



## Determinants of Utilization of Selected Forest Fruits in Ikono Local Government Area of Akwa Ibom State, Nigeria

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### Authors' contributions

This work was carried out in collaboration between all authors. Authors IKG and IEA designed the study, wrote the protocol and wrote the first draft of the manuscript. Author IKG reviewed the experimental design and all drafts of the manuscript. Authors IKG and UUA managed the analyses of the study. Author IKG identified the plants. Authors IKG and UUA performed the statistical analysis. All authors read and approved the final manuscript.

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### ABSTRACT

This study was carried out to determine the factors that affect the utilization of selected fruits in Ikono Local Government Area of Akwa Ibom State, Data were collected using well-structured questionnaire and analyzed using Multiple Regression Analysis and descriptive statistics such as frequency and percentages. The results indicated that 68% of the respondents were male, 39.9% had secondary education and majority of the respondents were farmers. The results also showed that most of the respondents (98.2%) bought their fruit from the market. The result indicated that 100% of the respondents had adequate knowledge on the existence of *Dacryodes edulis* (eben), and 95% on *Cola argentea* (ndiya), while few of the respondents (27.9%) had little knowledge on the existence of *Maesobotrya dusenii*. The result also revealed that numerous benefits such as food, income medicine are derived from fruits and that lack of money (91%), non-availability of the fruits, and deforestation of the forest (64.9%) were the major constraints faced in the utilization of

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these forest fruits in the study area. Result of the regression analysis revealed that age was positively related to the value of forest fruits utilized. The level of education was positive and significant ( $P < 0.10$ ). Income was positive and significant ( $P < 0.10$ ) implying that as income increase, the quantity of forest fruits consumed is likely to increase correspondingly and vice versa. Also forest fruits are versatile in their uses as food for man and animals, source of medicine and income generation. They could be obtained from the forest, homegarden and markets. Socioeconomic factors such as age, educational qualification, and income influence the utilization of the forest fruits extension activities should be carried out to enlighten the public on the uses and importance of the different forest fruits. Also policy makers should enact laws which would strictly discourage deforestation. This will ensure adequate and all-year-round availability of the different forest fruits in the state.

*Keywords: Forest fruits; utilization; forest; home garden.*

## 1. INTRODUCTION

Forest fruits like other non-timber forest products play a vital role in mammalian existence and to enhance the biodiversity [1,2]. According to [3], about 60% of the population of the developing countries depends on non-timber forest products such as fruits for their primary health and nutritional needs. The possibility that fruit and vegetable consumption may protect human health is an intriguing prospect and has been studied around the world [4]. Over the past few decades, the number of studies suggesting an association between fruit and vegetable intake and reduced risk of major chronic diseases has continued to grow [4]. Fruit and vegetables are important components of a healthy diet, and their sufficient daily consumption could help prevent major diseases, such as cardiovascular diseases and certain cancers [5]. Also according to the [6] low fruit and vegetable intake is estimated to cause about 31% of ischemic heart disease and 11% of stroke worldwide. Most species like birds and mammals consume fruits at least occasionally [7]. Fruit consumption according to [8] has been linked to mammalian survival and reproductive success. During winter for example, fruits are very important to all vertebrates when other food sources are scarce [7].

Millions of people especially those living in rural areas of developing countries make a living out of collection and sales of forest fruits daily. They contribute a significant source of food and income for people [9,10]. Although the exploitation of forest fruits is done primarily as a source of food to the rural households in Nigeria, it has a great deal of effect on their economic well-being as they are sold in pre-urban and urban areas to generate income. This actually can make a difference during period of famine

and food scarcity in rural communities throughout Africa [11]. Food is a major focus for social interactions and many eating occasions occur in company and outdoor environment. Eating in this way may affect the type, amount of foods and fruits eaten. Consumers of fruits and vegetable had tendency to consume more of their meals in the living rooms in front of the television compared with those who are in a number of outdoors [12] Differences in fruits and vegetable intake of people could also be attributed to difference marital status [13]. Found that being married is associated with increased fruit and vegetable intake, whilst being single, separated or divorce may be associated with lower intakes. Moreover, the cost of fruits is a major factor determining fruit choice. It has been found that those in lower socioeconomic groups consume less fruits and vegetables than those in higher socioeconomic groups [14]. Here, the law of demand comes to play as the quality of fruits demanded/consumed is determined by the cost of such fruits.

