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Is Climate change Responsible for Farmers-Herders Clashes in Nigeria?

Ufuoma Earnest Ofierohor , Joseph Osaro Denwi, Endurance Ujerekre Ofierohor, & Oghale Blessing Ofierohor

Abstract:
This paper bothers on analytical review on how desertification caused by climate change propels herders-farmers clashes in Nigeria, as it continues to spread further southwards. The data for the study were obtained from the PRS International Country Risk Guide, Food and Agricultural Organization (FAO) and Statistical Bulletin of the Central Bank of Nigeria, spanning from the year 2000-2019. A documentary and econometrics technique were employed, where in, graphical regression analysis, unit root test, bound test, Autoregressive-Distributed Lag short and long run test were conducted. Internal conflict index provided by PRS as index of herdsmen/farmers clashes was used as dependent variable, while desertification was captured in the model using primary tree loss as the felling of trees signifies such, average temperature was captured in the model as a variable that could explain herdsmen/farmers conflicts as a harsh temperature might reduce green vegetation, exacerbating the conflicts and rainfall which is seen to aid green vegetation were captured as independent variables. From the result of the study, no evidence of significant relationship exists between internal conflicts and desertification in Nigeria. In line with this, the study concludes that internal conflicts in Nigeria is not attributable to climate change. In view of this, the study recommends that; Government should set up ranches in the Northern part of Nigeria and feeds provided using the hydroponic farming system. This recommendation is predicated on the cultural differences between the Southern and Northern part of Nigeria so as to avoid occurrence of violent clashes.

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About Author (s)

Ufuoma Earnest Ofierohor (corresponding author), Department of Finance and Banking, University of Port Harcourt, Nigeria.
Joseph Osaro Denwi, Department of Economics, University of Port Harcourt, Nigeria.
Endurance Ujerekre Ofierohor, Department of Electrical and Electronic Engineering, University of Port Harcourt, Nigeria.
Oghale Blessing Ofierohor, Department of Law, University of Nigeria, Nsukka, Nigeria.

Introduction

This paper examines closely desertification as a major cause of herders-farmers conflict in Nigeria attributable to climate change. According to Cubuild Advanced English Dictionary, Climate change refers to "changes in earth's climate, especially the gradual rise in temperature caused by high levels of carbon dioxide and other gases". Owing to the adverse effect of climate change on grasses that can be grazed by cattle in the northern part of Nigeria, herdsmen are triggered to migrate southwards.

The arrival of the herdsmen has triggered a lot of killings of farmers in the southern and northern part of Nigeria (Ani, 2018). Farmers often complain that their crops are been grazed by cows, which has resulted into several clashes (Oyaba & Nein, 2019). The increase in clashes between farmers and herdsmen in Nigeria has made the issue a national security, inter-ethnic political and developmental concerns (Adigun, 2019). In a bid to control this, many have opined that ranches be made by government for the benefit of herders and taxes paid annually in line with the modus operadi of a conventional private exchange. In light of this, the RUGA policy was proposed by government but currently suspended owing to complications. According to 2018 global terrorism index, 1700 violent deaths have been attributed to herdsmen attack.

This unending problem exert a deleterious consequence on the gross domestic product of Nigeria as farmers find it difficult to carry out their agrarian activities owing to pervasive insecurity situation in the country to which the herdsmen's attack is a subset (FPW, 2014). Available statistics from Nigeria Watch revealed a total of 489 deaths occurred in Nigeria in 2016 brought to bear by cattle rustling. The episodes negatively affected agricultural output as crop production bottomed from N4,639.61 billion in the third quarter of 2016 to N4,185.89 billion in the fourth quarter of 2016. The trend in violent conflict attributable to herdsmen's famers clashes continued unabated as an aggregate of 2,000 people were killed in Benue and Kaduna in 2016 (Olu-Adeyemi, 2017). This poses a challenge for food security considering the status of Benue as the food basket of the nation. This is reflective in valuation of agricultural activity as crop production dropped significantly to N2,943.53 in the first quarter of 2017 from N4,185.89 in the fourth quarter of 2016 (CBN, 2018). In 2018, about 505 deaths were recorded in a group of key states such as Benue, Cross River, Rivers state, Delta, Ebonyi, Akwa Ibom and Taraba. A critical assessment of these States revealed that they contribute significantly not just to the revenue base of the country, but also to the food bank of the country. Literature presents a broad spectrum of causation of this violent conflict. Many scholars are of the opinion that the propellers of these herdsmen/farmers scuffle in the southern and middle-belt region of the country ranges from droughts, lack of green vegetation, nomadic way of life, lack of institutional support by government, harsh sunny climate, differential in cultural values and beliefs, among others (Dimelu, Salifu & Igbokwe, 2016; Ikezue & Ezeah, 2017; Olalekan, 2019). In lieu of this, the non-attendant to these violence conflict and its contributory factors has potentials of setting the country back in her drive to attaining inclusive growth and development. Going by the foregoing, it is the object of this paper to critically investigation the contributory effect of desertification to the herders-farmers conflicts in Nigeria, with the intent that, the outcome of the investigation would birth a near end solution(s) to these conflicts and chart a way forward to a cordial association between the regions of the country and promote output growth.

