

Consumption Pattern of Neglected and Underutilised Vegetables among Rural Households in Akinyele Local Government Area, Ibadan, Nigeria

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Abstract: Vegetables make up a major portion of human diet in many parts of the world and play significant role in human nutrition especially as sources of vitamins, minerals, dietary fibre and phytochemicals. In Nigeria, some indigenous vegetables have become neglected and underutilised despite their great potential in contributing to food security and nutrition. This study therefore aimed at determining the consumption pattern of neglected and underutilized vegetables among rural households in Akinyele Local Government Area (LGA), Ibadan, Nigeria. The descriptive cross-sectional study was carried out among 220 rural household women in Akinyele LGA. Information on socio-economic and demographic characteristics, respondent's knowledge of and familiarity with the chosen indigenous vegetables, frequency of consumption and factors influencing consumption of these vegetables were obtained from respondents using pre-tested, semi-structured, interviewer-administered questionnaire with a section on multi-pass 24-hour diet recall. Data were analysed using descriptive statistics and Chi-square test at $p < 0.05$. Mean age of respondents was 44.7 ± 18.0 years. Only few (7.3%) of the respondents know, have seen and eat *Ogunmo*, while many (26.4%, 35.0%, 31.4%, 30.9% and 41.8%) know, have seen and eat *Moringa* leaf, *Efo odu*, *Yanrin*, *Ebobo*, and *Worowo* respectively out of all the vegetables studied. Many respondents reportedly consume *Worowo* (42.7%), *Ebobo* (53.6%), *Ugwu* (28.2%), *Yanrin* (40.5%), *Efo odu* (41.4%) and *Igbaagba* (27.7%) less than once in a month and 65.0%, 30.0%, and 59.1% has never consumed *Ogunmo*, *Efirin*, and *Moringa* leaf respectively in the last one month. Most (96.4%) respondents reported that the seasonal nature of the vegetables affects their consumption. There is need for consumers education on the benefits of inclusion of indigenous neglected and underutilised vegetables in their daily diets as they have been found to possess a high potential for improving nutrition and health in many areas around the world.

Keywords: Dietary Diversity, Neglected and Underutilized Vegetables, Vegetable Consumption Pattern, Rural Households

Introduction

Undernutrition and hunger are prevalent in sub-Saharan Africa which accounts for about 9% of the global population, with high prevalence of food and nutrition insecurity especially in rural areas (Bekunda et al., 2010). About 800 million people still suffer from food and nutrition insecurity, and more than 2 billion individuals suffer from micronutrient deficiencies (hidden hunger) (FAO, 2013). The effects of micronutrient deficiencies can be devastating, leading to mental impairment, poor health, low productivity and even death. In addition to affecting human health, hidden hunger can curtail socioeconomic development, particularly in low- and middle- income countries, of which Nigeria is one (GHI, 2014).

Neglected and underutilised plant species play important role in food security, enhancing better nutrition and fighting hidden hunger. Plant species such as vegetables, which are rich sources of micronutrients, play significant role in human nutrition, especially as sources of vitamins A, B, C, E, minerals, dietary fibre and phytochemicals. A daily consumption of vegetables has been strongly associated with overall good health, reduced risk of some forms of cancer, diabetes and a number of other chronic diseases (Janick, 2011).

Traditional or indigenous vegetables are vegetables of a locality which originated from an area and may or may not be confined to that particular region (Guarino, 1997; Nnamani et al. 2009). They sometimes belong to the group of world plants often



regarded as weeds, some grow in the wild and do not require formal cultivation and many of them are resilient, adaptive and can tolerate adverse climates (Nnamani *et al.*, 2009). However, despite their ability to be raised comparatively at lower management cost even on marginal lands, they have remained underutilised due to lack of awareness and popularisation of technologies for their proper utilisation (Chweya and Eyzaguirre, 1999; Odhav, 2007; Nnamani *et al.* 2009).

Traditional or indigenous vegetables have been used to meet nutritional needs from time immemorial. These vegetables are often grown by local farmers to serve as a means of protein, minerals, vitamins and a means of adding variety to the diet in various African countries, particularly in the South-western region of Nigeria (Amujoyegbe *et al.*, 2015). These vegetables have the potential to greatly reduce the scourge of malnutrition especially micronutrient malnutrition by providing essential nutrients and some of these vegetables can be used to manage diseases like high blood pressure, diabetes, bronchitis diarrhea and others (Salami, 2001). Underutilised indigenous vegetables represent inexpensive, high quality nutritional resources which can make substantial contribution in meeting the nutritional needs of the population, especially the low income group and particularly in times of seasonal scarcity. They can as well serve as a means of food security and income generation; therefore, their erosion can have immediate consequences on the nutritional status and food security of the poor, and their enhanced use can bring about better nutrition and fight hidden hunger (Magbagbeola *et al.*, 2010; Dansi *et al.*, 2012). This study is therefore set out to determine the consumption pattern of neglected and underutilised vegetables among rural households in Akinyele Local Government Area, Ibadan, Oyo State, Nigeria.

