# Factors Influencing Land Use Conflict among Crop Farmers and Nomadic Herders in some Local Government Areas of Kaduna State, Nigeria

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**Abstract**: The objective of this research was to evaluate the factors that contribute to land use conflicts between crop farmers and Nomadic Kaduna State, Nigeria. A total of 25 villages were purposefully selected from five Local Government Areas: Kachia, Kagarko, Zangon Kataf, Jaba, and Jema'a. These areas were chosen due to their significance in agricultural activities and animal husbandry, which often lead to conflicts between crop producers and Nomadic herders. Within each village, 11 crop farmers and 2 Nomadic herders were selected, resulting in a total of 293 crop farmers and 56 Nomadic herders participating in the study. Data was collected using structured questionnaires, and the analysis involved descriptive statistics and a multiple regression model. The findings of the study revealed that the majority of farmers were in the age range of 36-55 years, while the mean age of Nomadic herders was 29 years. On average, farmers reported an annual income of N101, 129, whereas Nomadic herders reported an average income of N203, 393 per annum. The participants identified crop damage by cattle as the Elementary education cause of conflict, with 100% of crop farmers and 82% of Nomadic herders reporting this issue. Additionally, encroachment into grazing areas was reported by 81% of farmers and 100% of Nomadic herder. Regression analysis was conducted to explore the relationship between conflict and farmers' production output and livelihood income. The results revealed a significant negative impact of conflict on both farmers' production output and livelihood income at a 1% level of significance. Based on these findings, the study recommends educational interventions to address the conflicts between crop farmers and Nomadic herders. Specifically, raising awareness among farmers and herdsmen about land use regulations is suggested as a means to mitigate conflicts and promote peaceful coexistence. In conclusion, this study investigated the factors influencing land use conflicts between crop farmers and Nomadic herders in Kaduna State, Nigeria. The results highlighted the detrimental effects of conflict on farmers' production output and livelihood income. The study proposes educational interventions as a potential solution to enhance understanding and adherence to land use regulations among both farmers and herdsmen

**Keywords:** Conflict, Crop farmers, Land use, Nomadic herders

## INTRODUCTION

Conflicts are a social phenomenon that occurs in all aspects of life (Albert, 2004). Conflict arises when opposing ideals and actions clash among different entities, leading to an antagonistic state. It is an inevitable part of life as each individual possesses their own opinions, ideas, and beliefs. We all have unique perspectives and act based on what we consider appropriate, resulting in conflicts in various scenarios involving individuals, groups, or even internal struggles. Consequently, conflict influences our actions and decisions (Best, 2016).

Throughout history, people of all races and colors have been involved in land disputes, from prehistoric times to the present (Signer, 1996). In fact, land played a significant role as the principal catalyst for the escalation of the largest warfare in human history, World War II. Conflicts stemming from the utilization of land and other finite natural resources emanate from intricate struggles revolving around the appraisal of these scarce assets. Within these contestations, various groups engage in endeavors to assert their distinctive values or assertions upon these resources. In many instances, the overarching objective behind

these endeavors is to either uphold or reshape the prevailing societal framework in alignment with their vested interests (Lorenzen, 2019). Land conflicts often turn violent when linked to wider processes of political exclusion, social discrimination, economic marginalization, and a perception that peaceful actions are no longer effective strategies for change (FAO, 2003).

Improved human health, rapid population growth, urbanization, and large-scale land acquisitions have increased pressure on arable land, intensifying competition for this limited resource (Weber, 2014). Due to increasing human population, technological advancements, and worsening climatic conditions, the relationship between crop producers and Nomadic herders has become strained (International Region Information Network, 2009). Rivalry and unhealthy competition induced by increased population and deteriorating soil conditions have become detrimental to their relationship (Weber, 2014). According to Kasomo (2017), conflicts have been accentuated by encroachment on traditional livestock migratory routes, cultivation of traditional grazing areas, dry season cultivation of riverine areas and valleys in Northern Nigeria, which have been encouraged by the Federal Government's Fadama Projects, as well as land grabs by wealthy trado-political merchant elites using land as a political tool to gain power.

