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DETERMINANTS OF UTILIZATION AND PARTICIPATION IN THE COLLECTION AND SALES OF FOREST PLANT LEAVES IN OGUN STATE, NIGERIA

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ABSTRACT

Determinants of participation in the collection and sales of forest plant leaves in Ogun state were investigated. Multistage sampling procedure was employed to select three hundred (300) respondents for the study. A structure questionnaire was used to elicit information from the respondents. Data obtained were analyzed using descriptive statistics, logit regression and budgetary analysis. The logit regression analysis results showed that the likelihood of utilization of the forest plant leaves is significantly determined by nature of the respondents occupation (farming and NTFPs) and their household size while the likelihood of participation in the collection and sales of forest plant leaves is significantly determined by nearness to the forest plant leaves, income realized from the leaves and gender. Sales of leaves were profitable with an average net profit of N14,179.17/month/respondent. Enlighten programs on forest plant leaves activities as means of livelihood and alleviation of poverty should be embarked upon for rural folks.

Keywords: Utilization, Participation, Collection, Sales, Forest Plant Leaves

INTRODUCTION

A forest plant like any plant comprises of root, stem, bark, leaves, flower, fruit and seed, which are used for one purpose or the other. Due to Nigeria's richness in biodiversity of plants and animals, the vegetation provides an array of products and services that play significant roles in rural and national economy. Forest plant leaves are found within diverse ecological zones of Nigeria depending on the species involved; for instance, a particular leaf may be restricted to or span through more than one ecological zone; example are leafy vegetables which can be obtained from various species in the different ecological zones. *Adansonia digitata* (Kuka in Hausa) is obtained from the savanna while species such as *Ghetum* species

(Okasi in Igbo), *Crassoephallus ruben* (Ebolo in Yoruba), *Telfaria occidentale* (Eforoko in Yoruba), *Pterocarpus* species (Oha in Igbo, Osun in Yoruba) and *Myranthus arboreus* (Ujanjan in Ibo, Ebisere in Yoruba) are obtained from the forest zone.

In Ho, Ghana, *Ceiba pentandra* fibres and fruits are used for pillow making; its leaves are consumed in soups, provide goat fodder and also used for mulching. The leaves of *Triumfetta rhomoboidea* are consumed in the Cameroon as emergency foods in an average of 19 out of 20 meals. According to Adebisi (1999), leaf extract of *Phyllanthus amarus* and *Solenostenon monostachyus* taken twice daily for two weeks have been recorded to be effective against arthritis and for the treatment of asthma, *Datura metel* leaves prepared into herb tea and smoked with pepper would decongest the chest. Plant leaves in the treatment of guineaworm (*Dracunculiasis*) infection at Mkpam village in Cross River State, Nigeria were also reported to include *Aspilia africana, Cyathula prostrata, Cyimbopgon citrates, Portulaca oleraceace and Sida acuta*. Apart from being used as food and medicines, forest plant leaves in Nigeria are also exploited for other purposes. The Igbos value the leaves of *Onchrocalamas* species for kolanut storage while leaves of *Maranthochloa flexuosa*, *Sacophyrynium* species and *Thamatococcus danielli* are utilized for wrapping food items such as "agidi", "ukpo", and "allele". *Halea ciliata* (Abura) leaves are common among the Yoruba for wrapping kolanuts. Similarly the leaves of *Thamatococcus danielli*, *Tectona grandis, Megaphirinium macrostachymum, Marantochloa flexuosa and Sacophyrynium* species are used for wrapping and preservation of food items.

