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SOCIO-ECOLOGICAL FACTORS AFFECTING PRODUCTIVITY AND PROFITABILITY OF LEAFY VEGETABLES AMONG FARMERS IN ANAMBRA STATE, NIGERIA

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Abstract
This study evaluated factors affecting productivity and profitability of leafy vegetable production in Anambra State, Nigeria. Primary data were collected from 150 respondents selected through multistage sampling procedure. Data were analyzed using descriptive statistics and Ordinary Least Square (OLS) regression model. Results show that sex, farm size, quantity of fertilizer and farming experience positively and significantly increased productivity of leafy vegetable farmers while quantity of fertilizer, distance from the water body and land acquisition negatively and significantly increased profitability of leafy vegetable production. High cost of inputs (fertilizers, agrochemicals), high cost of labour, poor visit by extension agents, inadequate finance, poor access to credit/capital, poor or bad road, low market price, price instability, transportation problem, low sales, attack of pest and disease, lack of market, storage problem, damages (high perishability of products), lack of pumping machine, and inadequate land for production and erosion hazard/climate change were constraints faced by leafy vegetable farmers in the study area. It was recommended that government should provide subsidy for farmers to enable them to acquire some necessary farm inputs such as; fertilizer and irrigation facilities. Farmers should be encouraged by agricultural development programmes to form groups/cooperatives to enhance access to farm inputs. Vegetable farmers should site their farms considering fertility of the soil and water availability as the most important factor.

Key Words: *Leafy vegetables, Profitability, Productivity, Socio-ecological factors, Anambra State*

Introduction

Leafy vegetables came from a very wide variety of plants and they are plants with edible leaves (Duma *et al.*, 2014). Leafy vegetables may be cool-season or warm-season crops and can be grown as annuals or as perennials. The increase in the demand for leafy vegetable has resulted in their all year round production and availability (Chubike *et al.*, 2013). In addition, some leafy vegetables are adapted to the tropics, while others are adapted to the temperate climates. Therefore, some of the important tropical leafy vegetable types that are cultivated and marketed extensively in Nigeria, especially in the South-eastern region include: *Vernonia amygdalina* (Bitter leaf/Onugbu), *Talinum triangulare* (Waterleaf/gbolobi), *Telfairia*

occidentalis (fluted pumpkin leaf), *Amaranthus esculentus* (Green or African spinach/Inine), *Gnetum africanum* (Okazi), *Pterocarpus soyauxii* (Camwood leaf or Oha), *Pterocarpus santalinoides* (Nturukpa), *Ocimum grattisimum* (Scent leaf), *Murraya koeningii* (Curry leaf), *Gongronema latifolium* (Bushbuck or Utazi), *Solanum nigrum* (Garden egg leaf), *Piper guineense* (Black pepper or Uziza), *Curcubita pepo* (Pumpkin or vegetable marrow leaf) and *Panicum maximum* (Guinea grass) (Chubike *et al*., 2013).

The worldwide production of vegetables has increased tremendously and the value of vegetables have gained more acceptance in the global trade, the value now exceeds that of cereals (Schreinemachers *et al.*, 2018). In the tropics, leafy vegetables are among the major food crops widely cultivated and forms an important part of the livelihood of the people (Ukpong and Idiong, 2013). In addition, these plants have contributed significantly to the household food security and added variety for good health to cereal-based staple diets in the tropics (Oulai *et al.*, 2014) aimed at achieving Sustainable Development Goals 2 and 3. These prompted the need to investigate socio-ecological factors that influence both the productivity and profitability of leafy vegetables in the study area.

Production of vegetable in Nigeria has been on-going for decades providing employment and income for the increasing population especially during the long dry season (Elizabeth and Zira, 2008) aimed at achieving SDG goal 1 therefore leafy vegetable production activities such as cultivation and marketing are profitable and economically sustainable. It has the potential for providing employment as well as raising the level of income of farmers and standard of living (Akaegbusi, 2002) . In recent time, Anambra State vegetable production sector has gained satisfactory achievements in domestic consumption and exportation of vegetables as it became the first state in Nigeria to export leafy vegetables valued at $5million to Europe (Vanguard newspaper, 2016).

