Empowering Educators: Assessing Climate Change Awareness among Secondary School Teachers in Ogun State, Nigeria, to Enhance Environmental Stewardship

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Abstract: Climate change is a pressing global issue, and teachers play a crucial role in developing environmental awareness and stewardship among students. This study aimed to assess the climate change knowledge and information sources of secondary school teachers, as well as any potential differences in their awareness levels based on gender and school location (urban vs. rural) in Ado-Odo/Ota Local Government of Ogun State. A survey design was employed for this study. A total of 150 teachers were sampled from 20 secondary schools using a stratified sampling technique, out of a population of 450 teachers. Data was collected using a 17-item questionnaire structured on a 4-point Likert scale. The instrument was validated by experts and found to be reliable with a coefficient of 0.85 using the product-moment correlation coefficient. Three research questions and four hypotheses were formulated and tested using both descriptive and inferential statistical tools, including the one-sample chi-square test for goodness of fit and the Mann-Whitney U test. The findings showed that the teachers in the areas of study have substantial knowledge about climate change, but the information sources are significantly low. The results also indicated that there is no statistically significant difference in the level of climate change awareness between the male teachers and female teachers. The study revealed that the differences between educators in urban and rural areas are not statistically significant. As established by our findings, it was concluded that teachers having insufficient information sources on climate change will impact the enhancement of environmental stewardship. It is hereby recommended that policymakers and educational authorities provide educators with more comprehensive and accessible information on climate change.

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1. Introduction

Climate change is an urgent global challenge that significantly affects human health, environmental stability, and economic security. This is primarily the result of human action, which necessitates heightened awareness and proactive measures to mitigate its effects. The rate at which climate change occurs has placed significant pressure on the environment, making Choon et al. (2019) describe it a major challenge in the present era. In Nigeria, the increasing frequency of climate-related events stresses the need for effective education and awareness initiatives, particularly among educators who shape future generations' understanding of environmental stewardship. Despite the growing recognition of climate change as a critical issue, there remains a gap in our understanding of how to effectively address it. This gap is particularly evident among secondary school teachers in Ogun State, Nigeria, who, while cognizant of climate change, lack access to comprehensive and reliable information on the subject.

Literature review

Climate change poses existential risks at various scales, threatening survival and basic human needs for individuals, communities, and humanity as a whole (Huggel et al., 2022). Haueis (2024) posits that the contemporary notion termed the "climate crisis" represents the most appropriate description for the establishment of mitigation and adaptation objectives, effectively integrating scientific,

political, and activist dialogues. Nigeria, similar to other nations globally, has encountered climate change disasters, as evidenced by changes such as rising temperatures, unpredictable rainfall patterns, drought, desertification, erosion, floods, thunderstorms, heat waves, and rising sea levels. In response to the visible effects of climate change in Nigeria, the National Emergency Management Agency (NEMA, 2023) issued a warning for residents living along the banks of the Benue River to evacuate immediately because of the risk of flooding caused by the opening of the Ladgo Dam in the Republic of Cameroon. Despite a general concern about climate change, a limited number of individuals are actively involved in efforts to mitigate its effects, primarily because of a lack of awareness and knowledge regarding the appropriate strategies for addressing climate change. This creates a challenge for the entire country in terms of increasing public awareness. Insufficient awareness of climate change and lack of proactive environmental behaviors have been identified as significant obstacles to addressing environmental concerns (Gifford, 2011). As a result raising awareness and promoting the adoption of adaptation strategies is imperative for mitigating these impacts.

Education plays a key role in fostering awareness regarding the climate change crisis; the implementation of climate change education will significantly equip individuals with the basic knowledge and skills necessary for mitigating the associated impacts. According to Bharati and Pandey (2023), education plays a critical role in increasing awareness and promoting mitigation and adaptation strategies for climate change. Ahove (2014) defined Climate Change Education (CCE) as the process through which individuals acquire knowledge and skills that result in a noticeable change in their behavior. Similarly Damoah (2023) stress that climate change education is crucial for addressing the global climate crisis and should be integrated across all disciplines. Açıkalın, et.al, (2024) conclude that though education plays an important role in increasing awareness of climate change, but there is a lack of common structure around climate change education. Examining the implications of climate change education, Esakkimuthu and Banupriya (2023) emphasized the need of integrating comprehensive climate change education into the curricula across all levels of the educational field. Integrating climate change education will in no small way bring more familiarity and increase awareness regarding climate change issues.

