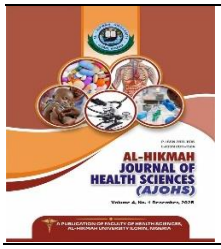
P-ISSN: 2811-1516
E-ISSN: 2811-1524



AL-HIKMAH JOURNAL OF HEALTH SCIENCES (AJOHS)

Official Publication of Faculty of Basic Medical Sciences

Al-Hikmah University Ilorin, Nigeria

https://alhikmahuniversity.edu.ng/AJOHS/index.php/journal

Original Article

Perceptions and Attitudes Towards Climate Change and Their Association with Preventive and Adaptive Health Behaviors among Residents of Ilorin Metropolis, Nigeria

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ARTICLE INFO

Article History
Received: 31st August, 2026
Accepted: 6th October, 2026
Available online: 15th November, 2026

Keywords:
Climate change
Perceptions
Attitudes
Public health
Nigeria

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ABSTRACT

Background: Climate change poses significant public health challenges, requiring effective community responses to reduce health risks. This study assessed perceptions and attitudes towards climate change and their association with preventive and adaptive health behaviors among residents of Ilorin Metropolis, Nigeria.

Methods: A community-based analytical cross-sectional study was conducted among adults selected through multistage sampling. Data were collected using a structured interviewer-administered questionnaire. A total of 427 questionnaires administered while 363 were correctly completed and analyzed using SPSS version 27. Descriptive statistics summarized the data, while Chi-square tests assessed associations between categorized perceptions, attitudes, and preventive and adaptive health behaviors at $p < 0.05$.

Results: Positive perceptions were reported by 304 (83.7%) respondents, good attitudes by 291 (80.2%), and good preventive and adaptive health behaviors by 247 (68.0%). Positive perceptions ($\chi^2 = 23.178$, $p < 0.001$) and good attitudes ($\chi^2 = 28.416$, $p < 0.001$) were significantly associated with preventive and adaptive health behaviors.

Conclusion: Residents demonstrated generally positive perceptions and favorable attitudes towards climate change, which were significantly associated with preventive and adaptive health behaviors. However, the smaller final sample and categorical scoring approach should be considered when interpreting the findings.

Please cite this article as: Abdulrahman, Q.A., Sarumi, W.O. & Oladimeji, L.O. (2026). Perceptions and Attitudes Towards Climate Change and Their Association with Preventive and Adaptive Health Behaviors among Residents of Ilorin Metropolis, Nigeria. *Al-Hikmah Journal of Health Sciences, 5*(3), 187-193.

Introduction

Climate change has become an important public health concern because of its widespread effects on environmental conditions, human health and socioeconomic development globally (WHO, 2024). Although scientific evidence on climate change continues to expand, the effectiveness of public health interventions depends largely on how individuals perceive climate-related risks and the attitudes they develop towards mitigation and adaptation measures (Baal *et al.*, 2023). Perceptions and attitudes influence the extent to which individuals recognize climate-related health threats, support environmental policies and engage in behaviors that reduce climate-related risks.

P-ISSN: 2811-1516
E-ISSN: 2811-1524

Perception refers to how individuals recognize, interpret and assign meaning to climate-related environmental changes and their associated health risks. These perceptions are influenced by personal experiences, cultural beliefs, educational attainment and access to information from various sources (Wen et al., 2025). Attitude describes an individual's level of concern, perceived responsibility and willingness to support actions that reduce the adverse health impacts of climate change (Wen et al., 2025). Positive attitudes may encourage participation in climate adaptation initiatives and promote environmentally responsible behaviors, whereas negative attitudes may discourage active involvement in climate-related interventions (Alotaibi *et al.*, 2025).

Sub-Saharan Africa remains one of the region's most vulnerable to climate change because of limited adaptive capacity, widespread poverty and fragile health systems (Anyanwu *et al.*, 2024). Rising temperatures, erratic rainfall, flooding and prolonged drought continue to increase the burden of climate-sensitive diseases and other environmental health challenges across the region (Abebaw, 2025). In Nigeria, climate variability, rapid urbanization, inadequate sanitation and poor environmental infrastructure further increase population vulnerability to climate-related health risks (Omokaro, 2025; Adeyanju *et al.*, 2025). Although awareness of climate change has increased, awareness alone rarely translates into positive perceptions or favorable attitudes towards climate-responsive behaviors (Edmondson et al., 2022). Educational attainment, socioeconomic status, access to information and institutional trust remain important determinants of public perceptions and attitudes towards climate change (Moshood *et al.*, 2025).

