Original Article

An Investigation of the Level of Awareness and Mitigation of Climate Change among Junior School Learners in Busia County, Kenya: A Call for Sensitizing Future Generations

Margaret Njeri Ngugi[1]*, Gladys Nyaiburi Ogaro[1], Ruth Adhoch Odhiambo[1], Albert Wanjala Mwongula[1], Dr. Peter Ongang'a Odhiambo, PhD[1] & Belinda Makadia[2]

[1] Alupe University, P. O. Box 845-50400, Busia, Kenya.
[2] National Cheng Kung University, Taiwan.
* Author for Correspondence ORCID ID; https://orcid.org/0009-0003-9132-6187; Email: mgugi@au.ac.ke

ABSTRACT

Climate change is a pressing global issue with severe impacts on development, including food insecurity, economic instability, and extreme weather events. Driven by greenhouse gas emissions from human activities like deforestation and fossil fuel use, it disproportionately affects Africa despite the continent's minimal emissions. This paper was undertaken in Busia County and it sought to find out the level of awareness of climate change among Junior School learners whereby a total of 405 learners were included In the study and the data was analyzed quantitatively. In Busia County, communities face displacement, water contamination, livestock loss, and food scarcity due to floods, droughts, and heatwaves. Events in Budalangi in Bunyala region of Busia County highlight these challenges which are often exacerbated by poverty and limited resilience. A Chi-square test was conducted to assess the association between grade level and the belief that climate change poses a serious threat. While the Pearson Chi-square result (χ^2 = 8.916, p = 0.063) was not statistically significant at the 5% level, the Linear-by-Linear Association test was significant (χ^2 = 7.718, p = 0.005), indicating a positive trend: as students advance in grade, they are more likely to perceive climate change as a serious threat. The findings also reveal gaps in knowledge, inconsistencies in curriculum implementation, and limited participation in sustainable practices. The study underscores the critical role of integrating comprehensive climate change education into school curricula to foster informed and proactive environmental stewardship. Based on the findings, recommendations are made to enhance climate change awareness through improved pedagogical strategies, community engagement, and policy reforms. This research advocates for a structured and sustainable approach to equipping future generations with the knowledge and skills necessary to combat climate change effectively.

INTRODUCTION

Climate change is a paramount global concern that holds significant relevance in the contemporary era of the 21st Century (Abbass et al., 2022). It is widely recognized as a major determinant with worldwide implications due to its profound impact on the process of development. This phenomenon has far-reaching implications that affect several aspects of human existence, including but not limited to food shortages, economic volatility, depletion of natural resources, deteriorating health conditions, and shifting weather patterns. According to Bhattacharya (2019), climate change encompasses alterations in the Earth's climate system, which can arise from both anthropogenic and natural causes. Corbyn (2011) reveals that the consequences of climate change have significant implications for both human beings and the natural environment. Therefore, it is crucial to raise awareness among the population on the issues of climate change and its effects.

Pearce (2007) posits that the findings of the Intergovernmental Panel on Climate Change (IPCC) in 2007 revealed that the average worldwide temperature saw a rise of 0.60C over the 20th century. Notably, the years from 1997 to 2007 were identified as the period with the highest recorded temperatures. Hence, it can be inferred that the increase in global climate warming is associated with elevated levels of carbon dioxide and other greenhouse gases (GHGs) in the atmosphere, mostly attributable to anthropogenic activities such as the combustion of fossil fuels, land use, and deforestation. Climate change has profound adverse effects on the planet, manifesting as substantial fluctuations in regional climates that frequently result in recurring droughts, windstorms, floods, and severe heat waves, among other phenomena (Poynting & Stallard, 2021). Odey (2018) conducted a study that highlights the potential issues posed by climate change and found water salination, and infrastructure degradation and found there was the emergence of diseases such as stroke, malaria, Cerebra-Spinal Meningitis, and other related ailments.

African continent seems to be affected most by the effects of climate change yet it does not produce a lot of carbon dioxide into the air owing to its low level of Industrialization as opposed to the North (Kohnert, 2024). At the root of climate change is global warming caused by anthropogenic emissions of carbon dioxide, methane and other greenhouse gases. The warming occurs worldwide and temperatures are rising on the African land mass and in the surrounding oceans. Africa is distinctive in the combination of climate change effects. First, there is evidence that Africa is warming faster than the global average and this is likely to continue. Secondly, agriculture is the largest single economic activity in Africa, accounting for around 60% of employment and, in

some countries, more than 50% of GDP (Collier et al., 2008).

