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Editorial

This is Port Harcourt Journal of Social Sciences (PHSS). The Journal is published by the Faculty of Social Sciences, University of Port Harcourt. It was conceived and established to avail researchers especially in the developing world and particularly Africa, the opportunity of publishing their manuscripts. It also provides greater insights into localized or regional socio-economic, political, geographical and environmental problems for the rest of the world to peruse. The Journal is committed to publishing well researched articles that exhibit empirical analysis and incisive positions on contemporary issues and problems in the Social Sciences especially in Africa and other parts of the world in general. Similarly, consultants, administrators and policy decision makers will surely find the journal of immense value and a useful collection in research libraries. The Journal can also be assessed in html and pdf formats at the faculty's website viz.: <http://www/facultyofsocialscience.com>. Critical comments, rejoinders and review articles are welcome from interested readers and contributors

PERSPECTIVE OF CLIMATE CHANGE, ENVIRONMENTAL CHALLENGE AND LIVELIHOOD RESILIENCE IN ILORIN METROPOLIS

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Abstract

This interdisciplinary study provides a comprehensive analysis of the impacts of climate change, environmental challenge and livelihood resilience in Ilorin metropolis, across key sectors, including biodiversity, human health, tourism, and the economy. Emphasizing the interconnectedness of these sectors, the overview underscores the urgent need for global collaboration and innovative mitigation strategies. The study objectives include understanding the perception of climate change in the study area, assessing the basic environmental challenge in the study area, assess the impact of climate change on the environmental challenge and determining how residents adapt and absorb to environmental challenge in the study area. Discussions encompass vulnerabilities and threats posed by climate change, with a focus on the adoption of renewable energy, afforestation initiatives, and the promising roles of biochar. However, the study concluded that there are valuable insights into the perspectives on climate change, environmental challenge, and livelihood resilience in Ilorin Metropolis which reveal a significant awareness and concern among residents regarding the impacts of climate change, with a majority recognizing the role of human activities in exacerbating these changes and recommendations propose sustainable practices, policy development, and adaptation planning.

Keywords: Climate Change, livelihood Resilience, Ilorin Metropolis, Environmental challenges and Carbon Footprint

Background of the study

The persistent change in the climate around the world has recently raised global concerns, as it increasingly threatens not only the sustainable development of global communities, but also the entire human existence (Rathoure & Pathel, 2020). In general, climate change affects livelihoods, ecosystems and socio-economic development of societies, and it determines the direction of human welfare and development (Shutterstock). Developing countries are particularly vulnerable to the effects of climate change because of their poor capacity to withstand shocks. Moreover, the characteristic poor urban planning, high rates of urbanization and slum expansion associated with many Third World cities exacerbate the impact of climate change on urban populations, especially the urban poor,

who are mostly concentrated in environmentally fragile areas and less resilient to the effects of climate change (Ogbuabor & Egwuchukwu, 2017).

Evidence of Nigeria's changing climate and its potentially significant effects on livelihood security are widely documented in the literature. Temperature increases, erratic rainfall patterns, rising sea levels and flooding, biodiversity loss, drought, and desertification have all been linked to climate change (Haider, 2019). The most frequent recurrent disaster in the nation is flooding. Since 1990, rainfall has increased in duration and intensity, causing significant runoffs and flooding in numerous locations. In Southern Nigeria, villages in Lagos and some areas of the Niger Delta have been submerged due to rising sea levels and ocean surges. Two million people were impacted by a flood in

Jigawa State, Northern Nigeria, in 2010 (Elisha et al. 2017). Unprecedented losses and damage to downstream human settlements and livelihoods were caused by severe nationwide floods in 2012 (Akande, 2017). In Rivers and Kogi States, respectively, the 2012 floods destroyed 82,361 and 152,575 hectares of farmland, with 85 percent of the impacted farmlands situated in the States' downstream regions, according to Okafor (2021). The 2012 floods destroyed 4,743 stores and 18 markets in Cross River State (Okafor, 2021). In Nigeria, droughts have also been frequent occurrences. Lakes face extinction as well, especially in Northern Nigeria (Elisha, 2017). In addition, temperatures have increased considerably since the 1980s, reaching comparatively higher levels in 1973, 1987, and 1998. Numerous ecological zones across the nation have seen temperature increases of roughly 0°C to 0°C every ten years (Dioha & Emodi 2018)

With its strong social, political, and environmental implications, climate change has emerged as a contemporary issue. According to Vassi et al. (2018), there is growing scientific agreement that anthropogenic climate change may harm the delicate ecosystem irreparably, which emphasizes these overtones even more. Understanding how the public views climate change is essential for planning and putting into practice efficient mitigation and adaptation plans that will lessen human susceptibility to both local and global effects. Behavior and perceptions of the environment do not always match exactly (Corral-Verdugo et al. 2003; Mainieri and associates; Kurz 2002. Without understanding how environmental threats are viewed, it is impossible to predict how everyone will react to environmental issues (Fischhoff 1985).

