Impact of Farmer-Herder Conflicts on Food Security in Northern Senatorial District of Adamawa State

Zainul Abideen Jibril
Adamawa State University, Mubi.
Political Science
Nigeria
E-mail Address(s): abideen660@adsu.edu.ng; zajibril@hotmail.co.uk

Abubakar Adamu
Adamawa State University, Mubi.
Public Administration
Nigeria
E-mail address: adamu758@adsu.edu.ng

Mr Sunday Ngamsan Jirah
Adamawa State University, Mubi.
Public Administration, Nigeria
E-mail Address: Jira732@adsu.edu.ng

Abstract

Farmer-herder conflicts in Nigeria's northern regions have intensified, threatening food security and rural livelihoods. The northern senatorial district of Adamawa state is particularly affected, yet research on the precise impact of these conflicts on food security in this area is limited. This study assessed the impact of farmer-herder conflicts on food security in the northern senatorial district of Adamawa state, identifying conflict causes and consequences, and examining their effects on food availability, accessibility, utilization, and stability. A stratified two-stage cluster sampling design was employed to select 400 households, out of which 384 questionnaires were returned. Data were collected through structured questionnaires and analyzed using descriptive statistics, ANOVA, and MANOVA. The study revealed significant impacts of farmer-herder conflicts on all four dimensions of food security. Conflicts disrupted agricultural activities, limited food access, affected nutritional quality, and compromised food supply stability. Main causes included land disputes, water scarcity, crop damage, and cattle rustling. Farmer-herder conflicts significantly affect food security in the northern senatorial district of Adamawa state, necessitating targeted interventions to mitigate their impact and enhance rural household resilience.

Keywords: *Farmer-herder conflict; Food security; Rural livelihoods; Agricultural productivity; Nigeria*

INTRODUCTION

Food security, defined by the FAO (1996) as consistent access to safe and nutritious food, remains a critical challenge in developing nations, where millions grapple with food insecurity. In Nigeria, a significant driver of this insecurity is the longstanding and intensifying farmer-herder conflict over land and water resources. This complex phenomenon, fueled by population growth, climate change, and socio-political dynamics, often leads to herders grazing livestock on farmlands, causing crop losses and escalating tensions (Ajala, O 2020; Shettima & Tar, 2008; Blench, 2010; Dimelu et al., 2017; Day and Caus, 2020). The resulting cycle of violence, displacement, and property destruction (Adano et al., 2012; Buhaug et al., 2015; Hendrix & Salehyan, 2012; Nnaji et al., 2022) directly impacts agricultural productivity and market access, hindering rural households' ability to achieve food security.

While traditionally, research linked conflict and food insecurity primarily to large-scale violence (George et al., 2020; D'Souza & Jolliffe, 2013), a growing body of research explores the connection between less-violent conflicts and food security, particularly its impact on food consumption (Adelaja & George, 2019; George et al., 2021, 2020). Studies by Owolabi et al. (2016) in Kaduna, Solomon (2021) in Taraba, Yakubu et al. (2021) in Gombe, and Nnaji et al. (2022) across rural Nigeria, all demonstrate the negative impact of farmer-herder conflicts on food security. Reinforcing this is the recent work by Abubakar et al. (2023) in Nigeria's FCT, highlighting the widespread nature of this challenge.

The northern senatorial district of Adamawa state is particularly affected by the farmer-herder conflict. Despite its prevalence, scant research has examined the conflict's precise ramifications on food security in this region. This study aims to bridge this gap by assessing the impact of farmer-herder conflict on food security in the district. It will identify the causes and consequences of these conflicts, examine the accessibility, availability, and stability of food for rural households, and analyze how these conflicts affect all four dimensions of food security.

The study will also test the following hypotheses:

- **Hypothesis 1***: There are no specific causes or consequences of farmer-herder conflicts in the northern senatorial district of Adamawa state.*
- **Hypothesis 2***: The conflict has not significantly affected the availability, accessibility, utilization, and stability of food for rural households in the northern senatorial district of Adamawa state.*

By addressing these hypotheses, this study will provide a comprehensive understanding of the impact of farmer-herder conflicts on food security in the Northern Senatorial District of Adamawa State, providing valuable insights for policy development and intervention strategies.

