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Research

Consumption pattern of indigenous leafy vegetables among selected households in Ibadan Zone, Nigeria

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Abstract

This study investigated the consumption pattern of indigenous leafy vegetables (ILVs) among selected households in Ibadan zones of Oyo State, Nigeria. A multistage sampling procedure was used to select 120 respondents; data were collected using a structured questionnaire and analyzed using descriptive and inferential statistics, Chi square test, Correlation coefficient, and ANOVA. Among our respondents, 67.5% were aware of ILVs, but only 51.7% had a low level consumption pattern and 48.3% consumed them often. The most commonly consumed ILVs were bitter leaf (46.7%), jute mallow (65.9%), water leaf (55%), green amaranth (43.4%), fluted pumpkin (42.5), Lagos spinach (40.8%), and scent leaf (40.0%). Most of the respondents had favourable perceptions of the health benefits of consuming ILVs. Awareness (r=0.304, p=0.001) and constraints (r=0.247, p=0.007) also significantly influenced consumption. There were significant differences in consumption frequency among households in the rural, semi-urban, and urban selected areas (F=5.236, p=0.007). Promoting awareness and addressing constraints through initiatives such as media strategic awareness campaigns and extension services, may increase the consumption of ILVs among households in the study area.

INTRODUCTION

Indigenous leafy vegetables (ILVs) are defined as plant species which are either genuinely native to a particular region, or which were introduced to that region ong enough ago to have evolved through natural processes or farmer selection (Nyarai et al. 2022). They are often referred to as traditional vegetables because of their long-standing use, and they are typically grown and consumed in specific locations, often featuring prominently in traditional recipes (Atuna et al. 2022). Indigenous leafy vegetables are diverse, colorful, and tasty foods that can play a strategic role in achieving balanced diets. (Mayekiso, 2024). Indigenous leafy vegetables are an essential part of the traditional diet in Nigeria, providing essential nutrients and health benefits. They are rich in vitamins (e.g vitamin A, B complex, folate, and vitamin C), minerals (e.g potassium, magnesium, calcium, iron, and zinc, and antioxidants, which are essential for maintaining good health (Oyewole, 2016).

Research has consistently shown that people who consume at least five servings of vegetables a day have a lower risk of many diseases, including cancer and diabetes (Aune, 2019). WHO (2023) suggests consuming more than 400 grams of fruits and vegetables per day to improve overall health and reduce the risk of certain non-communicable diseases. Malebo (2023) noted that indigenous green leafy vegetables often contain bioactive compounds such as niacin, omega-3-fatty acids, flavonoids, carotenoids and others. These compounds can provide antioxidant and anti-inflammatory properties, which may lead to health benefits, such as a reduced risk for health conditions like stroke, anemia, high blood pressure, certain cancers, and diabetes. The consumption of leafy vegetables in the daily diet has been strongly associated with stress management; specifically for instance, potassium-rich vegetables such as Talinum triangulare/Gbure (waterleaf) can reduce blood pressure. (Diass, 2019). Leavy vegetables are nutrient-dense, low in fat and calories but high in protein and other nutrients/g. They may also help improve gut health, immunity, and heart, bone, and skin health. Also, a daily serving of leafy greens may help slow cognitive decline that can come with aging (Morris et al. 2018).

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The consumption pattern of many wild vegetables likeYanrin (Wild lettuce, Launaea teraxacifolia), Iyanaipaja (Tree Spinach, Cnidoscolua aconitifoli) Ebolo (Fireweed, Crassocephalum crepiodiodes) – Elegede (Field pumpkin Cucurbita Pepo), Odu (Black nightshade, Solanum nigrum) Ogunmo (Huckleberry, Solanum scrabum), as well as the cultivated Igbaagba (Eggplant leaf, Solanum macrocarpon), has greatly reduced, and they are gradually disappearing from farms (Obembe et al., 2018). These plants continued to remain underutilized due to a lack of awareness of them by younger generations and a failure to promote them (Okunlola et al. 2023).

Crops like maize, potatoes, rice, and wheat are high in carbohydrates and provide a significant portion of global dietary energy intake; however, overreliance on these crops can lead to nutritional deficiencies (Nyarai et al., 2022). Nigeria demographic and health surveys in the past decade have established that many households rely on these carbohydrate-rich diets, leading to lack of dietary diversity and nutritious foods which contribute to malnutrition and food insecurity (Fajobi et al. 2024).

