Evaluation of Effects of Farmers/Herders` Conflict on Food Security in Delta State, Nigeria

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ABSTRACT

Crop and cattle production activities are important means of attaining food security in Delta State, Nigeria. But conflict between crop farmers and cattle herders is a critical impediment to food security. This study therefore examined the effect of farmers/herders` conflict on food security in Delta State, Nigeria. To achieve the set objective, primary data were collected from 15% of registered crop farmers and herders (i.e.700 respondents, comprising 500 farmers and 200 cattle herders). Multistage sampling technique complemented with purposive and snowball methods were adopted to compose the sample. Descriptive statistics and inferential statistical tools were applied to analyze collected primary data. The results revealed that farmers/herders` conflict had a statistically significant and negative relationship ($P \leq 0.05$) with all identified food security indicators (food availability, food accessibility, and food affordability) among both farmers and herders. Regression results showed that crop destruction, kidnapping, killing, and rape cases significantly reduced crop productivity. The logit regression results further indicated that conflict significantly reduced the probability of farmers investing in crop enterprises. The study recommended the establishment and effective management of grazing reserves and ranching systems as a panacea for peace and food security in Delta State, Nigeria.

Keywords: evaluation, effects, farmers/herders` conflict, food security, food security indicators.

INTRODUCTION

The farmers/herders crisis in Southern Nigeria is rooted in a complex mix of economic, environmental, and sociopolitical factors amongst many. Historically, pastoralist herders from the northern regions of Nigeria have migrated southward via grazing route in search of grazing lands, a practice exacerbated by desertification and land degradation in the North. However, this migration has increasingly led to conflicts with sedentary farmers in the South, who view the herders' livestock as a threat to their crops.

The rising incidence of violent conflict between farmers and herders in Nigeria has become one of the most pressing threats to national security, agricultural development, and food security (Okoli & Atelhe, 2014; Adisa, 2012). While the phenomenon was historically concentrated in the northern and central regions of the country, the escalation of violence and migratory patterns driven by climate change, desertification, and insecurity in the North have led to a significant shift, with the Southern region now emerging as a hotspot for farmer-herder clashes (Abbass, 2012; Okoli & Iortyer, 2014). Southern Nigeria - long regarded as a stable zone of agricultural production - is experiencing increased pressure on land, frequent destruction of farms, displacement of rural populations, and disruptions to food systems. These developments justify the need for a context-specific investigation of the impacts of this conflict on food security in the region.

Food security, as defined by the Food and Agriculture Organization (FAO, 2008), exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life. The four dimensions - availability, access, utilization, and stability—are all potentially affected by the conflict. The destruction of crops and livestock, abandonment of farms, restricted access to farmland, market disruptions, and rural displacement caused by the farmer-herder

conflict directly undermine food security outcomes in affected communities (Uche, 2020; Olaniyan, Francis, & Okeke-Uzodike, 2015). These realities point to an urgent need for empirical evidence on the nexus between the conflict and food security indicators in Southern Nigeria.

Previous studies have either focused primarily on the Northern region of Nigeria, where pastoralism is traditionally practiced (Higazi, 2013), or have addressed the conflict from a generalized national security perspective (Audu, 2014). However, little scholarly attention has been given to the regional dynamics of this conflict in the South, where different ecological, cultural, and land tenure systems affect the nature and consequences of the conflict. For instance, land ownership patterns in the South tend to be more communal or family-based and rigidly defended, making conflicts with pastoralists more volatile. Additionally, Southern Nigeria plays a critical role in national food supply, producing staple crops such as cassava, yam, plantain, and maize (NBS, 2022). Any disruption to farming activities in this zone has implications not only for local food availability but also for national food policy and market stability. Moreover, the complexity of the farmers-herders conflict in the South is compounded by weak policy frameworks, poor land use planning, and limited peacebuilding mechanisms. This study is therefore justified in its aim to bridge the gap between academic inquiry and policy relevance. Understanding the micro-level impacts (e.g., household food access and livelihood security) and macro-level outcomes (e.g., food market fluctuations, displacement-induced hunger) is essential for developing targeted interventions and promoting resilience in affected communities (International Crisis Group, 2017; Mwakali & Olayemi, 2021).

From a theoretical perspective, this study also contributes to advancing knowledge in the field of conflict studies, food systems, and development economics by exploring the intersection between resource-based conflict theory (Homer-Dixon, 1999) and food security frameworks. The findings will be instrumental in supporting governments, development partners, and civil society organizations working on rural development, peacebuilding, and sustainable agriculture.

This study, therefore, responds to an academic and developmental imperative. Its outcomes are expected to provide a robust evidence base for designing conflict-sensitive agricultural policies and for enhancing food system resilience in conflict-affected areas of Southern Nigeria.

The rising call to classify violent herders as terrorists underscores the urgency and severity of the situation.

Therefore, this study seeks to provide a business-centered analysis of the farmers-herders conflict in Delta State by exploring the relationship between food security and disruptions in the cattle value chain. By doing so, the study aims to uncover new economic opportunities and propose sustainable mitigation strategies that can inform policy and promote peaceful co-existence.

Objectives to the study

The broad objective of the study is to investigate the effect of farmers/herders' conflict on cattle trade and food security in Delta State, Nigeria. However, the specific objectives are to:

i. examine the relationship between farmers-herders conflict and food security in Delta State;

ii. examine the effects of farmers-herders conflict on crop productivity in Delta State; and

iii. examine the effects of farmers-herders conflict on food availability, accessibility and affordability in Delta State.

