

## EFFECT OF INSURGENCY ON FOOD CROP FARMERS' PRODUCTIVITY IN BORNO AND GOMBE STATES, NIGERIA

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### ABSTRACT

*The study analysed the effect of Insurgency on food crop Farmers' productivity in Borno and Gombe States, Nigeria. Data used for the study were obtained from primary source using questionnaire administered to randomly selected 240 food crop farmers. Descriptive statistics such as percentages, mean, and standard deviation were used to describe farmers' access to farm inputs and output of the farmers in the study area. The ordinary least square regression model was used to analyse the effect of insurgency on food crop farmers' productivity in the study area. The results revealed that in Borno State, the mean pesticides, fertilizer, seed and farm size required were 3.37 litres, 88.58kg, 3.30kg and 2.83ha, while the quantity used were 0.58 litres, 11.51kg, 0.06kg, and 1.35ha respectively and the differences were statistically significant ( $p < 0.05$ ). Also in Gombe State, the mean pesticides, fertilizer, seed and farm size required were 3.5 litres, 178.6kg, 6.6 and 5.3ha, while the quantity used were 1.3 litres, 39.3kg, 1.7kg, and 2.4ha respectively and the differences were statistically significant ( $p < 0.05$ ). The study also revealed a significant difference between the output produced in Borno and Gombe States with a mean value of 706.85kg/ha and 2846.19kg/ha respectively. The result of the regression analysis showed that farm size ( $p < 0.10$ ), fertilizer ( $P < 0.01$ ), farming experience ( $P < 0.05$ ), level of education ( $p < 0.10$ ) and age of the farmer ( $P < 0.01$ ) increased to productivity. While insurgency ( $P < 0.01$ ) was inversely related to productivity in the study area. The study therefore recommended that programmes aimed at enhancing easy and timely access to production inputs especially fertilizer should be strengthened in order to enable farmers improve their productivity. Also, government should provide peaceful atmosphere to boost food crop production and improve farmers' productivity in the study area.*

**Keywords:** Insurgency, Food Crops, Input Use, Production, Productivity,

### INTRODUCTION

Agriculture in Nigeria is the most important sector of the economy from the standpoint of rural employment, sufficiency in food and fibre, and export earning prior to the discovery of oil (Towobola *et al.*, 2014). Economically, agriculture contributes almost 40 % of Nigeria's GDP, and

employs about 70 % of the workforce, including almost 37 % of youths with mean age of 27 years (48 % males, 52 % females) [National Bureau of Statistics (NBS) and the Nigerian Federal Ministry of Youth Development, 2013]. The incidence of insurgency has destabilized agricultural and socioeconomic activities of the nation

especially, the northern part of the country (Ezema, 2013). The instability generated by the insurgency has caused an exact and substantial increase in prices for key agricultural crops produced in the insurgency control areas and exports to other regions of the country, Chad, Niger and Cameroon. This increase in prices is mainly due to a decrease in agricultural output, unavailability of labour, scarcity of farm input, uncertainties at markets and an increase in transportation costs. There is large fall in the production of cowpeas, maize, millet, rice and sorghum by 40% in the areas affected by the insurgency, which has affected overall food supply to other parts of the country (Kegna *et al.*, 2014). This reduction in the output of crops is due to reduction in the availability of labour due to the threat of attacks on farmers on their ways to the farm land. Both farmers and farm labourers are scared of attacks on the farms or bombs planted on the roads to farms. The lack of labour has caused insufficient and inappropriately timing of weeding and harvesting. This insurgency has made many farmers relocate to other places where there is peace in order to save their lives, causing them to leave their farmlands behind. Some of the crops they produced are also perishable and get spoiled leading to wastages (Adebisi *et al.*, 2017).

Agricultural production in Nigeria according to Oladele *et al.* (2008) is largely in the hand of peasants' farmers and the characteristics of these peasant farmers predispose them to low productivity. The crucial issue in the Nigerian agriculture is that of low productivity. The problem of declining crop productivity in Nigeria is compounded again with insurgency in the Northern part of the country. It has led to

mass rural-urban migration and most of those migrating are at their productive age which serves as the primary source of labour to the Agricultural sector. Therefore, the insurgency has led to scarcity of labour to Agricultural sector which have affected the productivity of the farmers in the affected area. The role of productivity of food crop farms is no longer debatable but a great necessity in order to increase the efficiency of small holder farms in Nigeria, since food crops have the potential for bridging the food gap. It is to this end that this study was undertaken with the view to analyze the effect of insurgency on food crop farmers' productivity in Borno and Gombe States, Nigeria.

