

Leafy Vegetable Farmers and their Profit Efficiency during COVID-19 Lockdown in Oyo StateMatthew O. Adio^{1*}, Abel B. Ogunwale², Matthew D. Ayeni³, Wasiu O. Ashaye⁴, Olorunsosgo O. Olugbemiga¹¹Department of Agricultural Economics and Extension, Faculty of Agriculture, Federal University, Oye-Ekiti, P. M. B. 373, Ekiti State, Nigeria²Department of Agricultural Extension and Rural Development, Faculty of Agricultural Sciences, Ladoke Akintola University of Technology, Ogbomosho, P. M. B. 4000, Oyo State, Nigeria³Department of Agricultural Economics and Extension, College of Agricultural Sciences, Landmark University, Omu-Aran, P. M. B. 1001, Kwara State, Nigeria⁴National Center for Agricultural Mechanization (NCAM), P. M. B. 1525, Kwara State, Nigeria**ABSTRACT**

Corona Virus Disease (COVID-19) pandemic and the associated lockdown is a global health emergency with far-reaching consequences on the economy, basic services, and livelihood of the poor and vulnerable including leafy vegetable farmers. This research focused on drivers of profits among leafy vegetable farmers during COVID-19 lockdown in Egbeda Local Government Area Oyo State. Multistage sampling techniques were employed to choose 120 leafy vegetable farmers. Structured questionnaire was designed to gather data and was analyzed using with the aid of descriptive statistics, Gross Margin analysis and Ordinary Least Square regression. Results showed that the mean age of leafy vegetable farmers was 51 years. Majority (83.3%) of the leafy vegetable farmers were married, most (87.6%) were educated with a mean farming experience of 19 years. The Gross Margin result indicated of the farmers involved in leafy vegetable production was ₦573,537.00 which implies that the enterprise is profitable. The determinants of profit among leafy vegetable farmers during COVID-19 lockdown in Egbeda L. G. were educational level (5%), farm size (1%), inputs costs (1%) and cooperative membership (1%). It is therefore, recommended that more effort should be put in place by policy makers and agricultural stakeholders inform of cash assistance, inputs and programs that will help boost farmers production, thereby enhancing profits at any given period of time.

Keywords: COVID-19, Lockdown, Leafy Vegetable, Profit, Regression Analysis

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Copyright: © 2023 Adio *et al.* This is an open-access article distributed under the terms of the [Creative Commons Attribution License](https://creativecommons.org/licenses/by/4.0/), which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.**Introduction**

The COVID-19 pandemic is a global health emergency with significant effects on the economy, essential services, and the way of life of the weak and vulnerable. In Nigeria, the pandemic led to the closure of many Micro and Small Enterprises (MSEs), jobs loss, stalled provision of basic services in poor communities and thereby increasing the population of Nigerians living below the poverty line. Nigeria COVID-19 Action Recovery and Economic Stimulus (Nigeria Cares) (2020). The COVID-19 epidemic had an impact on farm families' livelihoods since they struggled to sell their farm products owing to government-imposed lockdown limitations and to obtain the materials, supplies, and labour needed for their farms to operate at their peak output. Additionally, the deterioration of perishable foods like vegetables, particularly leafy vegetables, had an impact on farm families' revenue. Although the disease's effects on health were minimal compared to worldwide trends, the disease's breakout severely disrupted the livelihood of millions of families in Nigeria, especially rural communities whose livelihoods are vulnerable to changes and emergency situations like COVID-19.¹

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The government of Nigeria implemented a number of steps to stop the disease from spreading, including social distance that prevented mass gatherings, lockdowns of public and private spaces, and movement restrictions. The agricultural activities of rural farm families were disrupted by these measures, making it hard for them to get details on agronomic practices, denying them facts to markets and inputs, which resulted in an increase in input prices, wastage of harvested agricultural produce mostly the perishable among which were vegetables due to problem of transportation, and a decrease in finance to meet up their family's desires, as a result, both their food security and that of the nation were put at jeopardy.²

