

Full Length Research Paper

Overview of climate-induced food insecurity in Nigeria

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Food insecurity presents a formidable challenge in Nigeria, exacerbated by the interplay of climate change and conflicts. This study delves into the multifaceted nature of food insecurity in Nigeria and offers strategies for both mitigation and adaptation. Employing secondary data analysis and literature review, we shed light on the profound impacts of climate-induced food insecurity on public health. Our analysis exposes a distressing trend: Nigeria's global food security standing has deteriorated significantly, with the nation ranked 30th out of 143 countries for its high prevalence of severe food insecurity, affecting about 22% of its population. Climate change-induced events such as extensive droughts and flash floods have exacerbated this situation, particularly in regions experiencing increased aridity in the north and persistent flooding along coastal areas. Furthermore, conflicts and terrorism further exacerbate the challenges, disrupting food access and heightening vulnerability among affected populations. Moreover, our study uncovers compelling correlations between severe food insecurity and displacement due to conflict or violence, as well as CO₂ emissions, with R² values of 68.31 and 37.1%, respectively between 2015 and 2020. In 2021, the total population of food insecure individuals reached 90%, doubling from approximately 45% in 2015. In response to these challenges, promising initiatives like the National Multisectoral Plan of Action for Food and Nutrition (NMPFAN) exist, though their implementation faces obstacles. Recommendations include advocating for sustainable agricultural practices, increasing investments in research and technology, and prioritizing equitable adaptation measures. Collaboration and innovative solutions are vital to mitigate food insecurity and build resilience in Nigeria.

Key words: Climate change, conflicts, drought, food security, floods, Nigeria.

INTRODUCTION

According to the 1996 World Food Summit, food security is characterized by the condition wherein all individuals consistently possess physical and economic access to an adequate, safe, and nutritious food supply that aligns with their dietary requirements and preferences, facilitating an active and healthy life (FAO, 2008). In 2013, Nigeria was ranked 86th out of 107 countries on the Global Food Security Index (GFSI), scoring 33/100 according to the

Economist Intelligence Unit (2013). However, a convergence of climate change impact and heightened insecurity due to terrorism and banditry triggered a significant deterioration in Nigeria's global food security standing. By 2022, the country dropped further to the 107th position out of 113 countries, with a distressing score of 42.0/100, surpassing India in the number of people living in extreme poverty and trailing behind

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nations like Angola, Burundi, Ethiopia, and Sierra Leone on the poverty index (Economist Intelligence Unit, 2022).

Climate change is a major phenomenon in the 21st century that has profound impacts on global ecosystems and environmental stability. The gradual alterations to our ecosystems became notable in the 20th century, witnessing a rise in average temperatures by 0.9°C (Tajudeen et al., 2022). Forecasts from scientists indicate an alarming trajectory for global warming, projecting a substantial increase in average temperatures ranging from 3 to 4°C in the coming centuries. In Nigeria, the last 60 years have seen significant climatic shifts, including decreased annual rainfall and lengthening plant growing seasons. These changes have severely impacted agriculture by reducing crop yields and causing the loss of arable land, thereby exacerbating household food insecurity (Amare and Balana, 2023).

Nigeria's predominantly rain-fed agricultural system is heavily dependent on the availability and timing of rainfall. Frequent and prolonged droughts have led to water scarcity, adversely affecting crop yields (Adamaagashi et al., 2023).

This has devastating consequences for farmers, especially those practicing rain-fed agriculture. The projected temperature rise in Nigeria is particularly concerning, with estimates indicating a potential increase of 1 to 4°C across ecological zones by 2060 (Zhu et al., 2023). Additionally, a potential 1-m rise in sea levels by 2050 threatens coastal states, compounding the challenges for regions already vulnerable to climate change. Increased flooding, particularly in coastal and riverine areas, destroys crops, damages agricultural infrastructure, and displaces farmers from their land (Adamaagashi et al., 2023). When flooding occurs during planting or harvesting seasons, farmers lose their crops, leading to food shortages and economic losses. This raises concerns about the undernourishment of children and the economic viability of affected areas, particularly in the northern states experiencing increased aridity (Zhu et al., 2023).