## **METHODOLOGY**

**The Study Area:** This study was carried in Borno and Gombe States, Nigeria. The two States were selected for comparison purpose since Borno State is the most affected by insurgency, while Gombe State is among the least affected State in North East (Integrated Regional Information Networks (IRIN), 2013). Borno State is located between latitude 10°05'N and 14°05'N and longitude 11°30'E and 14°45'E with an elevation of 350 meters above sea level. Borno State shares international border with Republic of Niger to the North, Chad to the North East and Cameroon to the East. Within Nigeria it shares boundary with Adamawa to the South, Gombe to the West and Yobe to the North West. The State comprises of twenty seven Local Government Areas (LGAs) and a land mass of 50,778 square kilometres (University of Maiduguri (Unimaid), 2013). Gombe State is located between latitude 9°30'N and 12°30'N and longitude 8°45'E and 11°45'E with an elevation of 449 meters above sea

level and it shares boundary with Yobe State to the North, Adamawa and Taraba States to the South, Borno State to the East and Bauchi State to the West. The State comprises of eleven LGAs and a land mass of 20,625 square kilometre National Bureau of Statistics (NBS, 2015). The major crops grown in the two States are maize, rice, millet, sorghum, barley, groundnut, and beans among others. The States have three seasons the cool dry (harmattan) season from October – March, hot dry season (April –June) and rainy season (July – September),

**Sampling Procedure:** A two-stage sampling technique was used. The first stage involved random selection of one Local Government Area (LGA) each from the six Agro ecological zones in the States making six (6) LGAs altogether. In Borno State, Jere, Damboa and Kukawa LGAs and the farming communities such as Auno, Beneshiekh, Dalwa, Mallam Fatori, Kekenso and Bagawere selected. While Akko, Kaltungo and Kwami LGAs and the farming communities such as Kashere, Kalshingi, Bule, Kaltin, Bojude and Malleri were selected in Gombe State. The second stage involved random selection of twenty five (25) food crop farmers from each village in Borno State making one hundred and fifty (150) food crop farmers selected, while fifteen (15) food crop farmers were selected in each village of Gombe State making ninety (90) food crop farmers selected. The total number of food crop farmers selected in the study area was two hundred and forty (240).

## Data Collection

The primary data for this study were collected using structured questionnaire designed in line with the study objectives. The farmers in the internally displaced persons (IDP) camps were contacted with the help of security agents for the data collection. The data that were collected include socio economic characteristics such as farmer's age, marital status, sex, and years of farming experience, household size, years of schooling. Others include outputs and inputs variable, quantities of farm inputs required and obtained, and constraints faced by the food crop farmers in the study area.

**Analytical Techniques:** The descriptive and inferential statistics were used to describe food crop farmers' access to farm inputs and to compare the output of crop farmers that were most and least affected by insurgency in the study area. The ordinary least square (OLS) regression analysis was used to determine the effect of insurgency on food crop farmers' productivity.

**Partial Factor Productivity index:** This was used to determine effect of insurgency on food crop farmers' resource productivity, the various farm inputs considered were:

$$\begin{aligned} \text{Farm size productivity} &= \frac{\text{Total Food crop output}}{\text{Farm size use}} \dots \dots \dots 1 \\ \text{Labour productivity} &= \frac{\text{Total Food crop output}}{\text{Total Labour use}} \dots \dots \dots 2 \\ \text{Fertilizer usage productivity} &= \frac{\text{Total Food crop output}}{\text{Total fertilizer use}} \dots \dots \dots 3 \\ \text{Agrochemical usage productivity} &= \frac{\text{Total Food crop output}}{\text{Total Agrochemical use}} \dots \dots \dots 4 \\ \text{Improved seed productivity} &= \frac{\text{Total Food crop output}}{\text{Improved seed use}} \dots \dots \dots 5 \end{aligned}$$

The wheat grain equivalent table was used to aggregate the food crop outputs.

