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Bridging The Awareness–Behavior Gap: Determinants Of Climate Change Mitigation Behavior In An Urban Nigerian City

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Abstract: Climate change mitigation increasingly depends on individual behavioral change, yet a persistent awareness–behavior gap limits the translation of knowledge into action, particularly in rapidly urbanizing regions of the Global South. This study investigates the determinants of climate change mitigation behavior among urban residents in Benin City, Nigeria, focusing on the roles of climate awareness and perceived structural challenges. A cross-sectional survey of 80 respondents was analyzed using exploratory factor analysis, paired-sample t-tests, and hierarchical multiple regression. The results reveal a statistically significant awareness–behavior gap, with climate awareness levels exceeding actual mitigation practices ($t = 5.89$, $p < 0.001$). Regression findings indicate that climate change awareness is the strongest predictor of mitigation behavior ($\beta \approx 0.45$, $p < 0.001$), increasing the model's explanatory power from 8.3% to over 38%. Although structural challenges such as cost and limited infrastructure were reported, they did not significantly predict mitigation behavior. Overall, the final model explains approximately 39–46% of the variance in mitigation practices. These findings provide important empirical evidence from an underrepresented African urban context, demonstrating that while awareness is a critical driver of pro-environmental behavior, it is insufficient on its own to produce consistent behavioral change. The study advances the literature by explicitly quantifying the awareness–behavior gap and showing that low-cost, household-level mitigation actions may be less constrained by perceived barriers than commonly assumed. Strengthening the link between environmental knowledge and actionable practices is essential for enhancing individual contributions to climate mitigation in rapidly growing cities of the Global South

1. Introduction

Climate change has emerged as one of the most critical environmental challenges of the twenty-first century, posing significant threats to ecosystems, economic development, and human well-being across the globe. Rising global temperatures, extreme weather events, and shifting precipitation patterns have intensified environmental vulnerabilities, particularly in developing regions [IPCC], 2023). regions where adaptive capacity remains limited (Intergovernmental Panel on Climate Change Anthropogenic greenhouse gas emissions generated through activities such as fossil fuel combustion, deforestation, industrial production, and unsustainable consumption patterns continue to accelerate global climate change, thereby increasing the urgency for effective mitigation and adaptation strategies (United Nations Environment Programme [UNEP], 2023).

While international agreements and national policies play a crucial role in addressing climate change, increasing attention has been directed toward the role of individual behavioral actions in achieving meaningful emission reductions. Household consumption patterns, transportation choices, energy use, and waste management practices collectively contribute significantly to global greenhouse gas emissions (Dietz *et al.*, 2022). Behavioral research suggests that individual actions can generate substantial emission reductions when adopted widely across populations. Consequently, understanding the social and psychological factors that influence climate mitigation behavior has become an important area of inquiry within environmental governance and sustainability research.

A growing body of literature highlights environmental awareness and knowledge as key determinants of pro-environmental behavior. Individuals who possess greater awareness of climate change causes, impacts, and risks are more likely to support environmental policies and engage in sustainable behavioral practices such as energy conservation, waste reduction, and responsible consumption (van Valkengoed *et al.*, 2022; Steg *et al.*, 2021). Environmental awareness enhances individuals' perception of environmental risks and strengthens their sense of personal responsibility toward environmental protection. As a result, climate education, public awareness campaigns, and environmental communication strategies have increasingly been recognized as critical tools for promoting behavioral change and encouraging citizen participation in climate mitigation efforts.

Empirical studies across different regions have found a positive relationship between climate change awareness and mitigation behavior. For example, Lee *et al* (2020) found that individuals with higher levels of environmental knowledge were more likely to adopt sustainable consumption practices and energy-saving behaviors. Similarly, Bouman *et al*. (2021) reported that awareness of climate change risks significantly increases public support for climate policies and individual mitigation actions. Research has also shown that factors such as income, education, and access to resources may influence individuals' ability to translate awareness into action (Steg, 2018). For instance, households with limited financial resources may struggle to adopt certain climate mitigation technologies, such as renewable energy systems or energy-efficient appliances.

Environmental awareness has increasingly been recognized as a key factor influencing climate change mitigation behavior across different socio-economic contexts. Recent studies have demonstrated that individuals with higher levels of climate knowledge are more likely to adopt environmentally responsible practices and support climate policies. For instance, van Valkengoed *et al.* (2022) found that climate knowledge significantly predicts mitigation behavior across several countries, although the strength of this relationship varies depending on contextual and socio-economic factors. Similarly, Steg *et al*. (2021) emphasized that psychological factors such as awareness, values, and personal norms play a crucial role in motivating individuals to engage in energy-saving and sustainable consumption behaviors. More recent research also highlights the importance of integrating behavioral insights into climate policy and sustainability planning. For example, Bouman *et al*. (2021) argue that environmental values and awareness shape public support for climate policies and influence individual environmental actions.

Despite growing global awareness of climate change, translating knowledge into meaningful behavioral action remains a persistent challenge. Many studies have identified what is commonly described as the awareness–behavior gap, where individuals express concern about climate change but do not consistently engage in mitigation behaviors (Gifford, 2011). Structural constraints such as financial limitations, lack of institutional support, limited access to sustainable infrastructure, and

social norms may hinder individuals' ability to translate environmental awareness into practical actions. Understanding the interplay between awareness, perceived barriers, and behavioral outcomes is therefore essential for designing effective climate policies and behavioral interventions.

