Climate Change, Herder-Farmer Conflicts, and Food Security Crisis in Nigeria

Njoku, Chinwendu Shedrack[1], Ikwuoma Sunday Udochukwu[2], Njoku, Ekeledirichukwu Chukwuma[3]

[1,3]Department of Political Science, KO Mbadiwe University, Ideato, Imo State

[2]Department of Political Science University of Lagos, Akoka

DOI: https://doi.org/10.47772/IJRISS.2026.100400529

Received: 24 August 2025; Accepted: 23 April 2026; Published: 18 May 2026

ABSTRACT

The intersection of climate change, herder-farmer conflicts, and food security in Nigeria presents a complex and escalating crisis. Climate change has exacerbated environmental stress, particularly in the arid and semi-arid regions of northern Nigeria, where desertification and unpredictable rainfall patterns have disrupted traditional livelihoods. This has forced pastoralist herders to migrate southwards in search of grazing lands, bringing them into conflict with sedentary farmers over land and water resources. These tensions have resulted in violent clashes, leading to loss of lives, displacement of communities, and destruction of farmlands. The conflict undermines agricultural productivity, exacerbating food insecurity in a nation where agriculture is a key livelihood for millions. The challenges of addressing this crisis are multifaceted, involving environmental degradation, ethnic tensions, weak governance, and inadequate policy responses. Poor infrastructure, lack of effective conflict resolution mechanisms, and the inability to adapt agricultural practices to climate impacts further aggravate the situation. This paper highlights the urgent need for comprehensive strategies that integrate climate adaptation, conflict resolution, and food security interventions to mitigate the crises affecting Nigeria's rural communities. Addressing these issues requires coordinated efforts among local, national, and international stakeholders, alongside sustainable development and peace-building initiatives.

INTRODUCTION

Nigeria, Africa's most populous country, faces a convergence of challenges driven by climate change, herder-farmer conflicts, and food insecurity. As climate change intensifies, its effects are felt particularly in the northern regions of Nigeria, where desertification, drought, and erratic rainfall have disrupted the livelihoods of pastoralist communities. These environmental stresses push pastoralists, primarily Fulani herders, to migrate southward in search of greener pastures, placing them in direct conflict with sedentary farming communities over land and water resources (Blench, 2010). This conflict is not new, but it has escalated in recent years, with devastating consequences for both agricultural productivity and social cohesion in Nigeria.

The intersection of climate change, resource scarcity, and conflict has made food security a critical concern. Nigeria's agricultural sector, which provides livelihoods for over 70% of the population, is under increasing strain due to the destruction of farmland, displacement of farming communities, and the insecurity caused by violent clashes (Adelakun, Adurogbangba & Akinbile, 2015). As these conflicts intensify, the ability of the country to ensure stable food production and equitable distribution has been severely compromised. Food security, defined by the Food and Agriculture Organization (FAO) as the availability, access, and utilization of sufficient and nutritious food, is threatened not only by the environmental impacts of climate change but also by the socio-political instability created by herder-farmer conflicts (FAO, 2017).

The significance of these intertwined issues lies in their wide-ranging effects on Nigeria's rural communities, economic development, and national security. The persistence of herder-farmer conflicts has contributed to a cycle of violence, displacement, and agricultural disruption, which in turn exacerbates food insecurity. Additionally, climate change accelerates the resource scarcity that fuels these conflicts, further complicating the socio-political landscape (Olaniyan, Francis & Okeke-Uzodike, 2015). Given these interdependencies, understanding the dynamics between climate change, conflict, and food security is essential for addressing the underlying issues and mitigating their impacts.

Herder-farmer conflicts in Nigeria have grown in severity over the past decade, driven largely by environmental stressors linked to climate change. The migration of herders from the increasingly arid northern regions to the fertile southern regions has intensified competition over land and water resources, often leading to violent clashes. These conflicts disrupt agricultural activities, displace communities, and contribute to widespread food insecurity. The interconnection between climate change and conflict presents a unique challenge, as efforts to address food security must also contend with the socio-political instability created by these violent disputes (Benjaminsen et al., 2012). Thus, the impact of climate change on herder-farmer conflicts is central to understanding the broader food security crisis in Nigeria.

The purpose of this paper is to explore the nexus between climate change, herder-farmer conflicts, and food security in Nigeria. It identified the key drivers of these conflicts, analyze the role of climate change in exacerbating the situation, and assess the implications for Nigeria's food security. The paper also provides policy recommendations that could help mitigate the crisis by integrating climate adaptation, conflict resolution, and food security interventions.

Theoretical Discourse

The Environmental Conflict Theory provides a foundational framework for analyzing the herder-farmer conflict in Nigeria, positing that environmental degradation and resource scarcity are key drivers of violent conflict. As environmental conditions worsen due to climate change, competition over dwindling resources—such as arable land and water—intensifies, leading to clashes between communities that rely on these resources for survival (Homer-Dixon, 1999). In the context of Nigeria, the northward expansion of the Sahara Desert, decreasing rainfall, and increasing desertification have reduced the availability of grazing lands and water sources, forcing pastoralists to migrate southward in search of more fertile territories. This migration brings herders into conflict with sedentary farmers, who view the encroachment on their farmlands as a direct threat to their livelihoods.

