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Understanding Climate Change and Environmental Conservation from the Yoruba Cultural Perspective

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Abstract

This study examines the public perception of climate change and its impacts within Yoruba communities across eight (8) states in southwestern Nigeria. An online survey, using snowball sampling, was administered to 800 respondents, assessing climate change awareness, environmental challenges, and the role of Yoruba cultural practices towards environmental sustainability. Key climate-related concerns identified by respondents included heat-related illnesses (19.6%), food and water scarcity (18.7%), and agricultural decline (17.9%). Results indicated strong support for the integration of Yoruba culture in environmental conservation, with 56.4% of participants affirming that practices such as taboos and sacred groves promote pro-environmental behavior. Additionally, 70.8% believed Yoruba agricultural practices contributed to sustainable land use. A majority (75.9%) recognized the role of greenhouse gas emissions in environmental degradation, while 82.3% acknowledged the negative effects of land use changes, such as deforestation. Pearson correlation analysis revealed that higher educational attainment was positively correlated with increased climate change awareness. The study also explored climate change's influence on conflict, with 42.4% of respondents noting minimal impact on Fulani herdsmen clashes. The findings underscore the potential for integrating cultural practices into climate change mitigation efforts within Yoruba communities.

Keywords: Climate change, Environmental Impacts, Yoruba culture, Perceptions

INTRODUCTION

Climate change is a global issue that poses significant environmental, economic, and social challenges, affecting ecosystems, livelihoods, and economies worldwide (Omoyajowo *et al*., 2022). It succinctly describes long-term changes in temperature, precipitation patterns, and other atmospheric conditions on Earth, primarily driven by human activities such as burning fossil fuels, deforestation, and industrial processes. These changes lead to significant environmental impacts, including rising global temperatures, more frequent extreme weather events, and shifting ecosystems, which can affect both natural systems and human societies (Omoyajowo *et al*., 2022; IPCC, 2021).

As variously reported, human activities often release greenhouse gases, including carbon dioxide (CO2) and methane (CH4), into the atmosphere, and the effect of this gradually warms the earth, otherwise known as global warming, a significant driver of climate change. In fact, the World Health Organization (WHO) reports that climate change may be responsible for an estimated 250,000 additional deaths annually during the period from 2030 to 2050 (Watts *et al*., 2015). These fatalities are linked to extreme weather-induced mortality and morbidity, as well as the worldwide spread of vector-borne diseases (Lemery *et al*., 2021; Yang and Usman, 2021; Meierrieks, 2021; UNEP, 2017). Previous studies identified climate change as one of the drivers of community conflicts, the Fulani Herdsmen-Farmers conflict in Nigeria where clashes result to several thousands of deaths of human and livestock (Omoyajowo *et al*., 2022).

Climate change is a phenomenon that is being experienced across every culture and creeds. The Yoruba people, an ethnic group from southwestern Nigeria, are renowned for their vibrant cultural heritage, which encompasses a rich tapestry of traditions, religious beliefs, and social practices. Yoruba tribe constitute one of the largest ethnic groups in Africa, with significant presence in other countries like Brazil, Cuba, Trinidad and Tobago, Togo, and Benin, even US, Canada, and the UK. Central to their way of life is a profound reverence for nature, reflected in their spiritual practices and folklore, which emphasize the interconnectedness of humans, deities, and the environment. This deep-seated respect for nature is manifest in their rituals, art, and community activities that promote environmental stewardship. The Yoruba's holistic perspective on nature as a living entity and their practices of sustainable living offer valuable insights into climate change. Their traditional ecological knowledge and harmonious relationship with their surroundings provide a unique lens for understanding how cultural practices can contribute to sustainable environmental management and climate resilience, highlighting the importance of integrating indigenous knowledge into contemporary climate strategies.

Understanding climate change is critical for managing natural resources and developing strategies for adaptation and mitigation. Moreover, studying how cultures adapt to climate change is equally vital. This research endeavor promotes diversity, preserves local knowledge, fosters contextual understanding, ensures equity and social justice, and facilitates the dissemination of successful practices. Such efforts significantly contribute to resilience-building initiatives in the face of climate change impacts. It is important to recognize that cultures are intricately intertwined with specific social, economic, and ecological contexts (Schlosberg, 2013; Omoyajowo *et al*., 2024a).