These challenges are particularly pronounced in developing countries, where rapid urbanization, population growth, and infrastructural limitations intensify environmental pressures. Urban areas in many developing regions face rising energy demand, transportation congestion, waste management challenges, and environmental degradation. African cities are among the fastest-growing urban centers globally, and this rapid urban expansion has significant implications for climate change mitigation and environmental sustainability. As urban populations grow, individual consumption patterns and household energy use become increasingly important contributors to greenhouse gas emissions.

Nigeria represents a particularly important context for examining climate mitigation behavior. As the most populous country in Africa and one of the continent's fastest-growing economies, Nigeria faces significant environmental challenges associated with urbanization, energy demand, and infrastructure development. The country is highly vulnerable to climate change impacts, including flooding, desertification, coastal erosion, and changing rainfall patterns, which threaten agricultural productivity, infrastructure, and human livelihoods (Federal Ministry of Environment, 2022). At the same time, Nigeria's urban areas continue to experience rapid population growth and increasing environmental pressures.

Urban residents in Nigerian cities often rely heavily on fossil fuel-based energy sources, particularly petrol-powered generators, due to unreliable electricity supply. This widespread reliance on generators contributes significantly to carbon emissions and air pollution (Adekola *et al.*, 2021). In addition, inadequate public transportation systems encourage the widespread use of private vehicles and motorcycles, further increasing greenhouse gas emissions. Waste management challenges and unsustainable consumption practices also contribute to environmental degradation in many urban centers. These conditions highlight the importance of promoting individual-level climate mitigation actions as part of broader strategies for addressing climate change.

Benin City, one of the major urban centers in southern Nigeria, provides an important case for examining these dynamics. Like many rapidly growing cities in developing countries, Benin City faces increasing environmental pressures associated with population growth, energy consumption, transportation demand, and waste management challenges. Understanding how residents perceive climate change and how these perceptions influence their environmental behavior can provide valuable insights for designing effective climate policies and local sustainability interventions.

This study therefore examines the relationship between climate change awareness, perceived challenges, and climate mitigation practices among residents of Benin City, Nigeria. Drawing on the Theory of Planned Behavior (Ajzen, 1991), the study explores how awareness and perceived barriers influence individuals' engagement in climate mitigation activities. Specifically, the study aims to: (1) assess the level of climate change awareness among residents of Benin City, (2) identify the climate mitigation practices adopted by individuals, (3) examine the perceived challenges that may hinder mitigation actions, and (4) analyze the influence of awareness and perceived barriers on mitigation behavior using hierarchical regression analysis.

By providing empirical evidence on the behavioral drivers of climate mitigation in an urban Nigerian context, this study contributes to the growing literature on environmental behavior and climate

governance in developing countries. The findings offer important insights for policymakers, environmental organizations, and urban planners seeking to promote sustainable behavioral practices and strengthen climate resilience in rapidly urbanizing cities. Despite the growing body of research on climate change awareness and pro-environmental behavior, most empirical studies have focused on developed regions such as Europe and North America. Consequently, there remains limited empirical evidence on how climate change awareness influences individual mitigation behavior in rapidly urbanizing African cities where infrastructural, economic, and institutional conditions differ substantially. This study addresses this gap by examining the relationship between climate change awareness and mitigation behavior among urban residents in Benin City, Nigeria. This study contributes to the growing literature on climate change behavior in several important ways.

First, it provides empirical evidence on the determinants of climate mitigation behavior within a rapidly urbanizing African city. While a large body of environmental behavior research has been conducted in Europe and North America, empirical studies examining the behavioral drivers of climate mitigation in African urban contexts remain limited.

Second, the study contributes to the literature on the awareness–behavior gap by examining whether climate change awareness translates into practical mitigation actions among urban residents. By combining descriptive behavioral measures with hierarchical regression analysis, the study provides insights into the extent to which awareness influences behavioral outcomes in resource-constrained environments.

Third, the study extends existing research by evaluating the role of perceived structural challenges in shaping mitigation behavior. In many developing countries, individuals face infrastructural and economic constraints that may hinder the adoption of sustainable practices. As such understanding whether such barriers significantly influence climate mitigation behavior is therefore essential for designing effective climate policies.

Finally, the study provides policy-relevant insights for promoting individual-level climate action in rapidly urbanizing cities in the Global South. The findings highlight the importance of environmental awareness while also emphasizing the need for supportive institutional and infrastructural frameworks to facilitate sustainable behavioral change. The study is also guided by the following hypothesis:

H1: Climate change awareness has a significant positive influence on climate change mitigation practices among residents.

H2: Perceived challenges to climate mitigation actions have a significant negative influence on climate change mitigation practices among residents.

2.0 Conceptual framework

This study is guided by the **Theory of Planned Behavior (TPB) (**Ajzen, 1991**)**, which posits that human behavior is influenced by attitudes, subjective norms, and perceived behavioral control. In the context of climate mitigation, awareness of climate change can influence individuals' attitudes toward environmental protection and their willingness to adopt sustainable behaviors. Climate change awareness increases individuals' understanding of environmental risks and the importance of mitigation actions. Individuals who possess higher levels of environmental knowledge are more likely

to recognize the consequences of climate change and develop positive attitudes toward environmentally responsible practices. However, the translation of awareness into action may be constrained by perceived barriers such as financial limitations, lack of institutional support, or limited access to sustainable alternatives.

