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PEER REVIEWED ARTICLE

Socio-Ecological Drivers of the Pastoralist-Farmer Conflict in Nigeria's Mid-Benue Trough: Introducing the Ethnicity Dimension

Chukwudi Njoku,[1] Joel Efiong[2] and Stefano Moncada[3]

Abstract

It is not clear how different social, demographic, economic and ecological factors influence the prevalence and lethality of pastoralist-farmer conflicts in Nigeria's Mid-Benue Trough. This study introduces the ethnicity dimension alongside factors such as climate change, economic development, population density, political violence and terrorism. Data originates from secondary sources, and multinomial regression is used to model significant effects. The results suggest that ethnicity has a greater impact on the lethality of conflicts than other factors (0.038, $x^2 = 16.339$). Further results show that lethal pastoralist-farmer conflict incidents occur in areas directly affected by climate change (87.4 per cent), with low levels of economic development (77.3 per cent) and low population density (58.9 per cent). The study highlights the effect of the multi-ethnic nature of the area as a main driver of lethal conflicts. Solutions for actions are therefore discussed for consideration by relevant authorities in efforts to integrate the ethnic diversity of the area into policy.

1 Department of Geography and Environmental Science, University of Calabar, Nigeria. Email: chukwudi.njokupg@gmail.com

2 Department of Environmental Resource Management, University of Calabar, Nigeria. Email: joelefiong@unical.edu.ng

3 Islands and Small States Institute, University of Malta, Malta, University of Malta, Malta. Email: stefano.moncada@um.edu.mt

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1. Background to the Study

Conflicts between pastoralists and sedentary Indigenous farmers continue to be a major obstacle to social cohesion and development in different parts of the world, especially in countries of the Global South, which lack the symbiotic combination of crop and livestock enterprises as practiced in the Global North (Smith 1969).

The violent conflicts between pastoralists and farmers in the West Africa have escalated in recent years, claiming thousands of lives at known flashpoints – described as zones of insecurity – especially in parts of Nigeria and Mali (UNOWAS 2018). Similar to terrorism, these conflicts engender bottlenecks in the socioeconomic development of Nigeria (Njoku et al. 2018). Notwithstanding the widespread conflicts, in many areas of West Africa, pastoralists and farmers have a history of harmonious and symbiotic relationships characterised by exchange of goods and services (International Crises Group 2017).

Nigeria is at the centre of the conflict between pastoralists and farmers, which occur in varying degrees. The current scale of violence is unprecedented (Aov et al. 2017), with large parts of Nigeria, especially the Mid-Benue Trough in central Nigeria, experiencing an escalation of the conflict, which has leaft hundreds of citizens dead, property destroyed and thousands of people displaced (SBM Intelligence 2018). For example, in 2020, 363 communities in Taraba state were recorded to have experienced incidents of pastoralist-farmer conflicts leading to the displacement of more than 70,000 people in the state (Oruonye, Ahmed and Fatima 2020). Also, there was an estimated death toll of over 2,000 persons arising from the conflict in Kaduna and Benue states in 2016 alone (International Crises Group 2017). Overall, the conflict has led to the death of at least 4,000 people since 2016 (Adebayo 2023), the displacement of thousands of people, and it has cost Nigeria approximately 14 billion US dollars due to lost potential revenues annually (Baba and Abeysinghe 2017; International Crises Group 2017).

The interaction between the two groups has led to conflicts that often originate in broader issues, such as religion, ethnicity and politics. The conflicts have been described as 'localised green wars', taking place in a milieu of demographic change, environmental degradation, resource scarcity and political instability

(Shettima and Tar 2008: 179). However, it has not yet been empirically tested how much influence such factors have on the prevalence and lethality of the conflicts. For instance, notwithstanding the attempt to link climate change and conflict by scholars (Abugu and Onuba 2015; Akinyemi and Olaniyan 2017), there is still uncertainty about the actual weight of climate events on the lethality of the conflict (Amusan, Ola and Akinyemi 2017). Moreover, the attempts by scholars to investigate the potential link between climate change and violent conflict in recent years have not yielded a consensus (Odunuga and Badru 2015; Sester, Theisen and Schilling 2016; Akinyemi and Olaniyan 2017).

Similarly, it is not certain how socioeconomic factors like population density, economic development, terrorism, political violence and ethnicity influence the prevalence and lethality of conflicts. While some authors have identified a nexus between the five factors (Tavares 2004; Blomberg and Rosendor 2009), the debate about the level of their relative impact is ongoing (Python et al. 2019). For example, Le Houerou stated that conflicts involving pastoralists are driven by several factors and that 'the effect of climate on pastoralism cannot be validly considered in isolation but should be examined within a socio-economic framework' (1985: 4). In this vein, the new violent and widespread conflicts between pastoralists and farmers have been linked to an increase in both human and livestock population (Nwalimu and Matimbwa 2019; Nwakanma and Boroh 2019).

While ethnicity has been identified as a powerful motive for violence (Hansen, Nemeth and Mauslein 2018), its effects on the pastoralist-farmer conflicts in the multiethnic Mid-Benue Trough is yet to be empirically examined. Kratli and Toulmin (2020) attempted to link the conflicts in the sub-Saharan region to ethnic differences and stereotyping, especially between the Fulani pastoralists – the biggest ethnic group among the pastoralists – and sedentary farming groups who are of other ethnicities, such as the Tiv, Idoma, Jukun andHausa. According to Krätli and Toulmin (2020), ethnicity becomes a potential source of conflict when the pastoralists do not establish social connections with local communities. This is exemplified in the Ruga of the pre-colonial era, which aided conflict resolution between Fulani pastoralists and farming groups (Ellwood 1995). The Ruga is an elected official who regulates grazing activities within his group, selecting grazing areas and migratory routes, and takes responsibility for conflict resolution within Fulani groups and between his kinsmen and farming groups (Ellwood 1995).

Ethnicity may also lead to conflict when pastoral groups exhibit 'heroic' traditions that celebrate warfare and raiding. Furthermore, it has been hypothesised that the violence between pastoralists and farmers is usually high in areas of prevailing insecurity resulting from terrorism or ethnic and political violence (UNOWAS 2018; Kratli and Toulmin 2020; Tade 2020).

