Research Paper

Analysis of Food Security and Labour Use Among Rural Maize Farmers In Ihitte/Uboma Local Government Area, Imo State, Nigeria

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ABSTRACT
Food security at the household level remains a major issue in Nigeria and for other developing countries. Various food security programmes have been launched nonetheless, food security remains an issue among households in Nigeria. This study analyzed food security and labor use among rural maize farmers in Imo State. A two -Stage sampling technique was employed in the selection of the respondents "maize crop farmers" for the study area. Data for the study were obtained from primary sources. Data collected were analysed using descriptive statistics, food security index, Pearson product-moment correlation coefficient and logistic regression model.
The food security status in the study area was analyzed using food security index which revealed that 65.83% of the maize farmers were food insecure. The result on the factors affecting food security status indicated that increase in age and household size decreases household food security status of the rural maize farmers while increase in education, farming experience, income, member of a cooperative and farm size increases household food security status of rural maize farmers. The study concludes that farmers in Imo state make use of hired and family labour in varied proportion. Based on this, the study therefore recommends the need to have regulatory policies in place that will ensure that farm labour wage rate does not affect the quantity of production and farm families should form association that will make them to merge their farm land to large estates which will make technological application such as mechanization easier.
***KEYWORDS:** Food security, labour use, rural maize farmers*

I.   INTRODUCTION

Food is any substance consumed to provide nutritional support, it includes any nourishing substance that is eaten, drunk, or otherwise taken into the body to provide energy, promote growth, and sustain life. It is an indispensable prerequisite for the survival of mankind and its economic activities. Various foods serve as important vehicles for taking nutrients into the body and bringing about a healthy state, these nutrient include; carbohydrates, proteins, fats and oil, vitamins and minerals. Hence, the need for taking these classes of essential nutrients and which must be combined in appropriate proportion to ensure an adequate food intake is paramount. In every conventional household budget, food ranks the topmost need and accounts for a significant part of the budget. Food is firstly prioritized in the hierarchy of needs and it is essential for healthy living. Thus, achievement of food security is important in any household.

Food security is the state of having reliable access to enough good, healthy and culturally appropriate food (food forward, 2017). For food security to exist at the National, Regional and Local levels, food must be available, accessible and properly utilized. Food is secured through agriculture, Africa with its vast land area covering 3 billion ha has 1.3 billion ha of agricultural land out of which only 252 million ha (19.36%) is arable (FAO, 2011). Africa is the center of origin and also a major producer of several cereals like sorghum, pearl millet, finger millet, teff, African rice and maize. Maize has overtaken these traditional cereals. In Africa, it is grown over an area of 34.08 million ha producing 70.08 million tons (FAO, 2015). In Nigeria, the FAO in 2017 reported that Nigeria produced 10.5 million metric tons in 2016/2017. Maize (*Zea may L.*) is the world's highest supplier of calorie with caloric supply of about 19.5%, it provides more calorie than rice (16.5%) and wheat

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(15.0%). (World Atlas, 2017). In Nigeria, maize is the fourth most consumed cereal ranked below sorghum, millet and rice (FAOSTAT, 2012). The demand for maize is increasing at a faster rate daily (Sadiq *et. al.*, 2013), this may be due to the fact that the grain is multipurpose and most importantly serve as a food for many households (Ogunniyi, 2011).

The WHO states that there are three pillars that determine food security; food availability, food access, and food use. The FAO adds a fourth pillar; the stability of the first three dimension of food security over time. In 2009, the World Summit on Food Security stated that the four pillars of food security are availability, access, utilization and stability. Food availability means that enough safe and nutritious food either domestically produced or imported from the international market is available. Food availability does not ensure food accessibility. For food to be accessible individuals or families must have sufficient purchasing power or ability to acquire quality food at all times. The utilization demands sufficient quality and quantity intake (Omonona, 2007). These elements availability, accessibility and utilization in a larger context, embraces the supply, demand and adequacy of food at all times.

