Nigeria, the most extensive land use pattern was arable and tree crop farming and about 3000 people lived in about twenty eight villages scattered in this area.

2.3 Climate

The site falls within humid tropical lowland region with two distinct seasons: the longer wet season and shorter dry season. The wet season last for eight months and it extends from March to October while the dry season last for four months from November to February. The rainfall pattern is bimodal with an annual total which ranges from 1,300-1,500 mm most of which falls between May and September. The average daily temperature ranges between 21°C and 23°C while the maximum is between 28°C and 34°C. Radiation is about 5285MJ/m^2/year. Mean

relative humidity is in the range of 64% to 83% [19].

2.4 Vegetation

The natural vegetation in this area could be classified as tropical semi-deciduous forest with various pockets of vegetation types ranging from derived savanna, secondary forest and riparian types. According to [20], the area resembles mature Guinea-Congo lowland rainforest with scattered emergence of trees which include *Ceiba*, *Milicia* and *Terminali*a spp. Large clumps of bamboo (*Bambusa vulgaris*) are common; stands of *Raphia farinifera* are found along watercourses while scattered oil-palms *Elaeis guineensis* grow in both low-lying and the relatively better-drained upland areas. Thickets of climbers grow in openings where the secondary nature of the forest is most apparent.

2.5 Method of Data Collection

One hundred and five respondents were selected randomly from the population of collectors of non- timber forest products from IITA forests. Data were collected from the respondents by interview method with the aid of structured questionnaire. The respondents were tagged and monitored for the name, types and part of NTFPs collected for a whole month. The quantity of NTFPs collected were weighed and recorded for each of the respondent.

2.6 Data Analysis

Data were analyzed using descriptive statistics to summarize the data collected. Multiple regression analysis involving the use of Ordinary Least Square (OLS) was employed to determine the functional relationship between the dependent variable (Y) (quantity of NTFPs collected by the respondents) and set of explanatory variables (X) affecting the collection of NTFPs. Three functional forms were tried, namely; the linear function, the semi log and the double log function. The best functional form based on coefficient of multiple determination- R^2, F –statistics, t – ratio and a-priori expectations as well as the number of significant variables was chosen to explain the relationship. The data involving the null hypothesis was tested at 10%, 5% and 1% level of significance to determine the probability of association between variables. The model in its general form is;

$$Y = F(X_1, X_2, X_3, X_4, X_5, \text{-------} X_{12} + \mu_i) \quad \text{equation (1)}$$

The explicit of these functions are as follow;
Linear function;

$$Y = b_o + b_1 X_1 + b_2 X_2 + b_3 X_3 \text{ ------- } + b_{12} X_{12} + \mu_i \quad \text{(equation 2)}$$

Semi log function;

$$Y = b_o + b_1 \log X_1 + b_2 \log X_2 + b_3 \log X_3 \text{ ------+ } b_{12} \log X_{12} + \mu_i \quad \text{(equation 3)}$$

Double log:

$$\text{Log } Y = b_o + b_1 \log X_1 + b_2 \log X_2 + b_3 \log X_3 \text{ ------- } + b_{12} \log X_{12} + \mu_i \quad \text{(equation 4)}$$

Where;

bo = Constant,
b_1 to b_{12} = regression coefficient,
μ_i = error terms

X_1 = Cost of tools (₦), X_2 = Labour cost (₦), X_3 = transportation cost (₦), X_4 = Nearness of respondents to the forest (Distance in km), X_5 = Age of respondents (Years), X_6 = Household size (Actual number of household members), X_7 = Main occupation, X_8 = Level of education (years of schooling), X_9 = Marital status, X_{10}= Market location (Rural area= 1, 0 otherwise), X_{11}= Years of experience in the collection of NTFPs (Years), X_{12}= Extent of sale (level of patronage: Average number of patronage per day)
Y = Quantity of NTFPs collected (Kg).