Hypotheses of the Study

The following hypotheses were tested to guide the study

HO_1: There is no significant relationship between farmers–herders conflict and food security in Delta State, Nigeria.

HO_2: Farmers–herders` conflict has no significant effect on crop productivity in Delta State.

HO_3: Farmers–herders conflict has no significant effect on food availability, accessibility, and affordability in Delta State.

LITERATURE REVIEW

Concept of Farmers-Herders` Conflicts

Farmers/herders conflicts are a persistent and increasingly violent phenomenon across many parts of Sub-Saharan Africa. These conflicts typically revolve around disputes over land, water resources, and grazing routes. In Nigeria, and particularly in Delta State, the clashes between sedentary farmers and nomadic or semi-nomadic herders have escalated in intensity and frequency. These confrontations are exacerbated by environmental degradation, climate change, demographic pressures, and weak governance structures. This literature review explores the dynamics, drivers, and impacts of farmers/herder's conflict, with specific emphasis on Delta State, Nigeria. The conflict between farmers and herders is not a recent development. According to Tonah (2006), such disputes have deep historical roots in Africa, stemming from the interaction between different livelihood systems—agriculture and pastoralism. While these systems can be complementary, they often clash due to competition over the same natural resources, especially in regions facing ecological stress. Benjaminsen and Ba (2009) assert that the farmer-herder relationship is characterized by both cooperation and conflict. In more stable contexts, herders fertilize farmers' fields with manure, and farmers allow post-harvest grazing. However, when resources become scarce, competition intensifies and relationships sour.

Theoretical Framework

Frustration-Aggression Theory and the Farmers-Herders Conflict in Delta State, Nigeria

The Frustration-Aggression Theory, originally introduced by John Dollard and his colleagues in 1939, remains a foundational framework in the study of human behavior and social conflict. The theory asserts that aggression is a direct consequence of frustration, which arises when individuals or groups are impeded in their pursuit of essential goals. According to Dollard et al. (1939), the blocking of goal-directed behavior creates an aggressive drive that manifests in hostile actions, either directly against the source of frustration or displaced onto vulnerable targets. This concept has been widely applied in sociological, psychological, and political analyses to understand the root causes of violence, especially in contexts where resource scarcity and competition prevail.

In the context of the ongoing farmers-herders conflict in Delta State, Nigeria, the Frustration-Aggression Theory provides a valuable explanatory lens. Farmers and herders, both of whom rely heavily on natural resources such as land and water for their livelihoods, have increasingly found themselves in conflict due to competition over shrinking ecological resources. Rapid population growth, desertification in northern Nigeria, climate change, and the breakdown of traditional grazing routes have forced herders many of whom are of Fulani origin to migrate southward in search of pasture. This migration often brings them into direct conflict with sedentary farming communities, leading to disputes over land, water, and crop destruction.

MATERIALS AND METHODS

Study Area

The study was conducted in Delta State Nigeria. Primary data and secondary data were obtained from previous studies.

