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ASSESSING THE IMPACT OF CLIMATE CHANGE ON FOOD SECURITY IN NIGERIA

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Abstract

There is a definite increase in comprehension and acknowledgement regarding the global climate change crisis, which presents diverse implications for various sectors of society, particularly concerning global food security. This study aimed to examine the effects of climate change on the availability and security of food in developing nations worldwide, focusing specifically on Nigeria. Like numerous other West African nations, Nigeria remains in a state of development heavily reliant on agriculture for its financial resources, sustenance, and economic revenue. However, alterations in climatic conditions have led to erratic rainfall patterns, elevated temperatures, and the occurrence of extreme weather phenomena. These factors possess the potential to exacerbate food insecurity within the country by limiting the accessibility and consumption of an adequate, high-quality, safe, and nutritious diet. This research delved into the relationship between climate change and food security, exploring the intersection of these two phenomena and the repercussions of climate change on food security.

***Keywords*:** National Council on Climate Change (NCCC), United Nations, Greenhouse gases (GHGs).

1.0 Introduction

Several factors, encompassing technical, natural, and human elements, influence the process of food production. Among the natural factors are land availability, water supply, temperature variations, precipitation levels, and a humid climate. When these factors are imbalanced in terms of both quantity and quality, food production is likely to be unsuccessful. The deficiency of these factors could eventually result in food shortages and consequently exacerbate the level of food insecurity within a nation. The implications of climate change have raised significant concerns due to alterations in climatic elements at various scales, including local, national, and international levels. This has sparked widespread apprehension, primarily because it jeopardizes food security, particularly in developing regions.

Climate change is commonly defined as shifts in weather patterns and temperatures, and it is

primarily induced by the excessive utilization of fossil fuels, deforestation, and industrial activities that emit greenhouse gases (GHGs). These actions lead to the retention of heat in the atmosphere, culminating in global warming, which exerts diverse impacts on ecosystems and human societies. Given that Nigeria is a developing country situated in the West African region, it remains highly susceptible to the repercussions of climate change, with the most significant effects observed in the country's food sector.

The 11th edit of the Global Food Security Index publication disclosed that Nigeria occupies the 107th position in the global food security index among 113 countries, attaining a cumulative score of 42.0 points. Considering the profound influence of climate change on food security, it is plausible to suggest that the state of food security in Nigeria could deteriorate further if strategic measures are not implemented to counteract the ramifications of climate change on food security.

1.1 Concept of Climate Change

The commonly used definition of climate change originates from the United Nations Framework Convention on Climate Change, which characterizes it as any long-term modification in climate patterns resulting from human-induced alterations in atmospheric conditions (UNFCCC, 2005). Furthermore, climate change can be described as any alteration in climate within a specific locality over a defined period, as outlined by the Intergovernmental Panel on Climate Change (IPCC, 2007). However, a widely accepted notion is that climate change signifies a prolonged shift in Earth's climate conditions instigated by human activities and natural elements.

The world's climate is changing due to an increase in the concentration of greenhouse gases in the Earth's atmosphere, including carbon dioxide CO2, methane CH4, and nitrous oxide N2O, which intensify the greenhouse effect by trapping heat. Presently, activities like deforestation, modern industrial processes, and fossil fuel consumption have escalated the emission of ozone-depleting substances into the atmosphere. These emissions have heightened greenhouse gas levels, leading to consistent climatic shifts and disrupting the natural carbon cycle. The consequences of environmental transformations are far-reaching and affect various systems worldwide, including rising sea levels, ice cap melting, altered precipitation patterns, increased frequency of extreme weather events like severe storms, prolonged droughts, heat waves, ocean acidification, and disturbances in ecosystems and species populations.

Furthermore, climate change impacts nearly all sectors of society, including economic systems, public health, food security, water availability, and more. Changes in climatic conditions particularly impact vulnerable populations residing in coastal, arid, or developing regions.

1.2 Concept of Food Security

Food security, as defined by the World Food Summit in 1996, pertains to the provision of sufficient and nourishing food accessible to all individuals throughout their lifespan, thereby enabling them to maintain a state of well-being. It is commonly construed as the assurance of both the physical availability and economic accessibility of suitable food options for the populace. This fundamental right is intricately linked to various dimensions of public health (World Food Summit, 1996).

Yusuf (2014) highlights the ongoing discourse surrounding the concept of food security, with divergent perspectives on the global food distribution system. While some contend that the world produces adequate food supplies for all, issues arise from inequitable distribution practices. Conversely, there are assertions regarding the sufficiency of current production rates to sustain the future population.

Furthermore, the impact of globalization on the perpetuation or mitigation of food insecurity and poverty in rural areas remains a subject of contention (Yusuf, 2014).

