Herdsmen Attacks and Agricultural productivity in Benue and Nasarawa States of Nigeria.

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ABSTRACT

Herdsmen assaults have hampered agricultural activity in the studied regions throughout the years because local farmers have been discouraged, resulting in lower agricultural yield. This necessitated the use of time series data to analyze the impact of herdsmen assaults on agricultural output in the Benue and Nasarawa states of Nigeria from 2015 to 2020. The variables for the analysis were total agricultural output per labour (TAPL) as a proxy for agricultural productivity being the dependent variable while total cases of herdsmen attack in Benue and Nasarawa States (TCHA), Agricultural Credit to farmers in Benue and Nasarawa States (ACRF), Exchange Rate (EXC) and Inflation Rate (INF) stood as independent variables. The tools used in the study were descriptive and regression analysis. According to the findings, herdsmen assaults had a significant influence on agricultural productivity in the studied regions. Therefore, the study suggests that to reduce herdsmen attacks and encourage agricultural activity in the area, the authority must be assertive regarding security challenges and perils by utilizing advanced tools of intelligence gathering and sharing, coaching, supply chain, incentive, and mobilization of sophisticated technology in handling security challenges.

Keywords: Agricultural Productivity, Farmers, Herders and Insecurity
Jel Classification Code: H56

1. INTRODUCTION

Agriculture is Nigeria's most important non-oil sector. Oladele and Sakagami (2004) estimated that agriculture directly facilitates 63 per cent of the Nigerian population by accounting for about 70 per cent of non-oil export production and 28 per cent of total exports. A favourable environment is required for the agricultural output to attain its highest potential. Long-term agricultural growth needs, inter alia, the peaceful cohabitation of producer communities. Local communities can only adopt a sustainable common pool of resource conservation and management techniques if they collaborate. Furthermore, stable and harmonious communities are those that are resilient and inventive in reacting to environmental difficulties and retaining their livelihoods, as opposed to those that are unsatisfied with their surroundings (Blench, 2003). According to Fasona and Omojola, (2005), farmers and herders are the most prevalent resource-use conflict in Nigeria. Land

usage has been "intensified" and "most extensive" to generate food of agricultural and animal origin, as well as raw resources for export and industry to meet ever-increasing needs (Nyong & Fiki, 2005). The fight between these two agricultural land users has, however, regularly degraded into major overt and covert forms of animosity and societal strife in many parts of Nigeria. Conflicts have proven considerable enablement to exacerbate insecurity and food shortages, particularly in rural regions where the majority of conflicts occur, with far-reaching consequences across the country (Adisa, 2012).

Gyong (2007) described the conflict as a fight for dominance or control between two persons or organizations to subjugate or even eliminate the opponent. Nigeria is now experiencing conflicts that have resulted in widespread insecurity, terror, homelessness, and unemployment among various ethnic and religious groups. The herdsmen-farmers conflict is one of the most significant. While some other conflicts emerge among members of the same resource user group, such as agricultural communities, others arise between two groups who are users of the same resources according to Momale (2003). The most common resource-use conflict in Nigeria has been between farmers and herders (Adisa, 2012).

Due to social and economic difficulties, Fulani pastoralists and farmers are continually battling over land. The severity and variety of the conflicts are determined by the nature and kind of user groups where pastoralists graze. These conflicts have put both farmers' and pastoralists' lives and livelihoods in jeopardy, as well as what both groups are fighting to protect. Access to fields and livestock paths has become a routine occurrence that appears to defy solutions (Abbas, 2009).

Farm areas that are often kept fallow for natural soil regeneration are fast disappearing, while pastures that have historically provided dry season grazing for pastoralists are becoming increasingly rare (Gefu & Kolawole, 2002). As a result, the frequency and severity of rivalry among diverse land users have grown. Pastoralists' movement from one section of the nation to another is usually triggered by a surge in demand for fresh grazing grounds, especially during draughts, when pastoralists travel southwards to find pasture. They regularly clash with locals because their herd has destroyed local farmers' crops (Olaleye *et al.,* 2010).

