ANALYSIS OF HOUSEHOLD DEMAND FOR GARDEN EGG LEAF (Solanum aubergine) FOR FOOD SECURITY IN OWERRI METROPOLIS IMO STATE, NIGERIA.

Abstract

The study examined the analysis of household demand for garden egg leaf (solanum aubergine) for food security in Owerri Metropolis Imo State. Multi-stage sampling was used to select 300 respondents and data collected through a well-structured questionnaire. Results were analyzed using descriptive and inferential statistics. Result revealed that female respondents dominated the households in Owerri and most of them were literate. Study revealed that Garden egg leaf had a monthly budget share expenditure of ₦2753.33. Oha leaf, Fluted Pumpkin and Bitter Leaf were the most preferred vegetables which ranked 1st, 2nd and 3rd respectively. Regression result showed that Own Price, Price of Water Leaf, Price of Fluted Pumpkin, Price of Bitter leaf, Price of Amaranthus, Monthly Income, Household Size, and Level of Education were significant at 1% and 5% and greatly influenced the demand for garden egg leaf in the study area. The own price and income elasticity was found to be -0.06 and -0.18 respectively. The cross price elasticities of water leaf and fluted pumpkin were found to be 0.10 and 0.13 while the cross price elasticities of Bitter leaf and Amaranthus were found to be -0.20 and -0.11. It was recommended that Extension agents and health workers should also help to educate and create awareness amongst households through media programmes about the nutritional benefits of consuming garden egg leaf thereby boosting consumer demand for the vegetable.

Keywords – Demand, Garden Egg Leaf, Meteropolis Food Security.

INTRODUCTION

Food security involves the physical availability of food at all times and its access to all at affordable prices. Food security is defined as when all people at all times have physical social and economic access to sufficient, safe and nutritious food to satisfy its dietary requirements and food preferences for an active healthy life (Sarukhan, 2014). But food security has long been associated with the aim to secure access to sufficient carbohydrates such as grains, roots, and tubers – the staple crops that provide affordable sources of dietary energy. Many consumers in Nigeria are therefore focused on consuming affordable sources of energy instead of nutrient-rich food. As a result, intake of fruits and vegetables remains under the daily recommendation of 400g (Dijkxhoorn, Talabi, & Eunice, 2021). However, Garden egg leaf offers a potential to enhance and sustain household food security with safe, economical and nutritious qualities including availability round the year (Bangladesh Bureau of Statistics 2015; Omottesho,Muhammed-Lawal, Amolegbe, &

Abubakar, 2017). Therefore assessing its demand will provide a framework that examines how consumer choices are impacted by price, income, prices of other commodities, preferences, and market conditions. Demand is the process of assessing the quantity of a good or service that people are willing and able to purchase at different prices. Demand analysis therefore measures the forces or factors which influence the demand of a commodity or services by consumers (Yadav, 2023).

Garden egg leaf, a neglected crop in the past that is seen as a low-status vegetable associated with poor people is now an important crop in several African countries and is indigenous to sub-Saharan Africa. Garden egg leaf is a herbaceous plant or vegetable grown for its nutritional, medicinal and economic value (Nkamigbo *et al.,* 2024). It can be stored for up to three months by letting it dry. This is a useful characteristic in the tropics given the lack of refrigeration in some rural areas (Mangan, 2017). Garden eggplant has fruits that are shaped like chicken eggs, hence the name 'eggplants. The fruits may be pear-shaped, round, long or cylindrical depending on the variety. The Scientific name of the plant is Solanum spp. It belongs to the family Solanaceae and genus Solanum. It has about 1,400 species found around the world most especially in the temperate and tropical regions. The genus Solanum comprises over 1,000 species with at least 100 indigenous African species; among these the Gilo, Kumba, Shum, and Aculeatum cultivar groups are important in Africa, with Shum being highly cultivated for its leaves (Omotesho *et al.,* 2017). The plant looks just like a shrub. Its height varies from 40 to 150 centimeters. The plant's foliage stands out for its substantial size, rough lobes, and dimensions of 10 to 20 centimeters in length and 5 to 10 centimeters in width (Opara & Udourioh 2023). It can adapt to different climates. Garden eggplant can also grow even in most difficult soils little wonder it is seen as an easy way of producing food and raising income from numerous kinds of "agricultural wasteland (National Research Council, 2006) thereby boosting food security. Garden egg fruit are usually white, yellow, light yellow to green with smooth glossy skin. The garden egg is called by various local names in Nigeria. Yoruba call it Igbaaja, Hausa call it guata, Efik call it Anyara while the igbos call it Afufa or Anara (Opara *et al* 2023; Isibor *et al* 2023).