While there are substantial nutritional benefits of Nigeria's traditionally consumed green leafy vegetables, intake is insufficient (Petrikova, et al., 2025), In the latest national survey, 12.4% of the households reported to consume leafy vegetables, and 16.3% to consume non-leafy vegetables, at least once or twice per week. Comparable figures for urban areas, were 11.1% 16.6% respectively (Maziya-Dixon et al. 2004). The consumption of these vegetables has likely declined due to their being overshadowed by more exotic vegetables like carrots, lettuce, tomatoes, and others that tend to fetch higher prices for cultivators (Navya and Nagnur, 2024).

Reliable data on food intake in populations in developing countries (including Nigeria) are scarce and limited, meaning that the mentioned numbers may deviate from actual consumption (Global Panel on Agriculture and Food Systems for Nutrition, 2016). There is thus a need for further study of the current consumption pattern of ILVs in order to inform policies and interventions to encourage and improve their consumption. The present study seeks to contribute to such knowledge by assessing (1) the awareness of the respondents about the indigenous leafy vegetables, (2) the frequency at which they consume ILVs, (3) constraints they facein the consumption of indigenous leafy vegetables in the study area, and (4) the difference in the consumption pattern of ILVs in the selected rural, semi urban and urban study areas.

METHODS

AREA OF THE STUDY

This study was conducted in Ibadan zone, Oyo state, which has eleven (11) local government areas, both rural and urban. Ibadan, the capital city of Oyo State, is a major industrial and agricultural center situated in the southwestern part of Nigeria, and geographically characterized by a mix of savannah and forest vegetation. Agriculture is a significant aspect of the Ibadan Zone's economy with a majority of the population involved in small scale farming. The zone's fertile soil supports the cultivation of various crops, including ILVs.

SAMPLING PROCEDURE AND SIZE

Multistage sampling procedure was used to select the respondents for the study. The first stage involved purposive selection of a rural local government, semi-urban local government and urban local government which were Akinyele, Ido and Ibadan North respectively. Akinyele local government was selected because Akinyele predominantly consists of rural areas, while Ido local government predominantly consist of peri-urban areas. Ibadan North local government was chosen as the urban Local Government due to the presence of many industrial and infrastructural facilities as well as its high population density. The second stage involved the selection of one ward in each local government using a simple random technique. These include Moniya ward in Akinyele LGA, Agbowo ward in Ibadan North LGAand Omi – Adio ward in Ido LGA.The third stage involved the selection of 10% of the communities in the wards chosen using a simple random technique, which gave two (Alabata and Akingbile communities) out of 205 communities in Moniya ward, one (Kajola community) out 101 communities in Agbowo and two (Apete and Awotan communities) in Omi-Adio. The fourth stage involved using simple random sampling technique to select 1% out of 2010 and 1871 households in Alabata and Akingbile wards to give 20 and 18 households in the two selected communities respectively. Also 0.11% of out of the 30,500 households in Kajola community were selected randomly which gave 35 households.

Finally, one per thousand out of 25,002 and 22,300 households in Apete and Awotan were selected using simple random sampling technique which were 25 and 22 households respectively. A total of 120 households were thus selected for this study. Mothers (because they are caregivers) in the selected hoseholds were the unit of analysis. from each of the selected communities.

DATA COLLECTION AND ANALYSIS TECHNIQUES

This study employed the survey method and a structured questionnaire was used to obtain data on respondents' socioeconomic characteristics, awareness of selected ILVs, constraints to consumption of ILVs, perceived health benefits of ILVs, and frequency of consumption. Face content validation was used to validate the instrument. Data were analyzed using the descriptive (Mean, frequency and percentages) and inferential statistics (Chi Square, PPMC and ANOVA).

Awareness of ILVs were measured by providing the respondents with 17 indigenous leafy vegetable items and asking them to select the response option of 'Yes' or 'No' to indicate which ones they were aware of. The mean was computed and those who fell within and above the mean were categorized as high-level of awareness while those below the mean were categorized as low level of awareness. Constraints to the consumption of ILVs were obtained by using a 3-point scale of 'severe' (scored as 2), 'mild' (1) and 'not a constraint' (0). Perceived health benefits of ILVs were obtained by presenting a list of 15 health benefit items to the respondents who were then asked to select from the response action of 'to a greater extent =2', 'to a lesser exten=1', and 'not at all'= 0.

Respondents were asked how often they consume ILVs,

with response options ranging from 'more than once a week=4, once a week=3, occasionally=2 and'hardly consumed'=1 to not consume=0.' The index of frequency was calculated by summing all the responses and computing the mean. Respondents who scored at and above the mean were categorized as high, while those below the mean were categorized as low frequency of consumption.