In Nigerian rural villages, Fulani herdsmen attacks are occurring at an alarming rate, resulting in a major decline in agricultural productivity. Every day, farmers and civilians die as a consequence of herdsmen threats and attacks, widespread farm plot destruction, and the ensuing agonizing confrontations, which are eroding Nigeria's agricultural and rural development triumphs. Competition-driven confrontations between arable crop farmers and livestock herders have become widespread in many parts of Nigeria (Ingawa *et al.,* 1999). The battle between these two agricultural land user groups has regularly degraded into overt and covert violence and societal tension in various places of Nigeria (Adisa, 2012). Conflicts between herders and farmers have been more common in recent years (Nweze, 2005). According to the report, many farmers and herders have lost their lives and herds, while others have seen their herds' productivity decline. In the majority of these encounters, citizens are frequently killed, and property devastation or loss further impoverishes an already disadvantaged populace. The frequency and magnitude of these inter-communal clashes have reached frightening levels (Leadership Newspaper, May 17, 2011).

As the frequency of instances of violence along this occupational border grows, it's becoming more crucial to understand the herders-farmers conflict. We must comprehend not just why conflict occurs, but also why and how some conflicts connect with religious, ethnic, and political issues as they develop (Morizt, 2010). It is also important to understand how "farmers and herders" on the one hand, and "community and the state" on the other, have regarded such opposed circumstances, as well as the techniques used to alleviate or even resolve them. Unless the sources of such arguments are properly identified, understood, handled, and remedied, such instances will continue to rear their ugly heads at the slightest provocation (Abbas, 2009). The conflict between farmers and herders can be lessened or avoided if government policies are properly formulated and enforced to establish a guiding principle for future cooperation between the two battling groups. Hence, understanding the causes and consequences of conflict between nomads and farmers in host communities is essential for achieving agricultural productivity, social well-being, socio-psychological well-being, and family well-being goals. There is still a lot of work to be done in terms of policy reforms to ease the socio-economic effects of the country's war situation, especially as it impacts agricultural service delivery. It will be easy to focus on the major relationship between food security, pastoral production, and resource conflict as a result of this. There is a dearth of information on the impact of herdsmen assaults on farmers, both those who are hurt and those who are not. As a result, in an attempt to reduce the gap, this study evaluates the impact of Fulani herdsmen assaults on the agricultural production of arable crop producers in Benue and Nasarawa states.

2.0 LITERATURE REVIEW

2.1 Conceptual Literature

Herders are individuals who make their living largely from cattle to best use the limited and seasonally changing resources available in their location, as well as to provide food and water for their animals. The herders have Fula origins, often known as 'Fulanis,' and are widespread throughout Africa, with a stronghold in West Africa. Fulanis are Middle Eastern and North African descendants. In most cases, Fulani herders lived in fertile areas to raise their cattle, and as migration became more forced due to economic and socio-political factors, tensions between herders and their host communities (farmers) grew. Fulani herders claim the lives of many Nigerians each year, as well as their homes, farms, and crops. Confrontations between Fulani herders and farmers arose as a result of the Fulani herders' encroachment on farmland. Zubair et al. (2019) stated in their study that Fulani herder clashes of any kind are an act of terrorism with negative implications for economic growth and development in Nigeria.

According to Fulginiti and Perrin (1998), the output generated by a certain amount of inputs in the agricultural sector of a particular economy is referred to as agricultural productivity. It is more precisely defined as the ratio of the value of total farm outputs to the value of total farm inputs. The ratio of final output inappropriate units to a measure of inputs is used to calculate agricultural productivity (Iweala, 2013). Dharmasiri (2012) argued that agricultural production should be measured in terms of yield per unit. Agriculture productivity refers to the rise in agricultural production per capita production within an economy over a certain period. Annual trends are commonly used by economists and statisticians because of the exact and clear information they

provide. Agricultural product output tends to fluctuate over time, prompting the need for it to be examined or monitored. While individual products are normally measured by weight, which is known as crop yield, agricultural productivity is measured as the ratio of agricultural output to input. Varying products make assessing total agricultural production challenging. As a result, agricultural productivity is generally measured in terms of the market value of the end product.