METHODS

Study Area and Population

The study was conducted in the northern senatorial district of Adamawa State, Nigeria, comprising five local government areas (LGAs): Madagali, Maiha, Michika, Mubi North, and Mubi South. This predominantly agrarian district has a total population of 1,051,700 residents (City Population,

2022), with the primary crops cultivated being maize, rice, sorghum, millet, and groundnut. The district also has a significant pastoralist population that migrates in search of grazing land for their livestock.

Materials and Preparation:

Structured questionnaires were designed to collect quantitative data from rural households on the four dimensions of food security: availability, access, utilization, and stability. The questionnaires were developed in consultation with subject matter experts and stakeholders to ensure relevance and validity. Before the main survey, a pilot study was conducted to test the clarity and reliability of the questionnaires. Necessary adjustments were made based on the pilot study findings.

Sampling Technique:

This study employed a stratified two-stage cluster sampling design to select a representative sample of households from the northern senatorial district of Adamawa State, Nigeria. The district comprises five local government areas (LGAs): Madagali, Maiha, Michika, Mubi North, and Mubi South.

In the first stage, the target population was stratified by LGA. A sampling frame of all wards within each LGA was constructed using the provided lists: Madagali (7 wards), Maiha (10 wards), Michika (12 wards), Mubi North (11 wards), and Mubi South (10 wards). The number of clusters (wards) selected from each LGA stratum was determined through probability proportional to size (PPS) sampling, accounting for the number of wards in the stratum. A total of 30 clusters were allocated as follows: Madagali (4 clusters), Maiha (5 clusters), Michika (6 clusters), Mubi North (6 clusters), and Mubi South (5 clusters).

Within each LGA stratum, the required number of clusters was randomly selected using PPS sampling, ensuring that larger wards had a higher probability of inclusion while allowing for the representation of smaller wards.

In the second stage, within each selected cluster, an updated listing of households was created with the assistance of local authorities or ward leaders. Systematic random sampling was used to select a predetermined number of households from each ward. The sample size of 400 households was allocated proportionately across the LGA strata based on their relative population sizes, ensuring adequate representation and statistical power for subgroup analyses at the LGA level.

Sample Size Determination and Rate of Return

To determine the appropriate sample size for a population of 1,051,700 with a 95% confidence level and a 5% margin of error, Taro Yamane's formula is used:

$$n = \frac{N}{1 + Ne^2}$$

where:

$- (n)$ is the sample size,

$-(N)$ is the population size (1,051,700),

$-(e)$ is the margin of error (0.05).

Applying the formula:

$$n = \frac{1,051,700}{1 + 1,051,700 \times 0.05^2} = \frac{1,051,700}{2,630.25} \approx 400$$

Thus, the required sample size is 400. From the calculated sample size of 400, the actual rate of return was 384 responses. This indicates a high response rate, calculated as follows:

$$\text{Rate of Return} = \left(\frac{\text{Number of Responses}}{\text{Sample Size}}\right) \times 100$$

$$\text{Rate of Return} = \left(\frac{384}{400}\right) \times 100 \approx 96\%$$

This high response rate enhances the validity and reliability of the survey results.

Data Collection and Measurements:

A team of trained enumerators administered the structured questionnaires through face-to-face interviews with the selected households. The enumerators received comprehensive training on data collection procedures, ethical considerations, and techniques for ensuring data quality. The questionnaires gathered detailed information on the causes and consequences of farmer-herder conflicts, as well as their impact on the four dimensions of food security.

Quality Control and Ethical Considerations:

To ensure data quality, various measures were implemented, including random spot-checks, regular debriefing sessions with enumerators, and data validation checks. Ethical clearance was obtained from the relevant authorities, and informed consent was obtained from all participants. Strict confidentiality and anonymity protocols were followed to protect the privacy of the respondents.

Statistical Analysis:

Descriptive statistics, such as means, frequencies, and percentages, were calculated to summarize the data. Inferential statistical tests, including Analysis of variance and Multivariate Analysis of Variance, were conducted to explore the relationships between variables and determine the significance of the findings.