Despite the importance of vegetables in providing essential vitamins, minerals, and other nutrients, the daily consumption of vegetables is insufficient in Nigeria (Olatona *et al.*, 2018). According to FAO report 2017, 12.4% of the households in Nigeria consume leafy vegetables, and 16.3% consumed non-leafy vegetables, at least once or twice per week. In Nigeria, the availability of vegetables is insufficient to meet the recommended levels of intake of 400g per day (FAO, 2017). Additionally, a study in 2018 reported that vegetables production for Nigeria was 16.4 million tonnes. Between 1969 and 2018, vegetable production of Nigeria grew substantially from 2.87 million to 16.4 million tonnes rising at an increasing annual rate that reached a maximum of 20.89% in 2014 and then decreased to -0.12% in 2018 (Knoema, 2018). Vegetables should be produced throughout the season of the year to meet the growing demand. Crop yields are influenced by climate, soil type, and numerous decisions that farmers make each year regarding fertilizer use, weed and pest management, crop and varietal choice, tillage and many other factors. It is also widely accepted that both environmental factors outside the control of farmers and landscape characteristics can influence yields (Grab *et al.*, 2018). Therefore, this study focused on the factors affecting productivity and

profitability of major leafy vegetables in the study area with emphasis on; *Vernonia amygdalina* (Bitter leaf) and *Telfairia occidentalis* (fluted pumpkin leaf). However, from preliminary investigation, there are little or no information that studied factors affecting leafy vegetable productivity and profitability in Anambra State. Kelechi and Dorothy (2015), analyzed the economics of tropical leafy vegetables in the South East of Nigeria among rural women farmers. Nwalieji and Ajayi (2009), studied the impact of the Anambra State Fadama project phase-1 on the socio-economic life of the rural vegetable farmers. However, notwithstanding some studies on vegetable production and productivity, studies on socio-ecological factors influencing productivity and profitability that could guide evidence-based policy on boosting vegetable production are lacking. Hence the questions are: Which socio-ecological factors influence leafy vegetable productivity? Which socio-ecological factors influence leafy vegetable profitability? What factors constrain leafy vegetables production in the study area. This study, therefore evaluated the socio-ecological factors influencing productivity and profitability of leafy vegetable production in Anambra State, Nigeria.

Methodology

Study Area

Anambra state of Nigeria is one of the 36 States of Nigeria. Located in the South-Eastern parts of the Country, it is situated between Latitudes 5° 32′ and 6°45′N and Longitude 6°43′ and 7° 22′E respectively. With an estimated land area of 4,865km^2 or 486,500ha, the State is varied in terms of topography, population distribution and regional development. Created in 1991 from the old Anambra State, which has now been split into Anambra, Enugu and Ebonyi States. It has 21 Local Government Areas and about 177 Communities (ANSG, 2000). According to the National Population Commission (2010), the State has a population of 4,182,032 in 2006.

