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Climate Literacy, Risk Perception, and Information Sources among University Students in Southwestern Nigeria: Implications for Climate Education and Environmental Policy

Conference Paper

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Abstract

Climate literacy among university students is becoming even more crucial for further enhancing climate adaptation, mitigation and evidence-based environmental decision-making in areas facing growing climate risks. This study assessed climate-change awareness, perceptions of local climatic variability, information sources and response orientations among undergraduate students in two public universities in Ogun State, Southwestern Nigeria. A cross sectional quantitative survey was carried out with 400 under-graduate students selected using multi-stage sampling technique. Descriptive statistics and Pearson's chi-square tests of independence were used to analyse the data, with Cramer's V was used to evaluate the significance of the relationship. The results show that 63.5% of respondents reported awareness of global climate change, 67.8% described rainfall as stormy and 65.0% reported flooding following rainfall. The most common sources for information on climate were newspapers (23.5%) and television (23.3%). Chemical gases emitted were the most common cause of climate change identified (52.8%) while reduction of human activities was the most common climate change perceived reduction strategy (51.0%). There was a relatively high level of awareness of the greenhouse effect (75.3%) and a lower level of awareness of the depletion of the ozone layer (32.5%), with some concepts enjoying greater awareness than others. Climate-change awareness was significantly associated with sex, $\chi^2(1) = 4.470$, $p = .035$, age, $\chi^2(3) = 9.371$, $p = .025$, and academic discipline, $\chi^2(6) = 37.007$, $p < .001$; academic discipline showed the strongest association (Cramer's V = .304). There were no significant relationships for marital status or religion. The results indicate that the university students had a high general awareness of climate change, but they had low awareness in concepts and different awareness in the various subjects. Therefore, the need for strengthening interdisciplinary climate education, the availability of reliable climate scientific information and locally relevant climate communication, which will help to turn awareness into informed climate action, cannot be overemphasized.

Keywords: climate literacy; climate-change awareness; risk perception; climate communication; university students; Nigeria

1. Introduction

Climate change has become one of the defining environmental challenges of the twenty-first century, exerting profound impacts on ecosystems, human health, food security, water resources, and socio-economic development worldwide (IPCC, 2023). The increasing frequency and intensity of extreme weather events, including prolonged heatwaves, floods, droughts, and erratic precipitation underscore the accelerating consequences of anthropogenic greenhouse gas emissions and land-use changes (Karaelmas, 2025). According to the Intergovernmental Panel on Climate Change (IPCC, 2024), global warming has already exceeded approximately 1.1°C above pre-industrial levels, with many climate-related hazards projected to intensify during the coming decades (World Meteorological Organization, 2024). These changes present particularly severe challenges for developing countries, where adaptive capacity remains constrained by economic, institutional, and infrastructural limitations (United Nations Environment Programme, 2023).

Sub-Saharan Africa is widely recognised as one of the regions most vulnerable to climate change because of its high dependence on climate-sensitive sectors, rapid urbanisation, widespread poverty, and limited adaptive capacity (Trisos et al., 2022). Rising temperatures, changing rainfall regimes, increased flooding, land degradation, and declining agricultural productivity continue to threaten livelihoods, biodiversity, public health, and sustainable development across the region (World Bank, 2022). Nigeria exemplifies these vulnerabilities, experiencing increasing occurrences of urban flooding, prolonged heat stress, irregular rainfall patterns, coastal erosion, and environmental degradation (Adelekan et al., 2021). Recent national assessments have further identified southwestern Nigeria as one of the country's emerging climate-risk hotspots due to rapid population growth, urban expansion, and increasing exposure to hydro-meteorological hazards (Olapeju et al., 2025).

Although considerable attention has been devoted to understanding the physical dimensions of climate change, there is growing recognition that effective adaptation and mitigation depend not only on scientific and technological solutions but also on public understanding of climate science (Monroe et al., 2020). Climate literacy, the ability to understand climate processes, evaluate scientific information critically, recognise climate-related risks, and make informed environmental decisions has consequently emerged as a central objective of climate policy and sustainability education (UNESCO, 2021). Individuals possessing higher levels of climate literacy are more likely to support evidence-based climate policies, adopt environmentally responsible behaviours, and participate actively in mitigation and adaptation initiatives (Simpson et al., 2021). Universities therefore occupy a strategic position in developing future professionals, policymakers, and community leaders capable of responding effectively to climate challenges (Leal Filho et al., 2023).

Despite the increasing prominence of climate education, empirical evidence from many developing countries suggests that high levels of climate awareness do not necessarily translate into accurate scientific understanding or informed environmental behaviour (Rousell & Cutter-Mackenzie-Knowles, 2020). Young adults frequently

encounter climate information through social media and other digital platforms, where scientific information coexists with misinformation, political narratives, and simplified interpretations of complex climate processes (Allgaier, 2020). Consequently, many students demonstrate awareness of observable environmental changes while simultaneously exhibiting misconceptions regarding the underlying causes, mechanisms, and mitigation strategies associated with climate change (Bhattacharya et al., 2021). This disconnect between awareness and scientific literacy has become an important concern within contemporary climate communication research (Pan et al., 2023).

Previous studies conducted in Nigeria, Ghana, Kenya, and other African countries have examined climate change awareness, perception, and attitudes among university students (Uzochukwu et al., 2020). These studies generally report moderate to high levels of awareness but identify substantial variations in scientific knowledge across demographic groups, academic disciplines, and educational contexts (Ofori et al., 2023). However, findings remain inconsistent regarding the influence of socio-demographic characteristics on climate literacy (Abdulqadir, 2022; Natnael, 2025). While some studies report significantly higher levels of climate knowledge among students enrolled in environmental or science-related disciplines, others suggest that widespread exposure to digital media may be reducing disciplinary differences in climate awareness (Ayanlade & Jegede, 2021). Furthermore, relatively few studies have simultaneously examined climate literacy, environmental risk perception, and the influence of information sources within universities located in southwestern Nigeria, where exposure to climate-related hazards continues to increase (Ogunbode et al., 2020).

Ogun State provides an appropriate context for investigating these issues because it has experienced increasing occurrences of heat stress, flooding, land-use change, and environmental degradation associated with rapid urbanisation and changing climatic conditions (Ogun State Environmental Protection Agency, 2025). Universities within the state enrol students from diverse socio-economic, cultural, and academic backgrounds, thereby providing an opportunity to examine whether climate literacy varies across demographic groups or whether contemporary information environments have become the principal drivers of climate understanding (Asifat, 2021). Understanding how students acquire climate knowledge and interpret environmental risks is particularly important because today's university students constitute tomorrow's decision-makers, educators, planners, researchers, and environmental managers (Molthan-Hill et al., 2022).

Against this background, this study investigates climate literacy, environmental risk perception, and the influence of information sources among undergraduate students in two public universities in Ogun State, Southwestern Nigeria. Specifically, the study examines students' awareness and scientific understanding of climate change, identifies the dominant channels through which climate information is acquired, evaluates perceptions of local climate-related environmental changes and mitigation strategies, and assesses whether socio-cultural background and academic discipline significantly influence climate knowledge. By integrating climate literacy with environmental risk perception and information-source analysis, this study extends existing research beyond conventional awareness assessments and provides evidence to inform climate education, science

communication, and environmental policy within higher education institutions in Nigeria and comparable developing-country contexts.