RESULTS AND DISCUSSION

TABLE 1. Demographic Information of Respondents

Variables	Category	Frequency	Percent
Employment Status	Business Owner	28	7.3
	Farmer	303	78.9
	Herder	24	6.3
	Others	29	7.6
	Total	**384**	**100.0**
Monthly Income	N10,000- N50, 000	24	6.3
	N110,000-N150,000	168	43.8
	N60,000-N100,000	192	50.0
	Total	**384**	**100.0**
Education Level	No Formal Education	27	7.0
	Primary	166	43.2
	Secondary	170	44.3
	Tertiary	21	5.5
	Total	**384**	**100.0**
Household Size	11-15	240	62.5
	16-20	48	12.5
	6-10	96	25.0
	Total	384	100.0
Gender	Female	50	13.0
	Male	334	87.0
	Total	**384**	**100.0**
Marital Status	Divorced	4	1.0
	Married	349	90.9
	Single	19	4.9
	Widowed	12	3.1
	Total	**384**	**100.0**

Source: Field Survey, 2024

From Table 1 above, the demographic profile of the respondents provides valuable insights into the socio-economic context in which the issue of food security and farmer-herder conflicts is embedded. The findings align with the broader literature on rural livelihoods in northern Nigeria, where agriculture remains the predominant economic activity, and household structures are characterized by relatively large family sizes (Alabi et al., 2020).

The predominance of male respondents (87%) is consistent with the traditional gender roles in the region, where men are typically the primary decision-makers and breadwinners for their households. However, it is essential to acknowledge the potential underrepresentation of women's

perspectives, as they only account for 13% of the respondents, despite often playing crucial roles in household food security and being directly impacted by conflicts (Simon-Karu, 2022).

The education levels of respondents show a relatively even distribution between primary (43.2%) and secondary (44.3%) education, with a small proportion having no formal education (7%) or tertiary education (5.5%). This educational profile may influence their ability to access information, adopt new agricultural practices, and engage in alternative livelihood strategies. However, it is important to note that formal education does not necessarily equate to practical knowledge or skills relevant to rural livelihoods.

The predominance of farming as the primary occupation (78.9%) underscores the importance of agriculture as a crucial livelihood source in the study area. This finding highlights the vulnerability of rural households to factors that may impact agricultural productivity, such as farmer-herder conflicts, environmental degradation, and climate change (Ajala, 2020; Shettima & Tar, 2008; Blench, 2010; Dimelu et al., 2017; Day and Caus, 2020). It's noteworthy that herders make up only 6.3% of the respondents, which may reflect the ongoing tensions between farmers and herders in the region.

The household size distribution is skewed towards larger families, with 62.5% of households having 11-15 members, and 12.5% having 16-20 members. This pattern of large household sizes may have significant implications for resource allocation, food security, and the ability to cope with shocks or stresses, such as those arising from farmer-herder conflicts.

The income distribution shows that half of the respondents (50%) earn between N60,000-N100,000 monthly, while 43.8% earn between N110,000-N150,000. Only a small proportion (6.3%) falls into the lowest income bracket of N10,000-N50,000. This income distribution may influence households' ability to access resources and cope with food insecurity.

The marital status of respondents indicates that the vast majority (90.9%) are married, which aligns with the cultural norms of the region and may influence household decision-making processes and resource allocation.

While this demographic profile provides valuable context, it is essential to recognize that these characteristics are not static and may be influenced by various socio-economic and environmental factors. For instance, changes in climate patterns or resource availability could potentially impact livelihood strategies, household compositions, and migration patterns (Adano et al., 2012; Buhaug et al., 2015; Hendrix & Salehyan, 2012).

TABLE 2: Descriptive Statistics of Farmer-Herder Conflicts and Food Security in Northern Senatorial District of Adamawa State

Statements	N	Sum	Mean	Std. Deviation
I identify as a farmer/herder in the northern senatorial district of Adamawa state.	384	793.0	2.065	1.1757
I have experienced or witnessed conflicts with other farmers/herders in the past year.	384	624.0	1.625	1.0065
The main causes of the conflicts are land disputes, water scarcity, crop damage, or cattle rustling.	384	755.0	1.966	.9262
The conflicts have resulted in loss of lives, property, income, or social cohesion.	384	550.0	1.432	.8523