Similarly, it has been noted that climate change and landscape transformation affect agricultural activities in Nigeria. The Intergovernmental Panel on Climate Change (IPPC) forecasts that these effects are likely to further strain the delicate relationship between pastoralists and farmers (Cabot 2017). Moreover, the uncontrolled loss of vegetal cover and continued aridity of northern Nigeria (Olagunju 2015) exacerbates changes in Land Surface Temperature (LST; Timbal and Arblaster 2006). This leads to a decline in land and water resources (Muhammed, Ismaila and Bibi 2015) and ultimately resource scarcity (Sester, Theisen and Schilling 2016). In this vein, Benjaminsen, Maganga and Abdallah (2009) linked the conflict between pastoralists and farmers to increased tension between the groups due to scarcity of renewable resources and population growth.

The uncertainty about the influence of socioeconomic, ecological and especially ethnic polarisation on the pastoralist-farmer conflicts in Nigeria presents a research gap. This study thus examines the effects of ecological (climate change) and socioeconomic (economic development, population density, terrorism, political violence and ethnicity) factors on the prevalence and lethality of the pastoralist-farmer conflict in Nigeria's Mid-Benue Trough, a hotspot of the conflict.

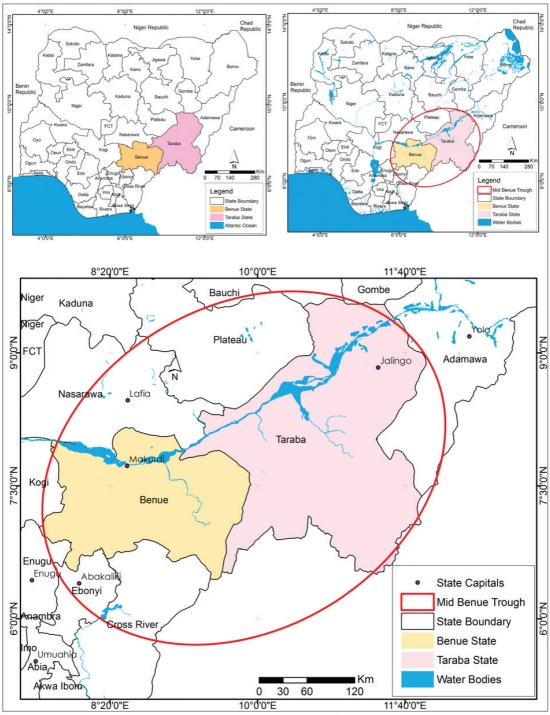
1.2 Description of Study Area

The study area is the Mid-Benue Trough of Nigeria, specifically, Benue and Taraba states (Figure 1). The Mid-Benue Trough is part of the Benue Trough of Nigeria, which is geologically partitioned into Lower, Middle, and Upper-Benue Trough. Benue and Taraba states are in the northcentral geopolitical zone of Nigeria. Both states are located in the Mid-Benue Trough, stretching west and east of the Benue River, from the SSouthwest, around Otukpo in Benue state, to the Northeast, around Jalingo, the capital city of Taraba state. The Mid-Benue Trough stretches latitudinally from 8°10′ to 11°40′ and longitudinally from 7°00′ to 9°30′.

The area is known to possess fertile soil and lush vegetation for farming and grazing (Isola 2018) and has been host to protracted violent conflicts. From 2001 to 2018, the conflicts are recorded to have led to about 60,000 fatalities, with more than 300,000 persons estimated to have been displaced. An estimated 176,000 were displaced in Benue and about 19,000 in Taraba alone (Babatunde 2021).

Both states are home to more than eighty ethnic groups, making the area one of the most ethnically diverse in Nigeria (Oronye 2012). According to Awopetu, Awopetu and Awopetu (2013), most of the people in the area are farmers and herders (especially on the Mambila Plateau and along the Benue and Taraba valleys), while the inhabitants of the riverine areas engage in fishing as their primary occupation.

Figure 1. Benue and Taraba states in the Mid-Benue Trough



SOURCE: AUTHORS, 2021

2. Data and Methods

Types of data used for the study include continuous data of LST, population density and nighttime-lights (NTL) data. Also, discrete data of incidents and attributes (lethality) of the pastoralist–farmer conflict, incidents of political violence and terrorism were collected, as well as nominal data of ethnicity. These datasets originate from secondary sources. Table 1 shows the types and sources of data and Table 2 shows the attributes of the remotely sensed LST, population density and NTL data.

2.1 Data Selection

2.1.1 Pastoralist-Farmer Conflict Data

The pastoralist-farmer conflict data was sourced from Armed Conflict Location and Events Data (ACLED 2019). ACLED is a conflict dataset that collects reported information on internal conflicts within unstable states (Raleigh et al. 2010). The ACLED data was suitable for this study as it provided information on the lethality of the conflicts. Lethality in this study implies conflict events with at least one death. The lethality of pastoralist-farmer conflicts formed the dependent variable of the study, and only conflict incidents with at least one death were considered for the analysis. This is similar to the study of Aliyev and Souleimanov (2018), where lethality was also the dependent variable that presented the total number of deaths during conflicts.

To prepare the conflict data for analyses, the ACLED data was filtered, arranged and reduced to reports of conflicts perpetuated by or between the pastoralists and farmers in Nigeria. The edited data comprises of the following information: date, type of conflict, actor (pastoralists and/or farmers), location of events (including coordinates), number of injuries, fatalities and a brief summary of the circumstances surrounding the event.

2.1.2 Covariates

There is no consensus on which of the covariates adopted in this study is more influential in the prevalence and lethality of the pastoralist-farmer conflict in Nigeria and elsewhere. The conflict between both groups have been hypothesised to be influenced by several factors, such as climate change, environmental degradation, population explosion, religion, ethnicity, political instability. Some of these possible causal factors were adopted as covariates for this study, based on the premise of

their nexus with the existing conflict reports and literature. The covariates considered in this study include climate change, economic development, population density, political violence, terrorism and ethnicity.

The role of climate change in the prevalence and escalation of the pastoralist-farmer conflict has been identified in a number of studies (Aliyu 2015; Sester, Theisen and Schilling 2016; Akinyemi and Olaniyan 2017). Climate change was proxied by LST, which ecologists posit as useful for assessing how humans interact with and within landscapes (Meacham et al. 2016).