2. Literature Review

2.1 Climate Literacy as a Foundation for Climate Action

Climate literacy has emerged as a central concept within climate science, environmental education, and sustainability research because it extends beyond simple awareness of climate change to encompass scientific understanding, critical evaluation of information, and the capacity to make informed environmental decisions (Simpson et al., 2021). The concept reflects an individual's ability to understand the causes and consequences of climate change, interpret scientific evidence, evaluate competing information sources, and translate knowledge into adaptive and mitigation behaviours (Monroe et al., 2020). As climate risks continue to intensify globally, climate literacy has become increasingly recognised as a prerequisite for achieving the objectives of the Paris Agreement and Sustainable Development Goal 13 (Climate Action) (IPCC, 2023). Recent international studies consistently demonstrate that higher levels of climate literacy are associated with stronger environmental concern, greater acceptance of scientific evidence, increased willingness to adopt sustainable lifestyles, and stronger support for climate policies (Hijazi, 2025). However, climate literacy remains unevenly distributed across populations because it is influenced by educational opportunities, socio-economic conditions, media exposure, cultural beliefs, and institutional support (UNESCO, 2021). Consequently, improving climate literacy has become a strategic priority for governments, universities, and international organisations seeking to strengthen climate resilience (Leal Filho et al., 2023). Within higher education, universities are increasingly expected to produce graduates capable of responding to complex environmental challenges (Bhattacharya et al., 2021). University students represent an important population because they constitute future policymakers, researchers, planners, educators, entrepreneurs, and community leaders whose environmental decisions will influence long-term sustainability (Rousell & Cutter-Mackenzie-Knowles, 2020). Therefore, assessing climate literacy among undergraduate students provides valuable evidence regarding the effectiveness of environmental education and identifies opportunities for strengthening climate-related curricula (Ofori et al., 2023).

2.2 Information Sources and Climate Change Communication

The rapid expansion of digital communication has fundamentally transformed how young people access climate-related information (Allgaier, 2020). Traditional sources such as formal classroom instruction, textbooks, newspapers, and scientific publications increasingly compete with social media platforms, online news outlets, blogs, podcasts, and artificial intelligence-assisted information systems (Pan et al., 2023). Although digital technologies have substantially increased access to climate information, they have simultaneously increased exposure to misinformation, conspiracy narratives, and scientifically inaccurate interpretations of climate processes (Pearce et al., 2021). Several studies conducted among university students indicate that social media has become the dominant source through which young adults first encounter climate change (Uzochukwu et

al., 2020). While these platforms facilitate rapid dissemination of environmental information, they frequently present simplified or inaccurate explanations that may reduce scientific understanding (Boyes & Stanisstreet, 2020). Students often report high awareness of climate change while demonstrating misconceptions regarding greenhouse gas emissions, fossil-fuel combustion, carbon cycles, and climate mitigation pathways (Abdulqadir, 2022). This discrepancy illustrates what scholars describe as the distinction between information exposure and climate literacy (Shepardson et al., 2021). In many developing countries, economic constraints further complicate this relationship (Trisos et al., 2022). Although scientific information is theoretically available through digital platforms, practical access is often limited by internet costs, subscription barriers, and inadequate institutional support (World Bank, 2022). Consequently, students frequently rely on freely accessible social media content rather than peer-reviewed scientific literature (Ayanlade & Jegede, 2021). This information inequality contributes to variations in scientific understanding and highlights the importance of universities as trusted providers of evidence-based climate education (Molthan-Hill et al., 2022).

2.3 Environmental Risk Perception among University Students

Environmental risk perception refers to the manner in which individuals recognise, interpret, and evaluate threats posed by environmental hazards (van der Linden et al., 2021). Within climate change research, risk perception has become one of the strongest predictors of behavioural intention because individuals who perceive climate change as an immediate personal threat are generally more willing to support adaptation and mitigation initiatives (Shershunovich, 2025). Among university students, perceptions of climate risk are often shaped by direct experiences of environmental events such as flooding, extreme temperatures, droughts, and changing rainfall patterns (Adelekan et al., 2021). In regions where these hazards occur frequently, climate change becomes a lived reality rather than an abstract scientific concept (Olapeju et al., 2025). Consequently, students residing in vulnerable environments generally report higher levels of concern regarding climate change than those with limited exposure to climate-related hazards (Ogunbode et al., 2020). However, empirical studies suggest that high levels of perceived environmental risk do not always correspond with accurate scientific understanding (Aksit, 2025). Individuals may correctly recognise increasing temperatures or more frequent flooding while simultaneously misunderstanding the mechanisms responsible for these changes (Cook et al., 2020). This divergence between environmental observation and scientific explanation represents an important challenge for climate communication and environmental education, particularly within developing countries (Natnael, 2025).

2.4 Socio-demographic Determinants of Climate Literacy

Previous studies have examined whether demographic characteristics influence climate knowledge and environmental attitudes (Karaelmas, 2025). Variables frequently investigated include gender, age, academic discipline, educational level, socio-economic status, and cultural background (Demoze, 2025). Nevertheless, empirical findings remain inconsistent (Asifat, 2021). Some international studies report significantly higher climate literacy among students enrolled in environmental science, geography, agriculture, engineering, and other

science-based disciplines because of greater exposure to environmental coursework (Ofori et al., 2023; Hijazi, 2024). Conversely, several African studies suggest that the widespread availability of climate information through mass media and social media has reduced disciplinary differences in climate awareness, although not necessarily in scientific understanding (Uzochukwu et al., 2020; Simpson et al., 2021). Similarly, while some researchers report significant relationships between socio-cultural background and climate perceptions, others conclude that climate awareness increasingly transcends traditional demographic boundaries because climate change has become a prominent issue within public discourse (Chisty, 2026). These inconsistencies suggest that the determinants of climate literacy are context-specific and require further investigation within different educational and geographical settings (Gilbert, 2025).

2.5 Research Gap

Although numerous studies have investigated climate change awareness among university students, three important gaps remain (Leal Filho et al., 2023; Hijazi, 2025). First, much of the existing literature focuses primarily on awareness rather than comprehensive climate literacy (Rousell & Cutter-Mackenzie-Knowles, 2020). Awareness alone does not necessarily indicate that individuals understand climate science or can critically evaluate competing sources of information (Bhattacharya et al., 2021). Second, relatively few studies within Southwestern Nigeria have simultaneously examined climate literacy, environmental risk perception, and information sources within a single analytical framework (Adelekan et al., 2021). Most previous investigations have considered these variables independently, thereby limiting understanding of how they interact to shape students' environmental knowledge (Olapeju et al., 2025). Third, existing studies present inconsistent findings regarding the influence of socio-demographic characteristics, particularly academic discipline and socio-cultural background (Asifat, 2021). Whether widespread exposure to digital media has reduced these traditional differences remains insufficiently understood within Nigerian universities (Ogunbode et al., 2020). This study addresses these gaps by examining climate literacy, environmental risk perception, and information sources among undergraduate students in two public universities in Ogun State. By integrating these dimensions within a single analytical framework, the study contributes to the growing literature on climate education, climate communication, and environmental policy in developing countries.

2.6 Theoretical Framework

Climate Literacy Framework

This study is anchored primarily on the Climate Literacy Framework, which conceptualises climate literacy as the ability of individuals to understand the scientific principles governing the Earth's climate system, critically evaluate climate-related information, communicate climate issues effectively, and make informed decisions that contribute to climate adaptation and mitigation. The framework was initially developed through the collaborative efforts of the U.S. Global Change Research Program (USGCRP) and has since been widely adopted in climate education and environmental literacy research worldwide (USGCRP, 2009; UNESCO, 2021).

Recent studies have further expanded its application within higher education, recognising climate literacy as a critical component of sustainable development and environmental citizenship (Aikowe & Mazancová, 2023; Monroe et al., 2022).

