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Demand for Forest Foods (snails and mushrooms) in Umuahia and Ikwuano Local Government Areas of Abia State

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Abstract
Demand for forest foods with specific reference to mushrooms and snails in Umuahia and Ikwuano local government areas of Abia State, Nigeria were studied. The socio – economic characteristic of respondents, various reasons for consumption, cultural, nutritional and medicinal value; frequency of use of food and nutrients, attributes attached to selected forest product and period of availability were addressed. Simple random sampling was adopted. Structured questionnaire were used for households in Ikwuano and Umuahia. A total of (120) one hundred and twenty questionnaires were administered among eight (8) villages. Data obtained were subjected to simple descriptive statistics. The results showed that the nutritional value of mushroom is the highest with about 85.2 per cent out of the respondents agreeing and medicinal value of snail was accepted among 67.0 per cent of the respondents. The frequency of use from the study showed that mushroom and snail had 42.3% and 44.4% seasonal usage respectively. The major attributes attached to mushroom and snail was their moderate sweetness among 85.7% and 88.1% of the respondents. The two results indicated a significant descriptive ($P<0.05$) contribution of the independent variables on the quantity of food and nutrients consumed. The period of availability is been determined by month of harvest. The study shows that 39.8 percent of the respondents agreed that mushroom is available mostly between January and March while 54.55 per cent of the respondent agreed that snail is available almost all the year round between February and December. Availability, nutrient and seasonality determined the consumption of these foods by the Igbo people of Ikwuano Area and Umuahia. In these communities, foods are eaten not only for their nutritional values but also for their medicinal and socio-cultural significance.

Keywords: nutrients, nutritional, frequency, availability, consumption

Introduction
Forest foods (also classified within the Non-timber forest products {NTFP's}) contain biological materials extracted for human use other than timber (WWF, 2019) [21]. They include snails, medicinal plants, fibres, mushroom, fruitsl, rodents, reptiles and insects (Ahekan and Bron, 2011). Snails as invertebrate animals belong to phylum mollusc and class gastropoda, while some are terrestrial, some are aquatic and distributed into fresh water and marine ecosystems (Cambridge University, 2016). African land giant snails *Achatina marginata* and *Achatina achatina* are terrestrial in nature; the proximate analysis for the two species revealed them as containing crude protein of 75.56% +/- 0.04% and 78.68% +/- 0.68% respectively; their carbohydrate and fat contents were generally low with crude fibre content almost absent (Fagbuaro *et al*., 2006) [8].
Mushrooms are other forms of non-timber forest products, the conspicuous umbrella shaped fruiting body (sporophore) of certain fungi typically of the order Agaricales are called mushrooms when edible and toadstool when inedible or containing poisonous sporophores (Encyclopaedia Britanica, 2019) [6]. Benefits of mushrooms in nutrition are extended to being great sources of fibre, potassium, copper, vitamin D and proteins (Food Revolution Network, 2016). Mushrooms are the leading source of anti-oxidant nutrients, these nutrients include selenium which protects body cells from cancerous damage, they are also sources of vitamins; mushrooms have low contents of sodium, they are gluten- and cholesterol-free and low in calories (The Mushroom Council, 2014).
This paper assessed the demand for snails and wild mushrooms among residents in Umuahia and environs with the aim of checking the trend of consumption for the nutrients in these forest products among the rural and urban settlers of Umuahia.

Materials and Methods
Study area
This study was carried out in Ikwuano local government area near Umuahia metropolis. Umuahia is the capital of Abia State and is located on the Eastern part of Nigeria lying between latitude 5^0N and 7^0N of the equator longitude 7^0E and 9^0E Greenwich meridian. Abia State comprises of seventeen local government areas. The population of Abia State according to National populations census (NPC 2006) is 359, 230. The indigene people of Abia State are the Igbo sub-group of the people of Oboro, the Bende, the Ibeku and Aba. (Okeke, 2012). The occupation of the people living in Ikwuano ranges from civil service to small service livestock rearing and fish farming in the urban part of the city (Okeke and Asiegbu, 2008) [17].