Despite the increase in educational initiatives in recent years, teachers' readiness for this critical task remains a question. There has been limited focus on how teachers' beliefs about climate change and how their classroom management practices affect students' awareness of climate change. It is important to recognize that raising awareness among students can play a fundamental task in promoting effective climate change education.

Teachers have a significant impact on students' attitudes, action, and knowledge, who will eventually become leaders and decision-makers of tomorrow. By incorporating climate change education into their teaching, educators can enable students to understand the impacts of climate change,

its consequences, and necessary measures for prevention and adjustment. This knowledge can stimulate well-informed decision making, advocacy, and collaborative efforts towards sustainable resolutions.

Ahmed et al. (2022) contend that the perceptions held by educators regarding climate change may vary based on factors such as institution type and personal experiences with extreme weather events. Building upon the controversial character of climate change education, Nation and Feldman (2022) stated that educators frequently hesitate to express their personal convictions concerning climate change within the educational environment due to the contentious elements of the topic and the fear of potential repercussions. According to Clayton et al., (2023) educators experience both affirmative and adverse emotions concerning climate change, which may significantly affect their readiness to teach on this subject. To alleviate these contentious challenges, Bleazby et al (2022) stress the importance for educators to employ critical pedagogies to navigate the controversies surrounding climate change in the educational setting, rather than allowing students to independently derive their conclusions. Schubatzky and Haagen-Schützenhöfer (2022) maintain that educators possess the necessary competencies to effectively address or "debunk" misinformation regarding climate change, as well as to instruct their students on how to identify and counter such misinformation.

In a study involving 19 teachers who participated in a professional development program focused on enhancing their understanding of global climate change, Liu et al., (2015) found that there is growing recognition among teachers about the critical nature of global climate change and the necessity of integrating this topic into their science curriculum. However, these educators were found to have misunderstandings about the causes and consequences of climate change.

Bozoglu et al (2022) highlighted the discrepancy in comprehending the effects of climate change between the general public and experts. Likewise, Igu et al., (2023) found that teachers' views on climate change significantly influenced students' perceptions. Therefore, it is essential for educators to enhance their knowledge and awareness of climate change to ensure that educational content aligns with the standards outlined by Burçkin et al., (2015).

In spite of the dissemination of information on climatic issues through various media outlets, there is still a lack of accurate information on this subject as advanced by Ogunleye (2016), that the United Nations and the International Communities have been utilizing media to raise awareness about climate change in Nigeria, but it appears that their efforts do not effectively reach the population. Similarly, Odjugo (2013) found that a large percentage of respondents in both rural and urban areas in Nigeria have a limited understanding of climate change. According to a study conducted by Dike and Amadi (2016), it was found that teachers have a low level of awareness regarding climate change and the sources of information related to it.

Research conducted by Dorji et al (2021) suggests that teachers possess a moderate level of awareness regarding climate change, with a stronger focus on its effects rather than its causes and methods of mitigation. Eze et al (2022) found that teachers have a moderate level of climate science literacy and expressed a strong need for training on climate change concepts. In the same ways, Mazyopa et al., (2022) found that the level of climate change knowledge among secondary school teachers in Lusaka is not notably low. In conclusion all indices clearly signified the consensus among researchers that the promotion of climate change education is essential for fostering awareness, which may successively accelerate changes in human behavior with respect to the environment. Hence, awareness constitutes fundamental prerequisites in mitigation and adaptive management of diverse climate disasters.

Significance of the study

The findings of this study have significant implications for educational policies and reform. Teachers play an important role in shaping the environmental attitudes and behaviors of future generations. This study contributes to the development of environmentally conscious citizens by empowering teachers with knowledge and skills. Policymakers should prioritize training programs that equip educators with comprehensive climate-science knowledge and teaching strategies. Moreover, integrating climate change education into the curriculum can promote critical thinking and engagement among students, preparing them to proactively tackle environmental challenges. This study emphasizes the necessity of collaborative efforts between educational institutions and governmental agencies to create a robust framework for climate education that addresses current gaps in knowledge and resources. In conclusion, by focusing on improving teachers' awareness and understanding of climate change, this research not only contributes to academic discourse, but also serves as a catalyst for practical reforms in educational practices aimed at fostering a more environmentally conscious society. It also aligns with SDG 4 (Quality Education) and SDG 13 (Climate Action) by promoting climate change education and fostering environmental responsibility.