Perceptions of environmental issues are also significant because, according to the majority of researchers, public opinion greatly influences policymaking, either directly or indirectly Bostrom et al. 1994; Kempton et al 1995; Read et al (1994). Leiserowitz (2006), for instance, claims that public attitudes regarding the risks associated with climate change will impact whether national and international governments support or oppose laws, policies, regulations, and treaties aimed at reducing the negative effects of global change. The hazards and climate change are not the same. First, it is impossible to directly observe changes in climate because they take place over a long period of time (Weber, 2016; Van der Linden 2015). In contrast to other local or regional hazards, climate change is a worldwide concern. Third, people believe that climate change will negatively impact others in the distant future, making it psychologically distant (Carmi & Kimhi 2015; McDonald et al. 2016 and Weber, 2015. These characteristics hinder human involvement and suggest that empirical research could benefit from an intervention that aids in bringing climate change closer and giving it more tangible form. The perceived level of climate change risk determines how involved one is. Assess the product's risk due to an element of uncertainty, i.e. the degree of severity and the perceived likelihood of a negative outcome, i.e. should show how serious the consequences of hazard are (Brum, 1994; Wolff & Larsen, 2012).

People's awareness of the causes of climate change and its negative effects is commonly referred to as their perception of the risk of climate change (Leiserowitz, 2006; Whitmarsh, 2008). Even though perception is defined narrowly here, awareness or familiarity with the issue is explicitly

important. In this study, the notion of perception has been expanded to the level of knowledge, reflecting people's understanding of facts, ideas, and connections pertaining to the causes, effects, and remedies of climate change. Perception, according to this definition, denotes a conscious comprehension of climate change and the risks it poses, not just "awareness" or "familiarity" with the subject. The definition of "risk" in this study is the sum of the impact's magnitude and likelihood of occurring.

Numerous challenges to human and other living things' physical and mental health have been connected to the rate of climate change (McMichael et al. (2006). Changes in the planet's typical climate, which includes temperature, precipitation, and wind, are a global phenomenon primarily caused by human activity, according to NASA (NASA, 2020). The sustainability of the planet's ecosystems, the stability of the global economy, and the future of humanity are all in jeopardy because of the changing climate. External, human, or natural factors (external variability) as well as natural internal climate system processes can both contribute to climate change. Therefore, human activity and natural causes are the main causes of climate change.

It has been determined that human activities like urbanization, deforestation, population growth, industrialization, and greenhouse gas production are major causes of the rise in carbon dioxide levels, which has changed the makeup of the climate in recent decades (Buba, 2004; Odjugo, 2007). Africa is the continent most vulnerable to climate change, according to studies (Ilevbare & Idemudia, 2017). Poor African nations have already experienced climate change and are unaware of its effects due to a lack of financial

resources, adaptation capacity, and climate knowledge (Ojomo et al. 2015). Climate change has had a detrimental effect on Nigeria, one of Africa's most populous countries with over 215 million people, because of its vulnerability and insufficient ability to cope (During, 2017).

Due to their low resilience capacities, inadequate urban planning, and rapid urbanization, cities in developing nations especially Nigeria are found to be extremely vulnerable to the effects of climate change. This makes it more difficult for urban planners to live in ecologically delicate areas (Zadawa & Omra, 2020). Temperature increases, erratic rainfall patterns, sea level rise, flooding, biodiversity loss, and drought are all signs of Nigeria's changing climate. Certain extreme climate events, like the floods in 2010 and 2012, have caused extensive harm to human settlements, farmlands, and markets (Ayeti et al., 2020). In order to ensure the welfare and sustainable development of communities, the statement highlights the urgent need for comprehensive strategies to address the pervasive and ongoing impacts of climate change on vulnerable regions (Dioha & Emodi, 2018).

The threat that climate change poses to human well-being, especially in urban areas, is becoming more widely acknowledged. This is also true of Ilorin, the capital of Kwara State, Nigeria. Rapid population growth, urbanization, and environmental deterioration are all occurring in the city, exacerbating the effects of climate change. This study looks into how people in the city of Ilorin view climate change, environmental issues, and the resilience of their livelihoods. The housing sector is significantly impacted by climate change, which affects both its vulnerability and its contribution to

environmental problems. Particularly in low-lying coastal areas and areas vulnerable to natural disasters, rising sea levels, extreme weather, and global warming directly threaten housing infrastructure. Climate change worsens housing issues by making extreme weather events like hurricanes, floods, and wildfires more frequent and intense. Homes may be destroyed, communities may be uprooted, and housing resources may be strained as a result of these occurrences. It is frequently difficult for vulnerable groups, such as those with low incomes, to recover from these effects and find safe, reasonably priced housing (Ortiz et al. (2021).

