Economic Evaluation of Fluted Pumpkin (*Telfairia occidentalis*) Production Among Women Farmers in Awka South Local Government Area, Anambra State, Nigeria

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Abstract
This study examines the economic performance of fluted pumpkin production among women farmers in Awka South Local Government Area of Anambra State, Nigeria. Specifically, it investigates their socioeconomic characteristics, the profitability of the enterprise, the external factors influencing income levels, and the challenges encountered in production. A multistage sampling procedure was employed, and data were obtained through structured questionnaires administered to 150 women engaged in fluted pumpkin farming. Analytical techniques such as descriptive statistics, budgetary analysis, least squares regression, and a three-point Likert scale were applied. Findings indicate that the women farmers had an average age of 45 years, household size of 11 persons, farm size of 1.3 hectares, 13 years of farming experience, and an average monthly income of ₦31,500. The net farm income was estimated at ₦42,870, while the return on investment (ROI) stood at 1.66, implying that every ₦1 invested generated a profit of ₦1.66. Key socioeconomic factors influencing profitability included age, education level, farm size, farming experience, source of labor, and monthly income. Major production challenges reported were high labor costs, poor storage facilities, limited access to credit, land acquisition difficulties, high seed costs, low yields, and the prevalence of pests and diseases. The study recommends that government and financial institutions should design flexible loan schemes tailored for women farmers to enable them expand production and cover input costs. And also, there should be provision of quality seeds, fertilizers, and agrochemicals at subsidized rates would reduce production costs and enhance yields.

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1. Introduction

Agriculture remains a vital sector of the Nigerian economy, providing employment opportunities for more than 60 percent of the population, particularly in rural areas (Akalonu, 2017) [2]. The sector is broadly divided into four major subsectors: aquaculture, forestry, fisheries, and crop production (Obianefo *et al.*, 2019; Anumudu *et al.*, 2020) [10, 4]. Within crop production, vegetable farming is one of the most common enterprises, especially among women. Fluted pumpkin (*Telfairia occidentalis*), an edible leafy and seed vegetable, is widely cultivated across southern Nigeria.

Scholars such as Ndor *et al.* (2013) [8] and Obinaju and Asa (2015) [13] have emphasized that fluted pumpkin is a rich source of micronutrients that play an essential role in human diets. According to Enete and Okon (2010) [5], the vegetable enhances disease resistance, while Aiyelaagba and Kintomo (2002) [1] reported its high antioxidant, hepatoprotective, and antimicrobial properties. Okorji *et al.* (2012) [17] described the leaves as a highly valuable complementary food that supports human health more significantly than many animal-based foods. The tender leaves and immature seeds are often cooked and consumed as vegetables, and they can also be prepared with okra or melon seed (*Citrullus lanatus*) (Odiaka, 2001; Grubben & Denton, 2004; Obinaju &

Asa, 2015) [7, 13]. Farmers engaged in fluted pumpkin cultivation contribute meaningfully to Nigeria's gross domestic product (GDP) and national food security. A thriving market system in this enterprise not only sustains farm incomes but also supports public health and overall economic productivity (Okorji *et al.*, 2012) [17]. Several studies, including those by Obinaju and Asa (2015) [13], Nwosu *et al.* (2013), Girei *et al.* (2017) [6], and Ogisi *et al.* (2014), confirm that fluted pumpkin production is highly profitable and requires relatively low startup capital, demonstrating the viability of the enterprise.

Vegetable production is predominantly practiced by women, whose contributions to agricultural production, processing, marketing, and distribution are often undervalued. Akalonu (2017) [2] estimated that women provide about 70 percent of the agricultural workforce in Nigeria. Their involvement spans multiple subsectors, including food production, processing, fisheries, fruit and vegetable farming, and marketing. Despite this, women farmers often face significant challenges such as unfavorable weather conditions, pest and disease infestations, scarcity and high costs of inputs, limited access to credit, poor market sales, and inadequate storage facilities (Obiekwe & Ugwumba, 2016) [11]. Additionally, studies by Obinaju and Asa (2015) [13], Anozie *et al.* (2017) [3], and Onoh *et al.* (2016) indicate that factors such as marital status, education, farming experience, farm size, and labor availability significantly influence women's productivity.

In view of these challenges, this study investigates the economic performance of fluted pumpkin production among women in Awka South Local Government Area (LGA) of Anambra State. The specific objectives are to: identify the socioeconomic characteristics of women in fluted pumpkin production; ascertain the profitability of the enterprise; determine the exogenous variables affecting the women's profit, and examine the challenges facing women fluted pumpkin farmers in the area.

