

## Analysis of The Effects of Farmer-Herder Conflicts on Rural Households Food Security in Gombe State, Nigeria

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### Abstract:

Farmer-herder conflicts have worsened recently resulted from cultivation of more land that is meant for grazing and cattle routes, leading to conflicts which effects the food security of the rural households. The study aimed at examined the effects of farmer-herder conflicts on rural household's food security in Gombe State, Nigeria. Primary data were collected using structured questionnaire and FGD among 118 farmers and 112 herders. Descriptive statistics and inferential statistics such as tobit and logit regression models were used in analyzing the data. The result shows that, household size and education was significant at 5% level, while farm size and cattle route encroachment were significant at 1% as the major causes of the conflict. In addition, killing of stray cattle, increase in population, raping and sexual harassment were all responsible to farmer-herder conflict with different marginal effects. The study assessed the effects of the conflict on food status using (USDA) scales. It shows that, 59.3% and 31.3% of the respondents, having food insecure with moderate hunger, while 43.7% and 66.1% are having food insecure with severe hunger. The study concluded that selling of grazing areas, corrupt practice by traditional rulers are some of the constraints that affects conflict management. Therefore, the research recommends the need to create a platform that will bring all stakeholders together on a quarterly basis in order to have an interaction, also the need for the law makers to revisit the existing 1964 grazing reserves act and 1978 land tenure act so as to give room to accommodate land ownership, usage and control for the competing parties, this may help in reducing the intensity of the conflict. Finally, there is need for the adoption of some mitigating strategies such as alternative dispute resolutions, arrest and prosecution of offenders so as to manage the reoccurrences of the conflicts.

**Keywords:** farmer-herder conflicts; rural households; food security status

### Introduction

Agricultural production provides the means of livelihood and economic sustenance for the majority of the population of Nigerians. Farmers and herders make significant contributions in meeting the nutritional needs of the country and thus contributing to food security of households (Onuoha, 2015). Food security at the individual, household, national, regional and global levels is achieved when all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs for an active and healthy life. While food insecurity exists when people do not have adequate physical and economic access to food as defined above (FAO, 2014).

Recently, there have been a lot of concerns expressed over the looming danger of food crisis in many nations, including Nigeria. The main goal of food security, therefore, is for individuals to be able to obtain adequate food needed at all time, and to be able to utilize the food to meet the body needs. The World Bank identified four pillars underpinning food security. These are food availability, food accessibility, food utilization and food stability (FAO, 2014). In recent years, Nigeria have witnessed series of violent communal clashes arising from the activities of the herders who move about on a daily basis with their cattle in search of water and green pastures. Many farmers and herders have lost their lives, while others have experienced declining production in their crops and herds (Ufuoku and Isife 2009).



Conflict has been one of the stumbling blocks and a major threat to world peace today. Conflict has been defined by Collins (2010), as a serious disagreement or argument about something important that leads to the outbreak of law and order. Conflict has also been defined basically as a struggle or contest between people with opposing needs, ideas, values and goals (Dietz et al., 2016). According to Oyetade (2017), access to water and grazing land has become more competitive and had led to farmers and herders into arguments on a regular basis. This is a worrisome trend because both have coexisted inter-dependently for centuries, sharing the same fields for farming and grazing with a manageable level of tolerance and accommodation.

Historically, conflict between farmers and herders in Nigeria have worsened recently with the increase in population as well as climatic changes which had led to cultivation of more land that is meant for grazing and cattle routes. It is important to note that these conflicts have direct effects on the food security of those involved as well as the country at large. It also disrupts and threatens the peaceful coexistence of different ethnic's groups in the country as well as sustainability of agricultural production in Nigeria (Moritz, 2010).

However, Gombe State is one of the States that witnessed the spreads of farmer-herder conflicts. This had led to damage of crops, attacks on cattle, destruction of properties, killings of live and cattle rustling. It is reported that climatic changes, population growth, environmental degradation, Government policies as well as insurgency activities are some of the major trigger of the conflicts and violence between the two groups (Suleiman, 2015).

**Objectives of the Study:**

The broad objective of the study is to analyze the effects of farmer-herder conflicts on rural household's food security in Gombe State, Nigeria. The specific objectives of the study are to:

- i. describe the socio-economic characteristics of farmers and herders;
- ii. determine the socio-economic characteristics, institutional and environmental factors influencing farmer-herder conflicts;
- iii. examine the effects of farmer-herder conflicts on food security of rural households;
- iv. identify the mitigation strategies associated with the management of the farmer-herder conflicts.