Other studies have highlighted the effects of socio-economic factors on the prevalence, escalation and lethality of pastoralist-farmer conflicts (e.g., Hima et al. 2019; Tavares 2004). The role of economic development in particular was highlighted in a similar study on non-state terrorism by Python et al. (2019). NTL was used as a proxy for economic development in their study as it turned out to be suitable for modelling human economic activities worldwide. NTL has been used in the same vein by several other authors (e.g., Ebener et al. 2005; Elvidge et al. 2007; Henderson, Storeygard and Weil 2009).

In the present study, NTL is used as a proxy to measure economic development. While the limitations of using NTL to measure economic development has been identified, such as the tendency to underestimate economic activities that emit less or no additional NTL (Keola, Andersson and Hall 2015), in Nigeria and elsewhere, energy is closely linked to economic development. Research shows that a higher Gross Domestic Product (GDP) correlates with greater electricity use and access (Jack 2022), and light intensity (Levin and Zhang 2017). According to Pérez-Sindín, Chen and Prishchepov (2021), the level of illumination of towns and cities is therefore important to examine patterns of socioeconomic change, especially in middle- and low-income countries like Nigeria.

Rapid population growth, informed by the demographic theory of conflict, has also been identified as a factor that explicates violent and far-reaching nature of farmer-herder conflicts (Nwakanma and Boroh 2019; Nwalimu and Matimbwa 2019). In this vein, Hauge and Ellingsen hypothesised that 'countries with high population density are more likely to experience domestic armed conflict than countries with low population density' (1998: 305). Oyama (2014) also attributed conflicts to population explosion. These assertions and inferences are in-line with

Malthusian and Neo-Malthusian conceptions of population growth and increasing land and water scarcity as primary drivers of resource conflicts (Conroy 2014).

Hauge and Ellingsen's (1998) hypothesis also linked political indicators to the prevalence and nature of conflicts. They posited that countries with stable democracies are less likely to experience violent conflicts, thus highlighting the possible role of political violence in the prevalence of pastoralist-farmer conflicts. In Nigeria, according to ACLED (2023), the electoral process coincides with a surge in violent events carried out by and against some supporters of political parties every election year. This political violence usually escalates along ethnic, sectarian and religious lines, resulting in several fatalities (Alabi 2023). Political violence in this study thus implies actions that suppress opponents, deter rival candidates from running, change voting outcomes and influence the overall electoral process. It also involves inciting hate speech and actions that stoke up intercommunal tensions along already fragile ethnic and religious lines (Oyewole 2022).

Also, the linkages between terrorism and the pastoralist-farmer conflict have been identified. Terrorism in Nigeria is characterised by organised violent attacks on targets such as government forces, institutions, individuals and groups, with the aim of undermining a lawfully constituted authority and breeding fear among the populace to advance their sociopolitical objectives (Osewa 2019). Terrorist groups in some parts of Nigeria, such as Boko Haram or their splinter group, the Islamic State West Africa Province (ISWAP), have exploited the pastoralist-farmer conflict to advance some of their activities such as recruitment, propaganda and violent attacks, which are easier to execute in an already chaotic civil state (Brottem 2021).

Ethnically polarised areas have also been shown to lead to more lethal conflicts (Python et al. 2019). Nigeria is an ethnically and socially diverse country. The Mid-Benue Trough reflects this with different groups of people who profess a shared common identity based on origin, traditions, cultural uniqueness and language (Solomon and Leith 2001). In Nigeria, the influential role of ethnicity in the conflict was attested to by Shettima and Tar (2008) but challenged by Shittu, Galtima and Dan (2016), who noted that factors such as climate change and environmental degradation are more influential. Other authors (Montalvo and Reynal-Querol 2000; Alesina et al. 2003) have used different sources to construct datasets of ethnic groups for a large sample of countries with good results. In line with this, this study adopted the ethnic-diversity data presented in a map by Went (2014).

Table 1. Types and sources of data

S/N	Data	Category	Type	Source	Period
1	Incidents and attributes (lethality) of pastoralists/farmers conflict	Secondary	Discrete	ACLED	1997 to 2019
2	Incidents of political violence	Secondary	Discrete	ACLED	1997 to 2019
3	Incidents of terrorism	Secondary	Discrete	ACLED	1997 to 2019
4	Satellite imageries	Secondary	Continuous	MODIS	2020
5	Population density	Secondary	Continuous	UNOCHA	2018
6	NTL	Secondary	Continuous	NASA	2016
7	Ethnicity	Secondary	Nominal	Went (2014)	

SOURCE: AUTHORS, 2023

Table 2: Attributes of satellite data

S/N	Dataset	Period	Time	Month	Resolution/ Sensor	Derivable	Source
1.	MODIS Land Surface Temperature and Emissivity	2020	Start: 00:00:00 End: 23:59:59	January	1000m/ MODIS Terra	LST (Day)	USGS NASA EarthData (https://lpdaac.usgs.gov/products/mod11a1v006/)
3.	DigitalGlobe high resolution population density raster	2018			30m	Population density	Facebook Connectivity Lab and Center for International Earth Science Information Network (https://data.humdata.org/dataset/highresolutionpopulationdensitymaps-nga)
4.	NTL	2016			National Oceanic and Atmospheric Administration (NOAA)	NTL	NASA (https://earthobservatory.nasa.gov/features/NightLights)

SOURCE: AUTHORS, 2023

2.2 Data-Analysis Techniques

To determine the linkages between the prevalence of lethal pastoralist-farmer conflicts and the covariates, the point data of the conflicts (see Appendix 1) were overlaid on each of the independent variables (LST, NTL, population density, political violence, terrorism and ethnicity) in the ArcGIS Geographic Information Systems (GIS) software application. The covariates were firstly analysed as maps and categorised into different classes (see Appendix 2 to 6). As shown in Table 3, the information obtained from the LST indices analysis was classified into five categories using the manual classification method and temperature-classification scheme adapted from Kapoi and Alabi (2013). Population density was classified into two categories; areas with low (<9) and high population densities (10–22) per 30 square metres grid. Terrorism and political violence were classified into two categories respectively, differentiating places where such events did and did not occur in the past. NTL was divided into five categories based on radiance level, while ethnicity was broken down into nine categories based on the number of major ethnic groups identified in the area. The *extract multi-values to point* tool in ArcGIS was used to extract the lethal incidents that occurred within each category of the independent variable.