Climate literacy extends beyond simple awareness of climate change. It encompasses an integrated understanding of climate science, human influences on the climate system, observed and projected climate impacts, adaptation and mitigation strategies, and the ability to evaluate the credibility of climate information obtained from different sources. Consequently, individuals who are considered climate literate are expected not only to recognise environmental changes but also to distinguish scientifically validated information from misinformation and translate scientific knowledge into informed environmental decision-making (UNESCO, 2021; Aikowe & Mazancová, 2023).

Within university settings, climate literacy is increasingly recognised as an essential graduate competency because higher education institutions play a strategic role in preparing future professionals, policymakers, researchers, educators, and community leaders to respond effectively to climate-related challenges. Universities therefore have the responsibility to provide interdisciplinary climate education that equips students with scientific knowledge, critical thinking skills, and evidence-based decision-making abilities required to address contemporary environmental problems (Monroe et al., 2022; UNESCO, 2021).

The Climate Literacy Framework provides an appropriate theoretical foundation for this study because it corresponds directly with the variables investigated. Students' awareness of climate change represents the initial stage of climate literacy, while their understanding of climate causes, observed environmental changes, and mitigation strategies reflects deeper scientific literacy. Likewise, information sources—including social media, academic publications, and digital platforms constitute important pathways through which climate literacy is acquired and developed. By examining these dimensions simultaneously, the present study evaluates the extent to which university students possess climate literacy beyond basic awareness.

Risk Perception Theory

To complement the Climate Literacy Framework, this study also draws upon Risk Perception Theory, which explains how individuals interpret, evaluate, and respond to environmental hazards. The theory proposes that people's responses to environmental problems are influenced not only by scientific knowledge but also by their subjective perceptions of risk, personal experiences, social values, cultural contexts, and trust in information sources (Slovic, 1987; van der Linden, 2021).

Within climate change research, risk perception has become an important predictor of environmental concern, policy support, and willingness to engage in mitigation and adaptation actions. Individuals who perceive climate change as an immediate and personally relevant threat are generally more likely to seek additional climate information, support climate policies, and adopt environmentally responsible behaviours. Conversely,

individuals who perceive climate risks as distant or insignificant often demonstrate lower levels of engagement despite possessing basic knowledge of climate science (van der Linden, 2021; IPCC, 2022).

Among university students, perceptions of environmental risk are frequently shaped by direct exposure to observable climatic events such as extreme heat, flooding, irregular rainfall patterns, drought, and environmental degradation. These lived experiences influence how students interpret climate change, evaluate scientific information, and prioritise environmental issues. However, previous studies have demonstrated that personal experiences alone do not necessarily result in accurate scientific understanding because environmental observations may be interpreted through incomplete or inaccurate information acquired from informal communication channels (Aikowe & Mazancová, 2023; Ofori et al., 2023).

Risk Perception Theory therefore complements the Climate Literacy Framework by explaining why students may exhibit high awareness of local environmental changes while simultaneously demonstrating misconceptions regarding the underlying causes of climate change. Together, the two frameworks provide a comprehensive explanation of how scientific knowledge, information sources, and perceived environmental risks interact to influence climate literacy among university students.

2.7 Conceptual Framework of the Study

Drawing upon the Climate Literacy Framework and Risk Perception Theory, this study proposes that climate literacy among undergraduate students is influenced by multiple interacting factors. Information sources including social media, classroom instruction, academic publications, television, and other digital platforms serve as the primary channels through which climate knowledge is acquired. These information sources shape students' understanding of climate science, which subsequently influences their perception of environmental risks, including heatwaves, flooding, changing rainfall patterns, and other locally observed climate-related hazards. At the same time, socio-demographic characteristics, particularly academic discipline and socio-cultural background, may moderate levels of climate literacy by influencing exposure to environmental education and climate communication. Accordingly, this study conceptualises climate literacy as the dependent construct, while information sources, environmental risk perception, academic discipline, and socio-cultural background constitute the principal explanatory variables. The relationships among these variables provide the analytical basis for examining whether university students' climate knowledge is primarily determined by formal education or by the broader information environment within which they acquire climate-related information.

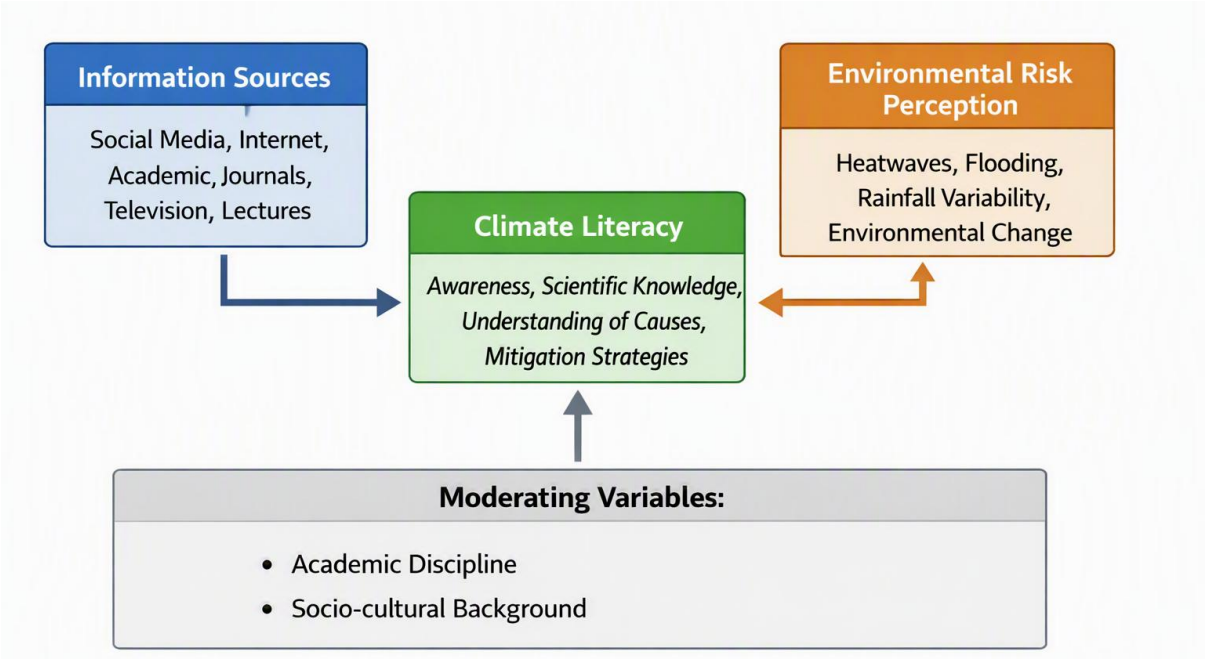

Figure 1: Conceptual Framework of the Study

3. Methodology

3.1 Research Design

This study adopted a cross-sectional quantitative survey design to investigate climate literacy, environmental risk perception, and the influence of information sources among undergraduate students in public universities in Ogun State, Southwestern Nigeria. A cross-sectional survey was considered appropriate because it allows the collection of data from a large population at a single point in time and facilitates the examination of relationships among socio-demographic characteristics, information sources, and climate-related knowledge. The design is widely used in climate literacy and environmental perception studies because it enables the systematic assessment of attitudes, perceptions, and knowledge across diverse populations.

3.2 Description of the Study Area

The study was conducted in Ogun State, located in Southwestern Nigeria between approximately 6°15'–7°60' N latitude and 2°45'–4°45' E longitude. Ogun State shares boundaries with Lagos State to the south, Oyo and Osun States to the north, Ondo State to the east, and the Republic of Benin to the west.