**Hypotheses of the Study:**

- i. There is no significant relationship between farmer-herder conflicts and food security.
- ii. There is no significant relationship between socio-economic characteristics, institutional and environmental factors and farmer-herder conflicts.

**Methodology:**

The study was carried out in Gombe State, located at the center of the north eastern part of Nigeria between latitude 9° 30 and 12° 30' N, longitude 8° 5 and 11° 45 E. The State is made up of 11 Local Government Areas. It has a total land area of 20,265 Square kilometers with an estimated population size of (2,857,042) in 2006 (NPC, 2006) and a projected population of (4,195,662) in 2019. The target population for the study are farmers and herders. A multi-stage sampling procedure was used to select respondents for the study. The first stage involves the purposive selection of

three Local Government Areas, one each from the three agricultural zone

The selection was based on the frequency occurrences of farmer-herder conflicts in the State. The LGAs selected had recorded frequent clashes between farmers and herders. They are Billiri in the South, Dukku in the North and Yamaltu Deba in the Central Zones. The second stage involved stratified random sampling of (3) villages, from each of the (3) selected LGAs giving a total of (9) villages namely; Wade, Kuri, Dadin Kowa from Y/Deba LGA, Maltawo, Jamari, Maru from Dukku LGA and Tudu, Ayaba, Laushidadi from Billiri LGA. A total number of 276 farmers were selected while 267 herders were equally selected, to give a total sample frame of 543 respondents for both the farmers and herders respectively. Primary data were obtained using semi-structured questionnaire, interview schedule and FGD. Both descriptive and inferential statistics were used to analysed the data collected. Descriptive statistic such as mean, frequency, percentages, standard deviation were used to achieve objectives I and IV of the study while inferential statistics such as tobit and logit statistical tools were employed to achieved objectives II and III and tested the hypotheses.

**Model Specification:**

**Logit regression model:**

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8 + U;$$

Where:

$$Y = \text{Rural households food security } \begin{cases} Y=0 \text{ for food secure} \\ Y=1 \text{ for food insecure} \end{cases}$$

X<sub>1</sub> = Interpersonal dispute/clashes (Numbers of personal clashes)

X<sub>2</sub> = Group disputes/clashes (Numbers of group clashes)

X<sub>3</sub> = Violent confrontation (Numbers of violent confronted)

X<sub>4</sub> = Destruction of properties (Amount of properties destructed)

X<sub>5</sub> = Maiming and killing (Numbers of family member injured or lost)

X<sub>6</sub> = Cattle rustling (Numbers of cattle stole)

X<sub>7</sub> = Killing of stray cattle's (Numbers of cattle lost)

X<sub>8</sub> = Crop damage by cattle encroachment (Bags of crop destroyed)

β<sub>0</sub> = Constant

β<sub>1</sub> – β<sub>8</sub> = Regression coefficients

U = Error term

**Tobit regression model:**

$$Y_i^* = \beta_0 + \beta_1 + X_1\beta_2 + X_2\beta_3 + X_3\beta_4 + X_4\beta_5 + X_5\beta_6 + X_6\beta_7 + X_7\beta_8 + X_8\beta_9 + X_9\beta_{10} + X_{10}\beta_{11} + X_{11}X_{12} + \beta_{12}\beta_{13} + X_{13}\beta_{14} + X_{14}\beta_{15} + X_{15}\beta_{16} + X_{16}\beta_{17} + X_{17} \dots \dots \dots 2.4.2.$$

$$i = 1, 2, \dots \dots \dots 17.$$

Where:

Y<sub>i</sub>\* = Farmer-Herder conflicts.