The conflicts have affected my mental and physical health	384	611.0	1.59 1	.8346
The conflicts have disrupted agricultural activities and productivity in the study area.	384	449.0	1.16 9	.3755
The conflicts have increased the vulnerability and insecurity of the rural population in the study area.	384	516.0	1.34 4	.7380
I have enough food to meet my household's needs throughout the year.	384	1442.0	3.75 5	1.2038
I can access food from various sources such as markets, farms, or aid agencies.	384	634.0	1.65 1	.9819
The food I consume is nutritious, diverse, and safe.	384	692.0	1.80 2	.9183
The food supply and prices are stable and predictable.	384	1651.0	4.29 9	.4809
I experience food shortages or inadequate access to food on a regular basis throughout the year.	384	748.0	1.94 8	1.1322
Valid N (listwise)	384			

Source: *Field Survey, 2024*

Table 2 above highlights the multifaceted challenges faced by rural households in the northern senatorial district of Adamawa state due to farmer-herder conflicts. The moderate level of self-identification as farmers or herders (Mean = 2.065, SD = 1.1757) suggests a potential blurring of traditional occupational boundaries, which may have implications for conflict dynamics and resolution strategies (Blench, 2010).

The frequent occurrence of conflicts (Mean = 1.625, SD = 1.0065) aligns with previous studies highlighting the persistent nature of farmer-herder conflicts in the region (Shettima & Tar, 2008). The identification of land disputes, water scarcity, crop damage, and cattle rustling as predominant causes (Mean = 1.966, SD = 0.9262) corroborates findings from other studies in similar contexts (Dimelu et al., 2017).

The significant impacts of conflicts on livelihoods, health, and social cohesion underscore the far-reaching consequences of these disputes. The disruption of agricultural activities (Mean = 1.169, SD = 0.3755) is particularly concerning, given the region's reliance on agriculture for food security and economic stability (Ajala, O 2020).

The food security indicators reveal a complex picture. While respondents reported having enough food throughout the year (Mean = 3.755, SD = 1.2038), they also indicated regular experiences of food shortages (Mean = 1.948, SD = 1.1322). This apparent contradiction may be explained by seasonal variations in food availability or differences in household coping capacities (George et al., 2021).

Hypothesis Testing

Hypothesis 1: There are no specific causes or consequences of farmer-herder conflicts in the northern senatorial district of Adamawa state.

To test Hypothesis 1, Analysis of Variance (ANOVA) was conducted to examine whether there are statistically significant differences between groups regarding the perceived causes and consequences of farmer-herder conflicts. The results of the ANOVA are summarized in Table 3 below.

TABLE 3: ANOVA Test Result for Causes and Consequences of Farmer-Herder Conflicts

		Sum of Squares	df	Mean Square	F	Sig.
The conflicts have resulted in loss of lives, property, income, or social cohesion.	Between Groups	132.358	3	44.119	114.925	.000
	Within Groups	145.881	380	.384		
	Total	278.240	383			
The conflicts have affected my mental and physical health	Between Groups	182.329	3	60.776	273.376	.000
	Within Groups	84.481	380	.222		
	Total	266.810	383			
The conflicts have disrupted agricultural activities and productivity in the study area.	Between Groups	33.660	3	11.220	209.646	.000
	Within Groups	20.337	380	.054		
	Total	53.997	383			
The conflicts have increased the vulnerability and insecurity of the rural population in the study area.	Between Groups	83.692	3	27.897	84.853	.000
	Within Groups	124.933	380	.329		
	Total	208.625	383			

Source: Field Survey, 2024

The ANOVA results indicate significant differences between groups for each of the statements analyzed, as all p-values (Sig.) are less than 0.05. This strongly rejects Hypothesis 1, demonstrating that there are specific causes and consequences of farmer-herder conflicts in the northern senatorial district of Adamawa State.

The F-value of 114.925 ($p < 0.001$) suggests a significant variation between groups regarding the impact of conflicts on loss of lives, property, income, or social cohesion. This aligns with the findings of Dimelu et al. (2017), highlighting that land disputes, water scarcity, crop damage, and cattle rustling are critical drivers of conflicts that lead to severe socio-economic consequences.

Moreover, the extremely high F-value of 273.376 (p < 0.001) indicates a strong association between conflicts and adverse mental and physical health effects. This reinforces the understanding that continuous exposure to conflict environments leads to psychological stress and health deterioration, as supported by Ajala (2020).

