Cities and the Environment (CATE)

Volume 19 | Issue 1 Article 1

3-18-2026

Assessment of Residents' Knowledge, Attitude and Perception of Climate Change Issues in Ibadan South West Local Government, Oyo State, Nigeria

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Recommended Citation

Olanrewaju, Samson; Oyeniyi, Samuel; Atoyebi, Sola; Okubena, Modupeola; Abazu, Chinedu; and Adibe, Emeka (2026) "Assessment of Residents' Knowledge, Attitude and Perception of Climate Change Issues in Ibadan South West Local Government, Oyo State, Nigeria," *Cities and the Environment (CATE)*: Vol. 19: Iss. 1, Article 1.
DOI: 10.15365/1932-7048.1373
Available at: https://digitalcommons.lmu.edu/cate/vol19/iss1/1

Assessment of Residents' Knowledge, Attitude and Perception of Climate Change Issues in Ibadan South West Local Government, Oyo State, Nigeria

This study examines residents' knowledge, attitude, and behavioural responses to the impacts of climate change in Ibadan South West Local Government Area, Oyo State, Nigeria. It evaluates residents' awareness of climate change, analyses their behavioural responses to climate change impact, and identifies household characteristics that influence knowledge, attitude, and perception of climate change in the area. The study utilised a mixed-methods research approach, using such instruments as questionnaire administration and interviews. The study employed a multistage sampling technique where a total of seven (7) Enumeration Areas (EAs) were selected, and 206 questionnaires were administered to residents of the area. These selected respondents were also interviewed to gain a more personal understanding of their knowledge and perception. The data collected were analysed using descriptive analytical tools, including percentages and chi-square. Interviews were summarized and analysed thematically. The study revealed that 92% of the respondents are aware of climate change. The causes and evidence of climate change are significant across enumeration areas for bush burning, poor sanitation, fuel wood consumption, and settlement expansion, with p-values of 15.507 and 23.686, respectively. It, therefore, among others, recommended that governments at all levels, in collaboration with land sectors (public and private), should educate citizens on the increasing effect of climate change on the immediate environment.

Keywords

Climate Change, Knowledge, Attitude, Perception, Ibadan South West Local Government Area, Oyo State

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1.0 INTRODUCTION

Climate change is altering temperature and precipitation regimes (Naumann et al. 2018), with its effects on rainfall patterns and disease incidence (Patz et al. 2014). The global average surface temperature increased by 0.6°C during the 20th century (Kogan 2023), while precipitation also moved from 0.5 to 1.0 per cent per decade (Dore 2005). This is associated with an increase in global sea levels and intensified droughts across various cities – particularly in coastal towns (Naumann et al. 2018; Akhtar 2019). The incidences of climate change that have increasingly occurred in recent years are anthropogenic (Kweku et al. 2018; Nica et al. 2019), and they have grave implications for different facets of human existence (Shafique et al. 2024). Unfortunately, evidence suggests that, in the coming years, unless addressed, the situation will be worse, as global warming will be on the rise (Clarke et al. 2022).

In Nigeria, the evidence of climate change, such as desertification, flooding, and ecological devastation, has continued to increase (Amadi & Mac 2015; Agbebaku 2015). For instance, in Lagos, the country's economic capital and one of the largest metropolises in Africa, annual flood impacts around 90,000 inhabitants, resulting in the displacement of at least 4,000 in 2021 alone (Usigbe 2021). The Northern part of Nigeria is also acutely faced with desertification, which has claimed not less than 32% of the total vegetation of the region between 1984 and 2016 (Nwilo et al 2020). Currently, almost 30 million people, representing about 17% of the national population, and 15 out of 36 States of the country are impacted by desertification. Like other countries in Sub-Saharan Africa, Nigeria is currently fighting the incidence and impact of climate change. Considering the strong nexus between climate change and development, Nigeria has a high risk of food insecurity, multi-dimensional poverty, infrastructural deficits, and poor economic development (Ogwu 2019; Hasan et al. 2020; Elum et al. 2021).

To address the climate change impact in the country, Nigeria is a party to different global climate change deals and treaties, and has also put in different institutional and policy frameworks to ensure that it achieves these deals (Gasu et al. 2022). Meanwhile, central to the success of these agreements are the populace, who are critical to the implementation of these deals. Public understanding and behavioural responses are cardinal to the achievement of different governmental policies on climate change (Jellason et al. 2019). Everyday life and activities of the common man directly affect climate change – incidences, impacts, and responses. For instance, human activities, including deforestation and pollution, have reportedly increased, escalating Nigeria's climate change challenges (Iwuchukwu et al. 2023). Consumerism and the use of unsustainable energy sources, including the burning of fuel wood, have also informed small-scale and household-level contributions to climate change in Nigeria (Hanif 2024). In the rural areas of the country, there is a dominant use of wood as a primary source of energy (Elum et al. 2017), creating a dual challenge of deforestation and air pollution, which contributes immensely to climate change. These behavioural contributions to climate change require both urgent and concerted interventions.

Studies on public perspectives, knowledge, and actions are critical to addressing climate change, especially given the apparent increase in the manifestation of the phenomenon (Hügel & Davies 2020). Also, climate change starts and ends with the public, traversing their understanding, belief, interests, attitude, and perception. It is with this in mind that Schäfer & Painter (2021)

argued that climate change communicators should essentially consider prevailing attitudes, values, and psychological "needs" of their audiences. This will enable communicators to identify audience beliefs, perceptions, and, if possible, conflicts of thought and the best and closest related strategies to inform better climate responses. It will also close the gaps between indigenous and scientific climate knowledge, informing a nuanced and balanced response from the public. Harnessing human resources, like population strength, for climate action will become easier if there is an understanding of their knowledge, attitude and perception. For instance, Ibadan, the study area, is one of the most populous and oldest indigenous settlements in West Africa, which boasts a population of over three million inhabitants (Ibadan Urban Flood Project 2003). The potential of such huge human resources can be harnessed for climate actions if there is an in-depth understanding of what they know about climate change. Conversely, such a population can also be potentially dangerous if they engage in activities that contribute to climate change.