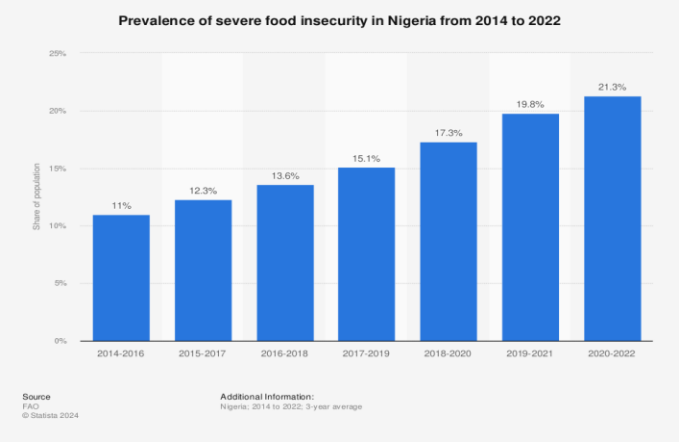
Despite the varying viewpoints, a significant proportion of the global population remains without proper access to nutritious food and this has significantly led to an increase in both world hunger and the global food insecurity index. Projections by the World Food Programme indicate that by 2024, 37.2 million individuals across 47 nations will confront acute food shortages, necessitating urgent humanitarian aid to safeguard their livelihoods and survival (World Food Programme, 2024).

The prevalence of food insecurity on a global scale underscores its status as a pressing international concern affecting nations at all stages of development. The ramifications of food insecurity extend beyond mere sustenance, impacting the physical well-being of individuals and communities through malnutrition, impaired growth, and heightened susceptibility to illnesses.

1.3 Food Insecurity in Nigeria

Food insecurity, the antithesis of food security, is characterized by the absence of food accessibility. It pertains to a circumstance in which individuals are unable to procure sufficient quantities of safe and nutritious food to fulfil the recommended dietary requirements of the human body. This condition arises when individuals or households lack the financial means to purchase necessary food items.

Moreover, it is crucial to acknowledge that food insecurity has profound implications for the well-being, livelihood, and development of individuals. When prolonged, it leads to impaired bodily functions, stunted growth, cognitive deficiencies, weakened immunity, and susceptibility to diseases. This phenomenon also impacts productivity, education, and the enhancement of living standards. Despite efforts to combat food insecurity in Nigeria, this issue persists in various regions across diverse demographic groups.



Source: FAO, cited by Sasu, (2023) @ Statista 2023.

According to Sasu (2023), in Nigeria, 21.3 per cent of the population experienced hunger on average between 2020 and 2022. Individuals facing severe food insecurity may forego meals entirely due to limited financial resources or alternative means. The escalation of acute food insecurity in Nigeria in recent years can be attributed to the nation's rapid population growth and escalating food demands (Sasu, 2023).

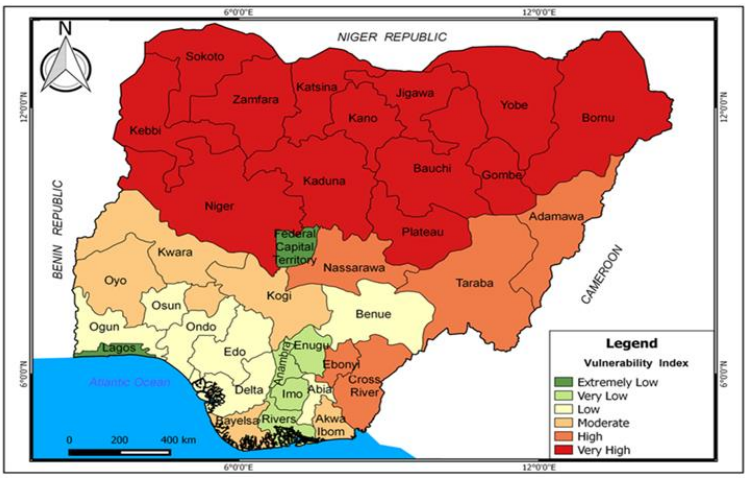
The provided graph above illustrates the prevalence of food insecurity in Nigeria spanning from 2014 to 2022. Food insecurity remains a pressing concern in the country, exacerbated by multifaceted challenges such as climate variations. Climate fluctuations significantly impact agricultural practices, resulting in diminished crop yields and livestock productivity, thereby compromising overall food security. Particularly, climate-related occurrences like droughts and desertification in regions such as the Sahel in northern Nigeria directly impede agricultural output and the self-sustainability of farmers and herders. These weather fluctuations have curtailed agricultural productivity in the area,

intensifying the food scarcity dilemma confronting the nation.

2. Evidence of Climate Change in Nigeria

Climate change impacts are being felt worldwide and Nigeria is not an exception. Nigeria is one of the largest countries in Africa with a land mass of 923,770 km2, which spans several geographical regions and is very vulnerable to the effects of environmental changes. Yusuf (2014), affirmed that each of the thirty-six state and federal capital territories in Nigeria is grappling with one or many challenges relating to climate change.