As the primary driver of the rapid extinction of species, climate change is having a substantial impact on biodiversity worldwide. Studies have shown a close relationship between different climatic events and the dynamics of large-scale species (Ortiz et al. 2021). Terrestrial, freshwater, and marine organisms' appropriate habitat ranges are changing due to the rate and severity of climate change. The relative abundance of species, range, timing of activities, and use of microhabitats are just a few of the ways that changes in general climate patterns affect ecosystems (Manes et al. 2021). Seaweed turfs have supplanted kelp-forest ecosystems in some areas, leading to increased herbivory as a result of the increased influx of tropical fish populations. Additionally, conditions that are far worse than the kelp communities' physiological tolerance level have been made worse by warming water (Wernberg et al., 2016). The loss of keystone species is a serious issue as well because it can have even more profound consequences for entire communities living in that habitat. Given that no particular population or community is specifically targeted by climate change, this is especially

noteworthy. Carbon storage and net ecosystem productivity may ultimately be jeopardized by species redistribution brought on by climate change (Vergés et al., 2016). Impacts on terrestrial and marine prod are among the noteworthy disruptions.

The complex and growing global health issue of antimicrobial resistance (AMR) has been highlighted by Garner et al (2019). This issue is of great concern to health professionals around the world, who acknowledge that it has the potential to undo a large portion of the advancements made in the field of health (Garner et al., (2019). Pathogenic microorganisms have gradually developed resistance as a result of the pharmaceutical industries' massive production of antibiotics worldwide. The pattern underscores the noteworthy influence that this matter may exert on the fundamentals of both national and international economies (UNEP 2017).

According to WHO (2018), AMR is thriving on every continent in the world and is not restricted to any one nation or area. A post-antibiotic era is rapidly approaching due to this new threat, in which susceptible pathogens could re-cause pandemics and widespread endemics after becoming resistant (WHO 2018). Regretfully, this situation could endanger intricate medical procedures like organ transplantation, joint replacements, and chemotherapy if it materializes (Su et al. (2018). Common illnesses like pneumonia, post-surgical infections, HIV/AIDS, tuberculosis, and malaria are becoming more difficult and expensive to treat or cure due to the rising prevalence of drug resistance (WHO 2018). An example demonstrates how antibiotic-resistant strains can readily spread across geographic boundaries from one individual to another (Lemery et al. 2021). Not only are the second- and third-

generation antibiotic classes—which include the well-known cephalosporin generations—more costly and broad-spectrum, but they are also more toxic and frequently necessitate longer treatment durations when administered to patients. According to WHO (2018), it has also been noted that the Southern region has a greater abundance of pathogen strains that are resistant.

Regardless of the ecosystem, temperature is an essential component for many living things to survive. Every living thing on Earth, particularly pathogens, needs a particular temperature range to survive. Rainfall is another important aspect of climate change (CC), and it has an impact on how different infectious agents are transported and dispersed. The extinction of numerous species is largely caused by global warming. On the one hand, species extinction could result from the changing climate, but on the other hand, the creation of new organisms could be encouraged by warming temperatures. Particular strains of microorganisms serve as clear examples of how environmental changes brought on by climate change may cause some pathogens to appear or become more common (WHO, 2018). This idea was recently demonstrated by the coronavirus (COVID-19) outbreak in the Republic of China, which caused pneumonia and serious acute respiratory complications (Cui et al., 2012). There are many different animals that host this large family of viruses, especially snakes and bats (livescience.com), and they eventually spread to people. Thus, it is crucial to recognize that climate change has an impact on the growth of multiple vectors that contribute to the spread of different diseases (Song et al., 2021)

A number of pandemics and epidemics are accelerated and made worse by climate

change (CC). The psychological effects of climate change may extend beyond its obvious effects on agriculture, forestry, health, and other areas in vulnerable societies. The recent global COVID-19 outbreak in several nations serves as an example of this (Pal, 2021). Those who would otherwise be healthy have become terrified and afraid as a result of this virus. After these epidemics, people who have fevers or common colds are also nervous and have to follow certain rules. Regular exposure to these kinds of circumstances makes people fearful, accustomed to stress, and ultimately leaves them psychologically exposed (Pal, 2021). The public's anxiety, distress, and other problems are exacerbated by climate change, which causes a number of mental health disorders. Furthermore, people who are exposed to extreme weather events, like geological disasters, on a regular basis are more likely to develop post-traumatic stress disorder, and their recurrent occurrences also contribute to the development of chronic psychological dysfunction. Additionally, individuals may experience elevated stress levels as a result of repeated exposure to the media (Association 2020). Communities in flood-prone areas also constantly live in fear of drowning and flooding-related death. The devastation of physical infrastructure brought on by food-related disasters is another reason to put pressure on these communities, in addition to the death toll (Ogden, 2018).

