



## Economics of Garden Egg Production in Uzo-Uwani, Local Government Area, Enugu, State, Nigeria

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### Abstract

This study explored economics of garden egg production in Uzo-uani Local Government Area, Enugu State, Nigeria. Multi-stage sampling method was adopted for the study. On the whole, 60 garden egg producers were randomly sampled. Descriptive and inferential statistics were used to analyse data for realization of objectives. Results show that majority of the farmers were male (58.3%), dominant age brackets were 21-30 and 31-40 which comprised of 50% and 38.3% respectively. Household size of 6 and above dominated with 58.3%, and majority had secondary education constituting 81.7%. Access to extension and loan services was low with 75% and 58.3% of no access respectively. Most of the farmers (83.3%) had farm sizes of less than 1 hectare. OLS regression analysis for determinants of quantity of garden egg produced showed that gender, education and age were positively significant at ( $p < 0.05$ ), ( $p < 0.01$ ) and ( $p < 0.05$ ) respectively. Also, access to loan, farming experience, farm size, fertilizer and labour were positively significant at ( $p < 0.05$ ), ( $p < 0.05$ ), ( $p < 0.01$ ), ( $p < 0.01$ ) and ( $p < 0.05$ ) respectively. On the hand, cost of seeds was negatively significant at ( $p < 0.05$ ). Net Farm Income (NFI) was ₦83,816.54. The most cultivated varieties of garden were the greenish white (50%), while the whitish round variety constituted 40.7%. The most practiced cropping systems among the farmers are the sole and mixed systems constituting (50%) and (45%) respectively. The study recommends that garden egg farmers in the study area should form cooperative societies to enable them acquire input at subsidized rate and access low interest credit from financial institutions in the area.

**Keywords:** Economics, Garden Egg, Production, Uzo-Uwani

### Introduction

Garden egg (*Solanum melongena*) is an important fruity/leafy vegetable which is very rich in vitamins and other nutrients essential for healthy living (Omotesho *et al.* 2017). According to Anyaegbu *et al.* (2013) and Nwaiwu *et al.* (2012) garden egg which is most often eaten raw is a good source of dietary fibre, potassium, manganese, copper, vitamin B<sub>6</sub>, magnesium. Ikeh and Akpan (2018) asserted that garden egg is an economically important crop and one of the leading fruit and leafy vegetables in the farming systems of southeastern Nigeria. Nutritionally, garden egg contains 92.7% moisture, 1.4% protein, 1.3% fibre, 0.3% fat, 0.3% minerals, carbohydrates (6%), vitamins B<sub>6</sub> and B<sub>1</sub>, niacin and magnesium (Omotesho *et al.*, 2017; Oreoritse, 2022). Nwaiwu *et al.*, 2012; Anyaegbu *et al.* 2013; Onu *et al.* 2022) also argue that some medicinal properties are attributed to the roots, fruits and leaves as they are used to treat colic and blood pressure *etcetera*. Garden egg is probably the third most consumed fruity vegetable in Nigeria and Ghana, after

pepper and tomatoes (Mangan *et al.* 2017). Virtually every Nigerian and most especially Enugu State indigenes consume both the fruits and leaves, making it as popular as tomatoes and peppers in Nigerian diets. Akinrinola and Odedokun (2020) assert that to the Igbos of the South-eastern Nigeria, the fruit can be used as a substitute for kola (*Colasp*) nut for entertaining visitors and plays a key role in ceremonies. Hence garden egg, especially the fruit, is well cherished and sought for in the South-eastern Nigeria.