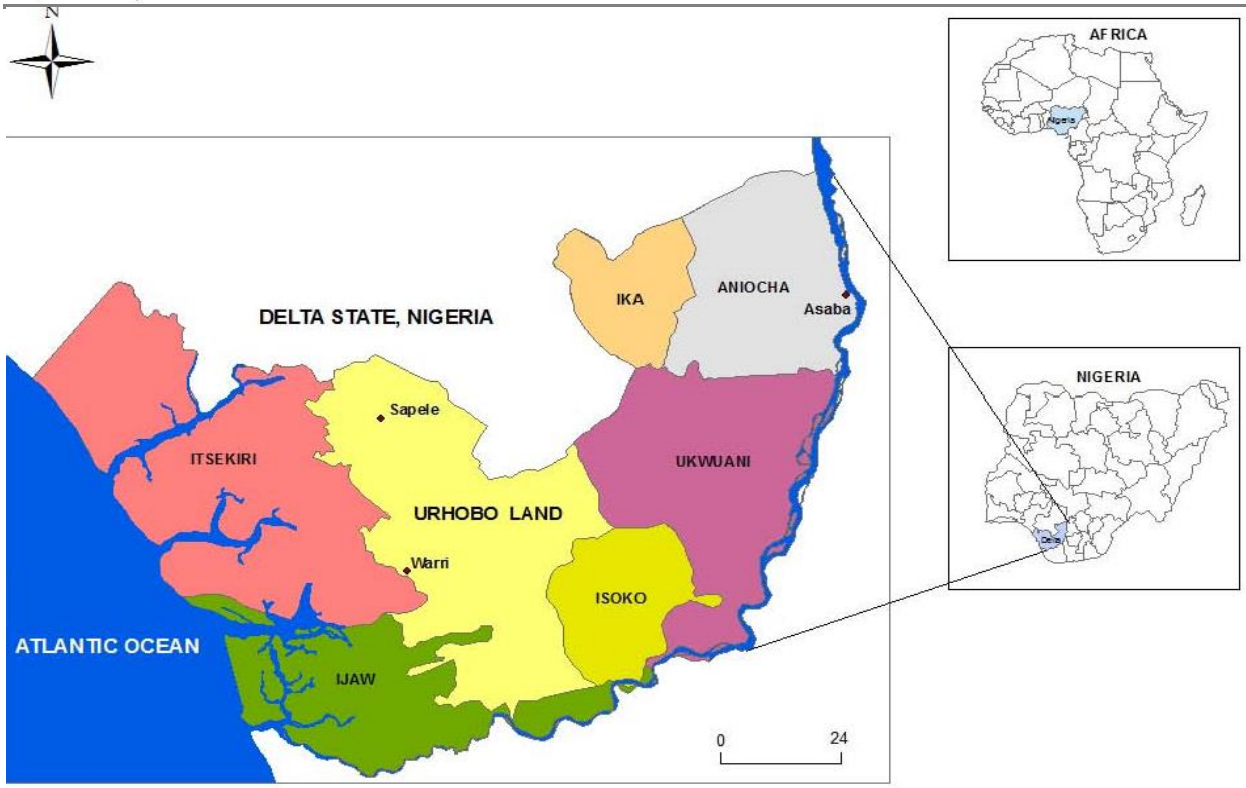

Fig.1 Map of the Study Area

Sampling Procedure

A multistage sampling procedure was employed to select respondents for this study to ensure broad coverage and representativeness across the study area. In the first stage, ten (10) Local Government Areas (LGAs) were selected across the study area using a stratified sampling technique to ensure geographic and demographic diversity. The second stage involved the purposive selection of five (5) communities within each of the selected LGAs. This purposive approach was necessary to target communities that are directly affected by the conflict and actively engaged in, farming, thereby aligning with the objectives of the study.

In the third and final stage, from each of the purposively selected communities, ten (10) respondents were chosen through simple random sampling. This yielded a total of 500 respondents (10 LGAs × 5 communities × 10 respondents), ensuring a fair and unbiased selection of participants involved in farming activities and potentially affected by the farmers-herders conflict.

In addition to the multistage sampling, a snowball sampling technique was used to identify key cattle trading hubs within the selected LGAs. This method is particularly appropriate for reaching cattle marketers. From these identified hubs, a purposive selection of 200 cattle marketers was made based on their active participation in cattle trade and their availability to provide reliable information.

In total, 700 respondents were engaged in the study: 500 from farming communities and 200 cattle marketers, ensuring a comprehensive data set for analysis.

Sample Size Determination of Respondents

(a) Farmers	**Variable**	**Selection procedure**
LGA	10	
Communities	5	5X 10 =50

Farmers	10	10X 50= 500
(b)Cattle Value Chain Actors (Cattle HUB)	200	200
Total		**700 Respondents**

Source: Authors Compilation (2025)

Methods of data collection

Data for the study were generated from primary and secondary sources. Primary data were collected with the aid of a well-structured questionnaire from 700 respondents. Secondary data were collected from published report, journals and other relevant materials on cattle trade in Delta State.

Methods of Data Analysis

Factors affecting wiliness to pay by herdsmen for commercial grazing pasture was achieved by regression analysis. Pearson moment product correlation analysis was used to test the hypothesis. The formula is given below

$$= \frac{n\sum xy - (\sum x)((\sum y)}{\sqrt{[n\sum x^2 - (\sum x)^2][n\sum y^2 - (\sum y)^2]}}$$

Objective I: The relationship between FHC and FS was analyzed using Pearson Product Moment correlation. The formula is presented below:

$$r = \frac{n\sum xy - (\sum x)((\sum y)}{\sqrt{[n\sum x^2 - (\sum x)^2][n\sum y^2 - (\sum y)^2]}}$$

Objective II: The effects of FHC on crop productivity in Delta State was achieved using multiple regression analysis. This sis specified as follows

$$CP(kg) = \beta_0 + \beta_1 CD + \beta_2 RP + \beta_3 KD + \beta_4 Kl + e_i$$

Where;

CP = Crop Productivity (Kg)

CD = Crop Destruction (loss (kg)

RC = Rape Cases (Frequency)

KD = Kidnapping (Frequency)

Kl = Killing (Frequency)

β_0 = Constant or intercept term

$\beta_1 - \beta_4$ = Coefficient of parameter estimates

ei = stochastic error term

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Objective III: Effect on FHC on food availability, accessibility and affordability in Delta State was achieved using the mean score of four-point Likert scale: Very serious= 4, Serious = 3, Fairly serious = 2, Not serious = 1.

Model Specification

Rating Scale Technique

The 4-point rating scale was used to identify and rank the improved flood management techniques adopted by fish farmers during flood events it was graded as very effective (VE) = 4, Effective (E) =3, Partially effective (PE) =2 and not effective (SD) = 1. The mean ratings of the respondents based on the 4-point rating scale were graded using real limit of number as stated below:

Likert scale rating scale

Response Categories	***ordinal values***	***real limit values***
Strongly Agreed (SA)	= 4	3.50 – 4.00
Agreed(A)	= 3	2.50 – 3.49
Disagreed (DA)	= 2	1.50 – 2.49
Strongly Disagreed (SD)	= 1	1.00– 1.49

Z test

Test of Z was consulted and was used to compare the means of two groups. It is a type of inferential statistic used to determine if there any significant difference between the mean of two groups which may be related in certain features. The t-test was employed in this study to test the null hypothesis: there is no significance difference between profitability index of flood prone and non-flood prone fisheries agribusiness clusters operators. Several studies in which T-test was used to achieve the hypothesis, for instance, Okafor (2020), carried out a study and used the t-test to realize the causes and consequences of drug abuse among youth in Kwara State and its significant difference.

