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DETERMINANT OF UTILIZATION OF SELECTED FOREST FRUITS IN IKONO LOCAL GOVERNMENT OF AKWA IBOM STATE, NIGERIA.

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-availabilityofthefruits, and deforestation of the forest (64.9%) were the major constraints faced in the utilization of 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.

KEYWORD: Forest Fruits, Utilization, Forest, Home garden

INTRODUCTION

Forest fruits like other non-timber forest products play a vital role in mammalian existence. According to Huxley and Van Hunter (1997), 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 (Hyson, 2011). 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 (Hyson, 2011). 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

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certain cancers (WHO, 2016). Also according to the world Health Report (2003) 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 (Kwit 2004). Fruit consumption according to McCarly (2002) 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 (Kwit,2004).

Millions of people especially those living in rural areas in developing countries collect these products (fruits) daily and many regard selling them as a means of livelihood. They contribute a significant source of food and income for people (Ndoye 1995, Ndoye *et al.,* 1997). 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. This is so because forest fruits collectors do no gather fruits only for their own domestic use, but also for sale in nearby pre-urban and urban area to generate income. Also the harvesting, utilization and marketing of indigenous fruit and nuts have been central to the livelihood of majority of rural community throughout Africa and can make a difference during period of famine and food scarcity (Leakey *et al*., 2005). 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 and amount of foods and fruit eaten.

According to Thompson *et al.,* (1999) study conducted in the United Kingdom (UK) revealed that the higher consumers of fruits and vegetable had tendency to consume more of their meals in the living room in front of the television compared with those who are in a number of outdoors. This could also explain the difference in fruits and vegetable intake of people with difference marital status; as it was found by Billson *et al.,* (1999) that being married is associated with increased fruit and vegetable intake, whilst being single, separated or divorce may be associated with lower intakes. The cost of fruits is a major factor

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determining fruit choice. This affects some groups of the population more than others. It has been found that those in lower socioeconomic groups consume less fruit and vegetable than those in higher socioeconomic groups (Anderson & Morris, 2000). Here, the law of demand comes to play as the quality of fruits demanded/consumed is determined by the cost implication of such fruits; hence cost of fruits is one of the determinants of fruit utilization.

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 (Mintal, 2001). 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.

MATERIALS AND METHOD

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 7^0 50′ and 8^0 00′ East and latitude $5^0$30′ and $7^0$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 (Anon 1999). 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 (NPC, 2010). The

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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 in characterized by two season, viz rainy reason which last from mid Mach to October (about 8 months) and dry season which last from November to February (4 months). Rainfall is heavy, ranging from over 3000mm along the coast to 2000mm on the Northern fringe of the state(Anthony and Ufia 2009).Temperatures are uniformly high throughout the year with shift variation and range between 26^0C and 28^0C. High relative humidity between 75% and 95% are common across the state (AKS, 1989).

Data Collection and Sampling Procedure:

Primary data were used for the study. With the aid of questionnaires, 120 households were selected using multistage sampling procedure. 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.

DATA ANALYSIS

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

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_1 = Gender of the use (D = 1 if male, O if otherwise)

X_2 = Age of the user (in years)

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X3 = Educational level (in years)

X4 = Marital Status (D=1 if massed, 0 if otherwise)

X5 = Occupation

X6 = source of fruit

e = Error term

RESULT

4.1 SOCIO-ECONOMIC CHARACTERISTICS OF THE RESPONDENTS

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

AGE OF THE RESPONDENTS:

From the result as presented in table 1 below, 19.8% of the despondence 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: Distribution of respondents by Age

Sampled clans	I0-30	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**

Educational background:

Table 2 as represented below, 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

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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.

Table2: Distribution of respondents by sex and educational qualification

Study Area	**Sex (%)**		**Educational**		**Qualification (%)**	
Clans	**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**

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 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**

Distribution of respondent based on their occupation

The result in table 4 below 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 above.