A diverse commercial endeavor, tourism is a powerful instrument with significant potential for generating income, creating jobs, generating foreign exchange, fostering intercultural understanding and collaboration, and advancing national development for both business owners and the nation at large (Scott 2021). Given that the climate is a vital resource that affects traveler preferences

in particular regions, the tourism industry is also greatly impacted by climate change despite its many benefits (Scott 2021). Depending on the suitability and compatibility of particular weather patterns, different locations draw tourists at different times of the year, both domestically and abroad. Consequently, the significant changes in these weather patterns brought about by climate change will unavoidably present enormous obstacles to both the local economy in specific regions and the national economy as a whole (Scott, 2021).

Economic growth and overall productivity are significantly influenced by the climate. Climate change (CC) has become a significant concern for both domestic and international environmental policymakers due to its increasingly global impact on economic growth (Gleditsch 2021). The negative impacts of CC on the agricultural sector's overall productivity are especially noteworthy when taking into account the creation of successful climate policy contracts and local adaptation policies. Prior international research on CC has already forecasted its effects on the agriculture industry, showing that it will have varying effects on various parts of the world. Researchers are now concentrating on examining how CC affects different agricultural practices in diverse demographic regions and developing solutions to mitigate these impacts (Gleditsch 2021).

The study focuses on Ilorin, the capital city of Kwara State, Nigeria. It is in the North-Central geopolitical zone of Nigeria, with the approximate latitude: 8.4855° N and longitude: 4.6600° E (Fig 1.1). The population as of the 2006 Census was over 777,667 people. Ilorin, being a diverse city, is home to various ethnic groups. The major ethnic groups found in Ilorin are the Yoruba, which is the largest ethnic group in Ilorin. They have a significant cultural and historical presence in the city, the Fulani, a pastoralist ethnic group, are also present in Ilorin. They contribute to the cultural diversity of the city, the Nupe, primarily found in the northern parts of Nigeria, are another ethnic group with a presence in Ilorin, the Baruba, they are associated with the Baruten Local Government Area in Kwara State, and some members of this ethnic group may also reside in Ilorin, the Igbomina, who is more prominent in some other parts of Kwara State, there may be members of this ethnic group in Ilorin as well. Most of the population in Ilorin practices Islam. The city has a significant Muslim community with mosques playing a central role in religious and community life. Christianity is also well represented in Ilorin. There are churches and Christian communities that contribute to the religious diversity of the city. The city head title is called Emir.

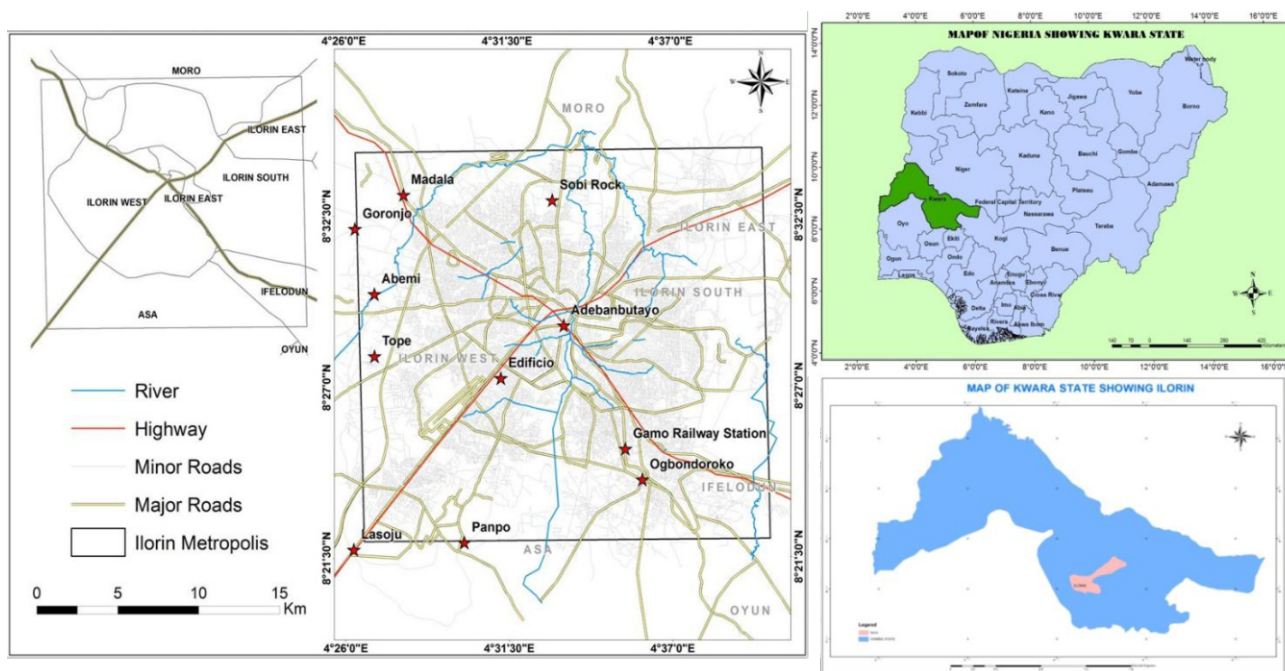


Figure 1.1. Map of the Study Area

Source: ArcGIS 10.8 (2024)