Anyaegbu *et al.* (2013) observed that small scale growers accounted for at least 86% of the production. The authors also argue that male respondents constituted 86% of the farmers. Onu *et al.* (2016) also affirmed that most of their respondents were small scale farmers who cultivated less than one hectare of farm land. However, according to FAO in Agency Report (2020), garden egg farming in Nigeria has taken a great turn towards commercial production for economic purposes. In Enugu State, and especially in Uzo-uwani,

many farmers are engaged in this enterprise, because it is very lucrative. However, the farmers do not have enough resources to engage in large scale production. According to Food and Agricultural Organisation (FAO) in Agency Report (2020) and Usifo *et al.* (2020), the profitability of garden egg farming is very high with more than 50% return on investment. Lawal *et al.* (2020) found garden egg farming to be profitable, with positive relationships between farm size, seed and fertilizer. Factors that affected the yield and net return from garden egg production include farm size, household size and cost of agro-chemicals, farming experience, education, access to credits and number of cultivation practices (Sima and Zakir, 2011; Nwaiwu *et al.* 2012; Onu *et al.* 2016; Omotesho *et al.* 2017). Credit significantly influenced efficiency among cassava smallholder farmers in Southwest, Nigeria Adeosun *et al.* (2022).

Garden egg production is a seasonal enterprise, and mostly cultivated in Enugu State during the rainy season. The dominant cropping system is sole cropping (Anyaegebu *et al.* 2013). It can as well be inter-cropped with other vegetables like tomatoes, pepper, and ground nut *etcetera*. Farmers resort to introduction of different improved garden egg farming technologies such as application of fertilizers, herbicides, high yielding varieties and irrigation facilities so as to increase quantity and quality of output.

The fruits may be pear shaped, round, long or cylindrical, depending on the variety, and can be stored for up to three months by letting it dry (Nwaiwu *et al.* 2012; Mangan *et al.* 2017). There are also various colours of the fruit, depending on varieties, ranging from white, purple, green, light gold *etcetera*. Anyaegebu *et al.* (2013) argues that the big sized green fruit is grown commercially in the Eastern part of Nigeria, while in the savannah zone of the country, the yellow, white and thick green skinned varieties are grown on large scale.

In spite of the economic, nutritional and medicinal importance of garden egg and the resultant high demand, its production in Uzo-uwani L.G.A is daunted with numerous challenges that reduce farmers' productivity, output and income. In fact it is mostly done on small scale basis while a few large farmers exist. The fruits and leaves are popularly consumed, particularly in the South-eastern part of Nigeria which puts it on high demand with the inherent increase in its price in the area. Anyaegebu *et al.* (2013) equally observed that garden egg production in Gwagwalada Area Council, Abuja, Nigeria is dominated by small scale farmers. Majority of the farmers in Uzo-uwani still engage traditional farming methods, and own average farm size of less than one hectare per farmer. According to Omotesho *et al.* (2017), an increase in farm size would increase the production of dry season garden egg. Unavailability of mechanized farming and small farm size would hinder improved quantity and quality yield for greater income to the farmers as well as create insufficient supply. Consequently, the heavy demand for the good outweighs its supply, resulting to high price. According to Anyaegebu *et al.* (2013), constraints identified include

inadequate finance, high cost of chemical fertilizers; and high level of post-harvest losses, poor soil fertility, pests and diseases attacks. Many researchers including (Onu *et al.* 2016; Omotesho *et al.* 2017; Mangan *et al.* 2017; Usifo *et al.* (2020); Oreoritse, 2022) have explored various topics on garden egg production in different geographical locations. However, to the knowledge of the current authors, there has been no information on economics of its production and determinants of yield in Uzo-uwani LGA, Enugu State of Nigeria, which equally prompted the need for this research.

The main objective of this study is the economic analysis of garden egg production in Uzo -Uwani Local Government Area, Enugu state Nigeria while the specific objectives explored the factors that affects garden egg production; measured the costs and returns of the enterprise in the area; identified different types of garden egg cultivated in the study area; and ascertained various types of cropping systems adopted by the farmers.

### ***Hypothesis of the Study***

The hypothesis was stated in the null form as:

**Ho:** Socio-economic characteristics of garden egg producers in Uzo-uwani, Enugu State do not significantly affect the quantity produced.

### ***Methodology***

The study was carried out in Uzo-Uwani Local Government Area of Enugu State, Nigeria. The area lies between latitude 6°55'N and 7°15'N, and longitude 6°30' and 7°00'E (Ali and Asogwa, 2017). It has an area of 855 km<sup>2</sup> and a population of 124,480 (NPC, 2006). The peoples' major occupation is farming with garden egg as one of their chief crops. The amount of rainfall, temperature and the soil texture of the area are good for garden egg production.

