SOCIO-ECONOMIC DETERMINANTS OF CONSUMER DEMAND FOR NON-TIMBER FOREST PRODUCTS IN OGUN AND OSUN STATES, SOUTHWEST NIGERIA

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ABSTRACT

*There is a dearth of research effort on the individual and household characteristics that affect the consumption of Non-Timber Forest Products (NTFPs) in parts of Southwest Nigeria. Yet, understanding the factors driving demand for NTFPs is crucial for managing supplies sustainably. Therefore, this study examined the socio-economic determinants of consumer demand for NTFPs in Ogun and Osun States, Southwest Nigeria. A survey involving 320 respondents randomly selected from eight communities in each of Ijebu East Local Government Area (LGA) of Ogun State and Ife South Local Government Area (LGA) of Osun State was carried out using questionnaires. Data were collected on five top priority species including: bush mango (**Irvingia gabonensis**), African walnut (**Plukenetia conophora**), chewing-stick (**Massularia acuminata**), fever-bark (**Annickia chlorantha syn. Enantia chlorantha**) and bush pepper (**Piper guineense**). Both descriptive and inferential statistics involving frequency tables, percentages, Likert scale, chi-square and multiple linear regression were used in analyzing the data at P = 0.05. Respondents' sex, age, marital status, educational attainment and primary occupation had significant impacts on the level of consumption of **P. conophora** and **A. chlorantha**, while that of **M. acuminata** was significantly impacted by both marital status and household size. Primary occupation and age of respondents also significantly impacted the level of consumption of **P. guineense**, whereas only household size had a significant impact on the level of consumption of **I. gabonensis**. Products' price, taste and substitute had no significant effect on NTFPs consumption. Although, each of the NTFPs has different socio-economic demand and niche among the consumers, the most determining factors of consumption were product availability and season of the year. The results of this study are valuable for predicting NTFPs consumption pattern and for policy orientation that targets sustainable use of the products.*

Keywords: *Socioeconomics, consumption patterns, Non-Timber Forest Products, policy*

INTRODUCTION

Non-timber forest products (NTFPs) are widely utilized by millions of people across the globe. There are numerous local, national and world-level estimates of the number of people in different areas who are dependent on NTFPs (FAO, 2011). In India alone, it is estimated that over 50 million people depend on NTFPs for their subsistence and cash income (Shaanker *et al.,* 2004). Forest-based activities, which are mostly in

the NTFPs sub-sector in developing countries, provide an equivalent of 17 million full-time jobs in the formal sector and another 30 million in the informal sector, as well as 13-35% of all rural non-farm employment (Phuong and Duong, 2008), 2008). Household consumption of NTFPs plays an important role in ensuring food security of both the rural and urban dwellers. There are numerous programmes and initiatives aimed at promoting NTFP-use and commercialisation as means of improving the well-being of rural populations and, at the same time, conserving existing forests (Arnold and Ruiz-Pérez, 1998, Neumann and Hirsch, 2000).

Understanding the socio-economic attributes associated with the collection and use of NTFPs is relevant to the debate on the role of NTFPs in rural poverty alleviation and biological conservation. Previous research works have identified several factors affecting household's or individual's decisions to engage in NTFPs collection (Angelsen and Wunder, 2003; Shackleton and Shackleton, 2004; Kamanga *et al.*, 2009). However, a complex inter-relationship exists between socio-economic attributes of people and dependence on NTFPs. For instance, Angelsen and Wunder (2003) noted that there is solid empirical evidence regarding the positive link between rural poverty and NTFPs' dependence. In the Kat River area of the Eastern Cape, South Africa, a greater proportion of poor households (> 30%) was found to engage in marketing of NTFPs as a means of cash generation (Shackleton and Shackleton, 2004).

Gender and other variables are also well-known to influence the harvest and processing of NTFPs. Gender plays a key role in the degree to which rural Africans depend on NTFPs as women's and men's rights, responsibilities, and expectations within the milieu of natural resources tend to be culturally specific (Meinzen-Dick and Zwarteween, 2001). The educational attainment of rural dwellers can also influence their reliance on

NTFPs. Kamanga *et al.*, (2009) found that households in communities with higher education levels generally have more reliable sources of income opportunities and generally wider asset base. In their survey of marula beer traders in South Africa, Shackleton and Shackleton (2004) found that more than half of the traders had some secondary education; 18% had the school-leaving certificate, and only one had tertiary diploma.

The reliance on forest-based incomes in general and NTFPs in particular, also vary depending on the season and accompanying household needs. Some activities are seasonal because the products or material can only be gathered at certain times of the year and/or is directed by the seasonality of other activities (e.g., agricultural production), or because of seasonally induced cash needs (e.g., school fees) (Arnold 1995; Schreckenberg, 2004). In some cases, the timing and seasonality of rural incomes have been considered even more important than their magnitude (Angelsen and Wunder, 2003).

Despite the contributions of earlier research works to our understanding of the socio-economic determinants of NTFPs collection for sale, researchers have paid little attention to the individual and household characteristics that affect the consumption of NTFPs. Yet, understanding the factors driving the demand for NTFPs is crucial for managing supplies sustainably. This is also important for policy orientation that targets sustainable use, as well as deepening our understanding of the socio-economics of NTFPs. This study, therefore, examined the socio-economic determinants of consumer demand for NTFPs among rural and urban communities in Ogun and Osun States, Southwest Nigeria.