Based on this framework, the present study proposes that climate change awareness positively influences climate mitigation practices, while perceived challenges may negatively influence individuals' ability to adopt such practices.

Climate Awareness --------\
Environmental Attitude ----/ ----> Mitigation Behavior
Perceived Challenges ----/

Control Variables
Age
Gender
Education
Income

3.0 Materials and methods

3.1 Research Design

This study adopted a quantitative cross-sectional research design to examine the relationship between climate change awareness, perceived challenges, and climate change mitigation practices among residents of Benin City, Nigeria.

3.2 Study Area

Benin City, the capital of Edo State, Nigeria, as shown in Figure 1, is located at geographic coordinates 6.34°N latitude and 5.62°E longitude. It is located in the tropical rainforest zone of southern Nigeria. The city is one of the biggest urban centres in Nigeria. The climate is tropical monsoon, with distinct wet and dry seasons. The rainy season normally lasts from April to October, with June through September seeing the most rainfall, averaging 2284.5 mm (Odiana and Idahosa-Ohio, 2023). Lower humidity and sporadic harmattan winds, which bring dry, dusty air from the Sahara Desert, are characteristics of the dry season, which runs from November to March. All year long, the average temperature is 27.7°C mm per year (Odiana and Ochulor, 2024).

3.3 Data Collection

Primary data were collected through a structured questionnaire administered to residents in selected areas of Benin City. The questionnaire contained sections on socio-demographic characteristics, climate change awareness, perceived challenges to mitigation, and mitigation practices adopted by respondents. The sample was dominated by young adults aged 18–25 years, who constituted 76.3% of the respondents. This reflects the demographic composition of the surveyed locations where a large proportion of residents and participants in the survey locations were students and early-career individuals. Young adults represent an important demographic group in climate change research

because they are often more exposed to environmental information through education, media, and digital platforms and are expected to play a critical role in shaping future climate-related behaviors and policy engagement.

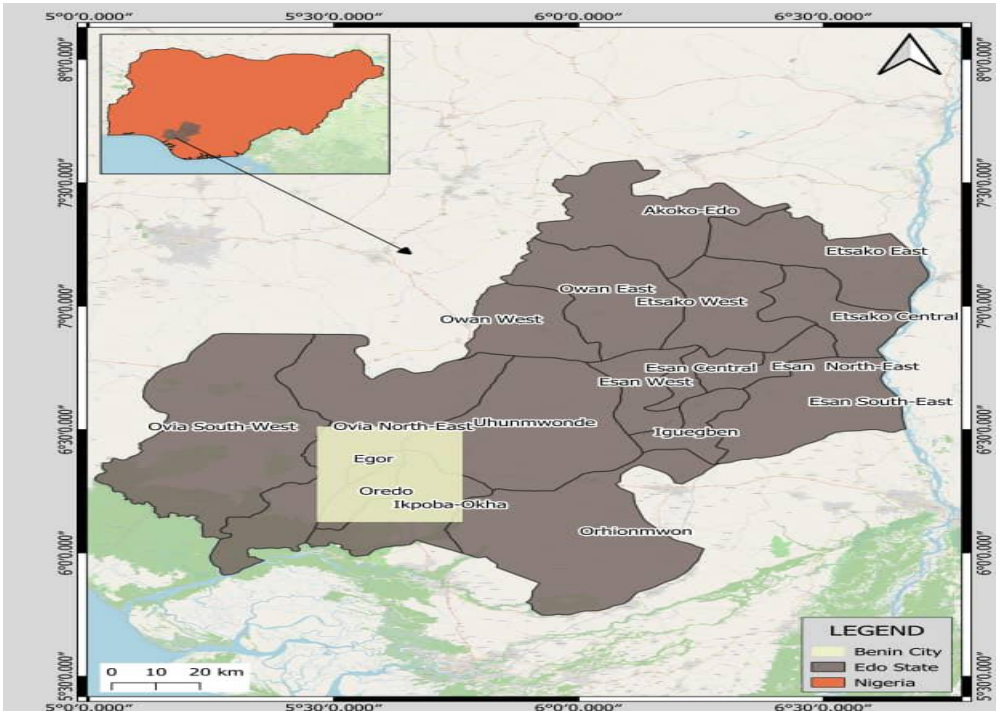

Figure 1: Map of Benin City

The sample size of 80 respondents is considered adequate for regression analysis. According to Green (1991), the minimum sample size required for testing individual predictors in multiple regression is $N \geq 50 + 8m$, where m represents the number of predictors in the model. Given that the main theoretical predictors in this study are climate change awareness and perceived challenges, the minimum required sample size would be 66 respondents. The sample used in this study therefore exceeds this threshold. In addition, previous methodological studies indicate that sample sizes between 70 and 90 respondents are sufficient to detect medium effect sizes in regression models with a small number of predictors (Cohen, 1992)

3.4 Measurement of Variables

The dependent variable in this study is climate change mitigation practices, measured using respondents' self-reported engagement in environmentally friendly behaviors such as energy conservation, waste reduction, and sustainable consumption practices. The independent variables include:

- **Climate change awareness**, measured using respondents' knowledge and understanding of climate change causes and impacts.
- **Perceived challenges to mitigation**, measured based on respondents' perceptions of barriers such as financial constraints, limited institutional support, and lack of access to sustainable infrastructure.