Study Objectives

Studies conducted by climate change experts have consistently emphasized the importance of climate change awareness and comprehensive knowledge as key solutions for addressing climate change. This study aimed to assess climate change awareness among secondary school teachers in the Ado-Odo/Ota Local Government Area of Ogun. Specifically, it sought to evaluate the level of climate change awareness among teachers, identify the sources of information that influence their understanding, and examine differences in awareness levels based on gender and urban versus rural settings.

Addressing this gap motivates the study within the Ado Odo/Ota local government so by tackling these objectives, the research aims to highlight the importance of empowering educators with accurate information and resources to foster a culture of environmental stewardship within their classrooms.

Research Questions

The research questions that guided this study are:
(i)   What is the level of awareness of secondary school teachers on climate change?
(ii)   What are the information sources on the development of climate change?
(iii)   How does the level of awareness of climate change comparable among gender (male/female) teachers in secondary school?

Hypothesis

This study hypothesizes that:
(i)   There will be no high significant level of awareness on climate change among secondary school teachers.
(ii)   The information sources on climate change by teachers are not significantly high.
(iii)   There is no significant difference between the male and female teachers on level of climate change awareness.
(iv)   There is no significant difference between the secondary school teachers in rural and urban areas on level of climate change awareness.

2. Materials and methods

The population employed for the study comprised 450 secondary school teachers in the study area. A total sample of 150 school teachers were drawn using stratified random sampling technique from 20 secondary schools in urban and rural areas in the local government. Stratified random sampling was utilized to ensure that both urban and rural schools are represented in the study. This method involves dividing the population into distinct subgroups (strata) based on relevant characteristics, such as location (urban and rural) and then randomly sampling from each stratum. So Ado-Odo/Ota Local Government which includes both urban and rural areas, stratified sampling allows for balanced representation of teachers from both settings. This ensures that the sample is representative of the entire population, providing more accurate insights into climate change awareness among teachers across different environments.

Study Area

Ado-Odo/Ota is one of the Local Governments in Ogun State, created in 1989 and it is the second largest local government in the state with the largest industrial area and highest number of industries. It generates the largest share of Internally Generated Revenue for the State. Ado-Odo/Ota local government was populated mainly by the Awori people, a sub set of the Yoruba's original inhabitants

of the area. Other ethnic communities such as the Egba, Ogu, and Yewa also inhabit the area.

The survey design was adopted for the study. The questionnaire for the current study consisted of self-designed questionnaire titled "Teachers Awareness of Climate Change Questionnaire" (TACCQ). It consisted of two sections, Second A which help to generate information on variables teachers' gender and other demographic information, while section B is a total of 17 items developed to measure climate change awareness: information sources on climate change (ISCC, 10 items) and level of awareness on climate change (LACC, 7). The question structured in Likert scales for the items in the following manner- Strongly Agree, Agree, Disagree, Strongly Disagree structure.

The reliability of the questionnaire was tested using the internal consistency test (with Cronbachs alpha coefficient) after the pilot study. Reliability is a measure of the degree to which a research instrument yields consistent results or data after repeated trials (Mugenda & Mugenda, 2003). Reliability relates to the consistency of the data collected and the degree of accuracy in the measurements made using a research instrument. The greater the ability of the instrument to produce consistent results, again and again, or rather the repeatability of the measure the greater its reliability. The Reliability of the Instrument for the pilot study was found to be 0.79 and the reliability of the instrument through test-retest method was found to be 0.85.

The study utilized both descriptive and inferential statistical tools for the data analysis. The descriptive tools involve the summary statistics (such as mean, standard deviation and skewness) on the variables being examined, such as information sources on climate change (ISCC) and level of awareness on climate change (LACC). Based on the objective of the study and the normality test results, the study employed non-parametric testing approach for the inferential analysis. More precisely, the one-sample chi-square test for goodness of fit and Mann-Whitney U test were utilized to conduct the test of hypothesis because it is a non-parametric test that does not require the data to meet the assumptions of normality or equal variances, which are often violated in social sciences research. This makes it suitable for comparing the awareness levels between different groups, such as urban and rural teachers, without assuming a specific distribution of the data. The one-sample chi-square test for goodness of fit was used to evaluate hypotheses 1 and 2. Meanwhile, the independent-sample Mann-Whitney U test was used for hypotheses 3 and 4.

