An Empirical Analysis of the Effect of Farmer-Herder Conflicts on Food Availability in Adamawa State

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Abstract

This study investigates the intricate relationship between farmer-herder conflicts and food availability in Adamawa State, Nigeria. Employing a comprehensive survey methodology and a Likert scale-based assessment of respondent perceptions, the research unveils the multifaceted impacts of conflicts on various dimensions of food availability. The findings indicate a unanimous consensus among respondents regarding the disruptive nature of these conflicts. Farmer-herder conflicts induce shocks that disrupt food availability, cause widespread devastation, limit market transactions, decrease productive capacity, and result in crop damage. Furthermore, these conflicts lead to the destruction of factors of production, including land and labor, disrupt infrastructure, and reduce output and income for crop farmers. Additionally, the displacement of farmers to Internally Displaced Person (IDP) camps affects food availability. Chi-square tests provide robust evidence of the significant relationship between farmer-herder conflicts and food availability in the region. In light of these findings, policymakers are urged to implement targeted strategies to mitigate the adverse impacts of conflicts and enhance food security in Adamawa State.

Keywords: Farmer-Herder Conflicts, Food Availability, Conflict Impact, Food Security, Adamawa State, Nigeria.

Introduction

Food security is a fundamental pillar of a nation's development, with far-reaching implications for global, national, regional, and individual well-being. It sustains livelihoods for billions of people worldwide and is integral to economic stability and progress. The critical role of agriculture in food production, employment, and income generation is underscored by statistics revealing that it provides sustenance for 2.5 billion people and contributes significantly to the global economy, comprising 29% of Gross Domestic Product (GDP) in developing countries (FAO, 2021).

Despite substantial global efforts, persistent hunger and malnutrition continue to afflict millions of individuals, with chronic hunger affecting an alarming one in eight people from 2011 to 2013 (Committee on Food Security, 2014). This global crisis has drawn attention to the immense challenges faced by those striving to overcome hunger, poverty, and achieve dignified livelihoods.

Projections indicate that feeding an additional 1.5 billion people by 2030, with 90% residing in developing countries, necessitates a 60-70% increase in global food production by 2050 (Convention on Biological Diversity, 2021).

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Food security rests on four key pillars: availability, access, utilization, and stability. It is achieved when individuals consistently possess both the physical and economic means to access sufficient, high-quality food. However, demographic and economic growth has raised questions about global food security, even with technological advancements in food production and distribution. Hunger and malnutrition persist, with approximately 35,000 people worldwide succumbing to hunger annually, and a larger population, predominantly women, children, and the elderly, suffering from malnutrition (Koc et al., 1999).

Uneven food supply and consumption persist globally, with climate change, technology, pests and diseases, water stress, poverty, and conflicts playing pivotal roles. Climate change, exemplified by global warming and shifting rainfall patterns, affects farming conditions, posing significant challenges for low-lying regions already grappling with survival. Advanced countries, while being major food exporters, are not immune to food shortages due to factors like drought (BBC, 2023). In Northern Nigeria, for instance, increased tension between farmers and herders has had a significant impact on food security (International Crisis Group, 2017).

Technology, a double-edged sword, can both enhance and diminish food availability. Oil spills and pollution, for instance, impact fish and food supply, while the expansion of the biofuel market consumes valuable farmland (BBC, 2023). In Nigeria, the Niger Delta region serves as an example, where oil spills and land degradation have contributed to reduced food availability (UNEP, 2011).

Pests, diseases, and access to pesticides compound food security disparities between advanced and low-income developing countries. Irrigation, despite doubling crop yields, presents economic and environmental challenges, as does water extraction from underground aquifers and rivers. Both have environmental consequences (Burney et al., 2013). Similarly, poverty, especially in low-income developing countries, hinders access to farming resources and nutritious food, as families allocate a substantial portion of their income to food (IPCC, 2019). In Northern Nigeria, poverty exacerbates food insecurity, as demonstrated by the reported lack of sufficient food among 7 out of 10 Nigerians in 2021 (Echendu, 2022).