2.2. Empirical Literature

There is a dearth of empirical literature in this area of research interest. However, for this study, the following related studies were reviewed.

Eneji et al. (2019) investigated the impact of insecurity on agricultural productivity in Nigeria (Balanga Local Government Area, Gombe State as a case study). Their study used the Ordinary Least Squares method of multiple regression analysis of time series data, with agricultural GDP (AGDP) as the dependent variable and poverty (POV), unemployment (UNMP), crime rate (CR), and federal government recurrent expenditures on internal security (FREXIS) as the independent variables. The OLS analysis showed an R square value of 0.43, meaning that the independent variables explained 43 per cent of the variation in AGDP. CR and UNMP were also shown to be adversely associated with agricultural production (AGDP), with values of (-0.58) and (-0.38), respectively.

Soomiyol and Fadairo (2020) investigated the consequences of farmers-herdsmen land use conflict on agricultural households' livelihoods in Benue State. Data were gathered from 110 agricultural households in the Guma and Logo Local Government Areas (LGAs) of the state through an interview schedule and focus group discussion. The majority (56.4 per cent) of respondents were male, aged 51.6 1.6 years, had a farm size of 9.14 5.75 acres, and had been active in farming for 27.7 14.16 years. The majority (>90 per cent) had a high level of exposure to conflict-related incidents such as property destruction, homelessness, and limited market access. Following a conflict regime produced by climate change, respondents indicated a strong impact of land use conflict on agricultural households' livelihoods (81.8 per cent) and land availability/usage (>50 per cent). The anti-open grazing restriction statute was seen positively by all respondents as a positive step toward minimizing conflict incidence. Farmers' herders' land use conflict had no significant influence on the livelihood of agricultural households in Guma and Logo LGAs ($t = 0.051$). Farming families are particularly exposed to the impacts of farmer-herder conflict and support the present local authority's restriction on open grazing. A concerted effort including religious institutions, government, and nonprofit organizations, as well as persuading herders to pursue other cattle production choices such as ranching or settlement schemes, would give urgency to current attempts to resolve the issue.

Ladan and Matawalli (2021) investigated the effects of robbery on food security in Katsina State, Nigeria. The approach used to collect data for the study was a focus group discussion comprising two groups of five people each from the LGAs afflicted by banditry that were sampled for the study, notably Jibia, which revealed that banditry had significantly impacted food security in Katsina State. Farmers have been killed and kidnapped, farmers have been chased off of their farmlands, farmlands have been seized, cattle have been stolen, grain silos have been burned and raided, and local trade routes have been blocked.

Gaibulloev et al. (2013) investigated the association between banditry and agricultural output in Western Europe. The study used ordinary least squares regressions using panel data from 147 countries from 1971 to 2009. Banditry, according to the research, lowers economic activity. The study showed that transnational and domestic banditry have differing effects on agricultural productivity: whereas local banditry boosts wasteful government spending, transnational banditry crowds out investment.

Okoro (2018) examined the prevalence of the herdsmen-farmers conflict and its effects on socioeconomic development in Nigeria. The study was anchored on frustration-aggression theory and the theory of dialectical-materialism. The research adopted a qualitative approach to data analysis which relied on secondary sources. Results show that the conflicts have resulted in the loss of lives, displacement, distrust, destruction of properties etc. The study concluded that the Herdsmen-farmers conflict created food insecurity, distrust and unemployment.

2.3. Theoretical Framework

The theory of collective violence served as the theoretical framework for this study. This theory refers to the process by which a group amasses material and non-material resources and places them under collective control with the ultimate aim of accomplishing the interests of the group through collective action. Obtaining resources must be accompanied by channelling funds (Isyaku, 2013). A group can flourish while yet failing to compete for power. According to Johari (2015), collective violence may come from the role of failing and flailing nations. That is in a nation where the rulers failed to develop a strong and stable political structure, and as a result, power-hungry factions come up to seize power by violence by wreaking havoc on the rule of law. A failed state, as defined by Rand and Johari (2015), has four characteristics: (a) a lack of state penetration as evidenced by corruption, the presence of the informal sector, and the absence of functional state institutions; and (b) a lack of monopoly of force as evidenced by illegal armed organizations, criminal networks, and a populace with access to weapons. (c) a lack of border controls; and (d) foreign interference. The motives for collective violence in Benue and Nasarawa states exhibit all of the features described above thereby justifying the adaptation of collective violent theory for the study.

