

The Nexus of Education, Gender and Climate Change in Tanzania

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Abstract:

The nexus between education, gender and climate is an important and complex issue in Tanzania and the world at large. The relationship between the three factors is not linear, as they are influenced by social, economic and political factors. Tanzania, among the countries which is most vulnerable to the impacts of climate change, there is a pressing need to address the gender gap in education and in climate change. The study used qualitative approach using both secondary and primary data. The secondary data were collected using literature reviews. Primary data were collected in-depth interviews with a purposive sample of 30 key informants with experience of working on education, gender or climate change projects in Tanzania. The data collected was analyzed using thematic analysis. Findings revealed critical insights into the nexus between education, gender and climate change in Tanzania. There was a noted gender gap in education and climate change in Tanzania. Therefore, there was a need to integrate education, gender-sensitive and climate-smart policies and programmes for girls in Tanzania.

Keywords: Nexus, Education, Gender, Climate Change, Gender Gap.

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1. INTRODUCTION

Education, gender, and climate change are deeply intertwined factors that shape sustainable development outcomes. Education provides people with the knowledge, skills, and awareness needed to understand climate risks, adopt adaptive behaviors, and pursue environmentally sustainable livelihoods (UNESCO, 2022). Gender influences access to resources, decision-making, and learning opportunities, which in turn affect vulnerability and resilience to climate-related challenges (UN Women, 2025). Climate change exacerbates existing social and economic inequalities, especially in contexts where disparities in education and gender persist (IPCC, 2022). Together, these factors form a critical nexus that determines both resilience and progress toward sustainable development goals.

Education is a vital tool for building climate resilience and promoting sustainable development. Individuals with higher levels of education are better equipped to adopt climate-smart practices, engage in sustainable livelihoods, and actively participate in environmental governance (UNESCO, 2022). Incorporating climate change into school curricula and training programs strengthens adaptive capacity and fosters a culture of environmental stewardship from an early age (IPCC, 2022). Countries that invest in education and skills development related to climate change tend to achieve more effective adaptation outcomes and community preparedness (World Bank, 2024).

Gender dynamics strongly shape vulnerability to climate change. Women and girls often face limited access to land, financial resources, information, and decision-making spaces, which restricts their ability to respond to climate shocks effectively (UN Women, 2025). Climate events can amplify care responsibilities, food insecurity, and risks of gender-based violence, all of which may hinder women's education and economic participation (IPCC, 2022). Promoting gender equity in education and climate policies is essential to ensure that adaptation measures are inclusive and effective (VPO & IUCN, 2013).

Climate change significantly affects education and gender equality. Extreme weather events, such as floods, droughts, and heatwaves, disrupt schooling, damage infrastructure, and threaten the livelihoods that support families (World Bank, 2024). These disruptions often result in school dropouts, especially among girls who may need to take on additional household responsibilities during climate crises (UNESCO, 2022). As such, climate change both intensifies and is reinforced by inequalities in education and gender (IPCC, 2022).

Globally, progress has been made in expanding access to education and promoting gender equality, but these gains are increasingly threatened by climate change (UNESCO, 2022). Educational systems face challenges from extreme weather, population displacement, and constrained public resources in affected regions (IPCC, 2022). Persistent gender gaps in education and participation in environmental decision-making underscore the importance of addressing this nexus to achieve climate justice and sustainable development (UN Women, 2025; World Bank, 2024).

Developed countries generally demonstrate high literacy rates, strong gender policies, and institutional capacity for climate action (IPCC, 2022). Climate education and gender equality are widely integrated into policies, and schools are often built to withstand climate impacts (UNESCO, 2022). However, vulnerable groups including Indigenous communities, migrants, and low-income households still face challenges in accessing quality education and climate preparedness resources (IPCC, 2022). This highlights that economic prosperity alone does not eliminate vulnerabilities at the intersection of education, gender, and climate change (UN Women, 2025).