Methodology

The descriptive cross-sectional study was carried out by purposively choosing Akinyele Local Government Area because of its rural nature and it hosts a number of these underutilised vegetables (Idowu, 2009). Two hundred and twenty (220) rural household women were randomly selected from three out of the twelve wards in the LGA because they are more available, have better access to household resources and are the primary decision-makers for food preparation (Boedecker *et al.*, 2014). Using the Cochran's formula ($n = z^2pq / d^2$) and vegetable consumption prevalence rate of $p=13.2\%$ (Maziya-Dixon *et al.*, 2003) taking into account 10% attrition rate.

A pre-tested, semi-structured, interviewer-administered questionnaire was used to obtain information on socio-economic and demographic characteristics, respondent's knowledge of and familiarity with the chosen indigenous vegetables, frequency of consumption, factors influencing consumption of these vegetables and interactive multi-pass 24-hour diet recall of the respondents. Data were analysed using descriptive statistics and Chi-square test and level of significance set at $p<0.05$.

Results

The socio-demographic characteristics of the respondents ($n = 220$) is shown in Table 1. Many (45.5%) of the households had a family size between 0-4 persons while 38.6% had 5-9 persons in the household. The mean age of the respondents was 44.7 ± 18.0 years, 94.5% were Yoruba, 1.4% Igbo, 2.3% Cotonou, 70.5% were Christians, 67.3% married, 22.3% widowed and 7.7% separated (Table 1(a)). About one-third (34.5%) of respondents had no formal education, 30.5%, 29.1% and 5.9% had primary, secondary, and tertiary education respectively.

Well water constituted the major source of water supply of the respondents, while firewood was the major source of energy for cooking. Petty trading (50.9%) was their major occupation followed by artisan (14.5%), farming (12.7%) and business (9.1%), while 7.3% combined farming with petty trading (Table 1(b)). About half (50.5%) of respondents reportedly earned between 10,001 – 30,000 naira, 40.9% earned less than 10,000 naira, and 8.6% earned above 30,000 naira/month. Few (6.8%) of the households earned less than 10,000 naira per month, 44.5% earned between 10,000 and 30,000 naira per month, 30.5% earned between 30,001 and 50,000 per month, while 18.2% earned above 50,000/month on household basis. More than one-third (35.9%) respondents spent between ten and twenty thousand naira on food monthly, 32.3% spent less than ten thousand naira, while 20.9% spent over 20,000 naira per month on food.

A large percentage of the respondents knows, has seen and eats *Ewedu* (97.3%), *Ewuro* (81.8%), *Gbure* (88.6%) and *Soko* (94.1%); 77.7%, 72.7%, 65.9%, 61.4% and 50.0% knows, has seen, and eats *Efo green*, *Amunututu*, *Igbaagba*, *Ugwu* and *Efirin* respectively; while only few of the respondents knows, has seen and eats *Ogunmo* (7.3%), *Moringa* (26.4%), *Efo odu* (35.0%), *Yanrin* (31.4%), *Ebobo* (30.9%), *Worowo* (41.8%) (Table 2).

Table 1(a): Socio-demographic characteristics of respondents (n = 220)

Variable	Frequency	Percentage (%)
Household size		
0-4	100	45.4
5-9	85	38.6
10-14	27	12.3
15-19	5	2.3
20-24	3	1.4
Total	220	100.0
Tribe		
Yoruba	208	94.5
Igbo	3	1.4
Cotonou	5	2.3
Others	4	1.8
Total	220	100.0
Age (years)		
15-39	97	44.1
40-64	82	37.3
65 and above	41	18.6
Total	220	100.0
Mean	44.7 ± 18.0 years	
Range	15 – 84 years	
Religion		
Christianity	155	70.5
Islam	65	29.5
Total	220	100.0
Marital status		
Single	6	2.8
Married	148	67.3
Separated	17	7.7
Widowed	49	22.2
Total	220	100.0
Level of education		
No formal education	76	34.5
Primary	67	30.5
Secondary	64	29.1
Tertiary	13	5.9
Total	220	100.0

Table 1(b): Socio-economic characteristics of respondents

Variables	Frequency	Percentage
Source of water for drinking		
Rainfall	19	8.6
Well	127	57.7
Borehole	46	20.9
Satchet water	28	12.8
Total	220	100.0
Source of cooking energy		
Firewood	148	67.3
Charcoal	13	5.9
kerosene stove	54	24.5
gas cooker	5	2.3
Total	220	100.0
Occupation		
petty trader	112	50.9
Farmer	28	12.7

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business man/woman	20	9.1
Artisan	32	14.5
petty trader and farmer	16	7.3
Others	12	5.5
Total	220	100.0
Average monthly income		
less than 10000	90	40.9
10001-30000	111	50.5
above 30000	19	8.6
Total	220	100.0
Estimated Household Monthly income		
less than 10,000	15	6.8
10,001-30000	98	44.5
30001-50000	67	30.5
greater than 50,000	40	18.2
Total	220	100.0
Estimated amount spent on food monthly		
less than 10000	71	32.3
10000-20000	125	35.9
> 20000	24	20.9
Total	220	100.0