MATERIALS AND METHODS

Study area

The study was carried out in Ijebu East Local Government Area (Ijebu East LGA) of Ogun State

and Ife South Local Government Area (Ife South LGA) of Osun State, Nigeria. Ijebu East LGA was created in 1976 with its headquarters at Ogbere located east of Ijebu-Ode on longitude 6°44′N and latitude 4°10′E. It has a land mass of 1,985.25 km^2 and a population of 110,196 based on the 2006 Population Census figure (National Bureau of Statistics, 2006). On the other hand, Ife South is a Local Government Area in Osun State, Nigeria. Its headquarters is at Ifetedo on longitude 7°11′00'N and latitude 4°42′00'E, with an area of 730 km² and a population of 135,338 as at the 2006 census.

The Ijebu and Ife sub-ethnic groups of the Yoruba race are the predominant people in Ijebu East and Ife South LGAs respectively. Agriculture is the traditional occupation of the people in both areas. The tropical nature of their climate favours the growth of a variety of food and cash crops. The main food crops include yam, maize, cassava, millet, rice and plantain, while the cash crops include cocoa, oil palm and kola. Two important government forest reserves, namely Omo and Shasha, found within the tropical lowland rainforest zone of southwest Nigeria are located in these local government areas. The J4 sector of Omo Forest Reserve is located in Ijebu East LGA, while Shasha Forest Reserve lies in Ife South LGA. Most of the inhabitants in the two local government areas, especially the rural communities, rely on the forests as a supplementary source of livelihood through hunting, collection and trade in NTFPs.

DATA COLLECTION

The study focused on the level of consumption of five top priority NTFP species, namely bush mango (*Irvingia gabonensis*), African walnut (*Plukenetia conophora syn. Tetracarpidium conophorum*), chewing-stick (*Massularia acuminata*), fever-bark (*Annickia chlorantha syn.*

Enantia chlorantha) and bush pepper (*Piper guineense*), based on the results of NTFPs ranking and prioritization exercise in the study areas (Amusa and Jimoh, 2012). Data collection was undertaken in communities within both Ijebu East LGA and Ife South LGA. Given the varied nature of communities found in Ijebu East LGA (urban and rural), a stratified sampling technique was used to select four communities in both the urban and rural centres. The sampled communities were: Ogbere, Itele, Ijebu-Ife and Ijebu-Mushin in the urban areas. In the rural areas, the sampled communities were: Akila, Ajebandele, Aberu and Owu-Ikija (Figure 1). The communities in Ife South LGA were all classified as rural. Therefore, a simple random sampling technique was used to select eight communities in the area. The sampled communities were: Awosiyan, Area 4, Aiyetoro, Onigbodogi, Omifunfun, Idiogun Sanni, Odesanmi and Araromi Oke odo (Figure 2).

Using a quota sampling procedure (Ambrose, 1996), twenty respondents were randomly chosen in each of the selected communities to access data on the consumption of the selected NTFPs through structured questionnaire. A total of 320 respondents were surveyed. Data were gathered on the socioeconomic characteristics of respondents, average quantity of each NTFP consumed during peak and slack periods, source of supply of NTFPs and demand factors such as availability, season, price, taste and substitute affecting consumption, among others.

Data analysis

Both descriptive and inferential statistics were used in analysing the data. The mean quantities of each of the selected NTFPs consumed per person or household per week were calculated using the formula for mean of group variables wherein the class marks were taken as scores.

Figure 1: Map of Ijebu East Local Government area showing the sampled communities.

Figure 2: Map of Ife South Local Government Areas showing the sampled communities.

NTFPs that were consumed at individual levels including *P. conophora* and *M. acuminata* were treated as being consumed per individual, while those that were consumed more at household level such as *I. gabonensis*, *A. chlorantha* and *P. guineense* were treated as being consumed per household. Afterwards, the values obtained were used to estimate the quantities consumed per year per person or household. Secondary information on population status of Ijebu East LGA and Ife South LGA was obtained from "Legal Notice on Publication of the Details of the Breakdown of the National and State Provisional Totals for 1991 and 2006 Census" OFFICIAL GAZETTE (FGP 71/52007/2,500(OL24).

Population projections for the two Local Government Areas were computed thus:

$$P_t = P_O (1 + r)^n \text{ .... (equation 1)}$$

Where P_t = Population in current year; P_O = Population in base year; r = Population growth rate (2.83% for Nigeria) and n = number of years in between.

This was further used to extrapolate the quantities of the NTFPs consumed by the entire population for the whole year.

Inferential statistical analysis involved the use of Multiple Linear Regression, Chi-square and the Likert scale. Both Multiple Linear Regression and Chi-square were used to test the relationship between the socioeconomic characteristics of NTFPs consumers and the level of consumption of products. The Multiple Linear Regression model estimated the coefficients of the linear equation, involving one or more independent variables that best predicted the value of the dependent variable. This relationship is described in the following formula:

$$Y = a + \beta_1 x_1 + \beta_2 x_2 + \ldots + \beta_n x_n \text{ .... (equation 2)}$$

Where: y = is the value of the dependent variable i.e. level of consumption of NTFPs; x_1, $x_2, \ldots x_n$= number of predictors/independent variables (factor variables) i.e. age, household size, and NTFP trading experience; a = is the regression co-efficient and; β_1, β_2, β_n = coefficients of the independent variables.

