



Effect of Boko Haram Insurgency on the Productivity of Local Farmers in Adamawa State, Nigeria

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Authors' contributions

This work was carried out in collaboration between all authors. Author AES designed the study and performed the statistical analysis. Author SZH wrote the protocol and managed the analyses of the study. Author APK wrote the first draft of the manuscript and managed the literature searches. All authors read and approved the final manuscript.

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ABSTRACT

The negative effect of *Boko Haram* insurgency in the North East Nigeria continues to be a source of worry to all and sundry. The main thrust of this research is to examine the effect of the sect activities on output status of peasant farmers in selected localities in Adamawa state. Three hundred and thirty-three (330) questionnaires were distributed to the target population. Both descriptive and inferential analysis was used in the research. Logit Model was used to determine the productivity of local farmers in the study area. The findings showed that, all the coefficients are statistically significant from 1 to 10% (0.000, 0.034 and 0.087). The major findings showed that: Peasant farmers experience decrease in their productivity, decline in the income of local farmers in the affected areas. Majority of the farmers in the affected areas are women farmers in the affected areas and could no longer access credit facilities. Government could no longer provide farm input subsidy as a result of fear of unknown. The researchers among others recommended that; there is an urgent

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need for Government and Non-Governmental Organizations (NGOs) to step into the issue of farm input subsidy and increase the provision of credit facilities, special agricultural program and policies are to be initiated in order to resuscitate agricultural potentials of the affected zone.

Keywords: Boko Haram; insurgency; agriculture and local farmer.

1. INTRODUCTION

Agriculture is the predominant activity in most of the zones in Nigeria. Percentage of persons involved in agriculture ranges between 24.4 and 85.1 per cent across all zones in Nigeria [1]. With respect to these states, the activity ranges between 2.4 and 91.7 per cent, with majority of states having over 50 percent increases in agricultural output, brought about by increasing land and labor productivity [1]. *Boko Haram* activities, has destabilized socio-economic activities, increased crime and destruction of both life and property of Nigerian citizens [2,3]. Affected are the mass movement of people living in northern part of the country most especially Northern part of Adamawa state. This situation has made it impossible for the citizens in that part of the state to carry on their legitimate activities such as farming, livestock production to mention a few. It is also scaring foreign investors out of this part of the country. Students have been forced to flee their schools. Agricultural sector has been destabilized. The gravity of the crisis has brought about decline in productivity that escalates the prices of Agricultural output reduces the per capita income of an individual [3]. Productivity of peasant farmers is essential and fundamental to any society or nation. In fact, agricultural sector is the driving force of any national economy in the world. Nations do not only plan for production, but also heavily invest in agricultural sector to boost food production, increase gross domestic product and by extension, secure the citizens from hunger and subsequent malnutrition. However, more often than not, insecurity constituted by *Boko Haram* in Adamawa state of Nigeria has to a large extent tampered with tens of thousands of people whom major activities is farming. The protracted violence in the affected zone has forced large scale farmers to abandon their farming activities in search for their dear lives. This has to some extent crippled economic activities and hence led to reduction in internally generated revenue of the state.

The mass displacement of people have resulted to poor harvest in the Northern and some

central part of Adamawa state; mainly Mubi North, Mubi South, Michika, Madagali, Maiha, Hong and Gombi Local government areas of the State. In addition, rising prices of food and other services in Adamawa have always been linked to high rate of insurgency in the state. There are challenges to low productivity, mass displacement, and decrease in internally generated revenue of the state. Most literature on *Boko Haram* has argued that insecurity in Nigeria occurs due to: (i) Economic and poverty level in the area, mostly insurgent gain members by claiming their struggle is for the people and that they would provide basic necessity for the general population if supported, (ii). Activities of internal actors and external actors. (iii). Relative deprivation as the main difference between what one expects but unable to get which is seen as a gap between aspirations and achievement, which brings about psychological state of frustration and aggressive attitudes coming out of such situation. The study area has recorded the highest activities of *Boko Haram* in the state. This has made the farmland for productivity in the study area inaccessible, because of the current growth of insurgency and crisis. This study used binary logit model to evaluate the effect of *Boko Haram* insurgency. The objective of this study was to examine the effect of *Boko Haram* insurgency on the agricultural output of peasant farmers in Adamawa state. The following specific objectives are to: evaluate the impact of insurgency on the agricultural output of peasant farmers in Adamawa State, Identify the impact of *Boko Haram* insurgency on the availability of credit facilities to peasant farmers in Adamawa State, assess the impact of *Boko Haram* insurgency on subsidy availability to peasant farmers in Adamawa State. Research questions include the following: what are the impacts of insurgency on the agricultural output of peasant farmers in Adamawa state Nigeria? What is the effect of *Boko Haram* insurgency on the availability of credit facilities to peasant farmers in Adamawa State? What are the effects of *Boko Haram* insurgency on subsidy availability to peasant farmers in Adamawa State?