Conflict exacerbates food scarcity, with warfare forcing farmers to flee or engage in battle, crops destroyed during fighting, and food supplies weaponized to gain strategic advantage. The South Sudan and Darfur regions exemplify the dire consequences of conflict on food security (WFP, 2022). In Nigeria, the complex and dynamic relationship between farmer-herder conflicts and food security is evident, with tensions escalating in recent years, leading to severe consequences. Adamawa State, in particular, has witnessed farmer-herder conflicts related to land and water disputes, migration routes, cattle ranges, livestock theft, and crop damage. This study aims to explore these issues comprehensively and shed light on the multifaceted impact of farmer-herder conflicts on food security in Adamawa State, a microcosm of a broader global challenge, with Northern Nigeria being a critical focus area in understanding food availability problems in Africa (Fajonyomi et al., 2014).

Review of Literature

2.1 Farmer-Herder Conflict

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Conflict is a prevalent aspect of human interactions, often arising from differences and disputes among individuals or groups over values, power, and resources (Ofuoku & Isefe, 2009; Okpalaobi, 2014; Biswaro, 2013). It is an inherent process characterized by unpredictable changes as societies seek positive developmental and peaceful changes (Tar & Musa, 2020). Conflict is not limited to human interactions; it is also observed among animal species. Regardless of its nature, real or imagined, conflict poses a significant threat to peace, progress, and development across various domains, including social, political, economic, environmental, cultural, psychological, and ecological aspects of national security (Tar & Musa, 2020).

The term "farmer" refers to an individual engaged in agricultural activities, be it for commercial purposes or subsistence farming (Ajiye, 2018). Historically, the term was initially used to describe tenants who leased farmland, but it has since expanded to encompass anyone owning or operating agricultural enterprises (Dyer, 2007). Farmers play a vital role in food production, cultivating crops and raising livestock for sustenance and public consumption (Mbaeze & Nnaji, 2018).

In contrast, a "herder" is an individual, often associated with the Fulani ethnic group in the Western Savanna, who tends to herds of cattle or flocks of sheep, usually in open fields (Mbaeze and Nnaji, 2018). Herders contribute significantly to Nigeria's livestock population, with the Fulani pastoralists being a dominant group owning a substantial portion of the national herd (International Crisis Group, 2017). Livestock farming constitutes a notable share of Nigeria's agricultural production and Gross Domestic Product (GDP) (Ogbeh, 2016).

Farmer-herder conflict, therefore, refers to a longstanding history of fluctuating conflicts, competition, and cooperation between settled farmers and nomadic or transhumant herders (Seddon, 1997). Such conflicts often revolve around land resource disputes and have taken on ethnic and religious dimensions, with Fulani herders making up a significant portion of pastoralists and farmers being from diverse ethnic backgrounds and predominantly Christian (International Crisis Group, 2018).

2.2 Food Security

Food security is a critical aspect of human well-being and has been a central concern throughout history (Okoli & Appollonia, 2018). It entails ensuring that all individuals have physical and economic access to sufficient, safe, and nutritious food to meet their dietary needs and preferences for a healthy and active life (World Food Summit, 1996; FAO, 1996). Food security encompasses four key dimensions: food availability, food accessibility, food utilization, and food stability (World Bank, 2001).

Food availability pertains to the physical presence of food and its supply, driven by factors like production, stocks, and trade (World Bank, 2023). At the global level, the challenge is to produce enough food to feed the world's growing population, although numerous factors such as climate change, land degradation, and conflicts like farmer-herder disputes pose significant threats (Ministry of Foreign Affairs, the Netherlands, 2012).

2.3 Effect of Farmer-Herder Conflict on Food Availability

Farmer-herder conflicts have substantial implications for food availability, particularly in regions like northern Nigeria (Yakubu et al., 2021; National Emergency Management Agency [NEMA], 2018). These

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conflicts generate economic costs through the destruction of crops, livestock, and essential infrastructure, thereby reducing the productive capacity of affected areas (Andrew, 2018). The resultant decrease in food production and income can negatively impact the livelihoods of rural populations dependent on agriculture, exacerbating food insecurity (Duru, 2016).

Furthermore, these conflicts disrupt farming activities, causing farmers to abandon their fields, leading to crop losses and reduced yields. This not only affects farmers' income but also diminishes their ability to contribute to the local food supply, affecting both rural and urban populations reliant on these agricultural resources (Food and Agricultural Organization, 2004).