Developing regions are more exposed to climate risks, which intensifies disparities in education and gender equity (IPCC, 2022). In Asia, schooling has improved markedly, yet climate-related disasters continue to interrupt education and livelihoods, particularly for rural and low-income populations (UNESCO, 2022). In Africa, chronic underfunding of education, poverty, and entrenched gender inequality intersect with climate vulnerability, making adaptation more difficult (World Bank, 2024). Consequently, understanding the interplay between education, gender, and climate resilience is crucial in these contexts (UN Women, 2025).

Sub-Saharan Africa faces significant climate-related challenges, including frequent droughts, floods, and temperature rises that disrupt livelihoods and education systems (IPCC, 2022). Gender disparities in school enrollment and literacy are especially pronounced among rural women and girls (UNESCO, 2022). Schools often lack resources to respond effectively to climate impacts, and governments have limited capacity to implement gender-sensitive climate education (World Bank, 2024). Strengthening education systems, enhancing girls' access to schooling, and promoting community-based adaptation strategies are vital for building regional resilience (UN Women, 2025).

East Africa relies heavily on climate-sensitive sectors such as agriculture and fisheries, making the region particularly vulnerable to climate variability. Increasing droughts and floods have disrupted livelihoods, displaced populations, and reduced school attendance, particularly among girls (IPCC, 2022). Traditional gender norms and limited resources further restrict equitable access to education and climate adaptation programs (UNESCO, 2022). Implementing gender-sensitive education and community-based climate adaptation initiatives can strengthen resilience and promote social inclusion (World Bank, 2024).

Tanzania has acknowledged the importance of addressing the nexus through national policies, including the National Strategy for Mainstreaming Gender in Climate Change (VPO & IUCN, 2013) and the National Climate Change Strategy (URT, 2021). Despite these frameworks, challenges persist. Climate change continues to affect agricultural productivity, exacerbate rural poverty, and disrupt education, particularly in drought-prone areas (World Bank, 2024). Gender disparities remain, with girls in rural regions disproportionately affected by household responsibilities and economic hardship (UNESCO, 2022). Enhancing gender-responsive education, community awareness, and climate adaptation initiatives is critical for Tanzania's sustainable development (UN Women, 2025).

Across global and regional contexts, three key observations emerge. First, education is a powerful yet underutilized tool for climate adaptation and gender empowerment (UNESCO, 2022). Second, persistent gender inequalities shape vulnerability and hinder the effectiveness of climate adaptation measures (UN Women, 2025). Third, although Tanzania has developed gender and climate policies, implementation within education systems and community programs remains limited (VPO & IUCN, 2013). These insights highlight the need for research exploring how education and gender interact with climate challenges in Tanzania and for identifying strategies that foster inclusive resilience (World Bank, 2024; IPCC, 2022).

The intersection of education, gender, and climate change represents a complex and urgent challenge in Tanzania and across the globe. These three factors are closely intertwined, with their interactions influenced by social, economic, and political contexts, making their relationship dynamic rather than straightforward (UNESCO, 2022; UN Women, 2025). Tanzania is particularly vulnerable to climate change, facing recurrent droughts, floods, and unpredictable rainfall patterns that disrupt livelihoods, compromise food security, and negatively affect access to quality education (IPCC, 2022; World Bank, 2024).

Despite efforts to improve educational access, significant gender disparities persist. Girls and women, especially in rural areas, experience lower enrollment, higher dropout rates, and limited opportunities to participate in climate-related decision-making processes (UNESCO, 2022; UN Women, 2025). Climate-related challenges further compound these inequalities, increasing household responsibilities for girls, interrupting schooling, and limiting women's engagement in adaptation and mitigation efforts (IPCC, 2022).

In practice, Tanzania has developed policies such as the National Strategy for Mainstreaming Gender in Climate Change and the National Climate Change Strategy. However, translating these policies into effective action remains a challenge. Key gaps include inadequate integration of climate change education into school curricula, insufficient gender-responsive programming, and limited local capacity for adaptation (VPO & IUCN, 2013; URT, 2021). These challenges hinder the country's ability to ensure equitable education and promote inclusive climate resilience.