In Nigeria, despite a significant increase in human population and aggregate incomes, domestic food and fiber production has lagged behind demand, especially since the 1970s oil boom. Apart from adverse ecological and seraphic conditions, unfavorable farm policies, inadequate research and extension systems, underdeveloped rural infrastructure, and inadequate access to essential agricultural inputs, the incidence of ethno-religious conflicts and insecurity have been identified as factors contributing to the slow growth of agricultural production in Nigeria (Ikeleghe, 2011). Consequently, both crop producers and Nomadic herders have been impoverished, with each group making frantic efforts to expand production seemingly at the expense of the other. These factors have set up a spiral of conflicts

Malachy (2014) quotes former President Obasanjo as saying, 'Violence is making it difficult for my administration to deliver the evidence of democracy to the Nigerian people.' Indeed, incidents of conflicts are reported in the Nigerian media on a daily basis. The conflict phenomenon not only has created a siege mentality in Nigeria but also undermines the efforts by various tiers of government to achieve macroeconomic stability, development, and poverty alleviation (Malachy, 2014).

Conflict resolution strategies that have been put in place have so far been unable to resolve conflicts between crop producers and Nomadic herders. In most parts of Nigeria, conflicts have surged in several locations and are clearly intolerable (Isaac, 2015). Signer (1996) worrisomely argues that government policies on grazing reserves and land tenure have been rendered useless and inoperative. This scenario has continued to affect the agricultural industry, which is clearly one of the major sectors of the national economy in which producers and Nomadic herders play key roles (Signer, 1996). Actions by the authorities to quell violent conflict have been minimal or ineffective, leading to a perception among communities that they should take responsibility for their own security. Judicial commissions held subsequent to conflicts do not result in effective action. Strategies of conflict resolution, however framed, will have little impact unless there is the political will to both follow up and enforce agreements, which would require a major change in political culture in Nigeria (Etekpe, 2017)."

In recent years, persistent conflicts have arisen between crop farmers and Nomadic herders over land use in various parts of Nigeria. These conflicts stem from the accumulation of different sources of tension, leading to the alteration or abandonment of previously recognized and socially accepted rules governing access to and use of land and natural resources (Lorenzen, 2019). While there is some evidence in the literature, such as Roger (2021), indicating that various government administrations have made efforts to mitigate land use conflicts in Nigeria, including the implementation of land laws, regulations, and codes, the conflicts between crop farmers and Nomadic herders continue to persist with dire consequences whenever they erupt. Traditional rulers in affected areas have also been tasked with mediating and controlling these conflicts through conflict resolution meetings with the conflicting groups (Roger, 2021).

The broad objective of this study is to assess land use conflict among crop producers and Nomadic herders in some selected LGAs of Kaduna State, Nigeria.

## METHODOLOGY

### Study Area

The study was conducted in five Local Government Areas (LGAs) of Kaduna State, Nigeria, namely Kachia, Kagarko, Jaba, Jema'a, and Zango Kataf LGAs. The area is located in the southern guinea savannah agro-ecological zone, characterized by a sub-humid climate with distinct dry and rainy seasons. The dry season typically spans from November to March, while the rainy season lasts from April to October. The temperature ranges between 27°C to 35°C, and the mean annual rainfall is recorded as 1430mm (IAR, 2004).

### Sampling Procedure and Sample Size

Twenty-five (25) villages were purposefully selected from five Local Government Areas (LGAs) in Kaduna State, namely Kachia, Kagarko, Zangon Kataf, Jaba, and Jema'a, due to their significance in farming and animal husbandry, as well as their high incidence of conflicts between crop producers and Nomadic herders.

To ensure a representative sample, a stratified random sampling technique was employed. The study included a total of 293 crop producers and 56 Nomadic herders as respondents, resulting in a sample size of 349 individuals.

Agriculture in the area primarily follows traditional practices and serves as the main source of livelihood for the majority of the population. The cultivation of crops such as ginger, yam, cowpea, maize, guinea corn, and cassava is prominent. Livestock rearing is also prevalent, with cattle, sheep, goats, poultry, and swine being the commonly raised livestock species. Additionally, trading and crafts are engaged in as additional economic activities.

Over time, the area has experienced frequent attacks and conflicts between farmers and herdsmen/Nomadic herders, resulting in loss of lives and significant disruptions to traditional economic activities.

### Sources of Data

The Elementary education data collection method employed in this study was through a survey using structured questionnaires. Trained enumerators were assigned and dispatched to the study area to ensure the collection of accurate and relevant information. The utilization of Elementary education data from this survey served as the Elementary education source of information for the study.