Responses were measured using Likert-scale items and aggregated to generate composite indices for the regression analysis.

3.5 Data Analysis

Reliability and construct validity were assessed before the regression analysis. Internal consistency reliability was evaluated using Cronbach's alpha, while exploratory factor analysis was conducted to confirm the factor structure of the measurement scales. The data were analyzed using descriptive statistics and hierarchial regression analysis. To examine the determinants of climate mitigation behavior, hierarchical multiple regression analysis was employed. Hierarchical regression allows the researcher to assess the incremental explanatory power of different groups of variables in predicting the dependent variable. In the first stage, socio-demographic variables including age, gender, education level, and income were entered into the regression model to control for individual characteristics that may influence environmental behavior. In the second stage, climate change awareness was introduced to assess its independent contribution to explaining mitigation behavior beyond demographic characteristics. In the third stage, perceived challenges to mitigation were added to evaluate whether structural or socioeconomic barriers significantly influence individuals' ability to engage in climate mitigation practices.

The hierarchical model is expressed as follows:

Stage 1 (Control Variables)

$CM = \beta_0 + \beta_1 Age + \beta_2 Gender + \beta_3 Education + \beta_4 Income + \varepsilon$

Stage 2 (Awareness)

$CM = \beta_0 + \beta_1 Age + \beta_2 Gender + \beta_3 Education + \beta_4 Income + \beta_5 Awareness + \varepsilon$

Stage 3 (Challenges)

$CM = \beta_0 + \beta_1 Age + \beta_2 Gender + \beta_3 Education + \beta_4 Income + \beta_5 Awareness + \beta_6 Challenges + \varepsilon$

This modeling approach enables the study to evaluate how much additional variance in mitigation behavior is explained by awareness and perceived challenges beyond demographic factors

Where:

CM = Climate mitigation practices
β_0 = Intercept
β_1–β_2 = Regression coefficients
ε = Error term

Regression analysis was used to determine the strength and significance of the relationship between the independent variables and mitigation behavior.

$$\textbf{Mean } (\bar{\mathbf{x}}) = \frac{\Sigma x_i}{N} \text{ ---------- Equation 3.2}$$

Where, Σx_i = Summation of all individual items

x_i = Mean of the *x*-variable in a sample

n = Total number of entries

$$\textbf{Standard Deviation } (\boldsymbol{\sigma}) = \sqrt{\frac{\Sigma(x_i - \bar{x})}{n}} \text{ ---------- Equation 3.3}$$

Where, $\Sigma(x_i - \bar{x})$ = Summation of all the individual items, x_i = Mean of the *x*-variable in a sample, $\bar{x}$ = Mean of the values of the *x*-variable and n = Total number of entries

However, Statistical Package for Social Scientists (SPSS) version 22.0 computer software was used for speed and accuracy.

4.0 Results

The reliability of the instrument used for this study is 0.819 as shown in **table 1** revealing an adequate reliability of our measures.

Table 1 Reliability Statistics

Cronbach's Alpha	No of Items
0.819	47

4.1 Construct Validity Test

Exploratory factor analysis (EFA) using principal component extraction with varimax rotation (**Tables 2,3 and 4**) was conducted to assess the construct validity of the measurement scales using data from respondents in Benin City (N = 80). The Kaiser–Meyer–Olkin (KMO) measure of sampling adequacy was 0.79, exceeding the recommended threshold of 0.60, while Bartlett's Test of Sphericity was statistically significant ($p < 0.001$), indicating that the dataset was suitable for factor analysis. Three factors with eigenvalues greater than one were extracted, corresponding to climate change awareness, mitigation practices, and perceived challenges. These factors collectively explained 63.1% of the total variance. All measurement items loaded strongly on their respective constructs with factor loadings above 0.60, confirming the construct validity of the scales used in this study.

Table 2. Sampling Adequacy Test

KMO and Bartlett's Test

Test	Value
KMO (Kaiser–Meyer–Olkin)	0.79
Bartlett's Test of Sphericity	$p < 0.001$

Interpretation

- KMO > 0.70 = good sampling adequacy
- Bartlett significant = data suitable for factor analysis

Table 3 Total Variance Explained)

Factor	Variance Explained
Climate awareness	30.6%
Mitigation practices	19.4%
Perceived challenges	13.1%
Total variance explained	63.1%

For social science research:

- Above 60% = strong construct validity

Table 4 Rotated Component Matrix (Simplified)

Item	Awareness	Mitigation	Challenges
Awareness of climate change	0.82		
Human activities cause climate change	0.79		
Knowledge of climate change causes	0.75		
Reduce electricity use		0.74	
Use energy-saving bulbs		0.71	
Avoid burning refuse		0.69	
High cost prevents action			0.78
Lack of sustainable alternatives			0.74
Limited government support			0.72

All factor loadings > **0.60**, which is considered strong.

4.2 Demographic Characteristics of the Respondents

The gender, age, monthly income and educational level of the respondents are shown in **Table 5**. There were 35.0% male and 65.0% female which means that most of the respondents were female. In terms of age, 76.3% were between 18-25 years. This showed that most of the respondents were in their economically productive age. This is beneficial because young people could have higher tendencies to engage in carbon emitting activities and for a longtime.