### ***Sampling procedure***

Multi-stage sampling technique was adopted for primary data collection from the LGA under study. Nimbo, Umulokpa and Nrobo communities were selected, considering the significant level of garden egg production in these areas. Well structure questionnaire was administered to 20 respondents from each of the communities, bringing the sample size to 60. Data were collected between the months of May and August, 2021.

### ***Data Analysis***

Descriptive statistics, gross margin and (OLS) multiple regressions were used to realize specific objectives. Hypothesis was tested using chi-square statistics.

### ***Model Specifications***

#### ***Cost and Return Analysis***

Net income = TR- TC; TR = P×Q; NR = TR - TC

Where: TR = total Revenue of garden eggs produced

TC= Total Cost of the garden eggs produced

P=Price of the garden eggs produced

Q = Quantity of garden eggs produced

NR = Net Return on garden eggs produced

**OLS Multiple Regressions:** OLS multiple regressions were used to determine farmers' socio-economic factors that influenced quantity of garden egg produced in the study area.

The model is stated implicitly as follows:

$$Y=f(X_1, X_2, X_3, X_4, X_5, X_6, X_7, X_8, X_9, X_{10})+e$$

Where: Y = Quantity of garden eggs produced (kg); X<sub>1</sub> = Gender (dummy: female=1; male=0); X<sub>2</sub> = Education level (years); X<sub>3</sub> = Age of respondent (years); X<sub>4</sub> = Cost of seeds (Naira); X<sub>5</sub> = Access to Credit (dummy: Yes=1, No=0); X<sub>6</sub> = Farming experience (years); X<sub>7</sub> = Farm Size (ha); X<sub>8</sub> = Marital status (dummy: married=1; not married=0); X<sub>9</sub> = Fertilizer (kg); X<sub>10</sub> = Labour (hours); e = Stochastic error term.

## Results and Discussion

### *Socio-economic Characteristics of Respondents*

The result from Table 1 shows that garden egg production in the study area was dominated by male with 58.3%, while the remaining were female (41.7%). This distribution could be due to the degree of labour and energy required for the enterprise. The result corresponds to Anyaegbu *et al.* (2013). The age distribution shows that people between 21-30 years constituted 50.0%, followed by 31-40 (38.3%) and 41-50 (10%). Anyaegbu *et al.* (2013) found similar result in their study. This implies that the enterprise requires farmers in their active and exuberant age, particularly in this study area, where manual labour is mostly adopted. Again, from the result, 41.7% of the household size lies between 1-5 persons, while 58.3% comprise of households with 6 and above. This shows that most of the farmers have moderately large household size, which could be a source of labour to the enterprise. The result also indicates that 75.0% of farmers had no access to extension services, while 25% of them accessed extension services. The implication is that farmers could lack adequate knowledge on the adoption of innovative technologies for greater yield. Similarly, the result also shows that 81.7% of the farmers had secondary education, while 18.3% attained primary level. The farmers in the area are moderately educated. Therefore, they could adopt some innovative approaches to increase output and revenue. Saima and Zakir (2011) Adeosun *et al.* (2022) affirmed that education could positively influence farmers' efficiency level. The result shows that 58.3% of the respondents did not access credit, while 41.7% did. By this result, the farmers could be hindered financially from acquiring more inputs. Furthermore, about 58.33% had experience of 1-10 years, while 33.33% had experience of up to 11-20 years. This shows that many of the farmers had adequate experience in garden egg production, which could positively affect their level of resource use efficiencies. The result also indicated that garden egg production was dominated by small scale farmers (83.3%) who cultivated less than 1 hectare per person. Onu *et al.* (2016) is in line with this finding.

### *Farmers' Socioeconomic Factors that Affect Garden Egg Production in Uzo-uwani LG*

In Table 2, the linear model was adopted and discussed for this study. The Adjusted R<sup>2</sup> (coefficient of determination) was 0.671 implying that 67% of the variations in Y - the quantity of garden egg produced was jointly explained by variations in the explanatory variables. The F-value of 0.000 (p < 01) implies that the overall model has a good fit.

