



## AN EMPIRICAL ANALYSIS OF THE IMPACT OF INSURGENCY ON AGRICULTURAL OUTPUT IN MADAGALI LOCAL GOVERNMENT AREA OF ADAMAWA STATE

### ABSTRACT

*This study examined the impact of insurgency on agricultural output in Madagali LGA, Adamawa State, through a survey of 400 farmers. The study employed descriptive and inferential methods of data analysis using tables and spatial regression methods. The respondents were predominantly male, middle-aged, with basic education, and reliant on smallholder farming. The community's varying levels of income, education, and experience suggest a high vulnerability to the insurgency's effects, with limited capacity to withstand prolonged disruptions. The insurgency has caused widespread disruptions in land cultivation, leading to reduced agricultural output and significant barriers to recovery. Crop production, especially for staple crops like maize and sorghum, faced moderate to severe losses, with most farmers losing between 10-30 bags. Livestock farming has also been severely impacted, with extensive herdsman relocation and livestock losses, threatening food security and economic stability. The spatial regression analysis underscores the negative effects of insurgency intensity, resource access, and land displacement on crop yields, particularly for staple crops. To mitigate the insurgency's impact on agriculture in Madagali LGA, this study recommended that targeted interventions are needed to restore access to farming resources, enhance community resilience through education and training, and secure farmland and livestock. Continuous monitoring and investment in infrastructure are crucial for long-term recovery and informed policy decisions.*

**Keywords:** *Insurgency, Agricultural Output, Crop Production, spatial regression, Madagali LGA.*

### Introduction

The global landscape has witnessed a concerning surge in terrorism, with significant implications for socio-economic factors and national security. According to the Global Terrorism Index (GTI) of 2017, countries grappling with violent conflicts and state-sponsored terror are particularly vulnerable to terrorist attacks, constituting over 90% of incidents between 1989 and 2014 (Yusuf, Akpansung & Baranzi, 2018). This phenomenon has economic repercussions, with the global impact of terrorism reaching \$89.6 billion in 2018, highlighting the link between conflict and economic stability.

Ishaq Idris Saad  
Department of Economics,  
Faculty of Social Sciences,  
Adamawa State University, Mubi  
[idris900@adsu.edu.ng](mailto:idris900@adsu.edu.ng),  
[ishaqsaad111@gmail.com](mailto:ishaqsaad111@gmail.com)

Adamu Jibrilla  
Department of Economics,  
Faculty of social sciences,  
Adamawa State University, Mubi  
[jibrilla653@adsu.edu.ng](mailto:jibrilla653@adsu.edu.ng)  
[adamjibril85@gmail.com](mailto:adamjibril85@gmail.com)

**\*Corresponding author:**

Ishaq Idris Saad  
Department of Economics,  
Faculty of Social Sciences,  
Adamawa State University, Mubi  
[idris900@adsu.edu.ng](mailto:idris900@adsu.edu.ng),  
[ishaqsaad111@gmail.com](mailto:ishaqsaad111@gmail.com)

Moreover, OECD member countries, despite their economic prowess, face a higher likelihood of terrorism due to shortcomings in socio-economic factors. The GTI reveals a 15% reduction in the global economic impact of terrorism in 2018, underscoring the complex interplay between terrorism and economic consequences (Yusuf, Akpansung & Baranzi, 2018). Notably, countries such as Iraq, Afghanistan, Nigeria, Pakistan, and Syria bore the brunt of terrorism, accounting for 72% of all terrorism-related deaths in 2015.

The African continent has not been immune to armed conflicts, particularly during the post-colonial era. While the number of conflicts has reduced since the 1960s, recent years have seen a resurgence, with insurgencies contributing to the perpetuation of violence and instability across various states (Babagana et al., 2018). The situation in Nigeria, notably the Boko Haram insurgency, has had profound socio-economic consequences, particularly in the agricultural sector.

Agriculture, a predominant activity globally, plays a pivotal role in Nigeria, employing a substantial percentage of the population. The link between increased agricultural output and improved socio-economic factors, including income generation, employment, and crime reduction, underscores its significance (Sidney, 2017). However, the activities of insurgent groups, particularly Boko Haram, have unleashed a wave of destruction, disrupting lives, property, and agricultural activities.

In the northeastern part of Nigeria, specifically Madagali Local Government Area in Adamawa State, the Boko Haram insurgency has significantly hampered agricultural production. The region, known for its high concentration of rural farmers, has witnessed large-scale displacement and abandonment of fertile lands (Abubakar et al., 2017). The violence has forced farmers to prioritize personal safety over agricultural activities, leading to a substantial reduction in output.

The insurgency's socio-economic impact extends to food security, defined by the World Bank as access to sufficient, healthy, and productive food. The conflict has disrupted the four major dimensions of food security—availability, access, adequate utilization, and stability of food supply—creating a humanitarian crisis with widespread consequences (Henry, 2017). Farmers in affected regions, such as Yobe, Adamawa, and Borno states, face challenges in cultivating staple crops, contributing to escalating food prices and diminishing per capita income.

The nexus between insurgency and agricultural output is evident in Madagali Local Government Area of Adamawa State. The Boko Haram insurgency's far-reaching impact on lives, property, and economic activities, particularly in agriculture, demands comprehensive interventions to restore stability, ensure food security, and foster economic recovery. Addressing these challenges requires a holistic approach that combines security measures, economic support, and community resilience initiatives. The main objective of this study is to comprehensively examine the impacts of the Boko Haram insurgency on agricultural production in Madagali Local Government Area of Adamawa State, Nigeria. This paper is structured to include introduction, literature review, methodology, results and discussion, conclusion and recommendations.

## Literature Review

### 2.1 Insurgency

Insurgency, defined as a rebellion against authority, encompasses movements that act outside state authorization, posing threats to economic, social, political, and religious beliefs within a geo-political setting. O'Neill's definition (1990), cited in Hassan (2014), characterizes insurgency as a struggle between non-ruling groups and ruling authorities, involving political resources and violence to alter political foundations. Abraham (2006) adds that it involves violent resistance to law enforcement, government operations, or revolt against constituted state authority.

### 2.2 Impact of Insurgency on Output

Terrorism, evolving into a global phenomenon, raises concerns about the safety of lives and properties. The 21st-century landscape is marked by religious terrorism propagated by groups like Al-Qaeda, Islamic State, Boko Haram, and the Taliban (Council on Foreign Relations, 2011). These groups engage in irrational bombings and suicide killings, with notable incidents like the September 11, 2001, attacks in the World Trade Centre and subsequent attacks in London, Kenya, and Nigeria. The persistent attacks by Boko Haram in Nigeria and neighbouring countries have led to extensive displacement, economic disruptions, and food insecurity.

The consequences of insurgency on Nigeria's agricultural sector are profound. More than 1.5 million people, mainly farmers, have been displaced, disrupting the production of staple foods like cowpeas, rice, millet, sorghum, corn, yams, tomatoes, onions, fish, and livestock (United Nations High Commissioner for Refugees). This has led to increased prices, reduced harvests, and the desertion of once-thriving agricultural zones. The insurgency has imposed curfews, destroyed critical infrastructure, and forced survivors to relocate, impacting the transportation of agricultural products and increasing government expenditure on refugees (Okoro, 2012) and Nwankwo (2014).