In Africa, there is a relatively wide gap between what is locally known and things that are scientifically proven about climate change and its related actions (Akrofi et al 2019). Also, while there is a growing documentation of indigenous climate knowledge, there is no evidence of what truly informs the knowledge base of the public, how it affects attitude, and perception of the phenomenon. Although public awareness in many African countries is reportedly high (GeoPoll 2024), there is a dearth of empirical evidence regarding the internal drivers of this knowledge and how it specifically shapes community attitudes (Leal Filho et al. 2025). Furthermore, there is a disconnect between localized risk perception and formal institutional planning, which often hinders the uptake of adaptation strategies (Okonkwo & Adeleke 2024; Zvobgo et al. 2024). Addressing these gaps requires an in-depth evaluation of what is known about climate change. It is to this end that this study examines residents' knowledge, attitude, and perception of responses to climate change in Ibadan South West Local Government Area, Oyo State, Nigeria.

2.0 LITERATURE REVIEW

Climate change is one of the pressing global challenges of the 21st century, affecting every aspect of the environment and human life, and attracting research interests and concerns (Ofori et al. 2023). Despite these, there are knowledge gaps and varying perceptions on the subject matter, which impede effective climate action. Salem et al. (2022) in their study argued that while many individuals appear to be generally knowledgeable about global warming, notable gaps exist in their understanding of specific factors of climate change. In another study, Biswas et al. (2021) noted that a general knowledge of climate change does not translate to an in-depth understanding and actions. This is as nearly 50% of their respondents who know about climate change lack a substantial understanding of the phenomenon.

Ojomo et al. (2015) documented that an average urban Nigerian is aware of the human activities that contribute to climate change. However, he went further to note that respondents from the southwestern region of Nigeria have more knowledge of localised impacts of climate change compared to those from other regions. Similarly, Okoro (2023) revealed that while urban populations in Anambra State (Nigeria) were generally aware of climate change and its impacts, rural populations had a significant knowledge gap, particularly regarding the causes of climate change. The varying knowledge of the public concerning climate change implies their belief, attitudes, and perceptions. For instance, Asekun-Olarinmoye et al. (2014) in their study of two local government areas of Osun State documented that residents of these areas recognised climate

change over the past decade and attributed it to supernatural explanations, informing their seeking of spiritual interventions rather than behavioural adjustments.

Behaviours are critical to climate change, and identified ones associated with it include smoking, bush burning, and tree felling (Okoro 2023). However, little effort has been made by individuals and communities in Nigerian settlements to address behavioural causes of climate change (Asekun-Olarinmoye 2014). There is a challenge of deeply ingrained cultural beliefs and the need for culturally sensitive education that addresses and corrects these misconceptions. Even for students in Nigeria, the knowledge of climate change issues is reportedly low, with many engaging in environmentally harmful practices (Falaye & Okwilagwe 2016). This suggests a likely connection between what the students know and what they do.

A review of the existing studies reveals a baseline of climate awareness in Nigeria. However, there is a gap in understanding the cognitive dissonance between awareness and behavioral shifts. Also, discussion about public perception, has treated it as a static data point that is disconnected from communication methods and approaches. Bridging this gap, this study investigates the internalized drivers of transition from knowing to acting. It examined how localized misconceptions are structured, thereby offering a culturally-aligned framework for climate communication.

3.0 THE STUDY AREA AND METHODOLOGY

Ibadan South West Local Government Area (Figure 1b), located on longitude 3°05'W and latitude 7°23'N of the equator, is a cosmopolitan local government area in Oyo state, Nigeria. It has a land mass of about 244.55 km². This feature makes it one of the largest local government areas in Oyo state. Ibadan South West Local Government Area is approximately 150km from Lagos by the most direct route and 659km from Abuja Federal Capital City (Oyo State Government 2023). The area experiences a mean annual temperature of 26.5°C and 1,420mm of rainfall (NiMet 2023), within an active LULC transition from green to impervious built-up surfaces (Okonkwo & Adeleke 2024).

The local government area is endowed with good natural, physical, and manmade features which may serve as constraints and at the same time potentials for development. The local government area accounts for the largest concentration of industries and companies in Oyo State. A significant number of the companies in the local government area are located in Oluyole Estate, while others are spread across other areas within the Local Government area. Consequently, due to a high concentration of industries in the LGA, the inhabitants are highly enterprising and resourceful.

This study utilised both secondary and primary data. The secondary data utilised for the study include maps of the study area, published documents, and relevant conference papers that were obtained from online academic databases such as journals and periodicals. Others were sourced from the libraries of Osun State University, Osogbo, and Ladoke Akintola University, Ogbomoso, both in Nigeria. The primary data utilised include information such as the socio-economic and demographic characteristics of the residents, and their Knowledge, Attitude and Perception (KAP) on the causes and evidence of climate change. These were collected using a mixed-method approach, comprising the administration of structured questionnaires and

interviews. The use of both methods gives a more personal, experiential, expressional, and deeper insight into the subject.

To select respondents, a multistage sampling technique was used. The local government area was first stratified into wards using the established wards stratification of the Nigerian Population Census (NPC 2006). From this record, the Local Government Area comprises twelve (12) wards, out of which seven (7) representing 60% were selected using a purposive sampling technique. This selection was done to ensure a representative geographical spread and to capture variations to reflect the diverse urban-rural continuum and varying levels of anthropogenic pressure within the LGA, thereby providing a more robust basis for analyzing climate perception across different residential strata. The selected wards are: Popo-Yemoja (Ward 1), Born–Photo (Ward 2), Beere (Ward 4), Foko (Ward 6), Molete (Ward 9), Oke–Ado (Ward 10), and Oluyole Estate (Ward 11). For every selected ward, the total number of housing units was calculated using ground-truthed Google Earth imagery of the area. From the imagery, a total of 3075 housing units were identified. Using a Cochran formula with finite population correction, the sample size of 206 housing units was determined at 95% confidence level with a marginal error of approximately 6.7%. Hence, 206 houses were selected systematically at an interval of 15 houses. To achieve this, the houses were numbered from 1 – 3075, while the first house was randomly selected from n = 1-15, and subsequent ones selected systematically at n+15. A structured questionnaires were thereafter administered to an adult resident from each of the selected houses, thus making a total of 206 questionnaires that were administered. For every selected house, an adult resident is identified, and a questionnaire is administered.

To evaluate the knowledge of residents about climate change, questionnaires and self-expressed interviews were tailored around questions like: Are you aware of climate change? What is the evidence of climate change? For the questionnaire, a Likert scale rated from 1 to 5 was used to weigh the responses of respondents. The WV (Weight Value) was obtained by summing up the product of the total numbers of responses to each variable and the weight attached to each rating, i.e. (ax1) + (bx2) + (cx3) + (dx4). The mean (X) used in the course of computation was obtained by summing up the WV and dividing it by the total number of variables. The RS was obtained by dividing the generated Weight Value (WV) by the number of respondents (NR (f)) (206). The deviation and the squares of deviation were also calculated to establish the degree (level) of variation in the responses. A positive index value is considered significant to the respondents, while a negative index value is considered insignificant. Other data from the questionnaire were subjected to descriptive statistics such as percentages and chi-square. Interviews were recorded, and analysed thematically.