Table 2: Knowledge of commonly consumed and underutilized vegetables

Variable	I have never heard, seen nor eaten it (%)	I have heard the name but neither seen nor eaten it (%)	I know and seen it before but have never eaten it (%)	I know, seen and eaten it before but no longer eat it (%)	I know and seen it, but have not eaten it recently (%)	I know, have seen and eat it (%)
Ewedu (<i>Corchorus Olitorus</i>)	0.0	0.0	1.9	0.0	1.8	97.3
Efo green (<i>Amaranthus hybridus</i>)	0.5	0.0	6.4	5.5	10.0	77.7
Worowo (<i>Senecio biafrae</i>)	0.9	2.7	5.0	12.7	36.8	41.8
Gbure (<i>Talinum triangulare</i>)	0.0	0.0	0.9	2.3	8.2	88.6
Ebolo (<i>Crassocephalum rubens</i>)	2.7	1.8	11.8	12.3	40.5	30.9
Ugwu (<i>Telfaria occidentalis</i>)	1.4	2.3	10.5	4.1	20.5	61.4
Ewuro (<i>Vernonia Amygdalina</i>)	0.0	0.0	2.7	2.3	13.2	81.8
Soko (<i>Celosia Argentia</i>)	0.0	0.0	0.5	1.8	3.6	94.1
Amunututu (<i>Basella alba</i>)	0.9	0.9	4.5	3.6	17.3	72.7
Ogunmo (<i>Solanum scarbrum</i>)	46.8	7.3	8.2	20.9	9.5	7.3
Efirin (<i>Occimum gratisimum</i>)	1.4	1.4	26.8	7.3	13.2	50.0
Yanrin (<i>Launea taraxacifolia</i>)	2.3	5.5	20.9	15.5	24.5	31.4
Efo Odu (<i>Solanum americanum</i>)	6.4	4.1	14.1	14.5	25.9	35.0
Igbaagba (<i>Solanum macrocarpon</i>)	0.5	1.4	7.7	5.0	19.5	65.9
Moringa leaves	13.6	8.6	37.3	4.1	10.0	26.4

Corchorus Olitorus was the most frequently consumed vegetable. Many (24.1%) of the respondents reportedly consumed it once a day, 25.9% consumed it 4 – 6 times per week, while 34.1% consumed it 2 – 3 times per week. *Celosia Argentia* was consumed 4 – 6 times/week by 12.7% of respondents, while *Amaranthus hybridus*, *Celosia Argentia*, *Talinum triangulare*, *Vernonia Amygdalina* and *Basella alba* were consumed by 54.1%, 40.4% and 34.1%, 22.7%, 20.5% respondents respectively 2-3 times/week. *Vernonia Amygdalina* (25.9%) was consumed once a week, *Basella alba* was consumed

by 23.6% of respondents less than once a week; *Senecio biafrae* (42.7%), *Crassocephalum rubens* (53.6%), *Telfaria occidentalis* (28.2%), *Launea taraxacifolia* (40.5%), *Solanum americanum* (41.4%) and *Solanum macrocarpon* (27.7%) were consumed less than once a month; while 65.0%, 30.0%, and 59.1% respondents had never consumed *Solanum scarbrum*, *Occimum gratisimum*, and Moringa respectively in the last one month (Table 3).

In Table 4(a), majority (70.0%) of the respondents reportedly obtained their vegetables through

farm/garden or gathering wild and purchase, 20.9% got them through purchase, while 9.1% obtained them wildly and through gift and purchase. Majority (79.1%) of the respondents reportedly got their vegetables on other days apart from market days and 43.6% reported that the vegetables are not readily available as they used to be; others (34.5%) mentioned that some were available while some were not. Most (97.3%) respondents mentioned that the soil conditions of their environment support the growth of the vegetables, and 89.5% of them like the vegetables, 26.8% reported to having unpleasant experience eating some of the vegetables, while 12.7% has reduced consumption of these vegetables due to their rising cost.

More than one-third (36.8%) respondents reported taste or smell of some vegetables as deterrent to their consuming such vegetables, with Ebolo having highest percentage (12.7%), followed by Yanrin (7.3%). Most (96.4%) of the respondents reported that the seasonal nature of the vegetables affects their consumption, and 82.7% mentioned that the vegetables' cooking was not complex. (Table 4(b)). Most (91.4%) of the respondents can afford the purchase of the vegetables. In Table 4(c), 10.5% of respondents reported some of the vegetables to be taboo for them, 94.5% mentioned that the vegetables were nutritious, 82.3% can prepared them, 91.8% can consume them if available, and 59.6% can consume Yanrin and Worowo in place of Ewedu and Gbure.

Table 3: Frequency of Respondents' consumption of vegetables in the last one month (%)