Participation in the utilization, collection and sales of these forest plant leaves are determined by the socio-economic characteristics of the participants such as age, gender, educational level, and nearness to the forest plant leaves, their household size, nature of their occupation, means of livelihood, their dependency ratio, marital status and income of the household (Idowu, *et al.,* 2011). Participation in the aforementioned activities provides means of livelihood through income for the participants especially in the rural area. Going by the assertions of Ellis (2000), Barrett (2001), Rudie (1995) and Buchenrieder (2003) that livelihood concept and diversification of income among rural households help in alleviating poverty; collection of forest plant leaves by the rural dwellers and folks living in forest reserve areas create rural employment that reduce poverty by generating alternative income sources and diminish rural-to-urban migration. The findings of de Janvry *et al.* (2005), Serova and Zvyagintsev (2006), and Zvyagintsev *et al*. (2008) supported this statement. According to Adekunle and Oluwalana (2002), trade and commercial activities in forest leaves in Omo Forest Reserve, Ogun State, Nigeria brought average annual financial benefits of N16, 000.00. Therefore, the research was conducted to provide answers to the following research question; does Ogun state rural folks especially forest reserves areas participate in collection and sale of forest plant leaves?, what inform their participation?, and what extent is the economic benefit accruing from such participation or activities?. In providing answers to the above questions, this papers aims at assessing the participation of rural folks in collection and sales of forest plant leaves, determinants of their participation and economic returns from such activities. Considering the above, it will be interesting to know the participation level.

MATERIALS AND METHODS

The Study Area: Ogun State, created in February, is one of the 36 states in Nigeria. It covers an area of 16,762km^2 (FOS, 2007). This includes a total area of 2,371.48km^2 of forest reserve (MANR, Ogun State Forestry Department, 1996). The state lies between latitudes 6° and 8°N and longtitude 2°31 and 5°E. It is situated in the moist tropical rain forest zone, much of which has been deforested. The State usually experience two seasons, the rainy season between March and November, and the dry season, November to March. Ogun State with a population of 3,728,098 million people (FOS, 2007) has 20 local government areas. The study covers 9 local government areas (45 percent) from where respondents were selected. The study area (Ogun State) was divided into three areas: Egba, Yewa and Ijebu/Remo as sub-ethnic divisions. The areas were based on ecological and climatic factors having political characteristics that fall along sub-ethnic divisions in the state. Egba and Yewa areas have forest and derived savanna vegetation types while Ijebu/Remo is in the rainforest region.

Sampling Techniques and Sample size: Multistage sampling procedure was adopted in selecting the samples from which data were collected for this study. The State was first divided into three areas representing the first stage of sampling which produced a sample of primary selection unit. Each primary selection unit denotes a stratum. In the second stage of sampling, from each sampling selection unit, three (3) local government areas were selected based on pretested survey information, two (2) rural community located close to forest area were purposively selected, from where seven (7) forest plant leaves traders were chosen. This procedure yielded a total number of one hundred and twenty-six (126) traders of forest plant leaves. From the third stage likewise, one hundred and seventy-four (174) forest plants leaves users and traditional herbalist were selected based on probability proportional size (PPS) determination from the eighteen (18) rural communities randomly selected. In all, three hundred (300) respondents were selected and used for the study.

Method of data collection: The mode of data collection was by the administration of questionnaires to the randomly selected respondents in each of the stratum. There are separate questionnaires for one hundred and twenty-six (126) forest plant leaves marketers and one hundred and seventy-four (174) respondents of forest plant leaves users including traditional herbalist.

Methods of Data Analysis: Both the descriptive statistics and quantitative techniques were used. The socio-economic characteristics of the respondents were analyzed using the descriptive statistics. The determinants of participation were analyzed using logit regression model while the economic returns were analyzed using budgetary analysis.

Logistic Regression Analysis: Following Idowu, *et al* (2011), the determinants of participation in the collection and sales of forest plant leaves was analyzed using logistic regression analysis.