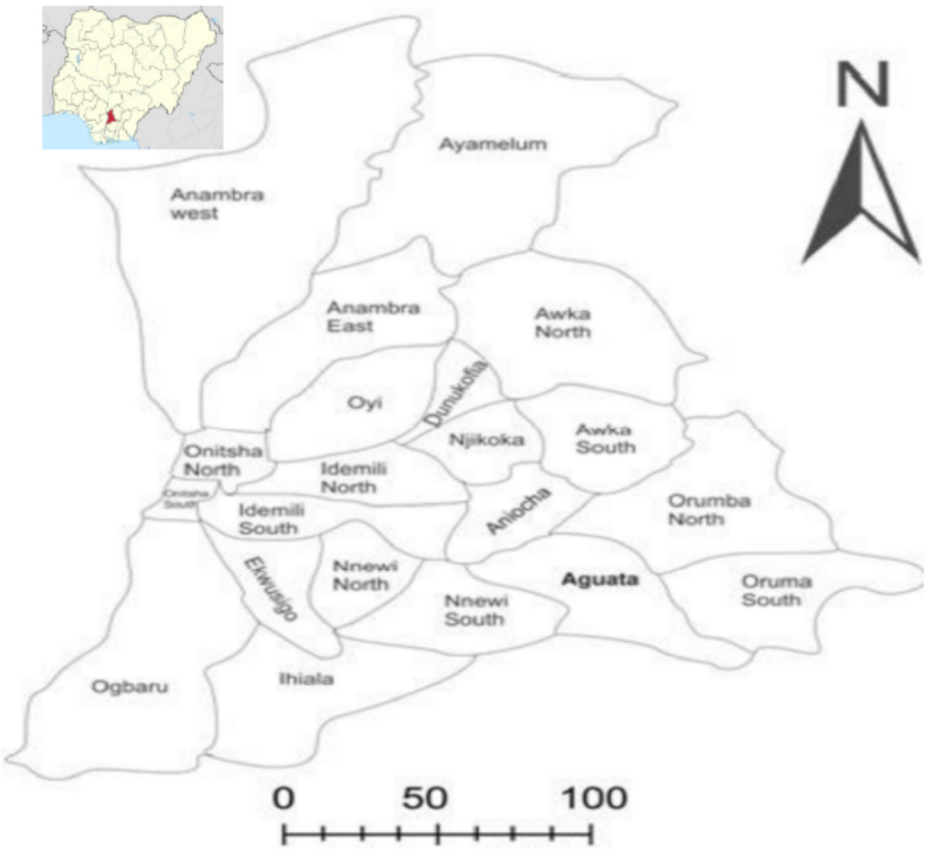

Fig. 1: Map of Anambra State, Nigeria showing the Local Government Areas of Anambra State

Data Collection

Multi-stage sampling techniques were used to select 150 respondents for the study. In the first stage, four Local Government Areas namely; Idemili North, Anambra West, and Ayamelum were purposively selected (high intensity of leafy vegetable production due to the presence of tributaries). In the second stage, five (5) villages were randomly selected from each of the LGAs to give fifteen (15) villages. Lastly, at the village level, ten (10) farmers were selected randomly from each village giving a total of the one hundred and fifty (150) respondents for the study. Primary data were generated by using a set of structured, pre-tested and validated questionnaire. Frequency, Means, Percentage, and Ordinary Least Square (OLS) regression model were used for the analysis. Output per hectare was used as a proxy for productivity.

The determinants of productivity of leafy vegetables measured by a p were evaluated using multiple regression analysis. The model was explicitly expressed as;

$Y_i = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 \ldots\ldots\ldots\ldots \beta_n X_n + e_i$

Where:

Yi = represents the output per hectare of vegetables produced (Kg)

β_0 = constant

β_1 - β_{18}= parameter estimates

X_1-X_{18}= explanatory variables

e_i = error term

X_1= Sex of the farmer (1 if male; 0 otherwise)
X_2 = Age (years)
X_3 = Education level of farmer (Years spent in school)
X_4 = Distance to market (Kilometres)
X_5 = Farm size (hectares)
X_6 = Fertilizer quantity (kilograms)
X_7 = Distance to water body (Kilometres)
X_8 =Erosion disturbance (Yes=1; 0 otherwise)
X_9 =Land acquisition (Inheritance/Community share/Gifts from friends and relations=1; 0 otherwise)
X_{10} = Cooperative society membership (Member=1; 0 otherwise)
X_{11} = Prevalence of pest and diseases (Yes=1; 0 otherwise)
X_{12} = Topography (flat=1; 0 otherwise)
X_{13} = Soil Type (loam= 1; 0 otherwise)
X_{14} = Sunlight intensity (high=1; 0 otherwise)
X_{15} = Rainfall duration (high=1; 0 otherwise)
X_{16} = Farming experience (years)
X_{17} = Access to credit by farmer (1 if access; 0 otherwise)
X_{18} = Household size (number of persons)

Factors influencing Profitability of Vegetable Farmers

Evaluation of the determinants of the profitability of vegetable farmers was conducted using multiple regression analysis. Gross margin per hectare was used as a proxy for profitability. The model is specified as:

$Y_i = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 \ldots\ldots\ldots \beta_n X_n + e_i$