### Materials

The data collection process encompassed gathering information on the socio-economic characteristics of both Nomadic herders and crop producers (Smith & Johnson, 2020). The data of analysis encompassed the use of both descriptive and inferential statistical methods. Descriptive statistics, including frequency distributions and percentages, were applied to examine the data and achieve objectives i, ii, iii, and v. To address objective iv, inferential statistics were employed, specifically utilizing the multiple regression model. The mathematical representation of the model is provided below: to investigate the perspectives of farmers and Nomadic herders concerning the causes of land use conflicts and the strategies implemented to alleviate such conflicts in the affected areas.

$$Y_i = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + U_i \ldots\ldots\ldots\ldots\ldots\ldots (1)$$

Where:

$Y_i$ =Production output (Kg per hectare)/Livelihood income

$X_1$ = Inter-personal conflict between crop producers and Nomadic herders (0, if the respondent didn't experience the occurrence of conflict, and 1, if the respondent experienced the occurrence of conflict)

$X_2$= Age of farmer (years)

$X_3$ = Education of farmers (Years of education)

$X_4$ = Number of plots owned by farmer (Number of plots)

$X_5$ = Distance from the farmer's residence to the plot (kilometers)

$X_6$= type of farming

$X_7$= Soil fertility

$\beta_1$ – $\beta_7$= Regression coefficients of the explanatory variables

$\alpha$ = Constant

$U_i$ = Stochastic error term

NB: The model was run separately for farmers' production output and livelihood income as dependent variables

## RESULTS AND DISCUSSION

### Socio-Economic Profiles of Crop Producers and Nomadic Herders

Table 1 unveils a comprehensive panorama of the socio-economic attributes characterizing both crop farmers and Nomadic herders, providing invaluable insights into their respective demographics. Among the cohort of farmers, a substantial segment, constituting 67.3% of the sample, falls within the age stratum of 36-55 years, signifying a prominent demographic trend. Conversely, the younger echelon of 15-25 years emerges with a relatively diminutive representation, accounting for a mere 5.5%. Delving into the depths of these demographics, the average age of farmers is calculated at 44 years. In stark juxtaposition, Nomadic herders exhibit a distinctive age distribution, with a mean age of 29 years. Evidently, the apex of representation rests within the 36-45-year age bracket, encapsulating 37.5% of the sample. A discernible inference surfaces, intimating that the occupation of cattle herding appears to attract a greater influx of youthful individuals as opposed to the realm of farming. It's noteworthy to underscore the gender dynamics intrinsic to cattle herding, evident from the male-dominant composition highlighted in Table 1. Remarkably, these observations mirror the findings of Lorenzen (2019), where exclusively male respondents constituted the demographic fabric of Nomadic herders. In contrast, approximately 30% of crop producers exhibited a female profile. This gender disparity might be rooted in the perceived convenience and feasibility of engaging in farming activities for women, while intricate socio-cultural and religious facets potentially dissuade Fulani women from embracing cattle herding as a vocation.

Furthermore, the tableau of Table 1 accentuates a modest favorability toward formal education within the cohort of crop farmers in contrast to their Nomadic herder counterparts. Within the realm of Nomadic herders, a substantial majority remains devoid of formal education, with an absence of individuals boasting a Higher Education degree. A distinct nuance is discernible through the prism of mean annual earnings, prominently illustrating a divergence between crop farmers and Nomadic herders. The former garners an average annual income of N101, 129, while the latter amasses N203, 393 on an annual basis. The family compositions of respondents encompass a spectrum ranging from solitary individuals (unmarried) to households of 20 members. Within this panorama, the modal range and the calculated mean for crop farmers manifest as 6-10 and nine individuals, respectively. Nomadic herders mirror this trend with figures of 11-15 and an average of 14 individuals. This salient observation illuminates the propensity toward larger family units within both factions, potentially correlating with elevated responsibilities and a consequential augmenting of available labor resources, further perpetuating their engagements in agricultural and cattle herding endeavors.

The distinct spheres of occupational pursuits embarked upon by the two cohorts yield notable disparities. A significant proportion of farmers operate on a relatively modest scale, while a contrasting scenario unfolds among herders, with a substantial majority engaged in comparatively more extensive operations, potentially elucidating the income asymmetry alluded to earlier. Additionally, a notable fraction of farmers tactfully diversify their income streams by engaging in auxiliary income-generating ventures alongside farming. Intriguingly, a distinct faction, approximating 20% of herders, inhabit the category of agro-Nomadic herders, adroitly harmonizing cattle herding with the cultivation of arable crops. This unique subset of respondents, primarily belonging to the ethnic Fulani community akin to their nomadic counterparts, effectively straddles the domains of both farming and herding. Conversely, non-Fulani farmers abstain from entwining cattle herding within their vocational tapestry. The motivations that propel respondents from both cohorts prominently orbit around income generation. Counter to conventional assumptions, a substantial 82% of farmers within the sample assert that their agricultural pursuits are underpinned by not only sustenance but also the pursuit of pecuniary gains. The pursuit of amplified earnings traverses both cohorts and could potentially underlie conflicts manifesting within the ambit of land use.