Ilorin Metropolis has experienced increasing temperatures, irregular rainfall patterns, flooding episodes and rapid urban expansion, exposing residents to various climate-sensitive health risks (Ebi et al., 2021; Morakinyo et al., 2025). Despite these challenges, limited evidence exists regarding residents' perceptions and attitudes towards climate change and its public health implications within the metropolis. Therefore, this study assesses perceptions and attitudes regarding climate change and their public health implications among residents of Ilorin Metropolis, Kwara State, Nigeria.

Methods

Study Design

A community-based analytical cross-sectional study was conducted to assess residents' perceptions and attitudes towards climate change and its public health implications in Ilorin Metropolis, Kwara State, Nigeria.

Study Area

The study was conducted in Ilorin Metropolis, the capital of Kwara State, Nigeria. The metropolis comprises Ilorin East, Ilorin West and Ilorin South Local Government Areas (LGAs). Ilorin experiences a tropical wet-and-dry climate characterized by distinct rainy and dry seasons. Rapid urbanization, increasing population density and environmental challenges such as flooding, poor waste management and rising temperatures make the metropolis particularly vulnerable to climate-related public health risks.

Study Population

The study population comprised adults aged 18 years and above who had resided continuously in Ilorin Metropolis for at least one year before data collection. Residents who provided informed consent and could communicate in English or Yoruba were eligible to participate.

Sample Size Determination

The sample size was determined using Cochran's formula for estimating sample size in large populations: $n=Z^2pq/d^2$

where Z = 1.96 at 95% confidence level, p = 0.50, q = 0.50 and d = 0.05. The minimum sample size obtained was 384 respondents. After adjusting for a 10% non-response rate, the target sample size was increased to 427 respondents. Of the 427 questionnaires administered, 363 were correctly completed, retrieved and processed for analysis, giving a response rate of 85.0%. Thus, the final analyzed sample was 21 respondents below the initial minimum sample size of 384. This reduction may have decreased statistical power and may limit the precision and generalizability of the findings; this was considered when interpreting the results.

Sampling Technique

A multistage probability sampling technique was employed. All three LGAs constituting Ilorin Metropolis were included in the study. Two wards were selected from each LGA using simple random sampling, giving a total of six wards. Households within the selected wards were selected using systematic random sampling, and the sample size was proportionately allocated according to the household population of each ward. One eligible adult respondent was selected from each household using simple random sampling whenever more than one eligible participant was available.

Research Instrument

Data were collected using a structured interviewer-administered questionnaire adapted from previous studies on climate change and public health and modified to suit the objectives and local context of the study (van Baal *et al.*, 2023; Wen *et al.*, 2025;

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E-ISSN: 2811-1524

Moshood *et al.*, 2025). The questionnaire collected information on respondents' socio-demographic characteristics and assessed perceptions and attitudes towards climate change and its public health implications using statements measured on a five-point Likert scale ranging from Strongly Disagree (1) to Strongly Agree (5).

Validity and Reliability of the Instrument

Content and face validity of the questionnaire were established through expert review by specialists in public health and research methodology. The instrument was pretested among 43 residents of Offa, Kwara state representing approximately 10% of the calculated sample size. Feedback obtained during the pilot study was used to improve the clarity and sequencing of questionnaire items. Reliability was assessed using Cronbach's alpha coefficient based on data obtained during the pilot study. The perception and attitude scale demonstrated good internal consistency with a Cronbach's alpha coefficient of 0.82.

Data Collection

Data were collected through face-to-face interviews conducted by four trained research assistants using the structured questionnaire. The research assistants received training on the study objectives, ethical considerations, participant recruitment, administration of the questionnaire and confidentiality. Completed questionnaires were reviewed daily to ensure completeness and consistency.

Measurement of Variables

Responses from the Likert scale were summed to generate composite perception and attitude scores. The respondents scoring 50% or more of the maximum obtainable score as having positive perceptions and attitudes, while those scoring below 50% were classified as having negative perceptions and attitudes. This cutoff was a prespecified scoring rule for the present analysis and is not presented as a universal standard threshold.

Data Analysis

Data were entered, cleaned and analyzed using SPSS version 27. Descriptive statistics, including frequencies, percentages, means and standard deviations, were used to summarize the study variables. Composite perception and attitude scores were categorized using the prespecified 50% scoring rule described above. The association between perceptions, attitudes and preventive and adaptive health behaviors was assessed using the Chi-square test. Statistical significance was set at $p < 0.05$.