Where:
Y_i = is profitability of vegetable production, measured by gross margin per hectare
β_0 = constant
β_1 - β_{18} = estimated coefficients of the explanatory variables
X_i = explanatory variables
e_i = error term
X_1= Sex of the farmer (1 if male; 0 otherwise)
X_2 = Age (years)
X_3 = Education level of farmer (Years spent in school)
X_4 = Distance to market (kilometres)
X_5 = Farm size (hectares)
X_6 = Fertilizer quantity (kilograms)
X_7 = Distance to water body (Kilometers)
X_8 = Erosion disturbance (Yes =1; 0 otherwise)
X_9= Land acquisition (Inheritance/Community share/Gifts from friends and relations=1; 0 otherwise)
X_{10} = Cooperative society membership (Member=1; 0 otherwise)
X_{11} = Prevalence of pest and diseases (Yes=1; 0 otherwise)
X_{12} = Topography (flat=1; 0 otherwise)
X_{13} = Soil Type (loam=1; 0 otherwise)
X_{14} = Farming experience (years)
X_{15} = Access to credit by farmer (1 if access; 0 otherwise)
X_{16} = Household size (number of persons)

Gross Margin Analysis

This evaluates the costs and returns of an individual enterprise. The gross margin per hectare was estimated using the following relationship:

$GM = TR - TVC$
$TR = Y_m * P_m$
Where:
GM = Gross margin (₦/ha)
TR = Total revenue (₦/ha)
TVC =Total Variable Cost (₦/ha)
Y_m = Output of vegetable (kg/ha)
P_m = Unit price of vegetable (₦)
$TVC = \Sigma P_i X_i$
Where:
P_i = unit price of the ith input (₦)

X_i = quantity of the ith input per hectare.
Σ = summation sign Output was measured in kilograms.

Likert Scale Rating Technique

The perceived constraints weighted include lack of pumping machine, lack of storage/processing facilities, high cost of fertilizer (inorganic manure), high cost of organic manure, lack of transportation facilities, access to credit, access to extension services, prevalence of pest and diseases, erosion hazards, marketing agreement and high cost of labour. A 4-point rating scale was used in this work to determine the perceived impediments to improved vegetable production in the area.

The rating was in the order: Very Serious (VS), Serious (S), Less Serious (LS), and Not Serious (NS) with corresponding values of 4, 3, 2, and 1 respectively. The mean score of respondents based on the 4-point rating scale was computed as;
(4+3+2+1)/4 = 2.5 cut off point

Using the interval scale of 0.05, the upper limit cut-off point was 2.50 + 0.05 = 2.55 while the lower limit cut-off point was 2.50 – 0.05 = 2.45. Based on this, any mean score below 2.45 (ms< 2.45) was taken as Not serious or Disagree as the case may be while those items with mean values between 2.45 and 2.55 was considered as Serious or Agree as the case may be (2.45< ms< 2.55). Finally, any means greater than 2.55 (ms >2.55) was considered Very Serious or Strongly Agree as the case may be.

Results and Discussion

Data Description

The result of descriptive statistics of the socioeconomic variables used in the analysis is presented in Table 1 below. Some of the variables measured household characteristics expected to influence productivity and profitability of leafy vegetables. These include household size, age, gender of the household head and primary occupation etc.

Table 1: Assignment and descriptive statistics of variables

Variables	Mean	Standard deviation	Minimum	Maximum
Age	37.4	15.75	14	65
Years spent in school	11.24	4.07	0	17
Household size	6.49	1.94	2	10
Dist. From water body	6.2	17.15	0.1	10
Years of Experience	11.25	7.97	1	50
Dist. to Market	13.127	25.31	0.5	42
Source of land			1	5
Farm size	3	1.2	0.7	15
Topography			1	4
Soil type			1	4
Frequent Sunlight			0	1
Erosion disturbance			0	1
Pest/Disease Prevalence			0	1
Rainfall duration			0	1
Fertilizer	5.8	7.7	1	50

Factors Influencing the Productivity of Vegetables

The results in Table 2 shows the regression of the socio-ecological factors influencing the productivity of vegetables. Results of the analysis in Table 2 showed that the double-log function had the best fit, and was therefore chosen as the lead equation. The equation of 'best fit' was selected based on its minimal standard error, high F-value and high coefficient of multiple determinations (R^2). The R^2 found was 0.617, implying that 61.7% variation in the productivity of vegetable was jointly explained by variations in the explanatory variables included in the model. The F-value of 1.865 ($p < 0.05$) implies that the overall model had a good fit.

