Climate Change and Food Security in Nigeria

Risikat Dauda, Ph.D.
Faculty Member, NESG Non-Residential Fellowship Programme

Abstract

The alarming rate of incidences of floods, drought, ocean heat, changes in snow and rainfall patterns, heavy rainstorms, increased frequency of heavy precipitation, depleting soil nutrients, and dwindling environmental quality indicates that climate change can cause severe risks to food security and nutritional outcomes in Nigeria. With all the pieces of evidence of climate change, only one percent of total arable land is equipped for irrigation in Nigeria. This study examines the impact of climate change on food security and nutritional outcomes in Nigeria. The study showed the country's readiness to tackle climate change and its vulnerability to climate change. The devastating impact of climate change on agricultural productivity, food insecurity, the number of people undernourished, and the average protein and dietary energy supply were revealed. The extent of climate change impact was reported alongside relevant policy directions to tackle climate change and reduce the prevalence of food insecurity in Nigeria.

Introduction

Healthy and well-nourished people are the primary focus of sustainable development; therefore, food security is essential for achieving the United Nations Sustainable Development Goals (SDGs). Food security focuses on ensuring that people have consistent access to safe, nutritious, and sufficient food for a healthy life. The dimensions of food security include adequate food utilization, physical and economic access to food, and the physical availability of food. Food security is an important global concern, interconnected with various factors, including climate change, nutrition, health, and socio-economic issues like insufficient food production, corruption, and gender inequality.

According to FAO, IFAD, UNICEF, WFP, and WHO (2017, 2018, 2019), the three factors responsible for food crisis include crisis (internal or external), national economy, and climate. Climate change poses significant challenges worldwide, leading to rising temperatures, sea levels, droughts, etc. Climate change refers to the degree of change in the mean variable properties of the climate over a period of time, usually one or two decades or longer. Nigeria, in particular, faces environmental challenges exacerbated by climate change, impacting sectors like infrastructure, water resources, and agriculture. Deforestation, desertification, erosion, and floods further degrade the environment, limiting access to safe water and sanitation for many Nigerians.

Climate change is primarily driven by human activities, such as the release of greenhouse gases (GHGs) from industries, agriculture, and transportation. GHGs like carbon dioxide and methane trap heat in the atmosphere, causing global warming. While GHGs are essential for maintaining a habitable Earth, human-induced emissions have erupted this balance, leading to adverse effects, including altered precipitation patterns and melting ice sheets. These climate changes negatively affect crop yields, contributing to agricultural losses, soil infertility, and droughts. This threatens food security, environmental health, and nutrition, leading to global concerns and initiatives like the Paris Agreement adopted by 196 countries at the UN Climate Change Conference (COP21) in Paris, France, in 2015. COP21 came into force in November 2016. The most recent tagged COP27 was held in Sharm El Sheikh, Egypt, between November 6 and November 20, 2022.

In Nigeria, food security is influenced by internal and external crises, economic factors, and climate change. The country experiences visible effects of climate change, particularly in the northern and southern regions, which impact agricultural productivity. Alterations in humidity, temperature,

rainfall patterns, and heavy precipitation have led to low agricultural productivity, poverty, hunger, and conflicts. These challenges result in food scarcity, malnutrition, health issues, and rising food prices. Food scarcity has led to malnutrition and incessant health challenges, especially for children. Efforts are being made at international conferences and initiatives to address these issues and ensure food security in the face of climate change.

Stylized Facts

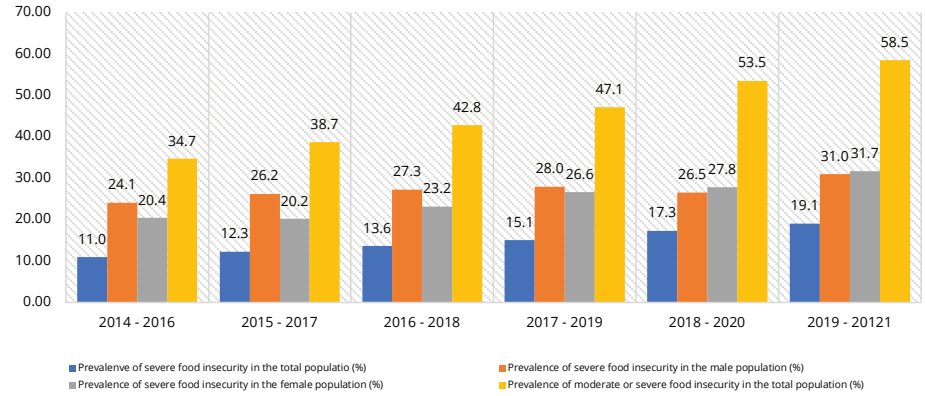
Table 1: Access to safe drinking water and proper sanitation

