



ARTICLE INFO

Received

June 18, 2017

Accepted

August 28, 2017

Published

December 25, 2017

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Keywords
 Productivity
 Economic burden
 Conflicts
 Arable farmers
 Herdsmen
How to Cite
 Ashagidigbi WM, Yusuf SA,
 Olubodun RA. Economic
 burden of conflicts on farmers'
 output in South-West Nigeria.
 Sci Lett 2017; 5(3):217-224

Open Access

Economic Burden of Conflicts on Farmers' Output in South-west Nigeria

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Abstract

Conflicts between Fulani herdsmen and arable crop farmers have become a common phenomenon in Nigeria, especially in the Southern part. The competition for land between these two stakeholders has caused losses in agricultural outputs and also inflicted the economic burden on both user-groups. Thus, the growing need to examine the economic burden of the conflicts is germane. Primary data were used and Multistage Sampling approach was adopted in selecting 160 farmers and 60 herdsmen in the study area. Descriptive statistics, economic loss model and Tobit regression model were the analytic tools employed. The findings revealed that mean loss of \$2,045.39 was incurred by arable farmers due to loss of lives, while their output was reduced by about 26% as a result of the conflicts. The major cause of conflict from the farmers' perspective was the destruction of crops by cattle, while herdsmen attributed it to blockage of stock routes. Creation of grazing routes and launching of crisis prevention initiatives are policy options that could be adopted to prevent economic loss and increase productivity among the farmers.



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Introduction

The importance of agriculture in the advancement of the economies of developing nations, including Nigeria, is undisputable [1]. Of the 82 million cultivable arable lands available in Nigeria, 42% is cultivated. Between 1986 and 1995, crop and animal production accounted for about 31.2% and 39.2% of the country's total GDP, respectively [2]. The contribution was, however, over 40% between 1999 and 2006. [3]. According to Tonah [4], crises brought about by resource use and/or control among arable crop farmers and herdsmen have been a recurring decimal in West Africa, including Nigeria. These conflicts are, however, not localized, but cut across the north and the south of the nation. However, the effect of such conflicts is much felt in the South due to the presence of lush vegetation, arable lands and high crop farming activities. Furthermore, the downward trend of economic fortunes, the need to reverse high food importation bills, dwindling 'stock' of grazing land and the ever increasing demands for food and raw materials continue to exert more pressures on the arable lands, which are required incidentally by both farmers and cattle herdsmen for their production activities. Thus, this results in the competition over such fertile lands, which culminated into conflicts between the two stakeholders.

Conflicts between the two user-groups have been reported in some parts of Oyo state, which lead to loss of lives, valuable properties and the infliction of injuries. The crises had, however, worsened the insecurity level and aggravate food crisis in the country [5]. An in-depth insight into the issue of conflicts from the perspective of the stakeholders could be a useful tool in ending farmers-herdsmen conflicts. Considering the above discussion, this study was attempted to proffer answers to these questions: what are the causes of conflicts between the farmers and the herdsmen? What are the levels of economic burden incurred by the farmers/herdsmen due to the conflict? Does the conflict significantly affect farmers' output? The primary objective of the study was to examine the effect of conflict and its economic burden on Farmers' output in South-west, Nigeria, while the specific objectives are to: identify the causes of conflict between the farmers/herdsmen

in the study area; estimate the economic loss incurred by the farmers/herdsmen due to the conflicts in the study area and determine the effect of economic loss due to conflicts on arable farmers' output in the study area.

A number of studies on farmers-herdsmen conflicts have been embarked upon. For example, Adekunle and Adisa [6] carried out a study on "empirical phenomenological psychological study of farmer-herdsmen conflicts in North-Central Nigeria". Odoh and Chigozie [7] researched on "climate change and conflict in Nigeria: A theoretical and empirical examination of the worsening incidence of conflict between Fulani herdsmen and farmers in northern Nigeria". Ofuoku and Isife [8] worked on "causes, effects and resolution of farmers-nomadic cattle herders' conflict in Delta State, Nigeria". This study, however, differs from those mentioned in that it aimed at estimating the economic loss incurred due to the conflicts and also captured the extent of the economic burden imposed, especially on the farmers whom from past studies usually bear the economic loss the more. There is a dire need for this research in order for the government to come up with a clear-cut policy measure that will prevent the loss of lives and economic burden as a result of incessant conflicts between the two user groups.

Materials and Methods

Theoretical framework

The study was based on *the environmental scarcity theory* proposed and developed by Homer-Dixon [9]. This theory attempts to link conflict between multiple resource users to increased tension between these groups resulting from growing vulnerability and insecurity of their livelihoods. It considers the conflict between multiple resource user groups as an inevitable consequence of the competition for scarce natural resources to achieve security of livelihood. Homer-Dixon [9] argues that "the three main sources of scarcity are changes in the environment, growth and unequal social distribution", which leads to violent conflict. In this context, Homer-Dixon [9] also considered the political economy of resource distribution, contending that 'the first and second sources of scarcity are the most devastating when

they intermingle with unequal distribution of resources’.