Conflicts and terrorism in Nigeria are worsening food insecurity, disrupting food access and agricultural activities (Ani et al., 2021). Violence in conflict zones displaces millions, leading to abandoned farms and strained resources. Fear among farmers hampers productivity, exacerbating food shortages. This study aims to provide a comprehensive analysis of food insecurity in Nigeria, exploring its multifaceted dimensions and underlying causes. By examining the impacts of climate-induced food insecurity and malnutrition on public health in Nigeria as a nation, we seek to understand the complexities of the issue and identify potential avenues for intervention and mitigation. Through a combination of quantitative secondary data analysis from the World Bank substantiated with data from the Food and Agriculture Organization (FAO), we delve into the current state of food insecurity in Nigeria,

highlighting regional disparities, climate change impacts, and socio-economic drivers. Additionally, we explore the effectiveness of existing government policies and interventions aimed at addressing food insecurity, offering recommendations for future strategies and initiatives. Ultimately, our goal is to advocate for holistic approaches that address the root causes of food insecurity while promoting sustainable solutions for a healthier and more resilient future for all Nigerians.

MATERIALS AND METHODS

Secondary data were obtained from the World Bank, including variables such as food insecurity global data for the year 2021, to contextualize Nigeria's position relative to the global landscape (World Bank, 2024). Additionally, data on the number of displaced populations due to conflict or violence, percentage of food insecurity, and CO₂ emissions (in Kilotons) spanning from 2015 to 2020 were collected (World Bank, 2024). These datasets were quantitatively analyzed to explore correlations between food insecurity in Nigeria and factors such as CO₂ emissions and the number of displaced people due to conflict or violence. Furthermore, supporting secondary data was sourced from the Food and Agriculture Organization (FAO) in Nigeria, particularly from the year 2023, to provide additional support for our analysis on food insecurity trends. Moreover, various published journals and articles were consulted to reinforce and substantiate findings.

RESULTS

From a total of 143 countries, Nigeria ranked 30th with a high prevalence of food insecure population in comparison with countries like the United States and Switzerland ranking 140th and 142nd, respectively (Figure 1). Figure 2 highlights the regions mostly affected by food insecurity in Nigeria. The northern states of Zamfara, Sokoto, Kebbi, Katsina, Kano, and Jigawa, as well as Bauchi, Yobe, Borno, and Gombe face intense drought (FAO, 2023), while the coastal states of Bayelsa, Delta, Akwa-Ibom, Cross-Rivers, Rivers, Ondo, Edo, Ogun, and Lagos contend with persistent flooding (Omole and Isiorho, 2011). Figure 3 illustrates a robust positive correlation between the percentage of people who are severely food insecure and the number of people displaced due to conflict or violence. An R² value of 68.31% indicates that 68.31% of the variation in severe food insecurity can be explained by displacement due to conflict or violence, as observed between 2015 and 2020. Figure 4 depicts a correlation between CO₂ emissions and food insecurity, with an observed R² value of 37.1% between 2015 and 2020. This indicates that 37.1% of the variation in food insecurity can be explained by changes in CO₂ emissions during this period. Figure 5 illustrates a concerning trend in Nigeria's food insecurity, showing a significant increase in the population of both severely and moderately food insecure individuals over the years. In 2020, the total population of food insecure individuals exceeded 82%, nearly doubling from approximately 45%