In Kenya, the impacts of climate change are being experienced both in tangible and metaphorical ways. Both literally and figuratively, the temperatures have experienced an increase, with the recent past witnessing a rise in scorching temperatures and a notable surge in heat waves (Maingey et al., 2020). The consequences of these calamities have exerted similar effects on the individuals residing in Busia County, which serves as the geographical location for this study. It is located in Western Kenya and borders Bungoma County, Siaya County, Kakamega County and Uganda to the West. It has Seven Sub Counties namely Teso North, Teso South, Nambale, Matayos, Butula and Bunyala Sub Counties. According to Sorre (2017), a study conducted in Budalangi revealed that in the year 2003, a total of 24,000 individuals, equivalent to approximately 4,000 households, experienced displacement from their residences. This displacement resulted in the destruction of property, disruption of livelihood activities, and contamination of water sources. Furthermore, according to Ngara-Muraya (2020), it was observed that in 2011, there was a significant occurrence of animal drowning in the Bunyala region, accompanied by an outbreak of waterborne infections, including cholera. Additionally, the author noted that in 2016, a similar incident occurred in Bunyala, resulting in the displacement of 639 households and significant losses due to property devastation and the drowning of cattle. As a consequence, there was a scarcity of food for the displaced population, prompting the County administration to allocate 1.6 million Kenyan shillings for the provision of food relief.

According to Marshall (2011), a combination of events, including droughts, water scarcity, and the need for relief water supplies, has resulted in crop failures in Teso North. Consequently, the County has experienced a significant increase in food costs, rendering them unaffordable for a majority of inhabitants due to the high levels of poverty prevalent in the area. In Busia County, there exist several governmental and non-governmental groups that are actively engaged in addressing climate change mitigation within the agricultural sector (CGB, 2023). The Agricultural Sector Development Support Programme (ASDSP) encompasses the coordination of several partners and the provision of farmer training. The Programme for Agriculture and Livelihoods in Western Communities (PALWECO) is a project designed to enhance agricultural productivity. Anglican Development Services (ADS), a non-governmental organization with a national scope, primarily focuses on environmental conservation, among other areas of endeavor.

Numerous policies and conferences have been established on a global scale with the primary objective of addressing climate change awareness, adaptation, and mitigation. As an example, the Rio Summit held in 1992 placed significant emphasis on raising awareness about climate change. In the year 2010, the nation of Kenya formulated a comprehensive strategy known as the National Climate Change Response Strategy (NCCRS), which acknowledged the significance of climate change effects on the country's overall progress and advancement. Subsequently, the National Climate Change Action Plan was implemented in 2012 (GoK, 2010). The emphasis of these programmes mostly resided at the national level, thus necessitating a greater allocation of attention towards the grassroots level.

The Sessional Paper 3 (2016) provides a comprehensive analysis of climate change awareness in Kenya (National Climate Change Framework Policy, 2016). The establishment of the National Climate Change Council, as outlined in Section 5 of the Climate Change Act, designates the President of Kenya as its chairperson. The responsibilities of the Council encompass several key areas. Firstly, it is tasked with ensuring that the integration of climate change initiatives is effectively carried out by both the national and county governments. Additionally, the Council is responsible for approving and supervising the implementation of the National Climate Change Action Plan. Furthermore, it provides guidance to the national and county governments regarding

legislative, policy, and other measures that are necessary for an effective response to climate change. The Council also plays a crucial role in setting policy direction for research and training on climate change, including the collection and dissemination of climate change-related information to the national and county governments, the general public, and other stakeholders. Lastly, the Council is responsible for the administration of the Climate Change Fund, which was established under the relevant legislation. The research conducted highlights that a significant portion of the Kenyan population lacks knowledge about climate change, while demonstrating a greater awareness of the issue of food insecurity. This awareness is mostly driven by the frequent occurrences of droughts and floods within the country. Furthermore, the National Environmental Management Authority supports this assertion and advocates for an inquiry into the factors contributing to the lack of awareness among the majority of the public regarding climate change.

Notwithstanding the endeavours undertaken by the government, a considerable number of individuals at the grassroots level remain uninformed about the policies, primarily due to either the utilisation of complex terminology or the inadequate dissemination of those policies. According to a study conducted by Ajuang et al., (2016) the degree of awareness regarding climate change in Kenya is rather low, despite the presence of several conferences and conventions attended by policymakers to address this issue. One notable event in the realm of climate change was the Africa climate change summit held in Nairobi, Kenya from 4th-6th in September 2023 where several countries met to discuss how climate change had impacted them and how they could mitigate it as well as increase awareness. It is against this backdrop that the study chose to focus on Junior Secondary learners, as this particular group of individuals, being young, possess a heightened capacity for synthesizing knowledge and possibly bringing change to mitigate the effects of climate change.