3. RESULTS AND DISCUSSION

3.1 Socio-Economic Characteristics of the Respondents

Table 1 revealed the socio- economic characteristics of respondents. All the respondents involved in the collection of non-timber forest products from Block A and Golf course forests of IITA are female. This agreed with the findings of [21] which stated that female is mostly engaged in NTFPs collection, while males are involved in other income generating activities.

The average age of the collectors was 51 years. The implication of this is that most of the respondents are slightly above their active age with little ability of going about the gathering of NTFPs. [22] in her findings described age of 20-50years as the active age group. However, most of the respondents were within the age (16-64)

defined by [23] as economically productive in population. 80.95% had the highest age range of 41- 60 years while 13.33% and 5.72% falls between 20-40 and 61-80 years respectively. Studies have found that young people may be more dependent on forest products than elderly people [24,25] this is because the young may have multiple uses for the forests and forest product collection is labor intensive. On the other hand, elderly people may not risk going into the forest to undertake forest activities particularly because they may not have the strength to carry out forest-related activities and thereby rely on less arduous activities [26,27,28].

The percentage of the collectors that were married was 78.10% while 21.90% were widowed. In terms of the household size, 52.38% had household size of 5-7. 26.67% had 8-10 while 20.95% had 2-4 household size, the collection of NTFPs will serve as financial support to the husband and children. Larger households collect more forest products and clear more forest compared to smaller households primarily because the large households have more workers and more people to feed [29]. Studies have found that larger families have a greater demand for natural resources and more labor to fulfill this demand, leading to higher forest income [29,30]. However, it appears that household composition, gender and age structure are more important than the mere numbers.

Majority (82.86%) of the respondents were not educated while only 17.14% had primary six educations. According to [31] and [32], the primary requirements to work with NTFPs is knowledge of product, their uses and location, and the time, energy and mobility to access the products. These requirements are fulfilled with increasing years of education among the respondents rather than formal education. Studies find that education makes NTFP collection increasingly unprofitable due to the higher opportunity costs of labor. Moreover, education creates opportunities for off-farm employment, self employment and better job facilities outside the forest area that reduce dependence on forest resources [24,30].

The years of experience of Non- Timber Forest Products collectors from IITA forests show that 48.57% had between 11-20 years experience while 32.38%, 12.38% and 6.67% had 1-10, 21-30 and 31-40 years of experience respectively. The main occupation of the respondents was crop farming which accounted for 62.86% while only 37.14% were engaged in trading. The minor occupation of all the respondents was NTFPs collection. All the respondents were native of the area and once had villages on the land area where the present IITA is located. The nearness of the forest to the respondents shows that 60% and 20% were near to the forest by 2 km and 4 km while 12.38% and 7.62% were closer to the forest by 3 km and 5 km respectively. The extent of sales of NTFPs by the respondents reveals that 58.10% and 40.95% had between 1-3 and 4-6 customers while only 0.95% has between 7-9 customers. 92.38% consumed and at the same time sold the NTFPs collected from the forests, 4.76% sold the products while only 2.86% consumed the NTFPs collected.

3.2 Types, Parts and Quantity of Non-Timber Forest Products Collected

Table 2 showed the types, parts and quantity of non timber forest products collected from Block A and Golf course forests of IITA as at the time of the study. The type of NTFPs collected includes firewood, bamboo, palm kernel, water leaf, pseudocolocynth, gum tree, Oil bean seed and drum tree. The parts of NTFPs collected are stems, branches, seeds, leaves and pods. The total quantity of non- timber forest products collected was 12,385 kg. Firewood recorded the highest quantity of 9,967 kg. [33] stated that 92% of rural households use firewood as their main cooking fuel, whereas over 50% of the urban population uses charcoal in many sub-Saharan countries. This was followed by bamboo and palm fruits/ kernel with 2,150.50 kg and 138.50 kg. The quantity of water leaf, pseudocolocynth and gum tree was 98.90 kg, 20.50 kg, and 5.50 kg respectively. Other such as oil bean seed and drum tree had 2.6 kg and 1.5 kg collection. Some of these non- timber forest products were collected in and at the edges of block A and Golf course forest. The NTFPs collected were used for cooking, production of palm oil and palm kernel oil, food, medicine and wrapping of food items. According to [34,35] and [36]) the historical dependency of human beings on forests is still intact either directly or indirectly for fulfilling their various needs, such as food, fodder, fiber, medicine and cultural epistemic. The age-old traditional interactions of people living in forests and forest fringes with their surrounding natural resources, ecosystems and environment have developed some specific knowledge on the use of forest and forest resources [34,35,36]. Most of these forest