Furthermore, the F-value of 209.646 (p < 0.001) shows significant differences in perceptions of how conflicts disrupt agricultural activities and productivity. Given that 78.9% of respondents are farmers, the disruption of agricultural activities directly impacts food security and economic stability in the region.

Also, the F-value of 84.853 (p < 0.001) highlights significant differences in the perception of increased vulnerability and insecurity among the rural population due to conflicts. This finding is consistent with previous research by George et al. (2021), which discusses how conflicts exacerbate vulnerabilities by disrupting livelihoods and social structures.

In conclusion, the ANOVA analysis provides robust evidence against Hypothesis 1, confirming that there are indeed specific causes and consequences of farmer-herder conflicts in the northern senatorial district of Adamawa State.

Hypothesis 2: *The conflict has not significantly affected the availability, accessibility, utilization, and stability of food for rural households in the northern senatorial district of Adamawa state.*

To test Hypothesis 2, Multivariate Analysis of Variance (MANOVA) was conducted to determine the impact of farmer-herder conflicts on the four dimensions of food security: availability, accessibility, utilization, and stability. The results of the multivariate tests are presented in Table 4 below.

TABLE 4: Multivariate Test Results for Food Security Dimensions

Effect		Value	F	Hypothesis df	Error df	Sig.
Intercept	Pillai's Trace	.997	24831.113[b]	5.000	376.000	.000
	Wilks' Lambda	.003	24831.113[b]	5.000	376.000	.000
	Hotelling's Trace	330.201	24831.113[b]	5.000	376.000	.000
	Roy's Largest Root	330.201	24831.113[b]	5.000	376.000	.000
DV	Pillai's Trace	1.334	60.494	15.000	1134.000	.000
	Wilks' Lambda	.072	110.574	15.000	1038.372	.000
	Hotelling's Trace	7.693	192.150	15.000	1124.000	.000
	Roy's Largest Root	7.009	529.905[c]	5.000	378.000	.000

a. Design: Intercept + DV
b. Exact statistic
c. The statistic is an upper bound on F that yields a lower bound on the significance level.

Source: Field Survey, 2024

The MANOVA results from Table 4 above indicate that farmer-herder conflicts have a significant impact on the availability, accessibility, utilization, and stability of food for rural households in the

northern senatorial district of Adamawa State. All multivariate tests (Pillai's Trace, Wilks' Lambda, Hotelling's Trace, and Roy's Largest Root) yield highly significant results (p < 0.001), rejecting Hypothesis 2. This implies that conflicts have indeed significantly affected all four dimensions of food security.

The conflicts have disrupted agricultural activities, leading to reduced food production and availability. As seen in the demographic data, a significant portion of the population relies on farming (78.9%), and disruptions in agricultural productivity due to conflicts directly impact food availability (Ajala, 2020).

Moreover, the conflicts have likely limited access to food. The moderate mean score (Mean = 1.651, SD = 0.9819) for accessing food from various sources such as markets, farms, or aid agencies suggests that conflicts create barriers to food access.

Furthermore, the nutritional quality and diversity of food consumed by households are also affected. The moderate mean score (Mean = 1.802, SD = 0.9183) indicates that conflicts may lead to consumption of less nutritious food, impacting overall health and food utilization.

Similarly, the stability of food supply and prices is significantly compromised. The high mean score (Mean = 4.299, SD = 0.4809) for food supply and price stability contrasts with the moderate score for experiencing regular food shortages (Mean = 1.948, SD = 1.1322), highlighting that conflicts cause fluctuations in food stability and availability.

In summary, the MANOVA analysis provides compelling evidence against Hypothesis 2, demonstrating that farmer-herder conflicts significantly affect the availability, accessibility, utilization, and stability of food for rural households in the northern senatorial district of Adamawa State.

CONCLUSION

This study provides compelling evidence of the significant impact of farmer-herder conflicts on food security in the northern senatorial district of Adamawa state, Nigeria. The research reveals that these conflicts disrupt agricultural activities, limit food access, affect nutritional quality, and compromise food supply stability. The main causes of conflicts, including land disputes, water scarcity, crop damage, and cattle rustling, underscore the multifaceted relationship between environmental, socio-economic, and demographic factors.