To draw inference from this study, the multinomial regression analysis was used to test the hypothesis that socio-ecological factors (climate change, economic development, population density, political violence, terrorism and ethnicity) do not significantly influence the lethality of pastoralist-farmer conflicts in the Mid-Benue Trough. The regression model is expressed as follows:

$$y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \beta_4 x_4 + \beta_5 x_5 + \beta_6 x_6 + \varepsilon \quad \textit{(equation 1)}$$

Where:
y = dependent variable (lethality of pastoralist-farmer conflicts)
β = coefficients
$x_1 - x_6$ = independent variables (LST, NTL, population density, political violence, terrorism, ethnicity)
ε = error term

The data were coded as dummy, nominal and ordinal variables into the SPSS database as shown in Table 3.

Table 3: Variable classification and coding

S/n	Variable (units)	Type	Dummy value	Variable classes
1	Conflict lethality	Nominal	1	Occurrence of lethality
2	Population density (persons per 30m2 grid)	Ordinal	1	Less than 9
			2	10 to 22
3	NTL (Radiance)	Ordinal	1	Less than 8
			2	8 to 51
			3	51 to 116
			4	116 to 176
			5	176 to 224
4	Terrorism	Nominal	1	Occurrence of terrorism
			2	No occurrence of terrorism
5	Political violence	Nominal	1	Occurrence of political violence
			2	No occurrence of political violence
6	Ethnicity	Nominal	1	Idoma
			2	Tiv
			3	Jukunoid
			4	Ful
			5	Jibu
			6	Somyev
			7	Mumuye
			8	Hausa
			9	Igbo
7	LST (°C)	Ordinal	1	Very low (<25°C)
			2	Low (26°C – 29°C)
			3	High (30°C – 33°C)
			4	Very high (34°C – 37°C)
			5	Extremely high (>38°C)

SOURCE: AUTHORS, 2023

3 Results and Discussions

3.1 Overlay of Pastoralist-Farmer Conflict Lethality and Socio-Ecological Drivers

An overlay of the conflict data on each of the independent variables revealed the number of conflicts that occurred within each variable class. As shown in Table 4, there were 203 lethal conflict incidents between pastoralists and farmers (65.7 per cent) in the high-LST class areas (30–33 degrees Celsius). This implies that there was more conflict prevalence in the high-LST class. In addition, the very high-(34—37 degrees Celsius) and extremely high-LST (>38 degrees Celsius) areas recorded 39 (12.6 per cent) and 28 (9.1 per cent) lethal incidents respectively.

The hostilities between the two groups have led to several fatalities in the high-LST areas, likely due to unfavourable climatic conditions, which places further strain on the delicate relationship between pastoralists and farmers (Cabot 2017). Drawing on the eco-violence theory, Odoh and Chigozie (2012) argued that, although the immediate cause of the pastoralist-farmer conflict in Nigeria is the scarcity of natural resources, climate change is likely to be its ultimate cause.

Supporting the notion of a nexus between climate change and conflict, Akinyemi (2016) contends that 'climate change has aggravated livelihood constrictions and migratory adaptation thereby heightening agro-cultural, economic and social contestations which account for increasing incidence of resource competition and violent conflicts in Nigeria' (2016: ix). This is similar to the case of the Agogo area in Ghana where Issifu, Darko and Paalo (2022) showed that frequent clashes and conflicts between the herders and farmers are primarily caused by the competition for water and grassland use, especially during the dry seasons, where an increased number of pastoralists and farmers hustle for reduced fertile lands and water resources.

Table 4 shows the result of the analysis of the number of lethal conflicts that occurred within each population density class. Notably, there were more lethal pastoralist-farmer conflicts (58.9 per cent) in low population-density areas (0 to 9 persons per 30 square metres) and fewer lethal conflicts in locations with higher population density (10 to 22 persons per 30 square metres). As argued by Shettima and Tar (2013), this implies that violent events are more likely to occur in areas with low population density, such as suburbs, villages, farmland and rangeland.

The prevalence of high incidents of conflict lethality in less densely populated areas also suggests that population growth in the rural areas is exceeding the capacity of the available land to support increased pastoral and farming activities (Nwakanma and Boroh 2019).

Blench (2005) noted that the more land under cultivation in areas with low population density the more likely is a conflict between pastoralists and farmers to occur. To contextualise this, in the pre-colonial era, the population of Nigeria was as low as 10 million, whereas in the late nineteenth century the population had grown to 140 million (Shettima and Tar 2013). In line with this, Brottem (2021) noted that 'the rural population in the Sudano-Sahelian zone of West and Central Africa has grown by more than 40 per cent over the past 20 years and cropland has doubled in area reaching nearly 25 per cent of the total land surface' (2021: 2). This trend is said to accelerate alongside population growth, leading to increased land scarcity, especially for pastoralists, and consequently, conflicts between competing land users.

NTL was used as a proxy to measure the level of economic development in the Mid-Benue Trough. The result of the analysis in Table 4 shows that there were 242 lethal conflicts in areas with the lowest NTL-radiance class (0 to 8 watt per steradian per square metre). This represented 77.3 per cent of the total number of conflicts. The prevalence of a high number of conflicts in low-NTL areas suggests that pastoralist-farmer conflicts may be driven by under-development. Beyene (2014) claimed that socioeconomic factors are both causes and remedies for conflict. Beyene noted that socioeconomic deprivation is a significant ingredient in the process of conflict initiation. The scenario of high lethal-conflict incidents in areas of low economic development can also be explained by Hauge and Ellingsen's hypotheses that 'economic development has a higher explanatory power in the initiation and escalation of conflicts than environmental scarcity' (1998: 305).