From a research perspective, there is a noticeable gap in understanding how education and gender interact to influence climate change adaptation and resilience in Tanzania. Few studies have explored the systemic and contextual factors, including social norms, economic constraints, and policy effectiveness, that shape this nexus. Gaining insights into these dynamics is essential for designing interventions that are both equitable and effective (World Bank, 2024; IPCC, 2022).

Addressing this research gap is critical for informing policies and practices that can simultaneously enhance educational opportunities, promote gender equity, and strengthen climate resilience. Without targeted research and evidence-based interventions, the combined effects of gender inequality, educational gaps, and climate

vulnerability could undermine Tanzania's development goals and exacerbate existing social inequities.

Therefore, this study maps the nexus of education, gender and climate change in Tanzania. It specifically explores (1) if there is an improved access to education for girls in rural areas of Tanzania; (2) if there is designed and implemented climate-sensitive and gender-responsive education curricula and teaching materials in Tanzania; and (3) if awareness of gender-responsive climate change among students is promoted in Tanzania.

2. LITERATURE REVIEW

2.1 Empirical Framework

2.1.1 Access to education for girls in rural Tanzania

Access to education for girls in rural Tanzania remains a significant challenge due to socio-cultural, economic, and infrastructural barriers (World Bank, 2024). Girls often face early marriage, household responsibilities, and gender-based violence, which contribute to lower enrollment and higher dropout rates compared to boys (UN Women, 2025). While community initiatives and policy reforms have been introduced to reduce these disparities, persistent cultural norms and limited resources continue to hinder progress (URT, 2021). Recent research also highlights that despite policy efforts, significant gaps remain in improving girls' participation and retention in rural schools (Wilbard, 2024).

2.1.2 Climate-sensitive and gender-responsive education curricula

Integrating climate change education into school curricula is crucial for building resilience among students (IPCC, 2022). In Tanzania, some environmental education initiatives have been implemented, but the degree to which these curricula are gender-responsive is still limited (UNESCO, 2022). Gender-responsive curricula recognize the different experiences and needs of girls and boys, ensuring both have equitable opportunities to learn about and engage in climate issues (VPO & IUCN, 2013). Studies indicate that more comprehensive integration of gender perspectives into climate education is needed to strengthen girls' adaptive capacities, particularly in climate-vulnerable communities (UNGEI, 2025).

2.1.3 Awareness of gender-responsive climate change among students

Raising awareness of climate change among students is essential for fostering informed and proactive engagement (IPCC, 2022). Programmes such as *Sauti ya Dada* in Tanzania aim to enhance girls' education by addressing barriers related to poverty, gender inequality, and climate impacts (UN Women, 2025). These programs provide mentorship, leadership training, and education on sexual and reproductive health, helping girls understand and actively participate in climate-related initiatives (UNESCO, 2022). Nevertheless, research suggests there is limited evidence on the effectiveness of such programmes in promoting gender-responsive climate awareness, highlighting a need for further studies (Mramba, 2024; Kamaika & Wangsness Willemsen, 2024).

a. Theoretical Framework

This study is anchored in the Capability Approach (CA), a development framework pioneered by Sen (1999) and further refined by Nussbaum (2000) and Robeyns (2005). The Capability Approach focuses on the idea that development should not be measured only by income, resources, or infrastructure, but by the real opportunities and freedoms people have to live the kind of life they value. In other words, it asks not ‘just what people have, but what they can actually do and become with what they have’.

In the context of this research which explores the intersection of education, gender, and climate change in Tanzania the Capability Approach provides a powerful lens for understanding how education can expand girls’ opportunities and enable them to engage meaningfully in building sustainable futures. Access to education is crucial, but Sen (1999) reminds us that opportunities alone do not guarantee empowerment. True development occurs when individuals can convert those opportunities into meaningful outcomes. This conversion is often limited by social, economic, or cultural barriers such as gender discrimination, poverty, or environmental vulnerability (Robeyns, 2005).

