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## **Microeconomic Analysis of Marketing Selected Non-Timber Forest Products (NTFPs) in AWGU Agricultural Zone of Enugu State, Nigeria**

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### **Authors' contributions**

*All authors contributed highly to the conception and design of the study. As authors NE and CB performed the statistical analysis and wrote the protocol with the first draft; authors NE and NL managed the literature searchers. All authors read and approved the final manuscript.*

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### **ABSTRACT**

Non-timber forest products have the capability of providing food, being a source of livelihood and income generation for the rural households. This study investigated the marketing of selected non-timber forest products (NTFPs) in Awgu Agricultural zone, Enugu state of Nigeria. The study sought after the socio-economic characteristics of the respondents, identified some of the NTFPs, and ascertained the profitability of NTFP marketing as well as the constraints facing NTFPs in the study area. With the use of data collection instrument, 90 respondents were interviewed from five (5) main rural markets across the two local government areas in the study area. Data were analyzed using descriptive statistics, net income analysis, benefit cost ratio, and profitability index. Results indicate that NTFP marketing is profitable with a gross margin of, ₦9,000 for bitter kola, ₦4,500 for ogbono, ₦1,200 for utazi, ₦1,300 for ukazi, ₦6,000 for grass cutter, also a net income of ₦7,297; ₦2,797; ₦309; ₦409 and ₦2,330 respectively for them. The benefit-cost ratio result also shows that for every

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₦1 the marketer puts into marketing these selected NTFPs, ₦1.20kobo; ₦1.20kobo; ₦1.10kobo; ₦1.10kobo and ₦1.60kobo were realized for; bitter kola, ogbono, utazi, ukazi, and grasscutter respectively.

**Keywords:** *Non-timber forest products; marketing; profitable; AWGU; Enugu state; Nigeria.*

## 1. INTRODUCTION

Non-timber forest products (NTFPs) are biological products which are extracted from natural ecosystems other than timber. These include vegetables, fruits, medicinal plants, nuts, being utilized and marketed by households. These NTFPs seemed to have social, cultural or religious significance among rural dwellers [1] perceived NTFPs as plants or plant parts that have perceived economic or consumption value which encourages their collection and removal from the forest.

Forest materials are derived from soil mineral, water, fauna and flora resources other than round wood (sawn wood) [2]. People living in forest areas depend on non-timber forest products for their livelihood, and in spite of its importance, their commercial value is low [3]. One of the difficulties encountered by small-scale collectors who seek to commercialize NTFPs is that often the markets for these products are relatively complex compared to those for timber and traditional agricultural goods. Prices for NTFPs vary across different locations as well as over time as reported by [3]. These factors contribute to the complexity of NTFP markets. This usually leads to the problem of food insecurity by influencing the household income of the people that are dependent on it as reported by [4]. Poor tribal colonies in the study region mainly depend on NTFPs for their livelihood and earn substantial income from these products.

Therefore, in order to meet with the growing demand for these non-timber forest products, there is need to investigate the dominant NTFPs in Awgu agricultural zone of Enugu State, Nigeria, the multiple uses, economic value, profitability and problems associated with the marketing of these NTFPs. There is a need for the research to be geared in the direction of microeconomic analysis of the marketing of selected non-timber forest products in the study area. The research specifically; examined the socio-economic characteristics of the respondents in NTFP marketers in Awgu

agricultural zone identified the various NTFPs available, determined the cost and return analysis of NTFPs gathering and marketing, and identified the constraints faced by the marketers of NTFPs in Awgu agricultural zone.

## 2. CONCEPTUAL FRAMEWORK OF THE STUDY

Focusing on natural resource-based livelihoods and market linkages of different stakeholders with the natural resource products, production-to-consumption systems (PCS) analyze broad issues including production, management of the resources, collection, product-flow and socioeconomic dynamics, including the roles of gender and influential people, post-harvest processing and manufacturing, value addition, market types and demand, and policy regulation and institutions. Also covered is how the different stakeholders' livelihoods are interlinked with the different processes of the systems as stated in Fig. 1.