Table 4 shows the number of lethal conflicts that occurred within communities that have also experienced terrorism. It indicates that only 42 pastoralist-farmer conflict events (13.6 per cent) occurred in locations with history of terrorism between the year 1997 and 2019. A total of 267 lethal conflicts (86.4 per cent) thus took place in locations without history of terrorism. The prevalence of pastoralist-

farmer conflicts and terrorism in the same communities could imply a nexus between the two violent events. Fulton and Nickels inferred that the conflicts between pastoralists and farmers can be worsened by the prevalence of terrorism in an area as the terrorists 'actively aggravate hostilities and manipulate ethnic and religious differences attached to different lifestyles of both groups' (2017: 2). Johnson and Okunola (2017) also linked the conflicts to terrorism, describing pastoralism as a new phase of terrorism in Nigeria. This linkage according to Fulton and Nickels is because 'general pastoralist grievances and conflicts could facilitate terrorism's push into new areas' (Ibid.). The United Nations (2021) also suggests that terrorist groups have exploited the growing tensions between herders and farmers to recruit new members. For example, in Mali, marginalised populations of herders are increasingly becoming a target of recruiters of terrorist groups; many pastoralists have actively joined terrorist groups because of anti-government and pro-pastoral causes (Benjaminsen and Ba 2021).

Political violence was shown to be prevalent in the Mid-Benue Trough. The result in Table 4 shows that, from 1997 to 2019, 151 lethal pastoralist-farmer conflicts (48.9 per cent) occurred in communities with history of political violence. Although Shettima and Tar (2013) noted that the conflicts are 'less political', the findings from this study suggest that political differences and the violence that ensues from this may be a driving factor of the conflicts. This corroborates the finding of Tade (2020) in Nassarawa state, where the tussle for election victory in 2019 was linked to the initiation and escalation of farmer-herder conflicts.

Further analysis in Table 4 revealed that Benue and Taraba states in the Mid-Benue Trough are multiethnic, thus people of different ethnic groups are neighbours or coexist in the same communities, even when there is a more dominant ethnic group. Lethal pastoralist-farmer conflicts occurred within the domains of the nine ethnic groups identified, although they were more lethal in some than others. Notably, there were more lethal conflicts (55.3 per cent) in the domain of the Tiv ethnic group. A total of 14.6 per cent of the conflicts also occurred within the Jukunoid areas and 8.7 per cent on the land of the Idoma ethnic group. According to Awopetu, Awopetu and Awopetu (2013), the majority of the people that make up these ethnic groups (Tiv, Jukunoid and Idoma) engage in farming and fishing as their primary occupation. On the other hand, only 9.1 per cent of the lethal conflicts occurred in the areas occupied by the Fulani ethnic group, who are predominantly pastoralists.

Table 4. Frequency of pastoralist-farmer conflict lethality within covariate classes

Variable	Class	Frequency	Percentage
LST (°C)	less than 25	1	0.3
	26 to 29	38	12.3
	30 to 33	203	65.7
	34 to 37	39	12.6
	greater than 38	28	9.1
	Total	309	100
Population density (persons per $30m^2$ grid)	less than 9	182	58.9
	10 to 22	127	41.1
	Total	309	100
NTL (Radiance)	less than 8	242	78.3
	51 to 116	33	10.7
	116 to 176	32	10.4
	176 to 224	2	0.6
	Total	309	100
Terrorism	occurrence of terrorism	42	13.6
	no occurrence of terrorism	267	86.4
	Total	309	100
Political violence	occurrence of political violence	151	48.9
	no occurrence of political violence	158	51.1
	Total	309	100
Ethnicity	Idoma	27	8.7
	Tiv	171	55.3
	Jukunoid	45	14.6
	Ful	28	9.1
	Jibu	18	5.8
	Somyev	3	1
	Mumuye	11	3.6
	Hausa	1	0.3
	Igbo	5	1.6
	Total	309	100

SOURCE: AUTHORS, 2023

3.2 Effects of Socio-Ecological Drivers on Pastoralist-Farmer Conflict Lethality

The multinomial regression analysis was adopted to test the hypothesis that socio-ecological factors (climate change, economic development, population density, political violence, terrorism and ethnicity) do not significantly influence the lethality of pastoralist-farmer conflicts in the Mid-Benue Trough. The first regression output, the goodness of fit (Table 5), tests the statistical significance of the variables added to the model compared to the intercept, or constant, alone, as seen in the 'Sig.' column, $p = 0.000$. This implies that the full model statistically significantly predicts the dependent variable better than the intercept-only model.

Table 5: Model-fitting information

Model	Model Fitting Criteria -2 Log Likelihood	Likelihood Ratio Tests Chi-Square	df	Sig.
Intercept Only	123.289			
Final	72.330	50.959	18	.000

SOURCE: AUTHORS, 2023

Table 6 shows the goodness of fit, which provides two measures for assessing how well the model fits the data. The table indicates that the Pearson chi-square is not statistically significant ($p = 0.594$), meaning that the model fits the data well. The second statistic is the deviance, which, in the same way, indicates that the model fits the data well as the test shows no significance ($p = 0.570$).

Table 6: Goodness of fit

	Chi-Square	df	Sig.
Pearson	37.260	40	.594
Deviance	37.794	40	.570

SOURCE: AUTHORS, 2023

The likelihood-ratio tests displayed in Table 7 show which of the covariates are statistically significant. The result shows that population density was not statistically significant because $p = 0.086$. Also, NTL, political violence and LST were not statistically significant ($p = 0.146$, 0.503, 0.962, respectively). On the other hand,

terrorism and ethnicity were shown to be statistically significant (p = 0.009, 0.038). Specifically, ethnicity had the highest chi-square value (X^2 = 16.339), which provides strong evidence supporting the hypothesis that ethnicity most significantly influences the lethality of pastoralist-farmer conflicts in the Mid-Benue Trough.

Table 7: Likelihood-ratio tests

Effect	Model Fitting Criteria -2 Log Likelihood of Reduced Model	Likelihood Ratio Tests Chi-Square	df	Sig.
Intercept	72.330(a)	.000	0	.
Population density	75.272	2.941	1	.086
NTL	77.713	5.382	3	.146
Terrorism	79.221	6.890	1	.009
Political violence	72.778	.448	1	.503
Ethnicity	88.670	16.339	8	.038
LST	72.936	.606	4	.962

SOURCE: AUTHORS, 2023

The conflict between pastoralists and farmers has been linked to demographic, socioeconomic and ecological shifts in the Sudano-Sahel Region. However, there is not sufficient evidence to suggest that the scarcity of resources or climate pressures are the primary causes of these conflicts. According to Brottem & McDonnell (2020), the pressure these factors assert are significant, but it is likely that they unfold in the background of cultural issues that are at the heart of conflicts involving both groups. The inference drawn from the hypothesis is that the multiethnic nature of the Mid-Benue Trough significantly and disproportionately influences the lethality of conflicts between pastoralists and farmers, while other factors (climate change, terrorism, economic development, political violence and population density)turned out to have less significant effects.