dwellers are tribal communities who collect various forest produce for their consumption and income generation. Despite the influence of modernization, cultural diffusion and market forces, most of the traditional practices, are still in existence within tribal communities [36] and [37]. Being the worshipper of nature and natural resources, many cultural practices of these forest dwellers depend on the forests resources [38]. Besides, the collection and consumption of forest produce are determined by certain cultural norms and institutions. The selection of plant species for use depends on the knowledge and experiences however, the dependency or exploration of forest resources is determined by the richness or poorness of the produces or the availability of the resources [37]. The creativity, evolution and accumulation of knowledge depend on the locality, availability and opportunity to access the resources.

3.3 Determinants of the Quantity of Non-Timber Forest Products Collected

The determinants of the quantity of non- timber forest products collected from Block A and Golf course forests of IITA was tested by subjecting some measured variables to regression analysis. Three functional forms were used. These include the linear, semi-log and double log function. The results are presented on Table 3. The tree functional forms tried were examined in terms of the significance of each functional form as indicated by F- statistics, the magnitude of the coefficient of multiple determinations (R^2), a-priori expectations which include the magnitude and sign of the coefficient. Using the above criteria, the Linear function was chosen as the lead equation based on the statistical criteria such as coefficient of multiple determination- R^2, value of F-ratio, t-ratio, a-priori expectations as well as the number of significant variables. Results of the analysis revealed that the coefficient of variable X_1 (cost of tools), X_2 (labour cost), X_3 (transportation cost), X_4 (nearness to the forest), X_5 (age of respondents), X_9 (marital status), X_{10} (market location) and X_{12} (extent of sales) were positively related to the quantity of non timber forest products collected in accordance with the a-priori expectation. Thus, 0.091, 0.312, 0.325, 0.051, 0.064, 0.027, 0.025 and 0.570 unit increase each in X_1, X_2, X_3, X_4 X_5, X_9,X_{10} and X_{12} will bring about one unit increase respectively in the quantity of non timber forest products collected by the respondents. On the other hand, the coefficient of variables X_6 (household size), X_7 (main occupation), X_8 (level of education), and X_{11} (years of experience) were found to be negatively related to the quantity of non timber forest products collected by the respondents. That is 0.143, 0.061, 0.045 and 0.081 unit increase in each X_6, X_7, X_8, and X_{11} will result in corresponding one unit decrease respectively in quantity of non timber forest products collected by the respondents.

The R^2 value of 0.705 means that the estimated (explanatory) variables included in the model explained 70.5% of variation in quantity of non-timber forest products collected by the respondents while the remaining 29.5% was due to error term. Variables X_2 (labour cost), X_3 (transportation cost) and X_{12} (extent of sales) were significant at 1% probability level while variable X_1 (cost of tools) and X_6 (household size) were significant at 5% level of probability. Variable X_{11} (years of experience) was significant at 10% probability level respectively. The coefficients of significant variables are explained thus:

The coefficient of cost of tools represented by variable X_1 had a positive sign in accordance with a priori expectation and significant at 5 percent probability level. This implies that good tools will enhance the collection of more NTFPs.

The coefficient of labour cost (X_2) had a positive sign in accordance with a priori expectation and significant at 1 percent probability level. This implies that the higher the number of labour employed the higher the quantity of NTFPs that will be collected.

Transportation cost coefficient (X_3) had a positive sign in accordance with a priori expectation and significant at 1 percent probability level. The higher the quantity of NTFPs collected the higher will be the cost of transportation.