Table 1: Socio-economic Characteristics of Crop Producers and Nomadic herders

| **Variable** | | **Crop producers (n=293)** | | | **Nomadic herders(n=56)** | | |
|---|---|---|---|---|---|---|---|
| | | **Freq.** | **%** | **Mean** | **Freq.** | **%** | **Mean** |
| **Age (years)** | 15-25 | 16 | 5.5 | 44.0 | 18 | 22.2 | 29.0 |
| | 26-35 | 67 | 22.8 | | 21 | 37.5 | |
| | 36-45 | 111 | 37.9 | | 12 | 21.4 | |
| | 46-55 | 86 | 29.4 | | 4 | 7.1 | |
| | 56 and above | 13 | 4.4 | | 1 | 1.8 | |
| **Sex** | Male | 206 | 70.3 | | 56 | 100.0 | |
| | Female | 87 | 29.7 | | - | - | |
| **Educational level** | No formal education | 82 | 28.0 | | 36 | 64.3 | |
| | Nomadic/ Quranic | 16 | 5.5 | | 12 | 21.4 | |
| | Adult education | 32 | 10.8 | | - | - | |
| | Elementary | 77 | 26.3 | | 6 | 10.7 | |
| | Intermediate | 65 | 22.2 | | 2 | 3.6 | |
| | Higher education | 21 | 2.1 | | - | - | |
| **Annual income (₦ 000')** | 1-40 | 106 | 36.2 | 101, 129 | 1 | 1.8 | 203,393 |
| | 41-80 | 64 | 21.8 | | 1 | 1.8 | |
| | 81-120 | 49 | 16.7 | | 12 | 21.4 | |
| | 121-160 | 22 | 7.5 | | 8 | 14.3 | |
| | 161-200 | 18 | 6.2 | | 8 | 14.3 | |
| | 201-240 | 34 | 11.6 | | 26 | 46.4 | |
| **Religion** | Christianity | 104 | 35.8 | | - | - | |
| | Islam | 167 | 57.0 | | 56 | 100.0 | |
| | Others | 21 | 7.2 | | - | - | |
| **Family size** | 1-5 | 59 | 20.2 | 9 | 10 | 17.9 | 14 |
| | 6-10 | 128 | 43.7 | | 11 | 19.6 | |
| | 11-15 | 83 | 28.3 | | 26 | 46.4 | |
| | 16-20 | 23 | 7.8 | | 9 | 16.1 | |
| **Farm size (Ha.)** | < 1 | 92 | 31.3 | 2.8 | 11 | 19.6 | |
| | 1-3 | 50 | 17.1 | | NA | NA | |
| | 4-6 | 56 | 19.1 | | NA | NA | |
| | 7-9 | 38 | 13.0 | | NA | NA | |
| | 10-12 | 21 | 7.2 | | NA | NA | |
| | 12-15 | 16 | 5.5 | | NA | NA | |
| | 16-18 | 8 | 2.7 | | NA | NA | |
| | No response | 12 | 4.1 | | NA | NA | |
| **Herd size** | 1-20 | NA | NA | | 16 | 10.7 | 41 |
| | 21-40 | NA | NA | | 26 | 28.6 | |
| | 41-60 | NA | NA | | 5 | 46.4 | |
| | 61-80 | NA | NA | | 3 | 8.9 | |
| | | NA | NA | | 42 | 5.4 | |
| **Alternative occupation** | None | 99 | 33.8 | | 14 | 75.0 | |
| | One | 108 | 36.9 | | - | 25.0 | |
| | Two | 69 | 23.5 | | - | - | |
| | Three | 17 | 5.8 | | - | - | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Production system** | Rain-fed | 179 | 61.1 | | - | - | |
| | Irrigation | 62 | 21.2 | | - | - | |
| | Both | 52 | 17.7 | | - | - | |
| | Nomadic herders | NA | NA | | 45 | 80.3 | |
| | Agro-Nomadic herders | NA | NA | | 11 | 19.7 | |
| **Production motive** | Food | 53 | 18.1 | | - | - | |
| | Income | 240 | 81.9 | | 56 | 100.0 | |
| **Experience (years)** | 1-5 | 28 | 9.6 | 13.7 | 10 | 17.9 | 9.1 |
| | 6-10 | 61 | 20.8 | | 26 | 46.4 | |
| | 11-15 | 83 | 28.2 | | 14 | 25.0 | |
| | 16-20 | 91 | 31.1 | | 4 | 7.1 | |
| | 21-25 | 30 | 10.3 | | 2 | 3.6 | |

**Source:** Field Survey, 2022; NA = Non-Applicable

**Causes of Conflict between Crop Producers and Nomadic herders**

Table 2 presents an elucidation of the underlying causes behind the conflicts that unfold between crop producers and Nomadic herders within the precincts of Kaduna State. The articulated outcomes are predicated on the insightful contributions furnished by the respondents. Emanating from this empirical exploration, a salient pattern emerges, characterizing crop damage and encroachment into cattle tracks as the prominent triggers catalyzing confrontations between the farming community and Nomadic herders. Notably, this consensus permeates both the perspectives of farmers and Nomadic herders alike.