The relationship between categorical variables including ethnicity, residency, sex, marital status, primary occupation and level of education were tested against the level of consumption of NTFPs using the Chi-square test. Mathematically, the Chi-square formula is given as:

$$\chi^2 = 1/G \sum_{ij} \frac{(Ga_{ij} - Si\,T_{j)\,2})}{S_i T_j} \text{ ....(equation 3)}$$

with (r-1) (c-1) degrees of freedom, where: χ^2 = *estimated* Chi–square value; G = sum of all observations; a_{ij} = individual observations in ith row and jth column; S_i = sum of individual observations in ith row; T_j = sum of individual observations in jth column; r= number of rows and; c = number of columns.

The Likert scale was used to measure other determinants of NTFP consumption including availability, season, price, taste and substitute (Albaum, 1997).

RESULTS

Socioeconomic characteristics of consumers of NTFPs

The socioeconomic characteristics of consumers of selected NTFPs are shown in Table 1. Over fifty eight percent (58.1%) of the respondents were indigenes of Ijebu East LGA; while 57.5% were indigenes of Ife South LGA. More males (63.1%) were interviewed compared to their female counterpart in Ijebu East LGA, while more females were interviewed in Ife South LGA.

Table 1: Socio-economic characteristics of respondents in Ijebu East and Ife South Local Government Areas (LGA), Southwest Nigeria.

Variables	Ijebu East L G A		Ife South L G A	
	Frequency	Percent	Frequency	Percent
Residency				
Non-native	67	41.9	68	42.5
Native	93	58.1	92	57.5
Total	160	100.0	160	100.0
Sex				
Female	59	36.9	82	51.2
Male	101	63.1	78	48.8
Total	160	100.0	160	100.0
Age Category (years)				
<= 20.00	8	5.0	4	2.5
21.00 - 30.00	53	33.1	8	5.0
31.00 - 40.00	65	40.6	59	36.9
41.00 - 50.00	28	17.5	74	46.2
51.00 - 60.00	4	2.5	15	9.4
> 60.00	2	1.3	-	-
Total	160	100.0	160	100.0
Marital Status				
Single	31	19.4	12	7.5
Married	120	75.0	145	90.6
Widowed	5	3.1	3	1.9
Divorced	4	2.5	-	-
Total	160	100.0	160	100.0
Household Size				
1-2	2	1.3	20	12.5
3-5	50	31.3	42	26.3
6-8	94	58.8	87	54.3
> 8	14	8.8	11	6.9
Total	160	100.0	160	100.0
Primary Occupation				
Farming	43	26.9	42	26.3
Trading	38	23.8	71	44.3
Civil servant	46	28.8	31	19.4
Others	33	20.6	16	10.0
Total	160	100.0	160	100.0
Level of Education				
No Formal Education	33	20.6	-	-
First School Leaving certificate	17	10.6	43	26.9
Senior Secondary School Certificate	55	34.4	59	36.9
Adult Education	8	5.0	15	9.4
ND/NCE	23	14.4	35	21.8
University Degree/HND	24	15.0	8	5.0
Total	160	100.0	160	100.0

The modal age category of the respondents in Ijebu East LGA fell within 31 - 40 years while the modal age category in Ife South LGA was 41 - 50 years. Majority of the respondents (Ijebu East LGA - 75.0%; Ife South LGA - 90.6%) were married. Most respondents (Ijebu East LGA - 58.8%; Ife South LGA - 54.3%) have family size in the range of 6 - 8 members. A large number of respondents in Ijebu East LGA were civil servants (28.8%), followed by farmers (26.9%) and traders (23.8%). On the other hand, most respondents in Ife South LGA were traders (44.3%), followed by farmers (26.3%) and civil servants (19.4%). Most of the respondents in the two LGAs (Ijebu East

LGA - 34.4%; Ife South LGA - 36.9%) have education up to the senior secondary school level. Many of the respondents consume the selected NTFPs, while a few indicated otherwise (Figure 3).

Level of consumption of NTFPs

Table 2 shows the average quantities of NTFPs consumed per week by respondents, though varying with the product. For *P. conophora,* the average quantity consumed by individual per week ranged from 0.1 to over 0.5 g with a mode of 0.3 - 0.4 g (5 - 6 pieces) in Ijebu East LGA.