Data collection area

The study area, Southwestern Nigeria was chosen due to the incessant arable farmers-herdsmen clashes that had ravaged so many communities in the zone. The data obtained were from primary source with the aid of a well-structured questionnaire. The sampling procedure adopted was multi-stage sampling. Purposive selection of Oyo state in the South-west due to the frequent clashes between the arable farmers and the herdsmen constitute the first stage. Out of the three zones, Saki and Ibadan/Ibarapa were purposively selected due to the existence of a large population of farmers and herdsmen in the zones (second stage). The third stage was the random selection of two (2) communities from each zone, that is, Iseyin and Okeho from Saki zone; and Eruwa and Igbo-Ora from Ibadan/Ibarapa zone. The fourth stage involved the random selection of forty (40) farmers and fifteen (15) herdsmen based on population proportionate to size from each town making a total of 160 farmers and 60 herdsmen, hence giving a total respondent of 220 in all. Analytical tools adopted for the study were: descriptive statistics, economic loss approach as described by Yonguan et al. [10] and Tobit regression. Descriptive statistics were used to analyze the socioeconomic characteristics of both the farmers and herdsmen. The economic loss model employed by Homer-Dixon [9] was adopted to estimate the economic loss (in monetary terms) incurred due to conflicts between arable farmers and the herders.

Loss due to death (LD)

$$LD = EEPO + EESO + EEOS \tag{1}$$

Where:

EEPO = expected earnings from primary occupation

EESO = expected earnings from secondary occupation

EEOS = expected earnings from other sources

Loss due to injury

$$LI = Ct + EEt \tag{2}$$

Where:

Ct = cost of treatment of injury

It = expected earnings during the period of treatment by the victim

Loss of facilities

Partial loss (damage) of facility (Ldf)

$$Ldf = Cr + EEft \tag{3}$$

Where:

Cr = cost of repair

Eft = expected earnings from the facility during time of repairs

Complete loss of facility (Lif)

Where:

$$Lif = PVf \tag{4}$$

PVf = present value of the facility (depreciated value of the facility)

The facilities include barns for storage, motorcycles, spraying pumps, and other farm implements for both farmers and herders.

Loss of shelter

Loss due to damage of shelter (Lds)

$$Lds = Cr + Cfdt \tag{5}$$

Where:

Cr = cost of repair of shelter

Cfdt = cost of family displacement during time of repairs

Loss due to total loss of shelter (Lls)

$$Lls = PVs + Cfdt + Hlp \tag{6}$$

Where:

PVs = present value of shelter (depreciated value)

Cfdt = cost of family displacement

Hlp = value of household property loss

Cost due to loss of farm/farm product (for both crops and livestock; Lly)

$$Lly = Y \times P + C \tag{7}$$

Where:

Y = total quantity produced/expected to be harvested

P = unit price of the produce

C = cost of production

Therefore, the total loss due to the clashes between farmers and herdsmen is given as:

$$TLDC = (LD + LI + Lds/Lls + Lly) \tag{8}$$

Tobit regression

The Tobit regression model was adopted to determine the effect of an economic burden on

arable farmers' output. The major crops produced by the farmers are maize, cassava and yam. The grain equivalent measure was adopted for the three crops for ease of summation.

The model specification for Tobit regression according to Maddala [11] is as given as:

$$Y^* = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \dots + \beta_n X_n + U_i \quad (9)$$

Where: $Y = Y^*$ if $Y > 0$ ($Y = 0$ if the production depletion index is less or equal to zero). In this case, any farmer not affected by the conflict has a zero observation as his production depletion index.

$Y = Y^*$ if $Y > 0$ ($Y = Y^*$ if production index is greater than zero)

Y^* = production index (ratio of actual output to expected output)

β = parameters to be estimated

Where:

X_1 = gender (1 if male, 0 = female)

X_2 = age of respondents (years)

X_3 = household size

X_4 = educational level (years)

X_5 = farm size (acres)

X_6 = no. of times of crop destruction within a production year

X_7 = marital status (married = 1, 0 otherwise)

X_8 = type of compensation (1 if monetarily, 0 otherwise)

X_9 = amount of compensation (\$)

X_{10} = years of experience

X_{11} = income (\$)

X_{12} = economic burden (\$)

U_i = error term.

