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Evaluating the economic impacts of climate change on agriculture and food security in South West, Nigeria

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Abstract
The study evaluated the economic impacts of climate change on agriculture and food security in South-West, Nigeria. Three specific purposes and three research questions guided the study. A descriptive survey research design was adopted. It was carried out in South West, Nigeria (Lagos, Ogun, Oyo, Osun, Ondo, and Ekiti States). The population for the study was 660 farmers randomly selected from the six states in South-West region of Nigeria and sampled using accidental sampling technique. Structured questionnaire was used for data collection and it was face validated by three experts. Cronbach alpha reliability method was used to ascertain the internal consistency of the instrument and a reliability coefficient of 0.78 was obtained which showed that the instrument was reliable and effective for the data collection. Data collection was carried out by the researcher and six research assistants. Mean and standard deviation were used to analyze the data collected. The findings revealed thirteen (13) impacts of climate change on agriculture and food security in South West region of Nigeria; eight (8) adaptive strategies adopted by farmers in South West region of Nigeria to mitigate the impact of climate change; and twelve (12) sustainable agricultural practices that can be adopted in mitigating the impacts of climate change. Based on the results obtained, the study concluded that it is essential to develop and implement effective strategies to mitigate the economic impacts of climate change on agriculture and food security in the South West, region of Nigeria. It was therefore recommended that the government and other stakeholders should promote climate-smart agriculture practices, such as conservation agriculture, agroforestry, and crop diversification to enhance agricultural productivity and resilience to climate change among others.

Keywords: Climate change, economic impacts, agriculture, food security and South West

Introduction

Climate change is a significant global challenge that affects various sectors, including agriculture, which is a crucial component of the Nigerian economy. It is a pressing global issue, with far-reaching consequences human well-being and agriculture (Intergovernmental Panel on Climate Change (IPCC, 2020) [9]. The South West region of Nigeria, which is predominantly agrarian, is highly vulnerable to the impacts of climate change. Rising temperatures, changing precipitation patterns, and increased frequency of extreme weather events are some of the climate-related stressors that affect agricultural productivity and food security in the region (IPCC, 2020) [9].

Climate change refers to significant changes in global temperatures and precipitation patterns over an extended period of time, usually resulting from human activities such as burning fossil fuels and deforestation. According to Jones and Johnson (2019) [10], climate change has led to shifts in weather patterns and extreme events, including heatwaves, storms, and droughts, which are becoming more frequent and severe due to greenhouse gas emissions. As noted by Rosenzweig *et al*. (2019) [16], climate change is the alteration of the earth's climate system, including changes in temperature, precipitation, sea level, and other environmental factors, that affect ecosystems, biodiversity, and human well-being. Climate change is the variation on earth’s climate which resulted to changes in climate parameters, such as temperature, precipitation, or sea level, over a period of time.

Climate change has brought a lot of challenges to human beings, livestock and crop productions. Climate change is altering precipitation patterns in Nigeria, leading to shifts in the timing and distribution of rainfall. Nwagbara (2020) stated that the change in precipitation patterns in Nigeria has resulted in reduced crop yields, water scarcity, and increased vulnerability to food insecurity among rural populations. Also, climate change causes more frequent and severe extreme weather events such as droughts, floods, and storms in Nigeria. Further, climate change creates favorable conditions for the spread of vector-borne diseases such as malaria and dengue fever in Nigeria. Oladipupo (2020) [12] stated climate change has adverse effects on crop yields and agricultural productivity in the South West region of Nigeria. The authors found that rising temperatures and erratic rainfall patterns are leading to decreased crop yields and food insecurity among farmers. According to Adejuwon (2019), extreme weather conditions disrupt agricultural activities and water leading to economic losses and displacement of communities. All these effects of climate change result in poor agricultural production.

Agriculture is the cultivation of crops and rearing of animals for food, fiber, and other products (Adegbola & Alabi, 2020) [1]. It encompasses various agricultural practices, including crop production, livestock production, and mixed farming (Adegbola & Alabi, 2020) [1]. Agriculture can also be defined as a production system that involves the transformation of inputs, such as land, labor, and capital, into outputs, such as food, fiber, and other agricultural products (Ogunjimi & Adeleke, 2020) [2]. Agriculture is a vital sector in Nigeria, contributing significantly to the country's Gross Domestic Product (GDP) and providing employment opportunities for millions of people. However, the sector is highly susceptible to climate-related shocks, which can lead to crop failures, reduced yields, and decreased food security. Oyinlola and Adeoti (2019) [15] emphasized the need for sustainable agricultural practices and adaptation strategies to mitigate the impacts of climate change on food security in Nigeria.