Therefore, the empirical result of the double-log function, the coefficients of gender, farm size, the quantity of fertilizer, and farming experience positively and significantly increased productivity (yield) of the respondents as showed in Table 2. The result of gender could be that men have more access to land and credit than women and this will help to increase the economy of scale thereby improved yield. This agrees with the study of (Dossah *et al*., 2016), that the yield level in vegetable production among female farmers is affected because female farmers are not given the title to land ownership and access funds like male farmers. On the farm size, this result is in accord with (Udoh, 2005), that land as a critical factor in agricultural production. This result on quantity of bags of fertilizer is consistent with the findings of (Umoh, 2006), that fertilizer increases crop yield.

Table 2a: Socio-ecological Factors Influencing the Productivity of Vegetables

Variables	Linear Coefficient (std. error)	t-ratio (linear)	Semi-Log$^+$ Coefficient (std. error)	t-ration (Semi-Log$^+$)	Double-Log Coefficient (Std. error)	t-ratio (Double-Log)
(Constant)	(859.251)	-.735	(1068.707)	-.868	(2.182)	2.672***
Sex	-.102 (183.840)	-.639	.115 (143.808)	.932	.306 (0.294)	2.435**
Age	.153 (7.763)	.689	.113 (255.020)	.569	-.030 (0.521)	-.148
Years spent in school	.010 (358.419)	.066	.031 (287.659)	.249	.009 (0.587)	.068

Table 2b: Socio-ecological Factors Influencing the Productivity of Vegetables continued

Variables	Linear Coefficient (std. error)	t-ratio (linear)	Semi-Log^{+} Coefficient (std. error)	t-ratio (Semi-Log^{+})	Double-Log Coefficient (Std. error)	t-ratio (Double-Log)
Distance to market	.081 (4.077)	.403	.056 (49.644)	.449	.040 (0.101)	.316
Farm size	.131 (14.362)	.699	.401 (63.087)	2.983***	.310 (0.129)	2.266**
Bags of fertilizers	.057 (9.824)	.370	.290 (77.174)	2.361**	.244 (0.158)	1.955*
Distance from water body	.061 (202.790)	.331	.070 (140.873)	.554	-.155 (0.288)	-1.200
Erosion disturbance	-.035 (210.020)	-.193	-.076 (152.566)	-.579	-.147 (0.311)	-1.105
Source of land	-.618 (236.429)	-2.998***	-.316 (149.493)	-2.520**	-.166 (0.305)	-1.305
Membership to cooperative society	.101 (213.882)	.596	-.003 (168.339)	-.022	.121 (0.344)	.937
Pest/ disease prevalence	-.083 (287.885)	-.489	-.135 (215.388)	-1.015	-.160 (0.440)	-1.181
Topography of the soil	.107 (215.049)	.600	.001 (158.968)	.005	-.075 (0.325)	-.559
Soil type	-.186 (265.455)	-.968	-.031 (208.713)	-.193	-.114 (0.426)	-.699
Sunlight	-.035 (379.031)	-.217	-.038 (329.728)	-.304	-.138 (0.673)	-1.098
Rainfall duration	.154 (464.995)	.935	.045 (399.099)	.365	.024 (0.815)	.192
Farming experience	-.103 (15.308)	-.440	.170 (148.360)	.902	.362 (0.303)	1.890*
Access to credit	-.084 (178.316)	-.523	-.071 (136.914)	-.582	-.122 (0.279)	-.980
Household size	.533 (57.309)	2.598***	.169 (189.697)	1.223	-.088 (0.387)	-.621
F-Value	1.146		2.029**		1.865**	

Table 2c: Socio-ecological Factors Influencing the Productivity of Vegetables continued

Variables	Linear Coefficient (std. error)	t-ratio (linear)	Semi-Log^{+} Coefficient (std. error)	t-ratio (Semi-Log^{+})	Double-Log Coefficient (Std. error)	t-ratio (Double-Log)
R^2	0.392		0.437		0.617	
Std. Error of the Estimate	539.43559		493.92801		1.00830	