1.1 Research Hypothesis

Ho: Insurgency has no significant impact on the peasant farmer's productivity in Adamawa state, Nigeria.

2. LITERATURE REVIEW

2.1 Theoretical Framework

2.1.1 Durkheim and Merton theory

The theory opted that the source of anomie is the collapse of the social structure caused by rapid social change. The social structure normally regulates the infinite human drives. If the social structure collapses, these drives are no longer regulated. Thus, valid regulation and norms of behavior lose their function, which eventually leads to deviant behavior in one form or another. While Merton 1957 asserted that, it is not the breakdown of the social structure that is responsible for anomie but that anomie is an inherent part of a society itself. Anomie emerges when the culture of a society prescribes specific goals to the majority of its members, but the social structures do not provide the legitimate means to achieve these goals. Hence, anomie results from the discrepancy between goals and means. Therefore, deviant behavior or action (behavior that is considered as illegitimate by the respective society) is caused by social pressure as people are expected to reach certain goals but do not have the means to do so. The predisposition to anomie depends on a person's specific position in a particular society defined by age, sex, ethnicity, religion etc. Anomie can occur on different systemic levels (i.e. in different subsystems to which an individual belongs) and can also be of varying degrees [4].

2.1.2 The army agenda theory

This last theory asserts that the real *Boko Haram* sect has been crushed long ago and what we now have is the military wing of the Nigerian Army taking their share of the national cake (There could be no other time than now). This theory also points fingers to all military contractors (Local and International), top military officers, etc. as acting as the *Boko Haram* when the sect no longer exists [5,6]. Agriculture in Yola North Local Government Area, Adamawa State, Nigeria.

A pilot survey by the Author revealed that farmers in the study area have experience of farming activities but need ease from the bottleneck in processing loan acquisition from the banks [7]. Examined the Effect of Insurgency on Borno State Economy 2008 – 2014. The study utilized both primary and secondary data. Study revealed that so far, the insurgency has claimed 28,209 lives. The number of people either abducted or missing stood at 2,751. It also revealed that prior to the insurgency, annual grain flow between Borno and her trade partners was 294,940 tones however, the flow of grain decreased to 94,500 tons by second quarter of 2014. The magnitude of the decrease in the flow of grains as well as number of deaths recorded showed that religious insurgency affected all spectrum of the Borno State economy. Agricultural activities grounded as farmlands, rivers and fishponds were abandoned. The study also revealed that the major cause of the insurgency aside of corruption and arrogant display of affluence by the elitist class was unrealized political will. The study recommended that genuine development and appropriate integrative program should form basis for governance.

2.2 Methodology

This section explained the methodology adopted in this research. It consists of sources and method of data collection, model specification and method of data analysis. Data for this study were sourced from primary sources from northern and central part of the state. The sampling frames used in this study were selected from the target population (local farmers) in each local government in Michika, Madagali, Maiha, Hong, Mubi North, Mubi South, and Gombi local government areas in Adamawa state. The justification for selecting these locations was based on the activities of *Boko Haram* insurgency, which hinder some farmers from accessing their farmland and this stood as constraints to farmers.

2.3 Model Specification

The effect of insurgency and its related violence depended on the probabilistic response of dependent variable; which is typically discrete and it often has the structure of a binomial.

Logistic regression was adopted [8]. The binary logistic model was used to estimate the probability of a binary response based on one or more predictor (or independent) variables (features). It allows one to say that the presence of a risk factor increases the probability of a given outcome by a specific percentage. Binary models are used to model relationships between a dichotomous (two distinct categories) response variable and a set of regressors variables. The log odds of the outcomes are modeled as a linear combination of the predictor variables. A probability is a number between 0 and 1 (inclusive): 0 means the event in question never happens, 1 means it always happens.

These assumptions define the mutual relationship of logistic regression model in which the productivity of peasant farmers is affected by three factors, [insurgency, credit facilities, farm input subsidies]. The underlying response variable y^* in the case of binary choice is defined by the multivariate logic relation.