RESULTS

The socio-economic characteristics of the respondents are shown in Table 1.

Table 1. Socio-economic characteristics of the respondents (n=120)

Variables	Frequency	Percentage (%)	Mean and SD
Age group			
⩽ 20	3	2.5	38.7±10.8 (years)
21- 40	72	60.0	
41-60	43	35.8	
>60	2	1.7	
Religion			
Christianity	84	70.5	
Islam	34	28.7	
Traditional	1	0.8	
Marital status			
Single	25	20.8	
Married	92	76.8	
Divorced	1	0.8	
Widowed	1	0.8	
Separated	1	0.8	
Household size			
1-4	60	50	
5-8	58	48.3	4.61±1.72
>8	2	1.7	
Level of education completed			
Primary	9	7.5	
Secondary	49	40.8	
Tertiary	62	51.7	
Occupation			
Civil service	29	24.2	
Business	12	10.0	
Trading	33	27.5	
Teaching	16	13.3	
Artisan	19	15.8	
Surveying	3	2.5	
Cleric	2	1.7	
Farming	2	1.7	
Driving	2	1.7	
Nursing	1	0.8	
Medical Doctor	1	0.8	
Monthly income			
⩽20,000	16	13.3	52,675±38,472
20,0001- 40,000	38	31.7	
40,001- 60,000	39	32.5	
>60,000	27	22.5	

Nigeria currency is in Naira. 1 dollar = 1600 Naira at the time of the study

Table 2a shows that the ILVs with a mean of 14.2. High awareness= 62.5%, (> 14.2) and low awareness=32.5% (< 14.2).

Table 2a. Distribution of respondent's level of awareness of indigenous leafy vegetables(n=120)

Awareness	Frequency	Percentage (%).	Mean
Low	39	32.5	< 14.2
High	81	67.5	> 14.2

Table 2b shows the proportions of the sample that were aware of the ILVs listed for them in the questionnaire.

Table 2b. Awareness of indigenous leafy vegetables (n=120)

Indigenous leafy vegetables	Yes		No	
	F	%	F	%
Indian/ Malabar spinach	109	90.8	11	9.2
Yoruba bologi (worowo)	106	88.3	14	11.7
Fireweed (Ebolo)	99	82.5	211	17.5
Wild lettuce (yanrin)	102	85.0	18	15.0
Eggplant leaf (Gbagba)	102	18.0	18	15
Huckleberry (Ogunmo)	40	33.3	80	66.7
Scent leaf (Efirin)	115	95.8	5	4.2
Black nightshade (Odu)	72	60.0	48	40
Green amaranth (Tete abalaye)	114	95.0	6	5
Lagos spinach (soko olobe)	105	87.5	15	12.5
Tree spinach (Iyanapaja)	105	87.5	15	12.5
Bitter leaf (Ewuro	118	98.3	2	1.7
African spinach (Tete olowojeja)	95	79.2	25	20.8
Water leaf (Gbure)	120	100	0	0
Field pumpkin (Elegede)	64	53.3	56	46.7
Jute mallow (Ewedu)	119	99.2	1	8
Fluted pumpkin (ugwu)\	119	99.2	1	8

Table 3 presents respondents' reports on the constraints that prevented them from consuming more ILVs.

Table 3. Constraints faced by respondents in the consumption of indigenous leafy vegetables (n=120)

Constraints	Not Constraint		Mild		Severe		Mean	S.D
	F	(%)	F	(%)	F	(%)		
Availability	29	24.2	40	33.3	51	42.5	1.18	0.80
Affordability	30	25.0	37	30.8	53	44.2	1.19	0.81
Convenience	37	30.8	41	34.2	42	35.0	1.04	0.81
Desirability	43	35.8	29	24.2	49	40.0	1.04	0.87
Health problems	48	40.0	12	10.0	60	50.0	1.10	0.95
Seasonality	17	14.2	52	43.3	51	42.5	1.28	0.70

*The respondents score on constraints on consumption of indigenous leafy vegetables were obtained by using a 3-point scale of ' Severe', 'Mild' and 'not a constraint'. The score 2, 1 and 0 were assigned respectively.

Table 4 shows the proportion of respondents who indicated that they believe each ILV can, to a greater or lesser extent, have selected health impacts.

Table 5 presents a rough estimate of how frequently respondents consumed ILVs. They were asked to indicate how often they consume indigenous leafy vegetables by selecting the response option of 'hardly consumed', 'occasionally', 'once a week', 'more than once a week', and scores 1, 2, 3, and 4 were assigned, respectively. An index of frequency of consumption was derived by adding all responses together and the mean was computed. Those respondents at or above the mean were categorized as high, while those below the mean were categorized as low frequency of consumption the overall mean was 42.2.