Methodology

Climate change information, environmental challenges, livelihood resilience, adaptation, and resilience strategies are among the data needed for the study. Both primary and secondary sources provided this information. A structured questionnaire intended to elicit information in multiple important areas was used to gather this data. Data on demographics (age, gender, education, occupation, and household size), climate change awareness, basic environmental challenges, how climate change affects these challenges, and livelihood resistance tactics will all be covered in the questionnaire. The entire population of Ilorin, Kwara State, is the study's target population. The sample frame consists of adults who are at least eighteen years old and live in different parts of the city. Cochran's sample size calculation formula was used to determine the study's sample size. With a 50% population proportion, a 5% margin of error, and a 95%

confidence level, 384 participants made up the estimated sample size.

$$n = \frac{Z^2 \times p \times (1-p)}{e^2}$$

Where:

- n = required sample size
- Z = Z-value (1.96 for a 95% confidence level)
- p = population proportion (assumed to be 50% or 0.5)
- e = margin of error (5% or 0.05)

Plug in values:

$$n = \frac{1.96^2 \times 0.5 \times (1-0.5)}{0.05^2} = 384.16 \approx 384.$$

Making the sample size of 384 participants used.

A multi-stage sampling technique was employed to select the study participants. Initially, Ilorin was divided into three local government areas: Ilorin East, Ilorin West, and Ilorin South. In the second stage, wards within each local government area were

selected through simple random sampling. Finally, households within each selected ward were chosen using systematic sampling, and eligible respondents within households were selected randomly to ensure a representative sample. The data were analyzed using descriptive analysis, this involves the use of frequency measurements in percentage, percentage change mean, standard deviation to analyze the climate change in the study area.

Results/Findings

Understanding of Climate Change in the Study Area

Most respondents 57.2% understand climate change as an increase in both temperature and rainfall, suggesting a comprehensive awareness of the phenomenon. A smaller number only associate it with temperature increase 21.6% or rainfall increase 14.7%. The majority 70.6% attribute climate change to anthropogenic causes, indicating a strong awareness of human impact. A smaller portion, 25.6% believe it is due to natural causes, while very few 3.8% attribute it to divine reasons. An overwhelming majority, 88.8% believe climate change is a significant

issue in the area, showing high awareness and concern among respondents. Most respondents 85.9% (table 3.1) have observed changes in weather patterns attributed to climate change, reinforcing the perception of its impact on the area. The data reveals a significant awareness of climate change among the respondents. Most of them understand climate change as an increase in both temperature and rainfall, indicating a comprehensive grasp of its multifaceted nature. Additionally, a considerable number attribute climate change to human activities, highlighting a high level of awareness regarding the anthropogenic causes of climate change. This understanding is crucial for fostering informed community responses and support for mitigation efforts. However, a minority of respondent's attribute climate change to natural causes or divine reasons, underscoring the need for continued education and outreach to ensure a consistent and accurate understanding of the origins of climate change. The widespread belief in the significance of climate change and the observed changes in weather patterns further reinforces the community's recognition of the issue's gravity and its local manifestations.

Table 3.1: Understanding of Climate Change in the Study Area

Question	Frequency	Percentage (%)
What do you understand by climate change		
Increase in temperature	69	21.56
Increase in rainfall	47	14.69
Increase in temperature and rainfall	183	57.19
Others	21	6.56
Cause of climate change		
Natural causes	82	25.63
Anthropogenic	226	70.63
God's anger	12	3.75
Climate change is a significant issue		
Yes	284	88.75
No	0	0
Unsure	36	11.25

Observed changes in weather patterns		
Yes	275	85.94
No	7	2.19
Unsure	38	11.88

Source: Authors fieldwork 2024

Basic Environmental Challenge in the Study Area

Heat waves are considered the most pressing challenge 50.9% followed by erosion 17.2% and air pollution 15.3%. Water and land pollution are less frequently identified as major issues. Waste disposal is identified as the primary source of environmental challenges 73.1%, highlighting a critical area for intervention. Urbanization 24.7% and industrial activities 2.2% are also noted but to a lesser extent. The most noted influence of climate change is improper waste disposal 52.2% followed by high temperatures 24.4% (table 3.2). This suggests climate change exacerbates existing waste management issues. In identifying the basic environmental challenge in the study area, the results show

that heat waves are considered the most pressing challenge, followed by erosion and air pollution. This highlights the acute thermal stress faced by the community, likely exacerbated by climate change. Waste disposal emerges as the primary source of environmental challenges, underscoring the critical need for effective waste management solutions. Urbanization and industrial activities are also noted but to a lesser extent, suggesting that these factors, while important, are secondary to waste disposal issues. The data points to improper waste disposal and high temperatures as significant influences of climate change, indicating that climate change exacerbates existing waste management problems, creating compounded environmental challenges that affect the community's well-being.