Although the connection between ethnicity and violent conflict is not straightforward and has been a subject of debate (Ylönen 2017), the nexus cannot be overemphasised where conflicts occur in ethnically polarised areas. Easterly (2000), for example, suggests that ethnic fractionalisation is an important driver of recurrent bloodshed on the African continent.

To buttress the role of ethnicity in the lethality of the conflicts, Hansen, Nemeth and Mauslein (2018) highlighted that ethnicity is a powerful motivation for violence as different parties usually organise along ethnic lines during a conflict. This process is termed ethnic mobilisation, where a group organises along ethnic lines to pursue a socioeconomic or political end (Nagel and Olzak 1982). When ethnicity motivates mobilisation in conflicts over natural resources, the conflict usually features overtones of ethnic claims to resources, such as the pastoralist and farming groups organising and collectively fighting to lay claim to specific lands (Wegenast and Basedau 2013).

This is likely the case in the Mid-Benue Trough, where Benue and Taraba are amongst the most ethnically diverse states in Nigeria. On the one hand, Benue State is inhabited by several ethnic groups, such as the Tiv, Idoma, Igede, Etulo, Abakpa, Jukun, Hausa, Akweya and Nyifon (Awopetu, Awopetu and Awopetu 2013). Taraba State, on the other hand, is the most diverse state in Nigeria; it is home to about 80 ethnic groups speaking around 70 languages (Oronye 2012). Among its major ethnic groups are the Jukun, Mambila, Fulani, Jango, Kuteb and the Mumuye.

Ylönen (2017) explained how ethnicity can drive conflict, noting that when physical violence occurs among individuals, it could extend to interethnic groups as the concerned persons often seek safety with the group they share specific binding identity attributes. Tade (2020) exemplified ethnicity as a trigger in Nassarawa State, where the Tiv ethnic group is a minority tussling for land resources with resident and migrating Fulani pastoralists, some of whom were displaced in Benue State, where the Tiv is a majority, due to the instituted anti-grazing law.

According to Richards (2013), rather than climate change, land expropriation and enclosure are possible drivers of the pastoralist-farmer conflict. This links the conflict to land ownership based on geographical boundaries along ethnic lines. Geographical boundaries in Nigeria are in most cases also ethnic borders. Pastoralism and crop cultivation are distinct agricultural production systems associated with specific groups. While 90 per cent of pastoralists are Fulani (ICG 2017), the farming groups are usually sedentary and have more legally recognised tenure rights over land, leading to issues around property and access rights (Shettima and Tar 2013).

This can be explained by Ostrom's (2008) common-pool resources (CPR) theory, which outlines the conditions necessary for cooperation in managing resources considered common, such as land, whosecontrol is at the centre of the pastoralist-farmer conflict. Conflicts over the utilisation of CPR are not simply material but also depend on the perceptions and affiliations of the competitors (Adams, Brockington, Dyson and Vira 2003). Thus Ostrom (2008) suggested eight principles necessary for managing CPR, such as the need to define clear group and resource boundaries, establish conflict-resolution mechanisms, self-monitoring and self-sanctions to deter rule-breaking, group member's participation in rule making and so on.

In a similar vein, Hardin (1968), in his tragedy of the commons theory, argued that indigenous land-tenure systems are often designed or structured along ethnic lines and have greatly influenced the initiation of conflicts in Africa. There is no well-defined land-tenure system in the region, causing confusion in land administration and intensifying the fight for scarce resources (Akov 2017).

In summary, this study has shown that it is necessary to include ethnicity as a regressor in empirical analysis of the drivers of the pastoralist-farmer conflict since ethnic polarisation is a significant driver of the conflict. In the same vein, Montalva and Reynal-Querol (2005) noted that ethnic diversity generates problems in the design of structural policies related to socioeconomic development. The structural problems that ensue foster corruption, such as favouritism and nepotism, and low efficiency in governments that undermine and marginalise ethnic minorities.

Chigudu (2019), however, noted that ethnic diversity is only a cause of conflict due to external factors like economic and political competition, marginalisation and inequality, which have negative impacts on ethnic diversity. This is the case because, as (Singh 2002) writes, ethnicity in itself is not a cause of violent conflict. However, it can emerge as a major fault line for violent conflicts when it gets linked to other social, economic and ecological processes in a problematic way.

4. Conclusion and Recommendations

This study argues that the ethnic polarisation in the Mid-Benue Trough is the most important predictor of the conflict between pastoralists and farmers. It specifically emphasises the effects of ethnicity on the lethality of the conflicts and suggests

that climate change, population growth, economic development, terrorism and political violence cannot be considered alone or as the main factors. The results presented in this paper indicate that ethnic issues are more central to the process of development in the Mid-Benue Trough, thus special attention should be paid to the area due to its multiethnic nature. It becomes necessary to implement appropriate institutional settings and policies that reduce feelings of grievance, which seem to be high in ethnically polarised regions. Highlighting the role of ethnicity does not, however, imply that the effects of climatic, demographic, political and economic linkages should be discarded, especially due to some limitations in the data available for some of the variables used in this research.

The study finds the following arguments that could be used to further guide policy and structural changes:

i. Institutions should be set up to mitigate the adverse effects of ethnic rivalry, taking as examples the structures in other places or eras that tended to prevent the negative social and economic consequences of ethnic fractionalisation. For instance, considering its level of success, the Ruga system that was implemented in the pre-colonial era could be reintroduced. The Ruga is a social structure that helped preserve the harmony between farmers and pastoralists through an elected official who regulated grazing activities within his group and spearheaded conflict resolution between both groups.

ii. Community-based peace-building committees should be set up. These committees and their activities should be driven by neutral parties such as the State or non-governmental organisations and should be inter-ethnic, to facilitate dialogue and implement conflict-mitigation interventions.

iii. The government should ensure the protection of every group, especially the rights of ethnic minorities. This will require the engagement of trusted, independent, external actors. The physical and legal protection of the individual groups could be a collective effort of security agencies and the judiciary, who would make sure that law and order prevails and that necessary sanctions and punishments are imposed on violators.

iv. The government, through its agencies that administer lands, agriculture and borders, could increase their efforts to ensure sustainable land development, defining clear boundaries and introducing innovations in agriculture that would reduce the dependence on large expanse of land for optimal productivity.