Dependent Variable: Productivity of vegetables

***, **,** and *** significant at $p \leq 0.1$, 0.05 and 0.01 respectively

Factors Influencing the Profitability of Vegetables

The results in Table 3 show the results of the regression of the socio-ecological factors influencing the profitability of leafy vegetables. Results of the analysis in Table 3 showed that the linear function had the best fit, and was therefore chosen as the lead equation. The equation of 'best fit' was selected based on its minimal standard error, high F-value and high coefficient of multiple determination (R^2). The R^2 was 0.585, implying that 58.5% variations in the gross margin of vegetables were jointly explained by variations in the explanatory variables included in the model. The F-value of 2.509 ($p < 0.01$) implied that the overall model had a good fit.

Therefore, the empirical result of the linear function showed that the coefficients of the quantity of fertilizer, distance from water body and source of land were found to be negative and significantly affecting the profitability of the respondents at 1%, 10% and 10% significant levels as revealed in Table 3. This implied that any increase in these variables would bring about the decrease in profitability of leafy vegetable farmers in the study area. For instance, a unit increase in the bags of fertilizer will lead to decrease in profitability of the leafy vegetable farmers by -0.516 due to increase in cost of production. On the other hand, a unit increase in the distance of vegetable farms from water body will lead to a decrease in the profit of the farmers by -0.231 as a result of more cost incurred in purchasing pumping machine and hose for irrigation. Finally, as more vegetable farmers continue to depend on an inherited land the profitability of the farmer will decrease by -0.327 due to land fragmentation that will limit production and economy of scale.

Table 3a: Socio-ecological Factors Influencing the Profitability of Leafy Vegetables

	Linear Coefficient (Std. error)	t-ratio (linear)	Semi-Log$^+$ Coefficient (Std. error)	t-ratio (Semi-Log$^+$)	Double-Log Coefficient (Std. error)	t-ratio (Double-Log)
(Constant)	(1096463.404)	-.166	(1593669.470)	.158	(12.129)	1.081
Sex	.044 (234592.028)	.329	.139 (214448.666)	1.118	.131 (1.632)	.922
Age	.059 (9905.693)	.322	-.049 (380289.438)	-.246	-.022 (2.894)	-.098
Years spent in school	.182 (457367.417)	1.434	.170 (428960.776)	1.360	.078 (3.265)	.550
Distance to market	-.017 (5203.045)	-.099	-.033 (74030.075)	-.259	-.042 (0.563)	-.290
Farm size	.016 (18327.348)	.102	.222 (94076.393)	1.636*	-.095 (0.716)	-.612
Bags of fertilizers	-.516 (12536.386)	-4.039***	-.412 (115082.453)	-3.331***	-.317 (0.876)	-2.247**
Distance from water body	-.231 (258774.319)	-1.509*	-.209 (210072.238)	-1.631*	-.126 (1.599)	-.867
Erosion disturbance	.161 (267999.517)	1.079	.118 (227508.304)	.891	.041 (1.731)	.270
Source of land	-.327 (301699.247)	-1.923*	-.300 (222926.684)	-2.376**	-.202 (1.697)	-1.398

Table 3b: Socio-ecological Factors Influencing the Profitability of Leafy Vegetables continued

Variables	Linear Coefficient (Std. error)	t-ratio (linear)	Semi-Log^{+} Coefficient (Std. error)	t-ratio (Semi-Log^{+})	Double-Log Coefficient (Std. error)	t-ratio (Double-Log)
Membership to cooperative society	-.064 (272928.094)	-.454	-.063 (251029.251)	-.495	-.120 (1.910)	-.819
Pest/ disease prevalence	.087 (367360.920)	.624	.017 (321188.796)	.129	-.124 (2.444)	-.813
Topography of the soil	.005 (274416.893)	.035	.090 (237055.917)	.676	-.068 (1.804)	-.447
Soil type	.018 (338738.256)	.116	.064 (311235.871)	.396	-.012 (2.369)	-.064
Sunlight	.175 (483669.704)	1.299	.108 (491695.476)	.865	.054 (3.742)	.382
Rainfall duration	-.100 (593365.869)	-.735	-.141 (595141.592)	-1.132	-.029 (4.529)	-.203
Farming experience	-.054 (19533.914)	-.281	.204 (221235.666)	1.076	.098 (1.684)	.455
Access to credit	-.116 (227543.809)	-.873	.016 (204168.071)	.128	.023 (1.554)	.163
Household size	.057 (73130.787)	.334	-.008 (282878.434)	-.059	-.005 (2.153)	-.032
F-Value	2.509***		1.946**		0.895	
R^2	0.585		0.427		0.255	
Std. The error of the Estimate	688356.71341		736551.98994		5.60559	