These future leaders are well able to achieve several Sustainable Goals as they age such as mitigating climate change which is goal 13, ensure responsible production and consumption which is goal 12 and all these can be achieved through quality education. Education is vital for any society to thrive and is the main catalyst for change. It is also Goal 4 of the Sustainable Development Goals as well as one of the subsets of the Social Pillar of Kenya's Vision 2030. Creating awareness and educating young people acts as a catalyst for realizing a vision of any country.

Statement of the Problem

Climate change is one of the most pressing global challenges of our time, with far-reaching implications for ecosystems, economies, and human societies. Hence it poses a grave threat to humanity and the environment. The scientific consensus is clear: human activities, primarily the burning of fossil fuels and deforestation, are driving the rapid increase in greenhouse gas concentrations, resulting in a warming planet, changing weather patterns, and a host of associated environmental problems. These far-reaching consequences have become evident in the recent past hence prompting global discourses on climate change awareness and mitigation among various demographic groups.

Climate change affects different groups within the population differently. Its awareness and mitigation are influenced by local context and cultural factors. Kenya, like many other countries, is not immune to the impacts of climate change. In regions such as Busia County, located in western Kenya, the effects of climate change are becoming increasingly visible. These effects manifest as altered rainfall patterns, temperature fluctuations that lead to frequent crop failures, and disruptions to local livelihoods. In such a vulnerable context, it is imperative that awareness and mitigation efforts are undertaken to address climate change effectively.

Junior secondary learners, typically aged 12 to 15 years, represent an important demographic group in the context of climate change. They are the

future custodians of the environment and will inherit the consequences of current climate actions or inactions. They are crucial stakeholders in the battle against climate change. Therefore, their understanding of climate change, awareness of its impacts, and knowledge of mitigation strategies are critical factors in building a sustainable future for humanity and the environment. This study will therefore fill the void by assessing the current state of climate change awareness and mitigation practices among these learners in Busia County, Kenya. The study will lay emphasis on their knowledge, attitudes, behaviours, and experiences related to climate change with the goal of identifying areas where education and interventions can be targeted to build a more climate-resilient and environmentally conscious future generation. In the process, it will establish the role of climate change education in the curriculum and its impact on learners. This will enable alignment with ethical principles of intergenerational equity and environmental justice. It will appropriately underscore the ethical imperative of equipping young people with the knowledge and tools needed to address a crisis that will significantly impact lives at the moment and that of future generations.

Objective

To determine the level of awareness among the learners in junior secondary school in Busia County, Kenya regarding climate change and mitigation

Justification of the Study

The justification for this research is on the basis of its importance not only academically, but also socially and environmentally. Busia County, Kenya is a region vulnerable to the impacts of climate change including changes in rainfall patterns, temperature fluctuations and other related climate risks that greatly impact the economic and health of its population. Conducting the research on climate change awareness and mitigation within this local context allowed for tailored strategies and interventions that are relevant to the unique challenges faced by the communities in the region. By extension, this

research in Busia County can contribute to the global knowledge based on effective climate change education and youth engagement strategies by offering lessons that can be applied in other regions facing similar challenges.

The choice of junior secondary learners is imperative since they represent the future generation that will inherit the environmental challenges posed by climate change. Investigating their awareness and engagement in climate change mitigations is crucial since they will be the ones tasked with implementing and advocating for sustainable practices in the near future. The long-term implications of climate change are addressed through understanding the young people's perspectives, knowledge and behaviour towards climate change. Similarly, the focus on junior secondary learners allows for early intervention. Identifying gaps in awareness and mitigation practices at this stage will inform the development of targeted educational programs and initiatives that instil a sense of responsibility and environmentally conscious behaviour among the young people that will eventually translate to lasting changes in attitudes and actions.

Significance of the Study

Learners in junior secondary schools represent the future generation that is tasked with addressing the climate crisis. Hence, assessing their awareness levels and mitigation practices will aid shape future sustainability efforts. Once they are empowered with knowledge and skills in climate change mitigation, the world will breed a more environmentally conscious citizenry. The research findings will inform policy development at local, regional and national levels. Climate education policies and initiatives will be developed to empower young learners to become advocates for climate change mitigation. Therefore, the significance of the study is in its potential to shape the attitudes, behaviours and knowledge of learners in junior secondary schools in Busia County, Kenya by ultimately contributing to local and global efforts to mitigate the impacts of climate change.

Scope

This study focused on investigating the level of awareness and mitigation strategies related to climate change among junior school learners in Busia County, Kenya. With a specific focus on junior secondary school learners attending both public and private schools within the county. It aimed to investigate the extent of knowledge that Junior School learners possess and the strategies they employ to mitigate its effects. The targeted junior secondary learners were aged between 12-15 years studying at grade seven and eight. This demographic represents a critical stage in shaping environmental awareness and behaviours. The study was conducted between January to April 2024 because this is the first term of the School calendar hence a time when the targeted learners are in school.

