

Food Security Status and Economic Efficiency of Noiler Producing Households in Abia State, Nigeria

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ABSTRACT

The food security and nutritional status of the most vulnerable population groups is likely to deteriorate further due to the health and socio-economic impacts of the COVID-19 pandemic. It further estimated that between 720 and 811 million people went hungry in 2020. A multistage random sampling technique was adopted in selecting 120 respondents. A well-structured questionnaire was used to collect information from the respondents. The economic efficiency of the respondents was analysed using Tobit regression model data envelopment analysis and the food security status was analysed using food security index. The result of data analysis revealed that extension visits, stock size and feed were the significant factors influencing the economic efficiency of the Noiler households. Forty one of the Noiler farmers recorded economic efficiency of between 70-100% and are said to be economic efficiency. The study area could be regarded as food insecure given the fact that majority of the rural households (63.3%) were food insecure while 36.7% were food secure. There is need to develop agricultural extension services and the inclusion of more farmers under such training programs to enhance efficiency and production level of the farmers also, government should monitor and support feed mills that can produce feeds of the required quality for the industry and at reduced cost.

Keywords: Food security; Nutritional status; COVID-19 pandemic; Economic efficiency; Noiler production; Tobit regression model; Food security index; Agricultural extension services; Feed production

INTRODUCTION

Food security has always been a major problem and a global challenge. The food security and nutritional status of the most vulnerable population groups is likely to deteriorate further due to the health and socio-economic impacts of the COVID-19 pandemic WHO [1]. The Food and Agriculture Organization defined food security as "food that is always available for everyone to eat, supported by the fact that they have access to it; and that it is nutritionally adequate in quantity, quality and variety, that must be accepted in culture. On the other hand, food insecurity is the lack of food security that results from the lack of those situations at different levels, for example, at the domestic, regional and national levels to a stage called "hunger". Globally, due to the lack of food security, the number of malnourished people has increased worldwide. Increasing the food security and income levels of farmers is possible by

increasing the efficiency and productivity of agricultural enterprises [2].

The effort to eradicate hunger, food insecurity, and other forms of malnutrition has been the topic of many studies Xie et al. [3]. Nevertheless, despite recent advances in these areas, many nations, particularly in developing countries like Sub-Saharan Africa, still face significant food insecurity challenges Cheteni, Khamfula, and Mah [4].

United Nations agencies have documented rising levels of severe hunger in the world, affecting 820 million people. More than two billion people suffer "moderate or severe" food insecurity. During the same period, the world is experiencing what Reuters called a "global grains glut," with surplus agricultural commodities piled up outside grain silos rotting for want of buyers, Wise [5].

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The United Nations estimates more than 100 million children fewer than 5 are malnourished and underweight, with about 98 percent of these estimates living in developing countries, including Nigeria. Especially in Nigeria, with a population of over 160 million, over 70 percent of the population is malnourished and suffers from poverty.

Although food security is a problem, Gavrilova opined that the biggest challenges in providing food to the Nigerian population are not only food shortages but also unbalanced diets that lead to many health problems.

According to the International Crisis Group, adding products of animal origin to the diet would help compensate for the lack of animal proteins and balance the protein and energy balance, the violation of which leads to a decrease in immunity and the development of anemia and other diseases in children. The poultry subsector is the fastest source of meat and its production method is the least dangerous and complex compared to other livestock enterprises. Increasing poultry production is therefore one of the surest and fastest ways to close the gap in animal protein consumption between developing countries and developed countries in the world Haruna et al.

According to Ayoola protein deficiency is reflected in the number of eggs Nigerians consume every year. He emphasized that Nigerians consume 70 eggs per person per year while developed countries like China have 370 eggs per person per year. Bridging this gap in protein consumption seems insurmountable given the current financial and technological limitations of our livestock industry. Zuberu et al., reported that poultry meat production as one of the most important sub-sectors of agriculture is an important supplier of zoologically valuable proteins, lipids and vitamins [6].