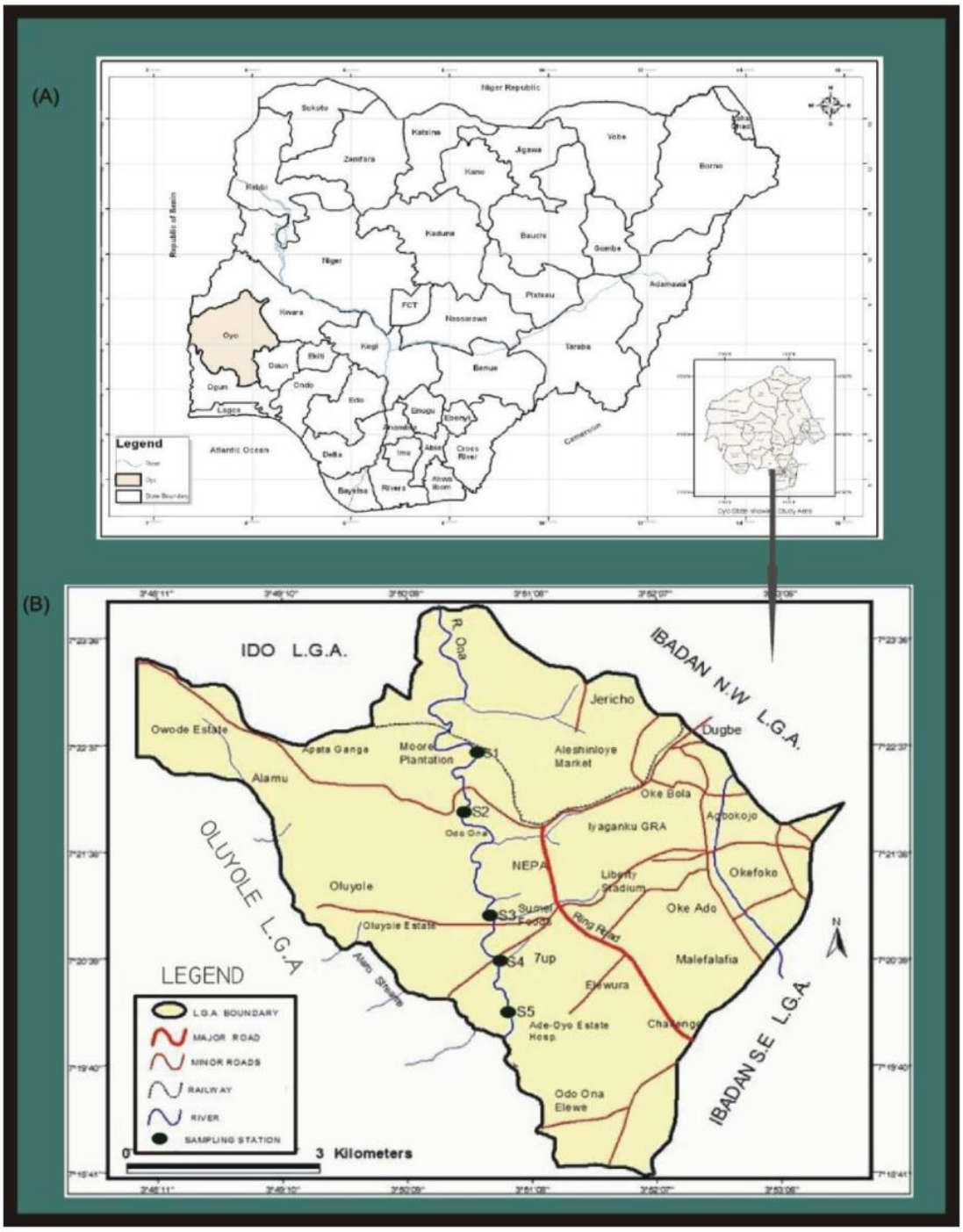

Figure 1a: Oyo State within the context of Nigeria
Figure 1b: Map of Ibadan South West Local Government Area
Source: Adapted from Andem et al. (2012)

4.0 RESULTS

4.1 Socio-economic Characteristics of Respondents

Understanding people's socioeconomic characteristics is crucial for explaining their perception of climate change, as well as their ability to adapt and be resilient (United Nations Framework Convention on Climate Change 2023; Intergovernmental Panel on Climate Change 2022). For this study, the socioeconomic indicators considered are educational attainment, residential density, and gender distribution. As presented in Table 1, we found that 38.8% of the respondents live in high-density areas, followed by those in medium-density areas (35.0%) and low-density areas (26.2%). Specifically, the high-density areas are Popo-Yemoja (Ward 1), Beere (Ward 4), and Foko (Ward 6), while the medium-density areas are Born–Photo (Ward 2), Oke–Ado (Ward 10), and the low-density areas are Oluyole Estate (Ward 11) and Molete (Ward 9). The high-density area characteristically has between 20 and 23 buildings per hectare, while the medium-density areas have between 10 and 14 buildings per hectare, and the low-density areas have fewer than 10 buildings per hectare.

We observed that 38.8% of respondents are women and 61.2% are men, revealing a notable discrepancy in the gender distribution of the respondents. In addition to providing a picture of the population distribution in the study area, this finding brings up important issues regarding a likely gendered dimension to climate vulnerabilities and adaptation abilities in the study area. In this particular context, our findings suggest that men may be more exposed to the impacts of climate change. This contrasts with the submissions of recent studies that consistently emphasise that pre-existing societal inequalities, limited access to resources, and traditional gender roles disproportionately burden women with climate change impacts (UNFCCC 2025; FAO 2023). Meanwhile, it is important to understand that the gendered effects of climate change are not uniform and can differ greatly among societies and contexts due to local sociocultural, political, and economic factors (FAO 2023). While global studies emphasise women's heightened vulnerability, men in certain contexts, particularly those engaged in climate-sensitive occupations like farming or informal trade, might be more exposed to occupational hazards related to climate impacts or face specific health risks during extreme events (Oladele & Okunlola 2020; Iyalomhe & Omoregie 2021). Therefore, even though there are clear differences in the effects of climate change, the gender that is most impacted depends on the particular context and necessitates a sophisticated comprehension of local social structures and livelihood strategies. As a result, attitudes towards and reactions to climate change should be gender-specific, impacted by roles, responsibilities, and information and resource accessibility.