Table 5 Demographic characteristics of the Respondents

Characteristics	Components	Frequency	Percentage (%)
Gender	Male	28	35.0
	Female	52	65.0
	Total	80	100.0
Age	18-25	61	76.3
	26-35	12	15.0
	36-45	6	7.5
	Above 46	1	1.3
	Total	80	100.0
Monthly income	Less than #50000	43	53.8
	#50000-100000	22	27.5
	#101000-#200000	10	12.5
	ABOVE #201000	5	6.3
	Total	80	100
Educational Level			
	Secondary	22	27.5
	Tertiary	58	72.5
	Total	80	100.0

Source: Researcher's computation, 2024

The predominance of young adults in the sample provides important insights into climate mitigation behavior among younger urban populations. Young people are increasingly recognized as key actors in climate governance and environmental advocacy, particularly in rapidly urbanizing regions of the Global South. Previous studies suggest that younger populations often demonstrate higher levels of environmental awareness due to greater exposure to environmental education and digital information sources (Lee *et al*., 2020; van Valkengoed *et al*., 2022). However, younger individuals may also face

economic and structural constraints that limit their ability to adopt certain mitigation practices. Understanding climate behavior among this demographic group is therefore important for designing targeted awareness campaigns and youth-focused sustainability initiatives. As shown in the table, 53.8% earn less than #50,000 monthly with only 6.3% earning above #200,000. Finance is a major factor in mitigating climate change as individuals would be required to change some practices that contribute immensely to climate change to more friendly practices. These changes would need money to achieve. The result also revealed that 72.5% had tertiary education signifying that most of the respondents were literate. Being mostly literate connotes that accepting innovations like carbon pricing and best practices that could help in mitigating climate change would not be a much problem in the study area.

4.3 Awareness of climate change

The results as shown in **Table 6** shows that most of the respondents agree on being aware of climate change, human activities contribute significantly to climate change and being knowledgeable about the major causes of climate change.

Table 6 Awareness of climate change

ITEMS	SA Freq (%)	A Freq (%)	UD Freq (%)	D Freq (%)	SD Freq (%)	Mean	STD	Remark
I am aware of the concept of climate change.	36(45)	36(45)	07(8.8)	00(0.0)	01(1.3)	4.33	0.742	High awareness
I understand that human activities contribute significantly to climate change.	40(50)	31(38.8)	04(5.0)	04(5.0)	01(1.3)	4.31	0.880	High awareness
I am knowledgeable about the major causes of climate change.	31(38.8)	35(4.38)	13(16.3)	01(1.3)	0(0.0)	4.20	0.753	High awareness
I frequently discuss climate change issues with friends or family.	07(8.8)	30(3.75)	31(38.8)	12(15.0)	0(0.0)	3.40	0.851	Low awareness
I am aware of the impact of climate change on the environment and human health.	33(41.3)	41(51.2)	04(5.0)	01(2.5)	0(0.0)	4.31	0.686	High awareness
I have attended seminars or workshops on climate change.	5(6.3)	28(35.0)	20(25.0)	23(28.7)	04(5.0)	3.09	1.05	Low awareness
I follow news or social media reports on climate change regularly.	7(8.8)	22(27.5)	27(33.8)	17(21.3)	07(8.8)	3.05	1.09	Low awareness
I know about the various strategies used to mitigate climate change.	13(16.3)	34(42.5)	19(23.8)	13(16.3)	07(1.3)	3.56	0.992	Low awareness
I am aware of international climate change agreements (e.g., Paris Agreement).	9(11.3)	19(23.8)	24(30.0)	21(26.3)	07(8.8)	3.03	1.147	Low awareness
I believe climate change awareness is low in Benin City.	23(28.7)	43(53.8)	07(8.8)	05(6.3)	02(2.5)	4.00	0.928	High awareness

Strongly Agreed (SA) = 5; Agreed (A) = 4; Undecided (UD) = 3; Disagreed (D) = 2; and Strongly Disagreed (SD) = 1. **Weighted Average (WA) =3.73**

They are also in agreement of being aware of the impact of climate change on the environment and human health and that climate change awareness is low in Benin City. However, majority were not of the opinion of discussing climate change issues with friends or family, attending seminars or workshops on climate change and listening to news or social media reports on climate change regularly. They also disagree with knowledge of the various strategies used to mitigate climate change and of the knowledge of international climate change agreements (e.g., Paris Agreement). It can de deduced that climate change awareness among the people is moderate.

4.4 Climate change mitigation practices

Table 7 reveals that most of the respondents were not of the opinion that using public transportation or carpooling to reduce carbon emissions, recycling plastic, glass, and paper products regularly and consciously buying products with minimal packaging to reduce waste. They were also not of the opinion of planting trees or participating in environmental conservation activities; adopting sustainable cooking practices (e.g., using energy-efficient stoves) and actively promoting climate change mitigation practices among my peers. On the other hands, majority were of the agreement of reducing energy consumption at home (e.g., turning off lights when not in use), limiting the use of air conditioners and prefer natural ventilation; avoiding burning refuse or engage in responsible waste management and using energy-saving bulbs and appliances at home. Therefore, it can be assumed that mitigation practices in the study area is low.