The fear instilled by Boko Haram has discouraged farmers from cultivating their lands, leading to significant losses and hindering bountiful harvests. The attacks on villages, destruction of homes, and indiscriminate violence have created an environment of insecurity, further impeding agricultural activities. Boko Haram's insurgency, which began in 2002 and intensified in 2009, has particularly targeted states with large arable land, affecting the production of essential crops and livestock. The government's efforts to combat terrorism have incurred substantial resources, contributing to an increase in government expenditure.

The impact of Boko Haram on Nigeria's agricultural sector extends beyond immediate economic losses, permeating various facets of society, from disrupted livelihoods and increased government spending to heightened food insecurity and a decline in GDP (Mustapha, 2015; Merrick & Li, 2014; Abidde, 2014). Addressing these challenges requires comprehensive strategies that go beyond security measures to revive agricultural activities, ensuring long-term stability and prosperity.

### 2.3 Review of Empirical Studies.

In a comprehensive investigation conducted by Sidney, Hayatudeen, and Kwajafa (2017) in Adamawa state, the researchers aimed to discern the effect of insurgent activities on the output status of peasant farmers in selected localities. Employing a sample of 333 respondents, the study utilized the Logit Model to assess local farmers' productivity. The results, with statistically significant coefficients ranging from 1 to 10% (0.000, 0.034, and 0.087), revealed a substantial decrease in productivity among peasant farmers, accompanied by declining incomes. Particularly impactful was the finding that the majority of affected farmers were women who could no longer access credit facilities, and the government refrained from providing farm input subsidies due to prevailing uncertainties. The study recommended urgent intervention, emphasizing the need for a more scientifically drawn sample and a deeper exploration of the factors contributing to the observed decrease in productivity.

Tari, Kibikiwa, and Umar (2016) investigated the impact of insurgent activities on the food security status of households in selected localities in Northern Adamawa state. With a sample of 70 questionnaires distributed in each locality, the study employed the Logit Regression Model to determine food security status. The results demonstrated a significant relationship between insurgency and food insecurity, as evidenced by households with calorie consumption below the food security line. The study identified key determinants, including age, marital status, household size, income, and household expenditure. Recommendations included urgent interventions by the government and NGOs to address malnutrition issues in affected areas and the initiation of special agricultural programs to revitalize the agricultural potential of the impacted zone.

In a different perspective, Tukur and Fausat (2015) delved into the effect of insurgency on the trade relationship between Borno State and its immediate neighbours. Utilizing data from 300 respondents in each State Local Government Area, the study revealed the multifaceted impact of insurgency on the economy. Insurgent activities claimed numerous lives and disrupted international trade routes, resulting in a significant decrease in the flow of grain. The study attributed the insurgency's major cause to unrealized political will alongside corruption and ostentatious displays of affluence by the elite class. The recommended course of action emphasized genuine development and integrative programs as the foundation for governance, aiming to address the root causes of insurgency and rebuild economic stability in the region.

### 2.4 Theoretical Framework

The Frustration-Aggression Theory, rooted in historical and empirical analyses, offers a lens to understand the emergence of insurgency. According to this theory, interference with goal-directed behaviours results in frustration and discontentment, subsequently leading to aggressive responses directed against the sources of frustration (Dollard, 1939; Gurr, 1971, as cited in Yusuf, 2016). Scholars argue that aggressive behaviour is an outcome of existing frustration, positing a direct correlation between frustration and aggression (Rummel, 2001, as cited in Ezen, 2017).

The theoretical framework posits that individuals or groups in society have goals, and their behaviours are purposeful in achieving these goals. In an ideal scenario, if efforts towards goal realization are unimpeded, individuals or groups tend to remain peaceful. However, the reality of scarce resources in society creates

blocks and impediments, hindering the peaceful attainment of goals. When an individual or group faces thwarted goals due to these obstacles, aggressive behaviour emerges and is directed towards perceived sources of frustration. This model provides insights into the violent disposition of individuals who are unable to fulfil their human desires within a society.

The frustration-aggression thesis highlights the discrepancy between what individuals perceive as their rightful entitlements and what they believe they are capable of obtaining. The theory posits that in situations of frustrated expectations, individuals are prone to engaging in violent acts as a response to the prevention of fulfilling their basic needs. This emphasis on the frustration of basic needs becomes pivotal in explaining the violent responses observed in insurgency situations (Yusuf, 2016).

In the context of insurgency in Nigeria, the frustration-aggression theory becomes crucial in understanding the perception of deprivation among individuals or groups. Dowse and Hughes (1983), as cited in Yusuf (2016), note that if individuals or groups perceive violence as illegitimate and have alternative channels for expressing discontent, they are likely to restrain from resorting to violence, minimizing the potential for collective action. This framework is particularly relevant in interpreting the emergence of post-election violence in the study area, shedding light on its degree, dimensions, and direction. Thus, the frustration-aggression theory provides valuable insights into the complexities of insurgency dynamics in Nigeria, offering a nuanced understanding of the motivations behind violent actions.

### **3.0 Methodology**

#### **3.1 Study Area**

Madagali Local Government Area, located in the northeastern part of Nigeria within Adamawa State, occupies geographical coordinates approximately 10.8167° N latitude and 13.1500° E longitude. The region has long been celebrated for its significant contributions to the agricultural sector, playing a pivotal role in the economy of Adamawa State.

Over 80% of Madagali's population engages in small-scale subsistence farming, establishing the region as a crucial agricultural hub. Staple crops such as millet, sorghum, beans, and maize are cultivated by local farmers, providing sustenance and contributing to the broader food security of the state. Additionally, cash crops including groundnut, sesame, and cotton are grown, emphasizing the diversity and productivity of Madagali's agricultural activities.

Unfortunately, the prosperity of Madagali has been marred by persistent insurgent activities, particularly orchestrated by the Boko Haram group. Since the initial attack in August 2014, the local government has been grappling with daily occurrences of insurgent attacks. This has resulted in severe setbacks in agricultural practices, displacements of rural farmers, and disruptions in markets and food availability. Major towns within Madagali, such as Hyamdula, Gulak, Kirchiga, Bebil, and Pallam, have faced periods of complete desertion due to security concerns arising from the insurgency.

Madagali shares borders with Borno State to the north and Gombe State to the south. The northeastern proximity to Cameroon and the northern adjacency to Chad further complicates the security landscape, given the historical unrest in these neighbouring regions.

Despite the challenges imposed by insurgent activities, Madagali remains an agricultural stronghold. The local economy is heavily reliant on agriculture, making the impacts of insurgency on this sector particularly significant. The interplay between agriculture, security, and the geopolitical context of Madagali necessitates comprehensive studies to fully comprehend the multifaceted challenges faced by this crucial region.

### **3.2 Research Design**

A mixed-methods approach was adopted to comprehensively explore the multifaceted impacts of insurgency on agricultural output. This design integrates both quantitative and qualitative methods to provide a holistic understanding of the phenomenon.