The coefficient of house hold size (X_6) had negative sign in contrary to a priori expectation but significant at 5 percent probability level. This means that most of the respondents are not making use of members of their family in the collection of NTFPs. This also reflects the fact that NTFPs collection is not the main occupation of the respondents, they have other sources of income from crop faming and trading.

The coefficient of years of experience (X_{11}) had negative sign in contrary to a priori expectation but significant at 10 percent probability level. This implies decreasing the years of experience of the

respondents increases the quantity of NTFPs collected from the forest.

The coefficient of extent of sales (X_{12}) had positive sign in accordance with a priori expectation and significant at 1 percent probability level. This implies that the higher the number of customers the higher the quantity of NTFPs collected by the respondents.

Table 1. Socio-economic characteristics of non- timber forest products collectors

Socio economic characteristics	Frequency	Percentage
Sex		
Male	-	-
Female	105	100
Age		
20-40	14	13.33
41-60	85	80.95
61-80	6	5.72
Marital Status		
Married	82	78.10
Widowed	23	21.90
Household size		
2-4	22	20.95
5-7	55	52.38
8-10	28	26.67
Level of Education		
Primary six	18	17.14
Not educated	87	82.86
Years of Experience of NTFPs collection from IITA forests		
1-10	34	32.38
11-20	51	48.57
21-30	13	12.38
31-40	7	6.67
Main occupation		
Crop farming	66	62.86
Trading	39	37.14
Nativity		
Yes	105	100
No	-	-
Nearness to Forest (Km)		
2	63	60
3	13	12.38
4	21	20
5	8	7.62
Extents of sales		
1-3	61	58.10
4-6	43	40.95
7-9	1	0.95
Uses of NTFPs		
Sold and consumed	97	92.38
Sold	5	4.76
Consumed	3	2.86

Source: Computed from field survey data, 2016.

Table 2. List of non-timber forest products, parts and quantity collected from IITA forest as at the time of survey

S/n	Scientific name	Common name	Yoruba name	Part collected	Uses	Quantity collected (kg)
1	*Adenopus breviflorus* Benth.	Pseudocolocynth, Lagenaria	Tagiri	Pod	Medicine	20.50
2	*Bambusa vulgaris*	Bamboo	Oparun	Stem	Cooking	2,150.50
3	*Cordia millenii*	African cordial, Drum tree	Omo	Leaves	Wrapping	1.5
4	*Elaeis guineensis* Jacq.	Palm fruit & Palm kernel	Eyin, Ekuro/Ira	Palm seed	Palm Kernel	138.50
5	*Pentaclethra macrophylla* Benth.	Oil bean seed	Pala, Igbogho	Leaves	Wrapping	2.6
6	*Talinum triangulare*	Waterleaf	Gbure	Leaves	Food	98.90
7	*Tetrapleura tetrapetra* (Schum. & Thonn.) Taub.	Gum tree	Aidan	Pod	Medicine	5.50
8		Firewood	Igi Idana	Stem, branches	Cooking	9,967
	Total					12, 385

Source: Computed from Field Survey Data, 2016.

Table 3. Determinants of the quantity of non- timber forest products collected from IITA forest by the respondents

Model	Coefficients			t	Significant
	Unstandardized coefficients		Standardized coefficients		
	B	Std error	Beta		
Constant	4.444	13.474		0.330	0.742
X_1 (Cost of tools)	0.049	0.022	0.091	2.218	0.028**
X_2 (Labour cost)	0.073	0.014	0.312	5.251	0.000***
X_3 (Transportation cost)	0.309	0.042	0.325	7.346	0.000***
X_4 (Nearness to forest)	1.134	1.042	0.051	1.088	0.278
X_5 (Age of respondents)	0.198	0.200	0.064	0.987	0.325
X_6 (Household size)	-1.791	0.688	-0.143	-2.605	0.010**
X_7 (Main occupation)	-2.942	2.609	-0.061	-1.128	0.261
X_8 (Educ. Level)	-0.425	0.617	-0.045	-0.689	0.492