From this perspective, education becomes both a *means* and an *end* in itself. Instrumentally, education provides girls with the knowledge, skills, and adaptive capacities needed to understand and respond to environmental challenges such as droughts, floods, and deforestation. Intrinsically, it builds agency and confidence allowing girls to make informed decisions, participate in climate action, and shape community resilience. As UNESCO (2022) emphasizes, a curriculum that is both climate-sensitive and gender-responsive is key to developing this form of empowerment, particularly in rural areas where both gender inequality and climate vulnerability are most severe.

The Capability Approach also aligns with the principles of gender and climate justice, which highlight that women and girls are disproportionately affected by the impacts of climate change due to existing inequalities in access to resources, education, and decision-making (Arora-Jonsson, 2019). When education systems intentionally integrate gender and climate concerns into their content and delivery, they help expand what Sen calls the *capability set* the real freedoms that girls have to act, decide, and thrive in a changing climate. This resonates with the global agenda for sustainable development, which places education at the center of both gender equality and climate action (UNESCO, 2022).

Within this theoretical framing, three interrelated pathways emerge:

a. Access to education as capability expansion

Providing girls especially in rural Tanzania with access to quality education broadens their capabilities to understand and respond to climate change. Education enables them to make informed decisions that improve their well-being and resilience (Sen, 1999).

b. Gender-responsive and climate-sensitive curricula as conversion factors

Well-designed curricula act as conversion mechanisms that transform educational opportunities into real outcomes by ensuring that learning content reflects the realities of both gender inequality and climate change. This helps bridge the gap between knowledge and practical capability (Robeyns, 2005; UNESCO, 2022).

c. Awareness and agency as functionings

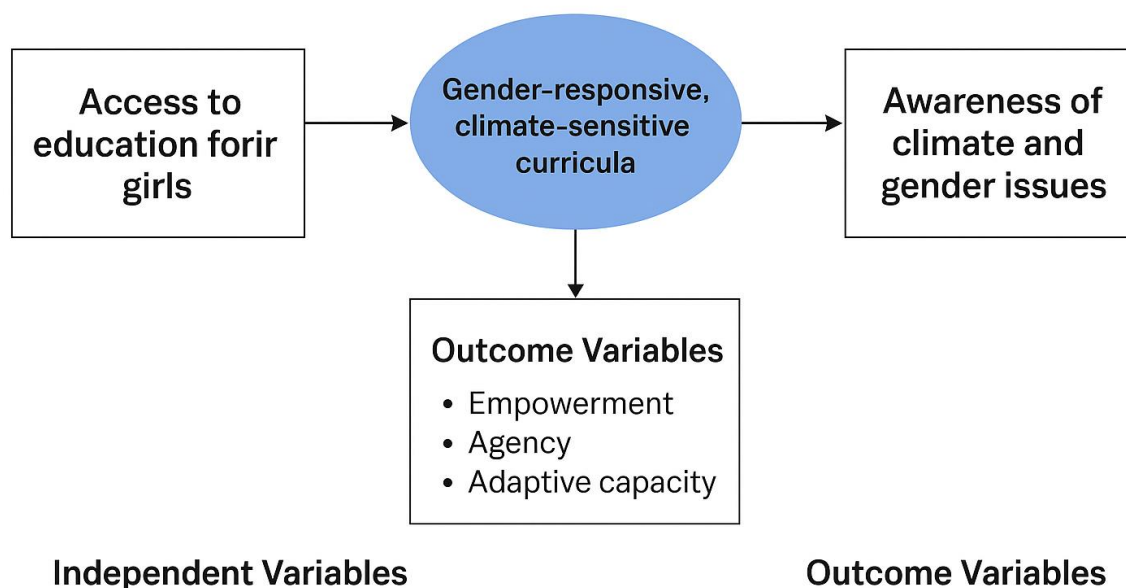
Promoting awareness of gender and climate issues among students translates educational capability into tangible action. The promoted awareness fosters agency, enabling girls to become active participants in adaptation, mitigation, and advocacy efforts within their communities (Nussbaum, 2000).