**Gender:** The coefficient of gender shows a positive influence at (p < 0.05) on the quantity of garden egg produced. Garden egg production in Uzo-uwani involves intense manual labour.

**Age:** Age positively influence quantity of garden egg produced with (p < 01). This implies that as age increases, quantity produced increases. However, there is the tendency that as age increases in the long-run, constant and diminishing returns would set in.

**Education:** The result on education is positively significant at (p < 0.01). Indicating that when education changes by one unit, the quantity produced would also change relatively in the same direction. Saima and Zakir (2011) confirms that education has constructive and significant effect on farmers' technical efficiency.

**Cost of Seeds:** Cost of seeds had a negative relationship with production at (p < 0.05). This implies that as cost of seeds increases, quantity produced reduces. This could be as a result of inability of the farmers to procure sufficient seeds required for cultivation due to the increased cost. Saima and Zakir (2011) Nwaiwu *et al.* (2012); Onu *et al.* (2016); & Omotesho *et al.* (2017) corroborate this result.

**Farming experience:** There was a significant positive relationship between farming experience and the quantity of garden egg produced (p < 0.05). This implies that one unit of increase in the years of farming experience will lead to one unit increase in the quantity of garden egg produced, as these actors might have acquired more knowledge on the combination and application of resources. Saima and Zakir (2011) observed the same trend in their study.

**Access to Credit:** Access to loan positively influenced the quantity of garden egg produced in the study area. This implies that both Y and X increase in the same direction. Saima and Zakir (2011) and Adeosun *et al.* (2022) corroborate this finding. Coefficients of farm size, fertilizer and labour were positively significantly at (p < 0.01), (p < 0.01) and (p < 0.05) respectively. This implies that a unit increase in either of them, while holding other variables constant would cause a corresponding increase in the quantity produced. Omotesho *et al.* (2017) found similar result.

### *Result of the Hypothesis Test*

Ho<sub>1</sub>: the null hypothesis which states that socio-economic characteristics of garden egg producers do not significantly affect quantity of garden egg produced was rejected at (p < 0.05).

### *Costs and Returns of Garden Egg Production in the Study Area*

The result on costs and returns shows that total revenue

was ₦110,000.00, while total cost was ₦26,183.46. Net Farm Income (NFI) was ₦83,816.54 realized from the enterprise within the period of study, implying that garden egg production is a profitable business in Uzo-uwani LGA, Enugu, Nigeria. Omotesho *et al.* (2017) and Usifo *et al.* (2020) also found similar results in their specific areas of study.

#### **Varieties of Garden Eggs Cultivated in the Study Area**

The greenish variety was the most cultivated in Uzo-uwani LGA of Enugu State, Nigeria, constituting 50%; followed by whitish round (40%). This suggests that the agro-ecological condition of the study area mostly favours the production of the two varieties, while the demand for them is higher. Anyaegbu *et al.* 2013 corroborates this finding.

#### **Planting Systems adopted by Garden Egg Farmers in the Study Area**

The most practiced planting system was sole cropping with about (50.0%), followed by mixed cropping with (45.0%). Anyaegbu (2013) is in line with this result. This suggests that the crop thrives better when cultivated alone, while it could still perform when intercropped.

#### **Conclusion**

The study explored economics of garden egg production in Uzo-Uwani Local Government Area of Enugu State, and found that garden egg production is profitable; however, the start-up capital outlay for the enterprise may be high. Therefore, there is need for necessary farm inputs, such as improved seedlings, fertilizer, pesticides and credit should be made available to the farmers by relevant government agencies for increased output (all things being equal) this will improve farmers' revenue generation. Garden egg producers in Uzo-uwani in Enugu State should form Farmers' Multipurpose Cooperative Societies so as to wield formidable force for cheaper and easier access to inputs as well as for their produce market penetration.