Indicator/Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
People using safely managed drinking water services, rural (percent of rural population)	13.67	14.08	14.48	14.88	15.28	15.68	16.07	16.47	16.86	17.25	17.65
People using safely managed drinking water services (percent of the population)	17.93	18.32	18.72	19.10	19.48	19.86	20.23	20.60	20.96	21.3`	21.66
People using safely managed drinking water services, urban (percent of urban population)	23.46	23.65	23.84	24.03	24.23	24.42	24.61	24.80	25.00	25.19	25.38
People using safely managed sanitation services (percent of the population)	25.07	25.55	26.05	26.56	27.08	27.62	28.17	28.73	29.31	29.90	30.50

The ND-GAIN Index assesses countries' vulnerability to climate change and readiness to enhance resilience. Nigeria is ranked 160 out of 181 countries, indicating its vulnerability to climate change impacts. In this index, lower scores signify higher vulnerability, while higher scores indicate greater readiness. Regarding access to safe drinking water services, rural areas in Nigeria saw a slight increase from 13.67 percent in 2010 to 17.65 percent in 2020, with minimal progress between 2015 and 2020 (see **Table 1**). However, the overall percentage of people with safely managed drinking water services only increased by 3.73 percent over the decade, lagging behind other lower-middle-income countries like Ecuador, Egypt, Cambodia, Indonesia, Iran, and Morocco. Similarly, the percentage of people with safely managed sanitation services only increased by 5.43 percent from 2010 to 2020.

Nigeria is characterized by three district climate zones: Sahelian hot and semi-arid climate in the northern part of the country, a tropical savannah climate in most of the central regions, and a tropical wet climate in the south. As a result, Nigeria is among the countries highly vulnerable to climate change compared to countries like Cape Verde, Cameroon, South Africa, Morocco, and Egypt (Notre Dame Global Adaptation Initiative, 2023). In addition, between 2000 and 2002, the prevalence of undernourishment was 8.90 percent in Nigeria. However, from 2012 till date, the prevalence of undernourishment has witnessed a steady increase in Nigeria, with over 26 million people estimated to be undernourished in 2021.

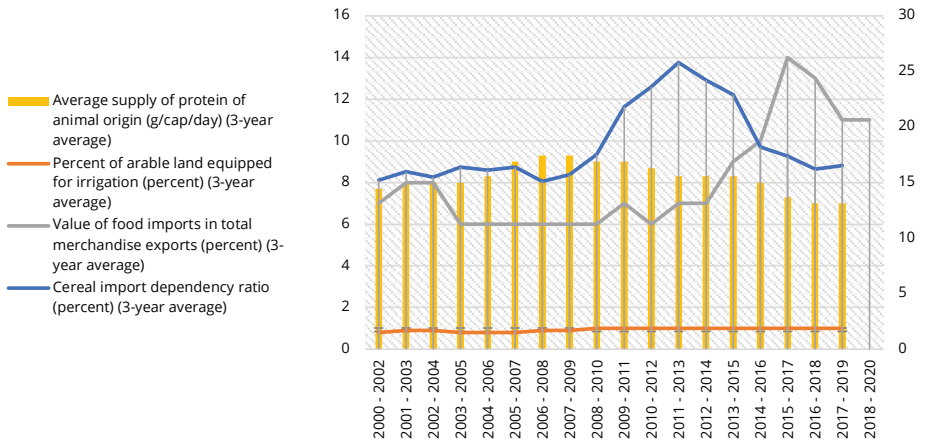
Figure 1: Selected Indicators of the Prevalence of Severe Food Insecurity