The study's findings reject the hypotheses that there are no specific causes or consequences of farmer-herder conflicts and that these conflicts do not significantly affect food security dimensions. Instead, the results demonstrate that these conflicts have far-reaching implications for rural livelihoods, community cohesion, and overall well-being.

The large household sizes, predominance of farming as the primary occupation, and the educational profile of respondents highlight the vulnerability of rural households to shocks arising from these conflicts. The gender imbalance in respondents also points to the need for more inclusive approaches in addressing these challenges.

This research contributes to the growing body of literature on the nexus between conflict and food security, particularly in the context of less violent but persistent conflicts. It provides valuable insights for policymakers, development practitioners, and researchers working on conflict resolution and food security in Nigeria and similar contexts.

Policy Recommendations

Based on the findings and the recommendations from respondents, the following policy measures are proposed to address food insecurity and mitigate farmer-herder conflicts in the region:

Increase Security Presence: Enhance security in conflict-prone areas to prevent further violence and ensure the safety of communities.

Establish Community Dialogue Forums: Promote peace and reconciliation among farmers and herders through regular dialogue forums. These forums can help address underlying grievances, build mutual understanding, and develop collaborative solutions.

Provide Financial Support: Offer financial assistance to affected households to help them rebuild their livelihoods. This support can be in the form of grants, loans, or subsidies for agricultural inputs.

Implement Sustainable Agricultural Practices: Encourage and support sustainable agricultural practices to boost food production and ensure long-term food security. Practices such as crop rotation, agroforestry, and water conservation can enhance resilience to climate change and reduce resource-based conflicts.

Strengthen Local Institutions and Governance: Improve the effectiveness of local institutions and governance structures to manage conflicts and address food insecurity. Effective governance can facilitate conflict resolution, enforce land use policies, and ensure equitable resource distribution.

Improve Infrastructure and Market Access: Develop infrastructure and enhance access to markets to facilitate food distribution and trade, improving overall food security. Improved roads, storage facilities, and market systems can reduce post-harvest losses and stabilize food prices.

Enhance Access to Education and Skills Training: Provide education and skills training to diversify livelihood options and reduce the vulnerability of rural households. Education and vocational training can enable individuals to pursue alternative income-generating activities, reducing dependence on agriculture and alleviating pressure on land resources.

Future Directions

Future studies could explore alternative sampling methods or combine quantitative and qualitative approaches to gain a more comprehensive understanding of the dynamics and nuances of farmer-herder conflicts and their impact on food security. Additionally, longitudinal studies or panel data collection could provide insights into the temporal patterns and long-term consequences of these conflicts.

Furthermore, the study opens up new avenues for research, such as exploring the effectiveness of different conflict resolution mechanisms, investigating the role of institutional and policy

frameworks in mitigating conflicts, and examining the potential impact of climate change on resource availability and the subsequent implications for farmer-herder conflicts.

Acknowledgements

REFERENCES

Abubakar, O. I., Abubakar, A. M., & Ali, M. B. (2003). Impact of herder-farmer conflicts on food security in FCT, Nigeria. *African Journal of Environmental Economics and Management (AJEC)*, 4(1), 1-21.

Adano, W. R., Dietz, T., Witsenburg, K., & Zaal, F. (2012). Climate change, violent conflict and local institutions in Kenya's drylands. *Journal of Peace Research*, 49(1), 65–80. https://doi.org/10.1177/0022343311427344

Adelaja, A., & George, J. (2019). Effects of conflict on agriculture: Evidence from the Boko Haram insurgency. *World Development*, 117, 184–195.

Ajala, O. (2020). New drivers of conflict in Nigeria: An analysis of the clashes between farmers and pastoralists. *Third World Quarterly*, 41(12), 2041-2059. https://doi.org/10.1080/01436597.2020.1811662

Alabi, O., Shamaki, M. A., Omisakin, O. A., Giro, M., & Odusina, E. K. (2020). Family and household issues in Northern Nigeria: Change and continuity. In C. Odimegwu (Ed.), Family demography and post-2015 development agenda in Africa (pp. 291-311). Springer. https://doi.org/10.1007/978-3-030-14887-4_14

Blench, R. (2010). Conflict between pastoralists and cultivators in Nigeria. Review paper prepared for Department for International Development, Nigeria. http://www.rogerblench.info/Development/Nigeria/Pastoralism/Fadama%20II%20paper.pdf