Generally, the Capability Approach provides both a normative and analytical foundation for this study. Normatively, it views education as a human right and a pathway to dignity, gender equity, and sustainability. Analytically, it illuminates how educational structures, teaching practices, and students' levels of awareness interact to either enhance or limit the real freedoms of girls in Tanzania to lead secure, empowered, and climate-resilient lives.

Table 1: Conceptual Representation

Key Concept	Operational Focus in Study	Capability Dimension
Access to education for girls	Enrolment, attendance, completion rates	Opportunity for learning and empowerment
Gender-responsive, climate-sensitive curricula	Integration of climate and gender content in teaching materials	Conversion factor linking education to climate resilience
Awareness of climate and gender issues	Student knowledge, attitudes, and participation	Functioning that demonstrates agency and adaptive capacity

Theoretical Framework: Education, Gender, and Climate Change Tanzania



3. METHODOLOGY

3.1 Research philosophy

This study was guided by a constructivist research philosophy, which emphasizes understanding social phenomena from the perspectives of those experiencing them (Creswell & Poth, 2018). This philosophy is particularly suitable for exploring the complex interplay between education, gender, and climate change in Tanzania, as it focuses on the lived experiences and insights of key stakeholders.

3.2 Research approach

A qualitative research approach was adopted to capture in-depth insights into how education, gender, and climate change intersect (Bryman, 2016). This approach allowed for a rich exploration of participants' experiences, perceptions, and practices regarding girls' access to education, the implementation of gender-responsive and climate-sensitive curricula, and awareness of climate change among students.

3.3 Research design

The study employed an exploratory research design, which is appropriate for investigating relatively under-researched and complex social issues (Saunders *et al.*, 2019). This design facilitated the collection of detailed qualitative data to provide nuanced

insights into educational practices, policy implementation, and gender-responsive climate education initiatives.

The research was conducted in five regions of Tanzania: Arusha, Dodoma, Dar es Salaam, Mbeya, and Mwanza. These regions were chosen for their diversity in socio-economic conditions, levels of climate vulnerability, and ongoing initiatives related to education, gender equality, and climate change (World Bank, 2024; URT, 2021). They also represented Tanzania major zones: Northern, Central, East, Southern and West.

3.4 Population, sample size and sampling technique

The study population comprised key stakeholders involved in education, gender, and climate change initiatives in Tanzania, including government officials, educators, gender advocates, climate change specialists, and NGO representatives actively engaged in relevant projects. A purposive sampling method was used to select 30 key informants with significant experience in education, gender, or climate change projects (Palinkas *et al.*, 2015). This approach ensured that participants had the knowledge and experience necessary to provide meaningful insights related to the research objectives.

3.5 Data collection

Data were collected using both secondary and primary sources. Secondary data were gathered through a range of documents, including Tanzanian policy frameworks, international and regional reports, academic literature, and NGO publications, to gain a comprehensive understanding of how education, gender, and climate change intersect and to identify gaps, challenges, and opportunities for improving girls' access to education, climate-sensitive curricula, and climate awareness initiatives (UNESCO, 2022; UN Women, 2025). Primary data were collected through in-depth interviews with the 30 purposively selected informants, guided by semi-structured interview questions that allowed flexibility while ensuring all research objectives were addressed.

3.6 Validity and reliability

To ensure validity, the study applied triangulation, comparing findings from the literature with insights from interviews to confirm consistency (Creswell & Poth, 2018). Reliability was ensured by recording and transcribing interviews verbatim, cross-checking transcripts with participants, and maintaining detailed records of the data collection and analysis processes to enhance transparency and reproducibility.

3.7 Data analysis

The collected data were analyzed using thematic analysis, which involved coding and identifying key patterns and themes relevant to girls' access to education, gender-responsive and climate-sensitive curricula, and awareness of climate change among students (Braun & Clarke, 2006). This approach enabled systematic interpretation of participants' perspectives and connections to existing literature.