2. Methodology

Research design

This study adopted a descriptive survey design. Survey research design is one in which a group of people or items is studied by collecting and analyzing data from only a few people or items considered to be representative of the entire group.

Study Area

Awka South Local Government Area (LGA) is one of the twenty-one LGAs in Anambra State, Nigeria. It serves as the administrative headquarters of the state capital, Awka. The LGA lies between latitudes 6°10′N and 6°15′N, and longitudes 7°05′E and 7°10′E. It is bordered by Awka North LGA to the north, Anaocha LGA to the south, Njikoka LGA to the east, and Idemili North LGA to the west.

The area has a tropical wet-and-dry climate characterized by two distinct seasons: the rainy season, which spans from April to October, and the dry season, which lasts from November to March. Annual rainfall ranges between 1,500 mm and 2,000 mm, while average temperature ranges from 26°C to 30°C, conditions that are favorable for the cultivation of vegetables and other crops.

Awka South has an estimated population of over 189,000 people (NPC, 2006 projection), with a high population density typical of southeastern Nigeria. The people are predominantly Igbo and are engaged in diverse occupations including civil service, petty trading, artisanship, and farming. Agriculture, particularly crop production, remains an important activity, with farmers cultivating crops such as yam, cassava, maize, cocoyam, and vegetables including fluted pumpkin.

The LGA is also known for its vibrant markets, which provide avenues for the marketing and distribution of agricultural produce. Its proximity to urban centers enhances access to input supplies, extension services, and consumer markets, making it a strategic location for the study of fluted pumpkin production among women farmers. The LGA has nine communities which are; Amawbia, Awka, Ezinato, Isagu, Mbaukwu, Nibo, Nise, Okpuno, and Umuawulu. The Nigerian Population Commission (NPC, 2006) reported that the total population of the LGA in the last census was 189,049 people. The LGA cover a land mass of 170km^2 and density of 1476km^2. Geographically, the LGA is located on latitude 06^{o}11.434^{l}N and 06^{o}11.643^{l}N and longitude 07^{o}3.619^{l}E and 07^{o}3.691^{l}E. The mean annual rainfall ranges from 1500-2500 mm.

Population of the study

The population of the study were all the registered women fluted pumpkin farmers (1,310) in Awka South Local Government Area of Anambra State.

Sampling procedure and Sample Size

A multi-stage sampling technique was adopted to randomly select a cross section of 150 women involved in fluted pumpkin farming. In stage one, five communities (Nibo, Mbaukwu, Okpuno, Umuawulu, and Nise) were purposively selected due to the dominance of women involved in the enterprise. In stage two, three villages were randomly selected to make it a total of fifteen (15) villages. Finally, in the last stage, 10 women engaged in fluted pumpkin farming were randomly sampled to make it a total of 150 farmers for the study.

Model Specification

The multiple regression analysis was used to determine the relationship between socio-economic characteristics of the farmers and their production output. The model is specified as:

PDO =f (AGE, HHS, EDL, FE, MS, MI, POC, SOL, OF, FS; e).

The explicit version of the linear form of the multiple regression model which will be tried with the data at 5% level of significance is given as:

$$PDO = \beta_0 + B_iAGE + \beta_iHHS + \beta_iEDL + \beta_iFE + \beta_iMS + \beta_iMI + \beta_iPOC + \beta_iSOL + \beta_iOF + \beta_iFS + e$$

Where:

PDO = Production output (in Naira)
AGE = age of the women (in years)
EDL = educational level (dummy: no formal education = 1, primary =2, secondary =3, tertiary =4)
HHS = household size (in number)
FE = farming experience (in years)
MS = marital status (dummy: single =1; married =2, widowed =3)

MI = monthly income (in Naira)
FS = in hectare
POC = Primary occupation (dummy: civil service =1, farming =2, artisan =3, trading =4)
SOL = Source of labour (dummy: family =1, hired =2)
OF =Ownership of farmland (dummy: free hold =1, family =2, community =3, leasehold =4)
β_i = parameters to be estimated
β_0 = constant
e = error term.