Homer-Dixon's Environmental Scarcity Model highlights how resource scarcity, population growth, and unequal resource distribution exacerbate conflicts (Homer-Dixon, 1999). In the Nigerian context, population pressures, compounded by climate-induced environmental changes, intensify competition for limited resources. The scarcity of arable land and water resources creates a zero-sum situation where herders and farmers struggle for control over the same essential resources. This conflict dynamic is further complicated by the lack of clear land tenure systems and ineffective governance, which fail to mediate resource competition (Benjaminsen et al., 2012). Thus, the environmental conflict theory, particularly Homer-Dixon's model, explains how climate-induced resource scarcity acts as a catalyst for violent conflict between herders and farmers.

Climate-Induced Migration Theories offer an essential perspective for understanding the southward movement of herders in Nigeria. As climate change exacerbates drought, desertification, and water shortages in northern Nigeria, pastoralist communities are compelled to migrate in search of better grazing lands and water. This migration is a survival strategy, as the environmental degradation of their traditional grazing areas renders them uninhabitable. The theory posits that extreme weather patterns and environmental disasters, such as droughts, push communities to migrate, while more favorable environmental conditions in other regions pull them toward new areas (McLeman & Smit, 2006).

The Push-Pull Theory further clarifies the migration patterns of herders in response to environmental degradation. In this case, the push factors include deteriorating environmental conditions in the north, such as soil degradation, desert encroachment, and reduced rainfall, all of which limit the availability of pastures and water for herding. These environmental changes make it unsustainable for herders to continue their traditional nomadic lifestyle in these regions (Adepoju, 1995). On the other hand, the pull factors include the relatively greener pastures and water availability in the southern and central regions of Nigeria. This movement into southern agricultural zones, however, creates friction with farming communities who depend on the same lands for crop cultivation.

This migratory pattern is further fueled by the inability of herders to adapt quickly to new environmental challenges due to limited access to climate-resilient technologies and inadequate government support (Ibrahim et al., 2022). Consequently, this migration increases the frequency and intensity of conflicts, as both herders and farmers vie for control over increasingly scarce land and water resources.2.3 Human Security and Food Security Framework

The Human Security Approach broadens the analysis by considering the multifaceted impacts of the herder-farmer conflict on livelihoods, food security, and community well-being. Human security focuses on the protection of individuals from threats such as violence, hunger, and environmental hazards, with an emphasis on the interdependence of these risks (UNDP, 1994). In Nigeria, the herder-farmer conflict has far-reaching implications for human security, as it threatens not only the physical security of individuals but also their access to food, livelihoods, and economic stability. Violent clashes between herders and farmers result in the destruction of farmlands, displacement of communities, and loss of lives, which in turn erode local agricultural productivity and food supply chains (Olaniyan, Francis & Okeke-Uzodike, 2015).

Within the context of food security, the Food Availability-Access-Utilization Framework provides a valuable tool for understanding how environmental stress and conflict undermine agricultural production and food security. This framework, developed by the Food and Agriculture Organization (FAO), assesses food security based on three pillars: availability (sufficient food production), access (ability to obtain food), and utilization (proper use of food for nutrition) (FAO, 2017). In conflict-affected areas of Nigeria, the availability of food is reduced due to the destruction of crops, displacement of farmers, and disruption of local food systems. Furthermore, the conflict limits access to food as displaced populations lose their livelihoods and purchasing power, while the insecurity restricts trade and transportation of agricultural products to markets (Hussein et al., 2020). Additionally, the utilization of food is compromised by malnutrition and inadequate health services in conflict zones, further exacerbating the food security crisis.

The human security and food security frameworks underscore the broader implications of the herder-farmer conflict, highlighting how the interplay of climate change, conflict, and resource scarcity not only threatens livelihoods but also creates conditions of chronic food insecurity in Nigeria.

Climate Change and Environmental Degradation in Nigeria

Nigeria is one of the countries most vulnerable to the adverse effects of climate change, with its diverse ecosystems suffering from a range of climate-induced stressors. Some of the most critical climate change indicators affecting Nigeria include desertification**,** erratic rainfall patterns, and drought. These environmental changes have far-reaching impacts on the country's pastoral and agricultural systems, which form the backbone of rural livelihoods.

Desertification has been a growing concern in Nigeria, particularly in the northern regions. The expansion of the Sahara Desert southward has reduced the availability of arable land and pasture. According to reports, desertification threatens approximately 35% of Nigeria’s landmass, affecting over 40 million people, primarily

in the northern regions (UNCCD, 2020). As desertification progresses, soil fertility decreases, water bodies dry up, and biodiversity is lost, significantly reducing the productivity of the land for both farming and livestock herding.

Erratic rainfall is another key climate change indicator disrupting Nigeria's agricultural and pastoral systems. Traditionally, rainfall in Nigeria was more predictable, allowing farmers and herders to plan their activities. However, climate change has altered rainfall patterns, resulting in shorter rainy seasons and prolonged dry spells. This unpredictability affects crop yields, grazing availability, and water resources. In some regions, floods follow erratic rainfalls, leading to the destruction of crops and infrastructure (Adejuwon, 2006).