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

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Ikono clan	12.6	5.4	2.7	2.7
Total	**49.5**	**207**	**18.9**	**10.8**

Regression Estimates for Factors Affecting the Utilization of Forest Fruits

Four functional forms were estimated for the factors affecting the utilization of forest fruits. Table 5 below shows the regression estimates for the factors determining the utilization of forest fruits. 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.

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)**

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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)**
	$R^2 = 0.562$	$R^2 = 0.528$	$R^2 = 0.782$	$R^2 = 0.61$

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.

KNOWLEDGE OF EXISTENCE OF FOREST FRUIT IN STUDY AREA

Table 6 below 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 dusenii* while 78 (55.8%) were aware of *synseppalum dulcificum.*

Table 6: Distribution of Respondent's Base on their Respondent's Knowledge of the Existence of some Forest Fruits

Sampled clan	**Fruits**					
	Artocarpus communis	*Dacroydes edulis*	*Denattia triepitala*	*Cola argentea*	*Maesobotrya dusenii*	*Synsepalum dulcificum*
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%)**

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Distribution of Respondents Based on the Sources of Forest Fruits

From table 7 below, 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.

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%**

Utilization of some Forest Fruits in the Study Area.

The result in table 8 below showed the utilization of forest fruit by the respondents. 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.

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%)

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Ikono clan	86 (77.5%)	114 (102.7%)	99 (89.2%)
Total	**291 (262.2%)**	**336 (302.7%)**	**369 (332.4%)**

CONSTRAINTS IN THE UTILIZATION OF FOREST IN THE STUDY AREA

Table 10 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 these fruit 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.

Table 10: 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

DISCUSSION

Socioeconomic Characteristic of the Respondents

The socioeconomic characteristics of the respondents revealed that the respondents were more of the age bracket 31-50 years followed by age bracket 51-60years then age bracket 10-30years and age bracket 60 and above. This result confirms that most of the respondents were within the economically active age.The result also showed that the respondents were more of male than female. Also the Education background of respondents revealed that most of the

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respondents had WASSCE followed by those with FSLC, OND/ HND and B.Sc. The Marital Status revealed that the respondents were more of married followed by single; Divorced, Widow and Widower while the occupation background of the respondents revealed that more of the respondents were farmers followed by traders as primary occupation followed by business men and women then civil servants.

Utilization of forestfruit 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 Huxley and Van Hunter (1997) 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 (McCarby 2002). 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 (Ndoye 1995, Ndoye *et al*. 1997).

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

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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 Tee (2007) 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 Huxley and Van Hunter (1997)who opine 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.

FACTORS AFFECTING THE UTILIZATION OF SELECTED FOREST FRUITS IN THE STUDY AREA

Factors affecting the utilization of forest fruits are numerous. Some of such factors 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 Cade *et al*., (1999) 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 Mintel (2001) 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

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biological resources. According to Udo (2015) 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.

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.

REFERENCES

AKS (AkwaIbom State) (1989) Physical Background, Soils and Land Use and Ecological problems. Technical Report of Task Force on Soils and land Use Survey. AkwaIbom State Ministry of Lands and Survey.Pp vii-xv.

Anderson, I. S. and Morris F. L. (2000) Ecological Interactions in Agroforestry System. Agroforestry Abstracts 6 (2):57-91.

Annon (1999) Information Bulletin, Published by Information Unit, Uyo Local Government pp 15-17.

Anthony and Udofia (2009). Income Generation from Homegardens of Akwa Ibom State, Nigeria. In: *Food production in a Developing Economy*, Graficas Guerrero. Spain. pp 377-383.

Billson, H., Pryer, J. A. and Nichols, R. (1999) Variation in Fruit and Vegetation Consumption among Adults in Britain. An Analysis from the Dietary and Nutritional Survey of British Adult. European Journal of Clinical Nutrition (53) 946-952.