3. Results and Discussions

Socioeconomic Characteristics of women fluted Pumpkin Producers

Table 1 reflect the summary statistics of the socioeconomic characteristics of women farmers of fluted pumpkin, the study revealed that the average age, household size, farm size, farming experience, and monthly income were approximately 45 years, 11 persons, 1.3 ha, 13 years, and N31,500.00 respectively. It was also discovered that majority (78.33%, and 71.67%) of the women are married, and has fluted pumpkin and other agricultural activities as their primary occupation. Furthermore, the majority (81.67%, 66.67%) of the women use hired labour, and lease land respectively.

Table 1: Socioeconomic characteristics of farmers

Variable	Frequency	Percentage (%)	Mean
Age (years)			
20-29	15	10	
30-39	23	15	
40-49	63	41.67	44.5
50-59	40	26.67	
60 and above	10	6.67	
Marital status			
Single	33	21.67	
Married	117	78.33	
Level of education			
No formal education	87	58.33	
Primary	38	25	
Secondary	15	10	
Tertiary	5	3.33	
Household size (person)			
1-5	70	46.67	
6-10	80	53.33	10.5
11-15	0	0	
12 and above	0	0	
Farm size (ha)			
< 0.5	130	86.67	
0.5 – 1	20	13.33	1.3
1.1 - 3	0	0	
above 3	0	0	
Farming experience			
1-5	10	6.67	
6-10	45	30	
11-15	87	58.33	13
16-20	5	3.33	
21 and above	3	1.67	
Primary occupation			
Fluted pumpkin + other activities	108	71.67	
Fluted pumpkin + non-farm activities	43	28.67	
Source of labour			
Family	27	18.33	
Hired	123	81.67	
Ownership of land			
Freehold	50	33.33	
Leased	100	66.67	
Monthly income (N)			
10,000-20,000	12	8.33	
21,000-31,000	87	58.33	31,500.00
32,000-42,000	45	30	
43,000 and above	5	3.33	

***Source*:** Field Survey Data, 2024.

Profitability analysis of fluted pumpkin enterprise

Table 2 reflect the profitability analysis of the women farmer, the study revealed that the total revenue from the production was N4,287,000.00 and the net farm income from fluted pumpkin production was N42,870.0. Also, the return on investment was 1.66, this implies that for every N1 investment, the women will make N1.66. These therefore, means that fluted pumpkin production is profitable in the study area and this assertion is in agreement with Obiekwe and Ugwumba, (2016) [11]; Girei *et al.*, (2017) [6] who opined that fluted pumpkin production is a profitable venture.

Table 2: Profitability analysis of fluted pumpkin enterprise

Variables	Amount (N)	Percentage
A. Fixed cost		
Machete	122,000.00	6.80
Hoe	108,875.00	6.07
Wheel barrow	675,000.00	37.65
Rent on land	712,500.00	39.74
Basket/pan	116,250.00	6.48
Kitchen knife	58,250.00	3.25
Total fixed cost (TFC)	1,792,875.00	100.00
B. Variable cost		
Labour	1,605,000.00	65.59
Seed	541,625.00	22.13
Fertilizer	209,125.00	8.55
Agro-chemicals	59,450.00	2.43
Transportation	32,000.00	1.31
Total variable cost (TVC)	2,447,200.00	100.00
Returns		
Total output/field (kg)	6,430,500.00	
Average output (kg)	42,870.00	
Average price/kg	100.00	
Total revenue	4,287,000.00	
Total cost (TC = TVC + TFC)	4,240,075.00	
Gross margin (GM = TR - TVC)	1,839,800.00	
Net Farm income (NFI = TR-TC)	46,925.00	
Return on investment (ROI = NFI/TC)	1.66	

Source: Field Survey Data, 2024.

Influence of socioeconomic characteristics on women's profit from fluted pumpkin

Table 3 reflect the influence of socioeconomic characteristics on women's profit from fluted pumpkin, ordinary least square regression model was used to analyze the influence. The coefficient of multiple determinant (R^2) was 0.561 implying that 56.1% variation in dependent variable (profit) was explained by the joint action of the independent variable (socioeconomic characteristics), while the remaining 43.9% was as a result error beyond the control of the women farmers. The coefficient of age (72.004) was positive and significant at 0.01 alpha level of probability, this implies that a unit increase in the age of women will increase their profit from the production of fluted pumpkin by 72.004 unit. This finding is in agreement with Anozie *et al.*, (2017) [3]; Okonkwo-Emegha, (2021) [15]. The coefficient of level of education (193.331) was positive and significant at 0.05 alpha level of probability, this implies that a unit increase in the level of education of women farmers will increase their profit from fluted pumpkin farming by 193.331 unit. This finding was in agreement with Onoh *et al.*, 2016. The coefficient of farm size (1949.11) was negative and significant at 0.05 alpha level of probability, this implies that unit increase in the number of women farmers with smaller farm size will reduce their profit from fluted pumpkin farming by 1949.11 unit. This finding was in line with the assertion of Onoh *et al.*, 2016. The coefficient of farming experience (173.961) was positive and significant at 0.1 alpha level of probability, this implies that a unit increase in the women farmers experience will increase their profit from fluted pumpkin by 173.961 unit. This finding was in line with the a priori expectation hence age and experience are positively related. This finding is in agreement with Obinagu and Asa, (2015) [14]; Okonkwo-Emegha, et.al. (2020) [15].