Food security is a critical issue globally, with a significant proportion of the population not having reliable access to nutritious and affordable food. The global food security challenge has become increasingly pressing, with the United Nations estimating that the world's population will reach 9.7 billion by 2050 (United Nations, 2020). In Nigeria, food insecurity persists, particularly among vulnerable groups such including public university workers (Oyebade *et al*., 2020) [14]. The country's agricultural sector, which employs approximately 30% of the workforce, has significant potential for addressing food security concerns (Federal Ministry of Agriculture and Rural Development, 2020). Agricultural production has been identified as a crucial sector for enhancing food security (Food and Agricultural Organization (FAO), 2018).

Food security is a situation that exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life (FAO, 2021). Food security is the successful provision of sufficient, safe, nutritious, and culturally acceptable food for all individuals within a society, achieved through sustainable food systems that promote equity and resilience (FAO & WHO, 2019). It emphasizes the need for food systems that are not only productive but also inclusive and environmentally sustainable. Food insecurity on the other hand is the inability to have access to sufficient, safe, and nutritious food for an active and healthy life. According to Sharma *et al* (2021) [17], food insecurity refers to barriers that prevent individuals from obtaining enough nutritious food to meet their dietary needs. This can result in hunger, malnutrition, and other health related issues due to lack of essential nutrients.

One major causes of food insecurity in Nigeria is low agricultural production. Climate change is one of the major factors militating against agricultural production. Climate change poses a significant threat to agriculture and food security in South West Nigeria. With increasing temperatures, unpredictable rainfall patterns, and extreme weather events, agriculture in the region is facing numerous challenges such as water scarcity, soil degradation, and pest outbreaks (IPCC, 2020) [9]. These impacts not only affect crop production but also have far-reaching consequences on food availability, nutrition, and livelihoods of the population. Thus, there is a need to evaluate the economic impacts of climate change on agriculture and food security in South West Nigeria to develop effective adaptation strategies and policies.

Objectives of the Study

The study evaluated the economic impacts of climate change on agriculture and food security in South-West, Nigeria. Specifically, the study investigated the:

1. Impacts of climate change on agriculture and food security in South West region of Nigeria;
2. Adaptive strategies adopted by farmers in South West region of Nigeria to mitigate the impact of climate change;
3. Sustainable agricultural practices that can be adopted in mitigating the impacts of climate change in South West region of Nigeria.

Research Questions

The following research questions guided the study:

1. What are the impacts of climate change on agriculture and food security in South West region of Nigeria?
2. What are the adaptive strategies adopted by farmers in South West region of Nigeria to mitigate the impact of climate change?
3. What are the sustainable agricultural practices that can be adopted by farmers in mitigating the impacts of climate change in South West region of Nigeria?

Research Methodology

The study adopted a descriptive survey research design, and It was carried out in South West, Nigeria. The South West region comprises of six states, namely: Lagos, Ogun, Oyo, Osun, Ondo, and Ekiti States. The population for the study was 660 farmers randomly selected from the six states in South-West region of Nigeria (that is 110 farmers from each state), and sampled using accidental sampling technique. There was no sampling since the population is small and manageable.

The instrument for data collection was structured questionnaire designed by the researcher. The questionnaire contained 35 items (that is 13 items for research question 1, 10 items for research question 2 and 12 items for research question 3). The instrument was structured into four-point response options of Strongly Agree (SA), Agree (A), Disagree (D) and Strongly Disagree (SD) with assigned weights of 4, 3, 2, and 1 respectively. The instrument was subjected to face validation by three experts. Two experts from Faculty of Agriculture, while one expert from Measurement and Evaluation Unit, all from Adeyemi Federal University of Education, Ondo City, Ondo State, Nigeria. Also, the reliability of the instrument was determined using Cronbach Alpha method. 30 copies of the validated instrument were administered to farmers in Edo State, Nigeria. The completed instruments were collected and analyzed to determine the reliability of the instruments for the study and the instrument yielded a reliability coefficient of 0.78. This showed that the instrument was reliable and could be effectively used to collect the desired data.

The instrument was administered and collected by the researcher with the help of three research assistants. A total of 660 copies of the questionnaire was administered to the farmers in the study area with the help of three research assistants. At the end, only 633 of the instruments were retrieved from the respondents and used for data analysis. Data collected were analyzed using mean and standard deviation. Mean was used to answer the three research questions while standard deviation was used to determine how close or far the respondents were to the mean. The cut-off point of 2.50 was used for decision-making. The decision rule is that any item with a mean rating of 2.50 and above was accepted while any item with a mean value less than 2.50 was rejected. All the data analyses were carried out with the use of statistical package for Social Sciences (SPSS) 25.0 version.