3. Results and discussion

3.1. Descriptive Analysis of the Respondents' Demographics

This section presents the distributions of the details of the respondents, viz. school area, age, gender, educational qualification and marital status.

Table 1: Respondents' Details Frequency Distribution

Details	Categories	Frequency	%
School Area	Urban	82	54.7
	Rural	68	45.3
	Total	150	100.0
Age	18 – 24 Years	2	1.3
	25 – 44 Years	78	52.0
	45 – 64 Years	70	46.7
	Total	150	100.0
Sex	Male	63	42.0
	Female	87	58.0
	Total	150	100.0
Marital Status	Single	42	28.0
	Married	99	66.0
	Divorce	9	6.0
	Total	150	100.0
Educational Qualifications	NCE	29	19.3
	First degree	94	62.7
	Master degree	25	16.7
	PhD	2	1.3
	Total	150	100.0

Source: Field Survey, 2024

Table 1 shows the frequency distribution of the respondent's demographic details. It appears that majority of the surveyed respondents are in the urban areas in Ado-Odo/Ota local government of Ogun State. Age-wise, majority of the surveyed teachers fall in the age range of 25 – 44 years. The age distribution shows that survey incorporates 58 percent female and 42 percent male, thus, involving larger female teachers than male counterpart. Evidently, majority of the respondents are married incorporating about 66 percent of the total surveyed secondary school teachers. The educational qualification distribution shows that the largest proportion of the respondents possess first degrees as their highest qualification.

3.2. Descriptive Analysis of the Variables

Following the data gathered from the survey, this section provides the summary statistics of the responses to

information sources on climate change (ISCC) and level of awareness on climate change (LACC). The summary statistics mean standard deviation (SD) skewness (SK), frequency and percentage distribution of the responses.

Tables 2 and 3 display the summary statistics of the responses to the statements/item on the variables relating to level of awareness on climate change among secondary school teachers in Ado-Odo/Ota local government of Ogun State. Following the study's structured questionnaire, each of the statements (observed variables) measuring the constructs is measured on a 4–point Likert scale. The ISCC include: Always = 4; Sometimes = 3; rarely = 2 and Never = 1. Meanwhile, LACC include: Strongly Agreed = 4; Agreed = 3, Disagreed = 2 and Strongly Disagreed = 1. For the each of the aforementioned constructs, the mean of the response scales is 2.5 response units. Since the items or statements are expressed in positive forms, items or statements of any scaled response with a mean above 2.5

are considered to be desirable while items of any scaled response with a mean below 2.5 are considered to be undesirable. The coefficient of skewness (SK) of any item or statement is negative if the mean response is above 2.5, and thus, implies that most of the responses hover around the 'agree' and 'strongly agree' response scales. On the other hand, the coefficient is positive if the corresponding mean response is less than 2.5, thus implies that most of the cluster around 'disagree' response scales.

3.3. Descriptive Analysis of Information sources on Climate Change

Table 2 shows the summary statistics of the responses to the statements on information sources on climate change (ISCC) based on the data obtained from the field survey. status.

Table 2: Summary statistics of Information Sources on Climate Change (*ISCC*)

S.N.	Item	Mean	SD	S$_K$
1.	I have heard about climate change	3.67	.682	-2.167
2.	I watch climate change issues on TV.	3.17	.862	-.966
3.	I listen to programs relating to climate change on Radio.	3.08	.879	-.639
4.	I read about issues relating to climate change in the newspaper.	2.93	.994	-.654
5.	I access social media for information on climate change issues.	3.05	.918	-.687
6.	I listen to government communication awareness on climate change.	3.31	.874	-1.131
7.	There is enough information about effect of climate change in media content.	3.25	.876	-.944
8.	Media spread of climate change is educative.	3.37	.719	-.917
9.	Information provided by media is understood, interesting and relevant.	3.37	.765	-1.116
10.	Media allocated more time to provide details about environmental noise.	2.99	1.023	-.659

Source: Field Survey, 2024

As shown in Table 2, it appears that every one of the statements has a mean response unit between 2.5 and 4.0, and thus, may be considered to be desirable. More evidently, statement 1 (mean = 3.67, SD = 0.68, SK = -2.167) has the highest mean response units. The forgoing empirical observation suggests that the most desirable statement or item as a measurement for information sources on climate change (ISCC) is the statement that "I have heard about climate change". Thus, majority of the responses hover

around 'agree' and 'strongly agree' response scales judging by the negative coefficient of skewness.