Umuahia is the capital of Abia State in Southeastern geo-political zone of Nigeria. It is located on railroad that lies between Port Harcourt to its south and Enugu city to its north; the population is 359, 230 according to 2006 population census (Climate Data, 2018). It is surrounded by vegetation cover of humid tropical rainforest in Southeastern geo-political zone of Nigeria and divided into two Local Government areas where rural and urban communities are located (Ochege and Okpala-Okaka, 2014) [14].
The two local governments (Ikwuano and Umuahia) were randomly selected from the seventeen local governments in Abia State. This represents 12% of the areas in Abia. Four villages were selected each from each local government making a total of eight villages. Fifteen (15) respondents per target group per community totalling 120 were interviewed. Hence the sample size was 120.
The target audience were the consumers of selected forest products at the household level in Umuahia and Ikwuano Local Government Areas (LGA) totalling 120 respondents. Simple random sampling technique was employed for questionnaire administration schedule. Descriptive statistics such as relative frequencies, mean, percentages and graphs was used to describe the socio-economic characteristics variables. This include: age, sex, educational level and household size as well as consumption pattern and consumer preference of selected forest product/s.

Results and Discussion

Socio-economic characteristics of respondents

A total of 120 questionnaires were used for this study; but 88 were recovered from the two local governments. The results of socio-economic characteristics of respondent is presented in Table 1 implied that the analysis of descriptive statistics on the socioeconomic variables among the consumers of foods from selected forest products revealed that most of all approximately 30.6% of them lie between ages 26 and 35 years while 31.8% lies between 46 years and above. This implies that the consumers are still in their active productive ages which signified increase in consumption. In fact these are the people that have actually taken up demand for food from selected forest products as a serious business enterprise and would want to remain in the business. The result also showed that about 17.6% of the respondents claimed to have primary education and 62.4% have secondary education. It is however, to be noted that the acquisition of formal education will enhance reading and interpretation of improved technological packages developed by the research institutes so as to know how to apply them. This is in line with the findings of Abubakar (2000) [1] who stated that the ability and readiness with which a particular producer accepts or rejects an innovation depends on his educational background.
The study also showed the involvement of 81.2% per cent of married couples in the demand for food from selected forest products. This therefore emphasizes the importance of selected forest products as source of food and income to their respective families. However, for the 15.3 % of these not married, yet they demand for food from selected forest product. It was evident that they wanted to consume more, since it is a viable business. Almost, about 97.6 % of the respondents were from Igbo's ethnic background.
From the table 15.3 % and 29.4 %of the respondent claimed to be farmers and traders respectively as their profession while 29.4 % are artisans.
Almost 95.2 % were fully engaged in their profession of family trading while 4.8 % were not. Almost 35.3 % of the respondents have between 0 - 4 household family size, while 49.4 % has about 5 - 8 family size, this showed that all members of their household ate food and nutrients from selected forest products.
The Table 1 below revealed that 36.0 % of all the respondents had an annual income of between 400,000 and 750,000 Naira while 26.9 % and 22.7 % had an annual income of 100,000 to 250,000 and 400,000 Naira respectively.
About 30.7 %% of all the respondents had a monthly income of 30,000 to 50,000 Naira while 29.3% and 20% had a monthly income of 16,000 to 30,000 and 10,000 to 15,000 Naira respectively. This showed that averagely comfortable people were consuming with a high taste. This is being supported as revealed in the table that 62.5 % of the respondents spent between 2,000 and 6,000 Naira monthly on food and nutrients while 22.5 % of the respondent spent just between 5,000 – 10,000 naira monthly on the selected forest products.
The major reason for consumption of selected forest products is the combination of medicinal, nutritional and cultural value which 51.9 % of all the respondents agreed to while sweetness by 25.3 of the respondents. And in specificity 12.7 % of the respondents said nutritional value is the reason for consuming selected forest product. This is in agreement with the study of Gruen and Wong of 1982 who indicated that edible mushrooms were highly nutritional as compared favourably with meat and milk food sources.
This study showed that 97.5 % of the respondents purchased weekly food and nutrients from selected forest products almost all the respondents 97.6 % agreed that the price quantity of purchase weekly is between 50 and N100 Naira. This shows that the consumption was reasonably high when once the food and nutrients were affordable.
Also, this study revealed that 97.6 % of the respondents were willing to buy more food and nutrients from selected products at scarce season, irrespective of period of availability.