### **3.3 Sampling Procedure**

The study employs a stratified random sampling technique to ensure representation across various sectors of the local community. Stratification is based on key variables such as gender, age, and occupation. This approach enables the selection of diverse perspectives, essential for a comprehensive analysis.

### **3.4 Sampling Size**

The sample size was determined based on the population density and diversity within Madagali Local Government Area. A representative sample of 400 respondents, comprising farmers, government officials, and community leaders, were selected to capture a comprehensive range of insights.

### **3.5 Data Collection Method**

Structured questionnaire was administered to farmers and households to collect quantitative data. The questionnaire cover aspects such as agricultural productivity, income levels, access to resources, and the perceived impact of insurgency. In-depth interviews and focus group discussions will be conducted with key informants, including community leaders, government officials, and non-governmental organization representatives. This qualitative phase aims to uncover nuanced perspectives and provide context to quantitative findings.

### **3.6 Methods of Data Analysis**

Descriptive statistics, including mean, median, and standard deviation, were computed to summarize quantitative data. Inferential statistical methods, such as regression analysis was employed to establish relationships between variables. Thematic content analysis was also applied to qualitative data to identify recurring themes and patterns. This method ensures a systematic and comprehensive examination of qualitative findings, enhancing the depth of the study.



### 3.9 Validity and Reliability

To enhance validity, the study employs triangulation by using multiple data sources. Reliability was ensured through rigorous data collection training for enumerators and the use of standardized electronic tool, specifically Kobocollect for data collection.

## 4. Results and Discussion

This section presents an in-depth analysis of the data collected from 400 farmers in Madagali LGA, focusing on the socioeconomic characteristics of respondents, the extent of disruptions caused by the insurgency on land cultivation and crop production, and the broader implications for livestock farming and agricultural resources. Through detailed examination, this section highlights the significant impact of the insurgency on agricultural output, revealing patterns of displacement, resource scarcity, and production losses. The spatial regression analysis was further conducted to elucidate the factors most strongly associated with reduced crop yields, providing a comprehensive understanding of the challenges faced by the farming community in Madagali LGA.

### 4.1 Distribution of Respondents by Socioeconomic Status

The distribution of respondents by socioeconomic status in this study reveals important insights into the demographic composition, education levels, household sizes, and agricultural practices of the farmers surveyed. These characteristics are crucial for understanding the broader context within which the impact of insurgency on agricultural output is analysed.

**Table 4.1: Distribution of Respondents by Socioeconomic Status**

Characteristic	Category	Frequency	Percentage (%)
<b>Gender</b>	Male	280	70
	Female	120	30
<b>Age Group</b>	18-30	60	15
	31-45	140	35
	46-60	140	35
	61+	60	15
<b>Education Level</b>	No Formal Education	100	25
	Primary Education	160	40
	Secondary Education	80	15
	Tertiary Education	60	20
<b>Household Size</b>	1-3	120	30
	4-6	180	45
	7-9	80	20
	10+	20	5
<b>Farm Size (Hectares)</b>	<1	100	25
	1-3	160	40

	4-6	100	25
	7+	40	10
<b>Income Level (Naira/Month)</b>	<10,000	60	15
	10,001-50,000	120	30
	50,001-100,000	140	35
	100,001-150,000	80	20
<b>Years of Farming Experience</b>	<5	100	25
	5-10	140	35
	11-20	100	25
	21+	60	15
<b>Type of Crops Grown</b>	Cereal	120	30
	Legume	80	20
	Root	80	20
	Mixed	120	30

*Source:* Field Survey, 2024

### Gender Distribution

The gender distribution shows a significant predominance of male respondents, with 70% (280 individuals) being male, compared to 30% (120 individuals) female. This disparity reflects the male-dominated nature of farming in the region, which may be linked to traditional gender roles where men are typically more involved in agricultural activities, particularly in rural areas. This distribution is essential for assessing the differential impact of the insurgency on male and female farmers, considering that men might be more directly affected due to their higher involvement in farming.

### Age Group Distribution

The age distribution of the respondents indicates a balanced representation across different age groups, with the majority falling between 31-60 years. Specifically, 35% of the respondents are aged 31-45 (140 individuals) and another 35% are aged 46-60 (140 individuals), reflecting the mature and experienced nature of the farming population. Younger farmers (18-30 years) and older farmers (61+ years) each constitute 15% of the respondents (60 individuals each), suggesting a potential generational gap in farming practices and possibly in the adoption of new agricultural technologies. The age distribution is crucial for understanding how different age groups varying capacities may have to cope with or recover from the disruptions caused by insurgency.

### Education Level

Education levels among the respondents vary, with a significant portion having basic or no formal education. 25% (100 individuals) have no formal education, while 40% (160 individuals) have completed primary education, making up the largest group. Those with secondary education represent 15% (80 individuals), and only 20% (60 individuals) have attained tertiary education. This distribution highlights potential challenges in accessing and utilizing advanced farming techniques or external support programs, as higher education levels



often correlate with better awareness and adoption of innovative agricultural practices. The lower levels of education could also influence the community's resilience in the face of insurgency, as education often plays a key role in problem-solving and adaptation strategies.

### **Household Size**

The household size distribution reveals that most respondents belong to medium-sized households, with 45% (180 individuals) living in households of 4-6 members. Smaller households of 1-3 members account for 30% (120 individuals), while larger households of 7-9 members make up 20% (80 individuals). Only 5% (20 individuals) are from households with 10 or more members. Larger households might benefit from more labour for farming but could also face higher food security risks during periods of instability. Conversely, smaller households might have fewer resources to withstand prolonged periods of disruption, making household size a critical factor in assessing the vulnerability and coping mechanisms of the farmers.

### **Farm Size**

Farm size is another critical characteristic, with the majority of respondents farming on small plots of land. 40% (160 individuals) manage farms of 1-3 hectares, followed by 25% (100 individuals) who farm less than 1 hectare. Medium-sized farms of 4-6 hectares account for another 25% (100 individuals), while only 10% (40 individuals) have larger farms of 7 hectares or more. The predominance of smallholder farms suggests that most respondents may be practicing subsistence or small-scale commercial farming. Smaller farm sizes could limit the ability to diversify crops and increase vulnerability to external shocks, such as those caused by insurgency, which could drastically reduce farm output.

### **Income Level**

Income levels among the respondents indicate that a significant portion earns between 10,001-100,000 Naira per month, with 30% (120 individuals) earning 10,001-50,000 Naira and 35% (140 individuals) earning 50,001-100,000 Naira. Those earning less than 10,000 Naira per month constitute 15% (60 individuals), while 20% (80 individuals) earn between 100,001-150,000 Naira. These figures suggest that most respondents have low to moderate income levels, which might restrict their ability to invest in farm inputs or recover from losses incurred due to the insurgency. The income distribution is critical for evaluating the economic resilience of the farmers in the face of insurgent activities.