Ethical Considerations

Ethical approval was obtained from the Kwara State Ministry of Health Ethical Review Committee before commencement of the study. Permission was also obtained from relevant community authorities. Written informed consent was obtained from all participants before data collection. Participation was voluntary, and respondents were informed of their right to decline or withdraw from the study at any time without consequences. Confidentiality and anonymity were maintained by assigning identification codes to questionnaires and restricting access to study data to the research team.

Results

Table 1: Demographic Profile of Respondents

Variable	Frequency (n=363)	Percent (%)
Sex		
Male	176	48.5
Female	187	51.5
Marital Status		
Single	142	39.1
Married	189	52.1
Divorced	18	5.0
Widowed	14	3.9
Tribe/Ethnic Group		
Yoruba	246	67.8
Hausa	42	11.6
Igbo	38	10.5
Nupe	37	10.2

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Religion		
Christianity	108	29.8
Islam	242	66.7
Traditional	7	1.9
Others	6	1.7
Highest Level of Education		
No formal education	18	5.0
Primary	49	13.5
Secondary	118	32.5
Tertiary	178	49.0
Occupation		
Trader	84	23.1
Civil servant	71	19.6
Artisan	53	14.6
Farmer	32	8.8
Student	89	24.5
Unemployed	21	5.8
Others	13	3.6
Average Monthly Income		
< ₦30,000	96	26.4
₦30,000–₦59,999	114	31.4
₦60,000–₦99,999	92	25.3
≥ ₦100,000	61	16.8
Mean Income ± SD	₦58,540 ± ₦37,850	

The respondents comprised 48.5% males and 51.5% females. Most were married (52.1%), Yoruba (67.8%) and Muslims (66.7%). Nearly half (49.0%) had tertiary education, while 32.5% had secondary education. Students (24.5%) and traders (23.1%) constituted the largest occupational groups, followed by civil servants (19.6%). Regarding monthly income, 31.4% earned ₦30,000–₦59,999, 26.4% earned below ₦30,000, 25.3% earned ₦60,000–₦99,999, and 16.8% earned ₦100,000 or more.

Table 2: Respondents' Attitudes and Perceptions towards Climate Change and Health Risks

Statements	SD	D	N	A	SA
Climate change poses a serious threat to public health	12 (3.3%)	26 (7.2%)	41 (11.3%)	173 (47.7%)	111 (30.6%)
My household is at risk due to climate change	18 (5.0%)	39 (10.7%)	54 (14.9%)	162 (44.6%)	90 (24.8%)
Flooding and heat waves are becoming more dangerous	11 (3.0%)	24 (6.6%)	37 (10.2%)	181 (49.9%)	110 (30.3%)
Individuals have a responsibility to protect themselves	9 (2.5%)	16 (4.4%)	32 (8.8%)	176 (48.5%)	130 (35.8%)
Government and community leaders should take action	7 (1.9%)	13 (3.6%)	28 (7.7%)	169 (46.6%)	146 (40.2%)
Preventive measures can effectively reduce problems	10 (2.8%)	21 (5.8%)	44 (12.1%)	182 (50.1%)	106 (29.2%)
Attitude Level					
Good Attitude	291 (80.2%)				
Bad Attitude	72 (19.8%)				
Perception Level					

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Positive Perception	304 (83.7%)				
Negative Perception	59 (16.3%)				

The findings revealed generally positive attitudes and perceptions towards climate change and its associated health impacts among respondents. Most respondents agreed that climate change poses a serious threat to public health and acknowledged that flooding and heat waves are becoming increasingly dangerous. A substantial proportion also believed that individuals have a responsibility to protect themselves against climate-related risks and that government and community leaders should take proactive measures to address climate-related challenges. Overall, 291 respondents (80.2%) demonstrated good attitudes towards climate change and its health impacts, while 72 respondents (19.8%) exhibited bad attitudes. Similarly, 304 respondents (83.7%) demonstrated positive perceptions towards climate change and related health concerns, whereas 59 respondents (16.3%) showed negative perceptions.