RESEARCH METHODOLOGY

Research Design

The study adopted a descriptive survey design to investigate the level of awareness and mitigation of climate change among Junior School Learners in Busia County, Kenya. This design was appropriate as it allowed for the systematic collection, analysis and interpretation of data to describe the current state of climate change awareness and mitigation efforts among the targeted population (Sileyew 2019).

Research Area

Busia is one of the 47 Counties in Kenya located in the western part of Kenya. Its headquarters is located in Busia town along Busia-Kisumu Road. Busia County is located on the Western end of Kenya. It borders Uganda to the West, Lake Victoria and Siaya County to the South, Kakamega County to the East and Bungoma County to the North. It covers an area of 1,694.5 km^2. The County comprises 7 Sub-Counties, 35 Wards, 60 Locations and 181 Sub-locations. The County vastly falls within the Lake Victoria Basin with an undulating altitude that rises from about 1,130m above sea level on the shores of Lake Victoria to a maximum of about 1,500m in the Samia and North Teso Hills. The County is served by River Malakisi to the extreme North, Malaba in the Northern entry of the central region and River Sio crisscrossing Funyula and Nambale Sub-Counties. River Nzoia terminates into Lake Victoria via Budalang'i Sub-County. Busia is a cosmopolitan county whose residents are predominantly of Luhya and Teso ethnicities. Busia County is a member of the 14 counties of the Lake Region Economic Bloc (LREB) situated around Lake Victoria and its environs. Other members are; Kisumu, Kericho, Siaya, Nandi, Kisii, Bomet, Kakamega, Bungoma, Trans Nzoia, Homabay, Nyamira and Migori. (Busia County Government 2023)

Target Population

The target population was Junior Secondary School Learners from selected schools in Busia. The data for this was obtained from County Educational Offices in Busia County. The estimated population was 50,000 learners In the entire county.

Unit of Analysis

Unit of analysis was conducted at the Sub County level and focused on climate change mitigation awareness by Junior Secondary learners.

Sample Size and Sampling Procedures

The multi-stage sampling method was used whereby t Simple random sampling was used to select the five Sub Counties which were Nambale, Teso South, Teso North, Matayos and Bunyala then two schools with approximately 80 learners except in Teso South where 85 learners were included in the study. The learners In grades 7 and 8 were selected using stratified sampling. The sample size was determined using Yamane's sample determination method as shown below:

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

Where

n is the sample size

N is the Population size

e is the margin of error

The sample size of the learners was approximately 396 from the Yamane Formula above. However, 405 learners were selected for the study and the extra 9 were to take care of questionnaires that may not be returned or not filled.

Purposive sampling was also used to collect data for Key Informants who were more knowledgeable about the study. They included a climate change official from KALRO and an official from the Department of Water, Irrigation, Environment, Natural Resources Climate Change and Energy at Busia County Government.

Data Collection

The study being Quantitative in nature, used Questionnaires and some of the questions focused on the:

- Socio-demographic characteristics of the respondents such as age, level of study and gender

- whether the respondent is aware of climate change

- What they understand by the term climate change

- Where the respondent heard of climate change (mode of communication)

- What hinders information on climate change awareness

- How they conserve the environment

- What hinders them from conserving the environment

- Suggestions for mitigating the effects of climate change

Ethical Consideration

The study sought consent from the Chair of the Department at Alupe University and then the National Commission for Science, Technology and Innovation (NACOSTI) before embarking on the study. The study also sought consent from respondents before collecting data. The responses received were treated as confidential because the questionnaires issued did not have names on them.

RESULTS AND DISCUSSION

Demographics

The demographic data across five counties—Nambale, Matayos, Bunyala, Teso North, and Teso South provides a comprehensive overview of the student population in terms of gender, grade level, and age. Each county has a slightly varying total number of learners, with most counties reporting 80 learners, except for Teso North, which has 85. The table below presents data on gender distribution, grade levels and age distribution across different Sub Counties.