The immediate availability of forest fruit is one of the major factors affecting fruit consumption. In 2000, supermarkets had 83% of the market share in fresh fruit and vegetable compared to 11% for independent and 3% for market sells [15]. This implies that where fruit is not readily available close to consumer, fruit intake could be reduced due to cost of transportation together with the cost of the fruit itself which will be high where it is scarce. This study therefore sought to identify the determinants of utilization of forest fruits in Ikono local Government Area of Akwa Ibom State. The objectives were to: (i) identify the socio-economic characteristics of forest fruit users in the study area; (ii) determine the source of forest fruits in the study area; (iii) assess the factors affecting the utilization of selected forested forest fruits in the study area.

## 2. MATERIALS AND METHODS

### 2.1 Study Area

The study was conducted in Ikono Local Government Area of Akwa Ibom State. It is located at the Northern part of Akwa Ibom State between 7°50' and 8°00' East and latitude 5°30' and 7°00' North, Ikono is bound on the North by Ini Local Government Area, South by Abak and Uyo Local Government Area and Westward by Ikot Ekpene Local Government Area. It has the land mass of 407.16 square kilometers [16]. According to the 2006 population census in Nigeria, Ikono Local Government Area has the total human population of 131,673 people with the number of male as 66,080 and female 65,593 [17]. The location by Akwa Ibom State is North of the equator within the humid tropics, and its proximity to sea makes the State generally humid. Akwa Ibom State is characterized by two seasons, viz rainy season which last from mid March to October (about 8 months) and dry season which last from November to February (4 months). Rainfall is heavy, ranging from over 3000 mm along the coast to 2000 mm on the Northern fringe of the state [18]. Temperatures are uniformly high throughout the year with shift variation and range between 26°C and 28°C. High relative humidity between 75% and 95% are common across the state [19].

### 2.2 Data Collection and Sampling Procedure

Primary data were used for the study. After the detailed field survey the semistructured interviews/questionnaires [20-23] were applied and multistage samplings were done. The first stage involved the random selection of 2 out of the 4 clans in Ikono. The second stage involved the selection of 10 villages per clans. The third stage involved the selection of 6 households per a village to make a total of 120 household.

### 2.3 Data Analysis

Data collected were analysed using descriptive statistics such as frequency table, percentages and multiple regressions analysis.

### 2.4 Empirical Model

This model was stated in the implicit form as follows:

$$Q = f(X_1, X_2, X_3, X_4, X_5, X_6, e)$$

Where

- Q = Value of forest product used per season in naira
- X<sub>1</sub> = Gender of the user (D = 1 if male, 0 if otherwise)
- X<sub>2</sub> = Age of the user (in years)
- X<sub>3</sub> = Educational level (in years)
- X<sub>4</sub> = Marital Status (D=1 if married, 0 if otherwise)
- X<sub>5</sub> = Occupation
- X<sub>6</sub> = Source of fruit
- e = Error term

## 3. RESULTS

### 3.1 Socio-economic Characteristics of the Respondents

The socio-economic variables considered in the study were age, sex, marital status, educational background and occupation.

#### 3.1.1 Age of the respondents

The results of the present study indicated that 19.8% of the respondents were in the age group 10-30yrs out of which 9% came from Ediene clan, 5.4% came from Itak clan, 2.7% came from Ndinya clan, 2.7% came from Ikono clan; 38.7% of the respondents were in age 31-50; 22.5% were in age group 51-60; while 18.9% of the respondents in the study were in the age group 60 and above (Table 1).

#### 3.2 Educational Background

Table 2 showed that 65.7% of the respondents were male while 34.2% were female. Also, the educational qualification of the respondents revealed that those with FSLC were 26.1%; WASSCE, 38.7%; OND/HND were 24.3% and B.SC holders were 10.8% of the total number of respondents.

#### 3.3 Marital Status

The marital status of the respondents was revealed as 61.2% of the total respondents were married, 27.0% were single, 5.4% were divorced, 4.5% were widows while 1.8% of them were widower (Table 3).