The logit model assumes,

$$P(Yt = 1/x_t) = \frac{\exp(x_t b)}{1 + \exp(x_t b)} \quad \ldots\ldots\ldots\ldots (1)$$

An equivalent form can be stated thus,

$$\frac{\exp(x_t b)}{1 + \exp(x_t b)} = 1 + \frac{1}{\exp(x_t b)} \quad \ldots\ldots\ldots\ldots (2)$$

This can be expressed as, $q_{it} = bx_{it} + e_{it}$ …….. (3)

Where qit = an unobservable latent variable for respondents participating in forest t leaves activities.
X_{it} = Vector of explanatory variables
= Vector of parameter to be estimated
e_{it} = Error term

The observed binary (0, 1) for whether respondents participate in forest plant leaves activities is assumed as in the usual logit model.
q_{it} = (1 if q_{it} ³ 0) i.e. participation = 1
(0 otherwise) otherwise = 0
The probability that the binary assumes the value 1 is,

$$\text{Prob.}(q_{it} = 1) = \frac{e^{ai} + b'xit}{1 + e^{ai} + b'xit}$$

The X_s are:
X_1 = Age of respondents (years)
X_2 = Gender (Female =1, 0 otherwise)
X_3 = Education of respondents (numbers of years spent in school)
X_4 = Distance from the community to the forest where the leaves are found (km)
X_5 = Means of livelihood (NTFPs =1, 0 otherwise)
X_6 = Household size (Number)
X_7 = Number of children/adults (Dependency ratio)
X_8 = Occupation (Traditionalist / farmer =1, 0 otherwise)
X_9 = Marital status (Single Parenthood =1, 0 otherwise)
X_{10} = Presence of Forest in the catchment area (Presence = 1, 0 otherwise)
X_{11} = Income from forest pant leaves activities (Naira)
X_{12} = Location Dummy (Ijebu = 1, 0 otherwise)
X_{13} = Location Dummy (Yewa = 1, 0 otherwise)

The estimated b will reveal the effect of each variable on respondent participation in forest plant leaves activities.

Budgetary analysis: Costs and returns analysis were used to determine the return from forest plant leaves trade in the study. Forest plant leaves enterprises were categories as homogenous group of enterprises usually with one employee. Following Adegeye and Ditto, (1985) Gross Margin (GM) = TR – TV C ----------4)
Where; TR = Total Revenue (TR); TVC = Total Variable Cost
Net Profit, NP = GM – TFC ----------(5)
Where; TFC = Total Fixed Cost (TFC) = TVC + TFC ---------- 6)
Where; TR = Total Revenue from the scale of the operation (Naira),
TVC = Total variable cost from scale of the operation (Naira),
TFC = Total fixed cost of scale of the operation (Naira),
TC = Total Cost of scale of the operation (Naira), NP = Net Profit (Naira)

In addition to the absolute magnitudes of gross and net profit, profitability was expressed in terms of the rate of return on investment (RORI) and Net profit to volume.
Net profit per volume = NP/Volume Used ----------(7)
Rate of Return on Investment (RORI) =NP/TC---------- (8)

RESULTS AND DISCUSSION

Socio-economics characteristics of participants in forest plant leave activities: The descriptive statistics of the characteristics of the respondents are presented in Table 1. The table shows that the average age

of the respondents was 49 years. Age of an individual dictates his availability as a member of the workforce. It is also used in literature as a proxy for experience. This is similar from the table, 33.33 % (collectors), 31.11 % (traders), 28.74 % (users), and 29.67 % (Pooled) of the respondents are between the ages of 51-60, 41-50 respectively. This shows that majority of the respondents in the study area were within the working age (active age). A total number of one hundred and seventy seven respondents are females (59 %) (Table 1), one hundred and twenty three respondents are males (41 %). Lesser male are interested in forest plant leaves trading rather they prefer collection and give to female to trade on it. The use of forest plant leave is not based on gender. Eight-three (83) respondents representing 27.67 % had no formal education while the remaining two hundred and seventeen (217) totaling 72.33 % had formal education. Out of the total respondents, 71.33 % collected the forest plants leave within a distance of 5 km or less while total respondents of 28.67 % reported that forest plant leaves were collected within a distance of over 5.01km and above. The table also reveals that 56.33 % of the household have between 1 and 5 members while the remaining total 43.67 % had between 6 and 15 members. The average household size was 5 persons. Household size is an important factor in resource allocation as it measures level of dependency. Household with large family sizes are usually associated with low per capita income especially resource-constrained economics. In other words, large family size is associated with poverty. Out of the total respondents, 28.67 % were NTFPs dealers, 28.66 % were artisans, and 20.67 % were herbalist. Majority (44.33 %) of the respondents were married while 25 % were widowed, 13 %, 9 % and 8.67 % were divorced, separated, or single.