Results and Discussion

The socioeconomic characteristics of the two user-groups are profiled in Table 1. It was observed that both arable farming and cattle rearing were male dominated occupations with 81% and 100% of the farmers and herdsmen being male, respectively. This conforms to the findings of Adekunle and Adisa [6], where the majority of farmers and herdsmen were male. The average age of the arable farmers was 10 years more than that of the herdsmen indicating that the farmers were relatively older than the herdsmen. All the herdsmen were

married, with 91% of the arable farmers also having household members to cater for. About 58% of the arable farmers had one form of formal education or the other, while the majority of the herdsmen (81.7%) had a Quranic education. The disparity in the level and type of education could be one of the probable causes of conflicts between the two groups. The herdsmen had three more household members to cater for in relation to that of the arable farmers which had eight on an average. The majority of the herdsmen (75%) were within the income range of \$277.78 – \$833.33 while about 52% of the arable farmers recorded income between \$833.33 and \$1,388.89.

As revealed in Table 2, the major causes of conflicts from the arable farmers' perspective include damage of crops, harassment and pollution of water sources by the herds. About 86% of the farmers identified loss or damage to shelters as the main type of loss incurred due to the conflict. Nearly half of the total arable farmers sustained one form of injury or the other during the crisis. They also attested to the fact that there has been a loss of lives during the crisis. On the other hand, as revealed on Table 3 corroborated by the findings of Ofuoku and Isife [8] and Adekunle and Adisa [6], the herdsmen identified a block of stock route, farmers' encroachment into grazing land, killing of cattle, theft and harassment as the major causes of conflicts. Injury to the herdsmen, blocking of the stock route and loss of herds are the three most important types of loss incurred by the herdsmen with 78%, 76.7% and 76.7% of the respondents witnessed such losses, respectively. About 14% of the respondents also affirmed that the clash had resulted in the loss of lives.

A comparative analysis was carried out on the cost of different types of losses incurred between the arable farmers and herdsmen using t-test (Table 4). The result showed that the cost incurred by the herders due to death and loss of shelter were significantly higher compared to that of the arable farmers. On the other hand, the arable farmers incurred significantly greater cost than the herders from loss experienced due to death, loss of facilities and that due to damage to shelters. As shown in

Table 1 Socio-economic characteristics of farmers and herdsmen.

Socio-economic characteristics	Farmers		Herdsmen	
	Frequency*	Percentage	Frequency*	Percentage
Gender				
Male	129	81.13	60	100
Female	31	18.87	-	-
Age (years)				
Less than 30	02	1.26	06	10.00
31-40	05	3.14	28	46.67
41-50	44	26.67	22	36.67
51-60	64	40.26	14	23.33
Above 60	44	25.67	8	13.33
Mean age		53.03		42.15
Marital status				
Married	144	91.44	60	100
Divorced	08	5.06	-	-
Widowed	05	3.16	-	-
Separated	01	0.64	-	-
Education				
Primary	46	28.75	06	10.00
Modern	08	5.00	02	3.33
Secondary	30	18.75	01	1.67
Adult education	10	6.25	-	-
Quranic school	21	13.12	49	81.67
No formal education	32	20.00	02	3.33
Vocational education	13	8.13	-	-
Household size				
1-5	65	40.88	08	13.33
6-10	75	47.17	21	35.00
11-15	15	9.43	20	33.33
15 and above	04	2.52	11	18.33
Mean size		08		11
Income group				
<\$277.78	15	9.38	08	13.33
\$277.78-\$833.33	62	38.75	45	75.00
\$833.33 – \$1,388.89	41	25.62	05	8.34
>\$1,388.89	42	26.25	02	3.33

Table 5, the level of output of arable crop farmers was expressed in grain equivalent in order to allow for the summation of the output of major arable crops planted by the farmers, which include maize, cassava and yam. About 36% of the farmers harvested over 40,000 kg (grain equivalent) of product in total, with 67,499.08 Kg being the mean output. However, it was observed that the output of the farmers was depleted to 74.17%. This implies about 26% of the actual output of the farmers was lost to conflict with the herdsmen. Thus, indicating that farmers would have realized 100% production had it been there was no conflict.

The Tobit regression as depicted in Table 6 was used to estimate the effect of an economic burden as

a result of conflict on crop farmers' output depletion. Output depletion or reduction was measured using the ratio of actual output due to conflict with that of expected (output index). The result reveals that the sigma (σ) was 0.6156 with a t-value of 4.190 affirms the model is a good fit. It was observed that marital status, years of farming experience, farm size and economic burden due to the conflict were significant at the one percent level, while household size and income were significant at 5%.

A year increase in experience and a dollar increase in the income of the arable farmers reduced their output depletion by 2.19% and 7.73%, respectively. The implication of this is that farmers with higher income and years of experience tend to

Table 2 Distribution of causes and types of loss due to conflicts with the herdsmen.

Causes of Conflicts	Frequency*	Percentage
Crop damage by cattle herd	142	89.31
Pollution of water source	43	27.04
Harassment	27	16.98
Types of Loss		
Human death	03	1.88
Injury	75	47.16
Crop loss	140	88.05
Loss/damage of facilities	140	88.05
Loss/damage of shelters	137	86.16

Table 3 Distribution of causes and type of loss experienced by herdsmen.