According to Yusuf, (2014), some conditions exist in Nigeria that threaten its sustainability, the northern states of Nigeria for example, are experiencing extreme drought and desertification while southern states are experiencing flood and coast erosion. As stated by the National Council on Climate Change (2023), since the 1960s, there has been a gradual decline in rainfall in the country. Rainfall distribution ranges from a high level of over 3500mm per annum in the coastal area to a low of less than 600mm per annum at the Sahel region in the northwest and north-eastern parts of the country. Rainfall variations throughout the year have led to some climatic risks such as floods and droughts. Using the rainfall data, the report revealed that, the rainfall for the country over the last one hundred years has declined by about 80 cm. It is projected that by 2050; the amount of rainfall will be 20 to 30mm per year in vulnerable regions (NCCC, 2023).



Source: Madu, I (2016), patterns of climate change vulnerability in Nigeria, p,g, 13.

Based on research carried out by Madu in 2016, the findings of the vulnerability study demonstrate a regional variance in climate change vulnerability, with northern states being more vulnerable than southern states in Nigeria. The first 13 states with high vulnerability are all located in the northern geopolitical zone (Madu, 2016). With the data provided by Madu (2016), and the National Council On Climate Change, it is safe to assume that by 2050; the amount of rainfall in the northern region of Nigeria will reduce because of the region's vulnerability to the effects of environmental changes.

Furthermore, according to NCCC (2023), Nigeria is expected to have greater amounts of precipitation events in the next decades due to the fact that, warmer climates increase the potential for more evaporated water to drop down, raising the possibility of extreme flooding. Days that rank in the top two percent of all recorded days with precipitation are referred to as "heavy precipitation days." Although there were, on average, 7.5 days of heavy precipitation per year in 2000, by 2080, this number is expected to rise to about 9 days (NCCC, 2023).

Additionally, in the last few decades, average temperatures in Nigeria have been remarkably

on the rise. Extreme temperatures are becoming increasingly frequent and severe as a result of climate change, especially in the north. The German Climate Service Centre (GERICS) researched 32 Global Climate Models (GCMs) and discovered that if current rates of emissions are maintained, temperatures in Nigeria are predicted to rise by 2.9°C to as high as 5.7°C (NCCC, 2023).

Temperatures are predicted to rise slower in the southern part of the country, but temperatures will rise more rapidly in the central region and northern regions of the country. Temperature projections for the nation point to a much warmer temperature in the future decades. These extreme heat conditions can have serious consequences for the well-being of humans and livestock, the agricultural sector, and the environment (NCCC, 2023).

In the country, usual trends in climate change like sheet erosion, gully erosion, flooding, degradation of the agricultural land and reduction in yields on crops are now new normal trends (Yusuf, 2014). All of these are a result of climate change either directly or indirectly and affect all persons in Nigeria.

3. Nexus Between Climate Change and Food Security

Climate change and food security can be said to be related problems that are escalating and causing numerous challenges to humanity. With the world's climate changing at an alarming rate, particularly through global warming, the viability and sustainability of food production become compromised. As asserted by the World Bank (2022), changes in climatic events have affected the level of food security globally. Heat waves, flooding, and droughts are all the effects of global warming and it has affected the level of food production in most of the countries in the world today.

Some scholars assert that there is a nexus between environmental changes and food security because climate changes affect the level of food production globally and that amounts to high levels of food insecurity. Climate change alters the conventional climate conditions and leads to more intense climatic events like droughts, floods, heat waves, and storms. Such occurrences negatively impact crop production, animal yields as well and the general productivity of agricultural produce. Furthermore, adverse changes in weather such as increased temperatures and changes in rainfall patterns interfere with growing seasons, planting, and harvesting, which affects the productivity of crops and overall food supply, resulting in food scarcity. A study conducted by the World Bank (2022), revealed that about 80% of the global population that is most at risk from crop failures and starvation due to climatic change exists in Sub-Saharan Africa, South Asia, and South East Asian regions. This has over time reduced the level of food security in the given regions and the entire world (World Bank 2022).

Other scholars, on the other hand, have a different perspective when it comes to the nexus between climate change and food security than the above context, arguing that food productivity leads to climate change. In a report by the World Bank, (2022), it was revealed that how food is processed currently, is attributed to one-third of the emission of greenhouse gases (World Bank, 2022). The agriculture firm is now an important source of greenhouse gases with a large portion of emissions resulting from animal farming, rice cultivating and the application of manufactured fertilizer. For instance, in Nigeria, the livestock sector with specific reference to enteric fermentation (methane emission from ruminant animals) is one of the sources of emission. Some scholars regard climate change from the context of how some of the agricultural and food production systems are among the producers of greenhouse emissions hence; the link between climate change and food security.