Z test is a statistical used to determine whether there is a statistically significant difference between the mean of sample and a known or hypothesized population mean when the population standard deviation is known, and its similar to a t-test but relies on standard normal distribution instead of of the t-distribution.

The Z-test

Z-test will be used to test hypothesis (Ho: 3 There is no significant relationship between farmers-herders conflicts on productivity) of the study. Z-test may be outlined as follows: If we want to test the null hypothesis (Ho:) against the alternative hypothesis (Hi:)

Mathematically, $Z^*=\frac{\widehat{bi}-bi^*}{\sigma(\widehat{bi})}$

Where;

$\widehat{bi}$=Estimate $b_{i;}$

bi*= Certain value (in this case 0); and

$\sigma(\widehat{bi})$= Standard error.

A two-tailed was performed on the Standard Normal Distribution at five percent (5%) level of significance to establish the level of significance of the explanatory variables on the dependent variable. If the empirical Z* falls in the critical region, (i.e. if Z*>1.96 or Z*<-1.96) we reject our hypothesis, if -1.96<Z*<1.96, we accept our basic hypothesis (Koutsoyiannis, 1977).

RESULTS AND DISCUSSION

Relationship between Farmers–Herders Conflict and Food Security

The results in Table 1 reveal a strong negative relationship between farmers–herders conflict and the dimensions of food security among farmers. The correlation coefficients indicate that as the intensity of farmers–herders conflict increases, food availability ($r = –0.716$, $p < 0.01$), food accessibility ($r = –0.689$, $p < 0.01$), and food affordability ($r = –0.734$, $p < 0.01$) decrease significantly. This suggests that violent clashes, land disputes, and crop destruction caused by these conflicts have direct implications for farmers' ability to produce and access food. These findings align with Lezuya (2021), who observed that in Taraba State, Nigeria, recurring conflicts disrupted both crop farming and grazing activities, resulting in low productivity, inadequate availability of food, and general food insecurity in rural communities. Similarly, Amare, Abay, Berhane Andam, and Adeyanku (2025) noted that violent conflicts reduce the cultivated land area and influence crop choice, further undermining food production and stability.

The negative correlations between farmers–herders conflict and food security dimensions also suggest that the conflict affects not only physical availability but also the socioeconomic accessibility of food. For instance, the destruction of crops, farmlands, and livestock impairs household income and limits farmers' ability to procure food from markets (Okwulu, Laraba, Ebimoboere, & Idhomi, 2024). This is consistent with the findings of Mwikali and Wafula (2019), who reported that farmer-herder conflicts in Kitui County, Kenya, led to loss of livelihoods, displacement, and restricted access to resources. In Delta State, Abushe, Nwachukwu, Enimu, and Ofuoku (2023) also confirmed that the intensity of farmer-herder conflicts was significantly linked to food insecurity, demonstrating that these conflicts hinder not only production but also equitable access to food across affected communities.

Furthermore, the impact of farmers–herders conflict on food affordability is evident from the strong negative correlation ($r = –0.734$, $p < 0.01$), implying that the economic cost of conflict through loss of crops, cattle rustling, and destruction of property drives up food prices. Oluwaseyi, Odunayo, and Olumide (2024) highlighted that such conflicts erode the gains of agricultural investment and lead to the high cost of food, reducing household purchasing power. Similarly, Abubakari and Abdu Rauf (2024) noted that violent conflicts have more immediate effects on farmers and herders than on other actors in the value chain, including fatalities and loss of property, which intensifies food insecurity. These findings collectively emphasize that mitigating farmers–herders` conflict, such as through structured ranching and proper policy interventions, is crucial to enhancing food security and ensuring the affordability, accessibility, and availability of food for rural populations (Otuisi, Ogisi, & Emaziye, 2022; Okeke, 2014).

Table 1: Relationship between Farmers–Herders Conflict and Food Security (Farmers)

Variables	Farmers–Herders Conflict	Food Availability	Food Accessibility	Food Affordability
Farmers–Herders Conflict	1.000			
Sig. (2-tailed)				
N	500			
Food Availability	–0.716**	1.000		

Sig. (2-tailed)	0.000			
N	500	500		
Food Accessibility	–0.689**	0.642**	1.000	
Sig. (2-tailed)	0.000	0.000		
N	500	500	500	
Food Affordability	–0.734**	0.598**	0.671**	1.000
Sig. (2-tailed)	0.000	0.000	0.000	
N	500	500	500	500

Note: Correlation is significant at the 0.01 level (2-tailed)

N = Number of farming households

Source: Computed from Field Data, 2025

The results in Table 2 show a significant negative relationship between farmers–herders conflict and the dimensions of food security among herders. The correlation coefficients indicate that an increase in farmers–herders conflict is associated with a decrease in food availability ($r = –0.621$, $p < 0.01$), food accessibility ($r = –0.587$, $p < 0.01$), and food affordability ($r = –0.654$, $p < 0.01$). This suggests that herders are directly affected by conflicts, which disrupt livestock management, grazing patterns, and access to pastures. These findings are consistent with Lezuya (2021) and Abubakari and Abdu Rauf (2024), who noted that violent interactions between farmers and herders compromise livelihoods, reduce productivity, and create insecurity, ultimately undermining the availability and distribution of food resources in rural communities.