Drought is another frequent phenomenon, particularly in the arid and semi-arid northern regions. Severe droughts have occurred more frequently over the past few decades, exacerbating the desertification process. Drought leads to the depletion of water resources, including rivers, lakes, and aquifers, directly impacting both farmers and herders who rely on these resources for irrigation and livestock watering (Musa & Shabu, 2021). As water becomes scarcer, herders are forced to migrate southward, where they encounter farming communities, creating competition for limited land and water resources.

The cumulative effects of climate change on Nigeria's pastoral and agricultural ecosystems have been profound. For pastoralists, the loss of grazing lands due to desertification and drought has reduced livestock productivity and increased the mortality rate of animals. For farmers, erratic rainfall and soil degradation have led to declining crop yields, threatening food security and livelihoods. As a result, both pastoralist and farming communities face increasing economic hardship, which exacerbates tensions and competition over remaining resources (Blench, 2010).

Desertification and the Shrinking Lake Chad Basin

A particularly stark example of the environmental degradation caused by climate change in Nigeria is the shrinking of Lake Chad, a vital water source shared by Nigeria, Chad, Niger, and Cameroon. Once one of Africa's largest freshwater lakes, Lake Chad has shrunk by over 90% since the 1960s due to a combination of climate change, reduced rainfall, and unsustainable water management practices (FAO, 2018). This reduction in water levels has had devastating effects on the communities that depend on the lake for fishing, agriculture, and livestock rearing.

As Lake Chad shrinks, it has become a focal point for regional resource stress. The decreasing availability of water has intensified competition among various groups—farmers, fishers, and herders—who rely on the lake for their livelihoods. For herders, the shrinking lake has forced them to seek new pastures and water sources, often leading to migration southward into more fertile regions of Nigeria (Tamatamah, 2020). This movement creates friction with farming communities in the southern regions, who also face pressure from declining agricultural productivity due to erratic weather patterns and soil degradation.

The shrinking of Lake Chad is an example of how environmental degradation can fuel resource-based conflicts. As water becomes more scarce, competition intensifies, and tensions rise between different groups vying for control of remaining resources. In the case of Nigeria, the southward migration of herders has triggered violent conflicts with farmers, particularly in the Middle Belt region, where competition over land and water is most acute (Okpara et al., 2015). The herder-farmer conflict, while deeply rooted in social and economic issues, is fundamentally a reflection of environmental stress caused by the degradation of key ecosystems such as Lake Chad.

In summary, climate change and environmental degradation have significantly impacted Nigeria's ecology, particularly through desertification, erratic rainfall, and the shrinking of vital water bodies like Lake Chad. These

changes have directly affected pastoralist and agricultural communities, fueling resource-based conflicts as herders and farmers compete for diminishing land and water resources. Addressing these environmental challenges will require coordinated efforts to mitigate the impacts of climate change while promoting sustainable resource management.

Herder-Farmer Conflicts: Drivers and Dynamics

The relationship between herders and farmers in Nigeria has evolved over centuries, transitioning from cooperation to conflict. In the pre-colonial and colonial periods, pastoralists and sedentary farmers coexisted relatively peacefully. During this time, herders primarily from the Fulani ethnic group practiced transhumance, a seasonal movement of livestock between grazing grounds, while farmers engaged in crop cultivation. The two groups established symbiotic relationships, with herders often relying on crop residues from farmers' fields to feed their livestock, while farmers benefited from manure left by the grazing animals, which fertilized their land (Blench, 2004). The mobility of herders allowed them to access different ecological zones during various seasons, reducing pressure on land and avoiding direct competition with farmers.

However, the introduction of colonial land policies and the subsequent changes in land use patterns began to strain this delicate balance. Colonial authorities introduced new land tenure systems that disrupted traditional grazing routes, fencing off areas for cash crop production and administrative purposes (Watts, 1983). The increasing commercialization of agriculture and the expansion of settled farming communities gradually limited the available land for pastoralism, leading to rising tensions between the two groups. In the post-colonial era, these tensions escalated as population growth, environmental degradation, and changes in agricultural practices further strained the relationship between herders and farmers.

Contemporary Drivers of Conflict

Today, several interrelated factors drive the increasing frequency and intensity of herder-farmer conflicts in Nigeria. Key among these are climate change, population growth, land tenure issues, and governance failures, all of which contribute to the competition for dwindling resources.

1. One of the most significant drivers of the herder-farmer conflict in Nigeria is climate change. As northern Nigeria becomes more arid due to desertification and unpredictable rainfall, pastoralists are forced to migrate southward in search of grazing lands and water for their livestock (Ibrahim et al., 2022). The southward migration of herders into traditionally agricultural zones heightens tensions as farmers perceive this movement as encroachment on their land. The loss of pasture and water sources in the north directly correlates with the increase in violent confrontations over land in the more fertile southern regions (Benjaminsen et al., 2012).

2. Rapid population growth in Nigeria exacerbates the competition for land and resources. With Nigeria's population projected to exceed 400 million by 2050, the demand for agricultural land to meet food security needs is increasing (United Nations, 2019). This puts additional pressure on land already strained by environmental degradation, pushing both herders and farmers into more frequent contact and conflict over available resources. The growing population density in agricultural areas limits the availability of open lands for pastoralists to graze their animals, increasing the likelihood of disputes.