The coefficient of source of labour (90.388) was negative and significant at 0.5 alpha level of probability, this implies that a unit increase in the number of hired labour employed will reduce the profit of women farmers by 90.388. This was expected by a priori expectation as most farming household in developing countries do not pay for family labour. The coefficient of monthly income (1584.47) was positive and significant at 0.05 alpha level of probability, this implies that a unit increase in the women farmers' income by a unit will increase their profit by 1584.47 unit. Thus, the study reveals that the socioeconomic variables that influence women's profit were age, level of education, farm size, farming experience, source of labour, monthly income.

Table 3: Influence of socioeconomic characteristics on women's profit from fluted pumpkin

Socioeconomic Variables	Coefficient	Standard error	Significance
Age	72.004	23.437	0.004***
Marital status	25.201	6.892	0.452
Level of education	193.331	18.091	0.022**
Household size	21.421	4.291	0.511
Farm size	-1949.11	13.731	0.046**
Farming experience	173.961	14.209	0.058*
Primary occupation	7.923	1.737	0.245
Source of labour	-90.388	1.035	0.034**
Ownership of land	10.059	2.253	0.110
Monthly income	1584.47	9.146	0.019**
R^2	0.561		
N	150		

Source: Field Survey Data, 2018.

Constraint to fluted pumpkin production in the study area

Table 4 reflect the challenges facing women fluted pumpkin farmers in Awka South LGA, the study use mean threshold from three point Likert type scale to analyze the data from the field, after the analysis; variables with a mean threshold of 2.0 and above was positive and strong in decision making as it poses serious challenge to the women in fluted pumpkin farming. Those with a mean threshold less than 2.0 were negative and weak for decision making. The study had a grand mean of 2.29 which means the challenges identified really affected the women. The challenges identified were; high cost of labour, poor storage facility, inadequate funding, and problems of land acquisition, high cost of seed, poor yield, pest and disease.

Table 4: Constraint to fluted pumpkin production in the study area

Sn.	Constraints	Very serious	Moderately serious	Not serious	Mean	Rank
1	High cost of labour	100	50	0	2.67	3rd
2	Poor storage facility	89	60	1	2.59	4th
3	Poor sales	10	40	100	1.40	8th
4	Inadequate funding	128	22	0	2.85	1st
5	Problem of land acquisition	89	40	21	2.45	5th
6	High cost of seed	48	64	38	2.07	7th
7	Poor yield	90	35	25	2.43	6th
8	Pest and disease	116	34	0	2.77	2nd
9	Soil erosion	0	52	98	1.35	9th
	Grand mean				2.29	

Source: Field Survey Data, 2018.

4. Conclusion

Women provides more labour in agricultural sector especially in the crop production subsector and family farm settings, but these group of labour force have often been neglected especially in policy and decision making in the sector. Vegetable farming is generally associated with women and this enterprise is capable of creating employment and generating income. This study was meant to investigate whether the enterprise is profitable enough to advice women in a place of income diversification. Hence the analysis has further proven that fluted pumpkin production is profitable and in agreement with other researchers' assertions. This finding is not without a grey area as the study revealed that the women are often challenged in the following constraints; inadequate funding, and problems of land acquisition, high cost of seed, poor yield, pest and disease, among others.

5. Recommendation

1. Women especially in the rural areas should be provided with agricultural subsidies to encourage them and reduce money needed for investment into the enterprise.
2. Women should endeavor to organized themselves into a formidable group to enjoy the principles of bulk purchase and reduce the cost of inputs
3. Governmental and non-governmental agencies should help to develop more lands for the women especially where traditional policy did not give women access to land.

6. Refernces

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