Dependent Variable: Profitability of vegetables

***, **,** and *** significant at $p \leq 0.1$, 0.05 and 0.01 respectively

Socio-ecological Constraints/Problems Influencing Productivity and Profitability of Leafy Vegetable Production

Table 4 showed the perceived constraints to the productivity and profitability of vegetable farmers in the study area using a four-point Likert scale. Among these were high cost of inputs (fertilizers, agrochemicals), poor access to credit/capital, poor or bad road, price instability, Poor or bad road network low sales, attack of pest and disease, lack of market, storage problem (High perishability), lack of pumping machine, inadequate land for production and erosion hazard/climate change.

This finding is in line with the study of (Tsoho and Salau, 2012), on profitability and constraints to dry season vegetable

production under Fadama in Sudan savannah ecological zone of Sokoto State, Nigeria that farmers indicated lack of extension advice as one of their major constraint. Elizabeth and Zira (2009), asserted that poor extension visits limit achieving high productivity in vegetable production.

Table 4: Socio-ecological Constraints to Vegetable Productivity and Profitability (their mean and standard deviation)

Factors Under Consideration	Mean	Standard Deviation	Ranks
High cost of inputs (fertilizers, agrochemicals)	3.693*	.6570	1st
Poor access to credit/capital	3.467*	.9348	2nd
Poor or bad road network	3.373*	.9833	3rd
Low access to improved technologies	3.000*	.9586	4th
Attack of pest and disease	2.987*	.9931	5th
Price instability	2.959*	1.1235	6th
Storage problem (High perishability)	2.787*	1.0436	7th
Flooding	2.767*	1.1489	8th
Inadequate Land for production	2.716*	1.2222	9th
Theft	2.227	1.1920	NC
Lack of water/Insufficient water supply	1.904	1.0822	NC
Poor visit by extension agents	2.493	1.0783	NC

*NC (Not a Constraint)

Conclusion

Leafy vegetable farming in the study area is viable but have some factors affecting their productivity and profitability. Gender, farm size, the quantity of fertilizer and farming experience significantly and positively increased the productivity of leafy vegetable farmers, while fertilizer, distance from the water body and land acquisition significantly and negatively influenced the profitability of vegetable production. They were also faced with challenges which hinder their efficiency in leafy vegetable production. Among these were high cost of inputs (fertilizers, agrochemicals), poor visit by extension agents, poor access to credit/capital, price instability, Poor/bad road network, attack of pest and disease, storage problem (high perishability of products), Access to land for production and Flooding.

Recommendation

Based on the findings, the following recommendations were made:

1. Government and agricultural development agencies should provide and regulate farmers' market in terms of subsidies on agricultural inputs. This can be achieved by providing subsidies directly to the farmers or through farmers cooperatives for some necessary inputs for leafy vegetable farmers such as; fertilizer, irrigation facilities, and agrochemicals.
2. Farmers should form production clusters and cooperatives to improve their market intelligence and enjoy economy of scale. In each group the farmers can procure inputs such as

fertilizers in bulk thereby reducing the unit cost. The farmers can also drill borehole together or pump water from a nearby water body.

3. Vegetable farmers should site their farms considering fertility of the soil and water availability as the most important factor.

References

Akaegbusi, J.C. (2002). *Economics of Vegetable Production: A Case Study of Oraukwu in Idemili Local Government Area of Anambra State*. University of Nigeria, Nsukka.

Anambra State Government (2000). Directory of communities in Anambra State. Mimeographed.