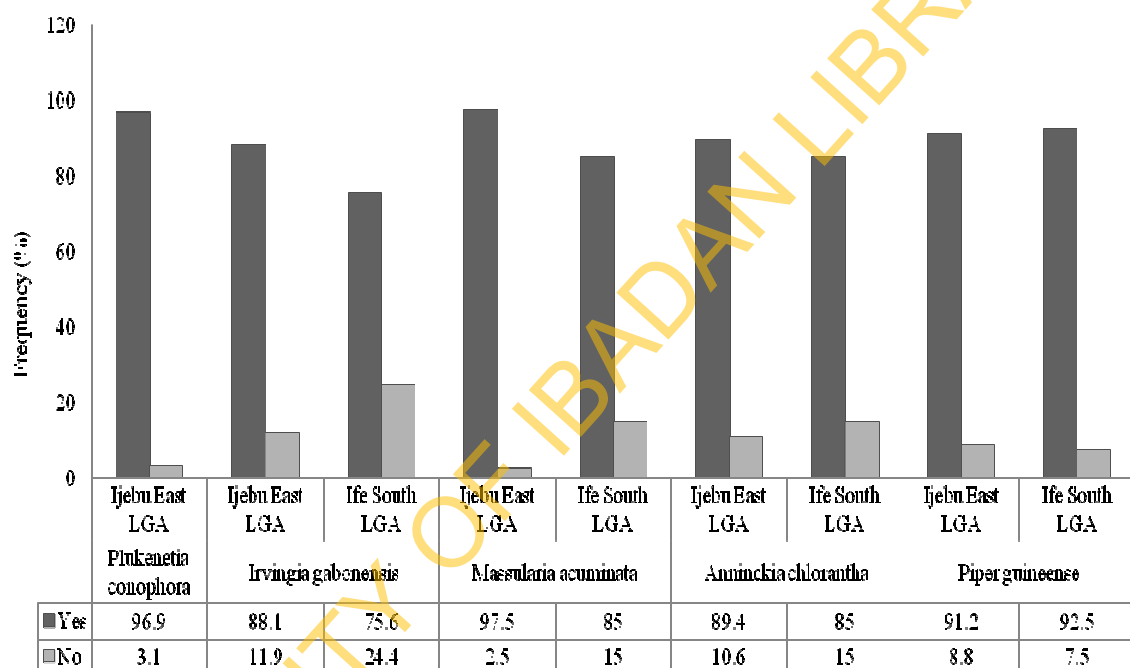|	Ijebu East LGA	Ijebu East LGA	Ife South LGA	Ijebu East LGA	Ife South LGA	Ijebu East LGA	Ife South LGA	Ijebu East LGA	Ife South LGA
	Plukenetia conophora	Irvingia gabonensis	Irvingia gabonensis	Massularia acuminata	Massularia acuminata	Anninckia chlorantha	Anninckia chlorantha	Piper guineense	Piper guineense
Yes	96.9	88.1	75.6	97.5	85	89.4	85	91.2	92.5
No	3.1	11.9	24.4	2.5	15	10.6	15	8.8	7.5

Figure 3: NTFP consumption in Ijebu East and Ife South Local Government Areas in Southwest Nigeria.

Table 2: Average quantities of NTFPs consumed per week in Ijebu East and Ife South Local Government Areas (LGA), Southwest Nigeria.

NTFP	Quantity (g)	Ijebu East LGA			Ife South LGA		
		Frequency	Percent	Mode	Frequency	Percent	Mode
Plukenetia conophora	≤ 0.100g	6	3.9		4	2.7	
	0.101-0.200g	4	2.6		-	-	
	0.201-0.300g	28	18.1		26	17.6	
	0.301-0.400g	87	56.1	0.301-0.400g (5-6 pieces)	-	-	0.401-0.500g (7-8 pieces)
	0.401-0.500g	21	13.5		110	74.3	
	> 0.500g	9	5.8		8	5.4	
	Total	155	100.0		148	100.0	
Irvingia gabonensis	< 50g	18	12.8		8	6.6	
	51-100g	23	16.3		22	18.2	
	101-150g	62	44.0	101-150g (2 tins of milk)	40	33.1	101-150g ; (2 tins of milk)
	151-200g	21	14.9		36	29.8	
	201-250g	13	9.2		8	6.6	
	251-300g	2	1.4		3	2.4	
	301-350g	1	0.7		-	-	
	>350g	1	0.7		4	3.3	
	Total	141	100.0		121	100.0	
Massularia acuminata	≤20g	5	3.2		6	4.4	
	21-30g	44	28.2		78	57.3	
	31-40g	76	48.7	31-40g; (3 pieces)	18	13.3	21-30g (2 pieces)
	41-50g	22	14.1		11	8.0	
	51-60g	5	3.2		13	9.6	
	>60g	4	2.6		10	7.4	
	Total	156	100.0		136	100.0	
Annickia chlorantha	≤30g	24	16.8		-	-	
	31-40g	7	4.9		-	-	
	41-50g	11	7.7		12	8.8	
	51-60g	23	16.1		35	25.7	
	61-70g	20	13.9		4	2.9	
	71-80g	41	28.7	71-80g (₦40.00-₦50.00 worth)	46	33.8	71-80g (₦40.00 - ₦50.00 worth)
	81-90g	1	0.7		16	11.8	
	91-100g	11	7.7		8	5.9	
	> 100g	5	3.5		15	11.1	
	Total	143	100.0		136	100.00	
Piper guineense	≤20g	17	11.6		12	8.1	
	21-30g	35	23.9		74	50	
	31-40g	61	41.8	31-40g; (₦50.00 worth)	12	8.1	21-30g; (₦30.00; ₦40.00 worth)
	41-50g	10	6.8		4	2.7	
	51-60g	12	8.2		3	2.0	
	61-70g	1	0.7		10	6.8	
	71-80g	-	-		-	-	
	81-90g	1	0.7		9	6.1	
	91-100g	4	2.8		16	10.8	
	101-110g	4	2.8		3	2.0	
	>110g	1	0.7		5	3.4	
	Total	146	100.0		148	100.0	