Model	Coefficients			t	Significant
	Unstandardized coefficients		Standardized coefficients		
	B	Std error	Beta		
X_9 (Marital status)	1.466	2.396	0.027	0.612	0.541
X_{10} (Market location)	1.709	3.817	0.025	0.448	0.655
X_{11} (Years of experience)	-0.215	0.131	-0.081	-1.643	0.102*
X_{12} (Extent of sales)	9.626	0.798	0.570	12.065	0.000***
Y= Quantity of NTFPs Collected					
F- Statistics	34.056				0.000***
R^2	0.705				
Adjusted R^2	0.685				

Source: Computed from field survey data, 2016
**** Significant at 0.01, ** Significant at 0.05, * Significant at 0.1*

Table 4. Distribution of respondents based on problems encountered in the collection of Non-Timber Forest Products

S/n	Problems	Frequency*	Percentage
1	Restricted access to the forest	105	33.33
2	Seasonality	85	26.98
3	Transportation	71	22.54
4	Perishability	55	17.47

*Source: Computed from Field Survey Data, 2016; * = Multiple responses*

The F-value of 34.056 obtained shows that the overall equation (model) was statistically significant at 1% probability level. With this result, the null hypothesis (Ho) which says there was no significant relationship between the quantity of non- timber forest products collected and the factors that are affecting it was rejected, implying that the variables included in the model determines the quantity of non timber forest products collected by the respondents. This simplifies the regression equation to:

$Y = 0.091\ X_1^{**} + 0.312\ X_2^{***} + 0.325\ X_3^{***} + 0.051\ X_4 + 0.064\ X_5 - 0.143\ X_6^{**} - 0.061\ X_7 - 0.045\ X_8 + 0{,}027\ X_9 + 0.025\ X_{10} - 0.081\ X_{11}^{*} + 0.570\ X_{12}^{***} + \mu_i$

3.4 Problems Facing the Collectors of Non- Timber Forest Products

The problems facing the respondents in the collection of non- timber forest products as presented on Table 4 includes restricted access to the forests, seasonality of NTFPs, transportation cost and perishability of the products. All the respondents (33.33%) complained of restricted access to the forests that is they are only allowed to enter into the forest twice a week and they are not allowed to enter into west bank forest. 26.98% and 22.54% of the respondents emphasized that the seasonality and high transportation cost of NTFPs was a problem. Only 17.47% of the respondents had problem of perishability of NTFPs.

4. CONCLUSION

Based on the findings of the study, it can be concluded that all the respondents involved in the collection of NTFPs from Block A and Golf course forests of IITA are female; all were native of the area and once had villages on the land area where the present IITA is located. They had the highest age range of 41- 60 years and average age of 51 years. Majority of them are married with 5-7 household size, 11-20 years of experience in the collection of NTFPs and are not educated. The main occupation of the respondents was crop farming and trading while NTFPS collection serves as the minor occupation. All the respondents were near to the forest by 2-5 km, having 1-9 customers per day, consumed and at the same time sold the NTFPs collected from the forests. From Table 2, it can be concluded that eight types of NTFPs are collected from the forests with total weight of 12, 385kg per month. From Table 3, it can be concluded that the major determinants of the quantity of NTFPs collected are labour cost, transportation cost and extent of sales. Others include cost of tools, household size and years of experience of the respondents in the collection of non- timber forest products. Based on the data presented on Table 4, it can be concluded that restricted access to the forests, seasonality, high transportation cost and perishability of NTFPs were the problems facing the collectors of NTFPs. Thus, it can be concluded that IITA forest serves as a reservoir of NTFPs which are useful for food, medicine, cooking and wrapping or preservation of food items

5. RECOMMENDATION

1. The quantity, types and frequency of collection of NTFPs from the forests should be moderated by the forest unit of IITA to prevent degradation and loss of the forest for future generations.
2. Studies should be conducted by the relevant research institute on the domestication and conservation of NTFPs that are useful especially for medicinal purposes and for food to reduce pressure on the forest and ensured continuous supply and availability to the people that needs them.