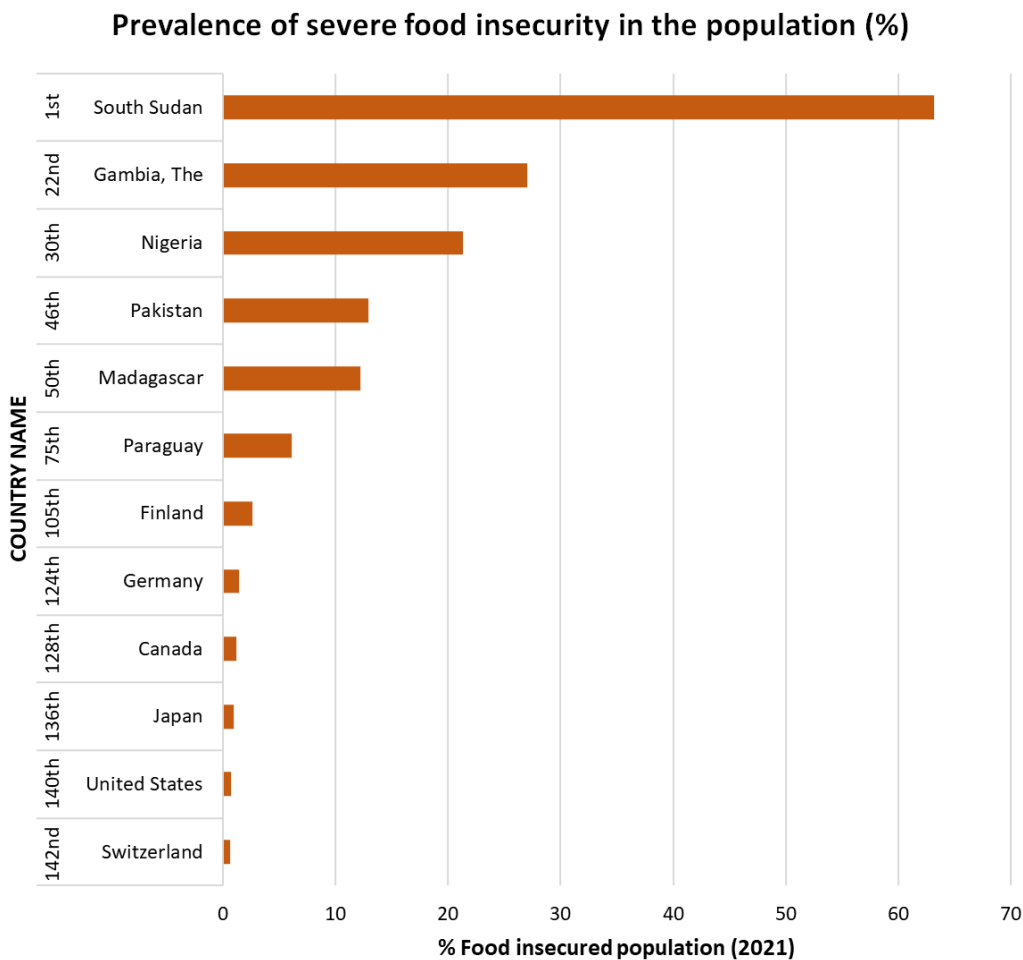


Figure 1. Prevalence of severe food insecure population global ranking for the year 2021 (World Bank, 2024).