In yesteryears, the government prescribed specific locales designated as cattle tracks, primarily intended for grazing purposes. This edict was accompanied by stringent constraints imposed on agricultural undertakings. Alas, the burgeoning exigencies stemming from escalating demands for arable land, in conjunction with the burgeoning human populace, have propelled a relentless encroachment upon these designated cattle tracks, transforming them into arable expanses. Consequently, this unanticipated transformation has inadvertently invited incursions by herders into these transformed farmlands, inflicting substantial damage upon cultivated crops. It's notable that this issue of encroachment and the resultant conflicts is not unique to the studied region, but resonates across various quarters of northern Nigeria.

However, while both factions converge in attributing crop damage and encroachment as pivotal triggers, a nuanced divergence in their perspectives is discernible. Additionally, a consequential fraction of respondents underscores the significance of other variables in the intricate tapestry of conflicts. The implications of inadequate grazing fields, unregulated bush burning, ineffectual land tenure systems, and the specter of corruption all emerge as notable contributory forces fanning the flames of strife within the area. Curiously, it's worth noting that no designated grazing fields are evident within the surveyed domains, despite the substantial cattle population being nurtured. This absence is notably incongruent with the overarching necessity, and consequentially, herders are compelled to graze their livestock perilously proximate to farmlands, effectively elevating the risk of encroachments and thereby accentuating the probability of confrontations with farming communities.

These empirical insights harmoniously resonate with a study conducted by Warner (2013), which delved into the intricate interplay of farmer-Nomadic herders' conflicts vis-à-vis

food production in Kaduna State. Warner's findings resonated with our present exploration, elucidating factors such as inadequate grazing land (87%), climate change (66%), and the specter of suspicion (60%) as formidable contributors.

The fulcrum of this discord, namely the insufficiency in the provisioning of grazing reserves and arable land, finds its genesis in the overarching neglect that the agricultural sector has been subjected to. Consequently, herders are cast adrift in search of viable grazing grounds, invariably culminating in encroachments upon farmlands and, ineluctably, igniting tensions with both farmers and host communities. Etekpe (2017) underscores the far-reaching ramifications of these conflicts, casting a shadow of heightened insecurity upon Nigeria, with the North Central region and other focal areas particularly bearing the brunt. Central to this maelstrom is the competition for dwindling resources, with grazing land emerging as the fulcrum upon which this struggle pivots. Interestingly, a historical prism offers illumination - the once-established grazing reserve system, promulgated by the Northern regional government in 1965, ostensibly offered a holistic solution. This system facilitated provisions of space, water, and even vaccinations for livestock, accompanied by a mechanism of taxation. Unfortunately, as the country pivoted towards oil as its economic cornerstone in the 1970s and 1980s, the allure of the agricultural sector gradually waned, resulting in a gradual abandonment of the grazing reserve system.

Additionally, the complex fabric of these conflicts is interwoven with an unexpected thread - the entanglement with Boko Haram, as evidenced within Tyler's (2009) findings. This involvement surfaces within Yobe State, which stands ensnared within the maelstrom of the Boko Haram conflict, offering a pertinent reminder of the multifaceted and interconnected nature of these conflicts.

In a more encompassing context, the disquieting aspect of these conflicts hinges upon the conspicuous absence of resolute political resolve demonstrated by governing bodies in instituting comprehensive measures to assuage these crises. It is conspicuous that governments have often displayed an unsettling disregard for both international accords and domestic legislation tailored to govern these conflicts. This disposition, unfortunately, transcends the confines of Nigeria and permeates the landscapes of diverse sub-Saharan African nations. The crux of the matter rests in the palpable lack of political will among member states, undermining the full-fledged implementation of the Protocol for Transhumant Movement, even as championed by the Economic Community of West African States (ECOWAS) at a regional level (Etekpe, 2017).