X<sub>1</sub> = Age (in years)

X<sub>2</sub> = Sex (Male = 1, Female = 0)

X<sub>3</sub> = Marital Status (Single = 0, Married = 1, Divorce =2, Widow = 3)

X<sub>4</sub> = Higher Educational Levels (Years spent)

X<sub>5</sub> = Households Size (Numbers of individual)



- X<sub>6</sub> = Farm Size (Numbers of hectare)
- X<sub>7</sub> = Herds Size (Numbers of cattle)
- X<sub>8</sub> = Farming Experience (Years in farming)
- X<sub>9</sub> = Herding Experience (Years in herding)
- X<sub>10</sub> = Membership of Association (Years spent as a member)
- X<sub>11</sub> = Government Policy (1 = Yes, 0 = No)
- X<sub>12</sub> = Role of Traditional Rulers (1 = Yes, 0 = No)
- X<sub>13</sub> = Extension Contact (Numbers of extension visit in a year)
- X<sub>14</sub> = Cattle Routes (5-point Liker scale)
- X<sub>15</sub> = Grazing Reserves (5-point Liker scale)
- X<sub>16</sub> = Water Resources (5-point Liker scale)
- X<sub>17</sub> = Vegetation Cover (5-point Liker scale)
- a = Constant
- β<sub>1</sub>-β<sub>17</sub> = regression coefficients
- e = error term

No contact	76(67.86)	40(33.90)
Once	19(16.96)	23(19.49)
Twice	12(10.71)	34(28.81)
Thrice	5(4.46)	17(14.41)
Four times	-	3(2.54)
Five times	-	1(0.85)
Mean		2

1

\*Figure in Parenthesis Are Percentages

**Table 1:** Socio-economic Characteristics of the Respondents

**Results and Discussion:**

Socio-economic	Farmers (N=118)	Herders (N=112)
<b>Age</b>		
<20 years	3(2.68)	
20-29 years	1(0.85)	14(12.50)
30-39 years	21(17.80)	34(30.36)
40-49 years	45(38.14)	31(27.68)
50-59 years	38(32.20)	15(13.39)
>60 years	13(11.02)	15(13.39)
Mean	46	42
<b>Households size</b>		
0-3	9(7.63)	45(40.18)
4-7	57(48.31)	51(45.54)
8-11	32(27.12)	15(13.39)
12-15	8(6.78)	1(0.89)
16-19	8(6.78)	-
>20	4(3.39)	-
Mean	8	4
<b>Farm size of the respondents</b>		
1-5 hectares	95(80.50)	1-200 cattle
6-10 hectares	22(18.64)	201-500 cattle
>10 hectares	1(0.85)	>500 cattle
Mean	4 hectares	99 cattle
<b>Extension contact</b>		

**Age distribution of the respondents:**

The result in Table 1 indicates that, 38.14% and 30.36% of respondents were below the age range of 50 years with an average age of 46 and 42 for farmers and herders respectively. It could therefore be inferred that both farming and herding are predominantly carried out by young and middle-aged people within the age range of 20-50 years who are energetic, more productive in the economic sector and more prone to conflict. This finding agrees with that of Kehinde (2011) who revealed in his work the mean age of 42 and 31 years for farmers and herders respectively.

**Households size of the respondents:**

The result in Table 1 shows that 48.31% and 45.54% of the farmers and herders falls within the household size of 4-7 persons. The average household size was 8 and 4 persons for farmers and herders respectively implying that, there is appreciable number of family labour supply to accomplish various farm operations. The result of study was similar to the findings of Ume and Chukwu (2015) who opined that, the household size of majority of the farmers was 45% with a ranged between 6 – 10 persons. This imply that the famers have large family size which can provide family labour for cultivation of large farm but could be prone to the risk of the conflict. While in the household size of herders, about 62.5% ranged between 16 – 20 persons, indicating that the herders too have large family size which could also be a force for conflicts occurrence.

**Farm/Herds size of the respondents:**

Table 1 reveals that 99% of the respondents had their farm sizes ranging from 1-10 hectares. This means that the respondents were predominantly small and medium scale farmers. This result is in contrast with Nwaiwu (2015) who opined that majority 74.9% of the respondents having farm sizes less than 1 hectare. Also, the result in Table 1 further shows that, the majority of the herders 85.71% keep a herd's size of less than 200, 13.39% within the range of 201-500, while only 0.89% maintain more than 500 cattle. The optimum herds size according to the Fulani classification small scale is having less than 200 herds, semi-medium herds to be between 201-500 animals and large herds to be above 500 herds. Using this as a yard stick, the majority of the herders are small scale herders.



**Extension contacts of the respondents:**

The distribution of the sampled farmers/herders was based on numbers of extension visit is presented in Table 1. The result reveals that about 33.9% farmers had no extension contact in a year, while 67.86% of the herders had no extension contact. This implied that extension agents play a vital role in conflict management and their inadequate in number in the study areas, also threat the peaceful coexisting between the farmers and herders in the study areas. This result was in contrary to the findings of Olabatoke and Omowumi (2017), who found out that extension agents can be used in managing conflicts, since their studies indicated that majority 81% of the respondents had contact with extension agents on monthly basis. And also 100% of the respondents agreed that settlement of dispute, giving of advice and educating both sides are the most effective mechanisms used by the extension agents to resolve conflicts between the farmers and herders.