**Table 1. Distribution of respondents by age**

Sampled clans	10-30	31-50	51-60	60 and above
Ediene clan	9%	8.1%	5.4%	3.6%
Itak clan	5.4%	8.1%	4.5%	7.2%
Ndiya	2.7%	99	6.3%	5.4
Ikono	2.7	12.6	6.3	2.7
Total	19.8%	38.7%	22.5%	18.9

**Table 2. Distribution of respondents by sex and educational qualification**

Study area Clans	Sex (%)		Educational		Qualification (%)	
	Male	Female	FSLC	WACE	OND	B.Sc
Ediene	18	8.1	7.2	12.6	3.6	27
Itak	16.2	9	8.1%	9.0	4.5	3.6
Ndinya	16.2	81	6.3%	9.0	8.1	0.9
Ikono	18.9	9.0	4.5	8.1	8.1	3.6
Total	65.7	34.2	26.1	38.7	24.3	10.8

**Table 3. Distribution of respondents by marital status**

Clans	Married %	Singe %	Divorced %	Widow %	Widower %
Ediene clan	16.2	8.1	0.9	0.9	0
Itak clan	15.3	5.4	0.9	0.9	0
Ndinya	10.8	9.0	2.7	0.9	1.8
Ikono	18.9	4.5	0.9	1.8	0
Total	61.2	27.0	5.4	4.5	1.8

### 3.4 Distribution of Respondent Based on Their Occupation

The result in Table 4 clearly showed that 49.5% of the respondents were farmers, 20.7% were traders, and 18.9% were business men and women while civil servants were at 10.8%. These percentages of the respondent were spread across the clans sampled during the study as represented in Table 4.

### 3.5 Regression Estimates for Factors Affecting the Utilization of Forest Fruits

Four functional forms were estimated for the factors affecting the utilization of forest fruits and the regression estimates for the factors determining the utilization of forest fruits is shown in Table 5. Double log was chosen as the lead equation due to its high  $R^2$  and F values. The estimated regression equation for forest fruits users has F value of 3.71 and  $R^2$  value of 0.782 which is an indication that the explanatory variables account for 78.2% of the total variable is in the value of forest fruit used. The regression estimate revealed that age was positively related to the value of forest fruits utilized. This implies

that as one advances in age, more of the forest fruits are consumed. Hence age of people affects the utilization of forest fruits. The level of education was positive and significant ( $P < 0.10$ ) also, which implied that as the level of one's education increases, the awareness and quantity of forest fruits consumed increases therefore one can say that educational level of people also affect the level of forest fruit utilization. Income, like level of education was also positive and significant at  $P < 0.01$  implying that, as income increases, the quantity of forest fruits consumed is likely to increase correspondingly vice versa.

### 3.6 Knowledge of Existence of Forest Fruit in Study Area

Table 6 explained the respondents' knowledge on the availability of some forest fruits in their locality. In Ediene, 13 (11.7%) were aware of *Artocarpus communis* availability, in Itak clan, 20 (18.0%) respondents were aware, in Ndiya clan 11 (9.9%) were aware while in Ikono clan 18 (16.2%) were aware of the fruit availability. Generally, a total of 62 (55.9%) of the respondents were aware of *Artocarpus communis* availability in the study area, 111 (100%) were aware of *Dacryodes edulis*, 57

(51.4%) were aware of *Denettia trepitala*, 95 (85.6%) were aware of *Cola argentea*, 31 (27.9%) were aware of *Maesobotrya duseonii* while 78 (55.8%) were aware of *synsepalum dulcificum*.

### 3.7 Distribution of Respondents Based on the Sources of Forest Fruits

From Table 7 it was revealed that forest, market and home garden are the sources of forest fruits for the people of Ikono Local Government Area. The table showed that 58.6% of the respondent takes their fruit from the forest, 98.2% acquire their fruits from the market, while 82% source their fruits from their home garden.

### 3.8 Utilization of some Forest Fruits in the Study Area

The results of the utilization of forest fruit by the respondents are given in Table 8, which clearly indicated that 81 (72.9%), 62 (55.9%), 63

(56.8%), 90 (81.1%), 114 (102.7%) from Ediene clan, Itak clan, Ndiya clan and Ikono clan respectively use forest fruits as medicine while 110 (99.1%), 91(81.9%), 94 (84.7%) and 99 (89.2%) of the respondents from Ediene clan, Itak clan, Ndiya clan and Ikono respectively used forest fruits as food. The result further showed that a total of 291 (262.2%) used forest fruits for income generation, 336 (302.7%) of the respondents use forest fruit as medicine while a total of 396 (332.4%) of the respondents use forest fruits as food.