Table 3.2 Basic Environmental Challenge in the Study Area

Question	Frequency	Percentage (%)
Most pressing environmental challenge		
Air pollution	49	15.31
Water pollution	25	7.81
Heat wave	163	50.94
Land pollution	28	8.75
Erosion	55	17.19
Main source of environmental challenge		
Industrial activities	7	2.19
Urbanization	79	24.68
Waste disposal	234	73.13
Influence of climate change		
High temperature	78	24.38
High rainfall	32	10.00
Improper waste disposal	167	52.19
Low rainfall	43	13.44

Source: Authors Fieldwork (2024).

Impact of climate change on environmental challenges in the study area

High temperature 65.3% is the most noted environmental impact of climate change, followed by floods 25.3% and intense rain 9.4%. This indicates significant thermal stress in the area. Most respondents 79.4% have noticed increased frequency or severity of environmental issues due to climate change, reinforcing the perceived impact on local conditions. A vast majority, 87.8% report that climate change has made their livelihoods less productive, highlighting the adverse economic impact. Very few report no change 10.9% or increased productivity 1.3% (table 3.3). The impact of climate change on

environmental challenges is evident in the reported experiences of high temperatures, floods, and intense rain. These findings highlight the diverse and severe impacts of climate change on the local environment, contributing to significant thermal and hydrological stress. Most respondents have observed changes in the frequency or severity of environmental issues due to climate change, reinforcing the perception of its escalating impact. This is further supported by the reported negative effects on livelihoods, with many respondents noting decreased productivity, underscoring the economic ramifications of climate change, which impair the community's ability to sustain their livelihoods.

Table 3.3: Impact of climate change on environmental challenges in the study area

Question	Frequency	Percentage (%)
Impact on environment		
Flood	81	25.31
Intense rain	30	9.38
High temperature	209	65.31
Changes in frequency or severity of issues		
Yes	254	79.38
No	22	6.88
Not sure	45	14.06
Effect on livelihood		
Less productivity	281	87.81
High productivity	4	1.25
No change	35	10.94

Source: Authors Fieldwork (2024).

Resident adaptation strategies in mitigating the impact of climate change

As shown in Table 3.4, the primary coping strategies are practicing self-care 60.63% and reducing carbon footprint 27.50%, indicating a proactive approach among respondents. Some 11.88% adopt a problem-solving attitude, suggesting varied adaptive behaviors. In terms of coping strategies, practicing self-care and reducing carbon footprint are the primary adaptive responses, indicating a proactive approach among

residents. This finding aligns with Salami et al., (2025) that states that a substantial number of people recognized their contribution to environmental degradation through activities like deforestation, yet their response to adaptation strategies remain limited, reflecting a gap in practical knowledge and proactive engagement. However, there is a need for broader and more integrated community and policy-driven strategies to enhance resilience and adaptive capacity.

Resident adaptation strategies in mitigating the impact of climate change

Question	Frequency	Percentage
Strategies to reduce the impact of climate change		
Reducing carbon-footprint	88	27.50
Practice self-care	194	60.63
Adopting a problem-solving attitude	38	11.88

Conclusion

This study has provided valuable insights into the perspectives on climate change, environmental challenges, and livelihood resilience in Ilorin Metropolis. The findings reveal a significant awareness among residents regarding the impacts of climate change, with a majority recognizing the role of human activities in exacerbating these changes. Heat waves, improper waste disposal, and erosion are identified as the most pressing environmental challenges, which are further intensified by climate change. The adverse effects of these environmental challenges are evident in the community, leading to decreased productivity and compromised livelihoods for many respondents. Despite the proactive coping strategies adopted by individuals, such as practicing self-care and reducing carbon footprints, there is a clear need for broader, more integrated community and policy-driven approaches. These should focus on enhancing education, improving waste management, and developing resilient infrastructure to better support the community in adapting to and mitigating the impacts of climate change. The study underscores the urgent need for targeted interventions and strategic planning to address the multifaceted challenges posed by climate change in Ilorin Metropolis. Policymakers, environmental planners, and community leaders must collaborate to implement effective measures that ensure sustainable development and resilience for

the community in the face of ongoing climate challenges.

Based on the findings of this study, the following recommendations are made:

- i. **Enhanced Education and Awareness Programs:** Implement continuous education and outreach programs to ensure a comprehensive and accurate understanding of climate change among all age groups and educational levels. These programs should emphasize the anthropogenic causes of climate change and the importance of mitigation efforts.
- ii. **Improved Waste Management Systems:** Develop and enforce more effective waste management policies and infrastructure. This should include proper waste segregation, recycling programs, and the reduction of waste generation at the source to tackle the primary environmental challenge identified by respondents.
- iii. **Climate-Resilient Infrastructure Development:** Invest in infrastructure that can withstand the impacts of climate change, such as improved drainage systems to manage floods and heat-resistant materials for buildings. These measures can mitigate the adverse effects of extreme weather events on the community.
- iv. **Support for Livelihoods:** Provide support and resources for livelihoods affected by climate change. This could include training in climate-resilient agricultural practices, financial assistance for businesses impacted

by environmental challenge, and diversification of income sources to reduce vulnerability.