The State experiences a humid tropical climate characterised by distinct wet and dry seasons. Mean annual rainfall ranges between 1,200 and 2,000 mm, while average temperatures generally range from 24°C to 34°C, depending on season and location. Rapid urbanisation, industrialisation, agricultural expansion, and population growth have increased exposure to climate-related hazards, including flooding, heat stress, land degradation, and changing rainfall patterns. The study focused on two public universities in Ogun State because they attract

students from diverse socio-economic, cultural, and academic backgrounds, making them appropriate settings for evaluating climate literacy and environmental risk perception among young adults.

3.3 Study Population

The target population comprised all full-time undergraduate students enrolled in the selected public universities during the 2024/2025 academic session. Undergraduate students were selected because they represent an important segment of society that will become future professionals, educators, policymakers, environmental managers, and decision-makers responsible for addressing climate-related challenges.

3.4 Sample Size Determination and Sampling Procedure

The sample size for this study was determined using the Yamane (1967) formula for finite populations, which provides an appropriate estimate where the target population is known.

The formula is expressed as:

$$n = \frac{N}{1 + N(e)^2}$$

Where:

n = required sample size

N = total study population

e = margin of error (0.05 at a 95% confidence level)

The target population comprised all undergraduate students enrolled in the two selected public universities in Ogun State during the 2024/2025 academic session. The total undergraduate population was 51,620 students, consisting of 19,831 students from Tai Solarin University of Education (TASUED) and 32,239 students from Olabisi Onabanjo University (OOU).

Substituting the values into the formula:

$$n = \frac{51{,}620}{1 + 51{,}620(0.05)^2}$$

$$n = \frac{51{,}620}{1 + 51{,}620(0.0025)}$$

$$n = \frac{51{,}620}{130.05}$$

$$n = 396.9$$

The calculated sample size was approximately 397 respondents. Following the recommendation of Israel (1992) that minor upward adjustments improve representativeness and to ensure equal allocation during sampling, the sample size was rounded to 400 respondents.

Furthermore, the selected sample exceeded the minimum requirement recommended by Yamane (1967), thereby enhancing the precision and reliability of the findings while compensating for possible non-response and incomplete questionnaires. Accordingly, 400 undergraduate students participated in the study and constituted the final sample used for statistical analysis.

A multistage sampling technique was adopted to select the respondents. In the first stage, Tai Solarin University of Education (TASUED) and Olabisi Onabanjo University (OOU) were purposively selected because they are the two major public universities in Ogun State, enrolling students from diverse socio-economic, cultural, and academic backgrounds. Their inclusion provided a suitable context for investigating climate literacy, environmental risk perception, and information sources among undergraduate students.

In the second stage, the sample was proportionately allocated to each university based on its undergraduate population using the proportional allocation formula:

$$n_h = \frac{N_h}{N} \times n$$

Where:

- n_h= sample allocated to institution h
- N_h= population of institution h
- N= total population
- n= total sample size

Tai Solarin University of Education (TASUED)

$$n_h = \frac{19{,}831}{51{,}620} \times 400$$

$$n_h = 153.7 \approx 154$$

Olabisi Onabanjo University (OOU)

$$n_h = \frac{32{,}239}{51{,}620} \times 400$$

$$n_h = 249.8 \approx 250$$

Because proportional allocation produced 404 (154+250) respondents after rounding, four questionnaires was deducted to maintain the predetermined sample size of 400. The final proportional allocation can therefore be adjusted as:

University	Final Sample
Tai Solarin University of Education	154

Olabisi Onabanjo University	246
Total	400

In the third stage, respondents within each university were selected from the various faculties to ensure representation across different academic disciplines. Finally, eligible undergraduate students were selected using convenience sampling until the required sample size for each institution was attained. The combination of purposive selection at the institutional level and probability-based sampling at subsequent stages enhanced the representativeness of the study while reducing selection bias.

3.5 Instrumentation and Data Collection

Data were collected using a structured, self-administered questionnaire developed based on the study objectives and relevant literature on climate change perception and knowledge. The instrument comprised three sections: Section A collected respondents' socio-demographic characteristics; Section B assessed perceptions of local climate variability; and Section C examined respondents' awareness, knowledge, information sources, perceived causes, impacts, and mitigation strategies related to climate change. The questionnaire contained both closed- and open-ended questions. Responses to open-ended items were coded into relevant categories before statistical analysis. The questionnaires were administered personally by the researcher and trained research assistants during lecture periods after obtaining permission from the university authorities. Participation was voluntary, informed consent was obtained from all respondents, and confidentiality was assured. Completed questionnaires were screened for completeness before coding and analysis.

3.6 Validity and Reliability of the Instrument

The questionnaire was subjected to face and content validity through expert evaluation. The draft instrument was reviewed by specialists in Geography, Climate Science, Environmental Management, and Educational Measurement to evaluate the clarity, relevance, and adequacy of the questionnaire items. Their recommendations were incorporated before the instrument was administered. The instrument was pre-tested among undergraduate students outside the study population. Internal consistency was evaluated using Cronbach's alpha coefficient, with an overall reliability coefficient of $\alpha = 0.84$, indicating good internal consistency.

3.7 Data Analysis

The collected data were coded, cleaned, and analysed using IBM SPSS Statistics (Version 27). Descriptive statistics, including frequencies, percentages, means, and standard deviations, were used to summarise respondents' characteristics, climate literacy, environmental risk perceptions, and information sources. Pearson's Product-Moment Correlation was employed to examine relationships between selected socio-demographic variables and climate knowledge. Statistical significance was assessed at the 5% significance level ($p < 0.05$). Before conducting the correlation analysis, assumptions relating to linearity, normality, and homoscedasticity should be checked and briefly reported if they were assessed.

3.8 Ethical Considerations

Participation in the study was voluntary. All respondents provided informed consent before completing the questionnaire. No personally identifiable information was collected, and confidentiality was maintained throughout the research process.

4. Results and Statistical Analysis

Table 1. Socio-demographic characteristics of respondents (N = 400)

Variable	Category	n	%
Sex	Male	195	48.8
	Female	205	51.2
Age	17-20years	56	14.0
	21-24years	164	41.0
	25-30years	132	33.0
	above 30 years	48	12.0
Marital status	Single	373	93.3
	Married	27	6.8
Religion	christian	167	41.8
	islam	233	58.3
Academic discipline	Humanities	56	14.0
	Vocational studies	81	20.3
	Social science	63	15.8
	Pure science	71	17.8
	Animal science	51	12.8
	Agricultural science	45	11.3
	Medical science	33	8.3

Note. Percentages are based on the total sample (N = 400).

Table 1 shows that the sample of 400 undergraduates was relatively balanced by sex, with 205 females (51.2%) and 195 males (48.8%). The age distribution was concentrated among respondents aged 21–24 years (41.0%) and 25–30 years (33.0%), while those aged 17–20 years constituted 14.0% and those above 30 years 12.0%. The

sample was predominantly single (93.3%), reflecting the expected demographic profile of an undergraduate population. Respondents were drawn from both Christian (41.8%) and Muslim (58.3%) backgrounds. Across academic disciplines, Vocational Studies constituted the largest group (20.3%), followed by Pure Science (17.8%) and Social Science (15.8%), while Medical Science represented the smallest proportion (8.3%). Overall, the distribution provides substantial variation across sex, age and academic discipline, enabling examination of whether climate-change awareness differs across these characteristics.