Presentation of Results

Research Question 1: What are the impacts of climate change on agriculture and food security in South West region of Nigeria?

Table 1: Mean Responses and Standard Deviation on the Impacts of Climate Change on Agriculture and Food Security in South West Region of Nigeria

S/N	Items on the Impacts of Climate Change:	$\bar{x}$	SD	Remarks
1	It leads to reduction in crop yields	3.09	0.77	Agreed
2	It changes the growing seasons of crops	3.25	0.76	Agreed
3	Increased food prices	3.14	0.83	Agreed
4	Reduced livestock productivity	3.23	0.79	Agreed
5	Increased food insecurity	3.12	0.78	Agreed
6	Reduced water availability	3.14	0.77	Agreed
7	Loss of biodiversity	3.17	0.80	Agreed
8	Increased pest and disease infestation	3.20	0.79	Agreed
9	Increased post-harvest losses	3.15	0.78	Agreed
10	Increased migration of rural youth	3.09	0.86	Agreed
11	Increased frequency of extreme weather events	3.21	0.80	Agreed
12	Loss of farmers income	3.25	0.71	Agreed
13	Changes in precipitation patterns	3.15	0.75	Agreed

Key: $\bar{x}$= Mean; SD = Standard Deviation; N = 633 farmers

The result presented in Table 1 showed the mean responses and standard deviation of the respondents on the impacts of climate change on agriculture and food security in South-West region of Nigeria. The result indicated that all the 13-items obtained mean responses above 2.50 cut of point indicating that the respondents (farmers) agreed that the items are the impacts of climate change on agriculture and food security in South West region of Nigeria. Also, the corresponding standard deviation for all the items ranged from 0.72 to 0.86, indicating that the respondents were very close to one another in their responses.

Research Question 2: What are the adaptive strategies adopted by farmers in South West region of Nigeria to mitigate the impact of climate change?

Table 2: Mean Responses and Standard Deviation of the Adaptive Strategies Adopted by Farmers in South West Region of Nigeria to Mitigate the Impact of Climate Change

S/No	Items on Adaptive Strategies Adopted by Farmers	$\bar{x}$	SD	Remarks
1	Diversification of crops and livestock	3.53	0.66	Agreed
2	Use of climate-tolerant crop and livestock varieties	2.42	0.59	Disagreed
3	Adoption of irrigation farming technique	3.37	0.78	Agreed
4	Crop insurance and risk management	2.34	0.70	Disagreed
5	Adoption of integrated pest management	3.35	0.70	Agreed
6	Adoption of climate-smart agriculture	3.36	0.68	Agreed
7	Adoption of early warning systems	2.51	0.79	Agreed
8	Promotion of sustainable agricultural practices	3.30	0.79	Agreed
9	Agroforestry practices	2.88	1.00	Agreed
10	Use of improved agricultural technologies	2.96	0.98	Agreed

Key: $\bar{x}$ = Mean; SD = Standard Deviation; N = 633 farmers.

Table 2 showed the mean responses and standard deviation analysis on the adaptive strategies adopted by farmers in South West region of Nigeria to mitigate the impact of climate change. The result revealed that 8 out of the 10 items had mean values ranging from 2.51 to 3.53 which is above the cut-off point of 2.50. This indicated that the respondents agreed that the eight items are the adaptive strategies adopted by farmers in South West region of Nigeria to mitigate the impact of climate change on agricultural production. Two items (2 and 4) had mean values lower than 2.50 indicating that the respondents disagreed that the two items are the adaptive strategies adopted by farmers in South West region of Nigeria to mitigate the impact of climate change. The corresponding standard deviation to each of the items ranged from 0.59 to 1.00, showing that the opinions of the respondents were very close to each other.

Research Question 3: What are the sustainable agricultural practices that can be adopted by farmers in mitigating the impacts of climate change in South West region of Nigeria?

Table 3: Mean Responses and Standard Deviation of the Sustainable Agricultural Practices that can be Adopted by Farmers in Mitigating the Impacts of Climate Change in South West region of Nigeria

S/No	Items on Sustainable Agricultural Practices	$\bar{x}$	SD	Remarks
1	Conservation agriculture	3.00	0.86	Agreed
2	Adoption of crop rotation and intercropping	2.90	0.69	Agreed
3	Organic farming practice	3.31	0.78	Agreed
4	Integrated pest management practice	3.34	0.70	Agreed
5	The use of cover cropping	3.05	0.77	Agreed
6	The use of mulching	3.26	0.68	Agreed
7	Reduced tillage	3.04	0.79	Agreed
8	Crop diversification	3.10	0.79	Agreed
9	Livestock diversification	3.08	1.05	Agreed
10	Adoption of irrigation farming	2.90	0.98	Agreed
11.	Practice of climate-smart agriculture	2.81	0.99	Agreed
12.	Agroforestry practice	2.66	0.98	Agreed

Key: $\bar{x}$ = Mean; SD = Standard Deviation; N = 633 farmers.