2.4 Binary Logistic Model (BLM)

$$y^* = \sum x_i \beta_j + u \quad (1)$$

The relevant logistic expression are given as

$$\text{Pro}(y^* = 1) = 1 - F(\sum x_i \beta_j) = \frac{e^{\sum x_i \beta_j}}{1 + e^{\sum x_i \beta_j}} \quad (2)$$

$$\text{Pro}(y^* = 0) = F(\sum x_i \beta_j) = \frac{e^{-\sum x_i \beta_j}}{1 + e^{-\sum x_i \beta_j}} = \frac{1}{1 + e^{\sum x_i \beta_j}} \quad (3)$$

Where

F = the cumulative distribution function for μ_i

$$\text{Pro}(y_i = \frac{0}{\beta_j x_i}) = F(-\sum x_i \beta_j) \quad (4)$$

$$\text{Pro}(y_i = \frac{1}{\sum x_i \beta_j}) = 1 - F(-\sum x_i \beta_j) \quad (5)$$

The likelihood function is given by:

$$L = \prod_{Y=0} \{F(-\sum x_i \beta_j)\} \prod_{Y=1} \{1 - F(-\sum x_i \beta_j)\}$$

While the likelihood function for the expression is

$$H(\beta) = \log L(\beta) = \sum_{i=0}^n y_i \log 1 - f [(-\sum x_i \beta_j)] + (1 - y) \log F(-\sum x_i \beta_j)$$

Where

Y = Productivity of local farmer (Output=1, otherwise, 0.)

μ_i = a logistic cumulative distribution in F

X_1 = Credit facilities.

X_2 = Farm inputs subsidy fertilizer, herbicide, insecticide etc

X_3 = Insurgency.

$\beta_1, \beta_2, \beta_3$, are the behavioral parameters measure the rate of change in crdf, fip and lns with respect to productivity of local farmers.

2.5 A Priori Expectations

$\beta_1, \beta_2 > 0$ and $\beta_3 < 0$: are the a-priori expectations of the signs of the parameters of the model. Therefore, the variable under consideration and their parameter exhibition of a priori signs have been summarize below. The above a priori will be guarded by these criteria.

When $\beta > 0$ = conform.

When $\beta < 0$ = not conform.

The parameter β_1 is expected to be positive because increase in credit facilities theoretically will lead to an increase in productivity of local farmer, β_2 which is the coefficient of farm input subsidy may also be positive because it comprises fertilizer, herbicide and other farm input to motivate farmers to work and β_3 is expected to be negative because insurgency affects the productivity of peasant farmers.

The descriptive analysis covered the use of mean, maximum, minimum and the simple percentages. However the inferential statistic covers the use of chi square which look at the effect of Boko Haram insurgency on the productivity of a peasant farmer.

A total of 420 questionnaires were administered out of which 330 were duly or correctly filled, 60 questionnaires were administered in each locality. Mubi North 47 questionnaires were retrieved Maiha 48, Gombi 54, Mubi south 45, Michika 44, Madagali 43 and Hong 49. The questions were designed to address the research objectives and hypothesis. Questionnaire were administered with the aid of research assistants' in the respective local governments and analyzed, while odd Logit Regression Model was used to determine the factors that affect their output in the study areas.

A simple random technique was used to determine the sample size for this study. The main economic activity of the study areas is agriculture. The major crops grown in the areas include rice, maize, groundnut, beans among others. They also rear animals such as pigs, goats, sheep, cattle and fowls. The communities are also endowed with economic trees like Cashew, mango, guava, among others. A few of the communities such as Hong and Gombi are into various rural industrial activities such as Shea butter extraction and rice processing. Nevertheless, the people have acquired informal knowledge and skills that help them in their daily household activities and in agriculture.

3. RESULTS AND DISCUSSION

Table 1 shows the descriptive statistic of the socio- economic characteristics of the respondents. The result shows that the maximum age of the respondents is 65 years and the minimum age of the respondents is 26 years. Their mean value is 64. The gender ratio is 139:193, females representing 41.51% and 58.49% respectively. Marital status of the respondents also consisted of 89 single, 192 married and 67% divorce representing 26.97%, 58.18% and 20.30% respectively.

3.1 Overall Model Fit

The overall fit for this model is performed to ascertain the 'health' of the model for all – both the dependent (pof) and predictors (Insurgency, credit facilities, farm input) ranging from a p-value at 1 percent to 10 percent as shown.

The maximum likelihood estimates for the logit model are presented in Table 3. The result of the analysis shows that the Chisquare of the regression is 23.29 found to be statistically significant at 1% level. The model has a high negative Log likelihood of -153.48652; describing a model displaying a good fit, this shows that the explanatory variables in the estimated logit model significantly explain the determinant of productivity of local farmers of the respondents in the study areas.