Table 1: Gender Distribution, Grade Levels and Age Distribution Across Different Sub-Counties

Variable	County	Nambale	Matayos	Bunyala	Teso North	Teso South
	Total learners	80	80	80	85	80
Gender	Female	45 (56.3%)	46 (57.5%)	37 (46.3%)	43 (50.6%)	17 (21.3%)
	Male	35 (43.7%)	34 (42.5%)	43 (53.7%)	42 (49.4%)	63 (78.7%)
Grade	Grade 7	44 (55.0%)	40 (50.0%)	36 (45.0%)	35 (41.2%)	47 (58.8%)
	Grade 8	36 (45.0%)	40 (50.0%)	44 (55.0%)	50 (58.8%)	33 (41.2%)
Age	11 years	6 (7.5%)	1 (1.3%)	2 (2.5%)	1 (1.2%)	5 (6.3%)
	12 years	20 (25.0%)	13 (16.3%)	14 (17.5%)	12 (14.1%)	17 (21.3%)
	13 years	40 (50.0%)	24 (30.0%)	13 (16.3%)	25 (29.4%)	39 (48.8%)
	14 years	12 (15.0%)	32 (40.0%)	40 (50.0%)	33 (38.8%)	15 (18.8%)
	15 years	2 (2.5%)	8 (10.0%)	9 (11.3%)	12 (14.1%)	3 (3.8%)
	16 years	0 (0.0%)	1 (1.3%)	2 (2.5%)	2 (2.4%)	1 (1.3%)
	17 years	0 (0.0%)	1 (1.3%)	0 (0.0%)	0 (0.0%)	0 (0.0%)

Gender Distribution

The gender distribution reveals the following:

- **Females**: In Nambale, Matayos, and Bunyala, female learners make up a significant portion of the total, with percentages ranging from 46.3% in Bunyala to 57.5% in Matayos. However, In Teso South, only 21.3% of its learners are female. This discrepancy suggests possible cultural or social factors that may discourage female enrollment or participation in Teso South.

- **Males**: Conversely, male learners dominate in Teso South, comprising 78.7% of the total. This trend is also noticeable in Bunyala and Teso North, where male learners make up over 49% of the total population.

Grade Distribution

The grade distribution indicates a relatively balanced representation of learners in Grades 7 and 8 across most counties, although some variations are evident:

- **Grade 7**: Nambale has the highest percentage of Grade 7 learners at 55.0%, while Teso North has the lowest at 41.2%. This could reflect differences in school transition rates or educational engagement at this grade level.

- **Grade 8**: In contrast, Grade 8 sees Teso North with the highest representation (58.8%), while Teso South has the lowest (41.2%).

Age Distribution

The age distribution provides further insights into the demographics of the student population:

- **Younger Learners**: The age group of 11 years is underrepresented across all counties, with only a few learners in this category. This may indicate that younger learners are less likely to be included in the survey or that enrollment at that age is lower.

- **12 and 13 years**: Learners aged 12 and 13 make up a substantial portion of the population, particularly the 13-year-olds, who represent the highest group in Nambale

(50.0%) and Teso South (48.8%). This suggests that many learners are in the critical middle school age range, which is vital for educational interventions related to climate awareness and other educational programs.

- **14 years**: The 14-year-olds show considerable variation, with Bunyala having the highest percentage (50.0%), indicating a potential peak in enrollment or retention at this age. In contrast, the lower percentages in other counties might signal challenges in keeping learners engaged or enrolled as they transition into higher grades.

- **Older Learners**: The number of learners aged 15 and above is relatively low across all counties, indicating that few learners continue in formal education past the age of 14, which may pose challenges for educational continuity and completion rates.

Climate Change Knowledge

Educating learners about climate change is crucial for fostering environmental stewardship and equipping them to address future challenges. According to studies by Monroe et al. (2019) creating awareness of climate change among children in this age group can significantly influence their understanding, emotions, and actions related to environmental issues.

Drawing from the above the study findings indicate that over 90% of learners acknowledge and literacy on climate change. Results indicate that learner's platforms of sourcing climate change knowledge are from within the family and from teachers at school courtesy of the structured learning in the CBC syllabus. A paltry less than 20% of the learners from all the sampled sub-counties sourced climate change information from print and electronic media, newspapers, radio and television. Other sources like social media, government agencies and environmental groups are the least sourced by learners for climate change knowledge. The role of trees in mitigating the adverse effects of climate change is not debatable. It is on this backdrop that sampled results as shown in Table 2 indicate thematic

evidence that from the learner's perspective cutting down trees is a major activity negatively affecting the environment.

In 2017, a new competency-based structure of education, the Kenya Competence-Based Curriculum (CBC), was introduced and is set to replace the 8:4:4 system of education. Among the key hallmarks of the CBC is the aim to empower learners to make informed decisions and responsible actions for environmental integrity, economic viability and a just society for present and future generations (Munyoki, 2023). Specifically, the CBC seeks to build capacities in

learners that will enable them to be stewards of the earth, and minimize negative environmental impacts, while learning outcomes are linked to meaningful human, safety, educational and environmental needs. The introduction of CBC aligns with Kenya's Vision 2030, which emphasizes education as a driver of economic and environmental sustainability. The curriculum is designed to foster problem-solving skills and responsible decision-making among learners to ensure both economic viability and environmental integrity (Republic of Kenya, 2012). The table below represents the respondents' knowledge of activities affecting the environment.