2. Review of Literature

Conceptual Review

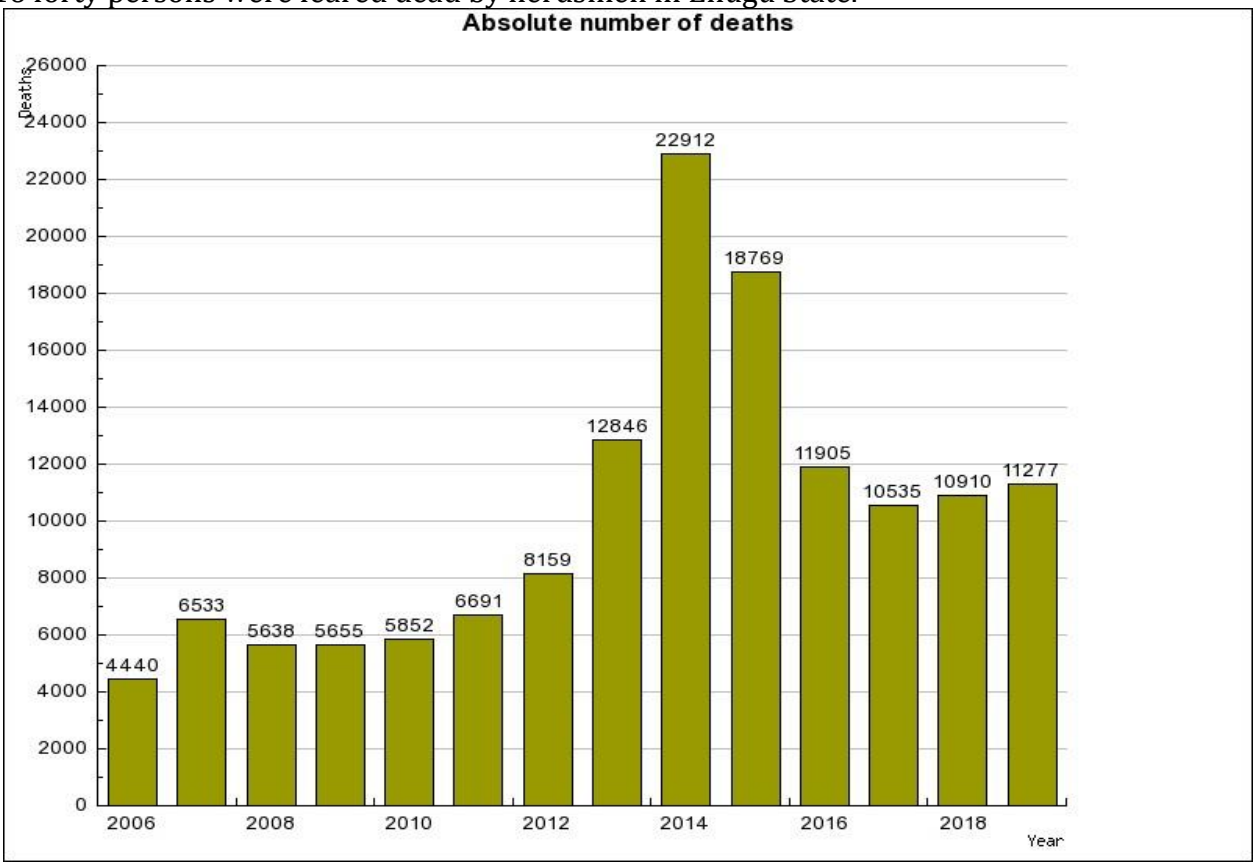
For better understanding of the research topic, key concepts which cover the topic will be explained.