**Total factor productivity Index:** This index was used to estimate the total factor productivity of the farmers in the two States. The results were compared to ascertain the most agricultural productive State during the period of the study. The total factor productivity index as used by Fakayode *et al.* (2008) is expressed as follows:

$$\text{Total Factor Productivity (TFP)} = \frac{VOP}{VIE} \dots \dots \dots 6$$

Let (TFP) index be Y.

VOP= Value of Output in Naira.

VIE= Value of Inputs Employed in Naira.

The effect of insurgency on food crop farmers' productivity was determined using the following regression model:

$$Y = f(X_1 X_2 X_3 X_4 X_5 X_6 X_7 X_8 X_9 X_{10} X_{11} + e_i) \dots \dots \dots 7$$

Where

Y = Total factor productivity index

X<sub>1</sub> = Farm size (Ha)

X<sub>2</sub> = Labour used (man-days)

X<sub>3</sub> = Fertilizer applied in (kg)

X<sub>4</sub> = seed used in (kg)

X<sub>5</sub> = Agrochemical applied in (litres)

X<sub>6</sub> = Age (years)

X<sub>7</sub> = Household size (number of people)

X<sub>8</sub> = Years of education (years)

X<sub>9</sub> = Farming Experience (years)

X<sub>10</sub> = Insurgency (1 if affected by insurgency; 0, otherwise)

X<sub>11</sub> = Gender (1 for Male, 0 for female)

### Linear Form:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 \dots \dots \dots + \beta_{11} X_{11} + e_i \dots \dots \dots 8$$

### Exponential Form:

$$\ln Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 \dots \dots \dots + \beta_{11} X_{11} + e_i \dots \dots \dots 9$$

### Semi-log Form:

$$Y = \beta_0 + \beta_1 \ln X_1 + \beta_2 \ln X_2 + \beta_3 \ln X_3 + \beta_4 \ln X_4 \dots \dots \dots + \beta_{11} \ln X_{11} + e_i \dots \dots \dots 10$$

### Double-log Form:

$$\ln Y = \beta_0 + \beta_1 \ln X_1 + \beta_2 \ln X_2 + \beta_3 \ln X_3 + \beta_4 \ln X_4 \dots \dots \dots + \beta_{11} \ln X_{11} + e_i \dots \dots \dots 11$$

β<sub>0</sub> = Intercept

β<sub>1</sub> – β<sub>11</sub> = Parameters to be estimated.

Y and X<sub>i</sub> are as earlier defined

## RESULTS AND DISCUSSION

### Input Required and Obtained by Food Crop Farmers in both the States

The summary of inputs required and obtained by the food crop farmers in both States are presented in Tables 1, 2 and 3. The results indicated that food crop farmers required average of 14.29 litres but obtained 1.64 litres of herbicide in the study area. Also, farmers' in the study obtained less than 15% of the seed they required and this was statistically significant at 1% (Table 1). Also the results in Tables 2 and 3 revealed that in Borno State, the mean pesticides, fertilizer, seed and farm size required were 3.37 litres, 88.58kg, 3.30kg and 2.83ha, while the quantity used were 0.58 litres, 11.51kg, 0.06kg, and 1.35ha respectively and the differences were statistically significant (p<0.05). Also in Gombe State, the mean pesticides, fertilizer, seed and farm size required were 3.5 litres, 178.6kg, 6.6 and 5.3ha, while the

quantity used were 1.3 litres, 39.3kg, 1.7kg, and 2.4ha respectively and the differences were statistically significant ( $p < 0.05$ ). This is an indication that farmers had less access to productive inputs and this might have been due to the conflict caused by the insurgency in the study area thereby affecting their productivity. More so, farmers sometimes had to travel far distances in order to purchase farm inputs and this could lead to a reduction in the quantity of inputs purchased. Similarly, differences between all inputs required and obtained were statistically significant ( $P < 0.01$ ). This finding agrees with Iliyasu *et al.* (2014), Stephen and Sharmarke (2014), Dell (2012) and Kegna *et al.* (2014), who reported that insurgency had affected farmers' access to farm inputs, reduced their productivity, caused destruction to their crops and livestock, conflict on land ownership and even forced the energetic farmers to migrate to more secured places.