Table 3 showed the mean responses and standard deviation analysis on the sustainable agricultural practices that can be adopted by farmers in mitigating the impacts of climate change in South West region of Nigeria. The result revealed that all the 12 items obtained mean values above the 2.50 cut of point. This implies that the respondents agreed that all the items are the sustainable agricultural practices that can be adopted in mitigating the impacts of climate change. The corresponding standard deviation to each of the items ranged from 0.68 to 1.05, which indicate that the opinions of the respondents were very close to each other.

Discussion of Findings

The result presented in Table 1 revealed thirteen (13) impacts of climate change on agriculture and food security in South West region of Nigeria. The impacts include: it leads reduction in crop yields, changes the growing seasons of crops, increased food prices, reduced livestock productivity, increased food insecurity, reduced water availability, loss of biodiversity, increased pest and disease infestation, increased post-harvest losses, increased migration of rural youth, increased frequency of extreme weather events, and changes in precipitation patterns. The finding on reduced crop yield aligns with Olayuri (2018) [13] who noted that climate change in the south west region of Nigeria has been leading to reduced crop yields due to changing rainfall patterns, increased temperatures, and extreme weather events such as droughts and floods. Warmer temperatures and changing precipitation patterns can result in crop failures, reduced yields, and decreased quality (Adeleke & Ogunjimi, 2020) [2]. Furthermore, the finding on reduced livestock productivity is in support of Olayuri (2018) [13] who pointed out that climate change also impacts on livestock productivity in the region, as rising temperatures and changing rainfall patterns affect the availability and quality of pasture and water sources for livestock. According to Ogunjimi and Adeleke (2020) [2], warmer temperatures and changing precipitation patterns can result in reduced livestock productivity, affecting meat and dairy production. The findings on increased food prices is in line with Ajetomobi & Abiodun (2019) [3] who contended that climate change causes increased in food prices in the South West region of Nigeria, thereby affecting the affordability and accessibility of nutritious food. Reduced crop yields and decreased food availability can result in increased food prices, exacerbating food insecurity (Ajetomobi & Abiodun, 2019) [3].

The findings presented in Table 2 identified eight (8) adaptive strategies adopted by farmers in South West region of Nigeria to mitigate the impact of climate change. The adaptive strategies found are diversification of crops and livestock, adoption of irrigation farming technique, adoption of integrated pest management, adoption of climate-smart agriculture, adoption of early warning systems, promotion of sustainable agricultural practices, agroforestry practices and use of improved agricultural technologies. The finding on diversification of crops and livestock aligns with Adeleke and Ogunjimi (2020) [2] who stated that farmers in the South West region of Nigeria are adopting crop and livestock diversification as an adaptive strategy to climate change. The farmers grow multiple crops and rear different livestock species to reduce dependence on a single crop or livestock species (Adeleke & Ogunjimi, 2020) [2]. The finding on agroforestry practices supports Ogunjimi and Adeleke (2020) [2] who pointed out that farmers in the South West region of Nigeria adopt agroforestry practices as an adaptive strategy to climate change. The farmers in the region integrate trees into agricultural landscapes to provide shade, improve soil health, and reduce soil erosion (Ogunjimi & Adeleke, 2020) [2]. In addition, the finding on adoption of irrigation farming technique is in support of Ajewole & Ogunjimi (2018) [4] who noted that farmers in the South West region of Nigeria are adopting irrigation farming as an adaptive strategy to cushion the effect of climate change. The authors also stated that the irrigation farming system helps to conserve water and reduce the impacts of drought.