## 3. ANALYTICAL FRAMEWORK OF THE STUDY

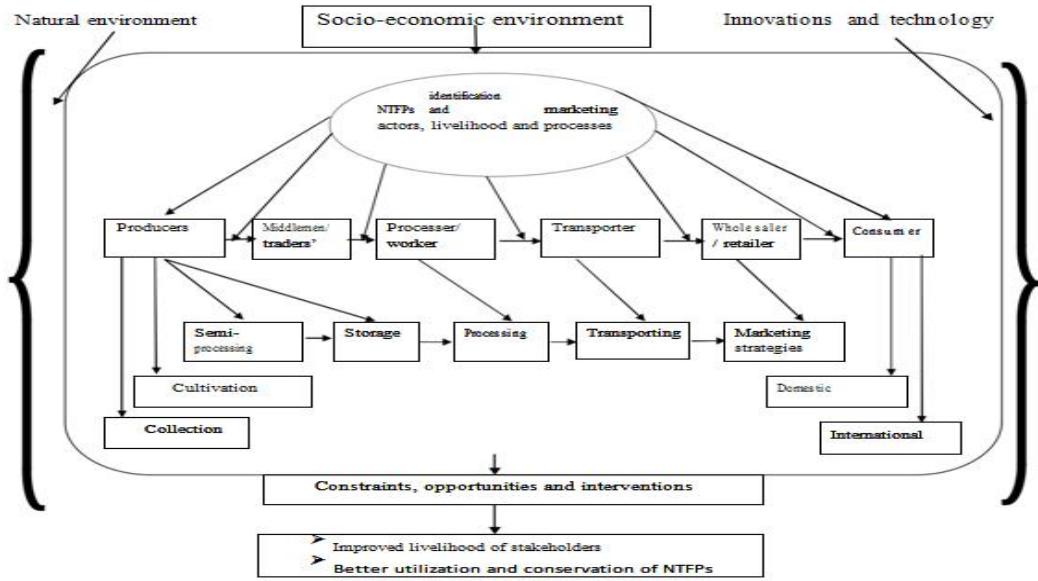
There are approaches that can be used to analyze data research work. The first set of common, but an important analytical tool used in data analysis is the descriptive statistical tool [6]. These include tables, graphs, charts, frequency distributions, percentages, mean and standard deviation among others. Some specific objectives and some quantitative data require in-depth analysis and may need extended analytical tools than the simple descriptive statistical tool for better understanding.

**The Concept of Net Income (NI) Analysis;**

**Total Costs (TC):** Is calculated as  $TFC + TVC$ .

**Average Variable Costs (AVC):**

$$\frac{\text{total variable cost}}{\text{output}} = \frac{TVC}{Q}$$



**Fig. 1. Flowchart illustration of the conceptual framework - The production-to-consumption systems (PCS) approach**

Source: Adapted from [5].

**Average Fixed Costs (AFC):**

$$\frac{\text{total fixed cost}}{\text{output}} = \frac{TFC}{Q}$$

$$PI = \frac{NI}{TR}$$

Where,

PI = Profitability Index

NI = Net Income

TR = Total Revenue.

**Average Total Cost (ATC):**

$$\frac{\text{total costs}}{\text{output}} = \frac{TC}{Q}$$

**Marginal Costs (MC):**

$$\frac{\text{change in total cost}}{\text{change in output}} = \frac{\Delta TC}{\Delta Q}$$

Hence, net income model:

$$NI = TR - TC$$

$$TC = TVC + TFC$$

Where,

NI = Net Income

TR = Total Revenue

TC = Total Cost

TVC = Total Variable Cost

TFC = Total Fixed Cost

The profitability index will further be used to measure the profitability of NTFP marketing in the study area. The profitability index model as used by Ibekwe et al., (2012) is expressed as:

#### 4. METHODOLOGY

The study was conducted in Awgu agricultural zone in Enugu State of Nigeria. Enugu state was created out of the former Anambra State in 1991 with its capital in Enugu city. Enugu State is located in the south-eastern region of Nigeria. It is bounded in the north by Kogi and Benue States, in the east by Ebonyi and Abia States, in the south by Ebonyi, Abia and Anambra, and in the west by Anambra State [7,8]. Its total land area is 7,161km<sup>2</sup> with a population of 3,367,837 according to [9]. It consists of six (Awgu, Udi, Nsukka, Enugu-Ezike, Enugu, and Agbani agricultural zones). Awgu agricultural zone consists of three local government areas (LGA), they include; Aninri, Awgu, and Oji River. The zone is bounded in the north by Udi and Nkanu West LGAs, in the west by Oji River L.G.A and share border with Isochi LGA of Abia state in the south. Awgu agricultural zone lies within the guinea savannah vegetation zone.