Table 1: Socioeconomic characteristics of respondents

Characteristics	Indicators or operationalization	Frequency	Percentage %
Gender	Male	34	40
	Female	51	60
	Total	85	100.0
Age	15-25	16	18.8
	26-35	26	30.6
	36-45	16	18.8
	46 above	27	31.8
	Total	85	100.0
Level of education	No education	.7	8.2
	Secondary	53	62.4

	NCE/OND	4	4.7
	Graduate	6	7.1
	Total	85	100.0
Marital status	Single	13	15.3
	Married	69	81.2
	Widowed	2	2.4
	Single parent	1	1.2
	Total	85	100.0
Tribe	Igbo	83	97.6
	Yoruba	2	2.4
	Hausa	-	-
	Total	85	100.0
Profession	Medical	3	3.5
	Lawyer	1	1.2
	Teacher	5	5.9
	Farmer	13	15.3
	Trader	25	29.4
	Driver	6	7.1
	Artisan	25	29.4
	Others	7	8.2
	Total	85	100.0
Household	0-4	30	35.3
Size	5-8	42	49.4
	9and above	13	100.0
	Total	85	100.0
Are you fully engaged in your profession	Yes	80	95.2
	No	5	4.8
	Total	85	100.0
Annual income	1000,000 – 250,000	20	26.7
	251,000-400,000	17	22.7
	401,000-750,000	27	36.0
	751,000-1m	10	13.3
	1m-5m	1	1.3
	Total	85	100.0
Monthly income	10,000-150000	15	20.0
	16,000-30,000	22	29.3
	31,000-50,000	23	30.7
	50,000&above	14	18.7
	200,000&above	1	1.3
	Total	85	100.0
Amount spend monthly on	2,000-6000	50	62.5
Food and nutrients	5000-10,000	18	22.5
	11,000-15000	4	5.0
	16000 above	7	8.8
	Parental care	1	1.3
	Total	85	100.0
Reason for consumption	Medicinal value	1	1.3
	Nutritional value	10	12.7
	Cultural value	7	2.5
	Aroma/flavour	2	2.5
	Sweetness	3	3.8
	All of the above	20	25.3
	Medicinal nutritional & cultural	41	51.9
	Total	85	100.0
How often do you buy	Daily	2	2.5
Feed and nutrient	Weekly	78	97.5
	Total	85	100.0
Price quality	50-100	83	97.6
Purchase	100-200	2	2.4
	300-300	-	-
	Total	85	100.0
Willingness to buy	Yes	83	97.6
More food & nutrient	No	2	2.4
	Total	85	100.0

***Source*:** Field survey (2013)

Cultural, Nutritional and Medicinal Values of the Products

The nutritional value of mushroom is the highest about 85.2 per cent out of all the selected forest products followed by cultural value of *Irvingia* which is 80.7 per cent and lastly medicinal value of snail which is 67.0 per cent as shown by the Table 2 from the responses of all the respondents.

In support of these Bano *et al.* (1976) [3] stressed that food value of mushroom lies between meat and vegetable. Crison and Sands (1978) observed that mushroom in general contain 90% water and 10% dry matter. More so the protein content varies between 27 and 48% carbohydrates are less than 60% and lipids is between 2 to 8%. While Ogundana and Fagade indicated that an average mushroom is about 16.5% dry matter out of which 7.4% is crude fibre, 14.6% is crude protein and 4.48% is fat and oil. Gruen and Wong (1982) [10] indicated that edible mushrooms were highly nutritional as compared favourably with meat egg and milk food sources.