Table 2. Perceived climate variability and climate-change awareness

Indicator	Response	n (%)
Rainfall character	Stormy	271 (67.8)
Flooding after rainfall	Yes	260 (65.0)
General prevalence of climate change	Low	200 (50.0)
Awareness of global climate change	Yes	254 (63.5)
Duration of awareness	1–3 years	225 (56.3)

The results indicate a moderate level of climate-change awareness alongside strong perceptions of local climate variability. Most respondents (67.8%) characterised rainfall in the study area as stormy, while 65.0% reported experiencing flooding after rainfall. Although 63.5% had heard of global climate change, half of the respondents (50.0%) perceived its prevalence in the area as low. Among those who reported awareness, 56.3% indicated that they had become aware within the previous 1–3 years. Overall, the findings suggest that respondents recognise noticeable changes in local rainfall and associated environmental conditions, but this experience has not necessarily translated into a strong perception of the broader prevalence of climate change.

Table 3. Climate-change knowledge, information sources and response strategies

Indicator	Leading response	n (%)
Main information source	Newspaper	94 (23.5)
Perceived major cause	Chemical-gas emissions	211 (52.8)
Main strategy for reducing global warming	Reduce human activities	204 (51.0)
Greenhouse-effect awareness	Yes	301 (75.3)
Perceived greenhouse-effect cause	Gas emission	228 (57.0)
Main greenhouse-effect reduction strategy	Reduce gas emissions	262 (65.5)
Ozone-layer awareness	Have heard	130 (32.5)

Main agricultural coping strategy	Seek climatological/meteorological knowledge	294 (73.5)
Main perceived educational impact	Health problems	202 (50.5)
Main general coping strategy	Updated with news/information	179 (44.8)

Note: The table reports the most frequently selected response for each indicator; $N = 400$.

The findings reveal uneven but generally substantial climate-change knowledge and awareness across specific environmental concepts. Newspapers (23.5%) were the most frequently reported source of climate-change information, followed closely by television (23.3%). Chemical-gas emissions were identified as the leading perceived cause of climate change (52.8%), while reducing human activities was the most frequently identified strategy for reducing global warming (51.0%). Awareness was particularly high for the greenhouse effect (75.3%), with gas emissions identified as its principal cause (57.0%) and reduction of gas emissions as the leading mitigation strategy (65.5%). In contrast, awareness of ozone-layer depletion was considerably lower, with only 32.5% reporting that they had heard about it. For adaptation, seeking climatological or meteorological knowledge was the dominant agricultural coping strategy (73.5%), while health problems were the most frequently perceived effect of climate change on education (50.5%). Overall, the results point to relatively strong general awareness but gaps in knowledge of specific climate and atmospheric processes, alongside a clear preference for information-based adaptation and emission-reduction responses.

Table 4. Association between selected socio-demographic characteristics and awareness of global climate change

Socio-demographic characteristic	**Pearson χ^2**	**df**	***p***	**Cramer's V**	**Decision**
Sex	4.470	1	.035	.106	Significant
Age	9.371	3	.025	.153	Significant
Marital status	0.125	1	.723	.018	Not significant
Religion	1.089	1	.297	.052	Not significant
Course of study	37.007	6	<.001	.304	Significant

Note: $N = 400$. Pearson's χ^2 test of independence was used. Cramer's V represents the magnitude of association. $p < .05$ was considered statistically significant. All five analyses satisfied the expected-frequency assumption; no cells had expected counts below 5.

The results demonstrate that climate-change awareness was significantly associated with sex, age, and course of study, but not with marital status or religion. Sex showed a statistically significant but weak association with awareness, $\chi^2(1, N = 400) = 4.470$, $p = .035$, V = .106. Male respondents reported greater awareness (68.7%)

than female respondents (58.5%). Age was also significantly associated with awareness, $\chi^2(3, N = 400) = 9.371$, $p = .025$, V = .153. Awareness was highest among respondents aged 17–20 years (78.6%) and lowest among those above 30 years (50.0%), although the association remained weak. The strongest association was observed for course of study, $\chi^2(6, N = 400) = 37.007$, $p < .001$, V = .304, indicating a moderate association. Awareness varied substantially across academic disciplines: it was highest among Humanities students (94.6%) and lowest among Pure Science students (45.1%).

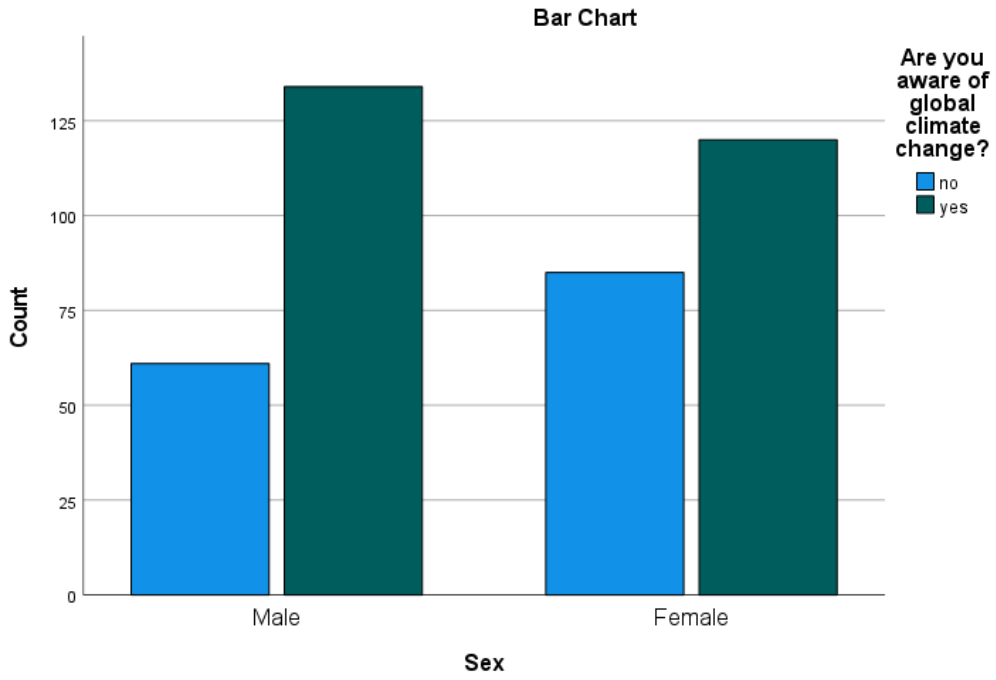

Figure 2. Global climate-change awareness by sex among undergraduate students

Figure 2 indicates a higher proportion of climate-change awareness among male respondents than female respondents. Approximately 68.7% of males reported awareness compared with 58.5% of females. Although the difference is visually apparent, the magnitude of the association is small, consistent with the corresponding χ^2 result and Cramer's V of 0.106. Thus, sex appears to distinguish awareness levels to a limited extent rather than representing a substantial divide in climate-change awareness.