**Socio-Economic Characteristics, Institutional and Environmental Factors Influencing Farmer-Herder Conflicts:**

Farmer-herder conflicts are viewed as a left-censored variable since the smallest number of conflicts experienced by the respondents is 1; given that all the respondents experienced at least a nature of conflicts but with varying intensity. Therefore, the left-censored Tobit model was rightfully chosen to fit farmer-herder conflicts in relation to their socio-economic, institutional and environmental factors. The parameters' estimates of the Tobit models in Table 2 were estimated by maximum likelihood estimator. The log likelihood value was statistically significant on the basis of the F-test at 1 percent level of probability which implies that all the coefficients in the model were jointly different from 0. In other words, all the 16 regressions in the model jointly affect farmer-herder conflicts.

The coefficient of household size was positively sign and statistically significant at 5 percent level of probability. It's an evident from the study that a large household are more prone to farmer-herder conflicts than those with fewer household.

While the coefficient of education had an inverse relationship with conflict and statistically significant at 5 percent level, thus suggesting that the higher the educational level of the household, the more they avert/avoid conflict compare to non-educated people. Educated person may be more open to dialogue during conflicts.

The coefficient of farm size also had an inverse relationship with conflict and statistically significant at 1 percent level. This may be due to high pressure on land resulted from increase in population vis-à-vis the traditional land tenure of inheritance.

Also Farming on the cattle routes was positively sign and statistically significant at 1 percent level. This implies that as farmers continue farming on the cattle routes this may cause farmer-herder conflicts. The positive relationship indicates that the more the cattle routes are encroached the more the probability to engage in conflict between farmers and the herders. This concurs with the assertion by Ingawa et al., (1999) and Yahaya (2008) that land encroachment is among the causes of farmer-herder conflicts. Also findings from Nyong (2010), revealed that it is natural for the farmers to encroach in to marginal lands that had been the traditional pasture routes for the cattle. This has therefore heightened struggle between livestock and agricultural

production which, often escalate the conflicts.

Variables	Coefficient	Std. Err.	T
Age	0.001101	0.00153	0.72
Sex	-0.02968	0.044071	-0.67
Marital status	-0.00025	0.025776	-0.01
Household size	0.006957	0.003349	2.08**
Education	-0.02762	0.012347	2.24**
Farm size	-0.01709	0.006787	2.52***
Farming experience	-0.00122	0.001516	-0.8
Cooperative membership	-0.00178	0.001526	-1.17
Extension contact	-0.01065	0.012233	-0.87
Herd size	-0.00025	0.000178	-1.39
Decline in grassland	-0.10091	0.074595	-1.35
Misuse of water bodies in the area	-0.00135	0.045183	-0.03
Farming on the grazing reserves	0.064896	0.050494	1.29
Farming on the cattle routes	0.135748	0.046381	2.93***
Low rainfall in the region	-0.05155	0.060611	-0.85
High incidence of desertification	-0.03506	0.042125	-0.83
Cons	0.195921	0.395053	0.5
Sigma	0.1635471	0.0081739	20.00
No of observation	230		
LR chi <sup>2</sup> (16)	75.56		
Prob > chi <sup>2</sup>	0.0000		
Log likelihood	51.046		

NB: \*\*\* P < 0.01, \*\* P < 0.05, \* P < 0.10, Std Err. = Standard Error, Coef = Coefficient.

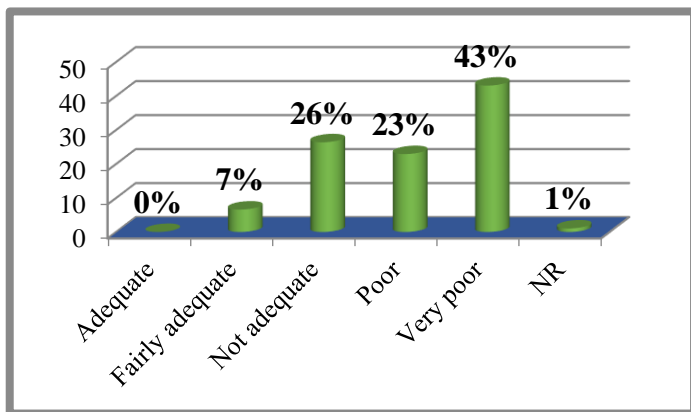
**Table 2:** Socio-economic Characteristics, Institutional and Environmental Factors Influencing Farmer-Herder Conflicts

**Effects of Farmer-Herder Conflicts on Rural Households Food Security:**

This section deals with the effects of farmer-herder conflicts on rural household's food security. Both qualitative and quantitative approach was used to analyse the result.