In northern Nigeria, where communal violence is common, the majority of the population depends on agriculture for their livelihoods. Consequently, farmer-herder conflicts have dire implications for food systems, causing production and income losses and restricting access to food resources (World Bank, 2023). As farmers are forced to flee their fields due to safety concerns, their crops are often damaged or consumed by herds of cattle. This further reduces food availability and increases food prices, exacerbating food insecurity (World Health Organization, 2018).

In conclusion, farmer-herder conflicts in northern Nigeria and similar regions have far-reaching consequences on food availability, economic productivity, and overall food security. These conflicts disrupt farming activities, damage crops and livestock, and impede the ability of affected populations to access and produce sufficient food, perpetuating a cycle of food insecurity and economic hardship. Addressing the root causes of these conflicts and implementing conflict resolution measures is essential to safeguard food availability and promote sustainable development in these regions.

Methodology

3.1 Study Area

The study focuses on Adamawa State, located in northeastern Nigeria, situated between longitude 12° 30' 00" E and latitude 9° 20' 00" N (National Geospatial-Intelligence Agency, 2022). Adamawa State was formed in 1991 from part of the former Gongola State and comprises four administrative divisions: Adamawa, Ganye, Mubi, and Numan. With a population of over 3 million people and Yola as its capital, the state spans approximately 14,250 square miles. The economy of Adamawa State is primarily based on small and very small-scale agricultural enterprises, commerce, and various social services.

Adamawa State was chosen as the study area due to recurrent farmer-herder conflicts impacting food production in the region.

3.2 Population of the Study

The study encompasses both farmers and herders in Adamawa State, covering the adult population, including males and females. Additionally, community leaders such as village heads and religious leaders are included in the study.

3.3 Sampling Technique and Sample Size

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The study employs a combination of purposive and multi-stage sampling methods to select the study areas, while simple random sampling is used to select target respondents. A total of 190 household heads from both farmer and herder communities are randomly selected. Purposive sampling is chosen due to its suitability for selecting variables that align with the study's context and objectives. It allows for the exclusion of irrelevant responses and efficient data collection, ultimately saving time and resources. One LGA from each of the four agricultural zones in the state is purposively selected based on the prevalence of farmer-herder conflicts and their significance as food-producing areas. The study utilizes a sample size of 190 respondents, selected through a random sampling after purposely selecting the LGAs.

3.4 Data Collection Method

Data is collected using structured questionnaires administered via Kobocollect mobile devices. Researchers meet with respondents, pose structured questions, and record responses electronically. This method minimizes errors, reduces costs, and is environmentally friendly.

3.5 Method of Data Analysis

The study employs descriptive analysis, which includes frequency tables to present data based on response frequencies and percentages. It also calculates averages (mean) and standard deviations to assess the effects of farmer-herder conflicts on food security pillars such as availability, accessibility, utilization, and stability using a Likert scale.

The study also utilizes inferential analysis, particularly the Chi-square test, to test hypotheses and achieve research objective. The Chi-square test is deemed suitable for the research questions and the structure of the data.

The general formulation of the Chi-square equation can be stated thus:

$$\chi^2 = \frac{\sum(fo - fe)^2}{fe}$$

Where:

χ^2 = Calculated value

$\sum$ = Summation sign

fo = Observed frequency

fe = Expected frequency

The level of significance = 0.05 or 5%

The decision criterion for the chi-square test is that the null hypothesis (H_0) is rejected if the χ^2 calculated value exceeds theχ^2critical value and where the level of significance (indicated by the probability value) is less than 0.05 at 5% level.

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RESULTS AND DISCUSSION

Effect of Farmer-Herder Conflict on Food Availability in Adamawa State

Table 4.1 presents an insightful analysis of how farmer-herder conflicts impact food availability in Adamawa State, based on respondents' perceptions. The results provide a detailed understanding of the degree to which these conflicts affect various aspects of food availability.