Table1: Socio-economics Characteristics of the Respondents in the Study Area

Socio-economics Variables	Categories of Respondents						Pooled N=300	
	Collectors N= 36		Traders N=90		Users N = 174			
Age (Years)	No	%	No	%	No	%	No	%
≤ 30	3	8.33	9	10	13	7.47	25	8.33
31-40	8	22.22	19	21.11	27	15.52	54	18.00
41-50	11	30.56	28	31.11	50	28.74	89	29.67
51-60	12	33.33	25	27.78	43	24.71	80	26.67
61-70	2	5.56	9	10	28	16.09	39	13.00
≥ 71	-	-	-	-	13	7.47	13	4.33
Mean	46	-	46	-	50	-	49	-
Gender								
Male	21	58.33	17	18.89	85	48.85	123	41
Female	15	41.67	73	81.11	89	51.15	177	59
Years of Schooling								
0	15	41.67	33	36.67	35	20.11	83	27.67
≤ 6	1	2.78	6	6.67	6	3.45	13	4.33
≤ 9	7	19.44	20	22.22	49	28.16	76	25.33
≤ 12	11	30.56	23	25.56	59	33.91	93	31.00
≤ 16	2	5.56	8	8.89	25	14.37	35	11.67
Mean	7	-	7	-	9	-	8	-

Distance Covered (km) for Collection								
≤ 5	31	86.11	73	81.11	110	63.22	214	71.33
≤ 10.0	2	5.56	5	5.56	55	31.61	62	20.67
≤ 15.0	1	2.78	8	8.89	9	5.17	18	6.00
≤ 20.0	2	5.56	4	4.44	-	-	6	2.00
Mean	4.58	-	4.97	-	4.93	-	4.88	-
Household size								
1-5	29	80.56	79	45.40	61	35.06	169	56.33
6-10	7	19.44	11	6.32	107	61.49	125	41.67
11-15	-	-	-	-	6	3.45	6	2.00
Mean	4	-	4	-	6	-	5	-
Occupation								
Cooks	5	13.89	29	32.22	24	13.79	58	19.33
Herbalist	-	-	5	5.56	57	32.76	62	20.67
NTFPs Dealer	29	80.56	28	31.11	29	16.67	86	28.67
Artisans	7	19.45	41	45.55	38	21.84	86	28.66
Artisans	2	5.56	12	13.33	14	8.05	28	9.33
Civil servants	-	-	-	-	32	18.39	32	10.67
Others	-	-	16	17.78	18	10.34	34	11.33
Marital status								
Married	16	44.44	34	37.78	83	47.70	133	44.33
Divorced	4	11.11	10	11.11	25	14.37	39	13.00
Single	5	13.89	9	10.00	12	6.90	26	8.67
Widow	8	22.22	28	31.11	39	22.41	75	25.00
Separated	3	8.33	9	10.00	15	8.62	27	9.00

Source: Field Survey, 2012

Effect of socio-economic correlates on household respondents' participation in forest plant leaves activities: The model predicts participation in forest plant leaves activities with one percent significant level obtainable from the log likelihood values (Table 2). The result revealed that nearness to the forest plant leaves; primary occupation and generation of income have positive significant likelihood on collection of forest plant leaves while male tends to collect forest plant leaves more than female counterpart. This implies that an increase in nearness to the forest plant leaves will increase the likelihood of participation in collection activities while an increase in income realized by the collectors also increases the probability of participation in collection activities. Traditionalist farmers are more likely to participate in collection activities than other occupations. In addition, male respondents are more likely to participate in collection activities than female respondents. Table 2 further revealed that income of the trader, nearness to the forest plant leaves and gender significantly affect participation in forest plant leaves trading activities. Trader's income positively affects participation in forest plant leaves trading activities at one per cent significant level. This suggests that an increase in trader's income will increase the probability of participation in trading activities. Gender of the forest plant leaves traders also had positive influence on trading activities. This also suggests that females are more likely to participate in forest plant leaves trading activities than male counterpart. Nearness to the forest plant leaves had a negative impact on the trading activities. This suggests that nearness to the forest

plant leaves will reduce the probability of participation in trading activities.