All the 90 respondents that market NTFPs constituted the population for the study. Both purposive and multistage simple random sampling techniques were employed to select 90 respondents for the study. First, one (Awgu) Agricultural Zone was purposively selected because the topography varies in the study area; with large quantity of NTFPs in the zone. It has natural denser vegetation with valley sparse at the top of the hills. In the second stage, two (Aninri and Oji-River) Local Government Areas were purposively selected from Awgu agricultural zones because of the forest density which could account for the presence of NTFP marketers.

In the third stage, two rural markets were selected from each LGA, giving a total of four rural markets. Finally, 90 respondents that market the NTFPs in the study area were purposively selected from each rural markets since the actual population frame of the respondents that specifically deal on NTFPs were unknown for the study due to lack of accurate data documentation in the rural area. Total 90 respondents were used for the study so as to establish baseline for this kind of research.

## 5. RESULTS AND FINDINGS

### 5.1 Socio-economic Characteristics of Respondents in the Study Area

In this study, set of socioeconomic characteristics of NTFPs marketers to determine

their resolutions on how they behave in marketing of NTFPs were analyzed. These are; information from the age of household, gender of respondents, years of experience acquired in NTFPs marketing, educational attainment of respondents among others. The result of the analysis is presented in Table 1.

### 5.2 Cost and Return Analysis of NTFPs Marketing in the Study Area

The global economy is losing more money from the disappearance of forests than through global financial crisis, according to an EU-commissioned study as reported by [8]. Some of these amount are used to alleviate the poverty levels of rural households that are involved in marketing of NTFPs as can be seen Table 3.

### 5.3 NTFPs Marketing and Its Constraints in the Study Area

Like in most developing areas, rural communities and households in sub-Saharan Africa including Nigeria especially in Enugu State depend on forest resources to meet up a variety of livelihood objectives including food security, social security, income and employment generation, risk management and essential subsistence goods as reported by [3]. Meanwhile, meeting up these listed objectives among others are constrained by various factors including that of NTFPs marketing especially in the study area.

**Table 1. Distribution of respondents according to socio-economic characteristics of NTFPs marketers in the study area**

Variables	Frequency (n=90)	Percentage (%)	Mean ( $\bar{X}$ )
<b>Sex</b>			
Male	28	31.1	
Female	62	68.9	
Total	90	100.0	
<b>Age(years)</b>			
≤20	29	32.2	
21-30	16	17.8	35.9
31-40	11	12.2	
41-50	6	6.7	
51-60	20	22.2	
≥61	8	8.9	
Total	90	100.0	
<b>Marital status</b>			
Single	40	44.4	
Married	25	27.8	

Variables	Frequency (n=90)	Percentage (%)	Mean ( $\bar{X}$ )
Divorced	0	0.0	
Widowed	25	27.8	
Total	90	100.0	
<b>Religious affiliation</b>			
Christian	88	97.8	
Traditionalist	2	2.2	
Total	90	100.0	
<b>Household size ( persons)</b>			
$\leq 4$	40	44.4	
5-8	43	47.8	5
9-12	5	5.6	
$\geq 13$	2	2.2	
Total	90	100.0	
<b>Educational qualification</b>			
Non formal education	27	30.0	
Primary education	7	7.8	
Secondary education	51	56.7	
NCE/OND	5	5.6	
<b>Primary occupation</b>			
Crop Farming	40	44.4	
Animal farming	6	6.7	
Trading	24	26.7	
Crop and animal farming	6	6.7	
NTFP farming	12	13.3	
Civil servant	2	2.2	
Total	90	100.0	
<b>NTFPs Marketing experience in year(s)</b>			
$\leq 5$	31	34.4	
6-10	27	30.0	8.9
11-15	20	22.2	
$\geq 16$	12	13.3	
Total	90	100.0	

Source: Field survey, 2017.