3. Nigeria’s land tenure system is another key driver of herder-farmer conflicts. Customary land rights in many parts of Nigeria do not provide formal recognition of grazing routes, which were traditionally respected. As a result, farmers often expand their agricultural activities into these areas, further limiting the movement of pastoralists. The absence of clearly defined grazing lands and the lack of government regulation over land use create conditions where land disputes are inevitable (Adebayo, 1997). The

government's failure to implement effective land management policies and resolve competing land claims has worsened the conflict (Abbass, 2014).

4. The Nigerian government's inability to effectively manage and mitigate resource conflicts has contributed to the escalation of violence between herders and farmers. Weak institutions, poor enforcement of laws, and the lack of political will to address the underlying causes of the conflict have allowed tensions to fester. In many instances, local governments fail to mediate disputes or provide adequate security, leaving communities to resolve conflicts through violence (Olaniyan et al., 2015). This governance vacuum has made it difficult to implement sustainable land use policies or create platforms for peaceful negotiation between herders and farmers.

5. The herder-farmer conflict is also influenced by ethnic and cultural factors. Herders in Nigeria are predominantly Fulani, while farmers belong to various ethnic groups depending on the region. As tensions escalate, the conflict is increasingly framed in ethnic and religious terms, deepening divisions and fostering resentment. The portrayal of the conflict through the lens of identity politics further complicates efforts at resolution, as both sides view the struggle over land and resources as a battle for cultural survival (Baca, 2015). This framing of the conflict increases the potential for ethnic violence and makes reconciliation efforts more difficult.

6. Another recent development in the herder-farmer conflict is the militarization of pastoralist groups. In response to increased attacks on their herds and livelihoods, some Fulani herders have resorted to armed violence as a means of protecting their interests. This militarization is partly fueled by the proliferation of small arms in West Africa and the inability of state security forces to provide adequate protection (International Crisis Group, 2017). Moreover, organized crime syndicates have exploited the conflict, engaging in cattle rustling and other illegal activities that further exacerbate tensions. This dynamic has transformed the conflict from localized skirmishes over resources into more organized and deadly confrontations involving well-armed groups.

In summary, the herder-farmer conflict in Nigeria is driven by a complex interplay of factors, including climate change, population growth, land tenure issues, and governance failures. Ethnic and cultural dimensions, as well as the militarization of pastoralist groups, add layers of complexity to the conflict, making it one of the most intractable challenges facing Nigeria today. Effective resolution will require a comprehensive approach that addresses the environmental, social, and political drivers of the conflict.

Food Security in Nigeria: Impact of Conflict and Climate Change

Food security in Nigeria is characterized by significant vulnerabilities, with various indicators pointing to widespread food insecurity across the country. Nigeria faces challenges in ensuring that its growing population has access to sufficient, safe, and nutritious food. According to the Global Hunger Index (GHI)**,** Nigeria ranks poorly in terms of hunger and malnutrition, with millions of Nigerians experiencing food insecurity (Global Hunger Index, 2022). The country's food production systems are under strain due to a combination of environmental challenges, governance issues, and economic instability.

Data from the Food and Agriculture Organization (FAO) highlights that Nigeria is the largest food producer in sub-Saharan Africa, but it is also a significant food importer, signaling a gap between local production and consumption needs. Nigeria's agricultural productivity is hampered by low levels of mechanization, inadequate infrastructure, and a reliance on rain-fed agriculture, which makes the sector highly vulnerable to climate variability (FAO, 2018). Climate change has exacerbated this vulnerability, with erratic rainfall patterns, droughts, and floods leading to fluctuating yields, reduced harvests, and increased post-harvest losses.

Furthermore, Nigeria's agricultural sector is fragmented, with smallholder farmers producing the bulk of the country's food supply. These farmers face significant challenges, including limited access to credit, seeds, and technology, as well as inefficient market systems. As a result, agricultural output often fails to meet domestic demand, contributing to rising food prices and worsening food insecurity, particularly for low-income households. According to the National Bureau of Statistics (NBS), inflationary pressures on food prices have been a persistent challenge, with food inflation reaching as high as 23.72% in 2022 (NBS, 2022).

Conflict-Induced Displacement and Agricultural Productivity

Violent conflicts, particularly the herder-farmer conflicts in northern and central Nigeria, have had devastating effects on agricultural productivity and food security. These conflicts have led to widespread displacement of farming communities, disrupting agricultural cycles and reducing the availability of arable land for cultivation. The Internal Displacement Monitoring Centre (IDMC) estimates that over 2 million Nigerians have been displaced due to conflicts, particularly in regions that are critical for food production (IDMC, 2021). Displaced populations lose access to their land, tools, and livelihoods, while those who remain are often unable to cultivate crops due to insecurity and violence.

As conflicts escalate, agricultural activities are severely disrupted. Farmers abandon their fields for fear of attacks, and herders lose livestock to violence or are forced to relocate to areas with limited grazing resources. This displacement leads to a sharp decline in agricultural productivity, exacerbating food shortages in affected regions. In areas where conflict is most intense, such as the Middle Belt region, which is a key food-producing area, the reduction in crop production has had a ripple effect on local and national food supply chains (Blench, 2010).