UNDER PEER REVIEW

Cade, J., Upmeier, H., Calvert, C. and Greenwood, D. (1999) Costs of a Healthy Diet Analysis from the UK Women's Cohort study. Public Health Nutrition. Vol.(12) 28-44.

Hexley and Van Hunter, H. (1997) Glossary for Agroforestry. International Centre for Research in Agroforestry. English Press, Nairobi, Kenya

Hyson, D. A. (2011) Fruits, Vegetables, and Health: A Scientific Overview,. Produce for Better health foundation. Web. <http://www.pbhfoundation.org>.

Kaey, R. W. J., Onochie, C. F. A. and Stanfield, D. P. (1989) Trees of Nigeria: A Revised Version of Nigeria Trees vol. 1 and 2. National Press Ltd. Apapa Lagos. Published by the Department of Forestry Research Institute, Ibadan.

Kwit, P.E.(2004) Cola in the History of Africa. Cashier d' Etudes Africaines.Pp 97-134.

Leakey, R. B.; Tchoundjeu, Z. Schreckenberg, K.; Shackleton, S. E. and Shackleton, C. M. (2005) Agroforestry Tree Products (AFTPs): Targeting Poverty Reduction and Enhanced Livelihoods. International Journal for Agricultural Sustainability (3), 1-23.

Mc-Carty, F.A (2002) Socio-economic Importance of Non- Timber Forest Products among Rural Residents of Shaki Agricultural Zone of Oyo state, Nigeria. Journal of Environmental Extention 6: 34-38.

Mintel, C. C.(2001) Vitamin and Mineral Supplements. London Mintel International Group Limited p12

Ndoye, O. (1995) "Commercialization and Diversification Opportunity for Farmers in the Humid Forest Zone of Cameroon: the Case of Non Timber Forest products" IITA (ASB) Report Consultancy, p44.

Ndoye, O.; Ruiz Perez, M and Eyebe A. (1997) "The Marketof Non- Timber Forest Productsin the Humid Forest Zone of Cameroon" Rural Development Forestry Network. Paper 22c, ODI, London.

Nikolic, M.; Nikic, D. and Petrovic, B (2008) 'Fruit and Vegetable Intake and the risk of Developing Coronary Artery Disease' Central Journal of European Public Health. 16(1): 17-20.

National Population Commission (NPC) (2010) Population Distribution by Sex, State, LGA & Senatorial District: 2006 Population and Housing Census, Abuja, Nigeria p55.

Takachi, R.; Inoue M.; and Ishihara J. (2008) Fruit and Vegetable Intake and Risk of Total Cancer and Cardiovascular Diseases.*Central Journal of European Public Health*. 167:59-70

Tee R. K. (2007) Potential of Wastelands for sequestering Carbon by Reforestation. Current Science, 66, 378-380

Thompson, D., Twyman, C., Osbahr, H., and Hewitson, B (1999) Adaptation to Climate Change and Variability: Farmer Response to Intraseasonal Precipitation Trends in South Africa. Climate Change 301-322.

UNDER PEER REVIEW

Udo (2015)Forest and climate change. A Lead Paper In:Akpan, M. and Udofia, S. I.(eds) Forests and Climate Change. Proceeding of the National Workshop of the Forestry Association of Nigeria, Akwa Ibom State Branch in collaboration with Forestry and Natural Environmental Mgt, University of Uyo and Directorate of Forestry and Environmental Conservation, Ministry of Environment and Mineral Resources, Uyo held in Uyo, AkwaIbom State, Nigeria. pp 80-88.

World Health Organisation (WHO) 2016 Promoting fruit and vegetable consumption around the world: Global Strategy on Diet, Physical Activity and Health. http://www.who.int/dietphysicalactivity/fruit/en/

World Health Organization (WHO) (2003) Global Strategy on Diet, Physical Activity and Health: Fruit, Vegetables and NCD Disease Prevention. http://www.who.int/dietphysicalactivity/media/en/gsfs_fv.pdf