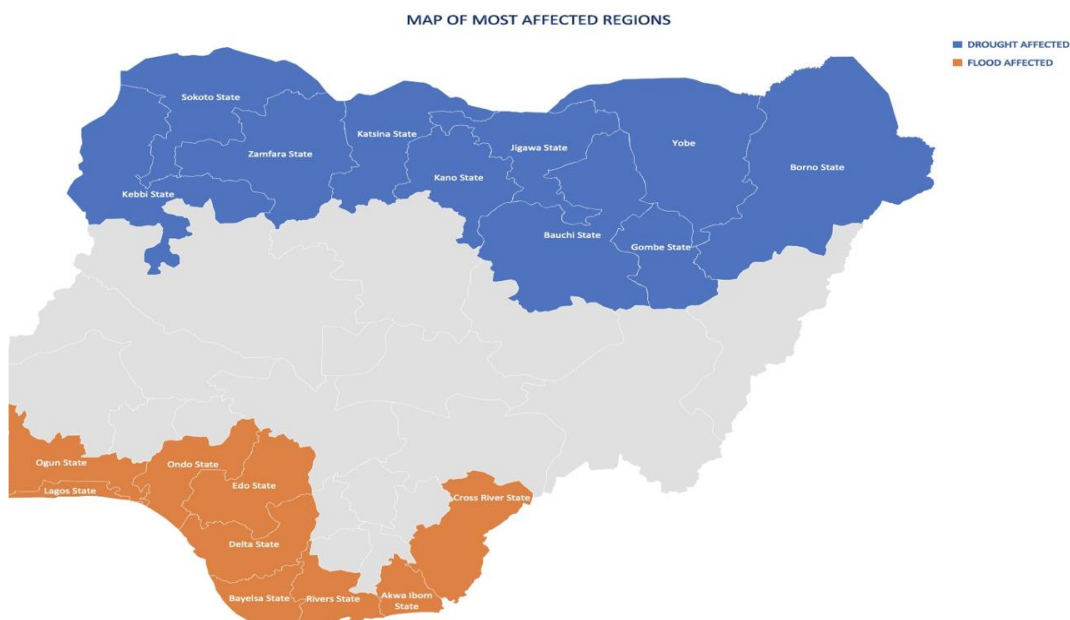


Figure 2. Conceptual map to visualize the most affected regions in Nigeria.

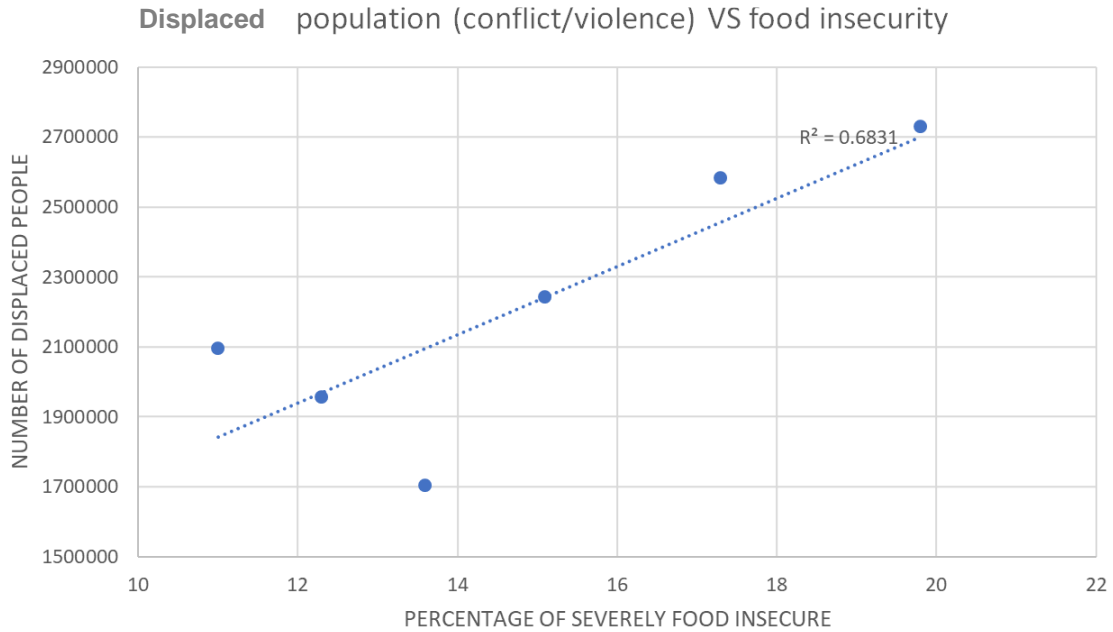


Figure 3. Correlation of displaced population and severely food insecure percentages from 2015 to 2020 (World Bank, 2024).