The negative correlations between farmers–herders` conflict and food security dimensions also reflect the socioeconomic consequences of conflict on herders. Conflicts often lead to cattle rustling, displacement, and loss of livestock, which directly reduce herders' access to essential food and income (Oluwaseyi, Odunayo, & Olumide, 2024). Mwikali and Wafula (2019) similarly observed that farmer-herder conflicts in Kenya resulted in loss of livelihoods and restricted access to critical resources. In Nigeria, Abushe, Nwachukwu, Enimu, and Ofuoku (2023) emphasized that herders experience decreased food security due to both the destruction of grazing lands and disruption of their traditional cattle-rearing activities, highlighting the vulnerability of herder communities to ongoing conflicts.

Furthermore, the strong negative correlation with food affordability ($r = –0.654$, $p < 0.01$) indicates that farmers–herders conflicts exacerbate the economic strain on herders by increasing the cost of sustaining their livelihoods. Abubakari and Abdu Rauf (2024) reported that conflict leads to reduced livestock productivity, loss of assets, and disruption of the cattle value chain, which in turn elevates food costs for herders. Similarly, Otuisi, Ogisi, and Emaziye (2022) suggested that structured ranching and proper herder training could mitigate these impacts, while Okeke (2014) highlighted that the extension of livestock production into farmlands has intensified conflicts, thereby threatening both herders' and farmers' food security. Overall, the findings underscore the urgent need for conflict management strategies to protect herders' livelihoods and ensure sustainable food security.

Test of Hypothesis (HO_1): There is no significant relationship between farmers–herders conflict and food security in Delta State, Nigeria.

The Pearson correlation analysis revealed a significant negative relationship between farmers–herders` conflict and food security indicators, including food availability ($r = –0.716$, $p < 0.01$), food accessibility ($r = –0.689$, p

< 0.01), and food affordability (r = –0.734, p < 0.01) among farmers, as well as similar significant relationships among herders. Therefore, the null hypothesis is rejected, indicating that higher levels of conflict are associated with reduced food security.

Table 2: Relationship between Farmers–Herders Conflict and Food Security (Herders)

Variables	Farmers–Herders Conflict	Food Availability	Food Accessibility	Food Affordability
Farmers–Herders Conflict	1.000			
Sig. (2-tailed)				
N	200			
Food Availability	–0.621**	1.000		
Sig. (2-tailed)	0.000			
N	200	200		
Food Accessibility	–0.587**	0.559**	1.000	
Sig. (2-tailed)	0.000	0.000		
N	200	200	200	
Food Affordability	–0.654**	0.512**	0.601**	1.000
Sig. (2-tailed)	0.000	0.000	0.000	
N	200	200	200	200

Note: Correlation is significant at the 0.01 level (2-tailed)

N = Number of farming households

Source: Computed from Field Data, 2025

Effect of Farmers–Herders Conflict on Crop Productivity

Table 3 presents the effect of farmers–herders conflict on crop yield, showing a substantial decline in agricultural productivity during periods of conflict. The mean yield before the conflict was 1,634.73 kg, which dropped drastically to 423.96 kg during the conflict, representing a mean difference of 1,210.77 kg. The t-test result (t = 37.842, p < 0.01) indicates that this reduction is statistically significant, confirming that the conflict has a profound negative impact on crop production. This finding corroborates Amare, Abay, Berhane Andam, and Adeyanku (2025), who reported that violent conflicts reduce the share of land cultivated and harvested, and force farmers to alter crop choices, thereby significantly reducing overall agricultural output in affected areas of Nigeria.

The dramatic decline in crop yield can be attributed to the direct destruction of farmlands, crops, and farming infrastructure by herders' livestock during conflicts. Lezuya (2021) highlighted that recurring farmers–herders clashes in Taraba State, Nigeria, disrupt crop farming, reduce land under cultivation, and increase food insecurity. Similarly, Okwulu, Laraba, Ebimoboere, and Idhomi (2024) noted that the escalation of tension between farmers and herders displaces farming communities and interrupts agricultural activities, leading to

low crop output. These studies underscore that the conflict not only reduces quantity but also affects the quality and timeliness of crop production, with serious implications for household food security and income.

Furthermore, the decline in crop yield during conflict periods has wider economic and social consequences. Oluwaseyi, Odunayo, and Olumide (2024) observed that such destruction contributes to higher food prices, reduced market supply, and diminished household income, exacerbating poverty and food insecurity. Abushe, Nwachukwu, Enimu, and Ofuoku (2023) similarly emphasized that farmers affected by conflicts experience reduced productivity and limited access to markets, which collectively threaten food availability, accessibility, and affordability. Overall, the evidence from Table 4.6 highlights the urgent need for conflict mitigation strategies, such as establishing ranches, enforcing open grazing bans, and improving security measures, to protect crop yields and ensure sustainable agricultural production in conflict-prone areas of Nigeria (Okeke, 2014; Otuisi, Ogisi, & Emaziye, 2022).

Table 3: Crop Yield Before and During Conflict

Variable	N	Mean Yield (kg)	Std. Deviation	Mean Difference (kg)	t-value	df	Sig. (2-tailed)
Yield Before Conflict	500	1634.730	218.457	1210.770	37.842	499	0.000
Yield During Conflict	500	423.960	134.928				

Source: Field Survey, 2025

Regression Result on Effect of Conflict on Crop Productivity

Table 4 presents the regression results on the effect of farmers–herders conflict on crop productivity, highlighting the significant negative influence of conflict-related variables. The findings indicate that crop destruction ($\beta = -0.519$, $t = -5.295$, $p < 0.01$) and killings ($\beta = -0.448$, $t = -4.870$, $p < 0.01$) are the most critical factors reducing crop productivity, followed by kidnapping ($\beta = -0.327$, $t = -3.674$, $p < 0.01$) and rape cases ($\beta = -0.192$, $t = -2.370$, $p < 0.05$). These results show that the incidence of violent and criminal activities during conflict periods directly diminishes agricultural output, as farmers are unable to cultivate their lands safely or protect their crops from destruction. This aligns with Lezuya (2021), who emphasized that recurrent farmers–herders conflicts in Nigeria disrupt crop farming, reduce cultivated areas, and lower overall agricultural productivity, thereby aggravating food insecurity in affected communities.