### **Output of Food Crop Farmers in Borno and Gombe States**

The mean outputs of food crop farmers in Borno and Gombe States during the study period are as presented in Table 4. The result showed that in Borno State a mean output of 706.85Kg was obtained which was less than what was obtained in Gombe State (2,846.19kg) with a mean difference of 2139.34kg which is statistically significant at 1% level of probability. This could be as a result of less insurgency attack experienced in Gombe State. This agrees with the findings of Awodola and Oboshi (2013), Kegna *et al.* (2014), IRIN (2013) and Metz (2007), who reported that areas with high insurgency activities always

produce low farm outputs since most of the farmers usually abandon their farm land as a result of insurgency thereby leaving their crop lands unattended to. Also, Kimenyi *et al.* (2014) reported that there was a drop in the output of some crops during the time of conflict in Borno State and this was attributed to inadequate supply of labour due to threats to farmers' life.

**Table 1: Summary statistics of food crop farmers' access to various farm inputs in Both States (n =238)**

| Variable             | Input Required |                    |         |         | Input Obtained |                    |         |         | t-value  |
|----------------------|----------------|--------------------|---------|---------|----------------|--------------------|---------|---------|----------|
|                      | Mean           | Standard Deviation | Minimum | Maximum | Mean           | Standard Deviation | Minimum | Maximum |          |
| Herbicide (litres)   | 14.29          | 8.22               | 10.00   | 100.00  | 1.64           | 1.21               | 1.00    | 10.00   | 4.80***  |
| Insecticide (litres) | 3.40           | 1.18               | 5.00    | 50.00   | 0.84           | 0.08               | 1.00    | 10.00   | 2.80***  |
| Fertilizer (kg)      | 122.62         | 70.24              | 25.00   | 1000.00 | 22.02          | 12.13              | 18.00   | 100.00  | 5.90***  |
| Farmyard manure (kg) | 299.28         | 110.20             | 30.00   | 750.00  | 123.5          | 40.00              | 100.00  | 250.00  | 4.10***  |
| Improved Seed (kg)   | 4.54           | 1.21               | 3.00    | 30.00   | 0.67           | 0.12               | 0.50    | 30.00   | 11.00*** |
| Farm Size (Ha)       | 3.78           | 2.54               | 1.00    | 15.00   | 1.80           | 1.18               | 1.00    | 7.00    | 4.70***  |

\*\*\* = Significant at 1% level of probability.

Source: Field Survey, 2016

**Table 2: Summary statistics of food crop farmers' access to various farm inputs in Borno State (n =148)**

| Variable             | Input Required |                    |         |         | Input Obtained |                    |         |         | t-value  |
|----------------------|----------------|--------------------|---------|---------|----------------|--------------------|---------|---------|----------|
|                      | Mean           | Standard Deviation | Minimum | Maximum | Mean           | Standard Deviation | Minimum | Maximum |          |
| Herbicide (litres)   | 10.93          | 6.68               | 10.00   | 30.00   | 1.04           | 1.36               | 1.00    | 3.00    | 14.35*** |
| Insecticide (litres) | 3.37           | 2.67               | 5.00    | 50.00   | 0.58           | 1.59               | 1.00    | 5.00    | 3.98***  |
| Fertilizer (kg)      | 88.58          | 50.07              | 25.00   | 250.00  | 11.51          | 5.18               | 25.00   | 50.00   | 10.21*** |
| Manure (kg)          | 262.63         | 122.01             | 30.00   | 750.00  | 62.97          | 13.54              | 100.00  | 150.00  | 3.15***  |
| Improved Seed (kg)   | 3.30           | 1.89               | 5.00    | 10.00   | 0.06           | 0.02               | 0.05    | 3.00    | 17.21*** |
| Farm Size (Ha)       | 2.83           | 1.04               | 2.00    | 6.00    | 1.35           | 0.65               | 1.00    | 4.00    | 13.30*** |

\*\*\* = Significant at 1% level of probability.

Source: Field Survey, 2016.