v. Community-Based Adaptation Strategies: Encourage and facilitate community-based adaptation strategies that involve local stakeholders in planning and implementation. This ensures that the measures are culturally appropriate and more likely to be sustained over time.

vi. Policy and Legislative Action: Advocate for stronger policies and legislation at the local and national levels that address climate change and environmental protection. This includes stricter regulations on emissions, incentives for renewable energy adoption, and penalties for non-compliance with environmental laws.

vii. Research and Monitoring: Establish a robust system for ongoing research and monitoring of climate change impacts and environmental challenges in Ilorin Metropolis. This will provide data to inform policy decisions and adapt strategies as needed.

Contribution to Knowledge

This study makes several important contributions to the understanding of climate change, environmental challenge, and livelihood resilience in the context of a developing urban area.

i. Local Perspective on Climate Change: It provides a detailed account of the local population's understanding and perception of climate change, highlighting the high level of awareness and concern among residents of Ilorin Metropolis. This contrasts with some assumptions that awareness may be lower in developing regions.

ii. Identification of Key Environmental Challenge: The research identifies heat

waves, improper waste disposal, and erosion as the primary environmental challenges exacerbated by climate change in the area. This insight is crucial for targeting specific issues in climate adaptation and mitigation strategies.

iii. Impact on Livelihoods: By documenting the negative impacts of climate change on productivity and livelihoods, the study underscores the economic dimension of environmental stress, which is often underreported in similar studies. This highlights the need for economic support measures in climate resilience planning.

iv. Adaptive Responses: The study sheds light on the adaptive responses of the community, such as practicing self-care and reducing carbon footprints, demonstrating proactive but limited individual-level strategies. This emphasizes the need for broader community and policy-driven approaches.

v. Policy Implications: The findings provide a basis for formulating targeted interventions and policies that address the specific environmental and climatic challenges faced by urban communities in developing countries. It calls for integrated efforts involving education, infrastructure development, waste management, and livelihood support.

This study enriches the body of knowledge on climate change adaptation and resilience, particularly in the context of an urban setting in a developing country and provides a framework for future research and policy development.

References

Akande, A., Costa, A. C., Mateu, J. & Henriques, R. (2017). Geospatial analysis of extreme weather events in Nigeria

- (1985–2015) using self-organizing maps. *Advances in Meteorology*.
- Association, A (2020) Climate change is threatening mental health, American Psychological Association, “Kirsten Weir.
- Ayeni, O. D., Adediran, A., Ofordu, C. S., Mba, N. C., Amoo-Onindundu, O. N., Arabomen, O. & Okumodi, B. O. (2020). Analysing the characteristic-sequence of rainfall amounts in Ibadan, Nigeria. *Journal of Meteorology and Climate Science*, 18(1),89-98.
- Bostrom, A., Morgan, M. G., Fischhoff, B., & Read, D. (1994), 'What do people know about global climate change?' *Risk Anal.* 14, 959-970.
- Brum, (1994) "Risk Perception: main Issues, approaches and findings," in subjective probability, Eds
- Buba, A. D. (2004). Climate Change and Water Problems in Chad Republic. *Journal of Arid Environments*, 3(2), 42-50.
- Carmi, Nurit, and Shaul Kimhi. (2015). "Further Than the Eye Can See: Psychological Distance and Perception of Environmental Threats." *Human and Ecological Risk Assessment: An International Journal* 21 (8), 2239-57. doi:10.1080/10807039.2015.1046419
- Corral-Verdugo, V., Bechtel, R. B., & Fraijo-Sing, B. (2003). Environ-mental beliefs and water conservation: An empirical study. *Journal of Environmental Psychology*, 23, 247-257.
- Cui, W., Ouyang, T., Qiu, Y. & Cui, D. (2021). Literature review of the implications of exercise rehabilitation strategies for SARS patients on the recovery of COVID-19 patients. In *Healthcare* (9(5), 590). MDPI.
- Dioha, M. O. & Emodi, N. V. (2018). Energy-climate dilemma in Nigeria: Options for the future. In *IAEE Energy Forum* 2,29-32.
- During, R. (2017). Impact of climate change on health in Nigeria. This Day Newspaper. Retrieved from <https://www.thisdaylive.com/index.php/2017/10/03/impact-of-climate-change-on-health-in-nigeria/>
- Elisha, I., Sawa, B. A. & Ejeh, U. L. (2017). Evidence of climate change and adaptation strategies among grain farmers in Sokoto State, Nigeria. *IOSR Journal of Environmental Science, Toxicology and Food Technology (IOSR-JESTFT)*, 11(3),1-7.
- Fischhoff B (1985). Managing Risk Perception. *Issues Sci Technol*
- Garner, S. (2019). *Bodied spaces: Phenomenology and performance in contemporary drama*. Cornell University Press.
- Gleditsch, N. P. (2021). This time is different! Or is it? NeoMalthusians and environmental optimists in the age of climate change. *Journal of Peace Research*, 58(1), 177-185.
- Haider, H. (2019). Climate change in Nigeria: impacts and responses. Knowledge, evidence and Learning for Development. Helpdesk Report for KD4. Retrieved from <https://opendocs.ids.ac.uk>
- Ilevbare, F. M. & Idemudia, E. S. (2017). Influence of gender and age on attitudes toward climate change: A survey of a Nigerian University Students' Population. *Gender and Behaviour*, 15 (4), 9831-9845.