Against this backdrop, this study aims to explore Yoruba perspectives on climate change, focusing on how indigenous knowledge systems contribute to environmental sustainability and resilience. Understanding these cultural dimensions is critical for promoting inclusive climate adaptation strategies that respect and incorporate local knowledge systems. The subsequent sections of this paper will follow a structured approach: a comprehensive literature review pertaining to the study's objectives, followed by a detailed description of the materials and methods employed, presentation and discussion of the findings, and finally, the concluding remarks.

LITERATURE REVIEW

Climate change significantly impacts both life activities and environmental resources, with direct effects on plant morphology, physiology, and productivity, as well as indirect effects like soil fertility, pests, and drought (Thornton *et al*., 2014). Water shortages and temperature extremes disrupt crop growth, reducing productivity and affecting germination rates and root development (Enete,

2014; Eludoyin *et al*., 2017a, b; Iloh *et al*., 2014). These impacts vary by region, with water scarcity and seasonal changes in groundwater levels worsening in some areas (Oloruntade *et al*., 2017; Shiru *et al*., 2019). Increased rainfall intensity has led to more flooding, affecting both coastal ecosystems and groundwater recharge (Ashaolu, 2015).

Studies have extensively explored the impacts of climate change on the environment, culture, and economic stability. Climate change has been shown to intensify extreme weather events such as floods, droughts, and heatwaves, leading to biodiversity loss, altered ecosystems, and declining agricultural productivity (IPCC, 2014). These environmental changes have cultural implications, as traditional practices and livelihoods, particularly in indigenous and rural communities, are disrupted. For instance, Thornton *et al*. (2014) highlighted that indigenous knowledge systems and agricultural practices are increasingly threatened by changing weather patterns. Economically, the destabilization of agriculture, which is a primary income source in many developing countries, has severe repercussions for food security, income levels, and overall economic stability (Enete, 2014). Additionally, as water scarcity and land degradation increase, conflicts over resources and migration may further strain cultural and economic systems, particularly in vulnerable regions (Eludoyin *et al*., 2017a, b). These interconnected impacts of climate change call for integrated approaches that consider environmental, cultural, and economic dimensions in adaptation and mitigation strategies.

On the other hand, the Yoruba people are distinguished by their deep environmental consciousness, honoring God's dominion over the Earth and integrating sacred practices into their conservation efforts, such as protecting certain trees and establishing sacred groves. Their cultural traditions, including the reverence for natural features as abodes of spirits and the prohibition of resource exploitation in sacred areas, underscore their commitment to preserving biodiversity and demonstrating an intrinsic respect for nature. The specific resources protected by the Yoruba people include the trees *Adansonia digitata* (baobab), *Bombax buonopozense*, *Newbouldia laevis*, and *Melicia excelsa* (Idowu 1973; Ogunade, 2005). Additionally, the Osun grove in Osogbo is a protected area, where both the forest and the river are off-limits for hunting and fishing (Ogunade 2005). Particularly, plants like *Newbouldia laevis*, which are highly significant in Yoruba culture for the ceremonial installation of 'Oba' (Kings), traditional leaders, and chiefs, are subject to strict protective measures to prevent their endangerment.

Yoruba communities in southwestern Nigeria, traditionally reliant on agriculture due to stable climatic conditions and fertile soils, now face challenges from prolonged climatic events such as heatwaves, droughts, irregular rainfall, and flooding. The northern region's frequent droughts have diminished vegetation and water sources, prompting migrations of Fulani herdsmen southward and leading to conflicts over scarce resources, with tragic consequences including massacres (Omoyajowo *et al*., 2022). In the southern regions, extreme weather events like floods adversely affect crop yields, cause extensive property damage, lead to loss of life, increase pollution, spread vector-borne diseases, displace populations, and disrupt social infrastructure. The intricate relationship between Yoruba culture and their natural environment means that climate change could significantly impact plant species vital for traditional medicine and cultural rituals, with studies indicating that climate change is a major driver of species loss and shifts in species dynamics (Ortiz *et al*., 2021).