Finally, it is necessary to state that the relationship between food security and climate change is intricate and has many layers. Global warming is affecting agriculture, and the food production systems in the world; and the food production systems also affect global warming; and these effects are expected to become worse in the future.

4. Impact of Climate Change on Food Security

As asserted by Adekunle et al, (2014), food security is the biggest threat humanity faces due to climate change. However, it is also worth mentioning that identifying the effects of climate change on food security is rather ambiguous; because threats are global and depend upon various factors, which affect individuals' and nations' abilities to cope with the challenges. Although some regions of the globe may stand to gain from climate change due to high crop production, developing nations are most likely to be significantly impacted since they are not in a position to adequately combat the impacts of climatic changes.

Ughaelu (2017), listed Nigeria as one of the sub-Saharan African countries most likely to suffer the impacts of climate change. Ughaelu (2017), and Ikem (2018), in their studies, identified that disasters have taken place in various regions of Nigeria within the last ten years, which has escalated the situation of food production in the country and made life even more uncomfortable for the citizens in the country.

These climate changes create the basis for one to argue that climate change is a threat to agricultural productivity. A lot of research papers have established that climate changes affect the output of agriculture in Nigeria negatively. This situation has also led to a scarcity of food and interruption of supplies; which in turn has led to inflation in the price of food products. Different sectors of the Nigerian agriculture and food systems are affected by climatic changes due to drought, excessive rainfall, floods of farmlands, rise in temperature, rise in aridity, acidity of soils, changes in relative humidity, and increased evaporation among others. As supported by Jung and Kunstman's empirical survey cited by Kralover (2020), climatic changes are detrimental to the growth of agricultural produce. Muringai et al (2020), investigated the effects of rising temperatures, decreasing water resources, and rising CO2 emissions on food production. Their findings, like those of the majority of other researchers, established a significant link between poor crop yields and climate change. They proved that there is a direct and substantial correlation between reduced crop yields and climate change.

Woosen et al, (2018), and Uwazie (2020), have explained that unfavourable climate conditions like desertification, excessive rainfall as well as a flood; hinder food production. According to academic works and research, environmental change is one of the key contributory factors to the current issues affecting food security in Nigeria (Uwazie, 2020). It has been established in these studies that climate changes affect the productivity of agriculture, thus, reducing the level of food security in the country. The affected areas in northern Nigeria for instance have become less suitable for agricultural and animal production due to reduced rainfall, this in the long run has contributed to low agricultural productivity in that area. Furthermore, current coastal flooding and floods in the southern area of Nigeria affect crop growth reducing the fertility level and raising the toxicity level of the soil, (Wossen et al., 2018).

Climate change also impacts food production in other ways such as the quality of food. In the course of investigating the effect of climatic changes on the quality of crop produce, several empirical researches indicate that the nutrient content of food crops is greatly influenced by

changes in climate factors. Of reduced crop quality; individuals could be exposed to hazardous food or they may not be able to meet their daily calorie intake (Ani et al, 2021). Taub et al, (2018), undertook a meta-analysis strategy to establish how climate change affects food production through various trials. They found out that food crops cultivated in high CO2 conditions have low protein content. As a result of this, the quality of food crops will decline in the subsequent years as the levels of CO2 within the atmosphere will rise (Ani et al, 2021).

Lastly, climate change also leads to severe problems in the preservation of foods and food products. In his research, Ikem (2018), found that the weather variability in sub-Saharan Africa impacts some farms, and farm product merchants as the increased temperature and heat duration lead to spoilage of agricultural food. He also noted that the majority of the farmers and business people who are affected cannot afford to construct storage houses that have better climate control mechanisms which can help in preventing food from getting rotten. Since there is a lack of proper storage for these generated commodities, most of the food produced becomes spoiled, which in a way affects food security in the country.

Conclusion

This paper has argued and used other research to prove that climate change has significantly impacted the level of food security in Nigeria, with food insecurity being the major impact of climate change. This challenge further exacerbates existing problems in the country's agricultural sector and poses threats to the production, distribution, and access to food. Regarding agriculture, the country appears to be extremely sensitive to any changes in temperature, patterns of rainfall, and weather changes. These changes have over time resulted in a decrease in crop productivity, a decline in livestock farming, and problems with food preservation.

Recommendations

Here are some recommendations to help combat the effects of climate change in Nigeria:

1. The Nigerian government should encourage the development of more solar, wind, and hydropower energy plants. This can be done by partnering with global firms and companies for large-scale renewable project funding.

2. There is a need to encourage sustainable agricultural practices to reduce emissions and promote climate change resilience crops.

3. The government should also encourage climate literacy. These can be achieved by using social media platforms and community organizations to raise awareness of climate change

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