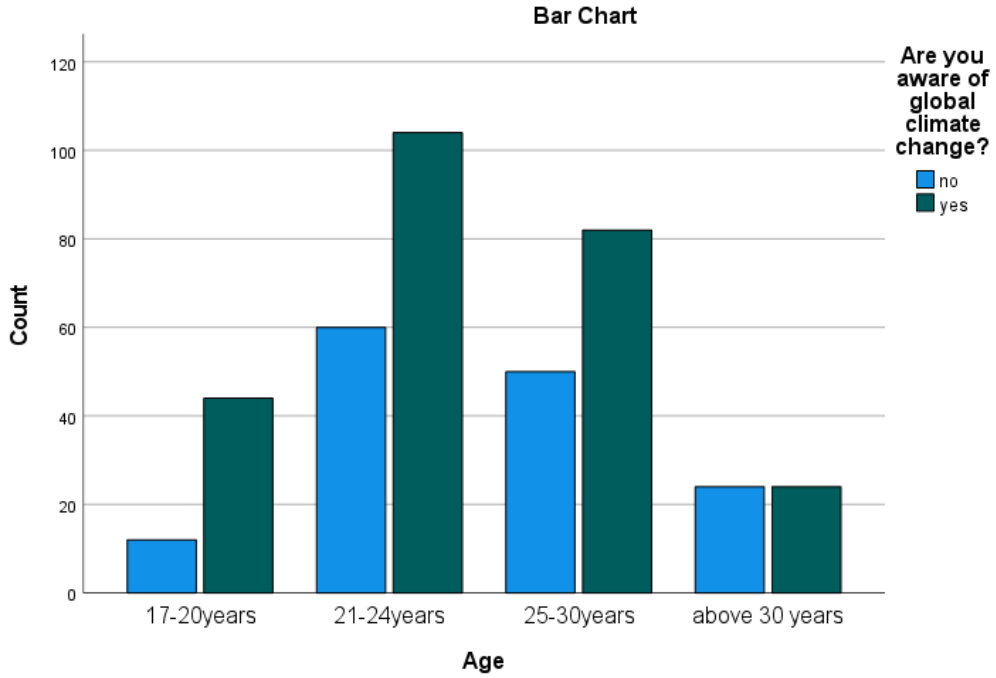

Figure 3. Global climate-change awareness by age group among undergraduate students

Figure 3 shows a noticeable age gradient in climate-change awareness. Awareness was highest among respondents aged 17–20 years (78.6%), followed by those aged 21–24 years (63.4%) and 25–30 years (62.1%), while respondents above 30 years recorded the lowest awareness (50.0%). This pattern corresponds with the statistically significant association between age and awareness, $\chi^2(3, N = 400) = 9.371$, $p = .025$, although the effect size was weak (Cramer's V = .153). The result therefore suggests an age-related difference in awareness without implying that age alone substantially explains variations in climate-change awareness.

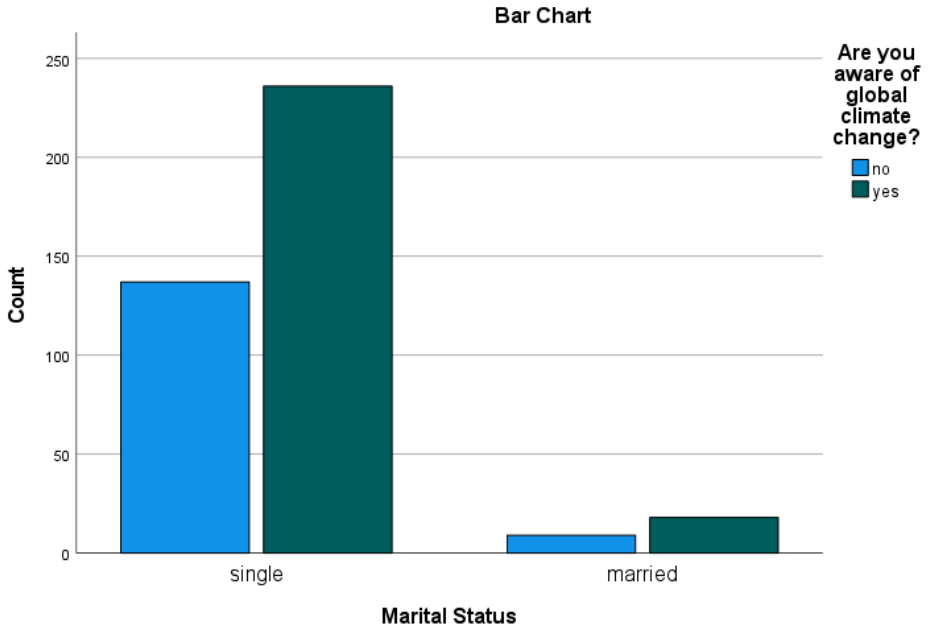

Figure 4. Global climate-change awareness by marital status among undergraduate students

Figure 4 shows broadly similar awareness levels across marital-status groups. Approximately 63.3% of single respondents were aware of global climate change, compared with 66.7% of married respondents. The relatively small difference is consistent with the non-significant association observed in the χ^2 analysis, $\chi^2(1, N = 400) = 0.125$, $p = .723$, Cramer's V = .018. Marital status therefore appears to have little practical relevance to differences in climate-change awareness within this sample.

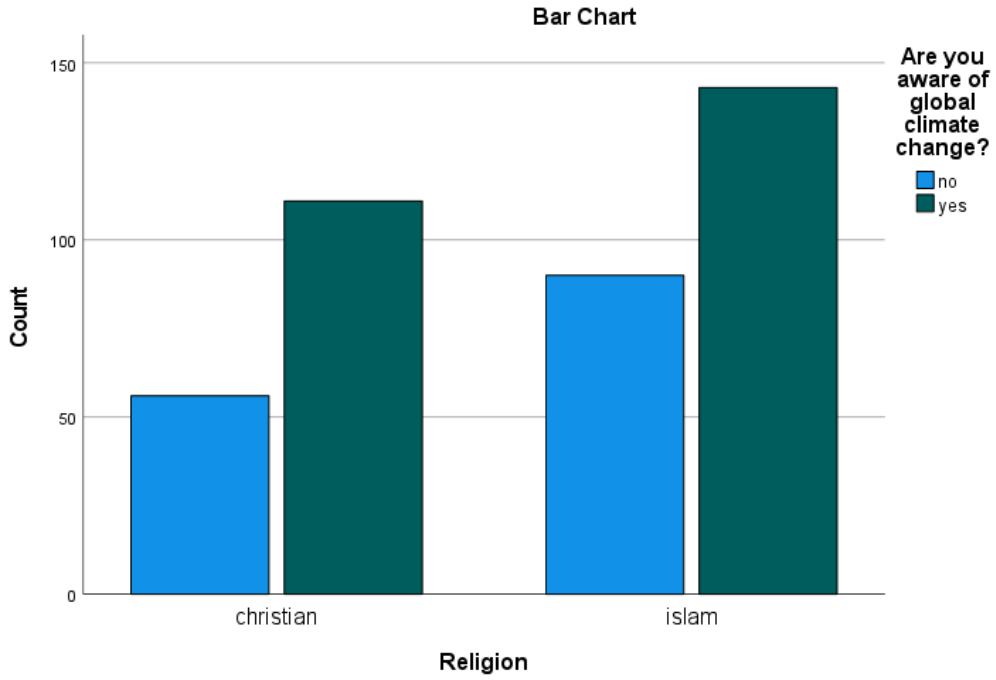

Figure 5. Global climate-change awareness by religious affiliation among undergraduate students

Figure 5 indicates relatively comparable awareness across the two religious groups represented in the sample. Approximately 66.5% of Christian respondents reported awareness compared with 61.4% of Muslim respondents. The difference was not statistically significant, $\chi^2(1, N = 400) = 1.089$, $p = .297$, with a negligible association (Cramer's V = .052). The pattern suggests that climate-change awareness cuts across the religious categories represented in the study rather than being strongly differentiated by religious affiliation.