More of the product was consumed in Ife South LGA with a modal consumption of 0.4- 0.5 g (7-8 pieces). The weekly consumption level of *I. gabonensis* as a condiment, ranged from *one tin* (70.5 g) to about *five tins* (352.5 g) with a mode of 101.0 -150.0 g (2 milk tins) per week in the two LGAs. *Massularia acuminata* consumption was in the range of 20.0 to over 60.0 g per week, with a mode of 31.0 - 40.0 g (3 pieces) in Ijebu East LGA; and a modal range of 21.0g-30.0 g (2 pieces) in Ife South LGA. One piece of chewing-stick (averaging 13.5 cm in length) was often used for more than a day among the respondents. Some respondents were, however, avid consumers of the product and could utilize a piece of the chewing-stick in a day. For *A. chlorantha*, the consumption level ranged from 30.0 g to above 100.0 g per week, while the modal consumption in the two LGAs was in the range of 71.0 – 80.0 g (₦40.00-₦50.00 worth). Essentially, the product was often

used in the treatment of malaria fever. Some respondents with a number of grown-up children indicated the need to always have a stock of the product at home as children are more prone to malaria attack. *P. guineense* was used for a variety of purposes; the commonest of which was in the preparation of *pepper soup* (i.e. a peppery sauce for whetting the appetite) and as an ancillary item in herbal mixtures. The consumption level ranged from 20.0 to more than 100.0 g, with a modal consumption level of 31.0-40.0 g (₦50.00 worth) in Ijebu East LGA and 21.0 g-30.0 g (₦30.00-₦40.00 worth) in Ife South LGA.

Table 3 shows the population and projected figures for both Local Government Areas for 1991 to 2010. Table 4 shows the estimated quantities of each NTFP consumed by the population in each of the two LGAs.

Table 3: Population and projected figures for Ijebu East (Ogun State) and Ife South (Osun State) Local Government Areas (LGA) from 1991 - 2001 Government Areas (LGA) from 1991 – 2010.

Year	Ijebu East LGA	Ife South LGA
1991*	61,120	88,170
1995	68,338	98,582
1999	76,408	110,224
2002	83,081	119,850
2006*	110,196	135,338
2009	119,818	147,156
2010	123,210	151,321

Shows years that census actually took place while the others are projected.

Table 4: Estimated quantity of Non-Timber Forest Products consumed per year per individual or household.

NTFP	Mean Quantity Consumed	
	Ijebu East L G A	Ife South L G A
P. conophora	17.68 g/year/individual	21.32 g/year/individual
I. gabonensis	6.73 kg /year/household	7.49 kg/year/household
M. acuminata	1.81 kg/year/individual	1.75 kg/year/individual
A. chlorantha	3.20 kg/year/household	3.77 kg/year/household
P. guineense	1.99 kg/year/household	2.36 kg/year/household

Consumption levels of *P. conophora, I. gabonensis, M. acuminata, A. chlorantha* and *P. guineense* were 17.7 g/person/year, 6.7 kg/household/year, 1.8 kg/person/year, 3.2 kg/person/year and 1.9 kg/household/year in Ijebu East LGA, while they were 21.3 g/person/year,7.5 kg/household/year,1.8 kg/person/year, 3.8 kg/household/year and 2.4kg/household/year in Ife South LGA. About 2.2 tons of *P. conophora* were consumed in Ijebu East LGA per annum, while 3.2 tons of the products were utilized in Ife South LGA. On the other hand, 138.2 tons and 188.9 tons of *I. gabonensis* as well as 223.0 tons and 264.8 tons of *M. acuminata* were consumed in Ijebu East and Ife South LGAs respectively. Also, 65.71 tons of *A. chlorantha* were consumed in Ijebu East LGA, while 95.0 tons were utilized in Ife South LGA. For *P. guineense,* the estimated quantity of the product consumed were 40.9 tons and 59.5 tons in Ijebu East LGA and Ife South LGA respectively.

Consumers' sources of NTFPs

The results show that NTFPs were obtained from retailers/marketers in the local markets, farmlands, forest reserves and fallow fields (Table 5). For *P. conophora* in Ijebu East LGA, 88.8% of the respondents claimed that they sourced it from the forest reserve, while 76.3% (multiple responses were allowed) indicated sourcing it from the local markets. A good number of the respondents (57.5%) also sourced the product from farmlands, while 6.3% collected it from fallow fields. In Ife South LGA, *P. conophora* was mainly sourced from the local markets (48.8%) and farmlands (43.8%).

Most respondents also sourced the product from the forest reserve through free access. For *I. gabonensis,* more respondents (71.9%) from Ijebu-East LGA sourced the product from local markets, while 66.9% sourced it from the forest reserve. A few of the respondents (16.9%) also sourced it from farmlands, while 10.6% sourced it from fallow fields.

In Ife South LGA, the product was also mostly sourced from the local markets (41.3%) and farmlands (36.9%). *M. acuminata* was widely sourced from the local market (80.0%), followed by the forest reserve (73.8%) and farmlands (21.9%) in Ijebu East LGA. A few of the respondents (6.3%) also sourced it from fallow fields. In Ife South LGA, *M. acuminata* was mainly sourced from the farmlands (43.8%), local markets (38.8%), and the forest reserve (2.5%). In Ijebu East LGA, majority of the respondents (70.0%) indicated sourcing *A. chlorantha* from the forest reserve, while 57.5% indicated the local markets as their source of supply. Some of the respondents (25.6%) also claimed to source it from farmlands, while 8.1% revealed that they sourced it from fallow fields. In Ife South LGA, the product was chiefly sourced from the local markets (38.8%), farmlands (38.8%), fallow fields (8.1%) and the forest reserve (2.5%).

For *P. guineense,* 63.8% of the respondents in Ijebu East LGA sourced it from the local markets, while 62.5% sourced it from the forest reserve. Some (13.8%) of the respondents also sourced the product from farmlands, while 10.0% claimed to source it from fallow fields. In Ife South LGA, the product was mainly sourced from the local markets (36.3%) and farmlands (26.9%).