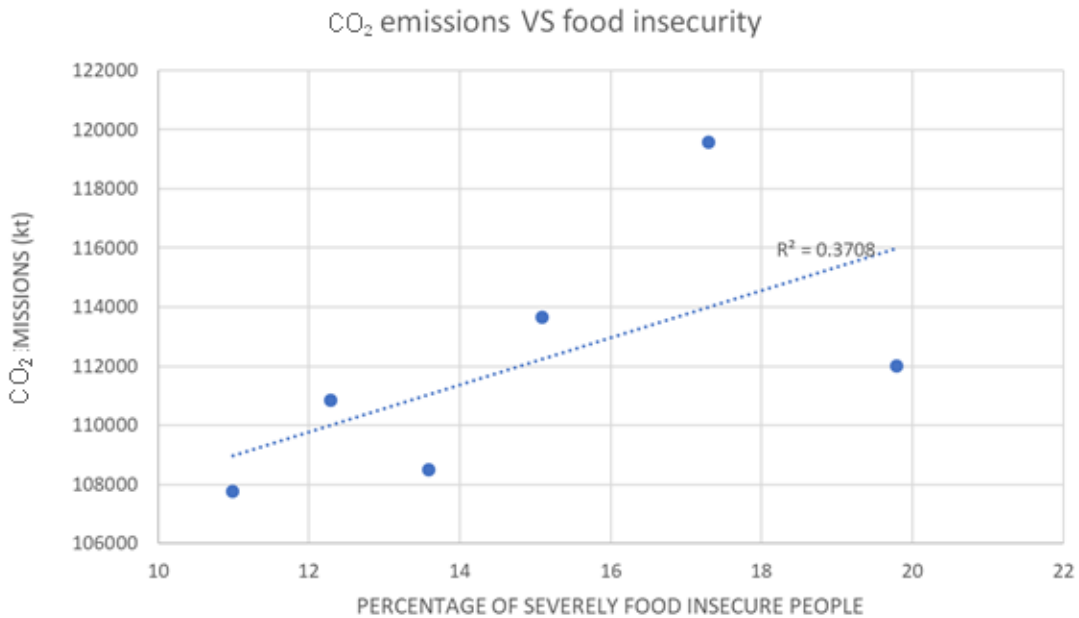


Figure 4. Correlation of CO₂ emission and severely food insecure percentages from 2015 to 2020 (World Bank, 2024).

in 2015.

DISCUSSION

Figure 1 shows the prevalence of severe food insecurity

globally from the World Development Bank database for the year 2021. The result revealed that Nigeria has about 22% severely food insecure population in 2021. With a population of over 207 million, Nigeria grapples with profound food insecurity challenges, with nearly 40% of its population living below the international poverty line