The model summary further strengthens the findings, with $R^2 = 0.712$ and adjusted $R^2 = 0.699$, indicating that over 70% of the variation in crop productivity is explained by the conflict variables. This high explanatory power confirms that violent events particularly crop destruction and killings are major determinants of reduced agricultural output. Similar findings have been reported by Amare, Abay, Berhane Andam, and Adeyanku (2025), who observed that violent conflicts not only reduce the cultivated land area but also influence farmers' decisions on crop choice and investment, further undermining productivity. Okwulu, Laraba, Ebimoboere, and Idhomi (2024) also noted that the displacement of farmers due to conflict prevents timely cultivation and harvesting, which directly lowers crop yield.

Furthermore, the regression results underscore the broader socioeconomic consequences of conflict on rural livelihoods. Reduced crop productivity translates into lower household income, decreased food availability, and higher vulnerability to poverty. Oluwaseyi, Odunayo, and Olumide (2024) highlighted that destruction of farmlands and insecurity from farmers–herders conflicts lead to reduced marketable produce, increased food prices, and loss of income, echoing the findings in this study. Abushe, Nwachukwu, Enimu, and Ofuoku (2023) similarly emphasized that mitigating such conflicts through policy interventions, structured ranching, and improved security is crucial for protecting both crop productivity and food security. The results from Table 4 confirm that farmers–herders conflict has a significant and negative impact on agricultural production, reinforcing the need for targeted conflict management strategies in Nigeria.

Test of Hypothesis (HO_3): Farmers–herders conflict has no significant effect on crop productivity in Delta State.

Regression results indicated that conflict-related factors significantly reduced crop yields, with crop destruction ($\beta = -0.519$, $p < 0.01$), kidnapping ($\beta = -0.327$, $p < 0.01$), rape cases ($\beta = -0.192$, $p < 0.05$), and killings ($\beta = -0.448$, $p < 0.01$) all negatively affecting productivity. Therefore, the null hypothesis is rejected, confirming that farmers–herders conflict significantly diminishes crop productivity.

Table 4: Regression Result on Effect of Conflict on Crop Productivity

Variables	B	Std. Error	Standardized Beta (β)	t-value	Sig.
(Constant)	4.025	0.512		7.857	0.000
Crop Destruction	–0.519	0.098	–0.465	–5.295	0.000***
Rape Cases	–0.192	0.081	–0.198	–2.370	0.018**
Kidnapping	–0.327	0.089	–0.308	–3.674	0.001***
Killing	–0.448	0.092	–0.427	–4.870	0.000***
Model Summary					
R	0.843				
R^2	0.712				
Adjusted R^2	0.699				
F-Stat	31.382				

Source: Field Survey, 2025

Effect of Farmers-Herders Conflict on Food Availability, Accessibility and Affordability

Table 5 presents the effect of farmers–herders conflict on food availability, accessibility, and affordability for both farmers and herders. The regression results indicate that farmers–herders conflict has a significant negative impact on all three dimensions of food security among farmers. Specifically, the conflict negatively affects food availability ($\beta = -0.412$, $t = -7.103$, $p < 0.01$), food accessibility ($\beta = -0.198$, $t = -3.194$, $p < 0.01$), and food affordability ($\beta = -0.365$, $t = -6.186$, $p < 0.01$). The model summary shows moderate explanatory power, with R^2 values ranging from 0.128 to 0.168 for farmers, suggesting that between 13% and 17% of the variation in food security is explained by farmers–herders conflict. These results are consistent with Lezuya (2021) and Nnaji, Ma, Ratna, and Renwick (2022), who observed that conflicts disrupt farming activities, reduce crop production, and limit farmers' access to affordable food, thereby exacerbating food insecurity in rural Nigerian communities.

For herders, the impact of conflict on food security is also negative but somewhat less pronounced compared to farmers. The coefficients show that conflict reduces food availability ($\beta = -0.287$, $t = -3.986$, $p < 0.01$), food accessibility ($\beta = -0.109$, $t = -1.536$, not significant), and food affordability ($\beta = -0.247$, $t = -3.529$, $p < 0.01$). The R^2 values for herders range from 0.011 to 0.078, indicating that the conflict explains a smaller proportion of the variance in food security among herders compared to farmers. This finding aligns with Abubakari and Abdu Rauf (2024), who noted that while herders experience income losses and livestock-related disruptions during conflicts, their access to personal food resources is slightly more resilient than that of farmers, possibly because they rely on livestock products as both food and economic assets.