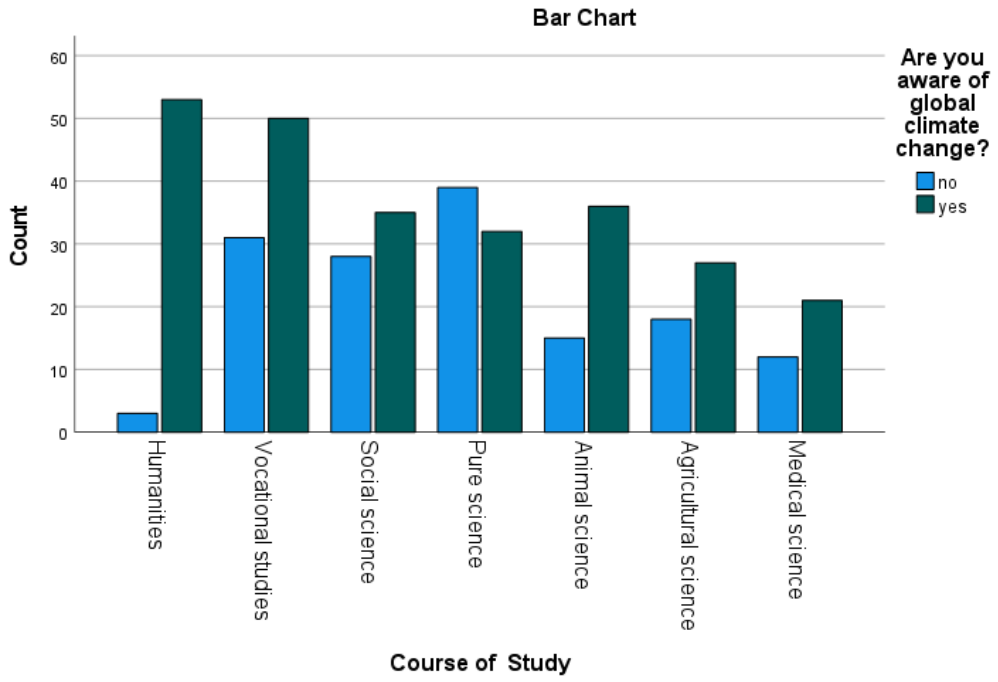

Figure 6. Global climate-change awareness by academic discipline among undergraduate students

Figure 6 reveals the clearest variation in climate-change awareness across the characteristics examined. Awareness was particularly high among Humanities students (94.6%) and Animal Science students (70.6%), while it was lower among Vocational Studies (61.7%), Agricultural Science (60.0%), Social Science (55.6%), Medical Science (63.6%) and, most notably, Pure Science students (45.1%). The pattern is supported by a statistically significant association between course of study and climate-change awareness, $\chi^2(6, N = 400) = 37.007$, $p < .001$, with Cramer's V = .304, representing the largest association observed in the analysis.

5. Discussion of Findings

This study examined climate-change awareness, perceptions of local climatic variability, information sources, perceived causes and response strategies among undergraduate students in two public universities in Ogun State. Taken together, the findings reveal a pattern of moderate general awareness, strong recognition of locally observable environmental changes, uneven understanding of specific climate-related concepts, and significant variation in awareness across academic disciplines. This combination is important because climate literacy extends beyond knowing that climate change exists to understanding its causes, consequences, risks and possible responses (Monroe et al., 2020; Simpson et al., 2021).

Awareness and perception of local climate variability

The finding that 63.5% of respondents were aware of global climate change indicates that the issue has achieved considerable visibility among undergraduates. This is broadly consistent with evidence from African university populations reporting moderate-to-high levels of climate-change awareness (Ofori et al., 2023; Moshood et al., 2024). However, awareness should not be equated automatically with comprehensive climate literacy. The

present findings show that although 67.8% of respondents characterised rainfall as stormy and 65.0% reported flooding after rainfall, 50.0% nevertheless described the prevalence of climate change in the area as low. This apparent distinction between recognition of environmental changes and assessment of climate change as a broader phenomenon supports the theoretical proposition that direct environmental experience can shape risk perception without necessarily producing complete scientific understanding (Aikowe & Mazancová, 2023).

The finding is particularly relevant to Ogun State, where flooding, heat stress and changing rainfall patterns constitute important environmental concerns. The high proportion reporting flooding after rainfall suggests that climate-related risk is not an abstract issue for many respondents but is connected to observable environmental experiences. Within the Risk Perception Theory perspective adopted in this study, such experiences can increase the salience of environmental hazards; however, their interpretation depends substantially on the quality of information available to individuals.

Information sources and the climate-information environment

An important finding that requires emphasis is that newspapers (23.5%) and television (23.3%) were the two most frequently reported sources of climate-change information, followed by radio (15.5%), academic seminars (14.5%), community awareness programmes (14.0%) and the internet (9.3%). This finding differs from the earlier version of the manuscript, which incorrectly presented social media as the dominant source. The previous 71.67% social-media statement should be removed completely.

The present evidence suggests that traditional mass-media channels remain important pathways for climate information among the surveyed students. This does not imply that digital media are unimportant; rather, it demonstrates that the information environment in this particular sample is more heterogeneous than the earlier analysis suggested. Contemporary climate communication research recognises that students encounter climate information through multiple overlapping channels, creating opportunities for both knowledge acquisition and misinformation (Allgaier, 2020; Pan et al., 2023). The implication is that universities should not rely exclusively on either formal instruction or digital communication but should develop coordinated climate-communication strategies that connect classroom learning, credible media and accessible scientific resources.

Uneven climate knowledge

The results also reveal an important distinction between general awareness and domain-specific understanding. While 75.3% of respondents had heard of the greenhouse effect, only 32.5% reported having heard of ozone-layer depletion. Similarly, emission-related explanations were the most frequently selected responses for both the perceived cause of climate change (52.8%) and the cause of the greenhouse effect (57.0%). These findings indicate substantial exposure to climate-related concepts but an uneven distribution of knowledge across different components of atmospheric and climate science.

This pattern is consistent with the broader climate-literacy literature, which cautions that awareness does not necessarily correspond to scientifically complete understanding (Rousell & Cutter-Mackenzie-Knowles, 2020;

Bhattacharya et al., 2021). The implication is therefore not that respondents were uniformly "climate illiterate"; rather, their literacy appears partial and concept-specific. This distinction is important for higher education because effective climate education should move students beyond recognition of climate change towards understanding its physical mechanisms, anthropogenic drivers, consequences and evidence-based response options.

Adaptation and mitigation orientations

The predominance of reducing human activities (51.0%) as a perceived means of reducing global warming and reducing gas emissions (65.5%) as the leading strategy for reducing the greenhouse effect indicates a reasonably strong orientation towards anthropogenic mitigation. The finding that 73.5% recommended seeking climatological or meteorological knowledge as a means of helping farmers cope with climate change is particularly noteworthy. It suggests that respondents recognise the value of scientific and professional climate information in adaptation decision-making.

This orientation is consistent with the broader argument that climate literacy can support more informed environmental decision-making and adaptive capacity (Leal Filho et al., 2023). Nevertheless, the results should not be interpreted as evidence that respondents necessarily engage in these behaviours. The questionnaire assessed perceptions and preferred strategies, not observed mitigation or adaptation behaviour. This distinction strengthens the methodological credibility of the paper.

Socio-demographic variation in climate-change awareness

The inferential analysis provides one of the study's most important contributions. Climate-change awareness was significantly associated with sex, age and academic discipline, but not with marital status or religion. The association with sex was statistically significant but weak (Cramer's V = .106), while the association with age was also weak (V = .153). These findings suggest that demographic differences exist but should not be overstated.