INFERENTIAL ANALYSIS RESULTS

There was a significant relationship between respondents' awareness of ILVs and frequency of consumption (r =0.304, p =0.001). There was also a significant relationship between constraints faced by respondents in the consumption of ILVs and frequency of consumption (r= 0.247, p=0.007).

Table 4. Perceived health benefits of indigenous leafy vegetables (n=120)

Benefits	Greater extent		Lesser extent		Not at all		Mean	S.D
	F	%	F	%	F	%		
Fight diseases	99	82.5	12	10.0	9	7.5	1.75	0.58
Gives energy and Vitality	100	83.3	20	16.7	0	0.0	1.83	0.37
Aid smooth skin	107	89.2	12	10.0	1	0.8	1.88	0.35
Reduces hypertension	100	83.3	18	15.0	2	1.7	1.82	0.43
Aid body building	101	84.2	18	15.0	2	1.7	1.83	0.40
Aid digestion	113	94.2	3	2.5	4	3.3	1.91	0.39
Provide good life	105	87.5	12	10.0	3	2.5	1.85	0.42
Prevent constipation	99	82.5	20	16.7	1	0.8	1.82	0.41
Aid development and growth	103	85.8	16	13.3	1	0.8	1.85	0.38
Prevent child Malnutrition	90	75.0	20	16.7	10	8.3	1.67	0.63
Good for eyesight	95	79.2	23	19.2	2	1.7	1.77	0.46
Prevents diabetes	95	79.2	16	13.3	9	7.5	1.72	0.60
Aid fetal growth	95	79.2	23	19.2	2	1.7	1.78	0.46
Increase blood flow	107	89.2	11	9.2	2	1.7	1.87	0.38
Prevents aging	89	74.2	21	17.5	10	8.3	1.66	0.63

* The respondents score on perceived health benefits of indigenous leafy vegetables were obtained by using a 3-point scale of 'To a greater extent', 'To a lesser extent' and 'not at all'. The score 0, 1 and 2 were assigned respectively.

Table 5. Distribution of Respondents' based on frequency of consumption of indigenous leafy vegetables(n=120)

Vegetables	More than once a week		Once a week		Occasionally consumed		Hardly consumed	
	F	%	F	%	F	%	F	%
Indian Malabar (Amunututu)	23	19.2	18	15.0	57	47.5	22	18.3
Yoruba bologi(Worowo)	8	6.7	15	12.5	69	57.5	28	23.3
Fire weed (Ebolo)	2	1.7	11	9.2	66	55.0	41	34.
Wild lettuce (yanrin)	9	7.5	11	9.2	43	35.8	57	47.5
Eggplantleaf (Gbagba)	15	12.5	16	13.3	49	40.8	40	33.3
Huckleberry (Ogunmo)	6	5.0	5	4.2	16	13.3	93	77.5
Scent leaf(Efirin)	48	40.0	26	21.7	38	31.7	8	6.7
Black nightshade (Odu)	7	5.8	9	7.5	40	33.3	64	53.3
Green amaranth (Tete abalaye)	52	43.4	30	25.0	21	17.5	17	13.2
Lagos spinach (Soko olobe)	49	40.8	38	31.7	20	16.7	13	10.8
Tree spinach (Iyanapaja)	33	27.5	21	17.5	44	36.7	22	18.3
Bitterleaf (Ewuro)	56	46.7	31	25.8	25	20.8	8	6.7
African spinach (Tete olowojeja)	32	26.7	19	15.8	32	26.7	37	30.8
Water leaf (gbure)	66	55.0	26	21.7	23	19.2	5	4.2
Field pumpkin (Elegede)	4	3.3	10	8.3	22	18.3	84	70.0
Jute mallow (Ewedu)	79	65.9	36	30.0	3	2.5	2	1.7
Flutted pumpkin (Ugwu)	29	42.5	36	30.0	51	42.5	4	3.3

Table 6 shows that there were significant differences in the consumption pattern of ILVs across the rural, semi urban and urban areas. The result of ANOVA Post Hoc Test(LSD) shows that there was asignificant difference between rural and semi urban locations (0.046), rural and urban location (0.027) and semi urban and urban location (0.003). This means that there was a variation in the consumption pattern of ILVS across the locations in the study area.