Variable	Never	< than once/month	Once/month	< once/week	Once/week	2-3 times/week	4-6 times/week	Once/day
Ewedu (<i>Corchorus Olitorus</i>)	0.9	0.5	0.0	3.2	11.4	34.1	25.9	24.1
Efo green (<i>Amaranthus hybridus</i>)	5.9	12.3	4.1	17.7	32.7	54.1	2.3	0.9
Worowo (<i>Senecio biafrae</i>)	18.2	42.7	13.6	16.8	8.6	9.1	0.5	0.5
Gbure (<i>Talinum triangulare</i>)	0.5	0.5	3.2	15.9	33.6	34.1	7.3	0.5
Ebolo (<i>Crassocephalum rubens</i>)	15.9	53.6	8.6	6.8	9.5	5.5	0.0	0.0
Ugwu (<i>Telfaria occidentalis</i>)	10.0	28.2	15.0	23.6	15.5	5.5	1.4	0.0
Ewuro (<i>Vernonia Amygdalina</i>)	3.2	11.4	10.9	18.6	25.9	22.7	5.5	1.8
Soko (<i>Celosia Argentia</i>)	0.5	4.1	3.2	8.2	25.0	46.4	12.7	0.0
Amunututu (<i>Basella alba</i>)	6.8	20.0	8.2	23.6	17.3	20.5	3.2	0.5
Ogunmo <i>Solanum scarbrum</i>)	65.0	27.7	2.7	2.3	0.9	1.4	0.0	0.0
Efirin (<i>Occimum gratisimum</i>)	30.0	20.0	13.2	14.1	9.5	10.0	2.3	0.9
Yanrin (<i>Launea taraxacifolia</i>)	31.4	40.5	10.0	10.0	5.9	2.3	0.0	0.0
Efo Odu (<i>Solanum americanum</i>)	26.4	41.4	7.3	9.5	8.2	7.3	0.0	0.0
Igbaagba <i>Solanum macrocarpon</i>)	9.5	27.7	7.3	20.9	21.4	12.3	0.9	0.0
Moringa leaves	59.1	17.3	6.3	5.9	7.3	2.7	1.4	0.0

Table 4(a): Factors influencing the consumption of neglected and underutilised vegetables

Variables	Frequencies	Percentages
How do you obtain your vegetables		
Farm/garden/wild and purchase	154	70.0
Purchase	46	20.9
Wild/gift and purchase	20	9.1
Total	220	100.0
Do you only get these vegetables on market days?		
No	174	79.1
Yes	46	20.9
Total	220	100.0
Are these vegetables readily available in your environment?		
No	96	43.6
Yes	48	21.8
some are, some are not	76	34.6

Total	220	100.0
Does the soil in your environment support the growth of these vegetables?		
No	6	2.7
Yes	214	97.3
Total	220	100.0
Do you like these vegetables?		
No	15	6.9
not sure, I have never eaten them	8	3.6
Yes	197	89.5
Total	220	100.0
Do you have an unpleasant experience eating any of these vegetables?		
No	161	73.2
Yes	59	26.8
Total	220	100.0
if yes, which one?		
None	161	73.2
Ewuro	5	2.3
Ebolo	19	8.6
Yanrin	15	6.8
yanrin and ebolo	8	3.6
ebolo, yanrin and Odu	4	1.8
Others	8	3.7
Total	220	100.0
Have you reduced consumption due to rising prices?		
No	192	87.3
Yes	28	12.7
Total	220	100.0

Table 4(b): Factors influencing the consumption of neglected and underutilised vegetables
(continued)

Variables	Frequencies	Percentages
Is the taste or smell a deterrent to consumption?		
No	139	63.2
Yes	81	36.8
Total	220	100.0
If yes, which one of them?		
None	135	61.4
Yanrin	16	7.3
Ebolo	28	12.7
ebolo and yanrin	14	6.4
Efirin	7	3.2
Others	20	9.0
Total	220	100.0
Do your household members like it?		
living alone	12	5.5
No	67	30.5
Yes	141	64.0
Total	220	100.0
How has this affected your consumption?		
living alone	12	5.5
reduced it	54	24.5
has no effect	53	24.1
increased it	101	45.9
Total	220	100.0
Does the seasonal nature of these vegetables affect its consumption?		
No	8	3.6

Yes	212	96.4
Total	220	100.0
Is the cooking procedure complex?		
No	182	82.7
Yes	38	17.3
Total	220	100.0
Which of the vegetables has a complex cooking procedure?		
None	188	85.5
Ewuro	20	9.5
Igbaagba	12	5.0
Total	220	100.0
Can you afford these vegetables?		
No	19	8.6
Yes	201	91.4
Total	220	100.0

Table 4(c): Factors influencing the consumption of neglected and underutilised vegetables
(continued)

Variables	Frequency	Percentage
Is any of the vegetables a taboo for you?		
No	197	89.5
Yes	23	10.5
Total	220	100.0
If yes, which one?		
None	194	88.2
Efo-Odu	12	5.5
Others	14	6.3
Total	220	100.0
Are these underutilized vegetables nutritious or not?		
I dont know	12	5.5
Yes	208	94.5
Total	220	100.0
Which of the neglected and underutilised vegetables can you prepare?		
None	8	3.6
All	181	82.3
Some	31	14.1
Total	220	100.0
Would you consume more of these vegetables if it was readily available?		
No	15	6.8
Yes	202	91.8
Not sure	3	1.4
Total	220	100.0
Would you readily eat vegetables like Yanrin and Worowo in place of well-known vegetables like Ewedu and Gbure?		
No	43	19.5
not sure	46	20.9
Yes	131	59.6
Total	220	100.0

In Table 5, more than half (51.4%) of respondents reportedly consumed 2 – 3 serving spoons of *Corchorus Olitorus*, 31.8% consumed one-half serving spoons. *Corchorus Olitorus* (15.5%), *Talinum triangulare* (5.5%), *Celosia Argentia* (5.0%), *Senecio biafrae* (4.1%), *Amaranthus hybridus* (2.7%), *Basella alba* (3.6%), *Telfaria occidentalis* (2.3%), and *Vernonia Amygdalina*

(2.3%) were the vegetables the respondents had consumed in quantities up to 3 serving spoons or more; while *Solanum scarbrum*, Moringa leaf, *Launea taraxacifolia*, *Solanum americanum*, *Crassocephalum rubens* and *Ocimum gratissimum*, had either not been eaten at all in the last one month by 90.5%, 68.6%, 65.5%, 65.5%, 63.6% and 46.4% of respondents respectively.