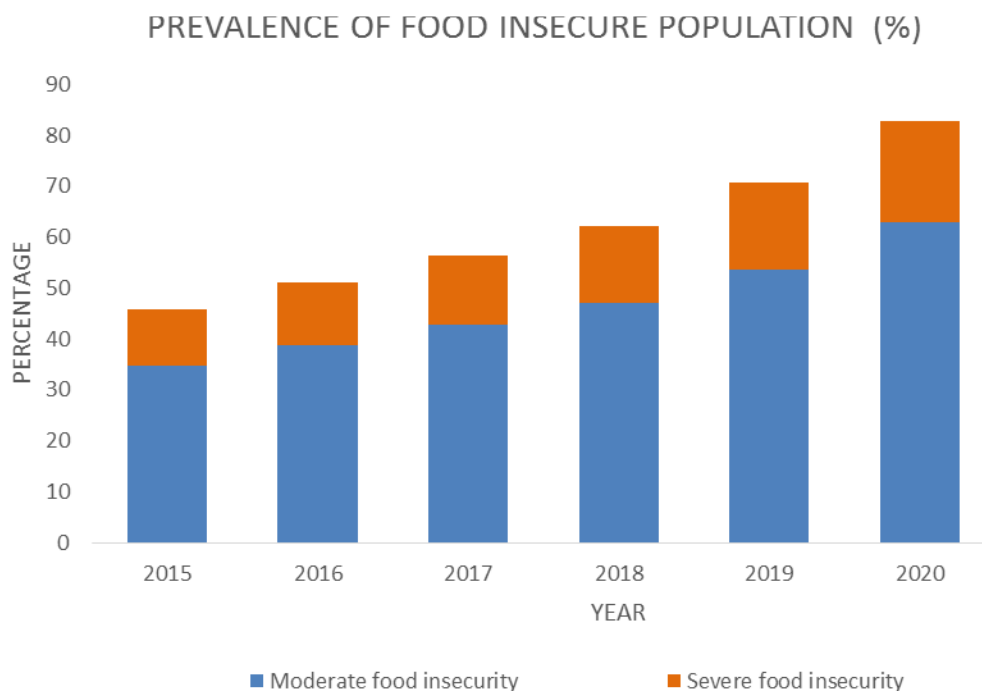


Figure 5. Prevalence of moderate and severe food insecurity in Nigeria from 2015 to 2020 (World Bank, 2024).

(Amare and Balana, 2023). Despite agriculture serving as a cornerstone of the economy, contributing 23% to GDP and employing 70% of the labor force, the persistence of low agricultural productivity is exacerbated by factors such as inadequate use of yield-enhancing technologies. Yields for staple crops such as rice, maize, and cassava fall significantly below global averages, further compounded by adverse climatic changes that hinder the agriculture sector from reaching its full potential (Amare and Balana, 2023). Consequently, this intricate web of challenges manifests in severe outcomes, as revealed by a research report jointly sponsored by a nutrition analysis known as *Cadre Harmonisé*, the Nigerian government, and the UN in 2023, in which approximately 26.5 million Nigerians are projected to confront severe hunger in the second quarter of 2024 (FAO in Nigeria, 2023). In contrast, countries like the United States and Switzerland exhibit remarkably lower prevalence rates of severe food insecurity (0.7 and 0.6%, respectively), reflecting their stable economies, efficient food distribution systems, and robust social safety nets. The United States, for instance, implements collaborative efforts between government agencies and stakeholders to expand food and nutritional security inclusively, integrating climate-smart agriculture practices (USAID, 2022).

Switzerland, known for its strong economy and commitment to addressing social issues, boasts exceptionally low prevalence rates of severe food insecurity, supported by robust policies safeguarding agricultural production and land (OECD, 2024). These

comparisons underscore the urgent need for targeted interventions in Nigeria, focusing on agricultural development, poverty reduction, and social welfare programs to address the underlying causes of food insecurity and ensure a sustainable food future for its population.

As seen in Figure 2, the impacts of climate-induced food insecurity are regionally diverse, with the northern states of Zamfara, Sokoto, Kebbi, Katsina, Kano, and Jigawa, as well as Bauchi, Yobe, Borno, and Gombe facing intense drought, while the coastal states of Bayelsa, Delta, Akwa-Ibom, Cross-Rivers, Rivers, Ondo, Edo, Ogun, and Lagos contend with persistent flooding due to rising ocean levels (Oderinde et al., 2023). Regions with less exposure to adverse climatic conditions are not immune, as nomadic cattle farmers frequently migrate southward in search of grazing areas for their cattle during the dry season (Ani et al., 2021). This movement has consistently resulted in conflicts between farmers and herders, leading to the loss of farmland and a growing number of internally displaced persons, thereby adversely affecting public health and overall well-being. Extreme weather and widespread flooding in the 2022 and 2023 rainy seasons had profound effects on food security in Nigeria. For instance, over 676,000 ha of farmland were destroyed between 2022 and 2023, thereby reducing harvest and escalating food insecurity risk (UNICEF, 2023). This climate-induced flooding not only reduced farm income but also contributed to outbreaks of waterborne diseases, emphasizing the