Table 7 Climate change mitigation practices

ITEMS	SA Freq (%)	A Freq (%)	UD Freq (%)	D Freq (%)	SD Freq (%)	Mean	STD	Remark
I reduce energy consumption at home (e.g., turning off lights when not in use)	21(26.3)	55(26.3)	10 (12.5)	05(6.3)	0(0.0)	4.01	0.803	High practice
I prefer using public transportation or carpooling to reduce carbon emissions.	5(11.3)	20(25.0)	28(35.0)	18(22.5)	5(6.3)	3.13	1.08	Low practice
I recycle plastic, glass, and paper products regularly.	7(8.8)	17(21.3)	22(27.5)	28(35.0)	06(7.5)	2.89	1.102	Low practice
I consciously buy products with minimal packaging to reduce waste.	5(6.3)	24(30.0)	25(31.3)	16(20.0)	10(12.5)	2.98	1.13	Low practice
I plant trees or participate in environmental conservation activities	7(8.8)	22(27.5)	25(31.3)	19(23.8)	07(8.8)	3.04	1.107	Low practice
I limit the use of air conditioners and prefer natural ventilation.	17(21.3)	21(26.3)	22(27.5)	18(22.5)	02(2.5)	3.41	1.13	High practice
I have adopted sustainable cooking practices (e.g., using energy-efficient stoves).	13(16.3)	26(32.5)	17(21.3)	19(23.8)	05(6.3)	3.29	1.18	Low practice
I avoid burning refuse or engage in responsible waste management.	16(20.0)	30(37.5)	18(22.5)	11(13.8)	05(6.3)	3.51	1.15	High practice
I use energy-saving bulbs and appliances at home.	27(33.8)	38(47.5)	10(12.5)	02(2.5)	03(3.8)	4.05	0.95	High practice
I actively promote climate change mitigation practices among my peers.	7(8.8)	29(36.3)	31(38.8)	11(13.8)	02(2.5)	3.35	0.915	Low practice

Strongly Agreed (SA) = 5; Agreed (A) = 4; Undecided (UD) = 3; Disagreed (D) = 2; and Strongly Disagreed (SD) = 1.
Weighted Average (WA) =3.37

4.5 Challenges in Implementing Climate Mitigation Actions

Table 8 shows that majority of the respondents were not in agreement that there are difficulties to accessing information on climate change mitigation, cultural norms and social pressures discourage persons from adopting sustainable practices. their actions are too insignificant to make a difference. They also disagree on not having enough time to engage in climate-friendly activities and not fully knowing the benefits of climate mitigation actions. However, most of them were of the opinion that High costs prevent them from adopting environmentally friendly practices and lack of access to sustainable alternatives hinders their efforts. They were also of the opinion that there is limited governmental support for individual climate change efforts and their neighbourhoods do not encourage sustainable practices. It can be inferred from the study that challenges to mitigating climate change at individual level in the study area are minimal.

Table 8 Challenges in Implementing Climate Mitigation Actions

ITEMS	SA Freq (%)	A Freq (%)	UD Freq (%)	D Freq (%)	SD Freq (%)	Mean	STD	Remark
High costs prevent me from adopting environmentally friendly practices.	13(16.3)	30(37.5)	18(22.5)	15(18.8)	04(5.0)	3.41	1.122	High challenge
Lack of access to sustainable alternatives hinders my efforts.	14(17.5)	34(42.5)	17(21.3)	9(11.3)	6(7.5)	3.51	1.136	High challenge
I find it difficult to access information on climate change mitigation.	7(8.8)	14(17.5)	23(28.7)	31(38.8)	05(6.3)	2.84	1.073	Low challenge
Cultural norms and social pressures discourage me from adopting sustainable practices.	04(5.0)	14(17.5)	22(27.5)	36(45.0)	4(5.0)	2.72	.981	Low challenge
I feel my actions are too insignificant to make a difference.	10(12.5)	17(21.3)	19(23.8)	25(31.3)	09(11.3)	2.93	1.220	Low challenge
Government support for individual climate change efforts is limited.	21(26.3)	35(43.8)	13(16.3)	09(11.3)	02(2.5)	3.80	1.036	High challenge
I do not have enough time to engage in climate-friendly activities.	2(3.8)	25(31.3)	22(27.5)	25(31.3)	05(6.3)	2.95	1.018	Low challenge
I do not fully understand the benefits of climate mitigation actions	00(0.0)	17(21.3)	12(15.0)	25(31.3)	20(25.0)	2.55	1.282	Low challenge
My neighborhood does not encourage sustainable practices.	12(15.0)	24(30.0)	22(27.5)	19(23.8)	03(3.8)	3.29	1.105	High challenge
I am skeptical about the effectiveness of climate change mitigation efforts.	4(5.0)	22(27.5)	27(33.8)	17(21.3)	10(12.5)	2.91	1.093	Low challenge

Strongly Agreed (SA) = 5; Agreed (A) = 4; Undecided (UD) = 3; Disagreed (D) = 2; and Strongly Disagreed (SD) = 1.
Weighted Average (WA) =3.09

4.6 Testing the Awareness–Behavior Gap

To examine the existence of an awareness–behavior gap among respondents in Benin City, a paired sample t-test was conducted to compare the mean scores of climate change awareness and climate mitigation behavior. The results shown in **Table 9** revealed that the mean score for climate change awareness ($M = 3.73$, $SD \approx 0.64$) is higher than the mean score for mitigation practices ($M = 3.37$, $SD \approx 0.67$). The paired sample t-test indicates that this difference is statistically significant ($t(82) = 5.89$, $p < 0.001$). This finding provides strong empirical evidence of the awareness–behavior gap among respondents. Although individuals demonstrate relatively high levels of awareness regarding climate change, their engagement in mitigation behaviors is significantly lower.