Consumers' perceptions of changes in availability of NTFPs in the last ten years

The varied perceptions of the respondents on the availability of NTFPs in the last ten years are shown in Table 6. There were variations in respondents' perception of changes in availability of the different NTFP species. Almost equal number of respondents in both Ijebu East and Ife South LGAs (50.0%; 55.0%) opined that the availability of *P. conophora* has either plummeted or increased respectively in the last ten years.

Table 5: Sources of supply of Non-Timber Forest Products (Freq. connotes Frequency).

NTFP	Local Markets				Farmlands				Forest Reserves				Fallow fields			
	Ijebu East LGA		Ife South LGA		Ijebu East LGA		Ife South LGA		Ijebu East LGA		Ife South LGA		Ijebu East LGA		Ife South LGA	
	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%
Plukenetia Conophora	122	76.3	66	41.3	92	57.5	59	36.9	142	88.8	-	-	10	6.3	-	-
Irvingia gabonensis	115	71.9	78	48.8	27	16.9	70	43.8	107	66.9	-	-	17	10.6	-	-
Massularia acuminata	128	80.0	62	38.8	35	21.9	70	43.8	118	73.8	4	2.5	10	6.3	-	-
Annickia Chlorantha	92	57.5	62	38.8	41	25.6	62	38.8	112	70.0	4	2.5	13	8.1	13	8.1
Piper guineense	102	63.8	58	36.3	22	13.8	43	26.9	100	62.5	-	-	16	10.0	-	-

Table 6: Respondents' perceptions of changes in availability of Non-Timber Forest Products in the last ten years.

NTFP	Decreasing				Increasing				Undecided			
	Ijebu East LGA		Ife South LGA		Ijebu East LGA		Ife South LGA		Ijebu East LGA		Ife South LGA	
	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%
P. conophora	42	26.3	69	43.1	111	69.4	52	32.5	7	4.4	24	15.0
I. gabonensis	80	50.0	88	55.0	74	46.3	52	32.5	6	3.8	20	12.5
M. acuminata	140	87.5	84	52.5	15	9.4	48	30.0	5	3.3	24	15.0
A. chlorantha	122	76.3	65	40.6	16	10.0	60	37.5	22	13.8	27	16.9
P. guineense	117	73.1	73	45.6	28	17.5	28	17.5	15	9.4	48	30.0

On the other hand, 3.8% and 12.5% of them could not ascertain any observable change in the availability of the species. Conversely, 69.4% of the respondents were of the view that the availability of *I. gabonensis* had not decreased since the last ten years in Ijebu East LGA, while 43.1% in Ife South LGA thought otherwise.

For *M. acuminata,* 87.5% of the respondents posited that the product availability had decreased in the last ten years in Ijebu East LGA, while

52.5% of respondents in Ife South LGA also believed that the availability of the product had plunged in the last ten years.

Similarly, 76.3% of the respondents in Ijebu East LGA indicated that the availability of *A. chlorantha* had declined in the last ten years, while 40.6% of respondents in Ife South LGA also alluded to this. The same trend was observed for *P. guineense,* with 73.1% in Ijebu East LGA revealing that the availability of the product had

fallen in the last ten years, while 45.6% of the respondents in Ife South LGA also agreed with decline in change in product availability.

Determinants of use / consumption of NTFPs

Table 7 shows the effect of five variables including availability, season, price, taste and substitute examined on the use/consumption of NTFPs against six attitudinal statements from very strongly affect use / consumption, strongly affect use / consumption, moderately affect use / consumption, somehow affect use / consumption, less likely to affect use / consumption and no effect on use/consumption.

The consumption of *P. conophora* was strongly affected by availability (4.06 ± 1.46) and season of the year (3.91 ± 1.60), while price (0.31 ± 1.60), taste (0.11 ± 0.64) and substitute (0.15 ± 0.78) show no effect on the consumption of the product among respondents.

Price (3.21 ± 1.70) and taste (3.08 ± 1.77) moderately affected the consumption of *I. gabonensis*, while availability (0.18 ± 0.75), season of the year (0.03 ± 0.25) and substitute (0.16 ± 0.72) had no effect on the consumption of the product.

Further, availability (3.04 ± 1.56) and season of the year moderately affected the use/consumption of *M. acuminata,* while price (0.20 ± 0.88), taste (0.08 ± 0.50) and substitute (0.07 ± 0.39) had no effect. The use/consumption of *A. chlorantha* was not affected by season (0.18 ± 0.73), price (0.07 ± 0.52) or substitute (0.19 ± 0.77), while availability (1.66 ± 2.01) was also less likely to affect the use/consumption of the product. On the other hand, taste (2.95 ± 1.88) somehow affected the use of the product. None of the test variables affected the use/consumption of *P. guineense,* except availability (2.58 ± 1.88).

Effects of socio-economic characteristics of respondents on level of consumption of NTFPs

The results of Chi-square tests on the association between categorical variables (including residency status, sex, marital status, level of education and primary occupation) and the level of consumption of NTFPs by respondents are presented in Table 8. Similarly, Table 9 shows the results of multiple linear regression fitted to examine the effect of age and household size of respondents on the level of consumption of the NTFPs.

Respondents' gender, marital status, level of education and age impacted significantly on the level of consumption of *P. conophora*. For *I. gabonensis,* only household size had a significant impact on the level of consumption among the respondents. The level of consumption of *M. acuminata* was significantly impacted by both marital status and household size of the respondents. Respondent's gender, marital status, level of education and primary occupation also impacted significantly on the level of consumption of *A. chlorantha*. Only primary occupation and age of respondents significantly impacted the level of consumption of *P. guineense*.