The value of vegetables as significant along with being effective micronutrients sources in Africans' food intake cannot be overstated. Vegetables are healthy foods because they provide trace amounts of all the nutrients that humans require, including protein, iron, mineral salts, carbohydrates, vitamins, aromatics, colourants, and essential oils that increase human resilience to disease. The average vegetable consumption in poor nations falls below the FAO's (Food and Agricultural Organization) annual recommended of 75 kg. Vegetable production has been going on for years in Nigeria, giving the expanding population work and a living, especially during the protracted dry season. However, insufficient infrastructure, agronomic, and socioeconomic factors limit productivity.³ Additionally,⁴ stated that the production of vegetables is characterised by the use of primitive tools, inadequate inputs, inability to read, and high cost and complicated technology

Vegetables (most especially leafy) are extremely perishable since they begin to lose quality as soon as they are harvested and continue to do so until they are consumed. Vegetable farming is therefore a risky venture. Several factors outside of the farmers' control contribute to

the riskiness of vegetable cultivation⁵. In Egbeda LG, parts of the major challenges encountered by vegetable farmers are listed as inadequate capital, inadequate storage facilities, pest and diseases outbreak (including COVID-19 and associated lockdown) and climatic conditions. Although there has been several studies on vegetable production, most especially on fruits vegetable, some of which are tomato, cabbage and cucumber. There are terse of study on the drivers of profit among leafy vegetable farmers during COVID-19 lockdown, most especially in the study area thereby opening a space to advance the body of knowledge.

Materials and Methods

This research was done in Egbeda Local Government Area (LGA) of Oyo State, Nigeria between January and December, 2022. Egbeda L.G. is a suburban situated in the rainforest agro-ecological zone. It is one of the 33 LGAs in Oyo State, (Figure 1). The headquarters is Egbeda. It is situated to the East and to the North East of Ibadan City, bordered on the west by Irewole LGA which is now located in State of Osun, Nigeria. It lies between latitudes 7°21'N4°3E' and 8°N of the equator. It has a large area of 191.00 km² and a total number of 281,573 people as at the census conducted in the year 2006.⁵ The choice of the location for this study is because Oyo State is ranked among the vegetable growers in the Nation, and in particular leafy vegetable production is prominent in Egbeda LGA of the State. The LGA enjoy massive land with some waterlogged area that favours vegetable production.

Multistage sampling procedure was employed in selection of the samples for this research. Purposive Selection was used to select Egbeda LGA from the 33 LGAs in Oyo State at the first stage due to the high number of leafy vegetable farmers in the LGA in addition to the fact that many green leafy vegetables are grown and thus increasing opportunities for the commercial production of vegetables in the LGA. Secondly, random sampling technique was employed to choose four wards out of the eleven in the LGA notable for vegetable production. At the third stage, two villages in each of the selected wards were randomly selected making a total of 8 villages. Finally, stage involved random and proportionate selection of 15 farming households making a total of 120 leafy vegetable farmers. The list was gotten from the village listing at the Local Government.

Analytical techniques

Descriptive statistics (frequency, mean, percentage), Gross Margin (GM) Analysis, and Ordinary Least Square regression were used to analyse the data collected.