Climate Change and Desertification

One of the problems faced in the 21st century is the issue of climate change. Climate change was defined in a United Nations convention in the year 1992 as a change caused by human activities. In a scientific research, it was found that atmospheric greenhouse gases have contributed greatly to climate change (Ebele & Emodi, 2016). The advisory council of Germany on climate issues, stated that climate change has great effect on humans and the ecosystem (McNicoll, 2003). Therefore, to this end, climate change has received a global awareness which led to the signing of Paris climate Change agreement by China and United States to reduce emissions of carbon in the next fifteen years by half. In the northern part of the country, there has been shift in cultivation of crops due to desertification (Scoones, et al., 2005; and Folami & Folami, 2013).

Herders-farmers Conflicts in Nigeria

As the herds of cattle ply the farmland in search of nutritional feeds, thus igniting clashes amongst herders and farmers. According to Global Terrorism Index, herders-farmers clashes resulted to more than 800 deaths in the year 2015. As at 2020, fourteen people were allegedly killed by herdsmen in Delta State, according to Vanguard newspaper, in the year 2016 forty persons were feared dead by herdsmen in Enugu State.



Main trend of violence 2006-2019

Source: Nigeria Watch (2019)

From the chart above, violence was at its peak in the year 2014 followed by the year 2015. This might be caused by 2015 presidential election. While the lowest figure was in the year 2006. From 2016-2019 there was a fluctuating marginal increase in the level of violence.

Theoretical Review

In this section, the theories that capture the underlining topic will be explained.

Conflict Theory

This theory was propounded by Karl Max (1818-1883), it was argued that the core feature of capitalism is conflict. The theory categorized classism into the upper, middle and the lower class. The theory argues that change in class can only take place through competition. Owing to scare resources, there is bound to be conflict; this is evidenced by the herders-farmer conflicts in Nigeria (Idowu, 2017).

Frustration Aggression Theory

This theory was propounded by Dollard & Miller (1939), it argues that as suffering and frustration increases, frustrated individuals tend to unleash their frustration on comfortable individuals. This theory clearly elucidates the phase "a hungry man is an angry man". In Nigeria today, farmers are being killed on their own farmland, igniting calls for government intervention to provide ranches in the Northern part of the country.

Empirical Review

From the empirical investigation of Ikezue & Ezeah (2017); Dimelu, Salifu & Igbokwe (2016); and Olu-Adeyemi (2017) on desertification as key cause of herders-farmers crises and its effect on farm activities in Nigeria, utilizing various analytical tools. It was discovered that desertification influences herders-farmers crises positively and affects farming negatively.

3. Research Methodology

Data was obtained from the PRS International Country Risk Guide, statistical bulletin of the Central Bank of Nigeria, Food and Agricultural Organization (FAO) from the year 2000-2019. The study utilized internal conflict index (Inc) provided by PRS as index of herdsmen/farmers clashes. Desertification was captured in the model using primary tree loss (ptl) as the felling of trees depicts such. Average temperature ($atemp$) was captured in the model as a variable that could explain herdsmen/farmers conflicts as a harsh temperature might reduce green vegetation, exacerbating the conflicts. Rainfall (arn) is seen to aid green vegetation and factored in the model.

The model for this paper is specified thus;

$$Inc = f\ (ptl, atemp, arn) \qquad (1)$$

In a linear form, equation is expressed thus;

$$Inc_t = \delta_0 + \delta_1 ptl_t + \delta_2 atemp_t + \delta_3 arn_t + e_t \qquad (2)$$

Theoretically, it is expected that: $\delta_1 > 0, \delta_2 > 0$, and $\delta_3 < 0$

Most macroeconomic conclusion are usually based on the assumption that the time series are stationary. In reality, this condition is often time violated. The consequence of this the production of a spurious regression when the series are nonstationary. This is remedied by carrying out a unit root test. Most literature favour unit roots test like Dickey-Fuller (DF), augmented Dickey-Fuller (ADF) test and Phillips-Perron (PP) tests. These tests have been shown to have low power resulting in a type II error. Going by this, this paper adopts a superior unit root tests of dickey-fuller generalized least square (DF-GLS) proposed by Elliot, Rothenberg & Stock (1996).