The result further revealed that household size, occupation and nearness to the forest plant leave positively affect utilization at one per cent significant level. This implies that an increase in household size will increase the probability of utilization of forest plant leaves. Traditionalist's farmers are more likely to utilize the forest plant leaves while an increase in nearness to the forest plant leaves will also increases the probability of utilization of forest plant leaves.

Gender, nearness to the forest plant leaves, occupation, income and household size are the most important participation criteria in forest plant leaves activities in the study area. This is in line with the results of Awudu Abdulai (2001), De Janvry *et al,* (2005) and Idowu *et al.*, (2013).

Table 2: Logit Estimation for Participation in Forest Plant Leaves activities

Respondents' Characteristics	Forest Plant Leaves Collectors		Forest Plant Leaves Traders		Forest Plant Leaves Household Users and Traditional Herbalists	
	Vector Parameter	Marginal Effect	Vector Parameter	Marginal Effect	Vector Parameter	Marginal Effect
Age (Years)	0.01036	0.000336	-0.02524	-0.0000122	0.012262	0.002895
	(0.421)	(0.419)	(-0.446)	(-0.295)	(0.588)	(-0.591)
Gender (Female = 1)	-1.02997*	-0.03337	2.55347*	0.001237	-0.65638	-0.15497
	(-1.743)	(-1.575)	(1.750)	(0.415)	(-1.174)	(-0.163)
Educational Status (Years of Schooling)	-0.08574	-0.00278	0.14456	0.00007	0.063591	0.015013
	(-1.610)	(-1.539)	(1.067)	(0.380)	(1.351)	(1.367)
Nearness to Leaves (Km)	0.48624***	0.02868	-1.08979***	-0.000527	0.22294***	0.052636
	(4.829)	(3.007)	(-3.452)	(-0.421)	(3.109)	(2.968)
Livelihood (Poor = 1)	-0.88535	-0.02865	-	-	-5.59662***	-1.32131
	(-1.191)	(-1.070)			(-7.100)	(-6.022)
Household Size	-0.0151	-0.00048	0.21208	0.0001027	0.42118	0.099437
	(-0.092)	(-0.093)	(0.631)	(0.333)	(3.024)	(3.033)
Dependency Ratio	-0.28969	-0.00938	5.73322	0.0027776	0.718101	-0.16954
	(-0.177)	(-0.177)	(1.603)	(0.444)	(-0.458)	(0.457)
Occupation (NTFPs Dealers & Herbalist=1)	1.03129*	0.03341	-2.36751	-0.000114	2.879191**	0.679751
	(1.828)	(1.557)	(-0.227)	(0.178)	(3.954)	(3.468)
Marital Status (Married =1)	-0.38515	-0.01247	0.72243	0.00035	0.468775	0.110674
	(-0.629)	(-0.634)	(0.514)	(0.312)	(0.910)	(0.911)

Forest Dummy	0.94271	0.03054	-1.20064	-0.000581	-0.30016	-0.07087
	(1.158)	(1.116)	(0.765)	(-0.348)	(-0.471)	(-0.472)
Income (₦)	0.50935***	0.00016	0.18012***	0.0000087		
	(5.370)	(3.094)	(2.998)	(0.443)		
Location of Resident Dummy						
(i) Ijebu	0.76065	0.024645	-1.45539***	-0.0007051	0.079555	0.018782
	(1.077)	(1.107)	(-1.009)	(-0.357)	(0.131)	(0.131)
(ii) Yewa	1.19559	0.03873	-1.41662	-0.000686	0.094905	0.022406
	(1.610)	(1.621)	(-1.017)	(-0.370)	(-0.148)	(0.148)
No of Observation	36		90		174	
Constant	-7.008**		-15.8939**		-0.81138	
	(-2.411)		(-2.002)		(-0.332)	
Log Likelihood Function	-64.645		-18.5541		-77.456	
Restricted Log Likelihood Function	-110.078		-183.259		-204.088	
Chi-Square	90.864***		329.41***		253.2632	