DISCUSSION

The results of socio-economic characteristics of respondents examined in this study revealed significant similarities between the sampled communities. The few observable differences in attributes may be due to the varied nature of communities found in Ijebu East LGA (urban and rural). The levels of consumption/use of selected NTFPs aptly reflected their socio-economic importance among the people. The study showed high demand potentials for all the five NTFPs, though varying with product type and usage. Few studies have attempted to quantitatively examine the level of consumption of NTFPs in Nigeria.

Table 7: Determinants of use / consumption of Non-Timber Forest Products (Freq. = Frequency; SD = Standard deviation).

NTFP		No Effect on Consumption		Less Likely Affect Consumption		Somehow Affect Consumption		Moderately Affect Consumption		Strongly Affect Consumption		Very Strongly Affect Consumption		Mean	SD
		Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%		
Plukenetia conophora	Availability	12	7.5	2	1.3	9	5.6	6	3.8	43	26.9	88	55.0	4.06	1.461
	Season of the year	18	11.3	2	1.3	5	3.1	5	3.1	52	32.5	78	48.8	3.91	1.601
	Price	147	91.9	2	1.3	1	0.6	1	0.6	3	1.9	6	3.8	0.31	1.116
	Taste	154	96.3	2	1.3	-	-	1	0.6	2	1.3	1	0.6	0.11	0.644
	Substitute	154	96.3	-	-	1	0.6	-	-	3	1.9	2	1.3	0.15	0.787
Irvingia gabonensis	Availability	67	41.9	31	19.4	3	1.9	28	17.5	30	18.8	1	0.6	0.18	0.751
	Season of the year	65	40.6	29	18.1	4	2.5	26	16.3	34	21.3	2	1.3	0.03	0.250
	Price	3	1.9	-	-	-	-	5	3.1	150	93.8	2	1.3	3.21	1.702
	Taste	-	-	-	-	-	-	1	0.6	158	98.8	1	0.6	3.08	1.770
	Substitute	1	0.6	1	0.6	-	-	5	3.1	152	95.0	1	0.6	0.16	0.723
Massularia acuminata	Availability	16	10.0	13	8.1	24	15.0	35	21.9	38	24.4	33	20.6	3.04	1.568
	Season of the year	19	11.9	13	8.1	21	13.1	42	26.3	26	16.3	39	24.4	3.00	1.637
	Price	151	94.4	-	-	3	1.9	2	1.3	-	-	4	2.5	0.20	0.882
	Taste	156	97.5	-	-	2	1.3	1	0.6	-	-	1	0.6	0.08	0.508
	Substitute	155	96.9	-	-	4	2.5	1	0.6	-	-	-	-	0.07	0.390
Annickia chlorantha	Availability	37	23.1	2	1.3	50	31.3	38	23.8	19	11.9	14	8.8	1.66	2.015
	Season of the year	87	54.4	6	3.8	11	6.9	8	5.0	26	16.3	22	13.8	0.18	0.734
	Price	147	91.9	6	3.8	3	1.9	-	-	3	1.9	1	0.6	0.07	0.515
	Taste	-	-	-	-	2	1.3	157	97.5	-	-	1	0.6	2.95	1.879
	Substitute	149	93.1	1	0.6	4	2.5	2	1.3	4	2.5	-	-	0.19	0.765
Piper guineense	Availability	42	26.3	9	5.6	19	11.9	25	15.6	34	21.3	31	19.4	2.58	1.882
	Season of the year	101	63.1	2	1.3	15	9.4	15	9.4	15	9.4	12	7.5	1.23	1.763
	Price	151	94.4	5	3.1	2	1.3	-	-	2	1.3	-	-	0.11	.521
	Taste	153	95.6	5	3.1	-	-	1	0.6	1	0.6	-	-	0.08	.428
	Substitute	146	91.3	3	1.9	1	0.6	2	1.3	8	5.0	-	-	0.27	.943

Table 8: Summary of Chi-Square tests of effects of socioeconomic variables of respondents on level of consumption of Non-Timber Forest Products.

NTFP	Socio-economic variables	DF	χ2	P-Value
P. conophora	Residency status	10	12.870	0.231
	Sex	5	26.862	0.003*
	Marital status	30	94.572	0.000*
	Level of Education	50	73.165	0.018*
	Primary occupation	50	52.969	0.360
I. gabonensis	Residency status	7	10.414	0.166
	Sex	7	6.905	0.439
	Marital status	21	20.383	0.497
	Level of Education	35	45.975	0.101
	Primary occupation	35	48.953	0.059
M. acuminata	Residency status	6	9.970	0.126
	Sex	6	9.067	0.170
	Marital status	18	43.469	0.001*
	Level of Education	30	28.499	0.544
	Primary occupation	30	25.744	0.688
A. chlorantha	Residency status	12	12.243	0.426
	Sex	12	41.407	0.000*
	Marital status	36	72.600	0.000*
	Level of Education	60	109.659	0.000*
	Primary occupation	60	88.089	0.011*
P. guineense	Residency status	12	10.938	.534
	Sex	12	13.097	.362
	Marital status	36	44.041	.168
	Level of Education	60	65.272	.299
	Primary occupation	60	88.233	.010

*Test is significant at P = 0.05.

Table 9: Regression analysis of socio-economic variables of respondents on level of consumption of Non-Timber Forest Products (NTFPs).