While for snail, Cardat (1955) reported the mucus of *Helix pomatia* favours the action of penicillin. The curative substance extracted from the snail is calcium phosphate (Lameed, 2006) [11]. This chemical is claimed to cure kidney disease, to improve constipation and haemorrhoids to prevent influenza, to restore virility and vitality, to perpetuate beauty and clear the skin. It is to be recommended especially for those who sing a lot and those in need of hormonal injections. All these findings is in support of the work done by Okeke and Asiegbu in 2008 who reported that in all Igbo communities foods and nutrient are eaten not only for their nutritional values but also for their medicinal and sociocultural significance.

Table 2: Cultural Nutritional and Medicinal Value of Selected Forest Products

Characteristics	Indicators or operationalization	Frequency	Percentage %
Nutritional value of mushroom	Yes	75	85.2%
	Missing	13	14.8
	Total	88	100.0
Cultural value of *Irvingia*	Yes	71	80.7
	Missing	17	19.3
	Total	88	100.0
Medicinal value of snail	Yes	59	67.0%
	Missing	29	33.0%
	Total	88	100.0

***Source*:** Field survey (2013)

Frequency of Use – Table 3

The study revealed that 42.3 per cent of all the respondents agrees that mushroom is used or consumed seasonally other wet season per dry season. While 25percent respondents agreed that they occasionally consume mushroom. Likewise, 23.1 and 5.8% per cent agrees that they periodically and weekly consumed mushroom respectively. While 1.9 per cent of the respondents agrees to the use of mushroom both more and always as shown in the table. These findings is in support of the work done by E.C. Okeke and Asiegbu in 2008 who claimed that availability and seasonality determined the consumption of food and nutrients by the Igbo people.

They are available all year round but are more abundant during the harvest season. Used as meat substitutes in soups.

Snails

The study showed that 44.4% per cent of the respondent agrees to seasonal use or consumption of snail. While 22.2% per cent attest to periodic usage. Likewise, 16.7 percent says occasionally they make use of snail (Ero in Igbo, Igbin in Yoruba). About 7.4 per cent of all the respondent agrees that more often they make of the snail while 5.6 percent agrees that always they use or consume snail meat, this study is in support of a work by Okeke (2012) who showed that snail (Ero) is now a delicacy for some people and the demand increased due to the avoidance of red meat, and some domesticated snails are sacred in some places and so not eaten.

Table 3: Frequencies of use

Characteristics	Indicators or operationalization	Frequency	Percentage %
Frequency of	Seasonal	22	42.3
Use of mushroom	Occasional	13	25.0
	Periodic	12	23.1
	More often	1	1.9
	Weekly	3	5.8
	Always	1	1.9
	Total		100.0
Frequency of	Seasonal	33	62.3
Use of *Irvingia*	Occasional	2	3.8
	Periodic	7	13.2
	Monthly	5	9.4
	More often	3	5.7
	Weekly	2	3.8
	Always	1	1.9
	Total		100.0
Frequency of	Seasonal	24	44.4
Use of snail	Occasional	9	16.7
	Periodic	12	22.2
	More often	4	7.4
	Weekly	3	5.6
	Always	2	3.7
	Total		100.0

***Source*:** Field survey (2013).

Attributes Attached to Selected Forest Product (Table 4)

The attributes for the selected forest product could be bitter, taste – sweet taste, sour taste, natural taste or salty tastes as carried out in this study.

Mushroom

From this study 85.7 per cent of all the respondents agreed that mushroom was having a very sweet taste in all the food and nutrients. While 14.3 per cent of the respondents agreed to neutral taste. This was in support of a research work by Okeke, (2012) who identified the mushroom types to local and scientific names levels with their attributes (Table 5).