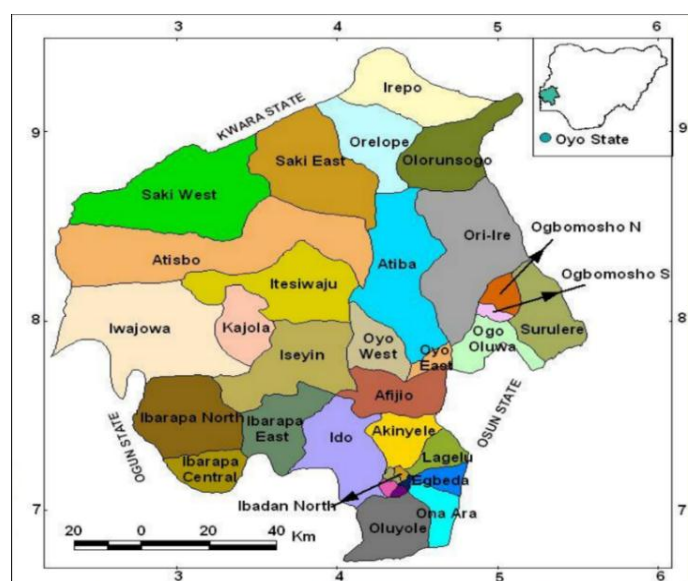


Figure 1: Map showing the delineation of Local Government Areas in Oyo State; Source: ¹⁵

Gross Margin (GM) analysis

For the purpose of the study, gross margin (profitability) analysis was used to assess the cost estimates and returns along the analysis of leafy vegetable by farmers in Egbeda LGA, Oyo state. The gross margin relationship is stated as follows:

$$GM = (TR - TVC)$$

TR = Total Revenue (from leafy vegetable sales)

TVC = Total Variable Costs. These include costs such as seeds, cost of labour, fuel cost, transports costs, fertilizer.⁶

Regression model

Income on leafy vegetable was used as the dependent variable (Y) while other socio-economic variables of the vegetable farmers; age, household size, level of education, sex, extension agent visit, years of farming experience and cost of production was used as the independents variables (X_i)

The multiple regression analysis is stated thus

$$Y = f (X_1, X_2, X_3, X_4, X_5, X_6, X_7 + e)$$

Y = output, X₁ = age, X₂ = educational level (numbers), X₃ = marital status, X₄ = farm size (hectares), X₅ = Input cost, X₆ = cooperative membership, X₇ = farming experience, e = error term

Results and Discussion

Socioeconomic attributes of Leafy Vegetable Farmers

Result of age distribution in Table 1 indicated that the average age of the leafy vegetable farmers was 50.81 years. It is an encouraging result showing that the leafy vegetable farmers are still comparatively active. Moreover, majority (68.3%) of respondents were male, while 31.7% were females. This suggests that men are actively involved in vegetable farming compares to the females. The reason may be due to general saying of the people that vegetable production involves rigorous labour. This result is in conformity with the study of Ogunji *et al.*⁷ The results of the findings also indicated that 83.3% of the farmers in the selected were married, 9.2% are single, 0.8% were divorced while 6.7% are widow. This demonstrates that a greater proportion of farmers growing leafy vegetables are married, which suggests that their wives are more likely to provide effective assistance, make wiser judgments, and take part in a variety of production activities in the research area. This result collaborates the findings of Adebisi, *et al.*,⁸ who revealed that choice by people who are married ease the level of involvement in vegetable farming and as a result reduces the constraint that might surfaced. In addition, the results revealed that 36.7% of leafy vegetable farmers completed secondary school, 16.7% finished primary and secondary school, 25.8% had earned their Ordinary National Diploma and National Certificate in Education, and 9.2% had earned their Higher National Diploma certificate. However, 11.7% of the respondents had not received any formal education and could not read or write. The degree of literacy attained in this study supports the findings⁹ found for vegetable producers in his study on vegetable production, livelihood diversification, and employment creation. Even though the high rate of unemployment in the nation may have contributed to the respondents' high literacy levels, this portends well for the development of farms since farmers will find it easier to read, write, understand, and access credit opportunities as well as comprehend government policy initiatives aimed at boosting farm output, income, and rural welfare.

Profit Efficiency of Leafy Vegetable Farmers

The result of profitability analysis in Table 2 revealed the TR generated was ₦846,237.00 per annum, and the TC of production was ₦467,646.00. GM equals to ₦573,537, while BCR was 1.81. The BCR of ₦1.81, shows that the farmers stand to gain an additional ₦1.81 for every one naira (₦1) spent on vegetable production. If the Benefit Cost Ratio (BCR) is less than one, it results in a loss, when equal to one (1), it is break even, and when greater than one, it indicates profit. The Investment Rate of Return was 80.96%. The Rate of Return on capital investment was analyzed to be high implying that vegetable production in the Egbeda Local Government of Oyo State is a profitable enterprise.