3.4. Descriptive analysis of information sources on Climate Change

Table 3 shows the summary statistics of the responses to the statements on level of awareness on climate change (LACC) based on the data obtained from the field survey.

Table 3: Summary statistics of Level of Awareness on Climate Change (*LACC*). Sample Size: 150 Respondents

S/N	Item	Mean	SD	S$_K$

11.	Creating climate change awareness will encourage teachers to change their attitudes and behavior.	3.02	.966	-.856
12.	Creating climate change awareness will prepare teachers for necessary skill, knowledge and qualities to deal with climate change.	3.43	.780	-1.601
13.	Creating climate change awareness helps teachers to familiarize with climate change issues.	3.23	.823	-1.264
14.	Creating climate change awareness will bring about an opportunity to improve learners' life prospects and the world around them.	3.41	.853	-1.634
15.	Creating climate change awareness will increase teachers' knowledge on health, nutrition, sanitation and disease prevention.	3.25	.827	-1.283
16.	Creating climate change awareness will helps to initiate the mainstream of climate change adaptation to learners.	3.04	.929	-1.003
17.	Through awareness I believe we can successfully overcome climate change problems.	3.37	.901	-1.465

Source: Field Survey, 2024

As shown in Table 3, it appears that every one of the statements has a mean response unit between 2.5 and 4.0, and thus, may be considered to be desirable. More importantly, statement 2 (mean = 3.43, SD = 0.780, SK = -1.601) has the highest mean response units. The forgoing empirical observation suggests that the most desirable statement or item as a measurement for level of awareness on climate change (LACC) is the statement that "creating climate change awareness will prepare teachers for necessary skill, knowledge and qualities to deal with climate change". Thus, majority of the responses hover around 'agree' and 'strongly agree' response scales judging by the negative coefficient of skewness.

3.5. Pre-diagnostic test

It is essential to examine the statistical property of the variables under investigation. Specifically, normality test was conducted to examine the normality condition of the variables (*ISCC* and *LACC*).

Table 4: Normality Test Results

Variable	Test Type	Stat.	*p*-value
ISCC	Kolmogorov-Smirnov	0.100	0.001
	Shapiro-Wilk	0.974	0.006
LACC	Kolmogorov-Smirnov	0.154	0.000
	Shapiro-Wilk	0.950	0.000

Source: Author's computation (2024) using SPSS (26)

As shown in table 4, the Kolmogorov-Smirnov test (stat. = 0.100, p = 0.001 < 0.05) and the Shapiro-Wilk (stat. = 0.974, p = 0.006 < 0.05) of the normality tests for Information sources on Climate Change (ISCC) reveal that the observations on the variable are non-normally distributed since the p-values are below 5% level of significance (i.e. statistically significant). Similarly, the observations on the variable, level of awareness on climate change (LACC) do not follow the normal distribution having significant normality tests for both the Kolmogorov-

Smirnov test (stat. = 0.154, p = 0.000 < 0.05) and the Shapiro-Wilk (stat. = 0.950, p = 0.000 < 0.05). In other words, both variables being investigated do meet the normality assumption. Thus, the subsequent tests of hypotheses were conducted using non-parametric testing procedure.

3.6. Test of hypothesis

Following the pre-diagnostic test results (Table 4), the study employed non-parametric test approach in conducting the test of hypothesis. The one-sample Chi-square test for goodness of fit was employed for hypotheses 1 and 2. Meanwhile, the independent-samples Mann-Whitney U test was used for hypotheses 3 and 4.

Test of Hypothesis 1

H_0: There will be no high significant level of awareness on climate change among secondary school teachers.