- Kurz T (2002). The psychology of Environmental Sustainable Behavior: fitting together pieces of the puzzles. *Ana Soc Iss Pub Pol*.
- Leiserowitz, A.A. (2006). Climate change risk perception and policy preference: the role of affect, imagery, and values.
- Lemery, J., Knowlton, K., Sorensen, C. & Linstadt, H. (2021). Commentary on Covid-19, climate change, and human health. *Global Climate Change and Human Health: From Science to Practice*.
- Manes, S., Costello, M. J., Beckett, H., Debnath, A., Devenish-Nelson, E., Grey, K. A. and Vale, M. M. (2021). Endemism increases species' climate change risk in areas of global biodiversity importance. *Biological Conservation*, 257:109-170.
- McDonnald R.I., Chai H.Y., & Newll B.R. (2015) Personal Experience and the 'psychological distance' of climate change: an integrative review. *J. Environ. Psychol* 44 109-118.
- McMichael, A. J., Woodruff, R. E. & Hales, S. (2006). Climate change and human health: Present and future risks. *Lancet*, 367(9513), 859-69.
- Odjugo, P. A. O. (2007). The impact of climate change on water resources, global and regional analysis. *The Indonesian Journal of Geography*, 39(1), 23-41.
- Ogbuabor, J. E. & Egwuchukwu, E. I. (2017). The impact of climate change on the Nigerian economy. *International Journal of Energy Economics and Policy*, 7(2), 217-223.
- Ogden, L. E. (2018). Climate change, pathogens, and people: the challenges of monitoring a moving target. *BioScience*, 68(10), 733-739.
- Okafor, J. C. (2021). Flood, livelihood displacement, and poverty in Nigeria: plights of flood victims. In *African handbook of climate change adaptation* 2:2535-2545. Cham: Springer International Publishing.
- Ola, A. (2022). Climate change effects and livelihood-adaptation strategies by the urban poor in Ibadan, Nigeria. *Town and Regional Planning*, 81:24-38.
- Ortiz-Bobea, A., Ault, T. R., Carrillo, C. M., Chambers, R. G. & Lobell, D. B. (2021). Anthropogenic climate change has slowed global agricultural productivity growth. *Nature Climate Change*, 11(4):306-312.
- Pal, J. K. (2021). Visualizing the knowledge outburst global research on COVID-19. *Scientometrics*, 126(5):4173-4193.
- Rathoure, A. K. & Patel, U. R. (2020). Climate conditions and biodiversity decline: impact assessment. In *Current State and Future Impacts of Climate Change on Biodiversity* (2:79-94). IGI Global.
- Salami, O.O., Rafiu, F.O., Akanbi-Gada, M.A & Walliyulahi, S (2025). Public Perception and Adaptation to Climate Change in Moro Local Government, Kwara State, Nigeria. *J.Appl.Sci. Environ. Manage.* 29(1), 217-221.
- Scott, D. (2021). Sustainable tourism and the grand challenge of climate change. *Sustainability*, 13(4):19-66.
- Song, Y., Fan, H., Tang, X., Luo, Y., Liu, P. & Chen, Y. (2023). The effects of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) on ischemic stroke and

the possible underlying mechanisms. *International Journal of Neuroscience*, 133(2):176-185.

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

Van der Linden (2015) *Pers. Individ. Differ.* 87,171.

Vergés, A., Doropoulos, C., Malcolm, H. A., Skye, M., Garcia-Pizá, M., Marzinelli, E. M. & Steinberg, P. D. (2016). Long-term empirical evidence of ocean warming leading to tropicalization of fish communities, increased herbivory, and

loss of kelp. *Proceedings of the National Academy of Sciences*, 113(48),13791-13796. Vassiki Sango

Weber, E. U. (2006). Experienced-based and description-based perceptions of long-term risk: Why global warming does not scare us (yet). *Climatic Change*, 77, 103-120.

Whitmarsh L. (2008). Are floods victims more concerned about Climate change than other people? The role of direct experience in risk perception and behavioral response. *Journal Risk Research*.

Wolff & Larsen (2012) A Taxonomy of terror about the effect of different kinds of terror on risk perception. *Scand. J.Hosp. Tour*