Despite the growing body of research on climate change impacts and cultural responses, there is a notable gap in literature specifically addressing the Yoruba people's perspectives on climate change. While much of the existing research focuses on the environmental effects and adaptation strategies within Yoruba communities, less is known about how climate change is perceived and understood from the Yoruba cultural and spiritual viewpoints. Exploring how traditional beliefs and practices shape the Yoruba's attitudes toward climate change could offer insights into their unique approaches to environmental stewardship and adaptation. Additionally, there is limited research on the integration of traditional ecological knowledge with contemporary climate science in Yoruba communities, which could illuminate how indigenous practices contribute to climate resilience.

MATERIALS AND METHODS

The methodology from Omoyajowo *et al*. (2024a, b) was adapted for this study. Respondents were 18+ years and above, who identified as indigenous Yoruba tribe. An online survey, designed using Google Forms, was distributed to 800 randomly selected households across Yoruba communities in Lagos, Ogun, Ondo, Kwara, Oyo, Osun, Kogi, and Ekiti States, within Nigeria. Nigeria is in West Africa 9.0820° N, 8.6753° E. Although confidentiality was guaranteed to all participants, they were encouraged to provide accurate and honest responses. This study adhered to ethical guidelines for research involving human participants, despite the absence of formal ethical approval. Informed consent was obtained from all respondents, with clear communication regarding the study's purpose, voluntary participation, and the right to withdraw at any time without consequence. The ethical principles outlined in the Helsinki Declaration were strictly followed, ensuring respect for participant autonomy, privacy, and data protection. All responses were anonymized, and no personally identifiable information was collected. Data was securely stored and accessed only by authorized personnel. Given the non-invasive nature of the survey, no risk was posed to respondents.

The survey featured closed-ended questions, including Likert scale and yes/no/not sure formats, and provided an open response section for suggestions. Experts reviewed the questionnaire for validity and two IT consultants evaluated its design and functionality on various devices. Snowball sampling was used, with participants encouraged to share the survey with acquaintances via email and social media. The rationale for using snowball was to address the difficulty of reaching a large, diverse sample within the Yoruba community, especially considering the focus on climate change perception, which may not be widely discussed in public forums. This sampling technique facilitated access to individuals who might otherwise be difficult to reach, enabling the collection of data from a broad spectrum of respondents. However, it acknowledges the potential for sampling bias, as this method may have led to overrepresentation of individuals with more pre-existing knowledge or interest in environmental issues. Data was collated, coded, and quality-checked before statistical analysis was conducted. This study employed both descriptive and inferential statistical analyses. Descriptive statistics, including mean, frequency, percentages, and standard deviation, were used to summarize the data. Inferential analysis was conducted using Pearson correlation to assess relationships between key variables such as age, gender, education, knowledge, and perception. All statistical analyses were performed using SPSS version 28.

RESULTS

The demographic profile of the respondents is summarized in Table 1. Most participants were between 26 and 35 years old (30.8%) and had a bachelor's degree (49.3%). Females made up 54.6% of the sample, and respondents from Ekiti State accounted for the highest representation (48.1%), while Lagos had the lowest (3.0%).

Respondents identified various climate-related challenges. Heat-related illnesses were the most frequently mentioned (19.6%), followed closely by food and water scarcity (18.7%) and agricultural productivity decline (17.9%). Social displacement was a less common concern but still significant at 11.7% (Figure 1). These findings underscore a range of perceived threats related to climate change within Yoruba communities.

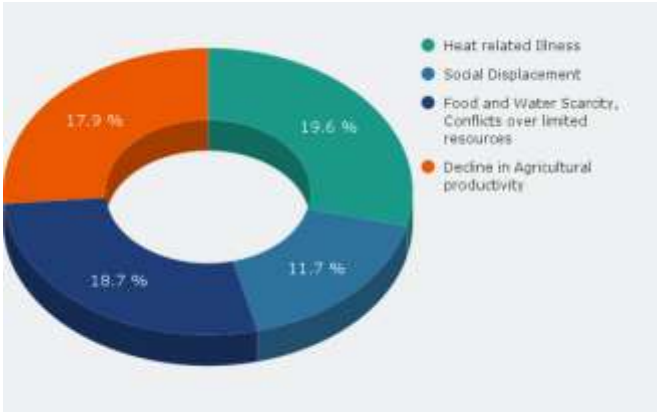

Figure 1: Climate change impacts faced in Yoruba communities.