The data presented in Table 3 showed twelve (12) sustainable agricultural practices that can be adopted by farmers in mitigating the impacts of climate change in South West region of Nigeria. The sustainable agricultural practices found are conservation agriculture, adoption of crop rotation and intercropping, organic farming practice, integrated pest management practice, the use of cover cropping, the use of mulching, reduced tillage, crop diversification, livestock diversification, adoption of irrigation farming, practice of climate-smart agriculture, and agroforestry practice. The findings on conservation agriculture is in support of Adeleke and Ogunjimi (2020) [2] who stated conservation agriculture can help mitigate the effects of climate change by reducing soil degradation and improving water retention (Adeleke & Ogunjimi, 2020) [2]. According to the authors, the practice involves using conservation tillage, crop rotation, and cover cropping to reduce soil erosion, improve soil health, and increase crop yields. Also, the finding on crop rotation and intercropping is in line with Ogunjimi and Adeleke (2020) [2] crop rotation and intercropping practices can help mitigate the effects of climate change by improving soil health, reducing soil degradation, and increasing crop resilience. Ogunjimi and Adeleke (2020) [2] further stated that rotating crops and planting multiple crops together can improve soil health, reduce pests and diseases, and increase crop yields. In addition, the finding on organic farming practice aligns with Ajetomobi and Abiodun (2019) [3] who opined that organic farming helps to mitigate the effects of climate change by reducing the use of synthetic fertilizers and pesticides, improving soil health, and increasing crop resilience.

Conclusion

Climate change has significant economic impacts on agriculture and food security in South West, Nigeria. Rising temperatures, changing precipitation patterns, and increased frequency of extreme weather events are affecting agricultural productivity, leading to reduced crop yields, decreased livestock populations, and increased food prices. The study concluded that it is essential to develop and implement effective strategies to mitigate the economic impacts of climate change on agriculture and food security in the South West, region of Nigeria.

Recommendations

Based on the findings, the study recommended the following:

1. Government and other stakeholders should promote climate-smart agriculture practices, such as conservation agriculture, agroforestry, and crop diversification to enhance agricultural productivity and resilience to climate change
2. The government should establish early warning systems to alert farmers and rural communities of impending climate-related disasters, such as floods and droughts, to enable them to take necessary precautions.
3. The government and private sector should promote agricultural insurance programmes to provide financial protection to farmers against climate-related risks, such as crop failures and livestock deaths.
4. The government and private sector should support research and development on climate change and agriculture, to develop new technologies and practices that can help farmers adapt to climate change.

References

1. Adegbola PA, Alabi OO. Agricultural Development and Economic Growth in Nigeria. J Agric Econ. 2020;71(2):1-12.
2. Adeleke O, Ogunjimi SI. Climate change and agricultural productivity in Nigeria: A review. J Agric Ext. 2020;34(1):1-13.
3. Ajetomobi JO, Abiodun AA. Climate change and food security in Nigeria: A review. J Food Secur. 2019;7(2):1-9.
4. Ajewole OC, Ogunjimi SI. Climate change and agricultural development in Nigeria: A review. J Sustain Dev. 2018;11(3):1-12.
5. Akinbode OS, Adejuwon SA. Climate governance and policy frameworks in Nigeria: Challenges and opportunities. J Environ Policy Plann. 2020;22(2):137-150.
6. Food and Agriculture Organization of the United Nations. The state of food security and nutrition in the world 2021. FAO; 2021.
7. Food and Agriculture Organization of the United Nations & World Health Organization. Sustainable healthy diets: Guiding principles. FAO; 2019.
8. Food and Agriculture Organization. The future of food and agriculture: Trends and challenges. FAO; 2018.
9. Intergovernmental Panel on Climate Change (IPCC). Climate change 2020: Impacts, vulnerability, and adaptation, Part A. Global and sectoral aspects. 2020.
10. Jones S, Johnson M. Climate change and extreme weather events. Annu Rev Environ Res. 2019;44:277-296.
11. Ogunjimi SI, Adeleke O. Economic impacts of climate change on agriculture in Nigeria. J Environ Econ. 2020;10(1):1-11.
12. Oladipupo AO. Impacts of climate change on agricultural productivity: Evidence from Southwest, Nigeria. Cogent Food Agric. 2020;2(3):22-30.
13. Olayuri TF. Impacts of climate change on agriculture in Nigeria: A review. J Agric Sci. 2018;10(7):395-403.
14. Oyebade SA, Oguntoyinbo FA, Oyedele OJ. Food insecurity among Nigerian households. J Agric Food Econ. 2020;8(1):1-12.
15. Oyinlola MA, Adeoti AI. Climate change impacts on agriculture and food security in Southwest, Nigeria. J Agric Sci Food Res. 2019;71(2):111-120.
16. Rosenzweig C, Horton R, Lesk C. Climate change impacts on cities. Nature Climate Change. 2019;9(1):15-23.
17. Sharma S, DePue J, Coberley C. Understanding food insecurity and the role of the built environment in addressing social determinants of health. Front Sustain Food Syst. 2021;5.
18. United Nations. World population prospects 2019. New York, NY; 2020.