4. Presentation of Empirical Results

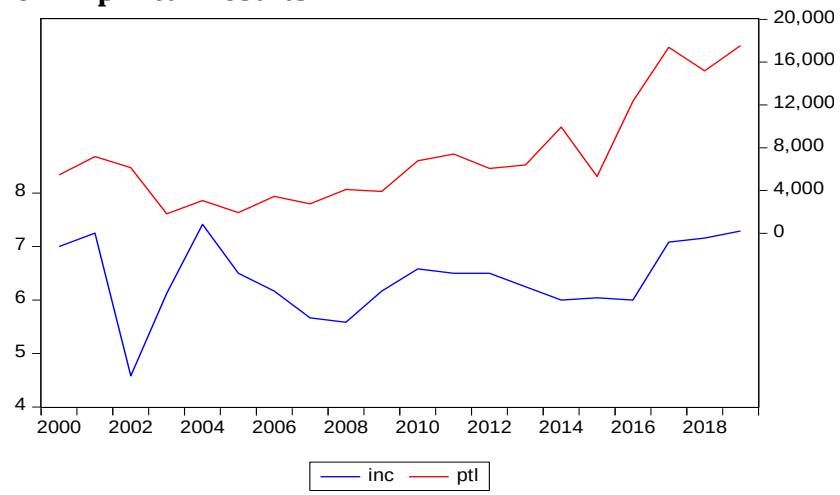


Figure 1: Trend of primary tree loss and violent conflict from 2000-2019
Source: Eview-11 Output (Authors Computation).

The figure above shows the trend movement of primary tree loss and violent conflicts over the sample period of 2000 through 2019. As evidenced by the graph, an increase in primary tree loss (depicting desertification) is associated with rise in violent conflicts in Nigeria. As observed from the graph, a fall in primary tree loss from 2002-2003, saw a corresponding decrease in violent conflicts. Howbeit, as primary tree loss rose between 2015-2017, similar trend movement was observed in violent conflicts in the country. As primary tree loss fluctuated between 2004-2013, identical trend movement was noticeable in violent conflicts employed as measure of farmers/herders clashes.

Table 1: Summary of Univariate Unit Root Result

	DF-GLS Result			
Variable	Level	First Difference	Order of Integration	Decision
$\Delta InARN_t$	-0.93005 (-1.96140)	-9.37142 (-1.96140)	I(1)	SS
$\Delta InATEMP_t$	-3.11732 (-1.96017)		I(0)	SS
$\Delta InINC_t$	-3.38175 (-1.96017)		I(0)	SS
$\Delta InPTL_t$	-0.51213 (-1.96140	-6.39312 (-1.96140)	I(1)	SS

Note: Δ = first difference operator; 5% critical value; SS = Stationary
Source: Eview-11 Output (Authors Computation).

Table 1 above, shows that only internal conflicts and annual temperature were stationary at level as their respective DF-GLS statistics was greater than their corresponding critical values at 5%. Primary tree loss and annual rainfall only became stationary after differencing once. Conclusively, the series are of mix order of integration, with no two I(2), prompting the adoption of the single equation ARDL model proposed by Pesaran, et al., (2013).

Table 2: Summary of Bound Test Based on F-Statistics

Significance	I(0) Bound	I(1) Bound	Statistics
10%	2.72	3.77	F-Stats = 6.261237***
5%	3.23	4.35	k = 3
2.5%	3.69	4.89	
1%	4.29	5.61	

(Null Hypothesis: No Long-run Relationship Exist)**;** *, ** and *** denote rejection of the null hypothesis at Significance of 10%, 5% and 1% level, respectively. *K* = Number of regressors.
Source: Eview-11 Output (Authors Computation).

Table 2 which captured the result of the bound test approach to long run determination between the series of interest. As evidenced from table, the F-statistics (6.261237) is greater than the upper bound value at 5% level of significance (4.35). Based on this, we conclude that there exists long run relationship between the series.

Table 3: Summary of Autoregressive-Distributed Lag Long Run Result

Variable	Coefficient	t-statistics	Prob.
$InPTL_t$	-0.0405	-1.2336	0.2455
$InATEMP_t$	5.0714	1.6429	0.1314
$InARN_t$	-0.5822	-2.4167	0.0363**
C	-11.9910	-1.1679	0.2699

Note: *, ** and *** denote significance at 10%, 5% and 1% level, respectively.
Source: Eview-11 Output (Authors Computation).