The garden egg leaf has numerous uses. The leaves of *Solanum aethiopicum* are eaten as a leaf vegetable and are actually more nutritious than the fruit. The garden egg leaf is eaten both raw and cooked and is becoming more popular as a cultivated crop. *Solanum aethiopicum* is used as an ornamental in Asia. In Nigeria, Igbo people use the fruit as a substitute for kolanut, especially for

those who do not want to chew kolanut, in which case it is used to welcome guests at home or before resumption of a traditional ceremony. Garden egg leaf, as it is commonly known in Nigeria, is sometimes used to make a tomato-based sauce which can be used to eat yam and it can also be sold by farmers to generate income. According to National Research Council (2006), garden egg contains many nutrients such as 92 percent water, small amounts of protein, vitamins, minerals, and starch. It has moderate sources of beta-carotene, B vitamins, and C. It also contains calcium, iron, potassium, and probably other minerals.

The leaves are excellent sources of vitamins A and B (particularly riboflavin), calcium, phosphorus, and iron. They contain about 5 percent of a protein containing significant amounts of methionine, one of the essential amino acids most difficult to find in plant-based foodstuffs. Garden Egg has some health benefits which includes helping people with glaucoma because it lowers the eye pressure, also helps in heart diseases and *arteriosccerosis and the leaves are* recommended for people who have type-2 diabetes because of its high fibre, low calories and low fat content *(Okon, Enete, & Bassey, 2010;* Anyakudo, Omogbehin, & Adeyomoye, 2022*).* According to Omovbude and Ikenwa (2020), garden egg leaves can be used to cure various ailments, including boils, stomach pains, and throat pains. The leaves are seen as natural "blood-pumping" vegetables, especially when it is consumed raw. The leaves possess detoxifying properties for the kidneys and also contain minerals that assist in blood filtration (Nkamigbo *et al.,* 2024). Furthermore, according to Isibor *et al.,* (2023), intake of the leaves helps in the improvement of health and in reducing the incidence of ill-health in children (aged < 5 years) and also contains anti-inflammatory properties that help in preventing cancer. They also noted that the leaves enhance smooth and healthy skin when consumed regularly in appropriate quantities.

Statement of Problem

There is a great concern over the rising food insecurity in most developing countries like Nigeria (Okengwu, 2025). In Africa, and especially Nigeria, garden egg leaf offers a potential to enhance and sustain household food security with safe, economical and nutritious qualities (Omottesho *et.al.,* 2017). Garden egg leaf is one of the oldest vegetables cultivated for its nutritional, medicinal, and economic values. It can be eaten, used to manage diabetes mellitus, heart diseases and can also be used to generate income for poor households (Isbor *et.al.,* 2023).

Despite all these benefits, vegetable consumption generally is much below the daily recommendation of 400g thus affecting its budget share in total food expenditure amongst households. According to Akpabio *et.al.,* (2025) and Akello *et.al* (2023) Sub -Saharan African countries like Nigeria have some of the highest population growth rates in the world which increases the severity of food insecurity thus widening the domestic demand and supply gap of vegetables. In addition, according to Adeleke *et.al.,* (2022), Socio-economic factors such as age, education, household size, income etc are among underlying determinants that influence the demand for vegetables. Global population growth according to Hussain *et.al.,* (2025) has led to a substantial increase in demand for food thus leading to renewed interest in reliable estimates of food demand elasticity at the disaggregated level (Hoskova *et.al.,* (2025).

Hence understanding the demand pattern of garden egg leaf in Owerri Metropolis of Imo State necessitated this study to examine how consumer choices towards this vegetable are impacted by price, income of household, prices of other commodities, preferences, and market conditions. This study will also help policy makers address the issue of food security in the study area. Several researchers who carried out research on garden egg leaf focused on its technical efficiency and socio economic determinants on its productivity, income and revenue analysis as well as the structure of its supply or marketing. However none of them looked at household demand for garden egg leaf in Owerri Metropolis of Imo State which this study seeks to address.