Conflict of interest

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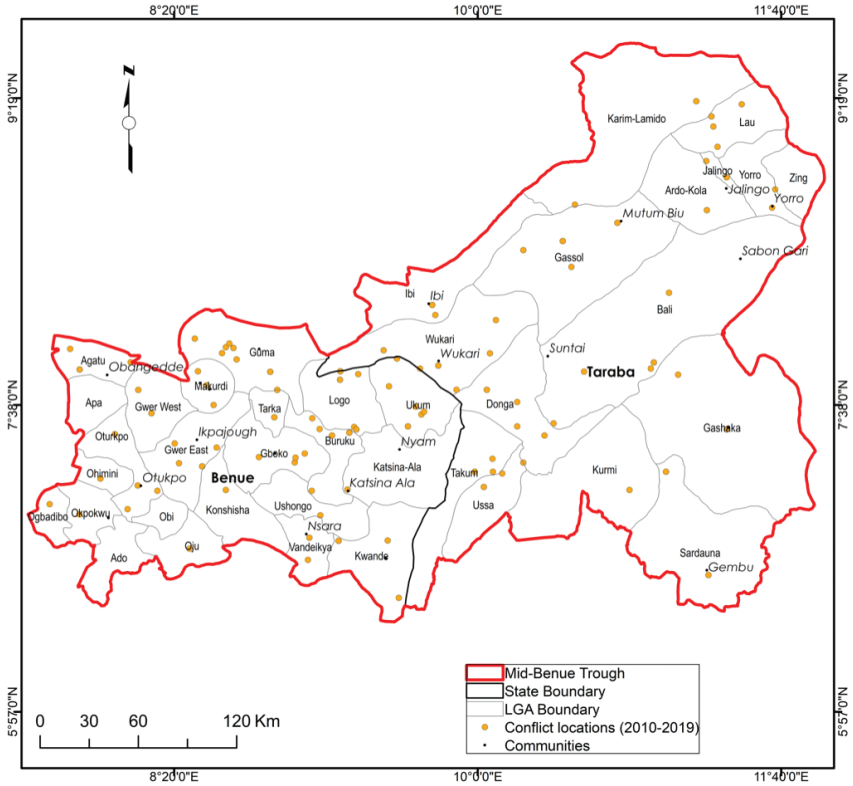
Appendices

Appendix 1: Map of pastoralist-farmer conflict incidents (1997–2019)