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**Table 1: Distribution of Respondents according to Socio-economic Characteristics**

Socio-economic variables	Frequency	Percentage (%)
<b>Gender</b>		
Female	25	41.7
Male	35	58.3
<b>Age (Years)</b>		
21-30	30	50.0
31-40	23	38.3
41-50	6	10.0
Above 50	1	1.7
<b>Household size</b>		
1-5	25	41.7
6 and above	35	58.3
<b>Educational qualification</b>		
Primary education	11	18.3
Secondary education	49	81.7
<b>Access to Extension Services</b>		
Yes	15	25.0
No	45	75.0
<b>Access to loan</b>		
Yes	25	41.7
No	35	58.3
<b>Garden egg farming experience (years)</b>		
1 – 10	35	58.33
11-20	20	33.33
21 and above	5	8.33
<b>Farm size</b>		
< 1 hectare	50	83.3
>1 hectare	10	17.7

*No. of Obs. = 60. Source: Field survey, 2021*

**Table 2: Socio-economic Factors that Affect Production: (OLS) Multiple Regressions**

Variables	Linear	Semi-Log <sup>+</sup>	Double-Log
(Constant)	103.954	1942.40	1678.00
Gender	2.49(0.044)**	1.090(0.091)*	1.276(0.076)*
Education	3.01(0.001)***	2.89(0.04)**	1.870(0.082)*
Age	2.15(0.032)**	2.78(0.042)**	3.981(0.05)*
Cost of seeds	-2.03(0.048)**	-2.28(0.060)*	-3.897(0.05)*
Access to credit	2.56(0.028)**	1.22(0.080)*	1.087(0.067)*
Experience	5.754(0.041)**	0.020(0.050)*	0.193(0.082)*
Farm Size	3.23(0.002)***	4.251(0.061)*	3.324(0.081)*
Marital status	5.462 (20.757)	0.039 (0.072)	0.004 (0.065)
Fertilizer	4.01(0.005)***	4.32(0.000)**	0.235 (0.061)*
Labour	0.112(0.041)**	4.3424(0.053)*	0.245(0.081)*
F-Value	0.000***	0.020**	0.022**
R <sup>2</sup>	0.68	0.652	0.629
Adj.R <sup>2</sup>	0.671	0.621	0.618
Std. Error	2.0390	3.2209	3.2064

*Source: Computed from Field Survey, 2021*

*(No. of Obs. = 60). \*, \*\*, and \*\*\* signify significant levels at 10%, 5% and 1% respectively, Numbers in parentheses are standard errors*

**Table 3: Costs and Returns of Garden Egg Production in Uzo-uwani LGA**

	<b>Cost and return items</b>	<b>Mean value (₦)</b>	<b>Total value (₦)</b>
	<b>Total Revenue (₦)</b>	110,000.0	
	Quantity of garden egg harvested (kg)	550	
	Unit price per 100kg bag	20,000.0	
<b>A</b>	<b>Total Revenue</b>		<b>110,000.0</b>
	<b>Costs (₦)</b>		
	Cost of garden egg seeds	1711.67	
	<b>Variable Cost:</b>		
	Cost of transportation	3070.18	
	Cost of hired labour	2875.0	
	Cost of fertilizer	3180.0	
	Cost of land (hired for the season)	15000.0	
	Cost of sacks	196.61	
	<b>Cost Of quantity consumed</b>	<b>150.0</b>	
	<b>Total Variable Cost</b>		<b>24,471.79</b>
<b>B</b>	<b>Total Cost</b>		<b>26,183.46</b>
<b>C</b>	<b>Net Returns (A-B)</b>		<b>83,816.54</b>

*Source: Field survey, 2021*

**Table 4: Cultivated Varieties**

<b>Varieties</b>	<b>Frequency</b>	<b>Percentage (%)</b>
Greenish Round	30	50
Whitish Round	24	40.7
Pear-shaped (light gold)	6	9.3
	<b>60</b>	<b>100</b>

*Source: Field survey, 2021*

**Table 5: Cropping Systems Practiced**

<b>Variables</b>	<b>Frequency</b>	<b>Percentage (%)</b>
Sole cropping	30	50.0
Mixed cropping	27	45.0
Crop rotation	3	5.0
<b>Total</b>	<b>60</b>	<b>100</b>

*Source: Field survey, 2021*