3.8 Ethical considerations

The study adhered to strict ethical standards, including obtaining informed consent from all participants, ensuring confidentiality, and allowing participants to withdraw at any stage without any repercussions (Resnik, 2020). Ethical approval was obtained from relevant institutional review boards, and pseudonyms were used to protect participants' identities in reporting the findings.

3.9 Researcher's reflexivity

As the researcher, I recognize that who I am my background, experiences, and values inevitably shaped the way I approached this study. My academic and professional journey in education, gender, and sustainability in Tanzania deeply influenced both my interest in the topic and the questions I chose to ask. Having worked closely with rural schools and community-based programs that promote girls' education and environmental awareness, I brought to this research a strong belief in the power of education as a tool for social transformation and climate resilience.

At the same time, I was mindful that my own enthusiasm for sustainable and gender-responsive education could bias how I interpreted participants' experiences. To manage this, I consistently practiced reflexivity throughout the research process keeping a reflective journal, questioning my assumptions, and discussing emerging insights with colleagues to gain alternative perspectives. This process helped me remain attentive to what participants actually said, rather than what I expected or hoped to find.

I also recognize my position as both an insider and an observer. As a Tanzanian researcher familiar with the social and educational context, I shared some of the cultural understandings of my participants, which helped in building trust and facilitating open dialogue. However, I remained conscious of the need to maintain analytical distance to ensure that interpretations were grounded in data, not personal experience. Ultimately, this reflexive stance allowed me to navigate the balance between empathy and objectivity acknowledging that my role was not only to collect data but also to co-construct meaning with participants in an ethical, respectful, and transparent manner.

4. RESULTS

4.1 Improved access to education for girls in rural areas of Tanzania

The results reveal that, there was an insufficient number of schools and an inadequate capacity to offer quality education to rural girls due to a lack of funding, poor infrastructure, cultural beliefs and practices that discriminate against girls, and ineffective policies. That being the case, improved access to education for girls in rural areas is essential to addressing the gender gap in education, reduce gender-based violence, and enhance economic development.

“There are not enough schools in rural villages, so many girls have to walk long distances, and some

simply drop out.” According to Respondent P at Dodoma.

“Even when schools exist, there is often a lack of qualified teachers and learning materials, making it hard for girls to get quality education.” According to Respondent X at Arusha.

“Cultural practices such as early marriage and gender roles still prevent girls from attending school regularly.” According to Respondent W at Mbeya.

4.2 Designed and implemented climate-sensitive and gender-responsive education curricula

The results showed that, Tanzania's education policies and practices lack climate-friendly curricula, programs, and teaching resources, despite climate change's pressing challenges. In addition, the curricula and education materials often exclude climate change and environmental protection content, which restricts students' knowledge, skills and abilities to address climate change impacts.

“Climate change topics are rarely included in the curriculum, and textbooks do not address environmental protection.” According to Respondent Y at Dar es Salaam.

“Most teaching materials do not consider gender differences, so girls often miss opportunities to learn about climate adaptation.” According to Respondent B at Mwanza.

“Without climate-friendly and gender-responsive content, students cannot develop the skills they need to respond to environmental challenges.” According to Respondent M at Dodoma.

4.3 Awareness of gender-responsive climate change among students

Regarding awareness, the results reveal that there was a lack of awareness to students about climate change and environmental protection, leading to limited involvement in mitigating and adapting to its impacts. The participants shared that climate change education would enable young people, particularly girls to become informed and responsible citizens and grassroots agents of change.

“Most students, especially girls, do not know much about climate change or how it affects their communities.” According to Respondent T at Arusha.

“If schools taught more about climate change, young people could become more responsible and take action locally.” According to Respondent H at Dar es Salaam. “Awareness programs are minimal, so students rarely participate in initiatives for environmental protection.” According to Respondent Z at Mwanza.