3.2 Binary Marginal Effects

A requirement of this study is to compute marginal effect. This is important to determine the effect of a unit change in the value of each explanatory variable, etc. Several changes had occurred in productivity of peasant

farmers over the years, especially the familiar Fulani herdsmen attack without warning' had affected the productivity of peasant farmers. Studies by various researchers on the productivity of peasant farmers in the state tends to shows decrease in the output as a result of the percentage increase in related to violence in the states. Marginal effects are used to show the probabilities of choice and rate of increase/decrease. It is thus important to examine or predict all outcomes, the marginal change in all outcomes. Using the predictors of x_1 x_2 x_3 (the predictors) always referring the base category, $Y=1$. Binary logit model (BLM) analysis was performed to measure the effect of change as a result of a unit change: Where the estimated π_i is the probability of weighted average of β_j and the marginal effects vary with the point of computation of any one predictor because P_{ij} varies with the predictor (x_i), the marginal effect is positive if $\beta_j > 0$. Thus, β_j is the marginal change in log odds with respect to X_i . Also, due to the risks involved in farming in most of the affected areas, thus high preference is made due to the risks involved Marginal effects show the change in probability when the predictor or independent variable increases (decrease) by one unit [9]. The discussion of results in Table 2 is therefore based on the changes in probabilities because of a unit increase (decrease) in estimated variables.

The probability of insurgency is statistically significant at 1 percent, but with negative coefficient. This shows that it has negative effect on the productivity of the peasant farmer. The result also shows that the odd of insurgency are estimated to be about 4 (1/0.284) times higher than the time when there was no insurgency. The odd ratio for insurgency expressed the effect of 1 percent increase in insurgency and decreases in the productivity of local farmer by an estimated 71%[- 71%=100(0.284-1)].

Farm input subsidy is statistically significant at 10 percent. The result indicates that the odd of farm input subsidy are estimated to be about 0.8 (1/1.202) times as high than the time when there is no farm input subsidy this is as a result of *Boko Harm* activities in those areas. The odd ratio for the farm input subsidy express the effect of 1 percent increase in the farm input subsidy increases the odd of productivity of peasant farmer by an estimated 20%[20%=100(1.202-1)].

Table 1. Summary of the socio-economic characteristic of respondent

Variables	Maximum	Mean	Minimum
Age	65	64	26
Income level	200,000		20,000
Output in a year	50		10
Gender	Frequency	Percentage%	
Male	137	41.51	
Female	193	58.49	
Marital status	Frequency	Percentage%	
Single	80	24.24	
Married	190	57.58	
Divorce	60	18.18	

Source: Researcher's computation

Table 2. Model fit information

Model	Log likelihood	Chi	DF	Significance
Intercept	-153.48652			
Final	-153.48652	23.29	3	0.0000

Number of obs: 330

Table 3. Logit regression model on the effect of *Boko Haram* insurgency on the productivity of local farmers in Adamawa state

Number of variables	Coefficient	p-value	Odd ration
Insurgency	-1.268 (0.288)	0.000	0.284
Credit facilities	0.504 (0.238)	0.034	1.655
Farm input	0.184 (0.236)	0.087	1.202
Pseudo R ²	0.0705		

Rebus standard error in Parenthesis *** p<0.01, ** p<0.05, * p<0.1

Source: researcher's computation using stata 14

From the result obtained, credit facility is statistically significant at 5 percent, the result indicate that the odd of credit facility is estimated to be about 0.66(1/1.66) times higher than the time when there is no credit facility, this may be as a result of *Boko Haram* attacks. The odd ratio expressed the effect of 1 percent increase in the credit facility as a result of increases in the odd of productivity of peasant farmer by an estimated 66% [66%=100(1.66-1)].

Finally, the result indicates a total decline in the total productivity of a peasant farmer in those affected areas. With decline it has brought about decrease in the internally generated revenue of the state, because most of the income in the affected areas comes from the farm produce. This make the state to solemnly depend on federal allocation as its source of income. Hence, level of dependence in the host community is on the increase and this result

in to stiff competition on the little resource in the host community.

4. CONCLUSION AND RECOMMENDATIONS

As seen in the previous sections of this study majority of the activities of *Boko Haram* constitute a serious threat to the development of the state. A part from its implications on agricultural sector, the human cost is of great concern to everybody in the state. Thousands of people have been displaced due to the persistent attacks from the dreaded sect called *Boko Haram*. People abandoned their legitimate activities which are farming. The result of inferential statistic indicates: a total decline in the productivity, income and farm input subsidy of the peasant farmers in the affected areas. Thus, the researcher recommends the following: there is urgent need for Government

and Non-Governmental Organizations (NGOs) to address the issue of insecurity, farm input subsidy and increase the provision of credit facilities in the area. In addition, Government should mobilize food supply across the region in an attempt to reduce hunger among the people. Special agricultural programs and policies should be initiated in order to resuscitate agricultural potentials of the attacked zone. There is the need to give more legal powers to existing recognized religious bodies/legal institutions to regulate the activities of preachers. This becomes necessary because, nowadays, dubious people use religion to advance their socio-economic interest.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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