Table 5: One-Sample Chi-Square Test Result for Hypothesis I

Sample Size (n): 150 Respondents
Variable: *LACC*

Stat.	*p*-value
Chi-square Statistic	102.373
p-value	0.000
Degree of Freedom	15
Mean	3.2498
Standard Deviation	0.4304

Source: Author's computation (2024) using SPSS (26)

Table 5 displays the result of Chi-square test for goodness of fit for hypothesis I. The result indicates that there was a high significant ($\chi_{(15, n=150)}^2 = 102.373, p = 0.000 < 0.05$) level of awareness on climate change among secondary school teachers. The forgoing suggests that the secondary school teachers in Ado-Odo/Ota local government of Ogun State have substantial knowledge about climate change. Thus, null hypothesis that "there will be no high significant level of awareness on climate change among secondary school

teachers" can be rejected. Meanwhile, having the standard deviation (0.4304) less than the mean (3.2498) of the aggregate responses implies that there was less variability in the responses of the selected teachers as regards the level of awareness of climate change. In other words, the teachers were steady in their responses.

Test of Hypothesis 2

H_0: The information sources on climate change by teachers are not significantly high.

Table 6: One-Sample Chi-square Test Result for Hypothesis 2

Sample Size (n): 150 Respondents
Variable: *ISCC*

Stat.	*p*-value
Chi-square Statistic	71.760
p-value	0.000
Degree of Freedom	20
Mean	3.2193
Standard Deviation	0.4376

Source: Author's computation (2024) using SPSS (26)

Table 6 displays the result of Chi-square test for goodness of fit for hypothesis 2. The result indicates that the information sources on climate change by teachers are not significantly high ($\chi_{(20, n=150)}^2 = 71.760, p = 0.000 < 0.05$). The forgoing empirical outcome suggests that the secondary school teachers in Ado-Odo/Ota local government of Ogun State have considerable information sources on climate change. Thus, null hypothesis that "The information sources on climate change by teachers are not significantly high" can be rejected. Meanwhile, having the standard deviation (0.4376) less than the mean (3.2193) of the aggregate responses implies that there was less variability in the responses of the selected teachers as regards the information sources on climate change. In other words, the teachers were consistent in their responses.

Test of Hypothesis 3

H_0: There is no significant difference between the male and female teachers on level of climate change awareness.

Specifically, this test of the hypothesis seeks to determine whether or not there is significance difference in level of climate change awareness (LACC) between the male and female teachers in Ado-Odo/Ota local government of Ogun State. However, since the distribution of LACC does not uphold the assumption of normality (see tables 4), the hypothesis is tested using the Mann-Whitney U Test, an alternative to independent t-test technique.

Table 7: Independent-Samples Mann Whitney U Test Result for Hypothesis 3

Sample Size (n): 150 Respondents
Variable: *LACC*, Categorical Variable: Gender

No. Male Teacher	63
No. Female Teacher	87
Median of Male Teacher	3.429
Median of Female Teacher	3.286
Mean Rank of Male Teacher	75.83
Mean Rank of Female Teacher	75.26
Mann-Whitney U	2719.50
Wilcoxon W	6547.50
Z	-0.081
p-value	0.936

Source: Author's computation (2024) using SPSS (26)

Table 7 displays the result of the independent-sample Mann-Whitney U test. Evidently, there is no statistically significant difference (U = 2719.50, z = -0.081, p = 0.936 > 0.05) in the level of climate change awareness between the male teachers (Md = 3.429, n = 63) and female teachers (Md = 3.286, n = 87) in Ado-Odo/Ota local government Ogun State. Thus, since the p-value of the test statistic is above 5per cent level of significance, the null hypothesis that "there is no significant difference between the male and female teachers on level of climate change awareness" is retained.

Test of Hypothesis 4

H_0: There is no significant difference between the secondary school teachers in rural and urban areas on level of climate change awareness.

Specifically, this test of the hypothesis seeks to determine whether or not there is significance difference in level of climate change awareness (LACC) between the urban and rural secondary school teachers in Ado-Odo/Ota local government of Ogun State. Similarly, the hypothesis is tested using the Mann-Whitney U Test, an alternative to independent t-test technique.