5. DISCUSSION

5.1 Improved access to education for girls in rural areas of Tanzania

The findings reveal that girls in rural Tanzania face both structural and socio-cultural barriers to education. Limited school availability and poor educational quality constrain learning opportunities, while traditional norms and gendered expectations further reduce girls’ school attendance. This combination perpetuates gender inequality and limits girls’ future social and economic prospects.

The findings reveal that access to education for girls in rural Tanzania remains limited, highlighting a persistent gender gap (World Bank, 2024). Participants noted an insufficient number of schools in rural regions, combined with limited capacity to deliver quality education (UNESCO, 2022). Several factors contribute to these challenges, including inadequate funding, poor infrastructure, entrenched cultural beliefs and practices that discriminate against girls, and ineffective policy implementation (URT, 2021; Wilbard, 2024).

The lack of educational opportunities for rural girls not only perpetuates gender inequality but also contributes to social and economic disadvantages, including vulnerability to gender-based violence and limited participation in local economies (UN Women, 2025). Improving access to education is therefore essential, as it can help close the gender gap, empower girls to engage in economic development, and foster social inclusion (UNGEI, 2025). These findings align with previous studies showing that investment in girls’ education is a critical strategy for addressing systemic gender disparities and promoting sustainable development (Palinkas *et al.*, 2015).

5.2 Designed and implemented climate-sensitive and gender-responsive education curricula

The findings indicate that Tanzania’s education system currently lacks sufficient integration of climate-sensitive and gender-responsive content. The absence of environmental education in teaching materials limits students’ understanding of climate change and reduces opportunities for girls to engage in relevant learning. This gap weakens students’ capacity to respond effectively to environmental challenges in their communities.

The study indicates that Tanzania’s education system currently lacks climate-sensitive and gender-responsive curricula and teaching materials (IPCC, 2022). Most policies and classroom resources fail to integrate environmental protection and climate

change topics effectively (UNESCO, 2022). This gap restricts students' ability to develop the knowledge, skills, and competencies required to understand and respond to climate challenges (VPO & IUCN, 2013).

The absence of climate-aware curricula and gender-inclusive teaching materials limits opportunities for girls to engage meaningfully in climate adaptation and mitigation initiatives. Participants emphasized that embedding climate and gender content into educational materials could empower students to become active agents of change in their communities (Mramba, 2024; Kamaika & Wangsness Willemsen, 2024). This observation supports prior research that highlights the importance of integrating gender and climate perspectives into education to enhance resilience and adaptive capacity, particularly in vulnerable regions (UN Women, 2025).

5.3 Awareness of gender-responsive climate change among students

The findings highlight a low level of awareness among students regarding climate change and environmental issues. Without sufficient knowledge, students cannot participate effectively in mitigation or adaptation strategies. Enhancing climate education, particularly with gender-sensitive approaches, is vital to empower girls and boys to become responsible, proactive citizens who contribute to community resilience.

The findings also reveal a low level of awareness among students regarding climate change and environmental protection (World Bank, 2024). Participants reported that students are often uninformed about climate issues, limiting their involvement in mitigation and adaptation activities. The study highlights that raising awareness about climate change, especially through gender-responsive approaches, is critical to developing informed and responsible young citizens (UNESCO, 2022).

Participants suggested that incorporating climate education into school programs would enable young people, particularly girls, to act as grassroots agents of change, advocating for sustainable practices within their communities (UN Women, 2025). This finding aligns with earlier studies that show when students, especially girls, receive targeted climate education, they are more likely to engage in proactive behaviors that support environmental sustainability and community resilience (UNGEI, 2025; Mramba, 2024).

In general, the results underscore the interlinked challenges of gender inequality and climate change in Tanzania's education system. Persistent barriers to girls' education, combined with inadequate climate-responsive curricula and low awareness among students, limit the country's ability to build resilience against climate impacts. These findings reinforce the need for comprehensive interventions that simultaneously address educational access, gender equity, and climate literacy. Effective policy implementation, investment in school infrastructure, teacher training, and the development of inclusive, climate-sensitive educational resources are critical to achieving these goals (UNESCO, 2022; URT, 2021; Wilbard, 2024).