interconnectedness of climate change, flooding, and public health challenges (Anabaraonye et al., 2022). These floods in Nigeria are the most severe in recent decades. They have far-reaching health implications, particularly within the realms of malnutrition and food insecurity (International Organization for Migration [IOM], 2022). The extensive destruction of homes, infrastructure, and farmland across 33 states led to the displacement of millions, with 2.8 million individuals directly impacted, 6,123 lives lost, and over 2,500 people sustaining injuries as of October 8, 2022. While over two million people sought refuge, their living conditions remained precarious. The public health consequences were substantial, manifesting in a surge of gastrointestinal diseases such as cholera, shigellosis, and enteric fever. The affected people also faced environmental hazards occasioned by contaminants resulting in waterborne pathogens, toxic chemicals, heavy metals, and biotoxins in buildings, amplifying the potential for respiratory issues like asthma and sinusitis (IOM, 2023). The impact of drought in Nigeria extends beyond environmental concerns and significantly affects public health and food security. Insufficient rainfall and crop failures not only contribute to poverty and hinder economic development but also lead to food scarcity, resulting in starvation, famine, forced migration, conflicts over natural resources, and heightened food insecurity (Abubakar and Yamusa, 2013). Moreover, water scarcity resulting from drought adversely affects domestic water availability, contributing to various health challenges as communities struggle to access clean water for drinking and sanitation.

Figure 3 shows a positive correlation between percentage of people that are severely food insecure, and the number of people displaced due to conflict or violence. The repercussions of drought and flood on food insecurity are compounded by the violence instigated by terrorist groups such as Boko Haram and the Islamic State of West African Province (ISWAP) in the Northern Nigeria (Ekwe, 2023).

Additionally, banditry and armed conflicts disrupt food access, leading to the abandonment of farmlands by thousands of farmers (Ani et al., 2021). Farmer-herder clashes, driven by land and water scarcity, have intensified, prompting nomadic herders to migrate south in search of better grazing areas (Ekwe, 2023). However, this movement often results in violent conflicts with local farmers, disrupting food supply chains and worsening malnutrition and food insecurity in affected regions.

Figure 5 illustrates the correlation between CO₂ emissions and food insecurity, emphasizing the significant implications of elevated CO₂ levels on plant nutrition and, consequently, human health and the global food supply (Ziska, 2022). Elevated CO₂ levels have been shown to decrease protein and mineral levels in plant-based foods, posing a threat to nutrition in humans and animals. Despite its substantial impact on global food production, there remains a significant research gap in

understanding the effects of CO₂ on plant nutrition in Nigeria.

The findings in Figure 5 highlight a significant increase in the population of both severely and moderately food insecure individuals over the years, consistent with reports from other sources such as FAO (2023), indicating a worsening food security situation. Despite a notable surge in fertilizer consumption in Nigeria amidst changing climatic conditions, there has been little improvement in nutritional outcomes. Data from FAO (2023) reveals a 10% reduction in average dietary energy supply adequacy from 2010 to 2022 and a concerning decline in average protein supply per capita per day between 2011 and 2020, underscoring persistent challenges in addressing malnutrition.

Moreover, the number of undernourished individuals has seen a dramatic increase, with approximately 15 million more individuals experiencing undernourishment over the past 5 years. Alarmingly, FAO (2023) reports

that between 2020 and 2022, an estimated 150 million Nigerians were classified as moderately and severely food insecure. Additionally, the prevalence of anemia among women of reproductive age (15 to 49 years) remains alarmingly high, standing at 56% of the population, according to FAO (2023). These findings underscore the urgent need for comprehensive interventions to address the root causes of food insecurity and malnutrition in Nigeria.