The presence of this gap suggests that awareness alone is insufficient to drive consistent behavioral change. Structural constraints, behavioral habits, and limited access to sustainable alternatives may hinder the translation of environmental knowledge into action. In rapidly urbanizing contexts such as Benin City, these factors may play a critical role in shaping individual climate mitigation practices. These results reinforce the need for integrated policy approaches that combine climate education with supportive infrastructure and targeted behavioral interventions to effectively bridge the awareness–behavior gap.

Table 9: Awareness–Behavior Gap Test

Variable	Mean (M)	Std. Dev. (SD)
Climate Awareness	3.73	0.64
Mitigation Behavior	3.37	0.67
Test	**Value**	
t-value	5.89	
Degrees of Freedom	82	
p-value	< 0.001	

4.7 Multiple Regression Analysis

A hierarchical multiple regression analysis was conducted to examine the determinants of climate change mitigation practices among residents of Benin City as shown in **Table 10 and 11**. In Model 1, socio-demographic variables explained 8.3% of the variance in mitigation behavior ($R^2 = 0.083$). When climate change awareness was introduced in Model 2, the explanatory power of the model increased significantly to 38.1% ($\Delta R^2 = 0.298$, $p < 0.001$), indicating that awareness is a strong predictor of mitigation practices. In Model 3, environmental attitude was added and further increased the explanatory power to 45.2% ($\Delta R^2 = 0.071$, $p < 0.01$). The final model included perceived challenges; however, this variable did not significantly predict mitigation behavior. Overall, the final model explained 46.3% of the variance in climate mitigation practices, with climate awareness emerging as the strongest predictor.

Table 10: Hierarchical Regression Predicting Climate Change Mitigation Practices

Variables	Model 1	Model 2	Model 3	Model 4
Age	0.172*	0.189*	0.175*	0.170*
Gender	-0.201	-0.197	-0.181	-0.178
Education	-0.012	-0.008	-0.006	-0.004
Income	0.041	0.039	0.042	0.039
Climate awareness	—	0.472***	0.451***	0.446***
Environmental attitude	—	—	0.214**	0.208**
Perceived challenges	—	—	—	-0.049

Table 11 Model statistics

Statistic	Model 1	Model 2	Model 3	Model 4
R^2	0.083	0.381	0.452	0.463
Adjusted R^2	0.035	0.341	0.408	0.417
ΔR^2	—	0.298	0.071	0.011
F	1.74	9.36***	10.11***	9.84***

Significance

- $p < 0.05$
  ** $p < 0.01$
  *** $p < 0.001$

5.0 Discussion

This study examined the determinants of climate change mitigation practices among residents of Benin City, Nigeria, using hierarchical multiple regression analysis to evaluate the relative contributions of demographic factors, climate change awareness, and perceived challenges. The findings provide important insights into the behavioral drivers of climate mitigation in a rapidly urbanizing African city.

The hierarchical regression results demonstrate that climate change awareness is the most significant predictor of mitigation behavior. When awareness was introduced into the model (Model 2), the explanatory power of the regression increased substantially from 8.3% to 38.1%, representing an increase of nearly 30% in the variance explained ($\Delta R^2 = 0.298$, $p < 0.001$). This substantial increase indicates that awareness contributes considerable explanatory power beyond basic socio-demographic characteristics. In the final model, awareness remained the strongest predictor of mitigation practices ($\beta = 0.476$, $p < 0.001$). These findings suggest that individuals with greater knowledge and understanding of climate change are significantly more likely to engage in environmentally responsible behaviors.

This result aligns with a growing body of literature emphasizing the critical role of environmental knowledge in shaping pro-environmental behavior. Studies across multiple contexts have consistently shown that individuals who understand the causes, risks, and consequences of climate change are more likely to adopt mitigation behaviors such as energy conservation, waste reduction, and sustainable consumption practices (van Valkengoed *et al.*, 2022; Steg *et al.*, 2021). Similarly, Lee *et al.* (2020) found that climate change awareness significantly predicts public engagement in climate mitigation actions across several countries. Awareness enhances individuals' perception of environmental risks and strengthens their sense of personal responsibility toward climate action, thereby encouraging behavioral change.

The findings also provide empirical support for the Theory of Planned Behavior (TPB), which posits that attitudes and knowledge shape behavioral intentions and ultimately influence behavior (Ajzen, 1991). Climate change awareness contributes to the development of positive environmental attitudes and increases individuals' perceived importance of engaging in mitigation activities. When individuals recognize the seriousness of climate change and understand the role of human activities in driving environmental change, they are more likely to adopt sustainable practices.

However, despite the strong influence of awareness observed in the regression analysis, the descriptive results of this study indicate that the overall level of mitigation practices among respondents remains relatively low. This finding reflects what has been widely described in the environmental behavior literature as the awareness–behavior gap**,** where individuals possess knowledge about environmental issues but do not consistently translate this awareness into practical behavioral change (Dietz *et al*., 2022). Structural conditions, behavioral habits, and limited institutional support often influence whether awareness translates into action.

Another important finding of the study is that perceived challenges to climate mitigation were not statistically significant predictors of mitigation practices. The inclusion of perceived challenges in the final model produced only a marginal increase in explained variance ($\Delta R^2 = 0.012$), suggesting that perceived barriers do not strongly influence individuals' engagement in mitigation behaviors in the study area. This finding contrasts with previous research which has identified structural barriers such as financial constraints, lack of infrastructure, and limited institutional support as key obstacles to climate action (Gifford, 2011; Steg, 2018).