The study also revealed substantial support for the role of Yoruba culture in environmental conservation. For instance, 56.4% of respondents agreed that Yoruba cultural practices—such as taboos and the protection of sacred groves-encourage environmental stewardship. Further, 70.8% endorsed traditional Yoruba agricultural practices, such as agroforestry, as fostering sustainable land use (Table 2).

Table1: Demographic Information of Respondents

N=800	Subcategories	Frequency	Percentage (%)
i. Age (Years)	18-25	151	18.9
	26-35	246	30.8
	36-45	225	28.1
	46-55	98	12.3
	55-65	50	6.3
	65 Above	30	3.8
ii. Gender	Male	363	45.4
	Female	437	54.6
iii. State of Origin	Ekiti	385	48.1
	Lagos	24	3.0
	Ogun	52	6.5
	Ondo	163	20.4
	Kwara	42	5.3
	Oyo	58	7.3
	Osun	48	6.0
	Kogi	28	3.5
iv. Education Attained	Postgraduate	109	13.6
	Bachelor	394	49.3
	National Diploma/NCE	297	37.1
v. Religion	Christian	634	79.3
	Islam	150	18.8
	Tradition	16	2.0
	No religion	0	0.0

N=number of responses

Table 2: Traditional Yoruba Practice (TYP) Culture and Beliefs that may align with Environmentalism and Relevant to Climate Change Mitigation

		Frequency	Percentages (%)	Mean	Standard Deviation
Teaching Yoruba culture may promote sustainable conservation efforts	Strongly Agree	98	12.3	2.42	.862
	Agree	351	43.9		
	Undecided	284	35.5		
	Disagree	50	6.3		
	Strongly Disagree	17	2.1		
The quest for environmental protection is keen to the Yoruba culture	Strongly Agree	91	11.4	2.32	.779
	Agree	413	51.6		
	Undecided	254	31.8		
	Disagree	31	3.9		
	Strongly Disagree	11	1.4		
Numerous taboos within the Yoruba culture may reinforce pro-environmental behavior e.g. restrictions on hunting certain animal species during specific seasons	Strongly Agree	149	18.6	2.16	.820
	Agree	425	53.2		
	Undecided	184	23.0		
	Disagree	29	3.6		
	Strongly Disagree	12	1.5		
Yoruba culture emphasizes the importance of water conservation and protection of water sources	Strongly Agree	163	20.4	2.12	.811
	Agree	424	53.0		
	Undecided	176	22.0		
	Disagree	27	3.4		
	Strongly Disagree	10	1.3		
Sacred groves in Yoruba communities are biodiversity hotspots and play a vital role in preserving natural habitats	Strongly Agree	119	14.9	2.23	.796
	Agree	434	54.3		
	Undecided	203	25.4		
	Disagree	34	4.3		
	Strongly Disagree	10	1.3		
Yoruba agricultural practices, such as agroforestry and mixed cropping emphasizes sustainable land use and soil conservation	Strongly Agree	141	17.6	2.12	.757
	Agree	456	57.0		
	Undecided	171	21.4		
	Disagree	26	3.3		
	Strongly Disagree	6	0.8		

In terms of climate change awareness, most respondents recognized the impact of greenhouse gas emissions (75.9%), deforestation (82.3%), and improper waste management (81.5%) as major contributors to environmental degradation (Table 3). Education was positively correlated with higher awareness and more informed climate perceptions (r = .304 and r = .311, respectively), suggesting that increased educational attainment enhances environmental knowledge.

Table 3: Respondents' Knowledge on primary causes of Climate change

		Count	Column N%	Mean	Standard Deviation
Greenhouse gas emissions and deforestation	Strongly Agree	214	26.8		
	Agree	393	49.1		
	Undecided	174	21.8	2.00	.762
	Disagree	19	2.4		
	Strongly disagree	0	0.0		
Industrial processes e.g. cement production, chemical manufacturing and the production of refrigerants and aerosols)	Strongly Agree	209	26.1		
	Agree	452	56.5		
	Undecided	128	16.0	1.93	.696
	Disagree	9	1.1		
	Strongly disagree	2	0.3		
Land use changes, including deforestation and urbanization)	Strongly Agree	186	23.3		
	Agree	472	59.0	1.97	.685
	Undecided	126	15.8		
	Disagree	16	2.0		
	Strongly disagree	0	0.0		
Improper waste, management practices particularly in the decomposition of organic waste in landfills)	Strongly Agree	193	24.1		
	Agree	459	57.4		
	Undecided	137	17.1		
	Disagree	11	1.4		
	Strongly disagree	0	0.0		
Agricultural practices such as rice cultivation and the use of synthetic fertilizers)	Strongly Agree	128	16.0		
	Agree	454	56.8		
	Undecided	195	24.4		
	Disagree	21	2.6		
	Strongly disagree	2	0.3		