Table 6. Comparison of mean consumption of indigenous leafy vegetables by area of residence

Location type(i)	Location type(j)	Mean diff(i-j)	Std error	P- value
Rural	Semi urban	-3.969	1.972	0.046
Rural	Urban	8.798	3.918	0.027
Semi urban	Urban	12.767	4.147	0.003

ANOVA Post Hoc Test, Least Significant Difference

The respondents score on the differences in the consumption pattern of ILVs across locations were obtained by using a 3-point scale of 'Rural', 'Semi rural' and 'Urban aeas', scored 1, 2 and 3 respectively.

DISCUSSION

Most of our respondents (67.5%) had what we defined as a high level of awareness of ILVs, having mean scores above 14.16. Our results can be compared to Ndlovu, et al. (2008), who reported that jute mellow, waterleaf, and Lagos spinach ranked highest for awareness while Yoruba bologi, huckleberry, wild lettuce, and black nightshade had fallen into disuse, as most respondents had never eaten them, or no longer eat them, and some had never even heard their names.

The most severe constraints faced by our respondents in the consumption of ILVs was seasonality. This is in agreement with the findings of Odukoya, et al. (2022) that the potential constraints against healthy food choices, including vegetable consumption, especially in the urban and rural areas of Nigeria included limited year round availability, affordability, and the need for convenience.

The vast majority of respondents believed there were health benefits of consuming at least certain ILVs. This finding is consistent with a study by Yusuf et al. (2022), which found that 92% of respondents in Ogun State, Nigeria, perceived that ILVs have health benefits, including improving digestive health and reducing the risk of chronic diseases.

Jute mallow (Ewedu) was the most frequently consumed ILV but others were also widely consumed by our respondents. Ejoh (2021) who found that the high frequency

of consumption of these vegetables in southwest Nigeria was due to the fact that th they are widely cultivated in all seasons.

Termote, et al. (2012) wrote that where the consumption of ILVs is in frequent, there is tendency that their availability greatly declines. This may also be partly due to the use of herbicides, as many of ILVs grow wild and are treated as weeds by "modern" farmers.

There was a significant positive correleation between respondents awareness of ILVs and frequency of consumption ($r = 0.304$, $p = 0.001$). This was similar to that found by Ugbaja et al. (2023) in Oyo State, Nigeria ($r = 0.267$, $p = 0.010$).

The result on Table 7 showed that there was a significant relationship between constraints faced by respondents in the consumption of ILVs and frequency of consumption of IL,Vs ($r = 0.247$, $p=0.007$) @ $p<0.005$. This result is similar to the findings of Abibu et al. (2021) who found that limited availability and high prices were significant predictors of low consumption of ILVs among households in Ogun State, Nigeria.

Not surprisingly, we found that consumption of ILVs was greater among our rural respondents than those living in urban areas. However, as far we know, ours is the first study to show that consumption was even greater among residents in semi-urban areas than in rural areas.

CONCLUSION

Respondents were aware of ILVs. Seven varieties were consumed more than once a week by over 40% of respondent. The most commonly consumed ILVs were jute mallow and water leaf, green amaranth, bitter leaf, Lagos spinach, scent leaf, and fluted pumpkin Most of the respondents had favourable perception of the health benefits of consuming ILVs. Awareness and constraints significantly influenced consumption pattern. There was a significant difference in consumption frequency among households in the rural, semi-urban, and urban selected areas.

Our respondents had a high level of consumption pattern of indigenous leafy vegetables. This implies that there is high level of consumption pattern of ILVs among households in Ibadan zone, Oyo State.

RECOMMENDATIONS

Nutritionists should promote nutrition education awareness to highlights nutritional benefits of the consumption of ILVs. Government policies and extension services should be developed to improve market linkages, availability at retail outlets, irrigation systems and pricing strategies which will help reduce or overcome constraints of unavailability of vegetables and boost the consumption of ILVs among households. Advocating for the cultivation of home gardens in rural, semi-urban, and urban areas can also help increase the availability and consumption ILVs. Since cost was commonly listed as a constraint, extension agents can learn and then teach the people which ILVs grow wild and where these can be commonly found. Wild foods can often be more nutritious that cultivated varieties that have been bred for other characteristics such as appearance.

AUTHOR CONTRIBUTIONS

MFO: Conception/design, development of data collection instrument, interpretation of data, revised manuscript. GOO: Data collection, interpretation of data and manuscript revision. Both authors approved the final version for publication.

CONFLICT OF INTEREST

The authors declare that they have no other potential conflicts of interest.

DECLARATION OF GENERATIVE AI AND AI-ASSISTED TECHNOLOGIES IN SCIENTIFIC WRITING

Nothing to disclose

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