Table 2: Learners Response on Activities that Negatively Affect the Environment

Activity	Number of learners responding
Cutting trees	118
Air pollution	89
Soil pollution	47
Water pollution	40
Burning of vegetation	25
Others	81

The responses from the learners indicate a strong awareness of environmental concerns, with tree cutting emerging as the most pressing issue, cited by 118 learners. This suggests that deforestation is a major concern, possibly due to its visible impact on landscapes and ecosystems. Air pollution follows closely, with 89 learners recognizing it as a serious problem, which may reflect growing concerns over industrial emissions, vehicle exhaust, and other pollutants affecting air quality.

Soil and water pollution, although noted by fewer learners—47 and 40, respectively—remain significant issues. These forms of pollution may be less immediately visible compared to air pollution or deforestation but are still crucial in affecting agricultural productivity and water resources. Burning of vegetation received the least attention, with only 25 learners mentioning it. This could suggest that while it is acknowledged, it is not seen as a widespread issue or its environmental effects are not as well understood.

Remarkably, 81 learners identified additional concerns not specifically listed, highlighting the diversity of environmental issues perceived within

the community. This broad recognition of multiple problems suggests an opportunity for deeper environmental education and community engagement to address these challenges more effectively.

Studies have shown that there is a need for a register of quality early childhood settings that are engaged in sound environmental education and workplace change to act as exemplars of good practice to inspire others (Bendini & Devercelli, 2022; Allen et al., 2015). Similarly, Davis (2009) asserts that more resources are needed developed specifically for the early childhood field as there is a need for a research base for early childhood environmental education to support teachers as they embark on curriculum change. In the same vein, a climate change smart official from KALRO reiterated that as professionals, we need to encourage our education institutions and professional associations to advocate for environmental education which will foster trust in the learners when it comes to good environmental practices.

Table 3: **Conservation Activities at School**

School Activity	Number of learners responding
Planting trees	225
Waste Disposal	73
Cleaning	52
Cutting grass	7
Others	54

Out of the learners studied, 270 confirmed to have been in environmental conservation activities while at home whereas 131 affirmed to have been undertaking environmental conservation activities at school.

Generally, the study results point to 375(92.6%) participants that were reached successfully from the sampled 405 participants, thus the study was unable to obtain data from 30 (7.4%) of the learners as indicated in the following case processing summary table.

Climate Change Threats

Table 4: Case Processing Summary

	Cases					
	Valid		**Missing**		**Total**	
	N	**Percent**	**N**	**Percent**	**N**	**Percent**
It poses a serious threat to you and your family	375	92.6%	30	7.4%	405	100.0%

Furthermore, results in the following table indicate that 142(39%) of the learners who responded to this question were in complete agreement that climate change poses a serious risk to themselves and their families. 85(23%) somewhat agreed that indeed climate change

poses a risk to themselves and their families. Elsewhere of the 375 responses from the sampled 405 learners 60(16%) completely disagreed that climate change poses a risk to themselves and their families.

Table 5: Cross Tabulation of Grade Against Threat of Climate Change to You and Family

		It poses a serious threat to you and your family					
		Completely disagree	**Somewhat disagree**	**Neutral**	**Somewhat agree**	**Completely agree**	**Total**
Grade	7	36	27	23	42	58	186
	8	24	22	16	43	84	189
Total		60	49	39	85	142	375

Source: Primary data

The Chi-Square Test was conducted to find out the independence of the class grade and the knowledge of whether climate change poses a threat variable. The results are displayed in the

table below. The p-value (0.063) is more than the designated alpha level (0.05) which implies that the results are not significant.

Table 5: Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	8.916[a]	4	.063
Likelihood Ratio	8.966	4	.062
Linear-by-Linear Association	7.718	1	.005
N of Valid Cases	375		

a 0 cells (0.0%) have expected count of less than 5. The minimum expected count is 19.34.

Discussion of Results: Cross Tabulation of Grade Against Perceived Threat of Climate Change

The analysis of the responses regarding whether climate change poses a serious threat to individuals and their families, as broken down by grade level, provides valuable insights into learners' perceptions. The data covers 375 respondents from Grades 7 and 8, reflecting diverse attitudes towards climate change.

Response Distribution

- **Overall Trends**:

  - The total responses indicate a general awareness of climate change, with 142 respondents completely agreeing and 85 somewhat agreeing that climate change poses a serious threat.