One possible explanation for this finding is that many of the mitigation practices examined in this study involve relatively low-cost behavioral changes that can be implemented without significant financial investment. Examples include reducing electricity consumption, avoiding waste burning, and using energy-efficient bulbs. These types of actions require minimal institutional support and can therefore be adopted even in contexts where broader structural barriers exist. Consequently, perceived challenges may not significantly constrain individuals' ability to engage in these basic mitigation practices.

The analysis also revealed that age has a modest but significant positive influence on mitigation behavior ($\beta = 0.191$, $p < 0.05$). This suggests that older respondents may be slightly more likely to adopt environmentally responsible behaviors. Previous studies have reported similar patterns, suggesting that older individuals may exhibit stronger environmental concern due to accumulated experiences and greater awareness of environmental changes over time (Bouman *et al*., 2021). However, given that the majority of respondents in this study were within the 18–25 age group, further research is needed to explore generational differences in environmental behavior within Nigerian urban contexts.

From a broader perspective, the findings highlight the importance of environmental awareness as a key driver of climate mitigation behavior in developing urban environments. Rapid urbanization in many African cities is increasing pressure on energy systems, transportation networks, and waste management infrastructure. In such contexts, individual behavioral change can play an important complementary role in supporting broader climate mitigation strategies. However, awareness alone is unlikely to achieve large-scale behavioral transformation. Effective climate governance requires integrated policy approaches that combine public awareness initiatives with supportive institutional frameworks and sustainable infrastructure. Policies that promote renewable energy adoption, improve public transportation systems, expand waste recycling programs, and encourage sustainable consumption practices can significantly enhance individuals' ability to adopt climate-friendly behaviors.

The findings of this study therefore suggest that policymakers should prioritize climate education and public awareness campaigns as key components of urban climate policy. Environmental education programs implemented through schools, community organizations, and media platforms can play an important role in strengthening public understanding of climate change and encouraging sustainable

behavioral practices. Previous studies have shown that sustained climate education initiatives can significantly influence environmental attitudes and long-term behavioral change (Steg *et al*., 2021).

Overall, this study contributes to the growing body of research on climate change behavior in developing countries by providing empirical evidence from an urban Nigerian context. The results demonstrate that climate change awareness plays a central role in influencing mitigation practices, while perceived challenges appear to have limited influence on basic household-level mitigation behaviors. Strengthening climate awareness while simultaneously improving institutional support and sustainable urban infrastructure will be critical for promoting effective climate mitigation actions in rapidly growing cities across the Global South.

6.0 Limitation of the study

This study has several limitations that should be acknowledged. First, the sample size is relatively small and predominantly composed of young adults, which may limit the generalizability of the findings to the broader urban population. Second, the cross-sectional design of the study does not allow for causal interpretation of the observed relationships. Third, the use of self-reported measures of mitigation behavior may be subject to social desirability bias. Future studies could employ larger and more diverse samples and incorporate longitudinal approaches to better understand behavioral dynamics related to climate mitigation

7.0 Conclusion

This results of this study highlight the critical importance of environmental awareness in promoting climate mitigation behavior among urban populations. Strengthening climate education and public awareness initiatives can therefore play a key role in encouraging sustainable behavioral practices. Educational institutions, community organizations, and media platforms can contribute significantly to improving public understanding of climate change and fostering environmentally responsible lifestyles. However, awareness alone may not be sufficient to drive large-scale behavioral change. Effective climate action requires coordinated efforts that combine public awareness initiatives with supportive policies and sustainable infrastructure. Governments and environmental stakeholders should therefore implement integrated strategies that promote renewable energy adoption, improve waste management systems, expand sustainable transportation options, and support community-based climate initiatives.

By providing empirical evidence from Benin City, this study contributes to the growing literature on climate change behavior in developing urban contexts. The findings underscore the importance of integrating behavioral approaches into climate policy and urban sustainability strategies in order to enhance individual participation in climate mitigation efforts and strengthen long-term environmental resilience. This study contributes to the growing literature on climate change behavior in three important ways. First, it provides empirical evidence on the determinants of climate mitigation behavior within a rapidly urbanizing African city, a context that remains underrepresented in the global environmental behavior literature. Second, the study demonstrates the substantial role of climate change awareness in shaping mitigation practices beyond socio-demographic characteristics. Third, the findings highlight the persistence of the awareness–behavior gap, suggesting that while awareness is a critical driver of environmental action, broader institutional and infrastructural support is necessary to translate awareness into sustained behavioral change

8.0 Policy implications

The findings of this study provide several important implications for policymakers and environmental stakeholders.

First, strengthening climate change education and public awareness campaigns should be prioritized. Educational institutions, community organizations, and media platforms can play an important role in improving public understanding of climate change and encouraging sustainable behavioral practices.

Second, governments should integrate climate education into school curricula and community outreach programs. Early exposure to climate knowledge can foster long-term environmental responsibility and sustainable behavior among citizens.

Third, policymakers should support initiatives that promote household-level mitigation practices, such as energy efficiency programs, waste management initiatives, and community-based environmental campaigns.

Finally, future climate policies should consider behavioral dimensions of climate action. Encouraging individual participation in climate mitigation efforts can complement broader structural and technological solutions aimed at reducing greenhouse gas emissions

9.0 References

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