Table 2: Possible causes of farmer-Nomadic herders' clashes

| **Causes of conflict** | **Crop farmers (n=293)** | | **Nomadic herders(n=56)** | |
|---|---|---|---|---|
| | **Freq.** | **%** | **Freq.** | **%** |
| Crop damage by cattle | 293 | 100 | 46 | 82.1 |
| Encroachment into cattle tracks | 238 | 81.2 | 56 | 100 |
| Inadequate grazing reserves | 262 | 89.4 | 54 | 96.4 |
| Lack of access to water points | 180 | 61.4 | 32 | 57.1 |
| Killing of stray cattle | 170 | 58.0 | 37 | 66.1 |
| Indiscriminate bush burning | 217 | 74.1 | 50 | 89.3 |
| Cattle theft | 149 | 50.9 | 35 | 62.5 |
| Poor land tenure system | 191 | 65.2 | 42 | 75.0 |
| Climate change | 156 | 53.2 | 24 | 42.9 |
| Desertification | 152 | 51.9 | 32 | 57.1 |
| Corruption | 236 | 80.5 | 41 | 73.% |
| Blockage and reduction in size of stock routes and access to water point | 184 | 62.8 | 54 | 96.4 |

**Source:** Field Survey, 2022 NB: There are multiple responses

**Frequency of Occurrence of Conflict between Crop Producers and Nomadic herders in Study Area of Kaduna State**

This section presents the findings regarding the frequency of land use conflicts between crop producers and Nomadic herders. The results are summarized in Table 3, encompassing the period from the 1980s to 2022. The analysis reveals that a significant proportion (90.0%) of the land plots examined were affected by conflicts. Furthermore, the majority (89.1%) of these conflicts involved Nomadic herders, while only a negligible percentage (0.05%) involved relatives, and the remaining portion (5.7%) involved non-relative farmers.

Based on these findings, land conflicts in the study area can be categorized into two Elementary education patterns: Farmer-Farmer i.e. Conflicts occurring between two farmers, either relatives or non-relatives and Farmer-Nomadic herders i.e. Conflicts arising between farmers and Nomadic herders.

The distribution of land conflicts demonstrates that only a minuscule proportion (0.06%) of the conflicts involved disputes solely between farmers, whereas the vast majority (89.1%) involved conflicts between farmers and Nomadic herders.

Table 3: Prevalence of Land Use Conflict (n = 349)

| Variable | Frequency | Percentage |
|---|---|---|
| **Conflict status of plot(s)** | | |
| There is conflict | 314 | 90.0 |
| There is no conflict | 35 | 10.0 |
| **Starting years of conflict** | | |
| 1980 – 1989 | 2 | 0.02 |
| 1990 – 1999 | 7 | 1.9 |
| 2000 – 2009 | 5 | 0.01 |
| 2010 – 2019 | 7 | 0.02 |
| 2020 – 2022 | 31 | 8.8 |
| **Conflict Involving Whom?** | | |
| Relative within the family | 18 | 0.05 |
| Fellow farmers | 20 | 0.06 |
| Nomadic herders | 311 | 89.1 |

**Source**: Field survey, 2022.

**Effects of Land Use Conflict of Farmers' Production Output**

In this section, we present the results of our regression analysis, which seeks to quantify the influence of land use conflicts on the production output of farmers in Kaduna State. The comprehensive findings, as detailed in Table 4, reveal a negative coefficient closely associated with the occurrence of land use conflicts, demonstrating statistical significance at a remarkable threshold of $p \leq 0.01$. This compellingly implies the existence of a substantial disparity in production output between plots impacted by land use conflicts and those unaffected. The outcomes distinctly unveil a noteworthy contraction in crop yield, with a pronounced magnitude of 0.49, signifying that land conflicts precipitate a consequential reduction of 49% in crop output. From a policy vantage point, this underscores the significant and adverse repercussions of land use conflicts on the vital sphere of food production.

Our regression analysis further unveils the nuanced effects of other pertinent variables on crop production. Each incremental year in age, rigorously validated at the 1% significance level, is associated with a meaningful upswing in crop output by an appreciable margin of 1.3%. This positive correlation can be attributed to the accrual of agricultural expertise and wisdom as farmers traverse the path of experience. Contrary to intuitive expectations, the level of education surprisingly surfaces as a counterproductive factor, yielding a noteworthy 26% decrement in crop output at the rigorous 1% level of significance. This intriguing observation potentially suggests that farmers with higher education levels might be diversifying their endeavors away from farming and towards alternative non-agricultural pursuits they perceive as more appealing.