We observed that respondents in the study area have a high educational attainment, as 63.1% of them have at least a Bachelor's degree or Higher National Diploma (HND/BSc), and 13.6% possess postgraduate degrees. Meanwhile, only 1.0% of the respondents had no formal education, no Arabic education, and no primary education. This demonstrates a comparatively educated populace, which could be associated with heightened cognisance, comprehension, and anxiety regarding environmental concerns, such as climate change (Gore & Aina 2020; Awuor et al. 2021; UNESCO 2023). People with higher levels of education are generally more likely to access and process information about climate risks, understand scientific concepts, and adopt adaptive behaviours (Gore and Aina 2020). Also, people with a strong educational background appear to have a solid basis for comprehending complicated climate change issues and possibly

implementing better-informed adaptation measures. According to recent meta-analyses, education about climate change has a major influence on people's knowledge, attitudes, and behaviours regarding climate action (UNESCO 2023).

Table 1

Socio-economic Characteristics of Respondents

Variable	Frequency	Percent
Residential Density		
High	80	38.8
Medium	72	35.0
Low	54	26.2
Total	206	100.0
Gender of Residents		
Male	126	61.2
Female	80	38.8
Total	206	100.0
Educational Level of Respondents		
No formal education	2	1.0
Arabic	2	1.0
Primary	2	1.0
Secondary	18	8.7
NCE/OND	24	11.7
BSC/HND	130	63.1
Post-Graduate	28	13.6
Total	206	100.0

Source: Author's fieldwork 2023.

4.2 Awareness of Climate Change Occurrence

As shown in Table 2, we observed that an overwhelming majority (92.2%) of the respondents are aware of climate change, with only 7.8% reporting no awareness. Amplifying this, nearly all the respondents acknowledge the observed change in the traditional raining period, which they ascribe to climate change. This high level of awareness among residents is significant and confirms both the global prominence of climate change as an issue and its palpable local impacts in urban centres across Nigeria (Adelekan et al. 2020; Gbobaniyi et al. 2023). This widespread recognition is likely influenced by increased media coverage, public discourse, personal experiences with extreme weather events (such as recurrent flooding and heatwaves), and educational initiatives (Gore & Aina 2020; Olatunji et al. 2021). The high educational attainment of the respondents, as previously highlighted, is also likely to contribute to this elevated awareness, as educated individuals tend to be more informed about complex environmental issues (UNESCO 2023; Awuor et al. 2021).

When asked about the causes of climate change, a significant majority (71.8%) of respondents attributed it primarily to human activities. When probed further, through interviews, the respondents reveal that causes of climate change include pollution from automobile exhaust, deforestation, and industrial activities. For one of the interviewees, "*pollution from automobiles*

and industries is the factor causing climate change" (Participant 001, Foko). This perspective aligns strongly with the overwhelming scientific consensus that anthropogenic factors, particularly the emission of greenhouse gases from industrial activities, deforestation, and fossil fuel consumption, are the principal drivers of climate change (IPCC 2021; UNFCCC 2023). The ability of a large proportion of the respondents to recognise human activity as a major cause of climate change indicates a relatively sophisticated understanding of the issue, which is crucial for fostering support for human-centric solutions and policy interventions (Adelekan et al. 2020; Ajayi & Olaleye 2020).

Meanwhile, (19.4%) of the respondents believe that climate change is caused by natural transitions associated with an "ageing planet. While natural climatic variability has always existed, the current rapid and unprecedented rate of warming is overwhelmingly attributed to human actions (IPCC 2021). The persistence of beliefs in purely natural causes, even among an educated population, underscores the need for continued and targeted climate communication campaigns that clarify the distinction between natural climate variability and anthropogenic climate change (Gore & Aina 2020; Olayinka & Alabi 2021). Understanding these differing perceptions of causality is vital, as beliefs about the causes of climate change directly influence willingness to support and engage in adaptation and mitigation efforts (Ajayi & Olaleye 2020; Gbobaniyi et al. 2023).

Table 2
Awareness and Observations of Climate Issues

	Frequency	**Percent**
Awareness of Climate Change Occurrence		
Yes	190	92.2
No	16	7.8
Total	206	100.0
Perceived Causes of Climate Change		
Natural	40	19.4
Human Induced	148	71.8
Both	18	8.7
Total	206	100.0

Source: Author's fieldwork 2023.

4.3 Evidence of Climate Change Observed

We asked the respondents to rate various indicators as evidence of climate change, with the results summarised in Table 3. The deviation values (D) indicate how each indicator's mean rating compares to the overall average perception score. Positive deviation values suggest a stronger perception of significance, while negative values indicate a weaker association.

As evidenced in Table 3, "Fluctuation in the number of days of rainfall" (A4) emerged as the most significantly perceived evidence of climate change, exhibiting the highest positive deviation value (1.41). This finding is particularly salient for Ibadan, a city frequently affected by erratic rainfall patterns that lead to both prolonged dry spells and intense, often destructive, downpours (Olatubara & Adewumi 2020; Olajide et al. 2023). Residents' direct experience with these highly variable precipitation patterns positions this as a readily observable and impactful indicator. Closely following this was "Temperature increase" (A10), with a positive deviation value of 1.39. The effects of urban heat island phenomena and a general upward trend in temperatures are increasingly recognised as significant climatic challenges in Nigerian cities, with direct implications for human health and comfort (Okereke et al. 2022; Adedeji & Popoola, 2021). These strong perceptions suggest that respondents in Ibadan directly associate these meteorological changes with the ongoing occurrence of climate change in their local government area.

Furthermore, "Fluctuations in the production and supply of foods" (A5) also received a notable positive deviation (0.63), highlighting the perceived impact of climate change on livelihoods and food security, which remains a critical concern in many African urban centers reliant on surrounding agricultural regions (Enete & Amusa 2020; Iyalomhe & Omoregie 2021). The positive perception of "Outbreak of climate-related diseases" (A8, 0.56) and "Water scarcity" (A11, 0.21) further emphasises the health and resource security dimensions of climate change as directly experienced by the community, phenomena that are increasingly documented in climate-vulnerable regions (WHO 2023; Adeniyi et al. 2022). Exhibiting deep concern about the evidence of climate change, one of the interviewees noted that: "*Climate change is causing havoc, as the well water that we do fetch dries off often, more worrisome when expected to still be available, as the trend of rain has changed in the past years" (Participant 001, Beere). Water scarcity is now becoming normalized, especially during the unexpected periods, as rains do not fall as expected, which makes the well dry up (Participant, 001, Born-Photo Area).*

In contrast, several indicators received negative deviation values, implying that respondents did not strongly associate them with climate change in their immediate environment. "Disappearance of certain species" (A1, -1.02) and "disappearance of certain species of animals" (A2, -0.99) registered the highest negative deviation values. This lower perception may suggest biodiversity loss. However, a significant global climate change impact might not be as directly or visibly experienced by urban residents as the more immediate, weather-related phenomena. Also, urban dwellers may have less direct engagement with natural ecosystems where such changes are most apparent, or the impacts are perceived as more subtle and less immediately consequential for daily survival.