3. Government at all levels and relevant research institute should made efforts in training the people on the domestication of these NTFPs so as to achieve sustainability

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. WCFSD. Our Forests Our Future. Cambridge: Cambridge University Press, World Commission on Forests and Sustainable Development; 1999.
2. World Bank. A Revised Forest Strategy for the World Bank Group. World Bank, Washington D.C; 2001.
3. FAO. Harvesting of the non-wood forest products. Rome: Food and Agriculture Organization of the United Nations; 2003.
4. Neumann RP, Hirsch E. Commercialization of non-timber forest products: Review and analysis of research. Bogor: Centre for International Forestry Research; 2000.
5. Sills EO, Lele S, Holmes TP, Pattanayak SK. Non-timber forest products in the rural household economy, In: Sills EO, Abt KL. (eds.), Forests in a Market Economy, Netherlands: Kluwer Academic Publishers. 2003:259-281.
6. Belcher BM. Forest product markets, forests, and poverty reduction. International Forestry Review. 2005;7(2):82-89.
7. Maharjan KL, Khatri-Chhetri A. Role of forest in household food security: Evidence from rural areas in Nepal. Annual Report of Research Centre for Regional Geography. 2006;15:41-67.
8. Yazici N, Bilir N. Aspectual fertility variation and its effect on gene diversity of seeds in natural stands of Taurus Cedar (Cedrus libani A. Rich.). Int. J. of Genom; 2017.
   ID 2960624, 1-5.
9. FAO Forestry. Towards a harmonized definition of non-wood forest products. *Unasylva.*1999;50(198):63-64.
   Available:http://www.fao.org/docrep/x2450e/x2450e0d.htm.
10. Shiva MP, Mathur RB. Standard non-timber forest products classification and documentation manual. London. Earthscan Publication; 2007.
11. Shomkegh SA, Tem O. Ethnobotanical survey of the non-timber forest products in Makurdi Local Government Area of Benue State. Proceedings of the 32nd Annual Conference of the Forestry Association of Nigeria held in Abia State University. 2008:682-687.
12. Agbogidi OM, Okonta BC. Role of women in community forestry and environmental conservation. Proceedings of the 29th Annual Conference of the Forestry Association of Nigeria held in Calabar between 6th and 11th Oct. 2003;15-21.
13. Bisong FE, Ajake AO. An economic analysis of women's dependence on forest resources in the rain forest communities of southern Nigeria. Global Journal of Pure and Applied Sciences.2001;7(2):345-350.
14. Van Rijsoort J, De Pater C. Non-timber forest products (NTFPs): Their role in sustainable forest management in the tropics. National Reference Centre for Nature Management, Wageningen. Theme Studies Series / Forest, Forestry and Biological Diversity Support Group no. 1. 2000.
    Available:http://library.wur.nl/ebooks/minlnv/rapporten/982092.pdf
15. Akunyili D. Registration and regulatory requirements for production and marketing of plant-based medicines in Nigeria: What you need to know. In: Innovation Science and Bio-business Development Conference and Expo, HerbFest at Sheraton Hotels and Towers Abuja; 2003.
16. Osemeobo GJ, Ujor G. The non-wood forest products in Nigeria: Report of the EC-FAO partnership programme (1998-2000). Federal Department of uja.

Forestry Statistics and Data Collection no. AFDCA/TN/06; 1999.