NTFP	Variable	Unstandardized Coefficients		Standardized Coefficients	T	Sig.	95% Confidence Interval for B	
		Beta	Std. Error	Beta			Lower Bound	Upper Bound
Plukenetia conophora	(Constant)	4.678	0.614		7.618	0.000	3.465	5.891
	Age	0.039	0.017	0.204	2.290	0.023	.005	0.073
	Household size	-0.132	0.104	-0.114	-1.274	0.204	-0.337	0.073
Irvingia gabonensis	(Constant)	1.607	0.349		4.606	0.000	.918	2.297
	Age	-0.008	0.010	-0.076	-0.860	0.391	-.028	0.011
	Household size	0.177	0.059	0.264	3.004	0.003	.061	0.293
Massularia acuminata	(Constant)	1.450	0.277		5.231	0.000	.902	1.997
	Age	-0.004	0.008	-0.049	-.551	0.582	-.020	0.011
	Household size	0.135	0.047	0.254	2.889	0.004	.043	0.227
Annickia chlorantha	(Constant)	51.765	13.818		3.746	0.000	24.432	79.099
	Age	0.728	0.396	0.176	1.838	0.068	-.055	1.512
	Household size	1.254	2.223	0.054	.564	0.574	-3.143	5.651
Piper guineense	(Constant)	26.150	11.228		2.329	0.021	3.972	48.327
	Age	0.847	0.315	0.238	2.693	0.008	.226	1.469
	Household size	-1.084	1.894	-0.051	-0.572	0.568	-4.824	2.657

The Department of Forest Resource Management, University of Ibadan, (1986) estimated that annual consumption of *I. gabonensis* kernels in southern Nigeria ranged from 3.2 to 14.13 kg / household/year. Jimoh (2002) also estimated the level of demand for the product at 2,227.33 tons for Osun State. These earlier reports are at variance with the findings of this study which estimated consumption levels of 6.73 kg / household / year for Ijebu East LGA and 7.49 kg / household / year for Ife South LGA. This variation could, however, be as a result of increase in population and the growing demand for the products, particularly in the urban areas. Generally, there is a positive connection between

the intensity of NTFP exploitation and the level of consumption of the products (Kilchling *et al.,* 2009).

As revealed by this study, the factors which affected the consumption of NTFPs most were product availability and season of the year. NTFP price often had less effect on consumers' demand. This observation differs from the submission of Cooke (1998) and Amacher *et al.* (1998) who reported that households are more price-responsive regarding consumption decisions for forest goods. The only notable exception to this, however, and which agrees with the submission of Cooke (1998) and Amacher *et al.* (1998) is *I. gabonensis*. Nonetheless, the acceptability of *I.*

gabonensis is also threatened by its taste and the same property that makes it unique (i.e. its mucilaginous property), which is detested by some segments of the respondents who indicated non consumption of the product. Meanwhile, that the existence of substitutes generally had no effect on the demand for the studied NTFPs indicates the wide socio-cultural acceptance of the NTFPs, a factor central to any further investigation on their status and sustainability.

As a corollary to the above, the findings on analysis of relationships between socio-economic characteristics of the consumers and consumption level of NTFPs differ from one variable to another for each of the NTFPs. This showed that each of the test NTFPs tend to have different socio-economic demand and niche among the consumers. For instance, gender had a significant impact on the level of consumption of *P. conophora.* Ajaiyeoba and Fadare (2006) have reported that eating *P. conophora* nuts helps improve sperm count in men and is therefore used to enhance male fertility. Thus, the marketing strategy for *P. conophora* would tend to orient product communication along gender lines. Furthermore, for *M. acuminata,* both marital status and age showed significant impact on the level of consumption. This is contrary to the submission of Aiyeloja and Ajewole (2006) who reported that the consumption of chewing-stick is not a function of income level or educational background of the respondents, and neither is it a function of sex nor marital status. Our study showed that marital status and age influence the consumption of the product with married and older people consuming the product more. This is consistent with the findings of Kayode and Omotoyinbo (2008). In the same way, sex, occupation and level of education impacted significantly on the level of consumption of *A. chlorantha,* while only age of respondents had significant impact on the level of consumption of *Piper guineense*. All these attest to the fact that NTFPs may possibly be niche-products for different segments of the society.

In the meantime, apart from local markets; forest reserves, farmlands and fallow fields also provide a medium for sourcing all the selected NTFPs. The revelation by consumers, particularly those in the rural areas of sourcing NTFPs from forests, farmlands and fallow fields gives an impression that the market potential of the NTFPs has not been fully realized (Kilchling *et al.,* 2009). However, the findings on consumers' perception of changes in the availability of NTFPs in the last ten years suggest a general consensus on the declining state of those products that are commonly sourced from the forests (including *M. acuminata, A. chlorantha* and *P. guineense*).

CONCLUSION

The study has shown that there is a potential for high demand for Non-Timber Forest Products (NTFPs) in the study areas. However, NTFPs tend to have different socioeconomic demands and niche among the consumers. The relationships between socioeconomic characteristics of consumers and consumption levels differ from one variable to another for each NTFP. The most determining factors of NTFPs consumption are mostly product availability and season of the year. Despite the emerging trend and consensus of a declining state of several NTFPs, there is an impression that the market potentials of the studied NTFPs have not been fully realized. The results of this study are valuable for predicting NTFPs consumption pattern at individual and household levels. Additional studies and analyses are required to predict the likely impact of policy changes on NTFPs consumption at specific locations. This is very important in order to manage the supplies of NTFPs sustainably.

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