Perhaps surprisingly, "Frequent flooding" (A6) also yielded a negative deviation value (-0.79), which reflects the success of the Ibadan Urban Flood Project aimed at curbing the then recurrent flood in the city (Olatubara & Adewumi 2020; Olajide et al. 2023). "Loss of land and soil fertility" (A7) recorded a deviation value of 0.00, indicating a neutral response from the respondents. This neutrality may reflect varying perceptions or a lack of strong consensus regarding the significance of this indicator, potentially because urban residents are less directly engaged in agricultural activities where soil fertility is a paramount concern, or they attribute changes in soil quality to non-climatic factors such as land-use change or specific agricultural practices (Oluwatayo & Olukemi 2020).

Generally, from the foregoing, it can be deduced that the respondents primarily perceive climate change through its direct meteorological and socio-economic impacts that profoundly affect their immediate daily lives. These include discernible changes in rainfall patterns, rising temperatures, and the cascading effects these changes have on food supply and public health. This localised understanding of climate change evidence is crucial for tailoring climate communication and adaptation interventions to resonate with the most salient and impactful local experiences effectively.

Table 3
Rating of the Evidence on Climate Change Observed

	VS	S	SS	NS	WV	RS	X	D	D^2
A4 -Fluctuation in the number of days of rainfall	560	99	28	19	706	3.43		1.41	1.9881
A10 -Temperature increase	548	102	36	17	703	3.41		1.39	1.9321
A5 -Fluctuations in the production and supply of foods	60	369	96	20	545	2.65		0.63	0.3969
A8 -Outbreak of climate-related diseases	16	375	126	14	531	2.58		0.56	0.3136
A11 -Water scarcity	84	42	326	8	460	2.23		0.21	0.0441
A7 -Loss of Land and soil fertility	32	54	300	30	416	2.02		0.00	0.0000
A12 –Others	60	114	164	71	409	1.99		-0.03	0.0009
A3 -Excessive dryness	8	72	56	152	288	1.40		-0.62	0.3844
A9 -Shrinking size/disappearance of water bodies	56	15	16	179	266	1.29		-0.73	0.5329
A6 -Frequent flooding	72	75	286	20	253	1.23		-0.79	0.6241
A2 -Disappearance of certain species of animals	8	0	0	204	212	1.03		-0.99	0.9801
A1 -Disappearance of certain species	0	0	0	206	206	1.00		-1.02	1.0404
						24.26	2.02		

Source: Author's fieldwork 2023.
NB: Rating label: 4=Very Significant, 3=Significant, 2= Slightly Significant, 1= Not Significant at All

4.4 Perception of Climate Change

As presented in Table 4, 99% of the respondents think that the government should be in charge of combating climate change. This result supports the widely held belief that climate change is a complicated public issue that necessitates strong regulation, comprehensive policy frameworks, and government intervention (Akintunde & Olaniyi 2021; Gbobaniyi et al. 2023). The belief that only a state-level actor has the power, means, and ability to undertake extensive, coordinated

efforts required to address a problem as big as climate change may be the cause of this strong reliance on government (Amakom & Adebayo 2020). In sharp contrast, only 1% of respondents attributed responsibility to businesses, whereas none of the respondents said that individuals, NGOs, and private entities should be responsible. This glaring absence of credit to non-governmental organisations raises the possibility that respondents view climate change as a problem that necessitates action that is well beyond the scope of private sector or individual efforts.

In contrast to bottom-up, fragmented efforts, top-down, systemic solutions are thought to be necessary due to the magnitude of emissions, infrastructure vulnerabilities, and systemic issues contributing to climate change (Adedeji & Ifegbayi 2021). Shared responsibility across all sectors is frequently emphasized in global climate discourse (UNFCCC 2023; IPCC 2022). Nonetheless, Ibadan residents' strong focus on government is a reflection of local experiences, where governance and public services are supposed to take the lead in resolving pervasive societal issues. This view is amplified by one of the respondents who stated that "*The state and local governments collect taxes and allocations both from the federal government and individuals; they should be able to use the money to address the impact of climate change (Participant 001, Oke Ado)*. For another participant, the opinion is thesame: "*In our area, there are many industries with many of them paying tax and all forms of dues to the government, they should use this to address climate change"* (Participant 002, Oke Ado). These views have important ramifications for climate governance since they show that the public sector is strongly expected to take the lead in developing and implementing climate policies.

Table 4
Observations on Who Controls Climate Change

Suggested Parties	**Frequency**	**Percent**
Government	204	99.0
Company	2	1.0
Individuals	0	0.0
NGOs	0	0.0
Private Bodies	0	0.0
Total	206	100.0

Source: Author's fieldwork 2023.

As shown in Figure 2, the majority of the population (83.5%) believes that mechanized farming is the most effective approach to addressing food supply challenges associated with climate change. Other suggestions include the use of improved seedlings (8.3%), organic fertilisers (2.9%), irrigation farming (2.4%), creation of more agricultural land (1.9%), and land use zoning (1.0%). Notably, no respondents advocated for the improvement of the transport system or other unspecified methods as a solution for improving food supply.