As seen from Table 3, the behaviour of the explanatory variables in the long run is captured in table 3 above. As revealed by the table, a negative relationship exists between primary tree loss and violent conflicts in the long, though the established relation is not statistically different from zero. Conversely, a negative and significant relationship abound between annual rainfall and violent conflicts in the long run. Annual temperature was found to contribute positively to violent conflicts in the long run. Though it contributory tendencies is insignificant.

Table 4: Summary of Short Run Autoregressive-Distributed Lag Model

	ARDL (2, 0, 1, 1)			
$\boldsymbol{Regressor}$	$\boldsymbol{Coefficient}$	$\boldsymbol{Std, Error}$	$\boldsymbol{T-Stats}$	$\boldsymbol{Prob.}$
$\boldsymbol{D(InINC_{t-1})}$	0.6439	0.2595	2.4811	0.0325
$\boldsymbol{D(InPTL_t)}$	-0.0736	0.0642	-1.1472	0.2780
$\boldsymbol{D(InATEMP_t)}$	2.4132	3.8226	0.6313	0.5420
$\boldsymbol{D(InARN_t)}$	-0.5235	0.3042	-1.7211	0.1160
$\boldsymbol{ECM_{t-1}}$	-1.8150	0.3758	-4.8292	0.0007

Source: Eview-11 Output (Authors Computation).

As evidenced from table 4, the short term, previous internal conflicts were found to significantly exacerbate current level of internal conflicts. Current primary tree loss which measures desertification was found to not to fuel current internal conflicts as an inverse and insignificant relationship exist between both phenomena. Identical relation was noticeable between annual rainfall and internal conflicts in the short run. In clear contrast to the above, annual temperature fuels current violent conflicts, though not significant. Discrepancy between previous actual values of internal conflicts and equilibrium level of internal conflicts is corrected at a speed of 181 per cent. This shows that the crafted model has a fast speed of adjustment.

Table 5: Summary of Diagnostic Test

Test/Hypothesis Tested	Test type	Test-stats.	Prob.	Decision
Residual Normality **(Residuals are normally distributed)**	Jarque-Bera	0.6111	0.7367	Accept
Serial Correlation **(no serial correlation)**	Breusch-Godfrey LM Test	0.8855	0.4493	Accept
Heteroskedasticity **(Homoscedasticity exist)**	Breusch-Pagan-Godfrey	0.3770	0.8958	Accept

Note: (hypothesis is in null form).
Source: Eview-11 Output (Authors Computation).

The reliance on the parameter estimates for prediction purposes is built on the residual scaling through certain diagnostics test. From table 5 above, the Jarque-Bera test revealed that the residuals are normally distributed. The outcome of the Breusch-Godfrey LM test shows the error terms are not serially correlated. Also, the Breusch-Pagan-Godfrey test disclose that the residual has constant variance. Conclusively, the parameter estimates of the model can be relied upon for forecasting future internal conflicts are all diagnostic conditions are satisfied.

5. Conclusion and Recommendations

The continuous depletion of trees has been titled as one of the primary causes of climate change as it increases the concentration of carbon dioxide in the atmosphere which adds to the volume of greenhouse gases (GHGs). The consequence of climate change manifest in the rise in sea level, loss of green vegetation, among others has been suggested as possible cause of the farmers-herders clash in Nigeria as it makes it difficult for herders to find required feed for their animals. This study, which empirically investigated this claim, considered the individual impact of primary tree loss, average temperature and annual rainfall on farmers-herders clash measured using the internal conflict index, a feat neglected by previous studies. Our empirical findings shows that the internal conflict index is unaffected by primary tree loss. However, an increase in annual rainfall translates into a decrease in internal conflict. Adigun (2019) found that climate change contributes to farmers/herders clashes in Nigeria. This paper deviates from this as it found no evidence of significant relationship between internal conflicts and desertification. In line with this, the study concludes that internal conflicts in Nigeria, in the form of farmers-herders clashes, is not attributable to climate change. In view of this, the study propose that government should set up ranches in the Northern part of Nigeria and feeds provided using the hydroponic farming system. This recommendation is predicated on the cultural differences between the Southern and Northern part of Nigeria to avoid reoccurrence of violent clashes.

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