There was no significant relationship ($p>0.05$) between the frequency of vegetable consumption and age, estimated household income, educational level and occupation of the respondents (Tables 6(a) & (b)). However, *Ewedu* consumption was significantly associated with occupation of respondents ($p<0.05$).

All the respondents reportedly consumed starchy staples the previous day before the study, 77.3% of them consumed from pulses, legumes and nuts group, 79.5% from meat or fish group, 7.7% ate eggs, 95.9% consumed other vitamin A-rich fruits and vegetables, 23.2% consumed milk or milk products, 1.4% consumed organ meat, and 69.5% consumed dark green leafy vegetables (Table 7).

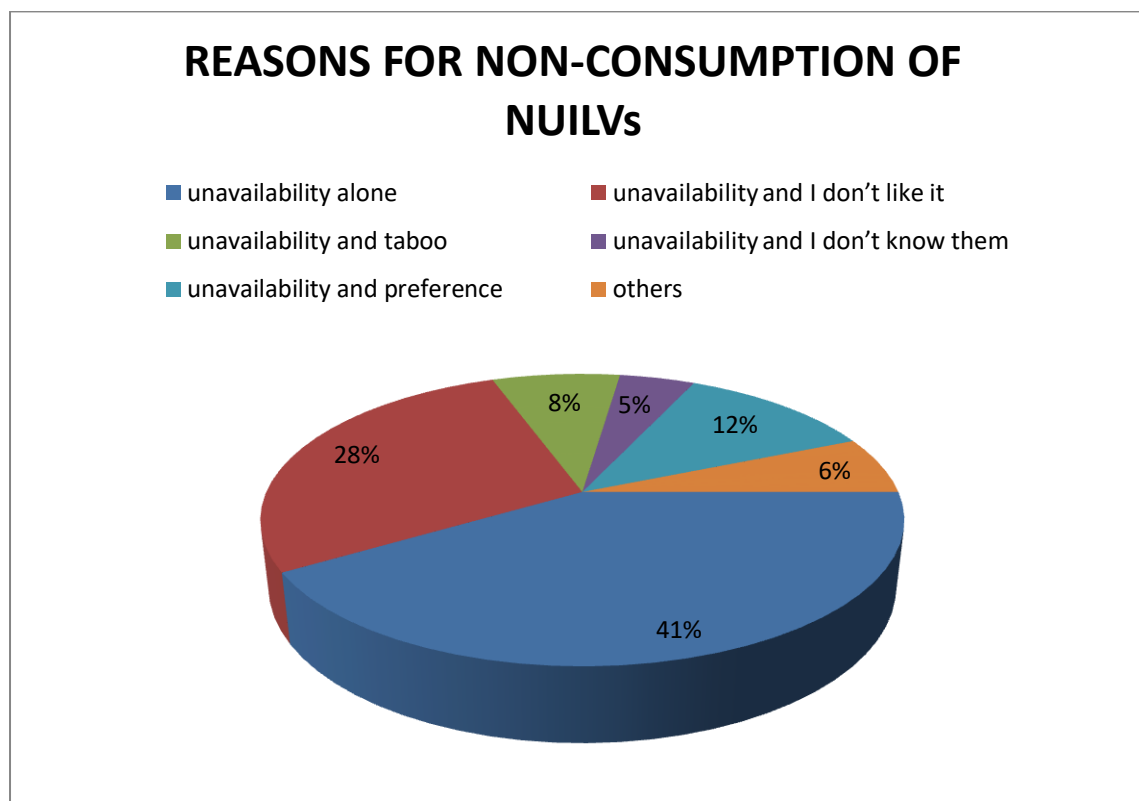


Figure 1: Reasons for non-consumption of NUILVS

Table 5: Portion size of vegetable consumption by respondents

Variables	Portion size			
	Not eaten in the last one month (%)	Half - one/half serving spoon (%)	Two - three serving spoons (%)	>3 serving spoons (%)
Ewedu (<i>Corchorus Olitorus</i>)	1.4	31.8	51.4	15.5
Efo green (<i>Amaranthus hybridus</i>)	20.5	43.2	33.7	2.7
Worowo (<i>Senecio biafrae</i>)	44.5	25.0	26.4	4.1
Gbure (<i>Talinum triangulare</i>)	5.0	41.4	48.2	5.5
Ebolo (<i>Crassocephalum rubens</i>)	63.6	29.5	5.9	0.9
Ugwu (<i>Telfaria occidentalis</i>)	30.9	40.0	26.8	2.3
Ewuro (<i>Vernonia Amygdalina</i>)	11.8	60.9	25.0	2.3
Soko (<i>Celosia Argentia</i>)	4.1	39.1	51.8	5.0
Amunututu (<i>Basella alba</i>)	25.0	36.4	35.0	3.6
Ogunmo (<i>Solanum scarbrum</i>)	90.5	6.8	2.7	0.0
Efirin (<i>Occimum gratisimum</i>)	46.4	42.7	10.5	0.5
Yanrin (<i>Launea taraxacifolia</i>)	65.5	27.7	6.8	0.0
Efo Odu (<i>Solanum americanum</i>)	65.5	25.5	9.1	0.0
Igbagba (<i>Solanum macrocarpon</i>)	31.8	41.8	25.9	0.5
Moringa leaf	68.6	25.5	5.5	0.5