Table 4.1: Degree of the Effects of Farmers-Herders Conflict on Food Availability in Adamawa State

Effect of farmer-herder conflict on food availability	Frequency	Percentage
Induced shocks		
Strongly agree	163	85.79
Agree	26	13.68
Undecided	1	0.53
Disagree	0	0
Strongly disagree	0	0
Total	190	100.00
Causes devastation		
Strongly agree	153	80.53
Agree	37	19.47
Undecided	0	0
Disagree	0	0
Strongly disagree	0	0
Total	190	100.00
Limits market transactions		
Strongly agree	148	77.89
Agree	41	21.58
Undecided	0	0
Disagree	0	0
strongly disagree	1	0.53
Total	190	100.00
Decreasing the productive capacity of firms and households		
Strongly agree	148	77.89
Agree	42	22.11
Undecided	0	0
Disagree	0	0
Strongly disagree	0	0
Total	190	100.00
Crop damage		
Strongly agree	148	77.89
Agree	42	22.11
Undecided	0	0
Disagree	0	0
Strongly disagree	0	0
Total	190	100.00

Source: Field Survey, 2023

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Table 4.1: Degree of the Effects of Farmers-Herders Conflict on Food Availability in Adamawa State, Continued

Effect of farmer-herder conflict on food availability	Frequency	Percentage
Destruction of factors of production such as land, labour and entrepreneurs		
Strongly agree	142	74.74
Agree	46	24.21
Undecided	0	0
Disagree	0	0
Strongly disagree	2	1.05
Total	190	100.00
Destruction of crops, livestock, land, and water		
Strongly agree	146	76.84
Agree	40	21.05
Undecided	1	0.53
Disagree	2	1.05
Strongly disagree	1	0.53
Total	190	100.00
Disruption of infrastructure, markets, and the human resources		
Strongly agree	140	73.68
Agree	48	25.26
Undecided	0	0
Disagree	2	1.05
Strongly disagree	0	0
Total	190	100.00
Reduction in output and income of Farmers/Nomads		
Strongly agree	148	77.89
Agree	42	22.11
Undecided	0	0
Disagree	0	0
Strongly disagree	0	0
Total	190	100
Farmers flee their farms for the safety of Internally Displaced Person camps		
Strongly agree	140	73.68
Agree	44	23.16
Undecided	2	1.05
Disagree	3	1.58
Strongly disagree	1	0.53
Total	190	100.00

Source: Field Survey, 2023

Induced Shocks: The majority of respondents strongly agree (85.79%) that farmer-herder conflicts induce shocks that disrupt food availability. This high percentage underscores the widespread consensus on the profound impact of conflicts on the region's food security. Only a negligible portion remains undecided (0.53%). This finding aligns with Fisher's (2017) emphasis on addressing conflict-related shocks to maintain food availability.

Causes Devastation: A significant percentage (80.53%) strongly agrees that conflicts cause devastation to food availability, while 19.47% agree to some extent. This points to the broad recognition of conflicts' destructive consequences. There are no respondents who disagree or strongly disagree. These findings emphasize the need for

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policies that target post-conflict recovery and rehabilitation of affected agricultural areas, consistent with Cotula et al. (2008).

Limits Market Transactions: The data reveal that 77.89% of respondents strongly agree that conflicts limit market transactions, with an additional 21.58% agreeing. This highlights the significant hindrance conflicts pose to the flow of food through markets. A small fraction (0.53%) strongly disagrees. To address this, policies should focus on market accessibility and stability, as emphasized by the Food and Agriculture Organization (FAO, 2019).

Decreasing Productive Capacity: For decreasing productive capacity, 77.89% strongly agree, and 22.11% agree. This shows a consensus among respondents on how conflicts curtail the ability of both firms and households to produce food. No respondents disagree or strongly disagree. This calls for policies that build resilience in the face of conflict-induced challenges, in line with UNCTAD's (2020) recommendations.

Crop Damage: A significant portion (77.89%) strongly agrees that crop damage due to conflicts undermines food availability, and 22.11% agree. None of the respondents express disagreement. This finding underscores the direct impact of conflicts on agricultural outputs. Mitigation strategies should encompass early warning systems and conflict resolution mechanisms to curb such crop destruction (Deininger & Jin, 2006).

Destruction of Factors of Production: Regarding the destruction of factors of production, 74.74% agree, while 24.21% strongly agree. A small fraction (1.05%) strongly disagrees. This highlights the widespread acknowledgment of conflicts affecting various components of agricultural production. To address this, policies should focus on restoring not only physical assets but also entrepreneurial capacities (Davis et al., 2010).

Destruction of Crops, Livestock, Land, and Water: Approximately 76.84% strongly agree and 21.05% agree that conflicts result in the destruction of crops, livestock, land, and water. A very small percentage (1.05%) remains undecided, and 1.05% disagrees, while another 0.53% strongly disagrees. These findings underline the comprehensive impact of conflicts on crucial agricultural resources. Policies should prioritize strategies that safeguard these resources to ensure food availability (Barnett & Adger, 2007).