Available:http://www.fao.org/docrep/003/X6695E/X6695E00.HTM

17. Nweze NJ, Igbokwe EM. Non timber forest products in the rural economies of southeastern Nigeria. Journal of Non-Timber Forest Products. 2000;7(3/4):145-155.
18. Ariyo OC, Oluwalana SA, Ariyo MO, Aasa OS. Indigenous knowledge of the uses of forest plants found in and around I.I.T.A forest reserve in Ibadan, Oyo State, Nigeria. In: Sudano- Sahelian Landscape and Renewable Natural Resources Development in Nigeria. Proceeding of the 37th Annual National Conference of the Forestry Association of Nigeria held in Minna, Niger State. (Eds.) Ogunsanwo OY, Akinwale AO, Azeez IO, Adekunle VAJ, Adewole NA. 2014;304-319.
19. Tenkouano A, Baiyeri KP. Adoption pattern and yield stability of banana and plantain genotypes grown in contrasting agro- ecology zone in Nigeria. African Crop Science Conference Proceedings. 2007;8: 377-384.
20. Ezealor AU. ed. Critical sites for biodiversity conservation in Nigeria. Nigeria Conservation Foundation: Lagos, Nigeria; 2002.
21. Heltberg R, Arndt TC, Sekhar NU. Fuelwood consumption and forest degradation: a household model for domestic energy consumption in rural India. Land.Econ. 2000;76(2):213–232.
22. Alabi OF, Aaron JA, Omodona S, Aloko AB, Aasa OS. Determining factors in improved maize technology usage among selected farmers in kaura local government area of Kaduna State Nigeria. International Journal of Agriculture and Development Economics. 2011;1(2):30-38.
23. Food and Agricultural Organization of the United Nation (FAO). Population Education and Nutrition: Version for Africa, Rome; 1992.
24. Godoy R, Contreras M. A comparative study of education and tropical deforestation among lowland Bolivian Amerindians: forest values, environmental externality, and school subsidies. Econ. Dev. Cult. Chang. 2001;49(3):555-574.
25. Mamo G, Sjaastad E, Vedeld P. Economic dependence on forest resources: A case from Dendi District, Ethiopia. Forest Policy Econ. 2007;9(8):916-927.
26. Cavendish W. Empirical regularities in the poverty– environment relationship of rural households: evidence from Zimbabwe. World Dev. 2000;28:1979-2000.
27. McElwee PD. Forest environmental income in Vietnam: household socioeconomic factors influencing forest use. Environ. Conserv. 2008a;35:147-159.
28. McElwee PD. Forest environmental income in Vietnam: Household socioeconomic factors influencing forest use. Environ. Conserv. 2008b;35:147-159.
29. Almeida ALO. The colonization of the amazon. University of Texas Press, Texas; 1992.
30. Adhikari B, Falco SD, Lovett JC. Household characteristics and forest dependence: evidence from common property forest management in Nepal. Ecol. Econ. 2004;48:245–257.
31. Raufu MO, Akinniran TN, Olawuyi SO, Akinpelu MO. Economic analysis of rural women income from non-timber forest products in ife south local government area of Osun State, Nigeria. Global Journal of Science Frontier Research Agriculture & Biology. 2012;12(1):1:22- 32.
32. Pierce AR, Shanley P, Laird S. “Tapping the Green Market”: Certification and management of non-timber forest products. Earthscan, London. 2002:172-182.
33. NBS - National Bureau of Statistics Tanzania. Household Budget Survey. Chapter 7: Income poverty and inequality. Dar es Salaam, Tanzania; 2007.
34. Gadgil M, Berkes F, Folke C. Indigenous knowledge for biodiversity conservation. Ambio. 1993;22:151-156.
35. Berkes F, Colding L, Folke C. Rediscovery of traditional ecological knowledge as adaptive management. Ecological Applications. 2000;10(5):1251-1262.
36. Kala CP. Ethnomedicinal botany of the Apatani in the Eastern Himalayan region of India. Journal of Ethnobiology and Ethnomedicine. 2005;1(11):1-12.

37. Kala CP. Aboriginal uses and management of ethnobotanical apecies in deciduous forest of Chhattisgarth state in India. Journal of Ethnobiolog and Ethnomedicine. 2009;5:1-12
Available:http://www.ethnobiomed.com/content/5/1/20

38. Kala CP. Home garden and management of key species in the Pachmarhi Biosphere Reserve of India. Journal of Biodiversity. 2010;1(2):111-117.

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