II.   MATERIALS AND METHOD

The study was conducted in Imo State which is among the five states in South-East Nigeria. The state is located between latitudes $5^0\ 10^1$ and $5^0\ 51^1$ North and longitude $6^0\ 35^1$ and $7^0\ 28^1$ East with a total land mass area of $5,289.49\ km^2$ and a total population of 3,934,899 persons (NBS, 2007) with many subsisting in farming. The state has an average annual temperature of 48^0c, an average annual relative humidity of 80%, average annual rainfall of 1800-2500 mm and an altitude of about 100m above sea level (Imo ADP, 1990). The State has agricultural zones namely Orlu, Owerri and Okigwe. It is also delineated into 27 Local Government Areas. The population of the study comprise of all maize farmers in Imo State. A two-stage sampling procedure was employed for this study. In the first stage, 2 zones were selected and 5 Local Government Area were randomly selected, the second stage twelve (12) maize farmers were randomly selected from the list of maize contact farmers obtained from the ADP in the area then this brought the size of the respondents to 120 maize farmers which was used for the research.

Data collected were analyzed using descriptive statistics, food security Index, Pearson product-moment correlation coefficient and logistic regression.

Pearson Product-Moment Correlation Coefficient is expressed as

$$r = \frac{n\sum xy - (\sum x)\ (\sum y)}{\sqrt{n\ (\sum x^2)-(\sum x)^2}\ \ \sqrt{n\ (\sum y^2)-(\sum y)^2}}$$

Where *n* is the sample size

The value of *r* is such that $-1 \leq r \leq +1$. The + and - signs are used for positive linear correlations and negative linear correlations, respectively.

Food Security Index (Z_i) is mathematically defined as:

$$Z_i = \frac{Y_i}{R}$$

Where Y_i is the daily per capita calorie consumption of household and R the households' minimum recommended daily per capita calorie requirements.

Logistic regression model is expressed as Logit (p)

$$= \log\left(\frac{p(y=1)}{1-(p=1)}\right) = \beta_0 + \beta_1 x_{i2} + \beta_2 \cdot x_{i2} + \_ + \beta_p \cdot x_{in}$$

III.   RESULTS AND DISCUSSION

Labour Sources available to the Farmers

The result of the farmers' distribution based on labour sources available to the farmers is presented in Figure 1. In the Column Bar Chart A 67.5% of the farmers reported that they made use of both labour (hired and family) in the current season and about 18.3%, 7.5% and 6.67% made use of family labour, other labours and hired labour respectively in the current season. While in the Column Bar Chart B 70.83% made use of both labours during the last season and about 15%, 9.17% and 4.17% made use of family labour, hired labour and other labours. This findings implies that maize farmers in the study area were using both labours (family and hired) in a varied proportion in both season. This is to say that some of the farm operations such as land preparation, planting, weeding, harvesting etc. was done with the use of both labour. This finding was against

the report of Mark O.M. (2017) who found that greater proportion of the respondent used family labour in the current season for farm operations while majority of the respondent used hired labour during the last season.

The use of available labour by the rural maize farmers

The result of the farmers' distribution according to labour types, disaggregated by farm operations in the study area is presented in Table 1. As regards to planting 52.5% of the farmers' used family labour, 36.67% used both labour and 10% used hired labour. In terms of weeding 62.5% used family labour, 25.8% used both labour and 10.8% used hired labour. For agrochemical application 77.5% used hired labour, 19.17% used family labour and 3.33% used both labour. Irrigation had 55.83% that used family labour, 40.83 used hired labour and 3.33% used both labour. Harvesting had 46.67% of farmers that used family labour, 31.67% used both labour and 21.67% uses hired labour. Transportation 50.83% used hired labour, 43.33% used both labour and 5.83% used family labour. Processing 63.3% used both labour, 18.3% used both family and hired labour. While for marketing 80.83% used family labour, 13.3% used both labour and 5.83% used hired labour.

These findings implies that both labour is being used in all the stages of farm operation but more of hired labour for irrigation, transportation and agrochemical application.