Despite the fact that Nigeria's agricultural sector employs over 60 percent of Nigeria's agricultural workforce; the country has not met the recently set Millennium Development Goal (MDG) of reducing hunger in the country by 50 percent. The proportion of underweight children under the age of five only decreased from 35.7% in 1990 to 25.5% in 2014, which is 7.6% below the Millennium Development Goal of 17.85%. Figures from the 2016 Central Bank of Nigeria (CBN) Statistical Bulletin showed that the share of agriculture in Nigeria's Gross Domestic Product (GDP) has steadily declined from 37.5 percent in 2002 to 21.2 percent in 2016.

Economic efficiency means choosing the best combination for a given level of output, which is determined by both output and input prices. Oparinde and Daramola [7], reported that a number of factors affect the extent of farmers' market participation such as farmer's age, poor delivery route, lack of market knowledge, quantity, membership in farmers' union, failure to meet standard, experience and improved agricultural practices, which significantly affected the share sold in the market. Protein Energy Malnutrition (PEM) is still a major public health problem in developing countries [8].

Amo Farm Sieberer Hatchery Limited came up with the idea of Noiler birds to curb poverty and malnutrition among rural people, especially women and youth. Noiler bird, a word formed by combining the two words "Nigerian" and "Broiler", they are

bred for two purposes; their eggs and meat. Noiler birds are cheap, hardy and easy to handle and produce four times more eggs than chickens in most rural areas of Nigeria. Female Noiler birds produce 160 eggs in their lifetime, after which they are sold for meat. Male birds mature to eating weight faster than local birds, which takes longer. Broiler weighs about 1.8 kg in 6 weeks, a male Noiler matures to a table weight of 2.0-2.5 kg in 14 weeks; a domestic chicken gains 1.5 kg in 10 months under the same conditions.

Agricultural households need to be efficient during production in order to make profit. To this effect, the household food insecurity can be overcome either by strengthening the household's resources or by enhancing their control and management of these resources, Ibrahim and Bello [9]. This forms the basis for this research to analyse the food security status and economic efficiency of Noiler producing households in Abia state of Nigeria.

MATERIALS AND METHODS

The study was conducted in Abia State. According to National population commission and National bureau of statistics, Abia state is about 3,727,347 people in 2016. According to Nigerian Investment Promotion Commission (NIPC), "Abia" is an acronym formed from the initial letters of four groups of people, namely: Aba, Bende, Isuikwuato and Afikpo. These constituted the major groups in the state at its creation. At the country's independence in 1960, Abia State nicknamed the God's Own State was part of the then Eastern Region but was carved out from Imo State on 27 August 1991.

Abia state comprises of 17 Local Government Areas (L.G.As) which are divided into three agricultural zones namely: Aba, Ohafia, Umuahia. Farmers who were involved in Noiler farming were the target population for this study.

A multistage random sampling technique was adopted in selecting the respondents for the study. In the first stage, all three Agricultural zones were used which are Abia South (Aba), Abia Central (Umuahia) and Abia North (Ohafia).

The second stage involved the purposive selection of two (2) Local Government areas from each of the agricultural zones. The local government chosen were Aba South and Osioma in Abia south zone, In Abia central zone; Umuahia North and Umuahia South while that of Ohafia zone were Bende and Isiukwato. The six (6) Local Government areas were selected based on the availability of Noiler farmers.

In the third stage, a random selection of four (4) communities from each of the Local Government Areas was done making it a total of 24 communities.

In the last stage, five (5) Noiler households were randomly selected from each of the selected communities, giving a total of 120 respondents. Relevant data were then collected from these respondents using a well structured questionnaire.

To determine the factors affecting to economic efficiency, the Tobit model was used. The Tobit regression model is specified as:

$$V_j = \beta Z_{ij} + e \quad (1)$$

$$V_j = V_j \text{ if } V_j > 0$$

$$V_j = 0 \text{ if } V_j \leq 0$$

$$j = 1 \dots n$$

V_j = Limited or censored dependent variable. It is the measure of severity of economic efficiency. It is defined as

$$(K - Y_j) / K \quad (2)$$

Where K = threshold level;

Y_j = j^{th} household's economic efficiency;

β = Parameter estimates;

B_{ij} = Vector of the explanatory variables. e = error term

The following variables affecting economic efficiency were fitted into the Tobit model:

X_1 = Age (Years)

X_2 = Education (years spent in school) X_3 = Labour (Man-day)

X_4 = Extension (Number of contact) X_5 = Stock size (Number)

X_6 = Farming experience (Years) X_7 = Feed (Kg)

While food Security index was estimated as follows;

F_i = Per capita monthly food expenditure for the i^{th} household/2/3 means per capita monthly food expenditure of all households (3)

Where:

F_i = Food security index.