Table 4: Local Names of Mushrooms in the Study Area

Vegetable	Local name	Scientific Names	Attributes

Mushroom	Ero/elo onyekaneta	Yet to be identified	Used as meat substitute in soups
White mushroom	Ero/elo agbowa	Yet to be identified	Used as meat substitute in soups
Blue mushroom	Ero Ukpu	Yet to be identified	Used as meat substitute in soups
Tough mushroom	Ero nku	Yet to be identified	Used as meat substitute in soups
Smooth mushroom	Ero ubakiri	Yet to be identified	Used as meat substitute in soups
Black mushroom	Ero nkwa	Yet to be identified	Used as meat substitute in soups
Soft mushroom	Ero akuru	Yet to be identified	Used as meat substitute in soups

***Source*:** Okeke *et al*. (2008)

E.C Okeke *et al.* (2008) concluded that a good many vegetable are eaten fresh and are cultivated in homesteads, few are dried for preservation to be eaten during the dry season. But unfortunately, not much has been done with mushrooms in this area in terms of their nutritional qualities. However, they are eaten as delicacies or meat substitutes in soups/sauces. Although most are not domesticated, there are efforts to domesticate their production and produce them in commercial quantities – as it is done in forestry research institute of Nigeria Headquarters in Ibadan office at Jericho.

Snails

This study showed that 88.1 per cent of all the respondents agreed that snail was having a very sweet taste being the highest proteinous meat while 11.9 per cent of the respondents attest to natural taste of the snail (Table 5).

Table 5: Attributes attached to Selected Forest Products

Characteristics	Indicators or operationalization	Frequency	Percentage %
Attributes attached	Sweet	72	85.7
to mushroom	Natural	12	14.3
	Total	84	100.0
Attributes attached	Sweet	71	84.5
to *Irvingia*	Natural	12	14.3
	Not eating	1	1.2
	Total	84	100.0
Attributes attached	Sweet	74	88.1
To Snail	Natural	10	11.9
	Total	84	100.0

***Source*:** Field Survey (2013)

Table 6 showed the cross-tabulation analysis result of willingness to buy more food and nutrient from selected forest product and socio-economic variable. It can be discovered that willingness to buy more food and nutrients depended on the various attributes attached to them (food and harvest) ($P<0.05$). The result therefore implies that increase in the price of food and nutrient will leads to decrease in the quantity demand which is the expected situation of any purchase of goods and services.

Table 6: determined statistical cross tabulation of willingness to buy more food and nutrient from selected forestry products and the following variables listed revealing the chi-square probability level and either significance or non-significance.

	Chi-square	P-level	Significance
9	**0.346**	**o.556**	**NS**
Attributes attached to *Irvingia*	0.381	0.827	NS
Attributes attached to snail	0.281	0.596	NS
Tribe	19.988	0.000	Significant

Period of Availability

The period is been determined by month of Harvest which is as shown in Table 7 with the respondent acclaiming different percentages.

Mushrooms

The study revealed that 39.77 per cent of all the respondents claimed that mushroom is highly available between the months of January to March. While mushroom is always available between the months of July-September. The least period of availability as revealed from the study is between the months of January to September, which is 22.73 per cent.

Snails

Here the study revealed from Table 8 that 54.55 per cent of all the respondents claimed that snail was highly available between the months of February and December while 26.14 per cent of the respondents claimed that snail was available between February and August. The least percentage of availability as revealed by the study was 19.31 per cent and was during the months of January and November.

Table 7: Period of availability of Mushroom and Snails

Selected forest product characteristics	Period of availability	Percentage %
Mushrooms	Jan-March	39.77
	Jan-Sept	22.73
	July-Sept	37.5
	Total	100.0
Snails	Jam-Nov	19.31
	Feb-Aug	26.14
	Feb-Dec	54.55
	Total	100.0