The disruption of agricultural activities also affects food supply chains and local markets. The destruction of infrastructure, such as roads and storage facilities, limits the transportation of food from rural areas to urban centers. As a result, markets face shortages of staple foods, driving up prices and making food less affordable for the population. In regions where agriculture is the primary source of income, rural livelihoods are undermined, leading to increased poverty and food insecurity. Studies have shown that areas experiencing high levels of violence and displacement also experience higher rates of hunger and malnutrition, as households struggle to access food and basic services (Okoli & Atelhe, 2014).

Impact on National and Regional Food Systems

The combined effects of climate change and conflict extend beyond local disruptions to impact Nigeria's national and regional food systems. The reduction in agricultural output caused by conflict-induced displacement and environmental stress leads to food shortages at the national level, affecting both food availability and affordability. As supply decreases, the prices of staple foods, such as rice, maize, and yams, increase. This price inflation disproportionately affects low-income households, which spend a higher percentage of their income on food, leading to reduced access to adequate nutrition (Olaniyan et al., 2015).

The disruption of Nigeria's food systems also has broader implications for the West African region, as Nigeria is a major food producer and exporter within the Economic Community of West African States (ECOWAS). Reduced agricultural production in Nigeria can lead to food shortages and price hikes in neighboring countries, exacerbating food insecurity across the region. Climate-induced migration and conflict-driven displacement further strain regional food systems as displaced populations increase demand for food and resources in host communities (FAO, 2020).

In addition to these broader economic impacts, the conflict and climate crisis have gendered dimensions that affect food security. Women play a critical role in Nigeria’s agricultural production and food systems,

particularly in small-scale farming, processing, and trading. However, women are often disproportionately affected by conflict and climate change. In conflict-affected regions, women are more likely to face displacement, and as primary caregivers, they bear the burden of ensuring household food security. The loss of livelihoods, combined with reduced access to land and resources, increases the vulnerability of women to food insecurity (Adebayo & Mundi, 2020). Gender inequalities in access to land, credit, and agricultural inputs further compound these challenges, limiting women's ability to recover from conflict and contribute to food production.

In summary, Nigeria's food security is highly vulnerable to the twin threats of climate change and violent conflict. The displacement of farming communities, disruption of food supply chains, and broader economic impacts exacerbate food insecurity at both the national and regional levels. Women, who are key actors in food production and household food security, are disproportionately affected by these crises, highlighting the need for gender-sensitive approaches in addressing food insecurity.

Challenges and Gaps in Addressing the Crisis

One of the major challenges in addressing the interrelated crises of climate change, herder-farmer conflicts, and food security in Nigeria is the inadequacy of policy responses and governance structures. Over the years, Nigeria has implemented various policies to address climate change, conflict management, and food security. However, these policies are often fragmented, poorly coordinated, and inadequately enforced.

The National Policy on Climate Change and the National Agricultural Policy both emphasize the need for sustainable environmental management and the promotion of food security. However, the National Climate Change Policy Response and Strategy (2012) has been criticized for its limited implementation and the failure to adequately integrate climate adaptation measures into local-level governance (Onuoha, 2014). There is a lack of coherence in the integration of environmental, agricultural, and conflict mitigation policies, leading to ineffective solutions that fail to address the root causes of resource conflicts and environmental degradation.

In the realm of conflict management, weak governance structures and the absence of effective conflict resolution mechanisms have allowed the herder-farmer conflict to persist and escalate. Traditional mechanisms for resolving disputes, such as community-based mediation, have weakened due to the erosion of trust in local authorities and the state's failure to provide security (Olaniyan, 2015). Moreover, the Land Use Act of 1978, which governs land tenure in Nigeria, has created ambiguity in land ownership, leading to disputes between farmers and pastoralists over land use. The government's failure to develop a comprehensive land management system that recognizes the rights of both pastoralists and farmers further exacerbates these tensions (Blench, 2004).

In addition, Nigeria's broader security apparatus has struggled to contain the violence associated with herder-farmer conflicts. The lack of state presence in rural areas, inadequate policing, and delayed military responses have contributed to the escalation of violence. This governance vacuum has allowed militias, criminal networks, and armed groups to exploit the situation, making conflict resolution even more difficult (International Crisis Group, 2017).

Inadequate Climate Adaptation Strategies

Nigeria's current climate adaptation strategies are insufficient to address the challenges posed by climate change, particularly in agriculture and pastoralism. The agricultural sector, which is heavily dependent on rain-fed systems, remains highly vulnerable to the impacts of climate variability, including erratic rainfall, desertification, and droughts (Ayanlade et al., 2018). While Nigeria has developed national adaptation plans, these policies often lack sufficient resources for effective implementation. Moreover, the focus tends to be on short-term relief

measures rather than long-term solutions that build resilience in farming and pastoralist communities (Nzeadibe et al., 2011).