Food Security Status of the Rural Maize Farmers

The result of the farmers' distribution based on food security status of the households estimated using food security index is presented in Table 2. It shows that based on the 2019 Food and Agriculture Organization (FAO) of the United Nations recommended daily calorie intake of 2,250 kcal, it was observed that about 65.83% of the households were food insecure while approximately 34.17% were food secured. Similarly, the average daily per capita calorie intake in the study area was 5927.94 kcal. This is also higher than the recommended minimum daily calorie requirement by Food and Agriculture Organization (FAO) of the United Nations and also higher than the National Average of 2700 kcal (National Bureau of Statistics (NBS), 2018).

Additionally, the average daily per capita calorie intake for food secured and insecure household were 9,521.31 kcal, which is higher than the National Average and 918.01 kcal respectively which is far below the National Average and the recommended minimum requirement by Food and Agriculture Organization (FAO) of the United Nations. The finding becomes clear that the sampled area could therefore be regarded as food insecure given to the fact that only 34.17% of the population was able to meet the recommended calorie intake of 2,250 kcal per capita per day, while 53.5% could not.

Relationship between Food Insecure Rural Maize Farmers and Labour used.

The result of the farmers' distribution based on relationship between food insecure rural maize farmers and labour used estimated using Pearson Product Moment Correlation (PPMC) is presented in Table 3. The Pearson product-moment correlation coefficient is a measure of the strength and direction of association that exists between two variables measured on an interval scale (*Buda and Andrzej, 2010*). The finding reveals a negative but strong and significant relationship -0.970 (-97.00%) between food insecure rural maize farmers and labour used. The finding also shows that the model has a strong explanatory power and a good fit. The implication of the findings is that as the level of food insecurity increases among households, the level and quantity of labour used decreases as well. There is a tendency to use more of family labour than hired labour. This is because family who are food insecure may not have the financial capacity and other resources of purchasing hired labour but family labour. In the same way, family that lacks the Food and Agriculture Organization (FAO) of the United Nations recommended daily calorie intake of 2,250 kcal may also not have the required energy engage in farming activities to increase their farm produce for at least family consumption. The result tallies with the findings of Kemi *et al.,* (2014) who asserted labour used food decreased with increased in food insecurity. The null hypothesis of "there is no significant relationship between food insecurity status and labour use of the rural maize farmers" is therefore rejected and the alternative hypothesis accepted because the P-value is greater than 0.05.

Relationship between Food Secure Rural Maize Farmers and Labour used

The result of the farmers' distribution based on relationship between foods secured rural maize farmers and labour used estimated using Pearson Product Moment Correlation (PPMC) is presented in Table 4. The Pearson product-moment correlation coefficient is a measure of the strength and direction of association that exists between two variables measured on an interval scale (*Buda and Andrzej, 2010*). The finding reveals a positive, strong and significant relationship 0.810 (81.00%) between food secured rural maize farmers and labour used. The finding also shows that the model has a strong explanatory power and a good fit. The implication of the findings is that as the level of food security increases among rural maize farmers, the level and quantity of labour used increases as well. There is a strong tendency to use both family labour and hired labour as household moves toward food security index. This is because family who are food secured will have

the financial capacity and other resources of utilizing both hired labour and family labour. In the same way, family that meets the Food and Agriculture Organization (FAO) of the United Nations recommended daily calorie intake of 2,250 kcal will have the required energy to engage in farming activities to increase their farm produce for both family consumption and commercial purpose.
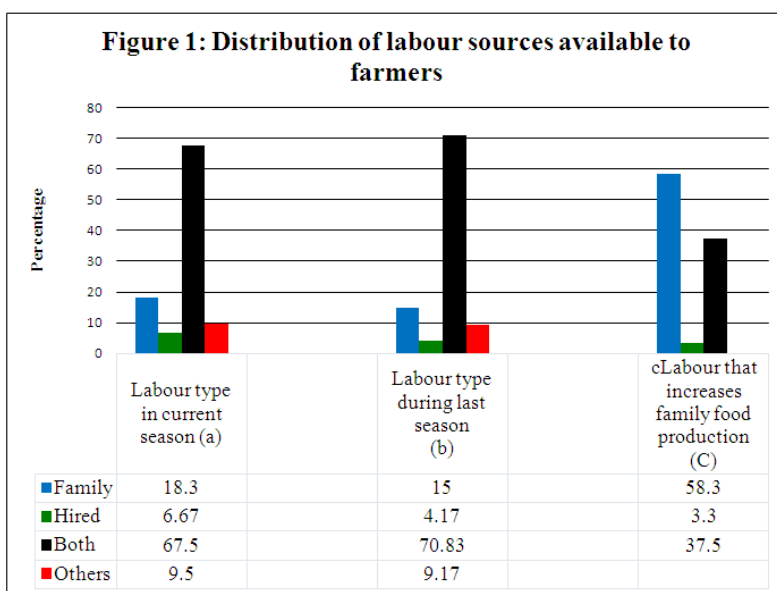
The positive relationship between hired labour used and household food security may be attributed to higher farm income generated from farm expansion and increased farming activities made possible by the available additional labour.