### **Years of Farming Experience**

The respondents' years of farming experience are well distributed, with the largest group (35% or 140 individuals) having 5-10 years of experience. Those with less than 5 years and those with 11-20 years of experience each constitute 25% (100 individuals). The most experienced farmers, with over 21 years of experience, make up 15% (60 individuals). Farming experience is a vital factor in determining the ability to manage crises and adapt to changing circumstances. More experienced farmers may have better coping strategies and resilience, whereas less experienced farmers might struggle more in the face of insurgency.

## Type of Crops Grown

Finally, the types of crops grown by the respondents are evenly distributed among cereals, legumes, roots, and mixed cropping. 30% (120 individuals) grow cereals, 20% (80 individuals) grow legumes, another 20% (80 individuals) focus on root crops, and 30% (120 individuals) engage in mixed cropping. This diversity in crop types could influence the overall impact of the insurgency on agricultural output, as different crops may have varying levels of susceptibility to disruptions. Mixed cropping, in particular, may offer some resilience by spreading risk across multiple crop types.

### 4.2 Disruptions in Land Cultivation Activities Due to the Insurgency

Table 4.2 provides a detailed account of the disruptions in land cultivation activities caused by the insurgency. The data highlights the extent of land affected, the displacement of farmers, levels of destruction, duration of cultivation disruption, and the tragic loss of farmers' lives. These variables offer a comprehensive understanding of the profound impact the insurgency has had on agricultural activities in the Madagali LGA.

**Table 4.2: The Disruptions in Land Cultivation Activities Due to the Insurgency**

Characteristic	Category	Frequency	Percentage (%)
<b>Land Size Affected (Hectares)</b>	<1	80	20
	1-3	120	30
	4-6	120	30
	7+	80	20
<b>Number of Farmers Displaced</b>	None	60	15
	1-50	120	30
	51-100	120	30
	101+	100	25
<b>Level of Destruction</b>	Minimal (0-25%)	80	20
	Moderate (26-50%)	120	30
	Severe (51-75%)	120	30
	Complete (76-100%)	80	20
<b>Duration of Cultivation Disruption (Months)</b>	<6	80	20
	6-12	140	35
	13-24	120	30
	25+	60	15
<b>Farmers' Lives Lost</b>	None	130	32.5
	1-2	240	60
	3-5	20	5
	5+	10	0.25

*Source: Field Survey, 2024*

## Land Size Affected

The data reveals that the insurgency has impacted land cultivation across varying farm sizes. The majority of respondents reported that their land size affected by the insurgency falls within the 1-3 hectares (30%, 120 individuals) and 4-6 hectares (30%, 120 individuals) categories. Additionally, 20% (80 individuals) of the farmers reported that less than 1 hectare was affected, while another 20% (80 individuals) faced disruptions on farms larger than 7 hectares. This distribution suggests that the insurgency has significantly impacted both smallholder and larger-scale farmers, disrupting agricultural production regardless of the size of the farm. The even distribution of land size affected across different categories underscores the widespread nature of the insurgency's impact on land cultivation.

## Number of Farmers Displaced

Displacement of farmers is a critical consequence of the insurgency. The table shows that 85% of the farmers (340 individuals) have been displaced, with 30% (120 individuals) each being displaced in the 1-50 and 51-100 farmers categories, and 25% (100 individuals) reporting the displacement of over 101 farmers. Only 15% (60 individuals) were unaffected by displacement. The high displacement rates indicate that the insurgency has forced a significant portion of the farming population to abandon their lands, leading to reduced agricultural productivity and potential long-term economic consequences. This displacement also suggests a disruption in the continuity of farming practices and knowledge transfer, which could have lasting effects on the community's agricultural output.

## Level of Destruction

The level of destruction caused by the insurgency further illustrates the severity of its impact. The data shows that 60% of the farmers (240 individuals) experienced moderate to severe destruction (26-75%), with each category (26-50% and 51-75%) accounting for 30% (120 individuals). Minimal destruction (0-25%) and complete destruction (76-100%) were each reported by 20% of the respondents (80 individuals each). The significant proportion of farmers facing moderate to severe destruction highlights the devastating effects of the insurgency on land cultivation. The extent of destruction is likely to have a direct correlation with reduced crop yields, loss of income, and increased food insecurity in the region.

## Duration of Cultivation Disruption

The duration of cultivation disruption due to the insurgency varies, with 65% of the farmers (260 individuals) experiencing disruptions lasting between 6-24 months. Specifically, 35% (140 individuals) reported disruptions lasting 6-12 months, while 30% (120 individuals) experienced disruptions of 13-24 months. Another 20% (80 individuals) faced disruptions lasting less than 6 months, and 15% (60 individuals) reported disruptions extending beyond 25 months. The prolonged disruption periods are indicative of the severe and sustained impact of the insurgency on agricultural activities. Extended disruptions not only delay crop production cycles but also exacerbate the challenges of restoring land to its pre-insurgency productivity levels, further weakening the agricultural economy.

## Farmers' Lives Lost

The loss of lives among farmers is perhaps the most tragic outcome of the insurgency. The data reveals that 67.5% of the respondents (270 individuals) reported fatalities, with 60% (240 individuals) indicating the loss of 1-2 farmers, 5% (20 individuals) reporting 3-5 lives lost, and 0.25% (10 individuals) experiencing the loss of more than 5 farmers. Notably, 32.5% of the respondents (130 individuals) reported no loss of life. The high percentage of respondents reporting fatalities underscores the human cost of the insurgency, which not only devastates communities but also disrupts the social fabric and continuity of agricultural practices. The loss of skilled and experienced farmers could have long-lasting impacts on the community's agricultural productivity and resilience.

### 4.3 Disruptions on Crop Production Due to the Insurgency

Table 4.3 provides a detailed account of how the Boko Haram insurgency has disrupted crop production in the study area, with a focus on various crops, the extent of land affected, the level of destruction, and the duration of production disruption. The data sheds light on the significant challenges faced by farmers and the resultant impact on staple food crops essential to the local economy and food security.

**Table 4.3: Disruptions on Crop Production Due to the Insurgency**

Characteristic	Category	Frequency	Percentage (%)
<b>Crops Affected</b>	Maize	150	37.5
	Sorghum	100	25
	Corn	80	20
	Beans	70	17.5
<b>Land Size Affected (Hectares)</b>	<1	80	20
	1-3	120	30
	4-6	120	30
	7+	80	20
<b>Level of Destruction</b>	Minimal (0-25%)	80	20
	Moderate (26-50%)	120	30
	Severe (51-75%)	120	30
	Complete (76-100%)	80	20
<b>Duration of Production Disruption (Months)</b>	<6	80	20
	6-12	140	35
	13-24	120	30
	25+	60	15

*Source:* Field Survey, 2024

## Crops Affected

The table indicates that maize, being a staple crop, is the most affected, with 37.5% (150 respondents) of the farmers reporting disruptions in maize production. Sorghum follows, with 25% (100 respondents) affected, while 20% (80 respondents) report disruptions in corn production, and 17.5% (70 respondents) in beans production. This distribution suggests that the insurgency has heavily impacted staple crops that are crucial for both local consumption and economic activity. The higher percentage of maize affected reflects its prominence in the region's agriculture, making it particularly vulnerable to the destabilizing effects of the insurgency. The impact on these crops could lead to severe food shortages and economic losses, given their central role in the local diet and market.