Furthermore, our examination finds that both the number of plot locations and the distance of a plot from a farmer's abode exert substantial influence on crop output, inducing reductions of 20% and 3.1% respectively, with remarkable significance levels of 1%. This confluence of outcomes harmonizes seamlessly with the insights gleaned from the descriptive analysis, positing that inadequate vigilance and monitoring of plots could be contributory factors to the diminution in crop yield. The notable impact of the distance variable resonates strongly, suggesting that farmers with plots situated further from their primary residence often establish temporary abodes on or near their plots, thereby ameliorating the spatial divide and enabling a more proximate engagement with their agricultural activities.
Moreover, the distinct type of farming practices emerges as an influential determinant, yielding statistically significant effects at the 10% level.

Part-time farmers, it is observed, confront a discernible 13% decrease in crop output relative to their full-time counterparts, thus underscoring the pronounced advantages associated with a dedicated and immersive commitment to farming activities.

Table 4: Regression Estimates of Effects of Land Use Conflict on Farmers' Production Output

| **Variables** | **Coefficient** | **T** | **P > / t /** |
|---|---|---|---|
| Conflict Status | -0.487351 | -3.58 | 0.000*** |
| Age of Farmer | 0.0135268 | 3.66 | 0.000*** |
| Education Level of Farmer | -0.2639842 | -3.38 | 0.001*** |
| Number of Plot Location | -0.2024742 | -3.47 | 0.001*** |
| Plot Distance to Farmer's Residence | -0.0313336 | -4.44 | 0.000*** |
| Type of farming | -0.1314273 | -1.73 | 0.084*** |
| Soil fertility | 0.027178 | 0.62 | 0.534 |
| F (8, 244) = 11.77 | Prob > F = 0.0000 | | |
| R-squared = 0.7785 | Adj R-squared = 0.7548 | | |

Source: Data analysis, 2022. *** significant at 1% *significant at 10%

**Effects of Land Use Conflict of Farmers' Livelihood Income**

Within this section, we present the outcomes of our regression analysis, aimed at gauging the magnitude of impact that land use conflict exerts on the income derived from farmers' livelihoods within Kaduna State. The discerning results, outlined in Table 5, unequivocally signal the presence of a notable and adverse effect attributed to land use conflict on farmers' income, attaining a significant level of 1%. An intriguing revelation surfaces as we examine the income differentials between farmers unaffected by conflict and their counterparts ensnared within its grasp. Notably, those unencumbered by conflict experience a substantially elevated income from agricultural pursuits, manifesting an income that surpasses their conflict-affected counterparts by a considerable margin of 74%. This stark discrepancy underscores an undeniable reduction of up to 74% in the income derived from farmers' livelihoods as a direct consequence of land use conflict.

Our regression analysis further unveils the multifaceted influences orchestrated by other salient variables upon farmers' income trajectories. Age, an influential variable, surfaces with a noteworthy impact, albeit at the 10% significance level, evoking a modest yet perceptible decrement of 1.3% in livelihood income for every successive year. Given an average age of 49 years, this inference hints at the potential contribution of waning physical vigor associated with aging to the observed decline in income.

Moreover, the dimensions of farmers' households, a consequential facet, remarkably impact livelihood income at a compelling 1% level of significance. Intriguingly, augmenting the household by an additional member usher in a commendable 6.1% augmentation in income drawn from farming endeavors. This upliftment can be attributed to the commendable labor contribution rendered by household members, effectively bolstering the workforce employed by farmers and inherently amplifying the income generated from agricultural pursuits.

Furthermore, the expanse of farm plots cultivated by farmers emerges as a pivotal determinant, wielding substantial influence upon their income trajectories at the robust 1% significance level. Our findings aptly indicate that with each contiguous hectare added to the cultivated plot, a commendable upswing of 4.7% ensues within the realm of income derived from agricultural operations. This unequivocally underscores the correlation between expanding the cultivated acreage and the concomitant elevation in farmers' income.

Collectively, our regression findings serve as a compelling testament, profoundly affirming the materializing negative imprint of land use

conflict upon the fabric of farmers' livelihood income. This resounding revelation fervently underscores the exigency of instituting efficacious measures geared toward the mitigation and adept management of conflicts, thus safeguarding and fortifying the economic well-being of our esteemed farmers. Moreover, the pivotal roles played by variables such as age, household magnitude, and plot dimensions underscore their significance as instrumental agents, intricately woven into the intricate tapestry that delineates farmers' income landscape within the domain of agriculture.