IV.   CONCLUSION

Maize farmers in Imo State make use of hired and family labour in varied proportion. Usage of more family labour tend to increase rural maize farming households' ability to be more food secure while usage of more hired labour tend to decrease rural maize farming households' ability to be food secure. The study recommends the need to have regulatory policies in place that will ensure that farm labour wage rate does not affect the quantity of production and farm families should form association that will make them to merge their farm land to large estates which will make technological application such as mechanization easier.

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Figure 1: Distribution of labour sources available to farmers

	Labour type in current season (a)	Labour type during last season (b)	cLabour that increases family food production (C)
■Family	18.3	15	58.3
■Hired	6.67	4.17	3.3
■Both	67.5	70.83	37.5
■Others	9.5	9.17	

Source: Own computation from Field Survey data 2019

Table 1: Distribution of farmers according to labour type, disaggregated by farm operations.

Farm operations	Labour Type	Frequency	Percentage (%)
Land preparation	Family	28	23.3
	Hired	27	22.5
	Both	64	53.3
Planting	Family	63	52.5
	Hired	12	10
	Both	44	36.7
Weeding	Family	75	62.5
	Hired	13	10.8
	Both	31	25.8
Agrochemical application	Family	23	19.2
	Hired	93	77.5
	Both	4	3.3
Irrigation	Family	67	55.8
	Hired	49	40.8
	Both	4	3.3
Harvesting	Family	56	46.7
	Hired	26	21.7
	Both	38	31.7
Transportation	Family	7	5.8
	Hired	61	50.8
	Both	52	43.3
Processing	Family	22	18.3
	Hired	22	18.3
	Both	76	63.3
Marketing	Family	97	80.8
	Hired	7	5.8
	Both	16	13.3

Source: Own computation from Field Survey data 2019

Table 2: Food Security Status of the Rural Maize Farmers

S/No	Food Security Indices	Food Secure Households	Food Insecure Households	Pooled
1	FAO recommended daily energy levels (L)	2, 250 Kcal		
2	Number of households	41	79	120
3	Percentage of households	34.17	65.83	100
4	Mean of household size	6.17	8.58	9.01
	Food Security index (Z)			
1	Mean (X)	4.15	0.47	2.16
2	Standard Deviation (SD)	0.61	0.031	0.38
3	Mean households daily calorie consumption (kcal)	74,906.92	9,102.74	5927.94
3	Mean households per daily calorie consumption (kcal)	9,521.31	918.01	5181.27
4	Food insecurity gap(P)/surplus index(S)	3.15	0.91	
5	Head count ratio (H)	0.34	0.77	

Source: Own computation from Field Survey data 2019

Table 3: Relationship between Food Insecure Rural Maize Farmers and Labour used

Variable Measured	Correlation Coefficient (r)	P- Value	Decision
Food Insecure Rural Maize Farmers and Labour used	-0.97 (-97.00%)	0.145	Negatively Significant

Source: Computer Printout of SPSS (2019); P- probability level of significance P<0.05 (Significant)

Table 4: Relationship between Food Secure Rural Maize Farmers and Labour used

Variable Measured	Correlation Coefficient (r)	P- Value	Decision
Food Secure Rural Maize Farmers and Labour used	0.81 (81.00%)	0.0001	Positively Significant

Source: Computer Printout of SPSS (2019); P- probability level of significance P<0.05 (Significant