Table 3: Assessment of Respondents' Practices and Adaptive Behaviors towards Climate Change

Statements	**Always n (%)**	**Sometimes n (%)**	**Rarely n (%)**	**Never n (%)**
I treat drinking water before use	102 (28.1)	148 (40.8)	72 (19.8)	41 (11.3)
I clear stagnant water around my home	134 (36.9)	141 (38.8)	57 (15.7)	31 (8.5)
I use mosquito nets or insecticides	121 (33.3)	132 (36.4)	65 (17.9)	45 (12.4)
I take protective actions during extreme heat	109 (30.0)	157 (43.3)	63 (17.4)	34 (9.4)
I have adjusted my diet due to climate-related food changes	52 (14.3)	144 (39.7)	96 (26.4)	71 (19.6)
I seek support for climate-related stress when necessary	46 (12.7)	118 (32.5)	101 (27.8)	98 (27.0)
Level of Climate Change Adaptive Behaviors				
Good Behaviors	247 (68.0%)			
Poor Behaviors	116 (32.0%)			

Table 4: Chi-square Analysis of the Association between Attitudes, Perceptions and Adoption of Preventive and Adaptive Health Behaviors among Residents of Ilorin Metropolis (n = 363)

Variable	**Good behavior n (%)**	**Poor behavior n (%)**	**χ^2**	**df**	**p-value**	**Decision**
	247 (68.0)	116 (32.0)				
Attitude towards Climate Change	291 (80.2)	72 (19.8)	28.416	1	<0.001	Significant
Perception towards Climate Change	304 (83.7)	59 (16.3)	23.178	1	<0.001	Significant

Significant at $p < 0.05$.

The findings showed that attitude towards climate change was significantly associated with the adoption of preventive and adaptive health behaviors (χ^2 = 28.416, df = 1, $p < 0.001$). Similarly, perception towards climate-related health risks was significantly associated with the adoption of preventive and adaptive health behaviors (χ^2 = 23.178, df = 1, $p < 0.001$).

Discussion

This study assessed residents' perceptions and attitudes towards climate change and its public health implications in Ilorin Metropolis. The findings showed that most respondents demonstrated positive perceptions (83.7%) and good attitudes (80.2%) towards climate change and its associated health risks. The majority recognized climate change as a serious public health threat and acknowledged increasing risks posed by climate-related challenges. These findings

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E-ISSN: 2811-1524

suggest a relatively high level of public concern and acceptance of climate change as an important public health issue, consistent with evidence that favourable perceptions and attitudes are important for supporting climate adaptation and health protection initiatives (van Baal *et al.*, 2023; Wen *et al.*, 2025; Alotaibi *et al.*, 2025).

The high proportion of respondents with positive perceptions and attitudes is consistent with previous studies that reported increasing public recognition of climate change and its health impacts (van Baal *et al.*, 2023; Wen *et al.*, 2025). This finding may be partly related to the educational profile of respondents, with nearly half having tertiary education, although the cross-sectional design does not permit causal inference. The study further revealed that both attitudes and perceptions were significantly associated with the adoption of preventive and adaptive health behaviors. Respondents with good attitudes and positive perceptions were more likely to engage in behaviors that reduce exposure to climate-related health risks. This interpretation is consistent with the Health Belief Model, which emphasizes perceived susceptibility, perceived severity, perceived benefits and perceived barriers as important determinants of preventive health behavior (Rosenstock, 1974; Becker, 1974).

Similar associations have been reported in previous studies, where favorable perceptions and attitudes were associated with climate change adaptation practices (Edmondson *et al.*, 2022; Alotaibi *et al.*, 2025). The findings underscore the importance of strengthening climate and health risk communication through sustained public education, community engagement and multisectoral collaboration. Enhancing access to accurate climate information and promoting community participation in adaptation initiatives could further reinforce positive perceptions and attitudes and support climate-responsive health behaviors among residents of Ilorin Metropolis.

Conclusion

This study found that the majority of residents of Ilorin Metropolis had positive perceptions and good attitudes towards climate change and its public health implications. Most respondents recognized climate change as a serious public health threat and acknowledged the increasing risks associated with flooding and heat waves. They also agreed that individuals, communities and government have a shared responsibility to address climate-related health challenges. Furthermore, positive perceptions and good attitudes were significantly associated with the adoption of preventive and adaptive health behaviors.

Recommendations

Community-based awareness programmes should be promoted to encourage greater participation in preventive and adaptive health behaviors related to climate change.

Community leaders, religious organizations and other relevant stakeholders should be actively involved in disseminating accurate information on climate-related health risks and appropriate adaptation measures.

Further studies should use larger samples that meet or exceed calculated minimum requirements and retain continuous composite scores where appropriate, or apply empirically justified cut-points, to improve statistical power and reduce information loss.

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