Table 5: Effect of Land Use Conflict on Livelihood Income of Farmers

| **Variables** | **Coefficient** | **t-value** | **P > / t /** |
|---|---|---|---|
| Conflict Status | -0.741457*** | -6.28 | 0 |
| Age | -0.012676* | -2.66 | 0.07 |
| Household Size | 0.061101*** | 4.17 | 0 |
| Farm Size | 0.046920*** | 7.86 | 0 |
| Level of Education | 0.0625846 | 1.07 | 0.282 |
| Sex | 0.0818324 | 0.83 | 0.567 |
| Marital Status | 0.0772867 | 1.26 | 0.332 |
| F (8, 191) = 43.06 | Prob > F = 0.0000 | | |
| R-squared = 0.6433<br>Root MSE = 64505 | Adj R-squared = 0.6284 | | |

**Source**: Survey data, 2022. ***Significant at 1%,*Significant at 10%

Table 6 presents the perceptions of farmers and Nomadic herders regarding potential solutions to the land use conflict between crop producers and Nomadic herders in Kaduna State. The results reveal that both groups agree that the provision of grazing reserves for Nomadic herders is the most effective solution to address the conflict. In the past, when human population growth was not as significant and there was less pressure on land resources due to lower food production needs and urbanization rates, the government established numerous grazing reserves and cattle tracks in areas with a substantial cattle population. However, with the encroachment into these areas driven by urbanization and competition for land for various development projects, many herders find themselves without sufficient grazing land for their animals.

Both farmers and Nomadic herders also highlight the importance of prompt government intervention as a measure to mitigate land use conflicts. Additionally, improved land tenure systems and awareness-raising campaigns are perceived as potential solutions. It is crucial to educate communities about the value and necessity of interdependence among different groups. Respecting the values, cultures, and needs of all communities is vital in finding sustainable resolutions. Utilizing various communication channels such as radio jingles, cinema shows, and lectures can be effective, particularly considering the nomadic nature of Fulani herdsmen who heavily rely on radio for news updates.

Overall, the perceptions of both farmers and Nomadic herders emphasize the importance of providing grazing reserves, government intervention, improved land tenure systems, and awareness campaigns to address the land use conflict between crop producers and Nomadic herders in Kaduna State. These measures aim to foster understanding, respect, and peaceful coexistence among different communities.

Table 6: Possible solutions to land use conflicts

| Measures | Crop farmers (mean) | Nomadic herders(mean) |
|---|---|---|
| Improved land tenure system/land use plan | 2.67 | 3.21 |
| Increased security | 3.0 | 3.23 |
| Good farming methods | 2.87 | 3.42 |
| Provision of grazing reserves | 4.0 | 4.0 |
| Stop bush burning | 3.43 | 3.77 |
| Awareness raising campaigns | 3.33 | 3.21 |
| Prompt intervention by authorities | 3.8 | 3.56 |

**Source**: Field Survey, 2022.

## CONCLUSION

The study concludes that conflicts between crop farmers and Nomadic herders over agricultural land remain prevalent in Nigeria, posing serious consequences for rural development. These conflicts have wide-ranging economic, production, and socio-psychological effects on households. Limited social support mechanisms were observed among both groups, indicating a lack of avenues for victims to seek assistance. Age, income, farm size, and farming/herding experience were identified as key factors influencing the use of coping strategies by respondents. Current coping strategies employed by both groups have yielded little progress in resolving and mitigating the conflicts. It is crucial for both farmers and Nomadic herders to adopt more realistic and effective coping strategies. Farmer-herdsmen conflict management should incorporate coping strategies into mainstream activities.

## RECOMMENDATIONS

Based on the findings, the following recommendations are proposed:

1. Educational interventions are necessary to raise awareness of land use regulations among farmers and herdsmen, provide conflict coping mechanisms through extension programs, and promote peaceful coexistence and mutual understanding. Extension agencies should establish units dedicated to farmer-herdsmen relations.
2. Governments at all levels should employ comprehensive security measures, including intelligence gathering, to prevent the proliferation of firearms in rural communities, as access to firearms significantly fuels the conflicts.
3. Politicization of farmer-Nomadic herders conflicts by unscrupulous individuals, particularly politicians, should be avoided, considering the potential socio-economic consequences of such acts.
4. Lack of political will and lukewarm attitudes of governments are identified as contributing factors to the conflicts. Therefore, governments should enact effective legislations and take decisive actions to bring an end to the conflicts.
5. Given that many of the northern states facing farmer-Nomadic herders conflicts are also affected by desertification, efforts to control desertification should be intensified. Ecological grants allocated to states facing ecological problems should be utilized judiciously for their intended purpose.
6. Traditional rulers, as the closest form of constituted authorities to the warring communities, should take a more proactive role in curtailing the conflicts. The study found that the efforts of traditional rulers and farmers' associations in managing the conflicts were inadequate.

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