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Table 6(a): Association between frequency of consumption and socio-economic characteristics of respondents

Variable	Consumption	Age		X ²	P value	Occupation		X ²	P value
		≤ 40	> 40			Farmer	Non-farmer		
Igbaagba	Frequent use	2	0	1.320	0.251	0	2	0.294	0.587
	Infrequent use	131	87			28	190		
Ewedu	Freq use	67	43	0.019	0.890	8	102	5.893	0.015
	Infreq use	66	44			20	90		
Ewuro	Freq use	8	8	0.789	0.374	0	16	2.516	0.113
	Infreq use					28	176		
Ugwu	Freq use	3	0	1.990	0.158	0	3	0.444	0.505
	Infreq use	130	87			28	189		
Soko	Freq use	19	9	0.735	0.391	4	24	0.070	0.791
	Infreq use	114	78			24	168		
Moringa	Freq use	3	0	1.990	0.158	0	3	0.444	0.505
	Infreq use	130	87			28	189		
Gbure	Freq use	13	4	1.977	0.160	1	16	0.777	0.378
	Infreq use	120	83			27	176		
Efo-Green	Freq use	6	1	1.930	0.165	1	6	0.016	0.900
	Infreq use	127	86			27	186		
Efirin	Freq use	4	3	0.033	0.855	0	7	1.054	0.305
	Infreq use	129	84			28	125		
Amunututu	Freq use	7	1	2.540	0.111	1	7	0.000	0.984
	Infreq use	126	86			27	185		

Table 6(b): Association between frequency of consumption and socio-economic characteristics of respondents

Variable	Consumption	Household income		X ²	P value	Education		X ²	P value
		≤20,000	>20,000			Educated	Not-educated		
Igbaagba	Frequent use	1	1	0.002	0.969	1	1	0.213	0.644
	Infrequent use	112	106			75	143		
Ewedu	Freq use	57	53	0.018	0.893	36	74	0.322	0.571

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	Infreq use	56	54			40	70		
Ewuro	Freq use	9	7	0.165	0.685	0	11	0.083	0.773
	Infreq use	104	100			70	133		
Ugwu	Freq use	1	2	0.396	0.529	0	3	1.605	0.205
	Infreq use	112	105			76	141		
Soko	Freq use	17	11	1.123	0.289	8	20	0.506	0.477
	Infreq use	96	96			68	124		
Moringa	Freq use	0	3	3.212	0.070	0	3	1.605	0.205
	Infreq use	113	104			76	141		
Gbure	Freq use	10	7	0.410	0.522	6	11	0.005	0.946
	Infreq use	103	100			70	133		
Efo-Green	Freq use	4	3	0.097	0.756	4	3	1.633	0.201
	Infreq use	109	104			72	141		
Efirin	Freq use	4	3	0.097	0.756	2	6	1.312	0.252
	Infreq use	109	104			74	138		
Amunututu	Freq use	3	5	0.639	0.424	1	7	0.335	0.563
	Infreq use	110	102			27	138		

Table 7: Food groups consumed by respondents in the 24-hour recall

Variable		Frequency	Percentage
Starchy staples	Yes	220	100
	No	0	0
Pulses, legumes and nuts	Yes	170	77.3
	No	50	22.7
Milk and milk products	Yes	51	23.2
	No	169	76.8
Eggs	Yes	17	7.7
	No	203	92.3
Meat and fish	Yes	175	79.5
	No	45	20.5
Other Vit A rich fruits & vegetables	Yes	211	95.9
	No	9	4.1
Other fruits and Vegetables	Yes	201	91.4
	No	19	8.6
Organ meat	Yes	3	1.4
	No	217	98.6
Dark green leafy vegetables	Yes	153	69.5
	No	67	30.5