Buhaug, H., Benjaminsen, T. A., Sjaastad, E., & Magnus, T. H. (2015). Climate variability, food production shocks, and violent conflict in Sub-Saharan Africa. *Environmental Research Letters*, 10(12), Article 125015. https://doi.org/10.1088/1748-9326/10/12/125015

Day, A., & Caus, J. (2020). Conflict prevention in the era of climate change: Adapting the UN to climate-security risks. United Nations University. http://collections.unu.edu/view/UNU:7632#viewAttachments

Dimelu, M. U., Salifu, E. D., Chah, J. M., Enwelu, I. A., & Igbokwe, E. M. (2017). Livelihood issues in herdsmen-farmers conflict among farming communities in Kogi State, Nigeria. *African Journal of Agricultural Research*, 12(24), 2105–2115.

D'Souza, A., & Jolliffe, D. (2013). Conflict, food price shocks, and food insecurity: The experience of Afghan households. *Food Policy*, 42, 32–47. https://doi.org/10.1016/j.foodpol.2013.06.007

City Population. (2022). Adamawa State in Nigeria. Retrieved December 12, 2023, from https://www.citypopulation.de/en/nigeria/admin/NGA002__adamawa/

FAO. (1996). Rome declaration on world food security and world food summit plan of action. https://www.fao.org/3/w3613e/w3613e00.htm

George, J., Adelaja, A., & Weatherspoon, D. (2020). Armed conflicts and food insecurity: Evidence from Boko Haram's attacks. *American Journal of Agricultural Economics*, 102(1), 114–131. https://doi.org/10.1093/ajae/aaz039

George, J., Adelaja, A., Awokuse, T. O., & Vaughan, O. (2021). Terrorist attacks, land resource competition and violent farmer-herder conflicts. Land Use Policy, 102, Article 105241. https://doi.org/10.1016/j.landusepol.2020.105241

Hendrix, C. S., & Salehyan, I. (2012). Climate shocks and political violence. *Global Environmental Change*, 28(1), 239-250. https://doi.org/10.1016/j.gloenvcha.2012.07.004

Mbih, R. A. (2020). The politics of farmer–herder conflicts and alternative conflict management in Northwest Cameroon. *African Geographical Review,* 39(4), 324-344. https://doi.org/10.1080/19376812.2020.1720755

Nnaji, A., Wanglin, M., Ratna, M., & Renwick, A. (2022). Farmer-herder conflicts and food insecurity: Evidence from rural Nigeria. *Agricultural and Resource Economics Review*, 51(3), 391–421. https://doi.org/10.1017/age.2022.9

Okoro, J. P. (2018). Herdsmen/farmers conflict and its effects on socio-economic development in Nigeria. *Journal of Peace, Security, and Development*, 4(1), 143-158.

Olanrewaju, O., & Balana, B. B. (2023). Conflict-induced shocks and household food security in Nigeria. *Sustainability*, 15(6), Article 5057. https://doi.org/10.3390/su15065057

Owolabi, J. O., Oladimeji, Y. U., Ojeleye, O. A., & Omokore, D. F. (2016). Effects on farmers-pastoralists conflicts on food security in two local government areas of Kaduna State, Nigeria. *Nigerian Journal of Rural Sociology*, 16(4), 29-33.

Shettima, A. G., & Tar, U. A. (2008). Farmer-pastoralist conflict in West Africa: Exploring the causes and consequences. *Information, Society and Justice Journal*, 1(2), 163-184.

Simon-Karu, R. (2022, August 17). Barriers for young women in Northern Nigeria: In answering calls to participate in their communities, young women confront systems designed for their exclusion. United States Institute of Peace. https://www.usip.org/publications/2022/08/barriers-young-women-northern-nigeria

Solomon, B. L. (2021). Impact of the farmers and herdsmen conflict on food security; Focus on Taraba State. *International Journal of Research and Innovation in Social Science*, 5(3), 564-573. http://www.rsisinternational.org/

Yakubu, S. M., Musa, M. W., Bamidele, T. E., Ali, B. M., Bappa, M. T., Munir, R. T., & Manuwa, A. (2021). Effects of farmer-herder conflicts on rural households food security in Gombe State, Nigeria. *Journal of Agricultural Extension*, 25(1), 11-20.