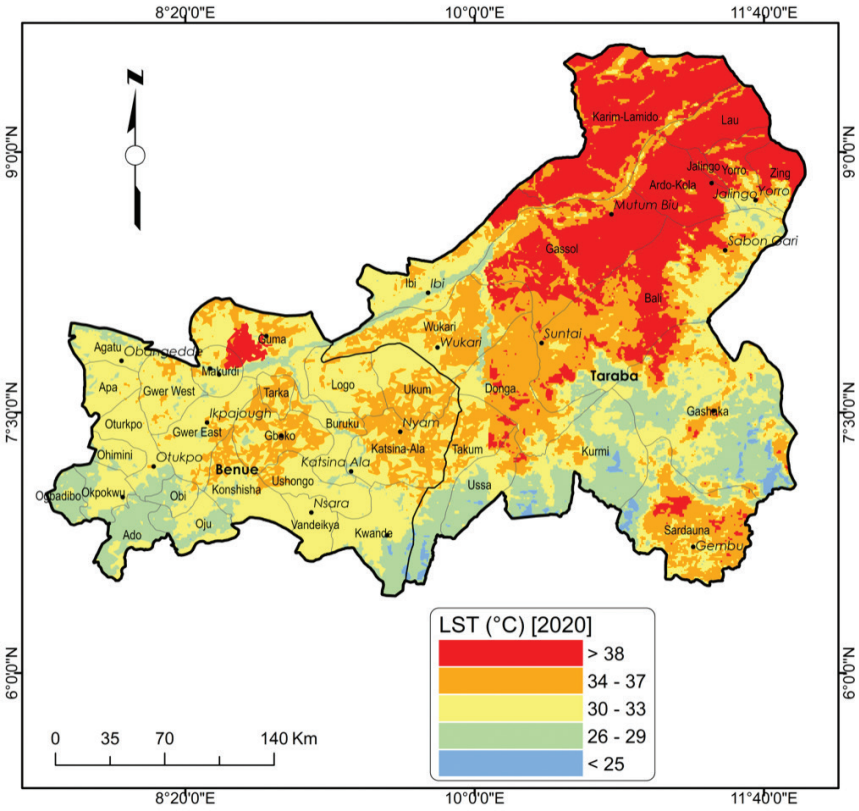


SOURCE: AUTHORS, 2023,

Appendix 2: Map of major ethnic groups in the Mid-Benue Trough

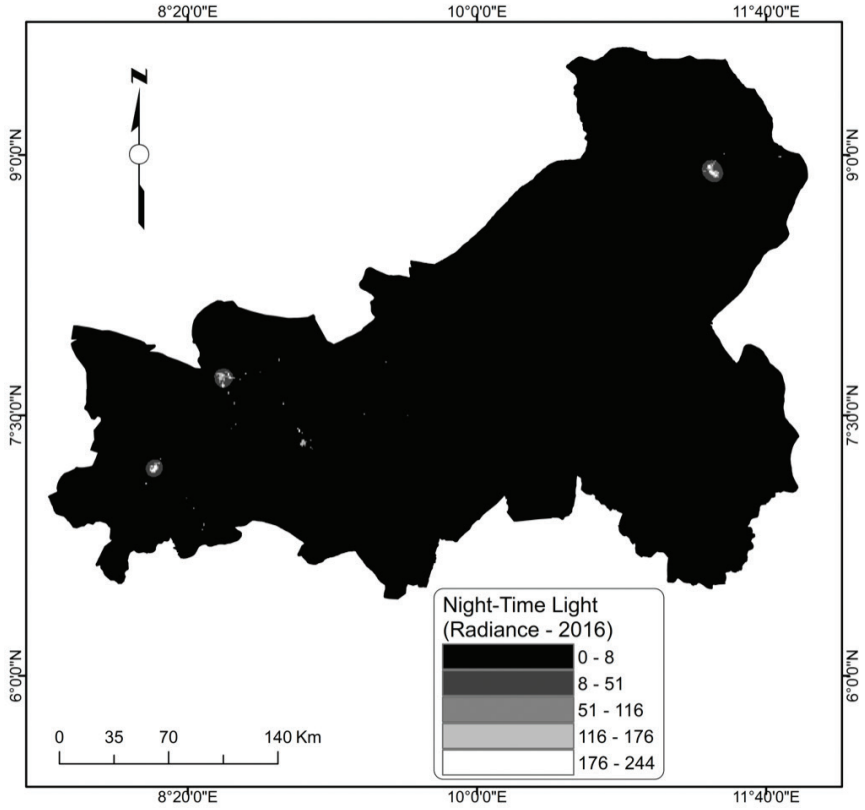
SOURCE: AUTHORS, 2023; WENT 2014

Appendix 3: Map of LST in the Mid-Benue Trough (2020)



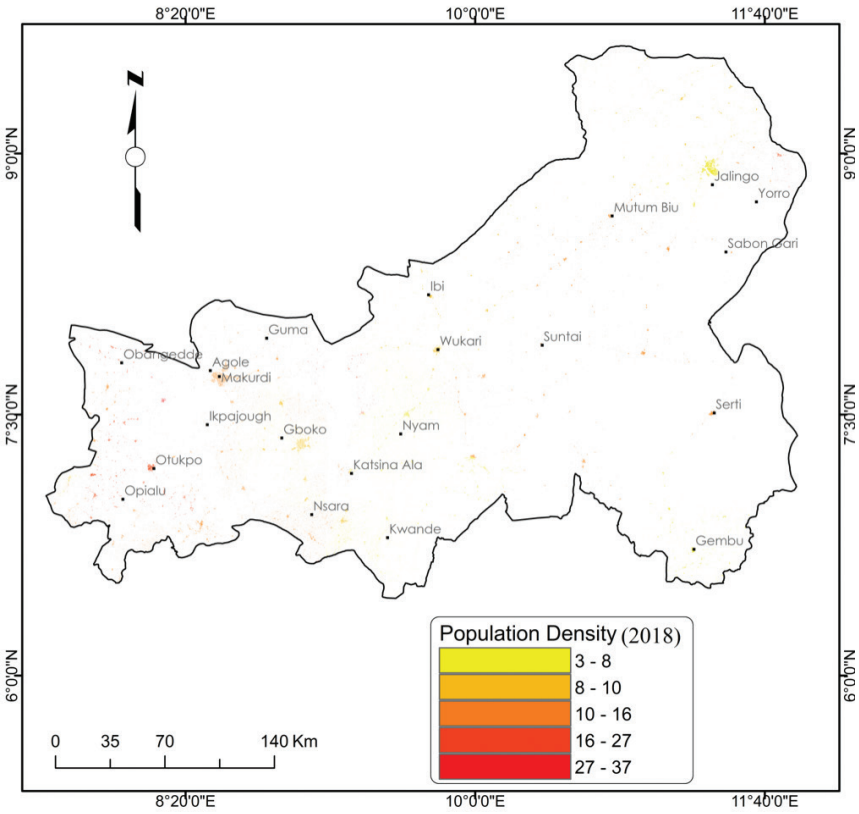
SOURCE: AUTHORS, 2023

Appendix 4: Map of NTL in the Mid-Benue Trough (2016)



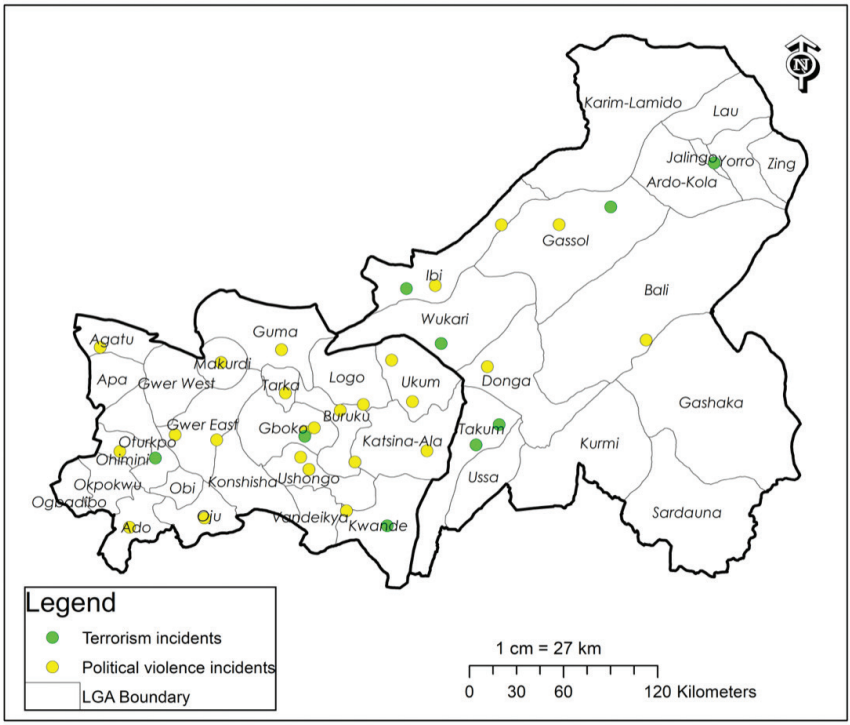
SOURCE: AUTHORS, 2023

Appendix 5: Map of population density in the Mid-Benue Trough (2018)



SOURCE: AUTHORS, 2023

Appendix 6: Map of political-violence and terrorism incidents in the Mid-Benue Trough (1997–2019)



SOURCE: AUTHORS, 2023