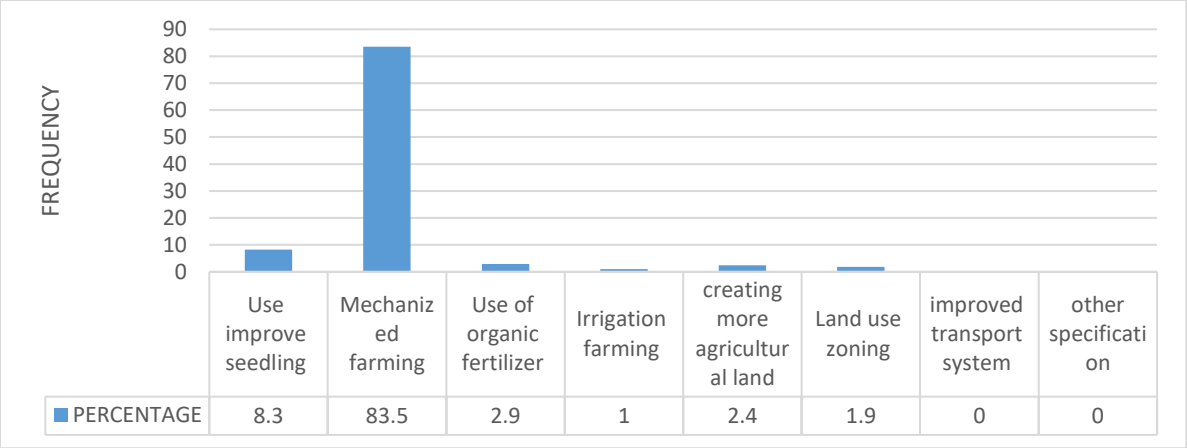

Figure 2: Action to improve Food Supply
Source: Author's Field work 2023.

A chi-square analysis was conducted to assess the relationship between respondents' willingness to adopt various climate change control measures and the suggested interventions. The analysis revealed a chi-square value of 1610.17, significantly exceeding the critical value of 23.686 at the 5% level of significance (Table 5). This result suggests a statistically significant relationship between the proposed control measures and the respondents' willingness to adopt them, indicating that the respondents' choices were not random but rather driven by specific preferences or perceptions regarding the effectiveness of these measures. Measures such as minimizing bush burning, planting of trees, and creating parks and gardens in urban areas received substantial positive responses, indicating strong support from respondents. These high chi-square values show that respondents overwhelmingly favor these actions as effective strategies to combat climate change.

Other measures like adopting eco-friendly farming practices and using bio-gas also gather a relatively moderate support, reflecting a balanced perception of their importance. Measures such as reducing the use of refrigerators and air conditioners and using organic fertilizers were less favored, indicating that respondents either do not see these actions as effective or are less willing to adopt them. The lower chi-square values suggest a weaker association between these measures and respondents' willingness to change behavior. The findings suggest that public policies and campaigns should prioritize actions like afforestation, the creation of urban green spaces, and reducing bush burning, as these measures have strong public support. Educating the public on the benefits of lesser-supported measures might also be necessary to increase their adoption.

Table 5

Chi-square analysis on Control Measures suggested to Climate Change

Control Measures	**YES**			**NO**		
	O	**$(O-E)^2$**	**$(O-E)^2/E$**	**O**	**$(O-E)^2$**	**$(O-E)^2/E$**
D1- Adopting eco-friendly farming practices	32	7673.76	64.16	174	7673.76	88.82
D2- Buy energy saving bulbs	40	6336.16	52.98	166	6336.16	73.34
D3- Creating more forest reserves	52	4569.76	38.21	154	4569.76	52.89
D5- Creating of parks and garden in urban areas	199	6304.36	52.71	7	6304.36	72.97
D6- Increased environmental campaigns	197	5990.76	50.09	9	5990.76	69.34
D7-Minimizing bush burning	206	7464.96	62.42	0	7464.96	86.40
D8-Planting of flowers and lawn in Houses	204	7123.36	59.56	2	7123.36	82.45
D9-Planting of trees	197	5990.76	50.09	9	5990.76	69.34
D10-Reduction in carbon emission (gas flaring)	199	6304.36	52.71	7	6304.36	52.71
D11-Reduction in use of Generator	184	4147.36	34.68	22	4147.36	48.00
D12-Reduction in use of refrigerator and A/C	67	2766.76	23.13	139	2766.76	32.02
D13-Restriction of waste dump on water bodies	54	4303.36	35.98	152	4303.36	49.81
D14-Use of bio-gas	58	3794.56	31.73	148	3794.56	43.92
D15-Use of Organic fertilizer	49	4984.36	41.68	157	4984.36	57.69
D16-Other specifications	56	4044.96	33.82	150	4044.96	46.82
SUM	**1794**		**683.65**	**1296**		**926.52**
	E = 119.60					**E = 86.40**

[Df: (r - 1)(c - 1) = (15 - 1)(2 - 1) = 14], Value at 5%= 23.686, X^2= 1610.17

Source: Author's Field work 2023.

To examine respondents' willingness to adopt various lifestyle changes in response to climate change, we utilised chi-square analysis. From the analysis, as reported in Table 6, the calculated Chi-square value of 1172.99, far exceeding the critical value of 15.507 at the 5% level of significance (df =8), indicates a highly significant relationship between the suggested lifestyle changes and the respondents' stated willingness to adopt them. This strong statistical significance confirms submissions by Culliford and Bradbury (2020) that individuals are often selective and show distinct patterns in their readiness to adopt certain environmentally friendly practices.

The results further illustrate a high inclination among respondents to embrace specific green behaviours. For instance, a substantial majority (202 respondents) indicated a willingness to walk or cycle instead of driving (C1), reflecting a potential for a shift towards sustainable transportation modes, possibly driven by awareness of both environmental benefits and personal

health advantages (Olatunji & Ayanlade 2021). Similarly, 180 respondents expressed willingness to purchase energy-efficient vehicles (C3), and 186 respondents were open to buying energy-saving bulbs and appliances (C5, C7). These responses collectively demonstrate a strong commitment to energy conservation and a readiness to adopt technologies that reduce energy consumption at the household level, which aligns with global efforts to promote energy efficiency as a key climate mitigation strategy (Amujo & Agboola 2020). The willingness to plant trees (C6, 25 respondents) and use public transport instead of personal cars (C8, 156 respondents) also signifies an understanding of carbon sequestration and reduced emissions from transport, though the planting trees response seems lower compared to other positive responses.

Conversely, fewer respondents expressed willingness to reduce the use of heaters (C4, 14 respondents) or to actively reduce greenhouse gas emissions (C9, 12 respondents). The low willingness to reduce heater use is understandable in a tropical climate like Ibadan, where heating is rarely a necessity. This item might be less relevant to the local context compared to regions experiencing cold winters. The particularly low willingness to "directly reduce greenhouse gas emissions" (C9) is more intriguing. This might suggest a lack of understanding regarding direct actions to reduce emissions, or a perception that this responsibility primarily lies with industries and governments, as highlighted in the preceding section. It could also imply a perceived lack of individual agency in directly influencing overall GHG emissions, or simply a reluctance to adopt behaviours perceived as abstract or burdensome without clear immediate benefits or incentives (Adelekan et al. 2020).