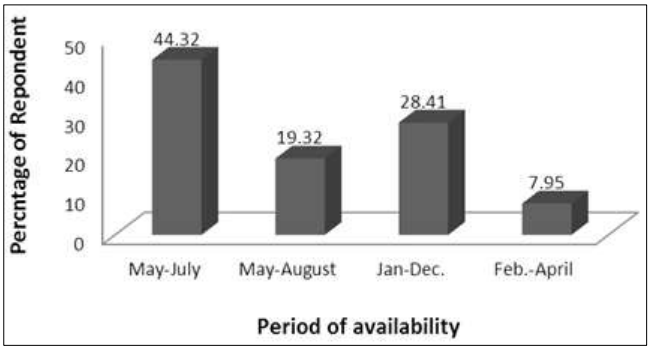

Fig 1: Period, when *Irvingia* is mostly available

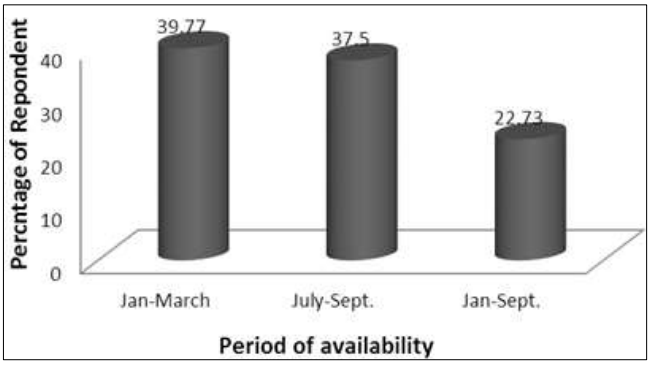

Fig 2: Period, when mushroom is mostly available

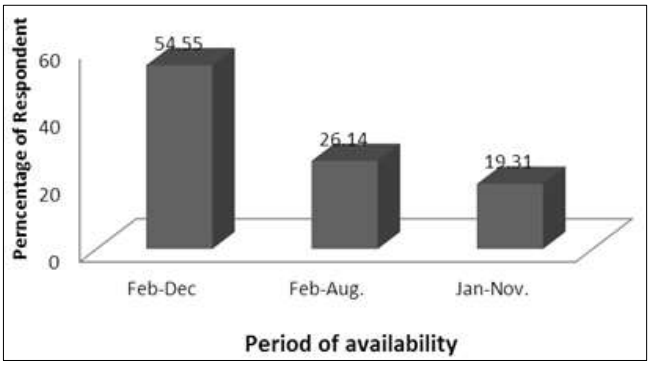

Fig 2: Period, when snails are mostly available

Conclusion

Agriculture is a heritage occupation of the Igbo people, this not with-standing, stunting and micronutrient deficiency (vitamin A, iron, iodine and zinc) are present. More recently, there has been an increased incidence of non-communicable diseases among the Nigeria population. The long-term malnutrition problem of the poor nations cannot be solved by food aid or food trade with the affluent countries but rather by the adequate utilization of indigenous food and nutrient from selected forest product (Lukong *et al*., 2012) [13]. This is because traditional food and nutrients resources can make sustained contribution in meeting the nutritional needs of the population, especially the low-income group and particularly in times of seasonal scarcity (Okigbo, 1986, FAO, 1987, Okeke and Asiegbu, 2008) [18, 17].

It can be concluded about the diverse benefits of food and nutrient from selected forest products, are valuable assets for the welfare of humans. The micronutrients in mushroom could help to relieve disorders, which range from constipation to heart disease and cancer. For example potassium in mushroom regularizes the heartbeat and improves oxygen supply to the brain. This relieves stress. Calcium could be used by the body to build strong bones and could play an important role in the proper functioning of the nervous system. In the body calcium and phosphorus are at a balance. Too much phosphorus in the body could lower the amount of calcium and could lead to loss of calcium from the skeleton. Most of the nutrients in mushroom and snail cannot be destroyed by sunlight and therefore dried ones still serve the same purpose.

Mushroom is a potential crop which can be grown by households in a sustainable way to generate livelihood and enhance human nutrition, while snail can be domesticated at the homesteads, also to enhance balanced human nutrition.

The added value from these other uses has not been quantified in the present study.

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