Research Questions

i. What are the socio-economic characteristics of the respondents in the study area?
ii. What are the major vegetables demanded by households in the study area?
iii. What is the monthly budget share expenditure by households on garden egg leaf and other vegetables?
iv. What are the elasticities and socioeconomic factors affecting the demand for garden egg leaf in the study area?

Purpose of Study

The main purpose of the study was to analyze the demand for Garden egg leaf among consuming households in Imo State. The specific objectives were to:

i describe the socio-economic characteristics of the respondents in the study area,

ii identify the major vegetables demanded by households in the study area,

iii ascertain the monthly budget share expenditure by households on garden egg leaf and other vegetables

iv determine how elasticities and socioeconomic factors affect the demand for garden egg leaf in the study area.

Methodology

Research Design

A descriptive design was used to assess the household demand for garden egg leaf (solanum aubergine) for food security in Owerri metropolis Imo State, Nigeria. The design was considered appropriate for the study since it involves drawing generalizations based on the analysis of data collected from the sample of the population.

Area of Study

The study was conducted in Owerri Municipal Council of Imo State. The study area was selected due to its cosmopolitan nature. It is made up of five communities/villages namely Ama Awom, Umu Odu, Umu Onyeche, Umu Ororonjo and Umu Oyima. Owerri Municipal has a population of about 127,213 according to 2006 population census. It is the headquarters of Imo State. Owerri Municipal area has two main seasons, the dry and wet season. The area has an annual rainfall of between 2250mm to 2500mm with average annual temperature of between 25-27^{0}c and annual relative humidity of 80% (Njoku and Igbokwe, 2021; Nwajei, *et al.,* 2017).

Population of the Study

The population of the study was made up of 3245 households in Owerri municipal according to National Social Registers study 2021.

Sample and Sampling Technique

Owerri Municipal town has one autonomous community namely Owerri Nchi Ise. The LGA has 5 villages namely Ama Awom, Umu Odu, Umu Onyeche, Umu Ororonjo and Umu Oyima. All these villages are urbanized with high percentage of non-indigenes. The five villages that make up

Owerri Municipal were purposively selected This helped to have a true representation of households in Owerri Municipal upon which relevant generalizations and inferences could be drawn.. From the five selected villages, list of households compiled by the National Population Commission were used to draw samples. 60 households were randomly selected from each of the five villages. A total of three hundred (300) households were selected for the study.

Method of Data Collection

The data for the study were collected from primary and secondary sources. The primary data were collected through the use of a well - structured questionnaire. Secondary data were collected through relevant journals, textbooks and conference proceedings.

Reliability

Test-retest reliability method was used to measure the consistency of the same test over time.

Validity

The instrument was given to four different experts in research methods for validation.

Method of Data Analyses

Econometric technique and descriptive statistics were used in analyzing the data collected. Descriptive statistics such as percentages and mean were used in describing the socio economic characteristics of the households and the major vegetables demanded by households in the study area, Budget share index was used to ascertain the monthly budget share expenditure by households on garden egg leaf and other vegetables, while multiple linear regression analysis was used to determine how own price, cross price, income elasticity and socioeconomic factors affect the demand for garden egg leaf in the study area.

Objective 2 was analysed using a 6 –point likert type scale of Extremely preferred (EP= 6), Moderately Preferred (MP = 5), Occasionally Preferred (OP = 4), Slightly Preferred (SF = 3), Least Preferred (LP = 2) and Not at all (1). The midpoint for taking decision was obtained by adding up the values of the scale (i.e. 6+5+4+3+2+1 = 21) and divided by the number of scale (i.e. 6) to give a mean value of 3.5. Any mean score that is greater or equal to 3.5 was regarded as preferred while those less than 3.5 were taken as least preferred.

Budget Share Index

Budget share index was used to estimate the expenditure share of each of the vegetables considered. These are garden egg leaf and other vegetables such as Water leaf, Fluted pumpkin, Bitter leaf, Amaranthus, and Oha leaf which could substitute or complement garden egg leaf. Budget Share equation as used by Ashagidigbi (2019) is stated as follows:

$$W_r = \Sigma_{i=1}^{n} \frac{X_{ri}}{X_i}$$

Where:

Wr = budget share on each vegetable consumed by ith household

X_r= expenditure on each of the vegetables consumed by ith household (₦)

X_i = total expenditure on all the vegetables captured (Water leaf, Garden egg leaf, Fluted pumpkin, Bitter leaf, Amaranthus, and Oha leaf)

i= 1,2……. n.