When $F_i \geq 1$ it implies that the i^{th} Noiler farmer is food secure

When $F_i < 1$, it implies that the i^{th} Noiler farmer is food insecure.

RESULTS AND DISCUSSION

Economic efficiency

Tobit model was employed to determine the factors associated with economic efficiency. The model was used because the

estimated regression coefficients were censored variables having values between 0 and 1. The result showed *chi-square* significant at 1% level (28.73) showing strong explanatory power of the model.

The economic efficiency index measure was regressed on farmers' age, labour, education, stock size, experience and quantity of feed. The result reveals that the estimated coefficients were significant and positive for extension, stock size and feed. A positive sign of an estimated coefficient parameter implies that an increase in the associated variable will lead to an increase in economic efficiency of Noiler farmers in the study area. A negative and significant relationship existed between experience and economic efficiency, and a negative sign of an estimated coefficient parameter implies that an increase in the associated variable it would lead to a decrease in the economic efficiency of the farmer.

The result in Table 1 shows that extension contact was positive and significant at 5% level. This implies that increase in numbers of contact with extension agents increases the level of economic efficiency of the Noiler farmers in the area. This finding is in-line with the a priori expectation and findings of where they noted that agricultural extension service positively and substantially influences farmers' economic efficiency [10-12]. The implication of this finding is that a number of farm visits of the agricultural officers play a vital role in enhancing the farmers' economic efficiency. This result is also akin to the previous findings by Adem and Gebregziabher [13], and Dinar et al. which reveal that there is the potentiality to promote economic efficiency of farmers through the agricultural extension services.

Table 1: Tobit regression model result on the determinants of economic efficiencies.

Variables	Coefficients	Std. Error	z-value
Age of farmer	-0.0010593	0.0012999	-0.81
Education	0.0032538	0.0023872	1.36
Labour	-0.0021232	0.002562	-0.83
Extension visit	0.0126858	0.004762	2.66**
Stock size	2.03e-06	8.36e-07	2.43**
Experience	-0.0021046	0.0010626	-1.98**
Feed	0.0005062	0.0002002	2.53**

Constant	0.4434527	0.10985564.04***
LR χ^2		28.73***
Prob> χ^2		0.0002
Pseudo R ²		0.2324
log likelihood		76.18197
Number of observation		120

Note: *, **, *** denotes 10%, 5% and 1% significant respectively.

The coefficient of stock size was significant at 5% and positively related to economic efficiency, this implies that economic efficiency increases with increase in stock size. The implication of this result is the need for farmers to increase their capacities of stocking so as to improved efficiency and maximum production of Noilers. The positive and significance levels of flock size have also been reported by Ezech et al., Olorunwa, Pakage et al. [14,15].

The coefficient of experience was significant and negative related at 5%. This is in-line with the findings of Athukorala et al., who noted that years of farming experience have a negative association with the economic efficiency of farmers, whereas previous studies conducted by Afrin et al., [16], and Rahman et al., [17], found an affirmative association between them.

There is a significant and positive relationship between feed and economic efficiency. This implies that increase in the quantity of feed it will lead to increase in economic efficiency. Olorunwa

estimated economic efficiency and reported quantity of feed influenced economic efficiency. According to Hadi et al., [18], feed intake positively and significantly affected broiler economic efficiency.

Distribution of economic efficiency

The frequency distribution of economic efficiency of farmers in the study area was presented in Table 2. It indicates that the values of efficiency obtained lies between 0 and 1. This implies that all the Noiler households were operating below the frontier. Thus the results of data envelopment analysis reveal substantial inefficiencies in Noiler production in Abia State. The estimated mean value of economic efficiencies was 0.562. This implies that the Noiler farmers were 56.2% economically efficient in production.