Source: FAO (2023)

Figure 1 presents data on severe food insecurity indicators in Nigeria. The overall prevalence of severe food insecurity in the total population steadily increased from 2014 to 2021. Notably, severe food insecurity among males increased from 24.10 percent (2014-2016) to 31.03 percent (2019-2021), while among females, it fluctuated but increased to 31.70 percent (2019-2020). The prevalence of moderate or severe food insecurity in the population also rose significantly from 34.70 percent (2014-2016) to 58.50 percent (2019-2021). Research also showed that the number of severely food insecure people in millions nearly doubled between 2014-2016 and 2019-2021, possibly due to climate change's adverse effects on agriculture. Male adults initially recorded higher numbers of food insecurity but were surpassed by female adults from 2018 onwards.

Figure 2: Arable Land for Irrigation, Cereal Import, Food Import, and Supply of Protein



Source: FAO (2023)

According to FAO (2019), the average protein supply has dwindled since 2007. The average dietary energy supply has not improved since 2010. However, the share of dietary supply derived from cereals, roots, and tubers has only increased slightly. **Figure 2** shows a decline in the average supply of animal-origin protein and limited attention to climate change and food security, as reflected by low arable land equipped for irrigation. Food imports increased from 2012 to 2014, but the cereal import dependency ratio started declining after peaking in 2011.

Identified Challenges

Climate change has led to environmental challenges, affecting agricultural activities, resulting in lower productive outputs and food insecurity in Nigeria. Climate change has contributed to the low food quality and nutritional composition of food crops, exposing people to harmful products and causing permanent health issues. Non-renewable energy sources in Nigeria trigger carbon emissions, exposing crops to toxic gases, reducing crop quality, and causing health issues. In all, some of the identified challenges posed by climate change on food security in Nigeria include:

- **The Alteration of Planting and Harvesting Seasons:** Climate change in Nigeria has caused variations in rainfall and sunshine patterns, particularly in the northern region where agriculture is the main economic activity. These changes have affected crop planting and harvesting seasons, leading to crop scarcity and unavailability, increasing food prices, and severe food insecurity.
- **Decrease in Crop Yield:** Climate change in Nigeria has caused variations in rainfall and sunshine patterns, particularly in the northern region, where agriculture is the main economic activity. These changes have affected crop planting and harvesting seasons, leading to crop scarcity and unavailability, increasing food prices, and severe food insecurity.
- **Increased Pest:** Climate change in Nigeria has led to an increase in pest breeding, affecting animals and food crops, causing undernourishment and food insecurity due to the evolution of different pest species.
- **Influence on Livestock:** Climate change threatens livestock, leading to persistent heatwaves and animal loss. High temperatures, a result of carbon emissions, increase livestock vulnerability to diseases and reduce fertility. Drought worsens food insecurity, as livestock reliant on foliage may endure more prolonged periods of undernutrition.
- **Flooding of Farmlands:** Rising sea levels and heavy rainfall caused flooding in Nigeria, particularly in the South-South and South-East regions. This leads to species loss, uncultivable farmlands, and disruption of agricultural activities, affecting agricultural produce.
- **High demands for Irrigation:** Climate change affects precipitation frequency and intensity by increasing the amount of water evaporated into the air, leading to more intense snow and heavy rain. However, it can also lower rainfall levels, as seen in the Sudan and Sahel savanna belts. This has increased irrigation costs, resulting in higher food prices and forced closures for farmers who cannot afford it. This could lead to food shortages.

Policy Options

Climate change impacts Nigeria's food security and nutritional outcomes, prompting a comprehensive strategy to address root causes. The following policies are proposed to enhance food security and improve nutritional outcomes.

- Legislative policies should promote environmentally friendly practices, encourage waste management and energy efficiency, and support environmental policies. Prohibiting anthropogenic activities like deforestation, gas flaring, and over-exploration of natural resources is crucial. Effective climate legislation supports conservative practices like recycling and minimizes human-induced factors driving climate change.
- Research in natural and climatological sciences should focus on developing animal and crop varieties with short maturity periods that can withstand reduced rainfall and extreme temperatures, ensuring food security and sustainable nutritional outcomes.
- Adopting agricultural methods or smart food systems that are less vulnerable and resistant to climate change is crucial for promoting food security and sustainable nutritional outcomes.