The Multiple Linear Regression Model

Multiple linear regression analysis is a model useful for estimating the relationship between dependent and independent variables. A multiple linear regression model was used in determining the factors influencing household demand for garden egg leaf in the study area. The estimation model generally formed is stated below as:

$Q = B_0 +$ ..... (1)

Based on the general estimation model above, the equation for this research is stated as follow:

$Q = \beta_0+\beta_1X_1+\beta_2X_2+\beta_3X3 +\ldots. +\beta_9X_9 + \mu$ ……. (2)

Where:

Q = Monthly demand expenditure on garden egg leaf (₦)

β_0 = Constant

X_1 = Own price (₦/100g)

X_2 = Price of Water Leaf (₦/100g)

X_3 = Price of Fluted Pumpkin (₦/100g)

X_4 = Price of Bitter Leaf (₦/100g)

X_5 = Price of Amaranthus (₦/100g)

X_6 = Price of Oha Leaf (₦/100g)

X_7 = Monthly disposable income (₦)

X_8 = Household size (Number.)

X_9 = Level of education (No of years spent in school)

$\beta_1 - \beta_9$ = Regression Coefficients

μ = Random error term

The linear regression equation above is transformed using a Natural logarithm (ln). Natural logarithm is used to analyze the linear relation between the independent and dependent variables to avoid biasness of linear regression estimates (Tenriawaru, 2021)

Equation (2) above is transformed to the model below:

$\ln Q = \ln b_0 + b_1 \ln x_1 + b_2 \ln x_2 + b_3 \ln x_3 + b_4 \ln x_4 + b_5 \ln x_5 + b_6 \ln x_6 + b_7 \ln x_7 + b_8 \ln x_8 + b_9 \ln x_9 + \mu$ ……. (3)

Results and Discussion

What are the socio-economic characteristics of the respondents in the study area?

Table 1: Socio-Economic Characteristics of Households in Owerri Metropolis Imo State

Gender	**Frequency**	**Percentage**
Male	40	13.3
Female	260	86.7
Total	**300**	**100**
Marital Status		
Married	240	80.0
Single	50	16.7
Widowed	10	03.3
Total	**300**	**100**
Educational Experience (Years)		
0 (No formal education)	0	0
1-6	60	20.0
7-12	50	16.7
13-18	190	63.3
Total	**300**	**100**
Mean	**12.1 Years**	
Household size (no of persons)		

1-5	140	46.7
6-10	160	53.3
Total	**300**	**100**
Mean Approx.	**6 persons**	
Occupation		
Civil Service	210	70.0
Trading	80	26.7
Others	10	03.3
Monthly Income (₦)		
30000-131000	210	70.0
132000-233000	60	20.0
234000-335000	20	06.7
336000-437000	10	03.3
Total	**300**	**100**
Mean	**₦124,700**	

Source: Field Survey Data, 2025

The socioeconomics characteristics of the households in the study area are presented in Table 1. The results revealed that out of the 300 households sampled, 13.3% are male, while a majority 86.7% are female. Most of the respondents have a household size between 6 and 10 persons, with a mean household size of 6 persons. This means that the respondents had relatively large-sized households and was advantageous to consumption since it will enable the respondents to consume more of garden egg leaf because of the large size of the household. Majorities (80%) of the respondents are married, this indicates a high sense of responsibility among the respondent. All the respondents had formal education with an average of 12.1 years of formal education. This shows that most of the respondents are literate which implies that the majority could be aware of the nutritional benefit of garden egg leaf, understand and consume garden egg leaf. Majority (70%) of the respondents are involved in civil service work, while the remaining 30% are involved in trading and other activities. (70%) of the respondents earn between ₦30,000 and ₦131,000 monthly with a mean monthly income of ₦124,700.

What are the major vegetables demanded by households in the study area?