One of the limitations of Nigeria's climate adaptation programs is the lack of emphasis on climate-resilient agricultural practices. For example, there has been limited investment in technologies and practices that can help smallholder farmers adapt to changing environmental conditions, such as drought-resistant crops, irrigation systems, and improved storage facilities to reduce post-harvest losses. Similarly, pastoralist communities have not been adequately supported in adopting sustainable grazing practices or alternative livelihoods, despite their increasing vulnerability due to the shrinking availability of arable land and water sources (Ibrahim et al., 2022).

Furthermore, early warning systems for climate-related disasters, such as floods and droughts, are underdeveloped, making it difficult for communities to prepare for or mitigate the effects of extreme weather events. Government programs aimed at climate adaptation are often hampered by poor coordination between federal, state, and local authorities, as well as insufficient funding for research and the implementation of climate-resilient solutions (FAO, 2020).

Socioeconomic and Infrastructural Constraints

Another significant challenge in addressing the herder-farmer conflict and food security crisis is the socioeconomic and infrastructural constraints faced by rural communities. Poor rural infrastructure, including inadequate road networks, irrigation systems, and storage facilities, limits the ability of farmers and pastoralists to increase productivity and access markets. Many rural areas in Nigeria are isolated, making it difficult for farmers to transport their produce to urban centers, while herders struggle to access grazing routes and water points due to degraded infrastructure (World Bank, 2021).

The lack of access to markets prevents smallholder farmers from selling their produce at competitive prices, leading to income insecurity and further entrenching poverty. The inability to store or process agricultural products due to inadequate infrastructure also results in significant post-harvest losses, which further compounds food insecurity. According to the United Nations Development Programme (UNDP), Nigeria loses about 40% of its agricultural output post-harvest, primarily due to inadequate storage and processing facilities (UNDP, 2018). This not only affects food availability but also impacts the livelihoods of farmers who rely on these crops for income.

In addition to infrastructural limitations, social safety nets for communities affected by conflict and climate change are woefully inadequate. Displaced farmers and herders often lack access to essential services such as healthcare, education, and livelihood support. Humanitarian responses are frequently short-term and fail to address the long-term needs of affected communities, leaving them vulnerable to chronic food insecurity (Olaniyan et al., 2015). Moreover, these vulnerable populations, particularly women and children, face additional challenges in accessing government aid programs due to bureaucratic inefficiencies and corruption.

In summary, the challenges in addressing the interconnected crises of climate change, conflict, and food security in Nigeria are multifaceted. Policy and governance failures, inadequate climate adaptation strategies, and deep-rooted socioeconomic and infrastructural constraints hinder the development of sustainable solutions. For Nigeria to overcome these challenges, a comprehensive approach that involves better governance, increased investment in climate-resilient agriculture, and improvements in rural infrastructure is necessary.

Addressing the Crisis

To effectively address the intertwined crises of climate change, herder-farmer conflict, and food security in Nigeria, there is a pressing need for integrated policy approaches that encompass both climate adaptation and

conflict resolution. The National Adaptation Plan (NAP) should be restructured to explicitly consider the link between environmental stress and conflict, with a particular focus on vulnerable rural communities. The integration of conflict-sensitive strategies into climate adaptation policies will help mitigate the escalating tensions between pastoralists and farmers, especially in regions experiencing extreme environmental degradation (Alemayehu & Bewket, 2017).

Community-based natural resource management (CBNRM) should be a key part of this strategy. Empowering local governance structures to manage land, water, and grazing resources more equitably can help reduce competition and foster cooperation between herders and farmers (Opiyo et al., 2015). For example, the establishment of grazing reserves and the development of water-sharing agreements in conflict-prone areas can promote peaceful coexistence. These local governance mechanisms must be supported by clear national policies that recognize customary land rights and protect both farming and pastoralist livelihoods (Olaniyan et al., 2015).

Furthermore, conflict resolution initiatives should focus on strengthening traditional and state-mediated dispute resolution mechanisms. Reviving traditional councils or local mediators who understand the dynamics of both herder and farmer communities can provide more culturally appropriate solutions to disputes. This approach would require improved collaboration between government institutions, local leaders, and civil society organizations to establish transparent and inclusive conflict management systems (Blench, 2010).

Promoting Climate-Resilient Agriculture

Scaling up climate-resilient agricultural practices is essential for protecting Nigeria's food systems in the face of climate change. A key recommendation is to promote the use of drought-resistant crop varieties**,** which are more suited to the erratic rainfall and prolonged dry periods becoming increasingly common in northern and central Nigeria. According to the Food and Agriculture Organization (FAO)**,** there is a need to expand access to improved seeds, such as sorghum and millet, which are both drought-resistant and nutritionally rich (FAO, 2020).

The adoption of water-saving irrigation technologies is another critical component of climate adaptation. Investment in irrigation infrastructure can reduce farmers' reliance on unpredictable rainfall and increase crop yields. Techniques such as drip irrigation and rainwater harvesting should be scaled up through public-private partnerships and government subsidies, particularly for smallholder farmers who are most vulnerable to climatic shocks (Nzeadibe et al., 2011). These efforts could be supported by providing farmers with access to agricultural extension services that offer training on climate-smart agricultural techniques.