Disruption of Infrastructure: The data indicate that 73.68% strongly agree and 25.26% agree on conflicts disrupting infrastructure. A small portion (1.05%) disagrees, and none strongly disagrees. This emphasizes the need for post-conflict rebuilding efforts that prioritize restoring infrastructure essential for efficient food distribution (FAO, 2021).

Reduction in Output and Income: Regarding the reduction in output and income, 77.89% strongly agree and 22.11% agree. No respondents express disagreement. This highlights the economic implications of conflicts on farmers and nomads. To mitigate this, policies should focus on alternative livelihood opportunities and income diversification to ensure sustained food availability (Scoones et al., 2015).

Farmers Fleeing to IDP Camps: A considerable percentage (73.68%) strongly agrees that farmers fleeing to Internally Displaced Person camps affects food availability. Additionally, 23.16% agree, and a small fraction (1.05%) is undecided. A few respondents (1.58%) disagree, and 0.53% strongly disagrees. These findings underscore the implications of displacement on agricultural productivity and the need for swift reintegration and protection of agricultural activities (FAO, 2021).

The comprehensive outcomes presented in Table 4.2 provide valuable insights into the intricate relationship between farmer-herder conflicts and food availability in Adamawa State. Policymakers must utilize these findings to develop targeted strategies that enhance food security and mitigate the negative impacts of conflicts on agriculture and livelihoods (Cissé & Barrett, 2017).

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4.3 Average Effects of Farmer-Herder Conflicts on Food Availability

Table 4.2 presents the average effects of farmer-herder conflicts on food availability in Adamawa State. Notably, the perceptions of respondents were measured using a Likert scale, where 1 signifies "Strongly Disagree," 2 represents "Disagree," 3 indicates "Undecided," 4 stands for "Agree," and 5 corresponds to "Strongly Agree." This table offers a comprehensive understanding of how these conflicts influence various dimensions of food availability. Each variable signifies a specific conflict-related outcome, while the mean scores provide insights into the average perception of the impact. Additionally, the standard deviation (in parenthesis) gives context to the variability of the responses.

The average effect score for induced shocks, assessed on a scale from 1 to 5, is 4.853, with a standard deviation of 0.37. This indicates a relatively high average perception of the impact of induced shocks due to conflicts on food availability. The relatively low standard deviation suggests a degree of agreement among respondents, underscoring the consensus on the disruptive nature of these shocks (Fisher, 2017).

For the impact of conflicts causing devastation, the mean score is 4.805, and the standard deviation is 0.397. This indicates a consistent perception among respondents regarding the destructive impact of conflicts on food availability. The relatively narrow standard deviation suggests that respondents generally share a similar view on this particular aspect (Cotula et al., 2008).

Table 4.2: Average Effect of Farmer-Herder Conflicts on Food Availability in Adamawa State

Effect of Farmer-Herder Conflicts on Food Availability	Obs	Mean
Induced shocks	190	4.853
		(0.37)
Causes devastation	190	4.805
		(0.397)
Limits market transactions	190	4.763
		(0.495)
Decreasing the productive capacity of firms and households	190	4.779
		(0.416)
Crop damage	190	4.779
		(0.416)
Destruction of factors of production such as land and labour	190	4.716
		(0.576)
Destruction of crops livestock land and water	190	4.726
		(0.581)
Disruption of infrastructure markets and the human resources	190	4.716
		(0.518)
Reduction in output and income of crop farmers	190	4.779
		(0.416)
Farmers flee their farms for the safety of Internally Displaced	190	4.679
		(0.632)

Source: Field Survey, 2023. Note: Standard deviation is provided in bracket.

Regarding the limitations posed by conflicts on market transactions, the mean score is 4.763, accompanied by a standard deviation of 0.495. This indicates a relatively high average perception of the hindrance caused by conflicts to market interactions related to food availability. The somewhat wider standard deviation implies a moderate variability in responses, reflecting differing degrees of agreement on this matter (FAO, 2019).

The average effect score for the reduction in productive capacity due to conflicts is 4.779, and the standard deviation is 0.416. This indicates a fairly uniform perception among respondents regarding the decrease in

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productive capacity. The narrower standard deviation points to a shared understanding of the impact on both firms and households (UNCTAD, 2020).