### 3.9 Constraints in the Utilization of Forest in the Study Area

Table 9 revealed the constraints in the utilization of forest fruits in the study area. According to the respondents, there were lots of constraints faced in the utilization of the fruits. The highest ranked constraints were the lack of money which was represented by 91% follower by non-available of

**Table 4. Distribution of respondent based on their occupation**

Sampled clans	Famers (%)	Traders (%)	Business men/women (%)	Civil servant (%)
Ediene clan	99	7.2	6.3	2.7
Itak clan	12.6	5.4	5.4	2.7
Ndinya clan	16.0	2.7	4.5	2.7
Ikono clan	12.6	5.4	2.7	2.7
Total	49.5	207	18.9	10.8

**Table 5. Regression estimates for factors affecting the utilization of forest fruits**

Variable	Linear	Exponential	+ double log	Semi-log
Constant	5.138 (2.013)**	14.341 (1.341)	8.131 (2.351)**	7.355 (1.550)
Gender	4.887 (1.337)	1.301 (0.904)	8.107 (1.205)	6.672 (1.1330)
Age	6.137 (2.181)**	4.176 (1.720)*	4.008 (2.614)***	6.706 (2.117)**
Education	11.612 (1.717)*	7.098 (1.679)*	9.726 (2.614)***	6.706 (2.117)**
Location	0.816 (1.512)	0.992 (1.643)	1.651 (1.138)	1.788 (1.089)
Income	11.052 (1.884)*	8.093 (1.904)	6.510 (2.062)**	10.086 (1.981)**
	R <sup>2</sup> = 0.562	R <sup>2</sup> = 0.528	R <sup>2</sup> = 0.782	R <sup>2</sup> = 0.61

$$Fvalue=2.93***Fvalue=3.11***Fvalue=3.71***Fvalue = 2.81**$$

Note \*\*\*, \*\*, \* indicate significance at 1%, 5% and 10% respectively with t-value in parenthesis while + indicate the lead equation

**Table 6. Distribution of respondent's base on their respondent's knowledge of the existence of some forest fruits**

Sampled clan	Fruits					
	<i>Artocarpus communis</i>	<i>Dacroydes edulis</i>	<i>Denattia triepitala</i>	<i>Cola argentea</i>	<i>Maesobotrya duseonii</i>	<i>Synsepalum dulcificum</i>
Ediene clan	13 (11.7%)	27 (24.3%)	14 (12.6%)	27 (24.3%)	9 (8.1%)	22 (19.8%)
Itak clan	20 (18.0%)	23 (20.7%)	13 (11.7%)	22 (19.8)	5 (4.6%)	20 (18.9%)
Ndiya clan	11 (9.9%)	25 (22.5%)	13 (11.7%)	18 (16.2%)	8 (7.2%)	11 (9.9%)
Ikono clan	18 (16.2%)	30 (27.0%)	17 (15.3%)	28 (25.2%)	9 (8.1%)	23 (20.7%)
Total	62 (55.9%)	111(100%)	57 (51.4%)	95(85.6%)	31 (27.9%)	76 (55.8%)

**Table 7. Distribution of respondents based on the sources of forest fruits**

Sampled clan	The forest	Market	Home garden
Ediene clan	11 (9.9%)	30 (27.0%)	26 (23.4%)
Itak clan	23 (20.7%)	29 (26.1%)	24 (21.6%)
Ndinya clan	11 (9.9%)	30 (27.0%)	26 (23.4%)
Ikono clan	17 (15.3%)	29 (26.1%)	24 (21.6%)
Total	65	109	91
Percentage (%)	58.6%	98.2%	82%

**Table 8. Distribution of respondents according to utilization of some forest fruits in the study area**

Sampled clans	Basis of utilization		
	Income	Medicine	Food
Ediene clan	81 (72.9%)	80 (72.1%)	110 (99.1%)
Itak clan	62 (55.9%)	73 (65.8%)	91 (81.9%)
Ndiya clan	63 (56.8%)	90 (81.1%)	94 (84.7%)
Ikono clan	86 (77.5%)	114 (102.7%)	99 (89.2%)
Total	291 (262.2%)	336 (302.7%)	369 (332.4%)

**Table 9. Distribution of respondents according to their response on the constraints of fruit utilization in the study area**

Constraint	Frequency	Percentage (%)
Lack of money	101	91
Non availability of these fruits	93	83.8
Deforestation	72	64.9
Lack of knowledge of the existence of the fruits in the locality	23	19.2
Lack of knowledge on the income generating potential of the fruits	28	23.3
Lack of knowledge in the importance these fruits	12	10.8
Irregular supply of these fruits	67	69.4
Long distance to the forest	32	28.8
High cost of forest fruits	53	83.8
Lack of knowledge on the nutritional value of the fruit	61	55

these fruits with 83.8% and deforestation of the forest with 64.9% from the result, it can be observed that the fruits are not quite expansive, but the residents of the area afford the fruits.