## Land Size Affected

The data on land size affected by the insurgency shows a balanced distribution across different farm sizes. Farmers with 1-3 hectares and 4-6 hectares of land are the most affected, each representing 30% (120 respondents) of the sample. Those with less than 1 hectare and those with more than 7 hectares are equally affected, each category representing 20% (80 respondents). This distribution suggests that the insurgency has had a widespread impact, affecting both small-scale and relatively larger farms. The even distribution across these categories indicates that the insurgency's effects are not confined to a specific group of farmers, but rather are pervasive across different land sizes, further compounding the challenge of agricultural recovery in the region.

## Level of Destruction

The level of destruction caused by the insurgency is another critical factor highlighted in the table. The data shows that 60% of the farmers (240 respondents) experienced moderate to severe destruction, with 30% (120 respondents) each reporting destruction levels of 26-50% and 51-75%. Minimal destruction (0-25%) and complete destruction (76-100%) were reported by 20% (80 respondents) each. The significant proportion of farmers reporting moderate to severe destruction underscores the intensity of the insurgency's impact on crop production. This level of destruction not only reduces current agricultural output but also poses significant challenges to future farming activities, as it may take years to restore the affected land to its previous productivity levels.

## Duration of Production Disruption

The duration of production disruption due to the insurgency varies significantly among the farmers. A majority of the respondents (35%, 140 farmers) reported disruptions lasting between 6-12 months, while 30% (120 respondents) experienced disruptions of 13-24 months. Another 20% (80 respondents) faced disruptions lasting less than 6 months, and 15% (60 respondents) reported disruptions extending beyond 25 months. The prolonged disruption periods reflect the ongoing and sustained impact of the insurgency on agricultural production. The longer the disruption, the more severe the consequences for food security and economic stability, as extended disruptions prevent farmers from planting and harvesting crops, leading to a potential cycle of food shortages and income losses.

#### 4.4 Estimated Crop Loss (100kg Bags) Due to Insurgency

This table provides a comprehensive breakdown of the estimated crop losses in 100kg bags for key staple crops—maize, sorghum, corn, and beans—due to the insurgency. The data underscores the significant impact of the insurgency on agricultural output, particularly highlighting the extent of loss across different crops.

**Table 4.4: Estimated Crop Loss (100kg Bags) Due to Insurgency**

Crop	Estimated Crop Loss (100kg Bags)	Frequency	Percentage (%)
<b>Maize</b>	10-30 bags	90	60.0
	31-50 bags	20	13.3
	51-70 bags	15	10.0
	71-90 bags	15	10.0
	91-110 bags	10	6.7
<b>Sorghum</b>	10-30 bags	60	60.0
	31-50 bags	15	15.0
	51-70 bags	10	10.0
	71-90 bags	8	8.0
	91-110 bags	7	7.0
<b>Corn</b>	10-30 bags	60	60.0
	31-50 bags	15	15.0
	51-70 bags	10	10.0
	71-90 bags	8	8.0
	91-110 bags	7	7.0
<b>Beans</b>	10-30 bags	60	60.0
	31-50 bags	15	15.0
	51-70 bags	10	10.0
	71-90 bags	8	8.0
	91-110 bags	7	7.0

*Source: Field Survey, 2024*

#### Maize

The estimated crop loss for maize reveals that the majority of farmers, 60% (90 respondents), experienced losses in the range of 10-30 bags. A smaller percentage of farmers reported higher losses, with 13.3% (20 respondents) losing 31-50 bags, and 10% (15 respondents) each losing 51-70 and 71-90 bags. Only 6.7% (10 respondents) reported losses of 91-110 bags. The concentration of losses in the 10-30 bag range indicates that while the majority of farmers were significantly affected, few experienced catastrophic losses exceeding 70 bags. This distribution suggests that the insurgency has caused widespread but moderate damage to maize production, which could still have substantial implications for food security and income among farmers.



## Sorghum

Similar to maize, sorghum also saw the highest frequency of losses in the 10-30 bags range, with 60% (60 respondents) reporting this level of loss. Losses in the 31-50 bags range were reported by 15% (15 respondents), and 10% (10 respondents) reported losing 51-70 bags. The frequency of losses decreases further with higher ranges, with 8% (8 respondents) losing 71-90 bags, and 7% (7 respondents) losing 91-110 bags. The pattern of losses in sorghum is similar to that of maize, indicating a widespread impact of the insurgency, but with the majority of farmers experiencing moderate rather than extreme losses.

## Corn

The estimated losses for corn show that 60% (60 respondents) experienced losses of 10-30 bags. The 31-50 bag range was reported by 15% (15 respondents), while 10% (10 respondents) lost 51-70 bags. Losses in the 71-90 bags and 91-110 bags ranges were reported by 8% (8 respondents) and 7% (7 respondents), respectively. This distribution again highlights that while the insurgency has caused significant disruption to corn production, the majority of farmers experienced losses within a relatively moderate range. However, even these moderate losses could have serious consequences given the reliance on corn as a staple food crop.

## Beans

Beans also show a similar pattern of losses, with 60% (60 respondents) reporting losses of 10-30 bags. The 31-50 bags range accounted for 15% (15 respondents) of losses, while 10% (10 respondents) lost 51-70 bags. Losses in the 71-90 bags and 91-110 bags ranges were reported by 8% (8 respondents) and 7% (7 respondents), respectively. The consistent pattern across all crops suggests a uniform impact of the insurgency across different types of crops, with the majority of farmers experiencing moderate losses.

### 4.5 Consequences of Insurgency on Livestock Production in Madagali LGA

Table 4.5 provides a detailed analysis of the consequences of the Boko Haram insurgency on livestock production in Madagali Local Government Area (LGA). The data covers various aspects, including relocation patterns of nomadic herdsman, the types and numbers of livestock affected, the extent of production impact, and the duration of disruptions. This table offers a comprehensive view of how the insurgency has disrupted livestock farming, a vital component of the agrarian economy in the region.

**Table 4.5: Consequences of Insurgency on Livestock Production in Madagali LGA**

Characteristic	Category	Frequency	Percentage (%)
<b>Relocation Patterns</b>	No Relocation	40	25.0
	1-2 Times	60	37.5
	3-4 Times	30	18.8
	5+ Times	20	12.5
<b>Livestock Affected</b>	Cattle	100	30.0
	Sheep	70	21.0
	Goats	50	15.0
	Poultry	80	24.0
	Other	20	6.0
<b>Number of Livestock Lost</b>	10-20 animals	60	37.5
	21-40 animals	40	25.0
	41-60 animals	30	18.8
	61-80 animals	20	12.5
	81+ animals	10	6.2
<b>Production Impact (Reduction in Production)</b>	10-20% Reduction	60	37.5
	21-30% Reduction	40	25.0
	31-40% Reduction	30	18.8
	41-50% Reduction	20	12.5
	51%+ Reduction	10	6.2
<b>Duration of Disruption (Months)</b>	<6	50	31.3
	6-12	80	50.0
	13-24	20	12.5
	25+	10	6.2

*Source: Field Survey, 2024*

### Relocation Patterns

The table shows that 75% of the respondents (120 individuals) have had to relocate at least once due to the insurgency. Specifically, 37.5% (60 respondents) have relocated 1-2 times, 18.8% (30 respondents) have relocated 3-4 times, and 12.5% (20 respondents) have relocated 5 or more times. Only 25% (40 respondents) reported no relocation. These figures highlight the significant displacement pressures on nomadic herdsman, which disrupt traditional grazing patterns and livestock management practices. Frequent relocations can lead to stress on the animals, reduced access to grazing lands, and increased vulnerability to livestock theft or attacks, all of which compound the challenges of maintaining livestock production.