Source: Computed from field survey data (2012) Values in parentheses are t-values
*indicate significant at 10%, ** significant at 5%, *** significant at 1%

Cost and return analysis on trades from forest plant leaves in the study area

Table 3 shows the breakdown of the cost and return to trades on forest plant leaves in the three areas considered in this study. In Ijebu area, an average total variable cost of N28, 040.00; and a total fixed cost of N4, 650.00 were expended. Average revenue of N193, 440.00 was earned. Consequently, trader's realized an average profit of N160, 750.00 in Yewa and Ijebu areas, an average total variable cost of N24, 920.00 and N37, 400 were expended with a total fixed cost of N4, 650 respectively. An average profit of N201, 310 and N238, 750 were realized respectively in these areas. The rate on return of investment value 4.92 means that for every N1.00 invested in forest plant leaves in the area, return of N4.92 is made on the trade, that is, 492 percent rate of returns on investment. This is in line with the study of Olawumi *et al.*, (2013) that describe marketing of chewing stick as one of the non-timber forest products (NTFPs) in Southwest, Nigeria as a profitable enterprise.

Table 3: Average Cost and Return Analysis from Forest Plant Leaves Trades in the Study Area

Items	Ijebu Area		Yewa Area		Egba Area		Pooled	
	Amount (N)	Percentage of Total Cost	Amount (N)	Percentage of Total Cost	Amount (N)	Percentage of Total Cost	Amount (N)	Percentage of Total Cost
Gross Annual Revenue (R)	193,440.00	-	230,880.00	-	280,800.00	-	235,040.00	-
Gross Volume Used (kg)	631.96	-	641.73	-	534.36	-	602.68	-
Variable Cost								
Transportation Cost	21,840.00	66.81	18,720.00	63.30	31,200.00	74.70	23,920.00	68.80
Tax/Permit	2,600.00	7.95	2,600.00	8.79	2,600.00	6.18	2,600.00	1.27
Rent	3,600.00	11.01	3,600.00	12.18	3,600.00	8.56	3,600.00	2.11
Total Variable Cost (TVC)	28,040.00	85.77	24,920.00	84.27	37,400.00	88.94	30,120.00	86.63
Fixed Cost (FC)								
Cutlass	2,430.00	7.43	2,430.00	8.22	2,430.00	5.78	2,430.00	6.99
Sack	2,220.00	6.79	2,220.00	7.51	2,220.00	5.28	2,222.00	1.08
Total Fixed Cost	4,650.00	14.23	4,650.00	15.73	4,650.00	11.06	4,650.00	13.37
Total Cost	32,690.00	100	29,570.00	100	42,050.00	100	34,770.00	100.00
Gross Margin	165,400.00	-	205,960.00	-	243,400.00	-	204,920.00	-
Net Profit	160,750.00	-	201,310.00	-	238,750.00	-	170,150.00	-
Net Profit/ Volume	254.37	-	313.70	-	446.79	-	282.32	-
RORI	4.92	-	6.81	-	5.68	-	4.89	-

Source: Field Survey, 2012 **Note**: RORI = Rate of return on investment (π/TC)

CONCLUSION AND RECOMMENDATION

The study has proved that utilization of the forest plant leaves is significantly determined by nature of the respondent's occupation (farming and NTFPs) and their household size. The high level participation in the collection and sales of forest plant leaves had shown that nearness to the forest plant, income realized from the leaves and gender influences the participation. Similarly, sales of the forest plant leaves were profitable.

The study therefore recommends that; more enlighten programs should be organized for forest rural folks that live close to forest area to improve their income generation through NTFPs in order to alleviate rural poverty.

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