Table 1: Socioeconomic characteristics of the respondents

	F	%		F	%
Age			Experience		
25-35	17	14.2	1-5	12	10.0
36-45	23	19.2	6-10	22	18.3
46-55	41	34.2	11-15	22	18.3
≥56	39	32.5	16-20	24	20.0
Total	120	100	≥21	40	33.3
Mean= 50.81			Mean		
Sex			Land		
Female	82	68.3	Inheritance	40	33.3
Male	38	31.7	Lease/Rent	21	17.5
Marital Status			Gift	4	3.3
Single	11	9.2	Family land	33	27.5
Married	100	83.3	Purchase	6	5.0
Divorced	1	0.8	Borrowed	16	13.3
Widow	8	6.7	Variety		
Education			Jute Leaf (<i>Corchorusolitorius</i>)	60	50
No formal education	14	11.7	Bitter leaf (<i>Vernoniaamygdalina</i>)	15	12.5
Primary	20	16.7	African Spinach (<i>Amaranthushybridus</i>)	25	20.8
Secondary	44	36.7	Water leaf (<i>Talinumtriangulare</i>)	6	5
OND/NCE	31	25.8	Lagos Spinach (<i>Celosia argentea</i>)	14	11.7
HND/University	11	9.2			
Cooperatives Membership					
Yes	55	45.8			
No	64	53.3			
Household size					
1-5	45	37.5			
6-10	71	59.2			
11-15	4	3.3			
Mean	9				

Source: Field Survey, 2022. Note: F = Frequency, % = Percentage

Determinants Profit Efficiency of Leafy Vegetables during COVID-19 Lockdown

The linear regression findings of the estimated model are reported in Table 3. From the model summary, adjusted R² of 0.8623 means 86.23% of the variables in the model are explained, whereas the others are unexplained variables, i.e., 13.77% of which exist in the error term.

From Table 3, the regression result revealed that there are some variables that are significant. Examples are educational level of respondents, farm size, cost of inputs, and membership of cooperative society. The result implied that educational level is positive and significant at 5%, while farm size, cost of inputs as well as cooperative membership are positively significant at 1%. The implication of this is that the more educated the respondents are the more their net income. The findings could be credited to the reality that as a farmer becomes more educated, the more they are exposed and readily adopts new techniques or innovations, and this will lead to greater profit. This resonates with¹⁰ who asserted that education definitely impact farmers' participation in agricultural activities.

At a threshold of probability of 1%, the farm size coefficient was also significant and positive, which suggests an additional boost in size of farm will be accompanied by proportional rise in level of involvement in vegetable production. Larger-scale farmers frequently have greater access to financial resources and financing, enabling them to invest more in farming operations focused on the production of vegetables. This supports the research of,¹¹ that hypothesised that farm size affects participation of farmers in all production (farming) activities. The cost of inputs for vegetable farmers had a positive and significant coefficient of 1%. This suggests that every increase in the inputs used by vegetable growers will result in proportional rise in vegetable production output. This is consistent with¹²'s findings, who believed that increasing the inputs from farming enterprise encourages more farmers' participation level in vegetable production. Cooperative membership was positively significant at 1%. The implication of this is that been a member of cooperative society increases their profit level because of the inherent benefit. The involvement or participation of vegetable farmers in a cooperative society will bring about an increase in their farm income.¹³ opined that vegetable farmers joining or forming cooperatives create avenues through which they acquire loan and invest in storage facilities.