The differences in the magnitude of the effects between farmers and herders suggest that farmers are disproportionately affected in terms of food availability and accessibility. Violent conflicts often result in crop destruction, farmland encroachment, and displacement, directly reducing the amount of food that farmers can produce and sell (Amare, Abay, Berhane Andam, & Adeyanku, 2025). Herders, on the other hand, face income losses primarily through livestock theft, killings, and restricted grazing, which indirectly affects food affordability and availability (Oluwaseyi, Odunayo, & Olumide, 2024). Okwulu, Laraba, Ebimoboere, and Idhomi (2024) further emphasized that these disparities in impact reflect the structural vulnerability of farming communities to conflict, highlighting the need for targeted interventions to protect both food production and distribution systems.

The overall significance of the models, indicated by F-statistics (F = 50.457for food availability among farmers; F = 15.888for herders), confirms that farmers–herders conflict is a critical determinant of food insecurity. The strong negative relationships underscore the need for sustainable conflict management strategies, including structured ranching, enforcement of grazing regulations, and improved rural security measures (Otuisi, Ogisi, & Emaziye, 2022; Okeke, 2014). By mitigating the incidence and severity of conflict, these interventions can enhance food availability, improve accessibility, and reduce the cost burden of food for both farmers and herders, thereby promoting overall food security in conflict-prone regions of Nigeria.

Test of Hypothesis (HO_5): HO5: Farmers–herders` conflict has no significant effect on food availability, accessibility, and affordability in Delta State.

Multiple regression results showed significant negative effects of conflict on food availability ($\beta = –0.412$, $p < 0.01$), accessibility ($\beta = –0.198$, $p < 0.01$), and affordability ($\beta = –0.365$, $p < 0.01$) for farmers, with similar patterns for herders. Thus, the null hypothesis is rejected, confirming that conflict significantly compromises all three dimensions of food security.

Table 5: Effect of Farmers-Herders Conflict on Food Availability, Accessibility and Affordability

Variables	Food Availability		Food Accessibility		Food Affordability	
	Farmers	**Herders**	**Farmers**	**Herders**	**Farmers**	**Herders**
	β (t-value)	**β (t-value)**	**β (t-value)**	**β (t-value)**	**β (t-value)**	**β (t-value)**
Constant	3.214 (22.633)	2.947 (16.009)	2.866 (18.987)	2.733 (16.168)	3.102 (21.103)	2.891 (16.420)
Farmers–Herders Conflict	–0.412 (–7.103) ***	–0.287 (–3.986)	–0.198 (–3.194) ***	–0.109 (–1.536)	–0.365 (–6.186) ***	–0.247 (–3.529) ***
Model Summary						
R	0.41	0.28	0.193	0.104	0.361	0.242
R^2	0.168	0.078	0.037	0.011	0.13	0.059
Adjusted R^2	0.166	0.074	0.035	0.009	0.128	0.056
F-Stat	50.457***	15.888***	10.203***	2.36	38.268***	12.451***

Effect on Crop Productivity and Investment Decisions

Crop yield was found to decline significantly during conflict periods. Regression results confirmed that conflict-related variables significantly reduced crop productivity. Logistic regression analysis further revealed

that farmers exposed to conflict were significantly less likely to invest in crop enterprises, particularly due to crop destruction, kidnapping, and killings.

Effect on Food Availability, Accessibility, and Affordability

Regression results indicated that farmers–herders conflict significantly reduced food availability, accessibility, and affordability, with stronger effects observed among farming households compared to herders.

CONCLUSION AND POLICY RECOMMENDATIONS

This study has demonstrated that farmers–herders conflict constitutes a pervasive and multidimensional challenge to agricultural livelihoods, cattle trade operations, and food security in Delta State, Nigeria. The conflict has disrupted productive activities, weakened market systems, constrained investment decisions, and intensified vulnerability among farming and herding households. The findings further underscore the interconnectedness between conflict dynamics, institutional arrangements, and livelihood outcomes. Weak governance structures, inadequate grazing infrastructure, and limited access to conflict mitigation mechanisms have compounded the adverse effects of the conflict. The study further concludes that sustainable resolution of farmers–herders` conflict is essential for restoring agricultural productivity, enhancing food security, and promoting inclusive rural development in Delta State, Nigeria.

Based on the findings of the study, the following recommendations are made:

i. The study recommends that state and local governments, in collaboration with traditional institutions and community leaders, should strengthen conflict prevention and resolution mechanisms at the community level.

ii. There should be early warning systems, dialogue platforms, and mediation committees should be institutionalized to minimize conflict escalation and protect household food security.

iii. There should be coordinated policy interventions that integrate security, institutional reform, livelihood diversification, and market development within a comprehensive agricultural and rural development framework.

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Conflict Of Interest

We (the authors), declare that there is no conflict of interest regarding the publication of this manuscript.

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APPENDIX

"Effect of Farmers/Herders Conflict on Cattle Trade and Food Security in Delta State, Nigeria."