For the impact of conflicts on crop damage, the mean score is 4.779, with a standard deviation of 0.416. This underscores a uniform perception among respondents regarding the extent of crop damage resulting from conflicts. The relatively low standard deviation suggests a shared understanding of the direct impact of conflicts on agricultural outputs (Deininger & Jin, 2006).

The mean score for the impact of conflicts on the destruction of factors of production such as land and labor is 4.716, with a standard deviation of 0.576. This suggests a relatively consistent perception among respondents regarding the conflict's impact on critical components of agricultural production. The wider standard deviation indicates some variation in perceptions about the extent of destruction (Davis et al., 2010).

The average effect score for the destruction of various agricultural resources due to conflicts is 4.726, accompanied by a standard deviation of 0.581. This reflects a moderate level of agreement among respondents regarding the breadth of destruction resulting from conflicts. The wider standard deviation suggests varying perceptions about the extent of this impact (Barnett & Adger, 2007).

For the impact of conflicts on disrupting infrastructure, markets, and human resources, the mean score is 4.716, with a standard deviation of 0.518. This suggests a consistent perception among respondents about the conflict's effect on disrupting critical components of food availability. The moderate standard deviation indicates some variation in how respondents perceive the extent of this disruption (FAO, 2021).

The mean score for the reduction in output and income of crop farmers due to conflicts is 4.779, with a standard deviation of 0.416. This aligns with previous variables in terms of both mean and standard deviation, highlighting a shared perception about the economic implications of conflicts. The narrower standard deviation suggests a consensus on this outcome (Scoones et al., 2015).

The average effect score for the impact of farmers fleeing to Internally Displaced Person camps on food availability is 4.679, with a higher standard deviation of 0.632. This indicates a more varied perception among respondents about the extent of this specific impact. The wider standard deviation underscores differing viewpoints on the consequences of displacement on food availability (FAO, 2021).

4.3 Test of Null Hypothesis 1: Farmer-Herder Conflict has no significant effect on Food Availability in Adamawa State

The null hypothesis (H0) that farmer-herder conflict has no significant effect on food availability in Adamawa State is examined through a chi-square test. The summarized results of this test are presented in Table 4.3, shedding light on compelling evidence of the substantial impact of farmer-herder conflicts on various dimensions of food availability. The significance of the chi-square test statistics, indicated by the remarkably low p-values of 0.000, strongly supports the rejection of the null hypothesis for all the assessed outcomes. This highlights a robust association between farmer-herder conflicts and food availability, reinforcing existing theories on the detrimental consequences of conflicts on food security.

Table 4.3: Chi Square Test of the Effect of Farmer-Herder Conflict on Food Availability

Null Hypothesis: Farmer –Herder Conflict has no significant effect on Food Availability	Chi-square Statistics	Significance (P-values)
Induced shocks	240.200	0.000
Causes devastation	70.821	0.000
Limits market transactions	182.411	0.000

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Decreasing the productive capacity of firms and households	59.137	0.000
Crop damage	59.137	0.000
Destruction of factors of production such as land labour.	161.853	0.000
Destruction of crops livestock land and water	413.211	0.000
Disruption of infrastructure markets and the human resources	155.916	0.000
Reduction in output and income of crop farmers	59.137	0.000
Farmers flee their farms for the safety of Internally Displaced	377.105	0.000

Source: Field Survey, 2023. Note that this table provides a summary of the chi-square test result.

The expected and the observed frequencies for each of the variables are provided in the appendix.

The chi-square statistic of 240.200 with a p-value of 0.000 provides strong evidence to reject the null hypothesis for induced shocks. This suggests that farmer-herder conflicts have a significant impact on inducing shocks that disrupt food availability. The high chi-square value indicates a substantial association between conflicts and induced shocks, underlining the importance of addressing conflict-related shocks to maintain food availability (Fisher, 2017).

With a chi-square statistic of 70.821 and a p-value of 0.000, the evidence is robust for rejecting the null hypothesis for causes of devastation. This underscores that conflicts cause significant devastation that affects food availability. The significant p-value highlights a clear link between conflicts and the adverse outcomes related to food availability (Cotula et al., 2008).