The Pearson correlation analysis indicates that age has a small positive correlation with knowledge (r = .133, p < .001) and perception (r = .177, p < .001), suggesting that older individuals may have slightly higher levels of knowledge and different perceptions.

Table 4: Correlation between Respondents' knowledge of climate change against perception and demographic factor (Age, Gender, and Education)

	Age	Gender	Education	Knowledge	Perception
Age	1	-.098	.108	.133"	.177"
		.006	.002	<.001	<.001
Gender	-.098"	1	.101"	.112"	.097"
	.006		.004	.002	.006
Education	.108"	.101"	1	.304'	.311"
	.002	.004		<.001	<.001
Knowledge	.133"	.122"	.304"	1	.821"
	<.001	.002	<.001		<.001
Perception	.177'	.097"	.311"	.821"	1
	<.001	.006	<.001	<.001	

Pearson correlation is significant at the 0.01 level (2 tailed), n=799

Gender shows a weak negative correlation with knowledge (r = -.098, p = .006) and a small positive correlation with perception (r = .097, p = .006), indicating minimal but statistically significant differences in these areas based on gender. Education has a moderate positive correlation with both knowledge (r = .304, p < .001) and perception (r = .311, p < .001), highlighting that higher educational attainment is associated with increased knowledge and more informed perceptions.

Interestingly, opinions were mixed regarding climate change's impact on conflicts, particularly regarding clashes with Fulani herdsmen. While 42.4% perceived minimal impact, 15.4% considered climate change a significant driver, indicating varied perceptions on this complex issue (Table 5).

Table 5: Influence of Climate Change on Conflicts between Yoruba Communities and Fulani Herdsmen

Statements	Frequency	Percentage (%)
Climate change has significantly contributed to conflicts between Yoruba communities and Fulani herdsmen	123	15.4
Climate change has had a moderate impact on conflicts between Yoruba communities and Fulani herdsmen	150	18.8
Climate change has had a minimal impact on conflicts between Yoruba communities and Fulani herdsmen	339	42.4
I do not believe climate change has played a role in conflicts between Yoruba communities and Fulani herdsmen	157	19.6
I am not aware of any conflicts between Yoruba communities and Fulani herdsmen	31	3.9

DISCUSSION

The findings of this study highlight the Yoruba people's awareness of climate change and underscore the importance of incorporating cultural practices into climate action. Respondents consistently identified heat-related illnesses, food and water scarcity, and agricultural decline as primary concerns, aligning with regional studies indicating that climate change exacerbates these challenges (Xu *et al*., 2020; FAO, 2018). These results reinforce the vulnerability of communities reliant on agriculture, especially in sub-Saharan Africa, where fluctuating climate conditions can directly impact food security and livelihoods.

A key insight from this study is the significant role that Yoruba cultural practices play in environmental conservation. The high level of agreement (56.4%) on the pro-environmental influence of cultural practices aligns with existing research on indigenous knowledge as a valuable resource for biodiversity conservation (Berkes, 2018). Notably, Yoruba practices such as sacred groves and taboos on hunting certain species reflect deep-seated respect for nature, which may contribute to more sustainable resource use and help mitigate local environmental impacts.

The mixed responses regarding climate change's role in conflicts, particularly with Fulani herdsmen, suggest that respondents perceive these conflicts as influenced by factors beyond environmental changes. This echoes studies indicating that such clashes are often driven by ethnic and economic tensions (Abioye *et al*., 2021). These findings highlight the need for conflict resolution approaches that consider socio-economic and cultural dimensions, alongside environmental stressors.

This study underscores education's importance in climate awareness, with higher educational attainment correlating with greater knowledge and pro-environmental perceptions. These findings support the idea that education is a critical tool for promoting climate literacy and fostering informed decision-making (Owusu & Adjei, 2021).