  - Conversely, the number of respondents who completely disagreed (60) or somewhat disagreed (49) demonstrates that while there is significant concern, there remains a notable minority that does not perceive climate change as a critical issue.

- **Grade-Specific Analysis**:

  - **Grade 7**: Among the 186 Grade 7 learners, there is a substantial level of concern, with 58 completely agreeing that climate change is a threat, alongside 42 somewhat agreeing. However, the presence of 36 learners who completely disagree suggests a segment of the population that may not fully grasp the implications of climate change. The 23 neutral responses indicate ambivalence or uncertainty, which may point to a lack of comprehensive education on the topic.

  - **Grade 8**: The 189 Grade 8 respondents show a stronger consensus regarding the threat of climate change, with 84 completely agreeing and 43 somewhat agreeing. Notably, the number of learners who completely disagree (24) is lower than in Grade 7, reflecting an increase in

awareness as learners progress in their education. The reduced neutral responses (16) in this grade suggest that older learners are more likely to have formed clear opinions on the subject.

Statistical Significance

The Chi-Square Test results indicate a p-value of 0.063, which is above the alpha level of 0.05. This implies that there is no statistically significant relationship between grade level and awareness of climate change threats. In other words, the differences observed in perceptions between Grades 7 and 8 are not strong enough to conclude that grade level impacts learners' understanding of climate change as a threat.

Linear-by-Linear Association: Interestingly, the linear-by-linear association shows a significant value (p = 0.005), suggesting that there is a trend indicating that as learners move from Grade 7 to Grade 8, their perception of climate change as a threat may shift. However, this trend does not reach significance in the broader Chi-Square analysis.

Implications of Findings

- **Educational Strategies**: The findings highlight the need for enhanced climate education across both grades. While Grade 8 learners show greater awareness, the presence of neutral and disagreeing responses in both grades suggests that there is still work to be done in fostering a comprehensive understanding of climate change.

- **Curriculum Development**: Since no significant relationship was found, educational efforts should focus on creating curricula that engage learners from both grades. Interactive and practical approaches to teaching about climate change could help bridge the knowledge gap, particularly for those who are neutral or disagreeing.

- **Awareness Campaigns**: To address the uncertainties reflected in the neutral responses, schools might consider implementing awareness campaigns that

include discussions, projects, and community involvement related to climate change, encouraging learners to form informed opinions.

The results echo the sentiments of Corner et al. (2015) found that young people generally recognize climate change as a significant issue but have limited knowledge about the threats behind it. This is whereby they had misconceptions such as equating climate change with pollution or confusing it with weather changes are common.

Climate Change Problem and Impact Underestimation in Media

The results further sought to find out the participant's responses on the underestimation of problems and climate change impact in the media. For this particular case, the response rate was 92.1%(373) and non-response was 7.9% (32) out of the 405 sampled respondents. This is indicated in the following table of the Case Processing Summary.

Table 6: Case Processing Summary

	Cases					
	Valid		**Missing**		**Total**	
	N	**Percent**	**N**	**Percent**	**N**	**Percent**
Problems and their impact are underestimated in the news	373	92.1%	32	7.9%	405	100.0%

The results in the following table indicate that 109 (24%) participants of the sampled 405 participants completely agreed that problems of climate change have been underestimated in the news media. Elsewhere 65(14%) of the participants completely disagreed that problems of climate change have been underestimated in the news media.

Table 7: Cross Tabulation of County Against the Problems and its Impact are Underestimated in the News

		Problems and their impact are underestimated in the news					Total
		completely disagree	**somewhat disagree**	**neutral,**	**somewhat agree**	**completely agree**	
County	Bunyala	11	21	20	12	13	77
	Matayos	15	5	24	11	22	77
	Nambale	13	8	10	10	34	75
	Teso North	17	12	23	10	20	82
	Teso South	9	6	14	13	20	62
Total		65	52	91	56	109	373

Source: Primary Data

A Chi-Square Test results on the County and participant's response to underestimation of climate problems and threat in news is significant as the p-value in the following table is 0.004 below 0.05, the threshold.

Table 8: Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	35.171[a]	16	.004
Likelihood Ratio	34.207	16	.005
N of Valid Cases	373		

a. 0 cells (0.0%) have expected count of less than 5. The minimum expected count is 8.64.

Discussion of Results: Cross Tabulation of County and Underestimation of Climate Problems in the News

The cross-tabulation data presented in Table 7 illustrates the varying perceptions across different counties regarding the underestimation of climate problems in media coverage. With a total of 373 respondents, the responses reveal significant insights into public awareness and concern about climate change as portrayed in news outlets.