The chi-square statistic of 182.411 and a p-value of 0.000 strongly reject the null hypothesis for limiting market transactions. This suggests that farmer-herder conflicts considerably hinder market interactions related to food availability. The low p-value reflects the significance of the association between conflicts and market limitations, emphasizing the need to address these constraints (FAO, 2019).

With a chi-square statistic of 59.137 and a p-value of 0.000, the null hypothesis is rejected for decreasing productive capacity. This implies that conflicts have a significant impact on reducing the productive capacity of both firms and households, affecting food availability. The substantial chi-square value and low p-value emphasize the strong link between conflicts and reduced production capacity (UNCTAD, 2020).

The chi-square statistic of 59.137 and a p-value of 0.000 provide strong evidence against the null hypothesis for crop damage. This indicates that conflicts lead to substantial crop damage, which directly impacts food availability. The significant p-value underscores the clear connection between conflicts and agricultural losses (Deininger & Jin, 2006).

With a chi-square statistic of 161.853 and a p-value of 0.000, the evidence is compelling for rejecting the null hypothesis for the destruction of factors of production. This suggests that conflicts significantly damage critical components of agricultural production, affecting food availability. The substantial chi-square value emphasizes the strong association between conflicts and the destruction of production factors (Davis et al., 2010).

The chi-square statistic of 413.211 and a p-value of 0.000 strongly reject the null hypothesis for the destruction of crops, livestock, land, and water. This underscores that conflicts have a significant impact on destroying crucial agricultural resources, thereby affecting food availability. The high chi-square value and low p-value highlight the profound connection between conflicts and resource destruction (Barnett & Adger, 2007).

With a chi-square statistic of 155.916 and a p-value of 0.000, the null hypothesis is rejected for the disruption of infrastructure. This implies that conflicts significantly disrupt critical infrastructure, markets, and human resources related to food availability. The substantial chi-square value emphasizes the strong link between conflicts and infrastructural disruptions (FAO, 2021).

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The chi-square statistic of 59.137 and a p-value of 0.000 provide strong evidence against the null hypothesis for the reduction in output and income of crop farmers. This suggests that conflicts have a significant impact on reducing the output and income of crop farmers, thereby affecting food availability. The significant p-value underscores the clear association between conflicts and economic losses (Scoones et al., 2015).

With a chi-square statistic of 377.105 and a p-value of 0.000, the evidence is compelling for rejecting the null hypothesis for farmers fleeing to Internally Displaced Person camps. This implies that conflicts significantly lead to farmers leaving their farms for IDP camps, affecting food availability. The substantial chi-square value and low p-value highlight the strong connection between conflicts and displacement (FAO, 2021).

Conclusion and Recommendations

This study has conducted a thorough investigation into the multifaceted impacts of farmer-herder conflicts on food availability in Adamawa State, Nigeria. Through a robust methodology involving surveys and statistical analyses, this research has provided valuable insights into the complex relationship between these conflicts and food security in the region.

The study's methodology involved surveying local stakeholders to gauge their perceptions of the effects of farmer-herder conflicts on food availability. The results showed a striking consensus among respondents, indicating that these conflicts have substantial and detrimental effects on various aspects of food availability. From induced shocks to devastation, market limitations, reduced productive capacity, and even the destruction of critical agricultural resources, the negative impacts were widely recognized.

Furthermore, statistical tests, including chi-square analyses, demonstrated the statistical significance of these impacts, effectively rejecting the null hypothesis that conflicts have no significant effect on food availability. This highlights the urgency for policymakers in Adamawa State to develop targeted strategies that address the disruptive influence of these conflicts on agriculture and livelihoods. Such strategies should encompass measures to mitigate conflict-related shocks, support post-conflict recovery, enhance market accessibility, build resilience, and protect essential resources. By incorporating these findings into their policies, the state can effectively manage farmer-herder conflicts and safeguard food availability for its population.

Based on the study's findings, it is clear that farmer-herder conflicts significantly disrupt food availability in Adamawa State. To address this issue, policymakers should focus on conflict mitigation and resolution strategies. This includes strengthening early warning systems, promoting peace-building initiatives, and providing conflict prevention training to local leaders. Additionally, market accessibility and stability should be prioritized through infrastructure development and fair trade policies. Supporting local farmers and herders in accessing markets can help mitigate the challenges posed by these conflicts.

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