**Table 3: Summary statistics of food crop farmers' access to various farm inputs in Gombe State (n=90)**

| Variable             | Input Required |                    |         |         | Input Obtained |                    |         |         | t-value |
|----------------------|----------------|--------------------|---------|---------|----------------|--------------------|---------|---------|---------|
|                      | Mean           | Standard Deviation | Minimum | Maximum | Mean           | Standard Deviation | Minimum | Maximum |         |
| Herbicide (litres)   | 19.8           | 23.8               | 20.0    | 100.0   | 2.6            | 1.3                | 5.0     | 10.0    | 1.3**   |
| Insecticide (litres) | 3.5            | 7.5                | 10.0    | 40.0    | 1.3            | 0.8                | 3.0     | 10.0    | 0.56    |
| Fertilizer (kg)      | 178.6          | 120.5              | 50.0    | 1000.0  | 39.3           | 26.3               | 50.0    | 100.0   | 3.2***  |
| Manure (kg)          | 359.6          | 118.3              | 30.0    | 2000.0  | 223.1          | 31.2               | 200.0   | 1500.0  | 3.3***  |
| Improved Seed (kg)   | 6.6            | 3.2                | 5.00    | 30.0    | 1.7            | 1.1                | 1.0     | 12.0    | 5.8***  |
| Farm Size (Ha)       | 5.3            | 3.4                | 1.0     | 15.0    | 2.4            | 1.5                | 2.0     | 7.0     | 7.3***  |

\*\*\* = Significant at 1% level of probability.

\*\*= Significant at 5% level of probability.

Source: Field Survey, 2016.



**Table 4: Summary statistics of food crop farmers output in the study area.**

| Variables         | Mean    | Minimum | Maximum  | Mean Difference |
|-------------------|---------|---------|----------|-----------------|
| Borno Output (Kg) | 706.85  | 225.00  | 3200.00  | 2139.34***      |
| Gombe Output (Kg) | 2846.19 | 400.00  | 31810.00 |                 |

\*\*\* = Significant at 1% level of probability

**Source:** Field Survey, 2016.

### **Partial Factor Productivity of Food Crop Farmers in the Study Area**

The results of partial productivity indices of inputs such as farm size, labour, fertilizer, seed and agrochemical are presented in Table 5. The result revealed that the mean partial productivity of farm size in Borno State (499.86kg/ha) was two times less than that of Gombe State (1104.22kg/ha) and the difference was statistically significant ( $p < 0.05$ ). This implies that land productivity in Borno was lower than that of Gombe. This agrees with the findings of Muhammad (2012), who reported that due to the insecurity caused by the insurgency, the farmers if possible only cultivated small farms. Also, the partial productivity of fertilizer, seed, agrochemical and labour were greater in Gombe State than Borno State and the differences were statistically significant. This difference in partial productivity could be attributed to the instability resulting from insurgencies experienced in Borno State because most farm operations are planned and timed, but with the challenges associated with insurgencies most of the farm resources were wasted due to improper timing of weeding and harvesting.

This agrees with the findings of Obasi *et al.* (2013), Chima *et al.* (2007), Fakayode *et al.* (2007) and Adesiyan (2015) who reported

age, level of education, years of farming experience, farm size, fertilizer use, planting materials and labour as the main determinants of productivity. Conversely, insurgency was indirectly related to productivity and was statistically significant at 1%, level of probability. This indicates that incidence of insurgency led to a decrease in food crop farmers' productivity. This finding further corroborates the results in Table 5 which revealed that productivity of food crop farmers in States mostly affected by insurgency was lower than the productivity of food crop farmers in State less affected by the insurgency.