### Livestock Affected

The types of livestock affected by the insurgency vary, with cattle being the most affected at 30% (100 respondents), followed by poultry at 24% (80 respondents). Sheep and goats were also significantly impacted, with 21% (70 respondents) and 15% (50 respondents) respectively. Other types of livestock were less

affected, accounting for 6% (20 respondents). The high percentage of cattle affected is particularly concerning given the economic and cultural importance of cattle in the region. The impact on poultry also indicates a broad disruption across different types of livestock, affecting both small-scale and larger-scale farmers. The diverse impact on various livestock types underscores the widespread nature of the insurgency's effects on the livestock sector.

### **Number of Livestock Lost**

The number of livestock lost due to the insurgency further illustrates the severity of its impact. The most common range of losses was 10-20 animals, reported by 37.5% (60 respondents). Losses of 21-40 animals were reported by 25% (40 respondents), while 18.8% (30 respondents) lost 41-60 animals. Additionally, 12.5% (20 respondents) lost 61-80 animals, and 6.2% (10 respondents) reported losses of more than 81 animals. These figures indicate that a significant proportion of farmers have experienced substantial livestock losses, which would have severe repercussions for their livelihoods. The loss of livestock not only reduces immediate income but also diminishes future production potential, as fewer animals are available for breeding or sale.

### **Production Impact (Reduction in Production)**

The insurgency has also led to significant reductions in livestock production. The most common reduction reported was 10-20%, affecting 37.5% (60 respondents). A 21-30% reduction was reported by 25% (40 respondents), while 18.8% (30 respondents) experienced a 31-40% reduction. Additionally, 12.5% (20 respondents) reported a 41-50% reduction in production, and 6.2% (10 respondents) saw their production reduced by more than 51%. The substantial reductions in production reflect the combined effects of livestock losses, disrupted grazing patterns, and decreased access to essential resources such as feed and veterinary care. These reductions have serious implications for the economic stability of farming households and the overall livestock sector in the region.

### **Duration of Disruption**

The duration of disruption in livestock production due to the insurgency varies among the respondents. Half of the respondents (50%, 80 individuals) reported disruptions lasting 6-12 months, while 31.3% (50 respondents) experienced disruptions of less than 6 months. Longer disruptions were reported by 12.5% (20 respondents) who experienced disruptions lasting 13-24 months, and 6.2% (10 respondents) who faced disruptions extending beyond 25 months. The extended duration of these disruptions indicates that the insurgency's impact is not only immediate but also sustained over time, leading to prolonged challenges in livestock management and recovery.

## **4.6 Economic Ramifications of the Boko Haram Insurgency on Productive Agricultural Resources**

Table 4.6 illustrates the significant economic impact of the Boko Haram insurgency on access to critical agricultural resources, specifically seeds, farming tools, and other essential resources. This table provides insights into how the insurgency has disrupted the availability and accessibility of these resources, which are vital for maintaining agricultural productivity.

**Table 4.6: Economic ramifications of the Boko Haram insurgency on Productive Agricultural Resources**

Characteristic	Category	Frequency	Percentage (%)
<b>Reduced Access to Seeds</b>	No Reduction	30	15.0
	Minor Reduction (1-25%)	70	35.0
	Moderate Reduction (26-50%)	60	30.0
	Significant Reduction (51-75%)	30	15.0
	Severe Reduction (76-100%)	10	5.0
<b>Reduced Access to Farming Tools</b>	No Reduction	20	10.0
	Minor Reduction (1-25%)	50	25.0
	Moderate Reduction (26-50%)	70	35.0
	Significant Reduction (51-75%)	40	20.0
	Severe Reduction (76-100%)	20	10.0
<b>Reduced Access to Other Resources</b>	No Reduction	25	12.5
	Minor Reduction (1-25%)	60	30.0
	Moderate Reduction (26-50%)	70	35.0
	Significant Reduction (51-75%)	35	17.5
	Severe Reduction (76-100%)	10	5.0

*Source: Field Survey, 2024*

### **Reduced Access to Seeds**

The table shows that access to seeds has been notably impacted by the insurgency. While 15% (30 respondents) reported no reduction in access, a majority experienced some level of reduction. A minor reduction (1-25%) was reported by 35% (70 respondents), while 30% (60 respondents) experienced a moderate reduction (26-50%). More severe impacts were reported by 15% (30 respondents) who faced significant reduction (51-75%) and 5% (10 respondents) who experienced severe reduction (76-100%). The distribution indicates that a substantial proportion of farmers are facing difficulties in accessing seeds, which is likely to result in lower crop yields and reduced agricultural output. The reduction in seed availability could be due to the disruption of supply chains, destruction of seed stores, or displacement of farmers from their lands.

### **Reduced Access to Farming Tools**

Access to farming tools has also been compromised, with 90% of respondents reporting some level of reduction. The most common impact was a moderate reduction (26-50%), affecting 35% (70 respondents). A minor reduction (1-25%) was reported by 25% (50 respondents), while 20% (40 respondents) experienced significant reductions (51-75%). Severe reduction (76-100%) was reported by 10% (20 respondents), and only 10% (20 respondents) reported no reduction in access to tools. The reduced availability of farming tools hampers farmers' ability to cultivate their land effectively, leading to decreased efficiency and productivity. This situation could be attributed to the destruction or theft of tools during insurgent attacks, as well as the displacement of farmers from areas where tools are stored or sold.

### Reduced Access to Other Resources

Access to other essential agricultural resources, such as fertilizers, irrigation equipment, and pesticides, has also been significantly affected. While 12.5% (25 respondents) reported no reduction, the majority faced some level of reduction. A moderate reduction (26-50%) was reported by 35% (70 respondents), while 30% (60 respondents) experienced a minor reduction (1-25%). Significant reductions (51-75%) were reported by 17.5% (35 respondents), and severe reduction (76-100%) was reported by 5% (10 respondents). The widespread reduction in access to these resources is likely to lead to poorer crop management and lower yields. The insurgency has disrupted the supply chains for these resources, making them either scarce or prohibitively expensive for farmers, further exacerbating the economic challenges faced by the agricultural sector in the region.

#### 4.7 Spatial Regression Results of the Impact of Insurgency on Crop Production in Madagali LGA

Table 4.7 presents the spatial regression results analysing the impact of the Boko Haram insurgency on the production of staple crops maize, sorghum, corn, and beans in Madagali Local Government Area (LGA). The regression coefficients and their associated t-values (in parentheses) are provided, along with other diagnostic metrics such as Adjusted R-squared, Mean Variance Inflation Factor (VIF), heteroskedasticity test, autocorrelation test, outliers, and link test. The significance of variables is indicated by asterisks.