To address the specific challenges facing pastoralists, promoting sustainable pastoralism through better resource management is crucial. Strategies such as rotational grazing, the creation of designated grazing corridors, and improved access to veterinary services can help pastoralists adapt to changing environmental conditions while maintaining their herds. Moreover, establishing early warning systems for droughts and extreme weather events can help both farmers and herders prepare for and mitigate the impacts of climate variability (Ibrahim et al., 2022).

Enhancing Food Security through Conflict-Sensitive Programming

Food security interventions must integrate conflict-sensitive programming to ensure that they do not exacerbate tensions between herders and farmers. This involves conducting conflict risk assessment**s** before launching agricultural development programs, particularly in regions prone to violence and displacement. Ensuring equitable access to agricultural resources, including land, water, and financial support, is critical to avoiding unintended consequences that could inflame existing conflicts (Peters et al., 2020).

International organizations, NGOs, and multilateral agencies have a significant role to play in supporting conflict-sensitive food security initiatives. The United Nations World Food Programme (WFP), for example, has implemented food-for-work programs in conflict-affected regions, helping displaced people rebuild their communities while improving local food production. Such programs not only enhance food security but also contribute to peacebuilding by bringing together herders and farmers in joint projects (WFP, 2021).

Moreover, international development agencies should prioritize funding for projects that promote **inclusive** agricultural growth in conflict-prone areas. Programs that specifically target women and youth, who are often disproportionately affected by food insecurity and conflict, are especially important. Women's empowerment in agricultural value chains, through access to credit, training, and decision-making opportunities, is vital for improving household food security and overall community resilience (Adebayo & Mundi, 2020).

Collaboration with local NGOs that have a deep understanding of the social and cultural contexts of the affected communities is also critical. These organizations can help facilitate dialogue between conflicting parties, provide humanitarian assistance, and advocate for policies that support the livelihoods of both farmers and herders (Opiyo et al., 2015).

CONCLUSION

This paper has examined the interconnected challenges of climate change**,** herder-farmer conflicts**,** and food security in Nigeria, highlighting the complex relationship between environmental degradation, resource competition, and violent conflict. Key findings demonstrate that climate change has exacerbated resource scarcity, particularly land and water, which has triggered and intensified herder-farmer conflicts. The shrinking Lake Chad Basin, desertification, and erratic rainfall patterns have reduced the availability of arable land and grazing areas, forcing pastoralists to migrate southward in search of resources, thus increasing tensions with sedentary farming communities.

The herder-farmer conflicts are driven not only by environmental stress but also by population growth**,** land tenure issues, and weak governance. Inadequate conflict resolution mechanisms, the militarization of pastoralist groups, and ethnic tensions further fuel the violence. These conflicts have profound implications for food security, as violent displacements disrupt agricultural activities, damage supply chains, and reduce access to markets. The result is increased food insecurity, particularly for vulnerable rural populations, with significant impacts on national and regional food systems.

Addressing the intertwined challenges of climate change, herder-farmer conflicts, and food security in Nigeria requires a multi-pronged, collaborative approach. First, there is a need to strengthen policies that integrate climate adaptation and conflict resolution. This includes promoting community-based natural resource management and enhancing the capacity of local governance structures to manage disputes over land and water. These efforts must be coupled with investments in climate-resilient agriculture and sustainable pastoralism, focusing on scaling up technologies like drought-resistant crops and water-saving irrigation systems.

Moreover, conflict-sensitive approaches must be embedded into food security programs to prevent further exacerbation of tensions. International organizations**,** NGOs**,** and multilateral agencies have a critical role in supporting peacebuilding initiatives, providing humanitarian assistance, and promoting inclusive agricultural development, particularly in conflict-prone areas.

Nigeria’s future depends on the successful implementation of sustainable peacebuilding and climate-resilient development strategies. It is imperative that policymakers, local communities, and international partners work together to address the root causes of conflict, reduce vulnerability to climate change, and secure long-term food

security for all Nigerians. Sustainable peace and development can only be achieved through coordinated, holistic efforts that prioritize both environmental sustainability and social cohesion.