Types of loss	Frequency*	Percentage
Block of stock route	46	76.67
Encroachment into grazing land	27	45.00
Killing of cattle	23	38.33
Theft	13	21.67
Harassment	15	25.00
Human death	14	23.33
Injury	47	78.33
Loss of herd	46	76.67
Loss of facility	45	75.00
Loss of shelter	44	73.33

Table 4 Mean cost of conflict of farmers and herders.

Types of loss	Mean cost incurred (\$)		t-value
	Farmers	Herdsmen	
Loss due to death	2,045.39	999.24	2.4***
Loss due to injury	66.57	91.27	1.87*
Loss of facilities	69.41	52.77	1.48
Loss due to damage of shelter	242.28	108.19	6.89*
Loss of shelter	104.47	489.61	12.8***
Loss of crops	447.22	-	
Loss of cattle	-	1,968.13	
Total mean loss due to conflicts	1,261.92	2,757.51	4.81***

*** = 1%, ** = 5%, * = 10%

with higher income and years of experience tend to record higher output index or reduced output loss due to the conflict. The finding is in line with the submission of Ofuoku and Isife [8] who stated that conflicts tend to reduce farmers' yield, income and economic welfare. This is expected as experience in farming is key in handling the issue of conflicts. Also, farmers with a strong financial base would be able to withstand the economic shock encountered after the conflicts. The depletion of the output of married farmers due to conflicts was increased by 21.6% compared to their unmarried counterpart. This is in line with the findings of Ofuoku and Isife [8] that most of the married arable farmers are

responsible and had their families to protect at time of conflicts. This, however, had a significant effect on their level of output.

An additional member of the household and increase in the farm size by an acre would increase farmers' output depletion due to conflict by 23.46% and 1.62%, respectively. This means that farmers with large acreage of farm land and larger household size tend to record higher output loss due to conflict. The implication of this is that the larger the land cultivated the more intense the devastation that would occur during the conflict period. Households with larger size would also have more mouth to feed, which would further deplete the

Table 5 Level of the output of arable crop farmers.

Output level (Grain equivalent)	Frequency	Percentage	Production (depletion) index
0-20,000	51	31.88	0.5258
20,001 – 40,000	52	32.50	1.0528
> 40,000	57	35.62	0.533
Mean	67,499.08		0.7417

Table 6 Effect of conflict on arable farmers' output.

Variables	Coefficient	P > z	Marginal effects
Gender	-0.94	0.359	-0.1874
Marital status	2.98	0.007***	0.2162
Years of experience	-3.03	0.006***	-0.0219
Economic burden	3.12	0.005***	0.0309
Household size	2.52	0.019**	0.2346
Income	-2.43	0.023**	-0.0773
Age	1.32	0.201	0.1332
Educational level	0.39	0.702	0.0438
Type of compensation	-1.14	0.265	-0.1037
Amount of compensation	-1.14	0.266	-5.7803
Acres of land	3.06	0.005***	0.0162
No. of times of crop destruction	1.11	0.277	0.0318
Sigma	0.6156		

*** = 1%; ** = 5%; * = 10 %

output during or after the period of conflicts. Lastly, a dollar increase in cost incurred during the conflict (economic burden) would increase the depletion of the output of farmers by 3.09%. This is supported by the finding of Odoh and Chigozie [7] who stated that the cost implication due to the bodily injuries sustained during the conflict was significantly high, and this prevented both groups from performing their economic activities. This is expected as economic loss of farmers during and/or after the conflict would have a tremendous effect on their output level.

Conclusions and Recommendations

It was observed in this study that conflicts arise between the herders and arable farmers due to the destruction of crops, harassment and pollution of water sources by the herdsmen. In relative and absolute terms, farmers are the worst hit (89%) and also suffered greater economic loss due to death (\$2,045.39) compared to the herdsmen. The regression result also showed that the output of arable crop farmers is depleted due to the economic burden incurred as a result of conflict with the herdsmen. This, however, will inhibit agricultural production and mitigate economic development in the study area. The result from the findings showed

that crop destruction through the constant incursion by herdsmen into farmland is a major cause of conflict which reduces farmers' output, and on the side of herdsmen is blockage of stock route. The government should make concerted efforts in making policy that will reduce the constant interaction of the two user-groups by creating a vast piece of land as grazing land strategically located in each local government of the country. It was also revealed in this study that economic loss incurred by the farmers adversely affected their productivity, which is reduced by 25%. It is recommended that there should be crisis prevention and/or management initiatives that would prevent or cushion the effect of economic loss incurred during the conflict period in order to stabilize farmers' productivity.

Conflict of interest

The authors declare that they have no conflict of interest.

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