Table 2: Economic efficiency distribution among Noiler farmers in Abia State, Nigeria.

Efficiency index	Economic efficiency	Freq %
0.10-0.19	8	6.7
0.20-0.29	8	6.7
0.30-0.39	33	27.5
0.40-0.49	5	4.2
0.50-0.59	8	6.7
0.60-0.69	9	7.5
0.70-0.79	14	11.7
0.80-0.89	33	27.5
0.90-1.00	2	1.7
Min	0.008	
Max	0.954	
Mean	0.562	

Total	120	100
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Economic efficiency shows minimum, maximum and mean were 0.008, 0.954 and 0.562, this implies in the short run, there is a hope for increasing Noiler production by 44% by adopting the technology and techniques used by most efficient enterprise as to reduce inefficiency and increase economic efficiency in Noiler production in the study area. The result also reveals that 45% of Noiler enterprise had an efficiency index less than 50% while 14% had between 50% and 69%. About 41% of the Noiler farmers recorded economic efficiency of 70-100%. Noiler households who scored 70% and above are said to be economic efficient; hence, only 41 of the farmers could be said to be economically efficient in Noiler production in the study area. The efficiency of the sampled enterprise is less than one (*i.e.* 100%) which indicates that all the enterprises are producing below the maximum efficiency frontier. This confirm with the assertion of Edet et al. [19].

Table 3: Distribution of the respondents based on food security status.

FSS	Freq	Percentage %
Food insecurity	76	63.3
Food secure	44	36.7
Total	120	100

The study area could be regarded as food insecure given the fact that majority of the rural households (63.3%) were not able to meet the per capita monthly food expenditure since it was less than two-third of the mean monthly per capita food expenditure while (36.7%) were food secure.

According to Ahmadi et al., [20], Food security is considered a pivotal factor for the sustainable development of communities. More specifically, it is of paramount importance in developing countries, even though future predictions point to a slow-down in agricultural productivity and a food-gap mainly in areas across Africa and Asia which are having ongoing food security issues. The problem of food insecurity is expected to worsen due to, among others, rapid population growth and other emerging challenges such as climate change and rising demand for biofuels.

The household food security theory includes, in its concept, the dimension of food accessibility of the households and the individuals within the household. This accessibility to food, according to Franken-berger and McCaston, is called entitlement. Following closely the idea of Sen's Food Entitlement theory, Franken-berger and McCaston defined entitlement as the set of income and resource bundles over which a household can secure its livelihood. Securing this livelihood ensures that the whole set of well-being of the household is put into consideration, and not just its food needs.

Food security status among farming household

The distribution of the respondents based on their food security status is presented in Table 3. The respondents were then classified into food secure and insecure households. A food secured household is, therefore, when $F_i \geq 1$ it implies that the i^{th} farmer is food secure, but when $F_i < 1$. This implies that the i^{th} individual is food insecure. Households are said to have attained food security level when the per capita monthly food expenditure fall above or is equal to two-third of the mean monthly per capita food expenditure. On the other hand, a food insecure household is that whose per capita monthly food expenditure fell below two-third of the mean monthly per capita food expenditure.

CONCLUSION

Food security is vital in both urban and rural areas, but an important determinant in the success rate largely depends on how efficient the resources were used. Based on the findings of the study, it could be concluded that the level of economic efficiency has effect on food security status of the Noiler farmers. Extension visit, stock size, quantity of feeds was all significant factors influencing the economic efficiency of Noiler producing households.

Indicating that farmers should be educated and sensitized on essential farm management practices. Furthermore, there is need to develop agricultural extension service methods and the inclusion of more farmers under such training programs to enhance efficiency and production level of the farmers. Lastly, since the coefficient of feed was positive and significantly influences efficiency, it is recommended that government should monitor and support feed mills that can produce feeds of the required quality for the industry and at reduced cost; it will encourage more smallholder Noiler farmers.

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