CONCLUSION

This study provides valuable insights into the Yoruba community's perspectives on climate change and highlights the potential for indigenous knowledge to contribute to environmental sustainability. Respondents consistently identified heat-related illnesses, food and water scarcity, and agricultural productivity decline as primary

climate-related concerns. Additionally, there was strong support for integrating Yoruba cultural practices, such as taboos and sacred groves, into environmental conservation efforts. Most respondents also recognized the impact of industrial processes, deforestation, and waste management on environmental degradation, with education playing a key role in shaping climate awareness.

Policy Recommendations

i. Integrate Yoruba Cultural Practices into Environmental Policies: Encourage the inclusion of Yoruba cultural values in environmental education and climate action plans to support community-based conservation.
ii. Develop Targeted Adaptation Strategies: Address specific vulnerabilities in Yoruba communities, including strategies to mitigate heat-related illnesses and food/water scarcity.
iii. Enhance Climate Education: Implement awareness campaigns, especially targeting younger and less educated populations, to improve understanding of climate change causes and consequences. Considering the mixed perceptions regarding climate change's impact on conflicts, especially with Fulani herdsmen, further research is needed to address potential climate-related conflict drivers and develop strategies for conflict resolution.
iv. Promote Sustainable Land Use and Waste Management: Establish policies that incentivize sustainable agricultural practices and efficient waste management to reduce environmental degradation.
v. Conduct Further Research on Conflict Drivers: Given the varied responses regarding the impact of climate change on conflicts, further studies should explore potential climate-related and socio-economic conflict drivers to inform resolution strategies.

These findings emphasize the need for culturally informed climate policies that respect and incorporate indigenous knowledge systems to foster resilience in vulnerable communities.

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Author Contributions

The author conceived the idea, design the methodology, performed the data analysis.

Data Availability Statement

The data used in this study can be provided by the corresponding author upon reasonable request.

Funding Statement

No funding was received for this study.

Conflict of Interest

The author declare that there are no conflicts of interest regarding the publication of this manuscript.

Ethical Statement

Although formal ethical approval was not obtained for this study, it adhered to the ethical principles outlined in the Helsinki Declaration.

Supplementary Data

Not applicable.

REFERENCES

Abioye, O. F., Olaniyan, I. O., & Oriola, T. (2021). "Fulani Herdsmen and Farmers' Conflict: Drivers, Impacts, and Resolution Strategies. *African Security Review*, 30(2), 112-132. https://doi.org/10.1080/10246029.2020.1842022

Acheampong, E. O., MacGregor, C. J., Sloan, S., & Sayer, J. (2019). "Deforestation is Driven by Agricultural Expansion in Ghana's Forest-Savannah Transition." Environmental Research Letters, 14(12), 124005. https://doi.org/10.1088/1748-9326/ab4091

Ashaolu E.D. (2015) Groundwater response to weather variability in a poor aquifer unit: an example from tropical basement complex rock of Nigeria. *Geograp. Environ. Sustain*., 8 (3): 55-68

Berkes, F. (2018). "Sacred Ecology." Routledge.

Eludoyin A.O., Nevo A.O , Abuloye P.A., Eludoyin O.M. , Awotoye O.O. (2017a) Climate events and impact on cropping activities of small-scale farmers in a part of southwest Nigeria. *Weather, Climate, and Society*, 9 (2): 235-253

Eludoyin, O. M., Adelekan, I. O., Webster, R., & Eludoyin, A. O. (2017b). Air temperature, relative humidity, climate regionalization and thermal comfort of Nigeria. *International Journal of Climatology*, 37(1), 25-35.

Enete I.C. 2014. Impacts of climate change on agricultural production in Enugu State, Nigeria. *J. Earth Sci. Climatic Change*, 5 (9): 234-242

FAO (2018). The State of Food Security and Nutrition in the World: Building Climate Resilience for Food Security and Nutrition." FAO.

Idowu, E. B. (1973). African Traditional Religion: A Definition. London: SCM Press Ltd.

Iloh A.C., Omatta G., Ogbadu G.H., Onyenekwe P.C. 2014. Effects of elevated temperature on seed germination and seedling growth on three cereal crops in Nigeria

IPCC (2021). *Climate Change 2021: The Physical Science Basis*. Cambridge University Press. https://www.ipcc.ch/report/ar6/wg1/

IPCC. (2014). Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Cambridge University Press.