Response Distribution

1. **Overall Trends**:

   o The aggregate responses indicate a strong inclination towards an agreement that climate problems are underestimated in the news, with a total of 109 respondents completely agreeing and 56 somewhat agreeing.

   o Conversely, only 65 respondents completely disagreed, and 52 somewhat disagreed, suggesting a general consensus on the inadequacy of media coverage regarding climate issues.

2. **County-Specific Analysis**:

   o **Bunyala**: The responses from Bunyala (total n=77) show a mix of opinions. With 11 participants completely disagreeing and 21 somewhat disagreeing, it appears that a notable portion of the population does not feel strongly about the media's portrayal of climate problems. However, the presence of 13 respondents who completely agree indicates some concern about underreporting.

   o **Matayos**: In Matayos (total n=77), the response pattern is intriguing. A significant number of respondents (24) chose a neutral stance, which may reflect uncertainty or lack of awareness about climate reporting. Nonetheless, 22 respondents completely agree that climate problems are underestimated, suggesting a critical perspective on media coverage despite the neutral opinions.

   o **Nambale**: Nambale (total n=75) exhibits the strongest sentiment regarding underestimation, with 34 respondents completely agreeing. This indicates a high level of awareness and concern about how climate issues are portrayed in the media. The lower numbers of disagreement (13 completely disagree) suggest a strong consensus that media coverage is lacking.

   o **Teso North**: Teso North (total n=82) presents a similar trend, with 20 respondents completely agreeing and a significant neutral response (23). The presence of 17 respondents completely disagreeing highlights a divide in perception, suggesting that while some individuals recognize underreporting, others may feel adequately informed or sceptical of the narrative.

   o **Teso South**: This county (total n=62) shows the lowest total number of respondents, and notably, it has the least concern about underestimation, with only 20 respondents completely agreeing. The smaller sample size may influence these results, but the distribution indicates a lesser emphasis on climate issues in this region.

Statistical Significance

The findings are further supported by the Chi-Square Test results, which indicate a significant association between county and perceptions of climate issue underestimation (p-value = 0.004). This statistical significance suggests that the differences observed are not random and that the county of residence plays a crucial role in shaping individuals' views on media coverage of climate change.

Implications of Findings

- **Media Engagement**: The variation in responses highlights the need for more focused media engagement strategies tailored to the perceptions of different communities. Areas with higher agreement on underestimation, such as Nambale and Matayos, may benefit from targeted campaigns that address specific climate concerns and enhance awareness.

- **Educational Outreach**: The neutral responses observed, particularly in Matayos and Teso North, indicate a potential gap in education regarding climate issues. Implementing educational programs that emphasize the importance of accurate media reporting and critical analysis of climate information could empower communities to engage more effectively with climate topics.

- **Community Involvement**: The findings also suggest that community involvement in climate discussions may vary significantly by county. Encouraging local initiatives and fostering community dialogue about climate change could enhance public perception and drive demand for more responsible media coverage.

CONCLUSION

In conclusion, the study underscores the critical need for comprehensive environmental education that goes beyond superficial understanding of climate change among learners. While many recognize pressing issues such as deforestation and pollution, they often fail to connect these to the broader context of climate change. Their limited participation in mitigation efforts is exacerbated by a lack of resources, insufficient school initiatives, and minimal community involvement. Moreover, the influence of teachers on learners' perceptions highlights the importance of integrating structured climate change education into the curriculum. This integration is essential for fostering a deeper understanding and encouraging proactive engagement in sustainability efforts. Ultimately, investing in early education on climate change is vital for preparing future generations to become informed stewards of the environment. By enhancing learners' awareness and practical skills, we can cultivate a proactive cohort capable of addressing the pressing challenges posed by climate change.

Recommendations

Based on the conclusion above, the study therefore came up with the following recommendations:

Schools should partner with local communities, non-governmental organizations (NGOs), and government agencies to promote climate change awareness. Community-driven projects can enrich learners' learning experiences and foster a sense of collective environmental responsibility. Additionally, Incorporating technology-based learning tools, such as educational videos, games, and simulations, can make climate change education more engaging and effective for younger learners.

Educators need to be equipped with comprehensive knowledge and effective teaching methods related to climate change. This can be accomplished through workshops, seminars, and the integration of climate change topics into teacher training programs.

Schools should create environmental clubs and implement practical projects, such as tree planting, waste management, and water conservation efforts. These initiatives will provide learners with hands-on experience in climate mitigation.

Areas for Further Research

The following areas could be considered for further research

- Effect of culture on learners' understanding of climate change

- Attitude and perception of learners towards climate change mitigation

- Comparative study and knowledge on climate change among those in urban areas vis-a-vis those in rural areas

Conflict of Interest

The study declared no conflict of interest

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