Despite these specific challenges, the overall chi-square result confirms that respondents generally express a significant willingness to adapt to most of the suggested lifestyle changes aimed at mitigating climate change. This broad willingness underscores a substantial potential for the successful implementation of climate change adaptation strategies that require individual behavioural shifts. However, the varying levels of willingness for different actions, particularly the seemingly low adoption for reducing heater use (due to irrelevance) or directly reducing greenhouse gas emissions (due to attribution or knowledge gaps), clearly highlight areas where further tailored education, practical incentives, or clearer communication on actionable steps may be necessary to achieve broader and more effective adoption.

Table 6
Chi-square analyses on lifestyles that respondents are willing to adapt

	YES			NO		
	O	**$(O-E)^2$**	**$(O-E)^2/E$**	**O**	**$(O-E)^2$**	**$(O-E)^2/E$**
C1-Walk/Cycle instead of Drive	202	8524.829	77.73	4	8524.829	88.50
C2-Recycle	26	7050.610	64.29	180	7000.610	72.67
C3-Buy energy energy-efficient vehicle	180	4946.309	45.10	26	4946.309	51.35
C4-Reduce the use of a heater	14	9152.749	83.46	192	9152.749	95.02
C5-Buy energy-saving bulbs	186	5826.269	53.13	20	5826.269	60.48
C6-Planting trees	25	7169.009	65.37	181	7169.009	74.42
C7-Buying energy-saving appliances	186	5826.269	53.13	20	5826.269	60.48
C8-Use of public transport instead of your Car	156	2146.469	19.57	50	2146.469	22.28
C9- Reduce Greenhouse gas emissions	12	9539.429	86.98	194	9539.429	99.03
SUM	**987**		**548.76**	**867**		**624.23**
			E = 119.60			**E = 86.40**

[Df: (r - 1) (c - 1) = (9 - 1)(2 - 1) = 8], Value at 5%= 15.507, X^2= 1172.99

Source: Author's fieldwork 2023

5.0 DISCUSSION OF FINDINGS

This section comprehensively discusses the major findings on residents' knowledge, attitudes, and perceptions of climate change in Ibadan, Nigeria. The findings are discussed within the context of existing and recent literature (2020 onwards), highlighting trends, divergences, and contributions to the broader discourse on climate change at the local level.

5.1 Residents' Knowledge and Awareness of Climate Change

We found that the vast majority of people in the study area have a basic understanding of climate change, especially when it comes to acknowledging its existence and naming some of its human-caused causes, like industrial emissions, deforestation, and unsustainable farming methods. This result is mostly in line with worldwide patterns that indicate a growing public consciousness of climate change, especially in areas that are directly feeling its severe effects (IPCC 2022; Gbobaniyi et al. 2023). The majority of respondents in recent studies conducted in Nigeria by Gbobaniyi et al. (2023) and Adelekan et al. (2020) reported similar levels of awareness in various urban settings, recognising climate change as a serious and urgent issue. This broad recognition in the study area is probably supported by increased media attention, community discussions, and firsthand experiences with climate-related events like frequent flooding and heatwaves, as was previously discussed in the section above.

Nevertheless, we found notable gaps in residents' knowledge of climate change, particularly for more specific and nuanced knowledge. Although the locals understood the general idea of climate change, their knowledge of the specific scientific processes—such as the complexities of the greenhouse effect and the long-term, systemic implications of climate change

on intricate ecological and human systems—was conspicuously lacking (Ajayi & Olaleye 2020). This gap in detailed scientific understanding is a concern echoed in other contemporary studies, such as those by Awuor et al. (2021) and UNESCO (2023), who found that while awareness of climate change is widespread, the depth of understanding varies significantly, often profoundly influenced by factors such as educational attainment, equitable access to reliable information, and direct personal experience with climate-related events.

From our findings, there is an urgent and critical need for more focused and advanced educational initiatives in the study area, even though previous awareness-raising efforts have been somewhat successful in establishing basic recognition. In addition to reaffirming the reality of climate change, these programs ought to systematically increase local awareness of its underlying mechanisms, complex long-term effects, and multifaceted causes. Increasing community outreach programs that strategically use local languages and culturally relevant examples to explain complex scientific concepts effectively could be one way to achieve this, as it would ensure a wider and more impactful reach within the diverse communities (Gore & Aina 2020; Olatunji et al. 2021).

5.2 Perception of Climate Change Impacts

According to recent research on the effects of climate change in Nigeria, respondents' perceptions of these impacts varied, but they were generally marked by a clear recognition of negative effects on vital sectors like agriculture, water resources, and public health (Adeniyi et al. 2022; Olajide et al. 2023). Most respondents said they had seen observable changes in local rainfall patterns, higher temperatures, and more frequent extreme weather events, all of which they directly linked to climate change. This view is in line with research conducted in sub-Saharan Africa, where locals regularly attribute environmental degradation and unpredictable weather patterns to climate change (Gbobaniyi et al. 2023; Dube & Phiri 2013).

Interestingly, some locals believe that some effects of climate change are less severe or immediate than others, which may indicate a discrepancy between their personal experiences and the general scientific consensus regarding the issue's urgency. For instance, despite Ibadan's history of flooding, the perceived significance of "frequent flooding" as direct evidence of climate change is lower, which points to an attribution gap where local infrastructure failures may obscure the climatic drivers (Olatubara & Adewumi 2020; Gbobaniyi et al. 2023). Inherent cultural beliefs, differences in personal experiences with particular climate events, and the differing efficacy of local climate communication strategies in connecting observed phenomena to more general climatic shifts are some of the reasons for this disparity in perception (Adewuyi et al. 2020). Thus, the results point to a strong need for more detailed and regional climate impact analyses in addition to highly specialised communication tactics. To ensure that the urgency and complexity of the effects of climate change are widely understood, these tactics must speak to the unique experiences, worries, and regional dialects of various community segments.

5.3 Attitudes Towards Climate Change Mitigation and Adaptation

According to the study, most respondents had an optimistic and proactive attitude towards strategies for mitigating and adapting to climate change. Numerous respondents indicated a strong desire to take a variety of actions, including embracing environmentally friendly farming methods,

cutting back on energy use, and aiding in reforestation initiatives. This finding is in line with recent scholarly research that notes that the perceived direct effects of climate change on people's lives and livelihoods are frequently closely associated with public support for climate action (Adger et al. 2023; IPCC 2022).