Table 2. Distribution of some major NTFPs in the study area

S/N	English name	Common name	Scientific name	Plant part in use
1	African guinea Pepper	Uda	<i>Xylopia aethiopica</i>	Seed
2	African nutmeg	Ehuru	<i>Mandora myistica</i>	Seed/nut
3	African star apple	Udara	<i>Chrysophyllum albidum</i>	Fruit
4	Bitter kola	Akilu	<i>Garcinia cola</i>	Fruit
5	Bitter leaf	Onugbu	<i>Vernonia amygdalina</i>	Leaf
6	Black pepper	Ose oji	<i>Piper guineensis schum</i>	Seed
7	African bush mango	Ogbono	<i>Irvingia gabonensis</i>	Fruit
8	Wild spinach	Okazi	<i>Gnetum africanum</i>	Leaf
9	Bush buck	Utazi	<i>Gongronema latifolium</i>	Leaf
10	Guinea cubeb	Uziza	<i>Piper guineense</i>	Leaf
11	Oilbean seed	Ugba	<i>Pentaclethra</i>	Seed
12	Mushroom	Ero	<i>Agaricus boscporium</i>	Plant

S/N	English name	Common name	Scientific name	Plant part in use
13	Kolanut	Mkpuru-oji	<i>Cola accuminata</i>	Fruit
14	Wild mango	Ugiri	<i>Irvingia wombolu</i>	Fruit
15	Oil palm	Mkpuru-akwu	<i>Elaeis guinensis</i>	Fruit
16	Fuelwood	Nku	NA	Twig
17	Elephant grass	Achara	<i>Pennisetum purpureum</i>	Leaf
18	Native pear	Ube	<i>Dacryodes edulis</i>	Fruit
19	Grasscutter	Nchi	<i>Thryonomys swinderianus</i>	Animal
20	Snail	Eju	<i>Achatina achatina</i>	Animal
21	Winged termites	Aku	<i>Isoptera blattodea</i>	Insect
22	African oil bean	Ukpaka	<i>Pentaclethra macrophylla</i>	Fruit

Source: Field survey, 2017.

NA\*\*- not available

**Table 3. Distribution of cost and returns analysis for selected NTFPs marketed in the study area**

S/No	Items	Non-timber forest product and cost (₦)				
		Bitter Kola	Ogbono	Utazi	Okazi	Grasscutter
A	Total Revenue (TR)	45,000/50kg	15,000/20kg	4,500/ 4kg or 2 heads	5,000/ 4kg or 2 heads	6,000/3 animals
B	Variable Cost (VC)					
ii.	Cost of goods	35,000	10,00	3,200	3,600	-
iii.	Processing cost	-	-	-	-	-
iii.	Nylon bags/sacks	500	100	50	50	-
iv.	Transportation	500	200	-	-	-
C	Total variable cost (TVC)	36,000	10,500	3,300	3,700	-
D	Fixed cost (FC)					
v.	Depreciation on equipment					
a.	Basket	720	720	-	-	-
b.	Basin	-	-	343	343	-
c.	Knife	-	-	137	137	137
d.	Cutlass	-	-	-	-	590
e.	Cutting board	-	-	100	100	-
f.	Stool	-	-	311	311	-
g.	Table and stool	983	983	-	-	-
h.	Animal trap	-	-	-	-	2,949
E	Total fixed cost (TFC)	1,703	1,703	891	891	3,670
F	Total Cost (TC)	37,703	12,203	4,191	4,591	3,670
G	Gross margin (GM)	9,000	4,500	1,200	1,300	6,000
H	Net Income (NI)	7,297	2,797	309	409	2,330
I	Profitability Index (PI)	0.16	0.19	0.07	0.08	0.39
J	Benefit cost Ratio (BCR)	1.2	1.2	1.1	1.1	1.6

Source: Field Survey, 2017.

**Table 4. Distribution of NTFPS marketing constraints as perceived by the respondents in the study area**

Constraints	Frequency	Percentage
<b>Transportation</b>		
Yes	50	55.6
No	40	44.4
Total	90	100.0
<b>Bad roads</b>		
Yes	55	61.1
No	35	38.9
Total	90	100.0
<b>Lack of fund</b>		
Yes	65	72.2
No	25	27.8
Total	90	100.0
<b>Inadequate market</b>		
Yes	39	43.3
No	51	56.7
Total	90	100.0
<b>Insufficient harvesting tools</b>		
Yes	2	2.2
No	88	97.8
Total	90	100.0
<b>Government policy</b>		
Yes	2	2.2
No	88	97.8
Total	90	100.0
<b>Seasonality of the product</b>		
Yes	70	77.8
No	20	22.2
Total	90	100.0
<b>All of the above</b>		
Yes	2	2.2
No	88	97.8
Total	90	100.0

Source: Field survey, 2017.