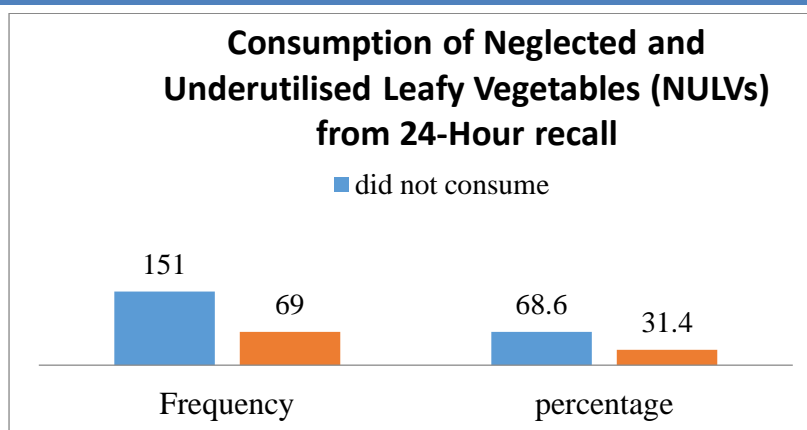


Figure 2: Consumption of NULVS in recall

Discussion

Socio-demographic characteristics of Respondents

The number of people that constituted the households size in this study is a reflection of both nuclear and extended family types in which relations live and eat together, and these types of households are typical of Yoruba culture and family set up (.....), and they constituted majority of the respondents. Majority of the respondents had low level of education (65.0% for both no formal and primary level of education). This low literacy level is however lower than what was found by Ayinde *et al.*, (2013) in the Nican-veg project aimed to revitalize farming and consumption of ten underutilized vegetables where 70.3% of the female respondents had no formal education. Idowu, (2009) also noticed high illiteracy level and opined that this could affect their exposure to strategies for promoting conservation and use of neglected and underutilized, while Boedecker *et al.*, (2014) reported respondents without formal education amounting to 93.3%. the improved reduction in the level of literacy in this study compared to other studies mentioned above is believed to be due to the fact that the LGA is more of peri-urban with movement of people from the urban to this LGA as their place of residence.

Knowledge of Commonly Consumed and Neglected/underutilised Vegetables

Corchorus Olitorus, *Amaranthus hybridus*, *Talinum triangulare*, *Vernonia Amygdalina*, *Celosia Argentina*, *Basella alba*, *Telfaria occidentalis* and *Solanum macrocarpon* were the commonly known and consumed green leafy vegetables in the study area, while *Senecio bialfrae*, *Crassocephalum rubens*, *Solanum scarbrum*, *Occimum gratisimum*, *Launea taraxacifolia*, *Solanum americanum* and *Moringa* leaf were known and consumed by less than half of the respondents. This observation is in line with the findings of Bello (2014), who rated the level of awareness and utilisation/underutilisation of the vegetables by respondents through measuring the frequency of seen and eaten, and concluded that *Corchorus Olitorus*, *Talinum triangulare*, and

Celosia Argentina ranked highest for seen and eaten. *Senecio bialfrae*, *Crassocephalum rubens*, *Solanum scarbrum*, *Occimum gratisimum*, *Launea taraxacifolia*, *Solanum americanum* and *Solanum macrocarpon* have fallen into disuse, as most respondents had never eaten them or no longer eat them, and some had never even heard their names. The findings here show that these vegetables were not consumed at all in the space of a month or had been consumed only once or twice. This is similar to the report of Termote *et al.*, (2012). The non-frequent consumption of these vegetables portrays that there is tendency that these important vegetables which can add variety to diversity and improve micronutrient intake of consumers may go into extinction through ignorance and modern farming methods which involve use of herbicides, as many of them grow wild and are treated as weeds.

Frequency and Factors influencing Respondents' consumption of vegetables

A decline in consumption of traditional green leafy vegetables has led to a loss of indigenous knowledge of production methods, thus vegetables such as *Ajefawo*, *Molangaran*, *Efo-Igo*, *Yanrin-Odo* have completely disappeared from the consumers' table, and others like *Ogunmo*, *Worowo*, *Yanrin*, *Ebolo*, *Igbaagba*, *Amunututu*, *Efo-Odu* are gradually disappearing (.....), thus narrowing the options of consumers to fewer and fewer crops. This is most likely the reason for the noticed high awareness and frequency of consumption of well-known commonly consumed vegetables. Usually, the most frequently given reasons for reduction in the use of traditional food species include over harvesting, local perceptions of these food as food for the poor, loss of traditional knowledge, the complexity of cooking methods and integration into market economies and globalization (Barucha and Pretty, 2010; Boedecker *et al.*, 2014). However, other reasons noticed in this study include food preferences (both personal and household), religious and cultural taboos, taste and smell of some of the vegetables, unpleasant eating

experiences in times past or that of a family member, means of obtaining the vegetables among others. Most of the respondents appreciated the vegetables and would readily consume more of them if readily available. However, an appreciable number of respondents revealed that they would not consume the neglected/underutilised ones in place of well-known vegetables due to their unavailability, confirming the fact that unavailability of these vegetables in both formal and informal markets at rural and urban areas has added to the downward trend in their consumption.

Vegetables consumption in sub-Saharan Africa is lower than WHO/FAO recommendation of 200g/day/person. This fact is reflected in the portion sizes consumed by the respondents in this study. Vegetables are mostly consumed as an addendum to staples, and the more preferred and frequently consumed ones are eaten in larger quantities than the less preferred ones.

There was no significant relationship between age, occupation, household income and educational level of respondents and frequency of vegetable consumption, neither was there any significant association between vegetable consumption and level of dietary diversity. This finding is contrary to that of Boedecker *et al.*, (2014) in their study of wild edible plants, and this observed difference could be due to the number of food groups from wild edible plants considered in the study other than green leafy vegetables, which could have improved the diversity of the diet.