Nonetheless, a noteworthy discovery was the strong dependence of the respondents on government and business to spearhead climate actions. Although residents showed a clear willingness to take personal action, there was a strong fundamental belief that to achieve a meaningful and scalable impact, larger, systemic changes—such as extensive policy interventions, significant technological advancements, and macro-level regulatory frameworks—are essential. This is consistent with the UN-Habitat (2024) and Leiserowitz et al. (2021) findings, which consistently emphasise the importance of individual actions, but also the indispensable role of governments and corporations in bringing about significant, transformative change. This dependence on outside parties emphasises how vital it is to empower local communities through focused capacity-building programs. Beyond just willingness to take action, such programs must be created to give locals the useful tools, easily accessible resources, and fundamental knowledge they need to play more active and productive roles in climate action (GCA 2024; UNDP 2023). It also strongly emphasises the urgent need for strong policy frameworks that, in addition to encouraging and facilitating individual actions, also—and this is vital—create an environment that supports coordinated, group action at the community level. In the face of growing climate challenges, this dual strategy is crucial for creating an urban landscape that is genuinely resilient and adaptable (UNFCCC 2023).

6.0 IMPLICATIONS AND CONCLUSION

The findings of this study have significant implications for both climate-related policy and practice in Ibadan and other comparable urban settings. First of all, residents' high levels of basic climate change awareness offer a strong basis for additional involvement and action. Nonetheless, policies should prioritise and fund comprehensive educational programs in light of the gaps in detailed scientific knowledge that have been identified. The goal of these programs should be to increase local comprehension of climate change, specifically its scientific foundations, underlying causes, and long-term effects. Crucial actions include stepping up community outreach with easily accessible, culturally appropriate examples (UNESCO 2023; Olatunji et al. 2021).

Secondly, the positive attitudes toward mitigation and adaptation, coupled with the pronounced reliance on government and industry, highlight the need for a dual-track approach to climate action. While it is essential to empower individuals and communities to take proactive measures through capacity-building and incentivization (GCA 2024), it is equally critical for policy frameworks to support systemic changes that address the root causes of climate change. This could include, but is not limited to, robust regulatory frameworks to curb industrial emissions, the implementation of incentives for adopting sustainable practices across sectors, and strategic investments in renewable energy infrastructure (Akintunde & Olaniyi 2021). Governmental departments, such as the Federal Ministry of Environment (with its Department of Climate Change), and key agencies like the National Environmental Standards and Regulations Enforcement Agency (NESREA) and the National Council on Climate Change (NCCC), must intensify efforts. They need to streamline processes and align their policies and functions to

directly initiate positive changes and foster a behavioural shift towards a more inclusive and integrated management of the environment, working in concert with educational institutions.

The study profoundly underscores the importance of tailoring climate action strategies to local contexts. The variation in perceived effectiveness and willingness to adopt different control measures indicates that one-size-fits-all approaches are unlikely to be successful or sustainable. Instead, policies and programs should be flexible, allowing for dynamic adaptation to local realities. This ensures that interventions are not only culturally relevant but also practically feasible and economically viable for the diverse segments of the population in Ibadan (Mertz et al. 2009; Gbobaniyi et al. 2023).

Lastly, several Sustainable Development Goals (SDGs) speak to the relevance of climate change issues and perceptions in today's society, however, the most directly relevant goal to this study is Goal 13: Climate Action. Findings of this research recognize the interconnectedness of climate change with other development priorities, such as water, energy, consumption, production, oceans, and land use. The impacts of which significantly affect the socio-economic aspect of people, hence the need to fully bring to the consciousness of people adaptive and sustainable measures to curb the negative impacts.

Based on the study's findings, we can conclude that while there's widespread awareness of climate change in the study area, residents' detailed knowledge and willingness to undertake certain mitigation actions are limited. Specifically, the perceived causes and observed evidence of climate change, such as bush burning, poor sanitation, fuel consumption, and settlement expansion, show significant relationships within the surveyed enumeration areas, as indicated by the chi-square values (15.507 and 23.686, respectively).

7.0 RECOMMENDATIONS

Based on the outcomes of this study, the following recommendations are proffered:

A. Enhanced Climate Change Communication and Awareness Initiatives: To spread interesting and approachable educational campaigns to locals, government organisations should collaborate with science-based organisations and neighbourhood associations. Local proverbs, storytelling, traditional theatre (like the Alarinjo or Yoruba Travelling Theatre), and town hall meetings hosted by esteemed elders (Ibadan Elders Council) and traditional leaders are all examples of indigenous communication channels that should be incorporated into these initiatives. This strategy will guarantee that all demographic groups understand messages and fit into regional cultural contexts. To promote a common understanding and sense of urgency, it is imperative that key messages regarding climate change, its mechanisms, and local impacts be conveyed to the public, private sector, and policymakers.

B. Integrating Climate Actions into CDAs' Functions: At the local level, there are community development associations and community-based organisations organised by residents at different localities, with diverse social functions. These CDAs and CBOs can be harnessed to advance climate actions through enlightenment and the organisation of community-based climate actions.

C. Strengthening Resilience and Reducing Vulnerability: Governments and relevant organisations such as the International Institute of Tropical Agriculture and the Nigerian Institute of Horticultural Research should intensify efforts to reduce vulnerability and build resilience to climate change impacts in Ibadan and similar places in the country. This will enable the leveraging of natural defences provided by ecosystems and the integration of indigenous ecological knowledge.

D. Promoting Sustainable Forest Management: The sustainable management of forests is critical in the fight against climate change, as it plays a catalytic role in reducing emissions from deforestation and forest degradation. Governments should ensure that policies and practices are in place to support sustainable forest management, thereby helping developing countries realize the economic and environmental opportunities that sustainably managed forests provide. This involves promoting reforestation, afforestation, and the conservation of existing forests, which are essential in maintaining biodiversity, regulating the climate, and providing livelihoods for millions of people.

E. Collaborative Action Among Government, Private Sector, and the Public: The government, private sector, and the general public need to collaborate and build on the knowledge and experience accumulated over decades of climate leadership. Such collaboration is necessary to ensure that climate change does not disproportionately affect vulnerable communities and environments. By working together, these stakeholders can develop and implement effective strategies for climate change mitigation and adaptation, drawing on shared resources, expertise, and experiences.

F. Capacity Building and Education: To effectively address climate change, it is vital to invest in capacity building and education at all levels. Governments and educational institutions should prioritize climate change education, ensuring that individuals, particularly the youth, are equipped with the knowledge and skills necessary to understand and address climate change. This could include integrating climate science into school curricula, offering training programs for professionals in relevant fields, and conducting public awareness campaigns.

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