Table 2: Profitability Analysis

Items	Price (₦)
Income generated per annum (A)	846237.00
VC	
Manure cost	15500.00
Vegetable seed	8300.00
Fertilizer	43100.00
Pesticide	56300.00
Herbicide	50000.00
Labour	100,000.00
TVC(B)	₦272,700
FC	
Wheelbarrow	18502.00
Basket cost	19640.00
Hoe cost	7103.00
Matched	5701.00
Land rent	144000.00
TFC (C)	₦194,946
TC D = (B+C)	₦467,646.00
GM E = (A – B)	₦573,537.00
Gross income/net profit E =(E-C)	₦378,591.00
Profit /Net revenue (A- D)	₦378,591.00

Source: Field survey, 2022

Rate of returns in investment = net profit / total cost x 100

 $378,591 / 467,646 = 0.8096 * 100 = 80.96\%$

BCR = TR/TC= ₦846237/ 467,646= 1.81

Constraint Militating against Leafy Vegetable Production

The perishable nature of vegetables creates storage and processing problems from the farm during harvesting to point of sale.¹⁴ The result in 4 is a presentation of the limitations faced as reported by leafy vegetable farmers. Result revealed that major challenge encountered by vegetable farmers included inadequate storage facilities (55.83%), high cost of input (16.7%) which causes an increase in the cost of production, bad road network (35.83%) which often results in mechanical damage of vegetables and flood/erosion (43%) which causes damage to land and thereby reducing the production of vegetable by the respondents and most importantly COVID-19 (45%)

pandemic which necessitated lockdown and prevent farmers from marketing of their produce and eventually resulted into great losses.

Conclusion

This research profiles Leafy Vegetable Farmers and their Profit Efficiency during COVID-19 Lockdown in Oyo State. In accordance to study's findings, leafy vegetable farming is not only feasible but also profitable in the study area. The research revealed that there was good prospects for leafy vegetable production in Egbeda L.G., the entire State and Nigeria, even during the COVID-19 lockdown and the factors that contributed to profit included educational level, size of farm, farm income and farming experience. The study also showed that leafy vegetable farmers are educated in some way, thus any effort to educate them in modern and improve methods of production will translate into a proportional rise in the amount of farmers' participation in leafy vegetable production in the study area. It can therefore be concluded that since vegetables, particularly leafy vegetables are perishable and the deterioration had an impact on farm families' revenue, leafy vegetable farmers should constantly be assisted most especially because of the significant benefit eating more fruits and vegetables as part of a balanced diet lowers the risk of developing various chronic diseases for example COVID-19, which is one of the health benefits of doing so. This study recommends that an encouragement to farmers in growing more vegetable by agricultural stakeholders (Governmental and Non-Governmental Organisation) is sufficient in bridging the gap between demand and supply of food and also a means of cheap source of access to the nutrients the body needs to fight against diseases (COVID-19 and others).

Conflict of Interest

The authors declare no conflict of interest.

Authors' Declaration

The authors hereby declare that the work presented in this article is original and that any liability for claims relating to the content of this article will be borne by them.

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Table 3: Regression Result

Variable	Co-efficient	Std. Err.	p-value	Mfx
Age	-0.308	0.409	0.454	0.452
Educational level	4.743	2.484	0.059**	0.056
Marital status	5.497	4.851	0.260	0.257
Farm size	277.856	50.416	0.000***	0.000
Input cost	0.00031	0.000071	0.000***	0.000
Cooperative membership	27.724	5.545	0.000***	0.000
Farming experience	0.392	0.427	0.360	0.358
Constant	-101.378	19.145	0.000	
Observations	120			
F(7, 110)	98.4			
Prob> F	0.0000			
R ²	0.8623			
Adj. R ²	0.8535			
Root MSE	26.887			

***, **, * Represents 1%, 5% and 10% significant levels respectively

mfx = Marginal Effects after Regression

Table 4: Distribution by Constraint faced by respondents

Constraints	F	%
Inadequate storage facilities	67	55.83
Lockdown arising from COVID-19	54	45.00
Inadequate/bad road network	43	35.83
Flood/Erosion	43	35.83
Inadequate rainfall	20	16.7
Rising cost of Input	20	16.7
Labour availability	13	10.83
Herdsmen invasion	12	10
Farmers Health Challenges	5	4.2
Land Encroachment	5	4.2
Communal Land issues	3	2.5
Total		100

*Multiple Response

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