Table 8: Independent-Samples Mann Whitney U Test Result for Hypothesis 4

Sample Size (n): 150 Respondents
Variable: *LACC*, Categorical Variable: Area

No. Urban Teacher	82
No. Rural Teacher	68
Median of Urban Teacher	3.286
Median of Rural Teacher	3.429
Mean Rank of Urban Teacher	70.77
Mean Rank of Rural Teacher	81.20
Mann-Whitney U	3175.50
Wilcoxon W	5521.50
Z	1.473
p-value	0.141

Source: Author's computation (2024) using SPSS (26)

Table 8 displays the result of the independent-sample Mann-Whitney U test. Evidently, there is no statistically significant difference ($U = 3175.50$, $z = 1.473$, $p = 0.141 > 0.05$) in the level of climate change awareness between the urban secondary school teachers ($Md = 3.286$, $n = 82$) and rural secondary school teachers ($Md = 3.429$, $n = 68$) in Ado-Odo/Ota local government of Ogun State. Thus, since the p-value of the test statistic is above 5 per cent level of significance, the null hypothesis that "there is no significant difference between the secondary school teachers in rural and urban areas on level of climate change awareness" is maintained.

3.7. Findings and discussion

The result derived from the one-sample chi-square test demonstrated that secondary school educators within the Ado-Odo/Ota local government of Ogun State exhibit a significant level of comprehension regarding climate change. This indicates that regardless of the school, the awareness concerning climate change among educators remains uniformly elevated. The integration of climate change subjects in school curricula may be linked to the need for teachers to stay updated and educate students on environmental issues. The likelihood of students engaging in the study of climate change is heightened when their educators demonstrate a personal commitment to the subject matter. Climate change has given rise to local consequences, including severe meteorological phenomena, prolonged droughts, and raised sea levels, affecting both rural and urban environments. The phenomenon of climate change has attracted considerable global scrutiny, resulting in heightened awareness and involvement within diverse educational frameworks. The finding support Mazyopa et al. (2022) and Ahmed,et al.(2022) that most teachers have heard about climate change in contrast to Akinnubi et al. (2012), who claimed that teachers have low awareness of climate change. Additionally, Dorji, et al., (2021) found that teachers possess a moderate level of awareness, particularly focusing on the impacts rather than the causes and mitigation strategies of climate change. Odjugo (2013) found that a large percentage of respondents in both rural and urban areas in Nigeria have a limited understanding of climate change.

An analysis of Hypothesis 2 revealed that teachers have a limited understanding of climate change. This finding implies that educators lack adequate knowledge regarding environmental issues. This observation aligns with the research of Akinnubi et al. (2012), Odjugo(2013) and Dike and Amadi (2016) which suggest an insufficiency of reliable information sources pertaining to climate change. It is important to highlight that the lack of dependable information on climate change may hinder effective climate change management, impacting educators' capacity to remain informed about the latest scientific discoveries, worldwide patterns, and recent policy advancements related to climate change. By providing accurate and comprehensive information, educators can proficiently instruct their students on the origins, effects, and solutions to climate change. Furthermore, having access to information will empower students to rectify misunderstandings, participate in productive discussions, and equip them to become knowledgeable and involved in tackling this crucial global concern.

Based on the findings of Hypothesis 3, it was determined that no significant disparity exists in the awareness of climate change between male and female educators. This outcome aligns with research conducted by Ogunleye (2016), indicating that the levels of climate change awareness among educators are consistent across gender lines. In contrasts with other studies that often find gender-based differences (Eze, 2020, Chowdhury et al.,2021).

This phenomenon may be attributed to the equitable availability of information and resources accessible to both male and female educators as they advance in their professional journeys.

Additionally, the findings of Hypothesis 4 reveal that there is no significant differentiation in climate change awareness between secondary school educators residing in rural and urban areas. This observation suggests that both groups of educators shared comparable levels of understanding of climate change. This similarity can be attributed to their educational background, professional experience, readily available information in the digital age, and personal interest in environmental matters. Both rural and urban teachers are conscious of their surroundings, and actively engage in environmental initiatives that go beyond geographical limitations. Collectively, these factors play a crucial role in facilitating efficient climate-change mitigation strategies.

Practical Implications of Findings for Policy and Educational Reforms

The findings of this study on climate change awareness among secondary school teachers in Ogun State, Nigeria, have several practical implications for policy and educational reforms. These implications are imperative for addressing knowledge gaps and fostering a culture of environmental stewardship through education

In terms of curriculum development and integration, the findings stress the need to incorporate comprehensive climate change education into the national curriculum at all levels. Policies should direct the inclusion of climate science as a cross-cutting theme across subjects, ensuring that students receive accurate and updated information on climate change causes, effects, and mitigation strategies. Educators' high awareness and commitment to teaching about climate change can be leveraged to foster informed decision-making and environmental stewardship among students. This would help bridge the knowledge gap identified among educators and students.