The strongest relationship occurred with academic discipline, $\chi^2(6, N = 400) = 37.007$, $p < .001$, V = .304. Awareness was highest among Humanities students (94.6%) and lowest among Pure Science students (45.1%). This finding is particularly interesting because it does not conform to the simplistic expectation that students in science-related disciplines will necessarily demonstrate greater climate-change awareness. Previous studies have reported differences in climate knowledge according to academic background, although findings across educational contexts remain inconsistent (Ofori et al., 2023; Umwigama & Koske, 2025).

The present result therefore suggests that academic discipline matters, but not necessarily in the direction conventionally assumed. The particularly high awareness among Humanities students and lower awareness among Pure Science students indicates that exposure to climate discourse may be shaped by curricular content, institutional communication, environmental interests and broader social information environments rather than disciplinary identity alone. Because the present study is cross-sectional and observational, the result should be interpreted as an association rather than evidence that academic discipline causes awareness differences.

The absence of significant relationships with marital status and religion further indicates that climate-change awareness is not uniformly structured by socio-cultural characteristics. Rather, the stronger differentiation by academic discipline points towards the potential importance of educational environments in shaping climate communication and awareness.

Implications for climate education

Taken together, the findings support the central argument of the Climate Literacy Framework and Risk Perception Theory adopted in the study. Students appear to recognise environmental changes in their immediate surroundings, but awareness of climate change is not synonymous with comprehensive scientific literacy. The significant disciplinary differences further suggest that universities represent an important institutional setting for closing these knowledge gaps.

The implication is not simply to increase the amount of climate information available to students. Rather, climate education should emphasise scientific accuracy, interdisciplinary integration, critical evaluation of information and the translation of environmental risk perception into informed adaptation and mitigation decisions. Such an approach is consistent with the growing emphasis on universities as strategic institutions for sustainability education and climate action (UNESCO, 2021; Leal Filho et al., 2023).

6. Conclusion

This study examined climate literacy, environmental risk perception, information sources, and socio-demographic variations in climate-change awareness among undergraduate students in two public universities in Ogun State, Southwestern Nigeria. The findings reveal considerable general awareness of climate change and strong recognition of local environmental changes, particularly stormy rainfall and flooding, but uneven understanding of specific climate-related concepts. Newspapers and television were the leading information sources, while academic discipline showed the strongest association with climate-change awareness. These findings demonstrate that awareness does not necessarily translate into comprehensive scientific understanding, highlighting the need for interdisciplinary climate education, credible climate communication, and locally relevant learning initiatives. Strengthening these interventions within higher education institutions is essential for improving students' climate literacy and supporting informed environmental decision-making, adaptation, and mitigation.

7. Recommendations

Based on the findings of the study, the following recommendations are provided:

- Implement mandatory foundational climate change courses across all non-science disciplines to equalize the "Discipline Effect".
- Provide open-access journal repositories and subsidized campus data bundles within tertiary institutions to move students beyond a superficial social media-level understanding.

- Establish mandatory tree-planting and carbon-monitoring programs on university campuses to translate student perception into proactive mitigation.

8. References

Adetoro, S. S., Michael, O. A., & Abdullahi, I. Y. (2023). Climate change misinformation & literacy: Perception of selected undergraduate students in a university of technology. *Library and Information Management Forum*, *26*(1), 153–163.

Aikowe, L. D., & Mazancova, J. (2023). Pro-environmental awareness of university students – assessment through sustainability literacy test. *International Journal of Sustainability in Higher Education*, *24*(3), 719–741. https://doi.org/10.1108/IJSHE-06-2021-0219

Federal Ministry of Health and Social Welfare. (2024). *Nigeria climate change and health: National vulnerability and adaptation assessment report*.

Intergovernmental Panel on Climate Change. (2024). *Fact sheet - Africa*.

IPCC. (2024). *Fact sheet – Africa: Climate change impacts and risks*. Working Group II – Impacts, Adaptation and Vulnerability.

Khabour, M. O., Tarabsheh, O. O., Al-zu'bi, B. M., Khabour, O. F., & Saadeh, R. (2025). Knowledge and attitudes of medical students towards the health impact of climate change: A study from Jordan. *PLOS One*, *20*(5), e0324943. https://doi.org/10.1371/journal.pone.0324943

Malgwi, P. G., & Joshua, W. K. (2021). Assessment of the perception and awareness of climate change and the influence of information amongst tertiary education students in North-East Nigeria. *Library and Information Science Digest, 14*(1), 14-24.

Moshood, F. J., Onatunji, A. B., & Shittu, B. A. (2024). Knowledge, awareness, and perceptions of climate change among forestry students in Nigeria. *Ethiopian Journal of Environmental Studies & Management*, *17*(2), 150–165. https://doi.org/10.4314/ejesm.v17i2.2

Mustapha, M. L. A., Muhammed, S. A., & Yusuf, J. (2022). Impact of climate change awareness on undergraduates' socio-emotional well-being in Nigeria. *International Journal of Emotional Education*, *14*(2), 53–67. https://doi.org/10.56300/GDUE5169

Nwankwo, B. E., Agu, S. A., & Eze, H. O. (2025). Climate change risk perception, response efficacy, and environmentalism among university undergraduates. *Nigerian Journal of Social Psychology*, *7*(2).

Ofori, B. Y., Ameade, E. P. K., Ohemeng, F., Musah, Y., Quartey, J. K., & Owusu, E. H. (2023). Climate change knowledge, attitude and perception of undergraduate students in Ghana. *PLOS Climate*, *2*(6), e0000215. https://doi.org/10.1371/journal.pclm.0000215

Okon, E. M., Falana, B. M., Solaja, S. O., Yakubu, S. O., Alabi, O. O., Okikiola, B. T., Awe, T. E., Adesina, B. T., Tokula, B. E., Kipchumba, A. K., & Edeme, A. B. (2021). Systematic review of climate change impact research in Nigeria: Implication for sustainable development. *Heliyon*, *7*(9), e07941. https://doi.org/10.1016/j.heliyon.2021.e07941

Ripple, J. W., Wolf, C., Gregg, W. J., Rockström, J., Mann, E. M., Oreskes, N., Lenton, M. T., Rahmstorf, S., Newsome, M. T., Xu, C., Svenning, J., Pereira, C. C., Law, E. B., & Crowther, W. T. (2024). The 2024 state of the climate report: The perilous times on planet Earth. *BioScience. 74*(1), 1-12.

Sanchez, K. L., Antipuesto, D. G., De Perio, J. L., & Campania, J. V. (2024). Climate change awareness and eco-anxiety among undergraduate students. *International Journal of Social Science and Education Research Studies*, *4*(9), 1017–1024. https://doi.org/10.5577/ijssers/V04I9Y2024-10

Schiffman, R. (2022, April 28). For Gen Z, climate change is a heavy emotional burden: An interview with Britt Wray. *Yale Environment 360*.

Simpson, N. P., Mach, K. J., Constable, A., Hess, J., Hogarth, R., Howden, M., Lawrence, J., Lempert, R. J., Muccione, V., Mackey, B., & New, M. G. (2021). A framework for complex climate change risk assessment. *One Earth*, *4*(4), 489–501.

Umwigama, B., & Koske, J. (2025). Climate change awareness among Kenyatta University undergraduates, Kenya. *African Journal of Environmental Science and Technology, 19*(1), 1-13.

Umwigama, B., & Koske, J. (2025). Climate change awareness among Kenyatta University undergraduates, Kenya. *African Journal of Environmental Science and Technology*, *19*(1), 1–13. https://doi.org/10.5897/AJEST2024.3307