**Table5: Summary statistics of the partialproductivity of inputs used by the food crop farmers in the study area.**

| Factors               | Borno State         |         |         | Gombe State          |         |         | t-value    |
|-----------------------|---------------------|---------|---------|----------------------|---------|---------|------------|
|                       | PartialProductivity |         |         | Partial Productivity |         |         |            |
|                       | Mean                | Minimum | Maximum | Mean                 | Minimum | Maximum |            |
| Farm Size (Ha)        | 499.86              | 225     | 1170    | 1104.22              | 225     | 6500    | -5.6731*** |
| Labour (man day)      | 11.08               | 5       | 31.25   | 15.38                | 3       | 122.35  | -2.4061**  |
| Fertilizer (kg)       | 10.94               | 3       | 33.75   | 29.39                | 4.5     | 212.07  | -5.7202*** |
| Seed (kg)             | 217.79              | 75      | 505.62  | 459.84               | 27.96   | 3623.01 | -4.6090*** |
| Agrochemical (Litres) | 403.37              | 68      | 1700    | 1541.77              | 75      | 31810   | -2.9934*** |

\*\*\* = Significant at 1% level of probability, \*\* = Significant at 5% level of probability

**Source:** Field Survey, 2016.

### Effect of Insurgency on Food Crop Farmer's Productivity in the Study Area

The result showing the effect of insurgency on food crop farmers' productivity in the study area is presented in Table 6. The results indicate that the model has an F-ratio 13.55 which shows that the whole model is statistically significant at 1% level of probability. The coefficient of determination ( $R^2$ ) indicated that 52.48% variation in the productivity of the food crop farmers in the study area was explained by the explanatory

variables included in the model. Table 6 further revealed that age, quantity of fertilizer applied, farming experience, level of education and farm size were directly related to productivity and significant at 1%, 5% and 10% level of probability respectively. This indicates that a unit increase in these variables holding other factors constant led to increase in the productivity of the farmers by 0.7520, 1.086, 0.1695, 0.4925 and 0.2535 respectively.

**Table 6: Effect of insurgency on food crop farmers' productivity in the study area (double-log as the lead equation)**

| Variables (n=238)          | Coefficients | t values |
|----------------------------|--------------|----------|
| Constant                   | 4.1434       | 4.95***  |
| Farm Size (ha)             | 0.2535       | 1.74*    |
| Labour (man-days)          | 0.3577       | 0.45     |
| Fertilizer (kg)            | 1.0861       | 7.32***  |
| Seed (Kg)                  | -0.0046      | -0.05    |
| Agrochemical (Litre)       | -0.0689      | 1.34     |
| Age (Years)                | 0.7520       | 4.72***  |
| Household Size             | 0.0667       | 1.10     |
| Level of Education (Years) | 0.4925       | 1.81*    |
| Farming Experience         | 0.1695       | 2.24**   |
| Insurgency                 | -0.4971      | -8.96*** |
| Gender                     | -0.0850      | -0.77    |
| $R^2$ Square               | 0.5248       |          |
| Adjusted $R^2$ Square      | 0.5017       |          |
| F- Ratio                   | 13.55***     |          |

\*\*\* = Significant at 1% level of probability, \*\* = Significant at 5% level of probability, \* = Significant at 10% level of probability.

**Source:** Field survey, 2016

## SUMMARY, CONCLUSION AND RECOMMENDATION

The study analysed the effect of Insurgency on food crop Farmers' productivity in Borno and Gombe States, Nigeria. The findings of this study revealed that farm inputs such as pesticides, fertilizer, seed and farm lands used by the farmers were lower than the amount required. The maximum pesticides, fertilizer, seed and farm size required were 150 litres, 1000kg, 30kg and 15ha, while the quantity used were 20 litres, 100kg, 30kg, and 7 ha respectively and the mean differences were statistically significant ( $p < 0.05$ ). The study also revealed a highly significant difference between the output produced in Borno and Gombe States with a mean value of 706.85kg/ha and 2846.19kg/ha respectively. The result of the regression analysis showed that farm size ( $p < 0.10$ ), fertilizer ( $P < 0.01$ ), farming experience ( $P < 0.05$ ), level of education ( $p < 0.10$ ) and age ( $P < 0.01$ ) of the farmer were directly related to productivity. While insurgency ( $P < 0.01$ ) was inversely related to productivity in the study area. In conclusion, the study revealed that insurgency had negative and significant effect on the food crop farmers' productivity in the study area. Based on these findings, the study therefore recommends that government should intensify efforts at restoring peace and security in areas affected by insurgency so as to improve the food crop farmers' productivity in the study area. Also, programmes aimed at enhancing easy and timely access to production inputs especially fertilizer should be strengthened in order to enable farmers improve their productivity.

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