3.0 METHODOLOGY

3.1 Data Source

The study utilized monthly time series data which span the period of January 2015 to December 2020. The data was sourced from the Global Security Insights Report (2021) in the study areas and CBN Statistical Bulleting (2021).

3.2 Model Specification

The theory of collective violence served as the theoretical framework for this study. The model for this study was adapted from the work of Opeyemi et al. (2021). The model was redefined in equation [1] to accommodate the variables of the study. The variables of interest include; total agricultural output per labour (TAPL) as a proxy for agricultural productivity being the dependent variable while total cases of herdsmen attack in Benue and Nasarawa States (TCHA), Agricultural Credit to the farmer in Benue and Nasarawa States (ACRF), Exchange Rate (EXC) and Inflation

Rate (INF) serve as independent variables.

$$TAPL_t = \beta_0 + \beta_1 TCHA_t + \beta_2 ACF_t + \beta_3 EXCH_t + \beta_4 INF_t + \varepsilon_t \ldots\ldots 1$$

Where,

TAPL = Total agricultural output per labour
TCHAL = Total cases of herdsmen attack
ACRF = Total Agricultural Credit to a farmer in both Benue and Nasarawa States
ECXH = Exchange Rate
INF = Inflation Rate
Ɛ = Error term, t= at present time
β_i = Coefficient (i = 0, 1, 2, 3, 4)

3.3. *a priori* Expectation

a priori expectations refer to the expected sign of the coefficient of the explanatory variables and which shows the expected impact of explanatory variables on the dependent variable. The a priori expectations for the explanatory variables in this study are:

$\beta_1 < 0$, $\beta_2 > 0$, $\beta_3 < 0$, $\beta_4 < 0$

It's empirically expected that herdsmen attacks in Benue and Nasarawa states, Exchange and Inflation Rates will all have negative impacts on total agricultural output per labour in both states. Positive expectation is order-wise expected to exist between Total agricultural output per labour and total Agricultural Credit to a farmer in both Benue and Nasarawa States in Nigeria.

4.0 RESULT OF FINDINGS AND DISCUSSION OF RESULTS

The descriptive summary statistics of the variables for the empirical analysis are presented in Table 4.1.

Table 4.1 Descriptive Statistics

Variables	Mean	Median	Max	Min	Std.Dev.	Skewness	Kurtosis	Jarque Bera	Prob
TAPL	24.89	19.86	43.42	11.05	12.64	0.52	1.58	9.36	0.07
TCHA	13.00	11.50	20.00	6.00	5.58	0.36	1.61	7.36	0.08
ACRF	241.89	195.86	432.42	111.05	124.64	0.52	1.58	9.36	0.06
EXCH	289.31	305.90	381.00	185.20	57.03	-0.56	2.44	4.74	0.09
INF	12.55	11.97	17.63	8.06	2.88	0.26	2.07	3.44	0.18

Source: *Author's Computation, 2021.*

The result from the table shows that total agricultural output per labour, total cases of herdsmen attack, total agricultural credit to farmers in both Benue and Nasarawa States, Exchange rate and Inflation rate are all positively skewed. The result shows that on the average total agricultural output per labour, total cases of herdsmen attack, total agricultural credit to farmers in both Benue and Nasarawa States, Exchange rate and the Inflation rate is 24.89 units, 13 cases, 241.89 million naira, 289.31 Naira to a dollar and 12.55 rate per month for study in Nigeria respectively. The Jarque-Bera probability values of all the variables are greater than 0.05, which means that all the variables are normally distributed.