Lemery J, Knowlton K and Sorensen C (2021) Global climate change and human health: from science to practice: John Wiley & Sons

Meierrieks D (2021) Weather shocks, climate change and human health. *World Dev* 138:105228

Ogunade, R. (2005). *Environmental Issues in Yoruba Religion: Implications for Leadership and Society in Nigeria*. Paper presented at "Science and Religion: Global Perspectives," June 4-8, 2005, Philadelphia, PA, USA. Metanexus Institute.

Oloruntade A.J., Mohammad T.A., Ghazali A.H., Wayayok A. (2017) Analysis of meteorological and hydrological droughts in the Niger-South Basin, Nigeria. *Global Planet. Change*, 155: 225-233.

Omoyajowo, K., Amiolemen, S., Makengo, B. M., & Ogunyebi, A. (2021). Impact of COVID-19 pandemic on single-use plastics in some American firms: Policy insights. *Ecological Safety and Balanced Use of Resources*, 12(2), 7–12. https://doi.org/10.31471/2415-3184-2021-2(24)-7-12

Omoyajowo, K., Danjin, M., Omoyajowo, K., et al. (2024a). Exploring the interplay of environmental conservation within spirituality and multicultural perspective: Insights from a cross-sectional study. *Environmental Development and Sustainability*, *26*(1), 16957–16985. https://doi.org/10.1007/s10668-023-03319-5

Omoyajowo, K., Agbaogun, B., Ogunyebi, A., Kanaan, M., Omoyajowo, B. M., Alayemi, A., Omoyajowo, K., & Alao, R. (2024b). Is bisphenol A (BPA) a public health concern? A cross-sectional study of public knowledge, attitude, and risk perception in southwestern Nigeria. *FUDMA Journal of Sciences*, *8*(2), 364–372. https://doi.org/10.33003/fjs-2024-0802-2371

Omoyajowo, K., Omoyajowo, K.., Bakare, T., Ogunyebi, A., & Ukoh, S. (2022). Reflections on the Nexus between Climate Change, Food Security and Violent Conflicts: A Tour through the Nigeria Experience. *Ecological Safety and Balanced Use of Resources*, (1(25), 22–30.

Ortiz AMD, Outhwaite CL, Dalin C and Newbold T (2021). A review of the interactions between biodiversity, agriculture, climate change, and international trade: research and policy priorities. *One Earth* 4(1):88–101

Owusu, G., & Adjei, D. O. (2021). "The Role of Education in Enhancing Climate Change Adaptation Practices in Ghana." Journal of Education and Practice, 12(14), 83-93. https://doi.org/10.7176/JEP/12-14-11

Schlosberg D. (2013). Theorising environmental justice: The expanding sphere of a discourse. Environmental Politics, 22(1), 37-55. *Sci. Res. Essays*, 9 (18) (2014), pp. 806-813

Shiru M.S., Shahid S., Shiru S., Chung E.S., Alias N., Ahmed K., 2019. Challenges in water resources of Lagos mega city of Nigeria in the context of climate change. *Journal of Water and Climate Change*, 11(4): 1067–1083

Thornton, P. K., Ericksen, P. J., Herrero, M., & Challinor, A. J. (2014). Climate variability and vulnerability to climate change: A review. *Global Change Biology*, 20(11), 3313-3328.

UNEP (2017) United Nations Environment Programme: frontiers 2017. from https://www.unenvironment.org/news-and-stories/press-release/antimicrobial-resistance- environmental-pollution-among-biggest

Watts N, Adger WN, Agnolucci P, Blackstock J, Byass P, Cai W and Cooper A (2015) Health and climate change: policy responses to protect public health. *The Lancet* 386(10006):1861–1914

Xu, C., Kohler, T. A., Lenton, T. M., Svenning, J. C., & Scheffer, M. (2020). "Future of the Human Climate Niche. *Proceedings of the National Academy of Sciences*, 117(21), 11350-11355. https://doi.org/10.1073/pnas.1910114117.

Yang B and Usman M (2021) Do industrialization, economic growth and globalization processes influence the ecological footprint and healthcare expenditures? Fresh insights based on the STIRPAT model for countries with the highest healthcare expenditures. *Sust Prod Cons* 28:893–910.