Table 2: Major Vegetables Demanded By Households in the Study Area According to Preference

Vegetables	Extremely Preferred (6)	Moderately Preferred (5)	Occasionally Preferred (4)	Slightly Preferred (3)	Least Preferred (2)	Not At all (1)	Mean	Rank
Water leaf	70	50	40	50	50	40	3.73	4th
Garden egg Leaf	30	60	50	70	60	30	3.46	5th
Fluted Pumpkin	60	80	50	30	20	60	3.96	2nd
Bitter leaf	80	40	40	70	60	10	3.93	3rd
Amaranthus (Green leaf)	30	20	60	20	90	80	2.80	6th
Oha Leaf	90	50	50	50	20	40	4.06	1st

Source: Field Survey Data, 2025.

NB: Mean Above 3.50 = Preferred; Mean Below 3.50 = Least Preferred

Table 2 above shows the result of the major vegetables demanded by households in the study area according to preference and rank. Majority of the respondents with mean 4.06 ranking 1st demanded for Oha leaf, Fluted pumpkin with mean of 3.96 ranked 2nd, some of the respondents preferred Bitter leaf which ranked 3rd with mean of 3.93. Furthermore, some preferred waterleaf with mean of 3.73 ranking 4th. More so, some of the respondents demanded for garden egg leaf with mean of 3.46 which ranked 5th while the least vegetable demanded by respondents was Amaranthus which ranked 6th with the mean of 2.80. This finding indicates that garden egg leaf is among the least vegetables demanded by households in the study area based on the ranking. This is in tandem with the findings of Ubosi (2015) and Arua *et al.,* (2020) who observed in their study that out of 11 vegetables demanded by households, garden egg leaf ranked 10th showing low demand for the vegetable.

What is the monthly budget share expenditure by households on garden egg leaf and other vegetables?

Table 3: Monthly Budget Share Expenditure by Households on Vegetables

Vegetables	Mean Monthly Budget Share (₦)	Percentage Budget Share
Water Leaf	3860.00	19.7
Garden Egg Leaf	2753.33	14.1
Fluted Pumpkin	4166.66	21.3
Bitter Leaf	3806.66	19.5
Amaranthus (Green)	2133.33	10.9
Oha Leaf	2846.66	14.5

Source: Field Survey Data, 2025

Table 3 above shows the monthly budget share expenditure by households on vegetables. The findings revealed that the monthly budget share for Water leaf is about ₦3860 (19.7%) while ₦2753.33 (14.1%), ₦4166.66 (21.3%) and ₦3806.66 (19.5%) is for Garden egg leaf, Fluted pumpkin and Bitter leaf respectively, ₦2133.33 (10.9%) for Amaranthus and ₦2846.66 (14.5%) for Oha leaf. This shows that Garden egg leaf is among the vegetables with least budget share expenditure probably due to high price or preference for other vegetables by households in the study area. This implies that households in Owerri municipal spend less than $2 (₦3000) on garden egg leaf in a month. However this is contrary to the findings of Arua *et al* (2020) who stated that households spend up to $6.6 (₦10000) on garden egg leaf in a month. This could be because as income increases over the years, most households would prefer to allocate the additional income to other vegetables or food items more preferred by them.

What are the elasticities and socioeconomic factors affecting the demand for garden egg leaf in the study area?

Table 4: Parameters of Multiple linear Regression Analysis of Demand for Garden Egg leaf

Predictor	Regression Coefficient	t-ratio
Constant term	8.7601	17.4582*

Own Price (X_1)	-0.0603	-1.9324**
Price of Water Leaf (X_2)	0.1003	2.9819*
Price of Fluted Pumpkin (X_3)	0.1313	6.0343*
Price of Bitter Leaf (X_4)	-0.2019	-7.5150*
Price of Amaranthus (X_5)	-0.1139	-2.9059*
Price of Oha Leaf (X_6)	0.0055	0.2322
Monthly Income (X_7)	-0.1803	-6.2547*
Household Size (X_8)	-0.0989	-2.9938*
Level of Education (X_9)	0.1094	3.0283*
R^2 = 0.7858		
F- ratio = 96.0908*		

**** = 5% significance * = 1% significance**

Table 4 showed the results of the Cobb- Douglas functional form, the coefficient of multiple determinations (R^2) was found to be 0.7858 implying that 78.58% of the variation in Garden egg leaf demand expenditure was explained by variations in the explanatory variables included in the model. The F-value was 96.0908, which was statistically significant at $P<0.01$. It implies that the joint influence of all the explanatory variables on Garden egg leaf demand was quite strong.