Table 4.2 Correlation Matrix Result

	TAPL	TCHA	ACRF	EXCH	INF
TAPL	1				
TCHA	-0.4631	1			
ACRF	0.5354	-0.7036	1		
EXCH	-0.3044	0.6413	-0.6344	1	
INF	-0.5721	0.0622	-0.4802	0.5213	1

Source: *Author's Computation, 2021.*

Table 4.2 presents the correlation coefficients matrix result which shows that TCHA, EXCH and INF have a negative correlation with TAPL while a positive correlation exists between ACRF and TAPL. The correlation between TCHA and ACRF is negative while a positive correlation exists between TCHA, EXCH, and INF. The result also shows negative correlation exists between ACRF, EXCH and INF. EXCH and INF exhibit a positive correlation. The nature of the correlation relationship between the independent variable, dependent and control variables are all in accord with prior expectations. Therefore, the correlation matrix shows the absence of multicollinearity since the entire correlation values are less than 0.8.

Table 4.3 Variable Inflation Factor

Variables	VIF	1/VIF
TCHA	1.34	0.75
ACRF	1.07	0.93
EXCH	1.25	0.80
INF	1.36	0.74
Mean VIF	1.26	

Source: *Author's Computation, 2021.*

Table 4.3 presents the Variance Inflation Factor (VIF) test result which ascertained the problem of multicollinearity among the independent variables. The table shows both the VIF and the mean of VIF which are within the benchmark of 1 to 4 and 1 to 10 respectively. These are indicative of the absence of multicollinearity in the independent variables.

Table 4.4 Stationarity Test Results (ADF, PP & KPSS, 1989-2020)

	Stationarity Results at Level			
Variables	**ADF**	**PP**	**KPSS**	**Order of Integration**
TAPL	-1.212659	-1.200442	0.988279***	I(0)
TCHA	-0.528113	-0.461741	1.06959***	I(0)
ACRF	-1.212659	-1.200442	0.988279***	I(0)
EXCH	-1.151302	-1.214376	0.882583***	I(0)
INF	-3.209502***	-1.667437	0.259757*	I(0)

Source: *Author's Computation, 2021.*

Note: *The asterisks (*) mean significant at 10%; (**) significant at 5%; (***) significant at 1%, the Lag Length based on SIC, and Probability based on Mackinnon's (1996) one-sided p-value.*

The study tested the variable's stationarity status to determine the order of integration of the time series data for further analysis. For more robust estimates, the study employed three stationarity tests which are common in literature. The variables were tested using first, Augmented Dickey-Fuller (ADF, 1979), second, Phillip-Perron (PP, 1988) and thirdly Kwiatkowski-Phillips-Schmidt-Shin (KPSS, 1992). The results of the stationarity test from table 4.4 indicate that the variables are all stationary having order of integration I(0)s. This is expected since the variables were all measured in rates and percentages. Therefore, a cointegration test is not necessary, as any shock to the system in the short run will quickly adjust to equilibrium in long run. Therefore, only the long-run model would be estimated. The results for the multiple regression analysis, using the Ordinary Least Square (OLS) estimation method are shown in table 4.5 below.

Table 4.5 Multiple Regression Result

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	18.58351	53.24206	0.349038	0.7282
TCHA	-0.659503	0.167100	-3.946752	0.0002
ACRF	0.060300	0.058323	1.033899	0.3049
EXCH	-0.348216	0.213514	-1.630882	0.1076
INF	-8.568490	1.813112	-4.725847	0.0000
R-squared	0.864025	Mean dependent var		289.3090
Adjusted R-squared	0.855907	S.D. dependent var		57.02522
F-statistic	106.4344	Durbin-Watson stat		1.986049
Prob(F-statistic)	0.000000			