Section A: Demographic and Socioeconomic Information

1. Age: _____
2. Gender: Male [ ] Female [ ]
3. Marital Status: Single [ ] Married[ ] Divorced/Widowed [ ]
4. Occupation: Farmer [ ] Herder [ ] Cattle trader [ ] Civil servant [ ]
5. Educational Level: No formal education [ ] Primary [ ] Secondary [ ] Tertiary [ ]
6. Household size: Below 5 [ ] 5 – 10 [ ] Above 10 [ ]
7. Years of farming/herding experience: Below 5 [ ] 5 – 10 [ ] Above 10 [ ]
8. Local Government Area: _____

Section B: Farmers-Herders Conflict and Food Security

Objective i: Relationship between farmers-herders conflict and food security

9. Have you experienced any conflict between farmers and herders in your area?

- Yes [ ] No [ ]

10. How often do these conflicts occur? Rarely [ ] Occasionally [ ] Frequently [ ] Very Frequently [ ]

11. To what extent has the conflict affected your access to food?

- Not at all [ ] Slightly [ ] Moderately [ ] Severely [ ]

12. Have you experienced food shortages due to farmers-herders conflict? Yes [ ] No [ ]

Section C: Effects on Income of Cattle Value Chain Actors

Objective ii: Conflict and income of cattle value chain actors

13. Are you involved in cattle trade or any part of the cattle value chain? Yes [ ] No [ ]

14. If yes, what aspect? Rearing [ ] Trading [ ] Transportation [ ] Butchering [ ]

15. How has the conflict affected your income from cattle-related activities?

No effect [ ] Slightly reduced [ ] Significantly reduced [ ] Completely lost income [ ]

16. Estimate your monthly income before the conflict: ₦_____

17. Estimate your monthly income now: ₦_____

Section D: Crop Productivity and Investment

Objective iii & iv: Effects on crop productivity and investment decisions

18. Has your farm or crops ever been damaged due to herders' activities?

Yes [ ] No [ ]

19. If yes, to what extent was your crop damaged (a) No damage (b) partially damaged (c) the entire crops were destroyed (d) others, please specify _____

20. How often was the damage _____

21. Estimate your yield before the conflict (in kg or bags): ___

22. Estimate your current yield (in kg or bags): ___

23. How much is the cost per kg_____

24. Has the conflict influenced your decision to invest more in crop farming? Yes [ ] N0 [ ]

25. If yes, how?_____

Reduced land under cultivation [ ] Stopped farming [ ] Shifted to other livelihoods [ ] Investing in security [ ] others, please specify _____

Section E: Food Availability, Accessibility, Affordability

Objective v: Impact on food security dimensions

26. Has food become scarce in your area in the past year? Yes [ ] No [ ]

27. If yes, how much do you buy a basket of garri before and during conflict_____

28. How easy is it for you to access food from the market now compared to the past?

Much easier [ ] Same [ ] More difficult [ ] Very difficult [ ]

29. Has food become more expensive due to the conflict? Yes [ ] No [ ]

30. How many meals does your household have per day currently? ___

Section F: Coping Strategies by Households

Objective vi: Coping mechanisms

31. What strategies have you adopted to cope with the effects of the conflict? (Check all that apply)

S/N	Coping Strategies	Responses
1	Reduce food consumption	Yes ( ) No ( )
2	Livelihood diversification	Yes ( ) No ( )
3	Migrated to another area	Yes ( ) No ( )
4	Government and community security support	Yes ( ) No ( )
5	Dialogue/Peace	Yes ( ) No ( )
6	Warning and information system (town crier)	Yes ( ) No ( )
7	Hired security	Yes ( ) No ( )
8	Relocation of market to safer area	Yes ( ) No ( )

30. How effective have these strategies been?

S/N	Coping Strategies	Not effective 1	Slightly effective 2	Effective 3	Very effective 4
1	Reduce food consumption				
2	Livelihood diversification				
3	Migrated to another area				
4	Government and community security support				
5	Dialogue/Peace				
6	Warning and information system (town crier)				
7	Hired security				
8	Relocation of market to safer area				

Section G: Causes of Farmers-Herders Conflict

Objective vii

32. In your opinion, what are the major causes of farmers-herder's conflicts in your area? (Select all that apply)

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Land ownership dispute [ ] Encroachment by herders [ ] Crop destruction by cattle [ ] Water resource competition [ ] Ethnic/religious tensions [ ] Lack of grazing reserves [ ] Government negligence [ ] Others, please specify _____

Section H: Livelihood Opportunities for Peacebuilding

Objective viii

33. What livelihood or business opportunities could help reduce the conflict? (Select all that apply)

S/N	Multiple responses	Yes	No
1	Ranching		
2	Livestock feed production		
3	Crop-livestock integration		
4	Skills training for youth		
5	Community-based peacebuilding		
6	Microfinance schemes		

Section I: Structure of Cattle Trade

Objective ix

34. What is your role in the cattle trade chain?

Owner [ ] Trader [ ] Transporter [ ] Butcher [ ] Middleman [ ] Not involved [ ]

35. Where do cattle sold in your area usually come from?

Within Delta State [ ] Other parts of Nigeria [ ] Neighboring countries [ ]

36. Where are cattle usually sold?

Weekly market [ ] Direct to consumers [ ] Through brokers [ ] Other: _____

37. What major challenges do cattle traders face due to conflict?

Transport disruption [ ] Market closures [ ] Cattle theft [ ] Security threats [ ]

Section J: Testing Hypotheses (Likert-Scale Items)

(Tick the most appropriate option for each statement)

Strongly Agree | Agree | Neutral | Disagree | Strongly Disagree

(Scale: 5 = Strongly Agree, 1 = Strongly Disagree)

	Statement	5	4	3	2	1
38	Cattle trade positively affects food security in Delta State					

39	Commercial grazing improves cattle quality (grade) in the region					
40	Farmers-farmers conflict has no significant effect on agricultural productivity					
41	Conflict has disrupted the cattle supply chain in Delta State					
42	Crop losses due to herders' activities reduce household food security					
43	Investing in ranching systems can help reduce farmers-herders conflict					
44	The government has done enough to address farmers-herders conflict					