#### 5.4 Discussion of Results

The Table 1 above shows that 68.9% of the respondents were female, while the remaining 31.1% were male. This implies that greater proportion of the marketers of NTFPs were female. Though more females were involved in NTFPs marketing, it does not mean out-rightly that females dominate males in the study area. Rather, it can be attributed to females being more interested in the marketing of NTFPs than males [8].

Table 1 also reveals that about 32.2% of the respondents fall into the age range of  $\leq 20$  years, 22.2% of them were in the age range of 51-60 years, 17.8% of them were in the age range of 21-30 years, 12.2% of them were in age range of 31-40 years, 6.7% of them were in age range 41-

50 years while 8.9% of the respondents were in age range of  $\geq 61$  years. The mean age was 39.5. The result of the analysis revealed that majority of the respondents were in their active age, and are energetic to handle the tasks entailed in non-timber forest products marketing in the study area. The findings could imply that older marketers could involve the youths who are in their productive age, and could withstand the tasks in NTFPs marketing.

Findings in Table 1 show that greater proportions (97.8%) of the respondents are Christians while 2.2% of them were traditionalists. This implies that majority of the respondents are Christians.

The primary occupation of respondents usually represents those activities which occupy at least

up to 50% of the working time of the households to support their financial base. About 44.4% of the respondents' primary occupation was crop farming, 26.7% of them were into trading, 13.3% of them were into NTFPs farming, 6.7% of the respondents were into animal farming and crop farming respectively while 2.2% of the respondents were civil servants. From the table 1 above, notwithstanding that higher percentage of the respondents had their secondary education. This might imply that only 2.2% of them were engaged in public service as their primary occupation.

Table 1 also shows that about 34.4% of the respondents had  $\leq 5$  years of experience in NTFP marketing, than 30% of them had 6-10 years of experience, 22.2% of them had 11-15 years of experience, while 13.3% of the respondents had  $\geq 15$  years of experience in NTFPs marketing. Results revealing fewer years of experience could confirm the earlier finding (Table 1) that more youths are involved in NTFPs marketing.

In Table 3, the results of the analysis carried out show that total revenue of ₦45,000, ₦15,000, ₦4,500, ₦5,000, and ₦6,000 were gotten from the sales of bitter kola, ogbono, utazi leaf, ukazi leaf, and nchi a gross margin of; ₦9,000 for bitter kola, ₦4,500 for ogbono, ₦1,200 for utazi, ₦1,300 for okazi, ₦6,000 for grasscutter, also a net income of ₦7,297, ₦2,797, ₦309, ₦409, ₦2,330 respectively for them.

The benefit cost ratio shows that for every ₦1 the marketer puts into marketing selected NTFPs, ₦20kobo, ₦1.20kobo, ₦1.10kobo, ₦1.10kobo, ₦1.60kobo is realized for; bitter kola, ogbono, utazi, okazi, and grass cutter respectively.

Table 4 reveal that majority (77.8%) of the respondents agreed that seasonality of the product is a major constraint affecting the availability of NTFPs, while 72.2% of the respondents perceived lack of fund as constraint in NTFPs marketing while 61.1% of the respondents perceived bad roads as constraints in NTFPs marketing.

## 6. CONCLUSION

The study investigated the microeconomic implication of the marketing of selected non-timber forest products (NTFPs) in Awgu agricultural zone of Enugu State, Nigeria. The

summary of the study showed that there is provision of timber forest products (NTFPs) provide income and employment for the rural dwellers in Awgu agricultural zone of Enugu State. The profitability index of bitter kola, ogbono, utazi leaf, okazi leaf, and nchi showed that NTFP marketing is a profitable and lucrative venture in the study area. The major constraints among the NTFPs marketers were lack of organized transportation system, bad roads, and seasonality of the products. The study recommends the need for both state and zonal government to construct feeder roads to enhance easy access of the urban marketers to the rural areas to the study area. This will attract more demand for NTFPs products among marketers. Furthermore, it will promote more processing of NTFPs in the State (Enugu) and the nation at large.

## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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