Source: *Author's Computation, 2021.*

The results from the multiple regression model in table 4.5 show that a negative relationship exists between the dependent variable (total agricultural output per labour) and the independent variables (total cases of herdsmen attack (TCHA), the Exchange rate (EXCH) and inflation rate (INF)) in both states throughout the study. A positive relationship exists between total agricultural credit to farmers and total agricultural output per labour in the states under investigation throughout the study. On that note, one case of herdsmen attacks holding other variables constant will bring about a 0.66 unit decrease in total agricultural output per labour in both states and the result is statistically significant at a 1 per cent level of significance. The results also reveal that one naira increase in agricultural credit to a farmer in both states will increase agricultural output per labour by 0.060 units but the result is not statistically significant. Naira increase in the exchange rate to a dollar in the forex market and a unit increase in general inflation rate while other things remain constant will result in to decrease in agricultural output per labour by 0.34 units and 8.57 units respectively. The result of the exchange rate is not statistically significant while that of the inflation rate is statistically significant at a 1 per cent level of significance.

The R-squared of 0.864025 shows that the model is a good fit because 86 per cent of the variation in the total agricultural output per labour is explained by changes in the independent variables used in the model while 14 per cent not explained is being accounted for by the error term. The Durbin-

Watson statistic of 1.986049 shows that the model is free from autocorrelation problems. The F-Statistics and probability value of 1% shows the general significance of the model regression estimates.

4.6. Post Estimation Diagnosis

The Breusch-Godfrey serial correlation test in table 4.4; shows a chi-square X^2 value of 3.36785 with the probability of 0.274 and it is greater than 0.05. Therefore null hypothesis of no serial correlation is accepted. This means no serial correlation in our model.

Table 4.6 Diagnostic test for Multiple Regression Model

Test Statistics	LM Test Statistics	F-Version
A: Serial Correlation	Chi-Square (2) = 3.36785(.274)	F (2, 65) = 9.22632(.845)
B: Heteroscedasticity	Chi-Square (9) = 6.86074 (.760)	F (4, 67) = 1.57058 (.114)

***Source*:** *Author's Computation, 2021.*

A: Lagrange multiplier test of residual serial correlation; B: Based on the regression of squared residuals on squared fitted value

Breusch-Pagan-Godfrey heteroskedasticity test result follows the chi-square distribution of several observations (n) times R-square($n.R^2$). The test statistic of the calculated chi-square is 6.86074 with a probability of 0.760. Since the probability of the calculated chi-square is greater than 0.05, the null hypothesis of no heteroskedasticity is accepted. This means that the variance of each residual of our observation in our model is constant.

4.7. Discussion of Results

The primary objective of this study is to investigate the impact of the herdsmen attack on agricultural productivity in the Benue and Nasarawa states of Nigeria. Monthly time series data was used from 2015 to 2020. The descriptive statistic summarized the variables of study in their average values. The Jarque-Bera values and their probabilities showed that the variables are normally distributed throughout the study. The stationarity test revealed the stationarity of the variables. The multiple regression model estimates showed a significant negative impact between herdsmen attacks and total agricultural output throughout the study in Nigeria. This finding is in agreement with the findings of Eneji et al. (2019), Soomiyol and Fadairo (2020), Ladan and Matawalli (2021), Okoro (2018), Gaibulloev et al. (2013). The post-estimation tests revealed that the model parameter estimates are normally distributed, heteroscedasticity free and have no serial correlation. Therefore, the parameter estimates are good and robust for policy-making guides and directions in Nigeria.

5. CONCLUSION AND RECOMMENDATION

Herdsmen attacks have hampered agricultural activity in the studied areas for years, since local farmers have been deterred, resulting in lower agricultural productivity. Based on the findings, the study concluded that, in the study areas, total agricultural productivity per labourer decreases as the number of cases of herdsmen attacks increases. This meant that as the number of herdsmen assaults increased, agricultural productivity in Benue and Nasarawa State decreased. Nevertheless, while the farmer-herder crisis affects all of Nigeria, Benue and Nasarawa are two states that stood out for the frequency, ferocity, and devastation of the episodes in their communities. Based on the findings,

the study recommended that the government be proactive in dealing with security issues and threats by employing modern techniques of intelligence gathering and sharing, training, logistics, motivation, and the deployment of advanced technology in managing security challenges to combat herdsmen attacks and encourage agricultural activities in the area.

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