The need for teacher training and capacity building highlights that while teachers possess substantial awareness of climate change; their access to reliable information sources is limited. Policymakers should prioritize the development of targeted professional development programs that equip educators with accurate and up-to-date knowledge of climate change science, its impact, and mitigation strategies. Equipping educators with

comprehensive knowledge will enable them to effectively teach and engage students in climate change discussions, thereby fostering a culture of environmental responsibility. This could include workshops, seminars, and online courses tailored to the local environmental challenges.

By creating public awareness campaigns, this study emphasizes the role of information dissemination in improving awareness. Access to accurate information is crucial for educators to remain informed about the latest scientific discoveries and policy advancements, thereby enhancing their teaching capabilities. Policymakers should collaborate with media outlets and non-governmental organizations (NGOs) to launch public campaigns aimed at increasing general awareness of climate change, particularly in rural areas where access to information may be more limited.

The allocation of resources, governments, and educational authorities should invest in providing schools with adequate teaching materials and resources for climate change. This includes textbooks, multimedia tools, and access to scientific data relevant to the local context. Such investments could enhance teachers' ability to deliver effective lessons on climate change.

To promote environmental initiatives, governments and educational authorities should encourage schools to adopt climate-friendly practices, such as planting trees and implementing sustainable waste management systems. Such initiatives can help reduce the impact of climate change and provide practical learning experiences for students, reinforcing theoretical knowledge with real-world applications.

On gender and geographical equity, the governments and educational authorities should continue to ensure equitable access to climate change information and resources for educators across genders and geographical locations. Maintaining uniform awareness levels will facilitate consistent educational outcomes and environmental engagement across demographics.

In the context of educational reforms, teachers play a significant role as change agents, empowering students to develop positive attitudes toward environmental issues. Consequently, educational reforms should focus on empowering teachers to act as agents of change by incorporating environmental stewardship into their teaching practices. This could involve training educators to use participatory teaching methods that encourage critical thinking and problem solving related to climate issues.

Governments should localize climate education to address regional disparities in climate change impacts, that is, educational content should be tailored to reflect local environmental challenges. For instance, lessons could focus on flooding risks in communities near rivers or on desertification in arid regions. This localized approach would make climate education more relevant and impactful.

To enhance climate literacy, regular assessments of both teachers' and students' understanding of climate change should be institutionalized. By routinely evaluating their knowledge, institutions can identify knowledge gaps and inform the design of future training programs or curriculum adjustments.

Schools should collaborate with environmental experts, environmental scientists, NGOs, and international organizations to bring expert knowledge into classrooms. Guest lectures, field trips, and collaborative projects can provide students with practical insights into climate-change mitigation and adaptation strategies.

Nigeria can build a generation of environmentally conscious citizens to tackle the challenges posed by climate change by addressing these gaps through policy changes and educational reforms. In fact, empowering teachers with knowledge and resources not only enhances their professional capacity but also ensures that students are better prepared to make informed decisions about their environment.

5. Conclusion

The limited availability of information sources poses challenges for enhancing environmental stewardship, as established by our findings. As teachers become more familiar with climate change, they become facilitators of environmental stewardship, impacting not only their students but also their wider community. As a result, there is a need for targeted training programs to be developed to inspire teachers that may include workshops, lectures, or even online courses focusing on climate change education. Up-to-date experiences will motivate teachers to guide students in practical and locally relevant climate change action plans.

Environmentally aware educators can serve as role models by demonstrating sustainable practices in their daily lives. This can motivate students, parents, and community members to embrace more environmentally responsible behaviors. The establishment of knowledge-sharing platforms, such as educational networks or digital communities, can facilitate the comprehension and exchange of exemplary practices in climate change education. In addition, periodic evaluations should be conducted by the government to appraise the effectiveness of empowerment initiatives and pinpoint areas that require enhancement. The study concluded that teachers' insufficient information sources on climate change will impact the enhancement of environmental stewardship.

The study recommends that policymakers and educational authorities provide educators with more comprehensive and accessible information on climate change to empower them to effectively integrate environmental stewardship into their teaching and learning practices.

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