REFERENCES

1. Abbass, I. M. (2014). No retreat, no surrender: Conflict for survival between Fulani pastoralists and farmers in northern Nigeria. European Scientific Journal, 8(1), 331-346.
2. Adebayo, A. (1997). Contemporary dimensions of migration among historically migrant Nigerians: Fulani pastoralists in southwestern Nigeria. Journal of Asian and African Studies, 32(1), 93-109.
3. Adebayo, O., & Mundi, T. (2020). Gender and food security in conflict zones: Evidence from northern Nigeria. African Journal of Food, Agriculture, Nutrition and Development, 20(3), 15694-15707.
4. Adejuwon, J. O. (2006). Food crop production in Nigeria. II. Potential effects of climate change. Climate Research, 32(3), 229-245.
5. Adelakun, O. E., Adurogbangba, B., & Akinbile, L. A. (2015). Socioeconomic effects of farmer-pastoralist conflict on agricultural extension service delivery in Oyo state, Nigeria. Journal of Agricultural Extension, 19(2), 59-70.
6. Adepoju, A. (1995). Migration in Africa: An overview. In Baker, J. & Aina, T. (Eds.), The Migration Experience in Africa (pp. 87-108). Nordiska Afrikainstitutet.
7. Alemayehu, A., & Bewket, W. (2017). Local climate variability and crop production in central highlands of Ethiopia. Environment, Development and Sustainability, 19(4), 1467-1484.
8. Ayanlade, A., Radeny, M., Morton, J. F., & Muchaba, T. (2018). Rainfall variability and drought characteristics in two agro-climatic zones: An assessment of climate change impacts and adaptation in Nigeria. Weather and Climate Extremes, 19, 1-9.
9. Baca, M. (2015). Understanding farmer-herder conflicts in West Africa: The case of Nigeria. Africa Security Brief, 30, 1-8.
10. Benjaminsen, T. A., Alinon, K., Buhaug, H., & Buseth, J. T. (2012). Does climate change drive land-use conflicts in the Sahel? Journal of Peace Research, 49(1), 97-111.
11. Blench, R. (2004). Natural resource conflicts in North-Central Nigeria: A handbook and case studies. Mallam Dendo Ltd.
12. Blench, R. (2010). Conflict between pastoralists and cultivators in Nigeria. Review Paper on Land Tenure and Resource Access in West Africa.
13. FAO. (2017). The state of food security and nutrition in the world 2017: Building resilience for peace and food security. Food and Agriculture Organization of the United Nations.
14. FAO. (2018). Nigeria: Situation analysis of agriculture and rural development. Food and Agriculture Organization of the United Nations.
15. FAO. (2020). The State of Food Security and Nutrition in the World 2020: Transforming food systems for affordable healthy diets. Food and Agriculture Organization of the United Nations.

16. Global Hunger Index. (2022). GHI Report 2022: Nigeria. Retrieved from https://www.globalhungerindex.org/nigeria.html

17. Homer-Dixon, T. (1999). Environment, scarcity, and violence. Princeton University Press.

18. Hussein, K., Sumberg, J., & Seddon, D. (2020). Food security in complex emergencies: Enhancing food system resilience. Disasters, 34(1), 41-64.

19. Ibrahim, I. A., Ahmad, A. B., & Yusuf, M. O. (2022). Climate change, migration, and conflicts: The pastoralist crisis in Nigeria. SAGE Open, 12(2), 1-13.

20. IDMC. (2021). Nigeria: Figures and trends on internal displacement. Internal Displacement Monitoring Centre.

21. International Crisis Group. (2017). Herders against farmers: Nigeria's expanding deadly conflict (Report No. 252). International Crisis Group.

22. McLeman, R., & Smit, B. (2006). Migration as an adaptation to climate change. Climatic Change, 76(1), 31-53.

23. Musa, S., & Shabu, T. (2021). Climate change and pastoralism in northern Nigeria: Implications for social security. Journal of Environmental Science and Management, 24(1), 45-58.

24. NBS. (2022). Consumer Price Index (CPI) Report September 2022. National Bureau of Statistics.

25. Nzeadibe, T. C., Ajaero, C. K., & Mbah, E. N. (2011). Climate change adaptation in Nigeria: Insights from rural farmers in the Niger Delta. African Technology Policy Studies Network, 42, 1-8.

26. Okoli, A. C., & Atelhe, G. A. (2014). Nomads against natives: A political ecology of herder/farmer conflicts in Nasarawa State, Nigeria. American International Journal of Contemporary Research, 4(2), 76-88.

27. Okpara, U. T., Stringer, L. C., Dougill, A. J., & Bila, M. D. (2015). Conflicts about water in Lake Chad: Are environmental, vulnerability, and security issues linked? Progress in Development Studies, 15(4), 308-325.

28. Olaniyan, A., Francis, M., & Okeke-Uzodike, U. (2015). The cattle are "Ghanaians" but the herders are strangers: Farmer-herder conflicts, expulsion policy, and pastoralist question in Agogo, Ghana. African Studies Quarterly, 15(2), 53-67.

29. Onuoha, F. C. (2014). Climate change and conflict in Nigeria: The Boko Haram challenge. African Journal on Conflict Resolution, 14(2), 101-124.

30. Opiyo, F. E. O., Wasonga, O. V., & Nyangito, M. M. (2015). Measuring household vulnerability to climate-induced stresses in pastoral rangelands of Kenya: Implications for resilience programming. Pastoralism, 5(10), 1-15.

31. Peters, K., Dupar, M., & Lambert, V. (2020). Climate change, conflict, and migration. Climate Centre Report.

32. Tamatamah, R. A. (2020). The Lake Chad Basin: Climate variability and its impact on human security. Journal of African Studies, 47(3), 221-236.

33. UNCCD. (2020). Nigeria and desertification: Combatting desertification through sustainable development. United Nations Convention to Combat Desertification.

34. UNDP. (1994). Human development report 1994: New dimensions of human security. United Nations Development Programme.

35. UNDP. (2018). Sustaining food security through resilient agriculture: Report on food security and climate resilience. United Nations Development Programme.

36. United Nations. (2019). World Population Prospects 2019. United Nations Population Division.
37. Watts, M. (1983). Silent violence: Food, famine, and peasantry in northern Nigeria. University of California Press.

38. WFP. (2021). WFP Annual Performance Report 2021. World Food Programme.

39. World Bank. (2021). Nigeria development update: Resilience through reforms. The World Bank Group.