**Change in food availability:**

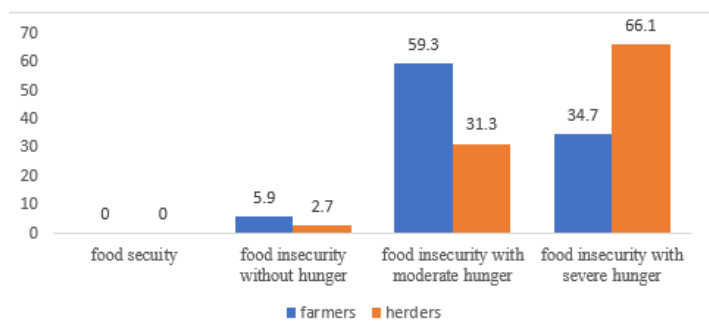
In determine the effects of the farmer-herder conflicts on the food security situation The study shows that 7% of the respondents opined that food availability is fairly adequate, 26% of the respondents stated that food availability is not adequate, while 23% were of the opinion that food security is poor, while 43% posited that the situation is very poor. The result in Figure 1 from the foregoing, about 92% opined that the farmer-herder conflicts have affected the availability of food supply in the study areas. This corroborates reports by National Emergency Management Agency (NEMA, 2018), among others of the grave food insecurity situation in the zone.



**Figure 1:** Effect of Farmer-Herder Conflicts on Food Availability.

**Food security status of United State Development Agency:**

The methodology adopted in estimating food security status of farmer-herder conflicts was based on scaled. This scale is a number continuum in a linear scale that ranges between 0 and 10. The scale measures the degree of food insecurity/hunger experienced by a household in terms of a single numerical value. Result in Figure 2 shows that, the farmers were more with food insecurity without hunger than the herders but fewer than their counterparts in terms of food insecurity with moderate hunger and food insecurity with severe hunger. As a whole majority of the respondents were food insecurity with severe hunger.



**Effects of Farmer-Herder Conflicts on Food Security of Rural Households:**

The Logit model is used in estimating effects of farmer-herder conflicts on rural households’ food security in Gombe State. The estimated coefficients of the Logit model, along with the standard error, z-values and marginal effect are presented in Table 3. The likelihood ratio test was -134.505 is significant at 1 percent. This implies that all the variables included in the Logit model are jointly significant in influencing farmer-herder conflicts on food security of rural households. Table 3 shows that killing of stray cattle, increase in population, raping and sexual harassment are statistically significant determinants of farmer-herder conflicts on food security of rural households. However, the parameter estimates of the Logit model provide only the direction of the effects of the independent variables on the dependent (response) variable, estimates do not represent actual magnitude of change or probabilities. Thus, the marginal effects from the model, which measure the expected change in probability of a particular choice being made with respect to a unit change in an independent variable.

Killing of stray cattle had a negative sign and statistically

significant at 5 percent level. Implying their inverse relationship to the respondents’ involvement in conflict. An increase in killing of stray cattle could lead to an increase in conflict between farmers and herders. The marginal effect of 0.78 shows that, killing of stray cattle increases the probability of conflict by 7.8%. This finding is in line with Bello (2013) among many others that, killing of stray cattle by farmers is among the causes of farmer-herder conflicts.

Increase in population has a direct relationship with conflict and statistically significant at 10 percent level. Implying that an increase in population will lead to farmer-herder conflicts. The marginal effect of 0.68 shows that continue increase in population, increases the probability of conflict by 6.8%. This is in line with the findings from Eje et al., (2016) among many other, that some of their respondents viewed crops damaged is due to encroachment of grazing routes which resulted from the increase in population causing conflicts between farmers and herders.