The integrated findings reveal a persistent intersection of gender inequality and limited climate education in Tanzania. Structural barriers, inadequate school resources,

cultural norms, insufficient curricula, and low student awareness all contribute to the challenges faced by rural girls. Addressing these interlinked issues requires comprehensive strategies that improve access to quality education, integrate climate and gender perspectives into teaching, and raise awareness among students.

Investing in girls' education and fostering climate-conscious, gender-inclusive learning environments are crucial for building resilience, reducing inequality, and promoting sustainable socio-economic development. These findings reinforce the growing consensus in the literature that the nexus between education, gender, and climate change represents a critical pathway for inclusive societal transformation in Tanzania and the broader Sub-Saharan context (Palinkas *et al.*, 2015; UNGEI, 2025; Mramba, 2024).

6. CONCLUSION, IMPLICATIONS, AND RECOMMENDATIONS

6.1 Conclusion

This study explored the intricate relationship between education, gender, and climate change in Tanzania, with particular focus on girls' access to education in rural areas, the integration of climate-sensitive and gender-responsive curricula, and the level of climate awareness among students. The findings indicate that these three factors are deeply intertwined and face persistent challenges within the Tanzanian education system.

Access to education for girls in rural regions is constrained by limited school infrastructure, insufficient teaching resources, and socio-cultural barriers such as early marriage and gendered expectations. These factors collectively hinder girls' learning opportunities, perpetuate gender inequality, and limit their ability to participate fully in social and economic life. Additionally, Tanzania's curricula largely lack climate-sensitive and gender-responsive content, reducing students' capacity to understand and respond effectively to climate change. Awareness of climate change among students, especially girls, is also low, limiting their engagement in adaptation and mitigation efforts. Taken together, these findings emphasize the urgent need for comprehensive interventions that address education access, curriculum content, and climate awareness in a coordinated, gender-sensitive manner.

6.2 Implications

6.2.1 Theoretical implications

The study contributes to the understanding of the interconnections between education, gender, and climate change, highlighting that these relationships are complex and mutually reinforcing. It emphasizes the importance of adopting an integrated perspective in both research and policy, showing that addressing one element in isolation is unlikely to yield meaningful or sustainable outcomes.

6.2.2 Practical implications:

Practically, the findings point to several areas requiring attention:

- i. Expanding access to quality education in rural areas, particularly for girls.
- ii. Designing and implementing curricula that are both gender-responsive and climate-sensitive, enabling students to acquire skills to respond to environmental challenges.
- iii. Promoting awareness of climate change and environmental protection among students to foster informed, proactive citizenship.
- iv. Addressing these issues will not only improve educational outcomes for girls but also contribute to building climate-resilient communities and reducing gender disparities.
- v.

6.3 Recommendations

Based on the study's findings, the following recommendations are proposed:

6.3.1 Policy and infrastructure development

Increase investment in rural education infrastructure, including building additional schools, improving classroom resources, and training teachers to provide quality instruction. Implement and enforce policies aimed at reducing socio-cultural barriers, such as early marriage, that prevent girls from completing their education.

6.3.2 Curriculum and resource reform

Integrate climate change, environmental protection, and sustainability topics across all levels of education. Ensure teaching materials and methods are gender-responsive, providing equal learning opportunities for girls and boys.

6.3.4 Awareness and capacity building

Implement school-based programs and extracurricular activities to increase students' understanding of climate change and its local impacts. Encourage students, particularly girls, to engage in community projects that promote climate adaptation and environmental protection.

6.3.5 Stakeholder collaboration

Foster partnerships between government agencies, non-governmental organizations, international development partners, and local communities to ensure sustainable and coordinated efforts. Establish monitoring and evaluation frameworks to track progress in improving gender equity, climate awareness, and educational access.

By taking these actions, Tanzania can strengthen the links between education, gender equality, and climate resilience, cultivating a generation of informed, responsible, and empowered citizens ready to contribute to sustainable development.

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