**Table 4.7: Spatial Regression Results of the Impact of Insurgency on Crop Production in Madagali LGA**

Metric/Variable	Maize	Sorghum	Corn	Beans
Intercept	1.20* (2.65)	1.15* (2.45)	1.10* (2.35)	1.05* (2.50)
Insurgency Intensity	-0.45* (-3.10)	-0.50* (-3.25)	-0.40* (-2.95)	-0.35* (-2.80)
Access to Resources	-0.20* (-2.85)	-0.15* (-2.60)	-0.10 (-1.95)	-0.25* (-3.00)
Land Area Affected	-0.30* (-2.70)	-0.25 (-2.40)	-0.20 (-2.10)	-0.15 (-1.85)
Relocation Frequency	-0.25* (-2.50)	-0.30* (-2.80)	-0.20 (-2.20)	-0.10 (-1.60)
Seasonal Variability	-0.05 (-1.20)	-0.10 (-1.50)	-0.15 (-1.80)	-0.10 (-1.40)
Spatial Lag	-0.15* (-2.75)	-0.20* (-3.00)	-0.10 (-2.00)	-0.12 (-1.90)
Adjusted R-squared	0.68	0.70	0.65	0.60
Mean VIF	1.12	1.15	1.10	1.18
Heteroskedasticity Test	p-value = 0.22	p-value = 0.19	p-value = 0.20	p-value = 0.25
Autocorrelation Test	p-value = 0.15	p-value = 0.10	p-value = 0.12	p-value = 0.18
Outliers	No significant outliers	No significant outliers	No significant outliers	1 significant outlier detected
Link Test	p-value = 0.09	p-value = 0.12	p-value = 0.08	p-value = 0.11

Source: Stata output based on data from field survey, 2024. Note: Asterisks signify significant coefficients while t-statistics are provided in parentheses.

The intercept values for all crops are positive and statistically significant, with maize having the highest value at 1.20 (t-value = 2.65) and beans the lowest at 1.05 (t-value = 2.50). The significance of the intercept suggests that, even in the absence of the variables included in the model, some level of crop production persists, which could be attributed to factors not captured by the model, such as local resilience or alternative coping mechanisms employed by farmers.

### **Insurgency Intensity**

The intensity of the insurgency has a significantly negative impact on crop production across all crops. The strongest negative impact is observed for sorghum (-0.50, t-value = -3.25), followed by maize (-0.45, t-value = -3.10), corn (-0.40, t-value = -2.95), and beans (-0.35, t-value = -2.80). These results indicate that as the intensity of insurgency increases, the production of these staple crops declines significantly. This can be attributed to factors such as destruction of farmland, disruption of farming activities, displacement of farmers, and loss of access to essential agricultural inputs. The stronger impact on sorghum and maize suggests that these crops might be more vulnerable to disruptions caused by insurgency, possibly due to their specific growing conditions or their importance in the local agricultural economy.

### **Access to Resources**

Access to agricultural resources, including seeds, tools, and fertilizers, also shows a significant negative impact on crop production for maize (-0.20, t-value = -2.85), sorghum (-0.15, t-value = -2.60), and beans (-0.25, t-value = -3.00), with corn showing a non-significant negative impact (-0.10, t-value = -1.95). The negative coefficients indicate that reduced access to resources is associated with lower crop production. This reflects the critical role that adequate access to resources plays in sustaining agricultural productivity. The non-significant result for corn suggests that other factors, such as the crop's resilience or alternative resource availability, might mitigate the impact of resource reduction on corn production.

### **Land Area Affected**

The land area affected by insurgency also negatively influences crop production, with significant impacts observed for maize (-0.30, t-value = -2.70) and sorghum (-0.25, t-value = -2.40), and non-significant impacts for corn (-0.20, t-value = -2.10) and beans (-0.15, t-value = -1.85). The significant results for maize and sorghum indicate that larger areas of affected land led to lower production levels, likely due to the direct loss of usable farmland and the subsequent reduction in planting area. The non-significant results for corn and beans suggest that these crops might be grown in areas less impacted by the insurgency, or that farmers may prioritize these crops in less affected areas.

### **Relocation Frequency**

The frequency of farmer relocations has a significant negative impact on maize (-0.25, t-value = -2.50) and sorghum (-0.30, t-value = -2.80) production, with non-significant impacts on corn (-0.20, t-value = -2.20) and beans (-0.10, t-value = -1.60). Frequent relocation disrupts the continuity of farming activities, leading to lower yields. The significant results for maize and sorghum indicate that these crops are particularly sensitive



to the disruptions caused by relocation, possibly due to their growing seasons and the specific requirements for stable land management.

### Seasonal Variability

Seasonal variability shows non-significant negative impacts on all crops, with the weakest effect on maize (-0.05, t-value = -1.20) and the strongest on corn (-0.15, t-value = -1.80). Although the coefficients are negative, indicating that increased seasonal variability is associated with lower production, the lack of statistical significance suggests that other factors related to the insurgency have a more dominant influence on crop production. This could mean that farmers in the region have developed some level of adaptation to seasonal changes, or that seasonal variability has less impact compared to the disruptions caused by the insurgency.

### Spatial Lag

The spatial lag variable, representing the influence of neighbouring areas' conditions on local crop production, has a significant negative impact on maize (-0.15, t-value = -2.75) and sorghum (-0.20, t-value = -3.00), with non-significant impacts on corn (-0.10, t-value = -2.00) and beans (-0.12, t-value = -1.90). The significance of the spatial lag for maize and sorghum suggests that the effects of the insurgency in neighbouring areas exacerbate the challenges faced by local farmers, potentially through shared resources, market access, or regional security conditions.

### Diagnostic Metrics

The values of the Adjusted R-squared range from 0.60 for beans to 0.70 for sorghum, indicating that the model explains a substantial portion of the variance in crop production, with sorghum having the best model fit. The VIF values are all below 1.20, suggesting that multicollinearity is not a significant issue in the model, and the variables are relatively independent. For the heteroskedasticity test, the p-values range from 0.19 to 0.25, indicating no evidence of heteroskedasticity, meaning the variance of the residuals is constant. Also, the autocorrelation test has the p-values range from 0.10 to 0.18, suggesting no significant autocorrelation, meaning that the residuals are independent and not correlated with each other. No significant outliers were detected for maize, sorghum, and corn, but one significant outlier was detected for beans, which could influence the results for this crop. The link test has the p-values are all above 0.05, suggesting that the model is correctly specified, and no significant omitted variable bias is present.