Conclusion

Wildly grown vegetables like *Ogunmo*, *Worowo*, *Yanrin*, *Ebolo*, *Amunututu*, *Efo-Odu* including the cultivated *Igbaagba*, have been revealed by this study to be neglected/underutilized, and are gradually disappearing from farms. Knowledge and consumption of these vegetables have greatly declined even in rural areas where they are thought to be popular, well cherished and readily available. Lack of knowledge about the neglected vegetables, seasonality, unavailability and erosion of biodiversity through agricultural practices have led to the disappearance of many of them, thereby losing their place on the consumers table, and thus, narrowing the options of consumers to fewer and fewer crops. This situation therefore calls for consumer education on the benefits of including wildly grown indigenous vegetables in their daily diets as good source of essential vitamins and minerals in addition to their dietary fibre, thereby improving their dietary diversity, meeting nutritional needs, improve health and prevent nutrition-related non-communicable diseases such as cancers, cardiovascular diseases and coronary heart disease. Farmers' awareness as to the

conservation and large production of these important vegetables is also recommended.

References

1. Amujoyegbe, D. J. Oyedele, M. K. Idowu, J. O. Ayinde and O. C. Adebooye (2015). Journal of Agricultural Extension and Rural Development, Vol.7(9), pp. 283-289, September, 2015 Barucha, Z., & Pretty, J. (2010). The roles of wild foods in agricultural systems. *Philosophical Transactions of the Royal Society B*, 365, 2913-2926
2. Bekunda, M.; Sanginga, N.; Woomer, P.L. (2010). Restoring soil fertility in sub-Saharan Africa. In: *Advances in Agronomy*, Donald, L.S. (Ed.), pp.183-236.
3. Boedecker, J., Termote, C., Assogbadjo A.E., Lachat, C. and Van Damme P. (2014) Food Security. Volume 6 (6), 833-849. doi:10.1007/s12571-014-0396-7
4. Chweya J.A, and Eyzaguirre P.B (1999). The biodiversity of traditional leafy vegetables. *IPGRI* Rome, Italy. Vol 12, pp182-187. consumption of traditional vegetables in Tanzania from the farmers point of view.
5. Dansi, A., Vodouhè, R., Azokpota, P., Yedomonhan, H., Assogba, P., Adjatin, A., Loko, Y., Dossou Aminon, K. and Akpagana, K. (2012) Diversity of the Neglected and Underutilized Crop Species of Importance in Benin. *Scientific World Journal*. Vol 9
6. FAO (2013). Linkages between biodiversity, food and nutrition. Commission on Genetic Resources for Food and Agriculture, Fourteenth Regular Session. Rome, Food and Agriculture Organization of the United Nations. <http://www.fao.org/docrep/meeting/027/mf561e.pdf>
7. Global Hunger Index (2014). The Challenge of Hidden Hunger. Pp 4-7
8. Guarino L (1997). Traditional Africa vegetables. Promoting the conservation and use of underutilized and neglected crops. In: Proceedings of the IPGRI international workshop on genetic resources on traditional vegetables in Africa. IPGRI, Rome, Italy.
9. Idowu O. (2009) ISHS Acta Horticulturae 806: International Symposium on Underutilized Plants for Food Security, Nutrition, Income and Sustainable Development. ISHS (International Society for Horticultural Science); Leuven, Belgium: 2009. Contribution of neglected and underutilized crops to household food security and health among rural dwellers in Oyo State, Nigeria
10. Janick J (2011). *Horticultural review*. John and Willey and Co. vol 38, pp 305.
11. Keding, G., Msuya, J. M., Maas, B. L., & Krawinkel, M. B. (2012). Relating dietary diversity and food variety scores to vegetable production and socio-economic status of women in rural Tanzania. *Food Security*, 4, 129-140
12. Magbagbeola, JAO. Adetoso, JA. and Owolabi, OA. (2010) Neglected and underutilized species (NUS): a panacea for community focused development to poverty alleviation/poverty reduction in Nigeria. *Journal of Economics and International Finance*, 2(10), 208 - 211
13. Maziya-Dixon B, Akinyele IO, Oguntona EB, Nokoe S, Sanusi RA and E Harris (2003). Nigeria food Consumption and Nutrition Survey (2001-2003). International Institute for Tropical Agriculture, Ibadan Nigeria.
14. Nnamani, C. V., Oselebe, H. O. and Agbatutu, A. (2009). Ethnobotany of Indigenous Leafy Vegetables of Izzi Clan, in Ebonyi State, Nigeria. In: Proceeding of 20th Annual National Conference of Biotechnology Society of Nigeria. Abakaliki, November 14th -17th, pp. 111-114.
15. Odhav, B, Beerkrum, S, Akula and Baijnath, H. (2007). Preliminary assessment of nutritional value of traditional leafy vegetables in KwaZulu-Natal, South Africa. *Journal of Food Composition and Analysis*, 20(5), pp. 430-435.
16. Salami TR (2011). Survey and identification of some under exploited indigenous vegetables in some parts of Osun State, Nigeria. University of Abeokuta, Horticulture M.Sc. Thesis, P89.
17. Termote, C., Bwama Meyi, M., Dhed'a Djailo, B., Huybregts, L., Lachat, C., Kolsteren, K., & VanDamme, P. (2012). A biodiverse rich environment does not contribute to a better diet: a case study from DR Congo. *PLoS ONE*, 7(1), e30533.