The Nigerian government has proactively implemented various strategies to address the multifaceted challenges of food insecurity, particularly in the face of climate change impacts. One significant initiative is the National Multisectoral Plan of Action for Food and Nutrition (NMPFAN), designed to combat malnutrition through multidisciplinary approaches (Federal Government of Nigeria, 2020). This plan focuses on enhancing food production, accessibility, and affordability, with targeted interventions to reduce postharvest losses and improve food quality. It also prioritizes initiatives such as the National Home-Grown School Feeding Program to address childhood malnutrition (Durosaye, 2023). However, despite its ambitious goals, challenges persist, including limited coordination and susceptibility to economic and political uncertainties, highlighting the need for enhanced collaboration and advocacy efforts to ensure sustained impact.

Furthermore, the current policy approach underscores Nigeria's recognition of the nexus between climate change, agriculture, and food security (Federal Ministry of Environment, 2021). Emphasizing sustainable and climate-smart agriculture, government policies aim to optimize production while minimizing greenhouse gas emissions. The approval of the National Food and Nutrition Policy provides a comprehensive framework for addressing food and nutrition insecurity across various levels, with a focus on vulnerable groups (Federal Ministry of Budget and National Planning, 2016). Despite

its potential, challenges such as inadequate implementation due to funding constraints and ineffective coordination have hindered its effectiveness. Moving forward, addressing these challenges will be crucial in realizing the policy objectives and achieving optimal nutritional status for all Nigerians.

Conclusions

The challenges surrounding food insecurity in Nigeria demand immediate and innovative action across multiple fronts. This article has underscored the profound impacts of climate change, socio-economic disparities, and political instability on food security and public health outcomes. From the northward migration of nomadic herders due to land and water scarcity to the devastating consequences of extreme weather events like droughts and floods, Nigeria faces a complex array of challenges that require holistic solutions. To address these challenges effectively, stakeholders must adopt innovative approaches that prioritize resilience, sustainability, and inclusivity.

First and foremost, to enhance agricultural productivity, the government should invest in and promote the use of modern agricultural technologies, such as improved seed varieties, efficient irrigation systems, and mechanized farming equipment. Adopting climate-smart agricultural practices like conservation agriculture, agroforestry, and integrated pest management is essential to ensure resilience against climate change. Additionally, providing extensive training programs for farmers on best practices in agriculture and climate resilience will be crucial in improving productivity and sustainability.

Moreover, supporting research and development is also critical. The government should fund research on climate-resilient crops, soil health, and sustainable farming practices to develop innovative solutions to agricultural challenges.

Enhancing data collection and analysis capabilities will provide a better understanding of the impacts of climate change on agriculture and food security, guiding effective policy decisions. Additionally, addressing climate change and environmental challenges requires comprehensive climate adaptation plans tailored to the specific needs of different regions, such as drought-prone northern states and flood-prone coastal areas. More broadly, the government should invest in renewable energy sources to reduce greenhouse gas emissions and mitigate the impact of climate change.

Large-scale afforestation and reforestation programs can also combat desertification and soil erosion, improving the resilience of agricultural lands.

Furthermore, to resolve conflicts and ensure security, the government must enhance mechanisms for resolving disputes between farmers and herders, preventing violence, and ensuring stable agricultural production. Increasing security presence and support in conflict-

affected areas will enable displaced farmers to return to their lands and resume agricultural activities, contributing to food security and stability.

Finally, improving policy coordination and implementation is essential for effective governance. There is an urgent need to enhance coordination between different government agencies, NGOs, and international organizations to ensure coherent and effective implementation of food security and nutrition policies. The government should aim to secure adequate and sustained funding for food security and climate adaptation programs through government budgets and international aid, and establish robust monitoring and evaluation systems to track the progress of these initiatives and make data-driven adjustments as needed.

CONFLICT OF INTERESTS

The author has not declared any conflict of interests.

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