Chubike, N.E., Okaka, J.C. and Okoli, E.C. (2013). Evaluation of vegetable consumption in South Eastern Nigeria, 5(June): 57–60. https://doi.org/10.5897/IJNAM2013.0142

Dossah, B.O., Mohammed, I.U. and Ndahi, A.K. (2016). Women in irrigated vegetable production: challenges and opportunities (case study of farmers in Plateau State, Nigeria). *European Journal of Physical and Agricultural Sciences*, 4(1): 26–32.

Duma, M., Alsina, I., Zeipina, S., Lepse, L. and Dubova, L. (2014). Leaf Vegetables as Source of Phytochemicals, 262–265.

Elizabeth, S. and Zira, D.Y. (2009). Awareness and effectiveness of vegetable technology information packages by vegetable farmers in Adamawa State, Nigeria. *African Journal of Agricultural Research*, 4(2): 65–70. Retrieved from http://www.academicjournals.org/AJAR

Food and Agriculture Organization (2017). Balance Sheet Nigeria. Available online: http://www.fao.org/faostat/en/#data/FBS (accessed on 11 November 2019).

Girei, A.A. and Dire, B. (2013). Profitability and technical efficiency among the beneficiary crop farmers of National Fadama II Project in Adamawa State , Nigeria, 1(September): 87–92

Grab, H., Danforth, B., Poveda, K. and Loeb, G. (2018). Landscape simplification reduces classical biological control and crop yield. *Ecological Applications,* 28: 348-355. https://doi.org/10.1002/eap.1651

Kelechi, A.I. and Dorothy, T. (2015). *Economic Study of Tropical Leafy Vegetables in South-East of Nigeria : The Case of Rural Women Farmers*, 2(April 2005): 34–41.Leaf Vegetables - Dictionary definition of Leaf Vegetables _ Encyclopedia. (n.d.).

Knoema Corporation (2018). World atlas. https://knoema.com/atlas/Nigeria/topics/Agriculture/Crops-Production-Quantity-tonnes/Vegetables-primary-production

National Population Commission (2010). Population of the Local Governments in Anambra State. Mimeographed.

Nwalieji, A.H. and Ajayi, A.R. (2009). Farmers' adoption of improved vegetable production practices under the National Fadama Phase One Development Project in Anambra State of Nigeria, 8(18): 4395–4406. https://doi.org/10.5897/AJB08.131

Olatona, F., Sosanya, A., Sholeye, O., Obrutu, O. and Nnoaham, K. (2018). Knowledge of fruits and vegetables, consumption pattern and associated factors among adults in Lagos State, vanguard Nigeria. *Res. J. Health Sci.*, 6: 50–62.

Oulai, P.D., Zoue, L.T., Bedikou, M.E., Megnanou, R. and Niamke, S.L. (2014). Impact of cooking of nutritive and antioxidant characteristics of leafy vegetables in northern. *International Journal of Plant, Animal and Environmental Sciences*, 576–585.

Schreinemachers, P., Simmons, E.B. and Wopereis, M.C.S. (2018). Tapping the economic and nutritional power of vegetables. *Global Food Security*, 16(June 2017): 36–45. https://doi.org/10.1016/j.gfs.2017.09.005

Tsoho, B.A. and Salau, S.A. (2012). Profitability and constraints to dry season vegetable production under fadama in Sudan savannah ecological zone of Sokoto State, Nigeria. *Journal of Development and Agricultural Economics*, 4(7): 214–222. https://doi.org/10.5897/JDAE12.031

Udoh, E.J. (2005). Technical inefficiency in vegetable farms of humid region: an analysis of dry season farming by urban women in south south zone, Nigeria. *Journal of Agriculture and Social Sciences*, 1(2): 80–85.

Ukpong, I.G. and Idiong, I.C. (2013). Maximum Likelihood Estimates and Determinants of Technical Efficiency of Leafy Vegetable Producers in Akwa Ibom State, Nigeria. *Journal of Agricultural Science*, 5(3): 139–145. https://doi.org/10.5539/jas.v5n3p139.

Umoh, G.S. (2006). Resource use efficiency in urban farming: An application of stochastic frontier production function. *International Journal of Agriculture and Biology*, 8(1): 38 - 44.

Vanguard news (2016). Retrievd from https://www.vanguardngr.com/2016/07/anambra-records-5m-vegetable-exports-europe/