## 4. DISCUSSION

### 4.1 Socioeconomic Characteristic of the Respondents

Respondents within 31-50 years age bracket were more than those in other age brackets. Therefore, most of the respondents were within the economically active age. Respondents were more of male than female. Educationally, the highest qualification attained by the respondents was B. Sc. with most respondents having WASSCE. The implication is that they are not highly educated and live within their community and so depend on the available resources

around them. Married people made up a greater percentage of the respondents while most of the respondents were farmers.

### 4.2 Utilization of Forest Fruit in the Study Area

Forest resources are a key component of the natural resource base of any community, region or country and they play a fundamental role in the socio-economic well-being of the people of those communities. The result in Table 8 showed that forest fruits were so important in the lives of the people of Ikono Local Government Area, as it serves the basic needs of life for the people. That is, providing income through the sale of numerous forest fruits such as *Artocarpus communis*, *Dacryodes edulis*, *Cola argentea* etc for income generation; it also serves as medicine for different illness as shown in the number of

respondents using forest fruits as medicine; that is, 336 (302.7%) respondents; and also serve as food where a number of forest fruits are eaten such as *Dacryodes edulis* and other. This agrees with [3] that 60% of population of the developing countries depends on non-timber forest products such as fruits for their primary health and nutritional needs. Also, fruits consumption has been linked to mammalian survival and reproductive success [8]. Non-timber forest products such as wild fruits are collected daily; and many regard selling them as a means of livelihood; thereby constituting a significant source of food and income for the people [9,10].

#### **4.3 Source of Forest Fruits in the Study Area**

As shown in result in Table 7, some of the fruit were sourced from the forest, Home garden and market. Hence one can say that the main sources of forest fruit are the forest and Home garden since forest fruit cannot get to the market except it is taken there from either the natural forest or planted forest which may be home garden, hence agreeing with [24] that forest is a reservoir of diverse product (food and services) that man uses every day of his life to satisfy his basic needs. Also agreeing with [3] who opined that products such as fruits nuts, honey, meat, fiber and mechanical extracts etc are derives from a variety of sources in the ecosystem. The result also revealed that a greater percentage of the respondents about 98.2% (109) got their fruit from the market followed by those who got their fruits from home garden about 82% (91) while less percentage (58.6%) of the respondents derived their fruit from the forest signify less pressure in the natural forest and gradual adoption of home garden.

#### **4.4 Factors Affecting the Utilization of Selected Forest Fruits in the Study Area**

Factors affecting the utilization of forest fruits include socio-economic factors such as age, educational qualification and income. Another constraint as mention by 91% of the respondents was lack of money. Some fruits are edible and are of high nutritional value. Hence fruit constitute a healthy diet making it unaffordable by some especially those of the low income grade. This agrees with [25] that a study conducted to investigate direct and indirect costs of a healthy diet, found a healthy diet to be more

expensive in monetary terms. Non availability of these fruits also was one of the constraints faced as the utilization of some forest fruits. The immediate availability of forest is found such fruits cannot be used. This is in line with [15] who stated that a study carried out to investigate perceived barriers to increase fruits, and vegetable consumption found that the participants were finding limited availability of vegetables and fruits at work when eating out, having takeaways and at friends' houses. These constitute a barrier to increasing fruit intakes. Deforestation her been the problem of the forest causing the loss of biological resources. According to [26], deforestation adversely affects the stock of forest resources. As pointed out by the respondents, deforestation has made some of the forest fruits unavailable for the people, while other respondents opined that there are not aware of the existence of some of the fruits; the medicinal values of the fruits; even the income generating potentials of the fruits; ofcourse one cannot use that he does not know, hence the lack of knowledge on the importance of some forest fruits as was noted by the respondents hinder the utilization of soil fruit. Irregular supply of the fruit which could be attributed to lack of all-time availability, long distance to the forest and high cost of forest fruits.

### **5. CONCLUSION**

Among other benefits, forest provides many non-timber forest products such as fruits. Forest fruits are versatile in their uses as food for man and animals, source of medicine and income generation. They could be obtained from the forest, home garden and markets socio-economic factors such as age, educational qualification and income influence the utilization of forest fruits in the study area. Where these constraints are overcome, proper utilization of forest fruits for the benefit of the citizenry is inevitable.

### **COMPETING INTERESTS**

Authors have declared that no competing interests exist.

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