- The government and stakeholders should promote alternative practices like recharging shrinking water bodies and irrigation in the Sahel and Sudan Savannah region to boost agricultural productivity and reduce food prices.
- Propagating drought-resistant grasses in drought-affected areas can reduce pastoral migration patterns in Nigeria, reduce farmers-herdsmen conflicts, and ensure peace and security for middle-belt and other regions.

References

Akano, O., Modirwa, S., Oluwasemire, K., & Oladele, O. (2023). Awareness and perception of climate change by smallholder farmers in two agroecological zones of Oyo state Southwest Nigeria. GeoJournal, 88(1): 39-68.

Bedeke, S. B. (2023). Climate change vulnerability and adaptation of crop producers in sub-Saharan Africa: A review on concepts, approaches, and methods. Environment, Development and Sustainability, 25(2): 1017-1051.

FAO, and ECA (2018). Regional Overview of Food Security and Nutrition. Addressing the threat from climate variability and extremes for food security and nutrition. Accra: Food and Agriculture Organization of the United Nations.

FAO, IFAD, UNICEF, WFP and WHO (2017), "The state of food security and nutrition in the world 2017", Building Resilience for Peace and Food Security, FAO, Rome.

FAO, IFAD, UNICEF, WFP and WHO (2018), "The state of food security and nutrition in the world 2018", Building Climate Resilience for Food Security and Nutrition, FAO, Rome.

FAO, IFAD, UNICEF, WFP and WHO (2019), "The state of food security and nutrition in the world 2019", Safeguarding against Economic Slowdowns and Downturns, FAO, Rome.

Food and Agricultural Organization (FAO) (2023). Sustainable Development Goals. https://www.fao.org/sustainable-development-goals/indicators/211/en/

Haj-Amor, Z., Araya, T., Kim, D. G., Bouri, S., Lee, J., Ghiloufi, W., ... & Lal, R. (2022). Soil salinity and its associated effects on soil microorganisms, greenhouse gas emissions, crop yield, biodiversity, and desertification: A review. Science of the Total Environment, 843: 156946.

IPCC (2014), "Global climate change impacts in the United States", Fifth assessment report of the United States Global Change Research programme, Cambridge University Press.

Kumar, P., Sahu, N. C., Ansari, M. A., & Kumar, S. (2023). Climate change and rice production in India: role of ecological and carbon footprint. Journal of Agribusiness in Developing and Emerging Economies, 13(2): 260-278.

Nathaniel, S. P., Solomon, C. J., Ajide, K. B., Ahmed, Z., & Fakher, H. A. (2023). Striving towards carbon neutrality in emerging markets: the combined influence of international tourism and eco-friendly technology. International Journal of Sustainable Development & World Ecology: 1-16.

Omodara, O. D., Ige, O. A., Oluwasola, O., Oyebanji, A. T., & Afape, O. O. (2023). Factors influencing cassava farmers' choice of climate change adaption practices and its effect on cassava productivity in Nigeria. Heliyon, 9(3): e14563.

Pickson, R. B., Gui, P., Chen, A., & Boateng, E. (2023). Examining the impacts of climate change and political instability on rice production: empirical evidence from Nigeria. Environmental Science and Pollution Research, 1-20.

Sohail, M. T., Mustafa, S., Ali, M. M., & Riaz, S. (2023). Agricultural communities' risk assessment and the effects of climate change: A pathway toward green productivity and sustainable development. Front. Eco-innovation and green productivity for sustainable production and consumption, 16648714, 123.
University of Notre Dame (2023). Notre Dame Global Adaptation Initiative. URL: https://gain.nd.edu/our-work/country-index/ Accessed: 25/4/2023.

World Bank Data Bank (2023). World Development Indicators, Nigeria. URL: https://databank.worldbank.org/source/world. Accessed: 25/4/2023.