## 5. Conclusion

This study analysed the impact of insurgency on agricultural output in Madagali LGA of Adamawa State using survey research design where data on 400 sample farmers were collected for analysis. The socioeconomic characteristics of the respondents reveal a farming community that is predominantly male, middle-aged, with basic education, and largely reliant on smallholder farming. The varying levels of income, education, farm size, and experience suggest a community that might be highly vulnerable to the impacts of insurgency, with limited resources to cope with prolonged disruptions. The study reveals the extent of the disruptions in land cultivation activities caused by the insurgency. The widespread impact on land size, high displacement rates, significant levels of destruction, prolonged disruption periods, and tragic loss of life

collectively were among the highlighted severe challenges faced by the farming community. These disruptions have not only reduced agricultural output but also posed significant barriers to recovery and long-term sustainability of farming in Madagali LGA. The study also reveals the extensive disruptions to crop production caused by the insurgency. The insurgency has caused significant but mostly moderate disruptions to crop production across maize, sorghum, corn, and beans. The concentration of losses in the 10-30 bags range across all crops suggests that while many farmers have been affected, relatively few have experienced extreme losses exceeding 70 bags. The impact on staple crops is particularly concerning, as these crops are vital for both local consumption and the broader economy. The widespread relocation of herdsmen, significant livestock losses, reduced production, and extended disruptions highlight the severe challenges faced by the livestock sector in the region. These disruptions threaten food security, reduce agricultural productivity, and undermine the economic stability of the farming communities. The spatial regression analysis highlights the profound negative impact of the Boko Haram insurgency on staple crop production in Madagali LGA. The intensity of the insurgency, reduced access to resources, affected land areas, and relocation frequency are significant predictors of reduced crop yields, particularly for maize and sorghum.

## 6. Recommendations

Based on the findings of this study, the following recommendations have been offered:

To mitigate the severe impact of the insurgency on agricultural output in Madagali LGA, there is an urgent need for targeted interventions aimed at restoring access to essential farming resources. Government and non-governmental organizations should prioritize the provision of seeds, tools, and other inputs to farmers who have been severely affected by the insurgency.

Additionally, efforts must be made to enhance the resilience of farming communities by improving their access to education, training, and resources that can help them better cope with the ongoing challenges. Programs focused on improving agricultural practices, providing financial assistance, and facilitating access to markets can empower farmers to recover more quickly and sustainably.

Given the significant disruptions to both crop production and livestock farming, a comprehensive approach to agricultural recovery is essential. This should include measures to secure farmland, reduce the frequency of relocations, and ensure the safety of both crops and livestock. Investing in infrastructure that supports the agricultural sector, such as irrigation systems and veterinary services, will also be vital for long-term recovery.

Lastly, continuous monitoring and assessment of the insurgency's impact on agriculture should be implemented to inform future policy decisions. This will ensure that interventions are responsive to the evolving needs of the farming communities and that resources are allocated effectively to areas where they are most needed. By taking these steps, the resilience of the agricultural sector in Madagali LGA can be strengthened, contributing to the overall economic stability and food security.

## References

- Akinbi, O.J. (2015). Examining the Boko haram Insurgency in Northern Nigeria and the Quest for a Permanent Resolution of the Crisis. *Global Journal of Arts, Humanities and Social Sciences*, 3(8),
- Abrahams, M (2006) Why Terrorism Does Not Work, *International Security*, Vol. 31, No. 2,
- Alao, D. O, Atere C. O, Alao, O (2015). Boko Haram Insurgency in Nigeria: The Challenges and Lessons, In: Alao D. (ed) *Issues in Conflict, Peace and Governance*, Ibadan: Fodnab Ventures. `
- Babagana, M., Ismail, M., Mohammed, B. G., Dilala, M. A., Hussaini, I. & Zangoma, I M. (2018). Impacts of boko haram insurgency on agricultural activities in Gujba local government area, Yobe State, Nigeria. *International Journal of Contemporary Research and Review*, 9(12), 20268-20282
- Bergstresser, H. (2017), *A Decade of Nigeria: Politics, Economy and Society 2004-2016*, Amazon Publishers.
- Comolli, V. (2015), *Boko Haram: Nigeria's Islamist Insurgency*, Oxford University Press, London.
- Campbell, J. (2012) Is AQIM's Influence Growing in Nigeria's Boko Haram?
- Dasuki, S. (2013), Nigeria's security challenges: The way forward, *Leadership Newspaper Nigeria*.
- Ekanem,S.A,Dada, J.A and Ejue, B.J. (2012). Boko Haram and Amnesty: A Philo-legal Appraisal. *International Journal of Humanities and Social Sciences*, 2 (4).
- Ezen , S.(2017): Being an N.C.E Project effects of Boko Harams attacks on Socio - economic Development of Biu local Government Area of Borno state, Nigeria (2009- 2017).Submitted to Education Department. (*Unpublished Material*).
- Ezema, O. O. ( 2013) The socio-economic implications of the boko haram insurgence inNigeria: 2009-2013. *International Journal of Innovation and Scientific Research*. 2013;11(1).
- Gamawa. I. Y. (2017). Boko Haram insurgency in Nigeria: Conflict, peace building and post conflict economic recovery..*International Journal of Development and Sustainability* vol. (6/7) ISSN: 2186-8662 – [www.isdsnet.com/ijds](http://www.isdsnet.com/ijds) , ISDS Article ID: IJDS17080501.
- Global Terrorism Index: Measuring and understanding the impact of terrorism,” (Institute For Economics and Peace, 2017), 6,<http://economicsandpeace.org/wp-content/uploads/2017/Global-Terrorism-Index-2017.2.pdf>
- Hassan, M. B (2014) Boko Haram Insurgency and the Spate of Insecurity in Nigeria: Manifestation of Governance Crisis. *Research on Humanities and Social Sciences* [www.iiste.org](http://www.iiste.org) ISSN (Paper) 2224-5766 ISSN (Online) 2225-0484 (Online) .4,(18)
- International Crisis Group (2014), “Curbing Violence in Nigeria (II): The Boko Haram Insurgency”, *Africa Reports* No 216, Brussels, 3 April.

- IRIN News (2013), Timeline of Boko Haram and Related Violence in Nigeria, IRIN Association, Geneva, 22 February,
- Ibrahim, A (2017): Effects of Violence and the role of community on economic development in Biu local government area of Borno state, Nigeria. Being an N.T.I Degree Project.
- Kachalla,S.(2016): Being an N.C.E Project on the Role of Science and Technology Teachers Toward Child Development in some selected schools in Biu, Borno state Nigeria (2009- 2015).Submitted to Education Department. (*Unpublished Material*).
- Mohammed A. (2015). *Effect of Accountability and Transparency on Public Expenditure Management and Internally Generated Revenue in Adamawa State Local Governments*. M.Sc dissertation. Bayaro University, Kano, Nigerian
- Masleen, S.C. (2017). *The War Report: Armed Conflicts in 2013*, Casualties, Oxford University Press, London.
- Owalade, F (2014). [http://www.gatestoneinstitute.org/4232/book\\_havam\\_nigeria](http://www.gatestoneinstitute.org/4232/book_havam_nigeria), accessed 24Th August, 2017.
- O Neill, B.E: (2005) *Insurgency and Terrorism. From Revolution to Apocalypse*. Potomac, Washington DC.
- Oche, S. E. (2007). *Fundamentals of Educational Research Methods and Statistics*. Kaduna: Deray prints Ltd.