Own price elasticity of Garden egg leaf:

The coefficient of each variable from the selected Cobb-Douglas functional form constitutes the respective elasticity of demand with respect to each variable (Gujarati, 2001).

The own price elasticity of demand is the relative responsiveness of quantity demanded of a particular commodity to changes in its price (Lusanda, 2023). The own price elasticity was found to be -0.0603. The negative sign implies that at higher prices, less of the garden egg vegetable will be demanded. In absolute terms, the price elasticity was found to be less than one in value. This implies that demand for garden egg leaf was relatively inelastic; a change in price had a relatively small effect on demand. This is in tandem with Awal *et al* (2008)

Income elasticity of Garden egg leaf:

The income elasticity of demand is the relative responsiveness of quantity demanded to changes in income (Lusanda, 2023). The income elasticity was found to be -0.1803. The negative sign

implies that at higher income, less of the garden egg vegetable will be demanded. This is contrary to the findings of Conrad *et al* .,(2022) who noted that increase in income increases the consumption of vegetables. The price elasticity was found to be less than one in value. This implies that demand for garden egg leaf was relatively inelastic; a change in income had a relatively small effect on demand.

Cross-Price elasticity of Garden egg leaf:

The cross-price elasticity of demand measures the relative responsiveness of quantity demanded of a particular commodity to changes in the price of a related commodity (Lusanda, 2023). The cross price elasticities of water leaf and fluted pumpkin were found to be 0.10 and 0.13. The positive sign confirm that garden egg leaf, water leaf and fluted pumpkin are substitutes. This is however contrary to the findings of Abiodun and Adebayo (2014) who noted that water leaf and fluted pumpkin are complements for most vegetables while the cross price elasticities of Bitter leaf and Amaranthus were found to be -0.20 and -0.11. The negative sign confirm that garden egg leaf, bitter leaf and Amaranthus are complements. This means that an increase in the price of garden egg leaf cuts down its consumption and consequently the consumption of the other vegetables. Their price elasticities were less than one in value. This implies that demand for these vegetables were relatively inelastic; a change in price had a relatively small effect on demand. This is in tandem with Abiodun and Adebayo (2014) that Bitter leaf and Amaranthus serve as complements to most vegetables.

Socio-economic Factors Affecting the Demand for Garden Egg Leaf in the Study Area.

The result from table 4 above shows that monthly income and household size are statistically significant at 1% and are negatively related to the demand for garden egg leaf implying that a unit increase in these variables would bring about a decrease in the demand for garden egg leaf which is in line with Awal *et al* (2008) while level of education was also statistically significant at 1% but positively related to the demand for garden egg leaf meaning that a unit increase in level of education would positively enhance the demand for garden egg leaf in the study area. This corresponds with the findings of Gido (2022) that education is positively related to demand for vegetables.

Conclusion

~~From the study,~~ It was concluded that female respondents dominated the households in Owerri metropolis of Imo State. Most of the respondents were literate and married with a mean household size of 6 persons and earned a mean monthly income of about ₦124,700 of which about 14.1% of it was spent on garden egg leaf. Findings also revealed that civil service work is the dominant occupation in the study area. It was revealed from the study that Garden egg leaf is among the vegetables with least budget share expenditure. The study also concluded that Oha leaf, Fluted Pumpkin and Bitter Leaf were the most preferred vegetables according to ranking in the study area while water leaf, garden egg leaf and Amaranthus were the least preferred vegetables. ~~It was also concluded from the study that~~ and Own Price, Price of Water Leaf, Price of Fluted Pumpkin, Price of Bitter leaf, Price of Amaranthus, Monthly Income, Household Size and Level of Education were the factors that greatly influenced demand for garden egg leaf in the study area.

Recommendation

Based on the findings obtained in the study,

- ❖ It is therefore recommended that households should endeavor to consume more of garden egg leaf because of its health benefits.
- ❖ Extension agents and health workers should also help to educate and create awareness amongst households through media programmes about the nutritional benefits of consuming garden egg leaf thereby boosting consumer demand for the vegetable.

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