Raping and sexual harassment has a direct relationship with farmer-herder conflicts and statistically significant at 10 percent level. Implying that continue increase in raping and sexual harassment will lead to an increase in farmer-herder conflicts. The marginal effects of 0.324 shows that an increase in raping and sexual harassment, increases the probability of conflicts by 32.4%. This is line with the findings from Ufuoku and Isife (2009), among many other that, the harassment of female was rated by both farmers and herders as having caused conflicts.

Variables	Coefficient	Std. Err.	Z	Marginal effect
Crop damage by cattle	0.114	0.216	0.53	0.027
Land Encroachment	-0.020	0.137	0.15	-0.005
Inadequate grazing reserves	-0.269	0.468	-0.58	-0.063
Lack of access to water point	-0.129	0.133	-0.97	0.03
Killing of stray cattle	-0.332**	0.137	-2.42	-0.078
Pollution of water points	0.314	0.376	0.83	0.073
Disregard for rules and regulation	-0.603	0.544	-1.11	-0.140
Increase in population	0.291*	0.148	1.96	0.068
Environmental degradation	-0.136	0.464	-0.29	-0.032
Boko haram insurgency	-0.847	0.518	-1.64	-0.197
Government policy	0.082	0.397	0.21	0.019
Spraying of grass with chemicals	0.072	0.159	0.45	0.017
Raping and sexual harassment	1.392*	0.722	1.93	0.324
_Cons	-0.602	4.303	-0.14	



No of observation	230			
LR chi <sup>2</sup> (16)	37.04			
Prob > chi <sup>2</sup>	0.0004			
Log likelihood	-134.505			

NB: \*\*\* P < 0.01, \*\* P < 0.05, \* P < 0.10, Std Err = Standard Error, Coef = Coefficient.

**Table 3:** Effects of Farmer-Herder Conflicts on Food Security of Rural Households

**Mitigation Strategies Associated with the Management of Farmer-Herder Conflicts:**

Result from Table 4 shows the various methods of conflict resolution commonly employed in resolving the farmer-herder conflicts in the study areas, the result shows that 99.1% indicated that arrest and prosecution as the most popular method of managing conflicts followed by alternative dispute resolution with 94.4%, also about 92.8% of the respondents reported that verbal warning and provision of relief materials is a mitigating strategies that could be use in resolving farmer-herder conflicts in the study area.

Mitigating strategies	Yes		No	
	Frequency	Percent age	Frequency	Percent age
Payment of compensation	95	29.7	225	70.31
Verbal warning	297	92.8	23	7.19
Alternative dispute resolution	302	94.4	18	5.63
Re-allocation of new plot	97	30.3	223	69.69
Re-payment for the loss of cattle	91	28.4	29	9.06
Provision of relief material	297	92.8	23	7.19
Arrest and prosecution	317	99.1	3	0.94

Sources: Field Survey, 2019 \* Multiple responses

**Table 4:** Mitigation Strategies Associated with the Management of Farmer-Herder Conflicts

**Conclusion and Recommendations:**

Farmer-herder conflicts have drastically reduced the availability of food supply as well as the income of rural households. The study identified three key factors responsible to farmer-herder conflicts in the study areas, these are; killing of stray cattle, increase in population, raping and sexual harassment by the parties. This issue has consistently been in the forefront of most of the media outlet of the nation. As such, farmers view cattle routes and grazing reserves as land not possessed by anyone and

can therefore be freely encroached. The herders on the other hand, has the belief that feeding his cattle at whatever circumstances is a superior and uncompromising right given to him by nature and these had led to clashes between the competing parties. It is recommended that, village extension agents should be employ who can serve as an intermediary between the farmers and herders. Also, the need to create a platform such as Local Development Plan (LDP) that will bring all stakeholders together on a quarterly basis. The research revealed that farmer-herder conflicts had an effect on food security. It is therefore, recommended that, government should identify victims of these attacks and assist them financially and materially. Findings from FGD revealed that, Government at the State level should investigate the report of traditional rulers and local Government official who engaged in corrupt practice of selling grazing areas and cattle routes, in order to take necessary action to prevents its reoccurrences. The study recommends the need for the law makers to revisits the existing 1964 grazing reserves act and 1978 land tenure act so as to give room to accommodate land ownership, usage and control to farmers and herders. This may help in reducing the intensity of the conflicts. The research also revealed the needs to adopt some mitigating strategies such as alternative dispute resolutions, provision of relief materials, arrest and prosecution of the offenders, this will help in managing the intensity of the conflicts.

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