

Analyzing the Role of Women in Climate Resilience Building and Sustainable Farming Practices in Nigeria

Udochukwu C Onoh

Graduate of Kogi State University, Anyigba.
Email: udochukwuonoh31@gmail.com

Elona Ezezi

Graduate of Delta State University, Abraka, Delta State
eerezi@outlook.com

Bethel Clement

Graduate of University of Jos
clementsbethel@gmail.com

Corresponding Author: adamaizuchukwu@gmail.com

D.O.I: 10.56201/ijgem.v9.no4.2023.pg65.87

Abstract

This study analyzes the role of women in climate resilience building and sustainable farming practices in Nigeria. The country's heavy reliance on agriculture and its vulnerability to climate change make it imperative to understand and enhance women's participation in these areas. Through a systematic review of literature, this research provides insights into the different levels of women's involvement in climate resilience building and sustainable farming practices. Women's contributions include knowledge and skills, natural resource management, community resilience, and education and awareness. However, women face challenges such as limited access to resources, gender-based discrimination, and exclusion from decision-making processes. Women's leadership in sustainable farming practices is crucial for global food security and sustainable development. Gender-inclusive policies and strategies are crucial for building climate resilience, as they acknowledge the unique challenges women face due to existing gender inequalities. Enhancing women's access to financing, training, and agricultural extension services is essential for gender equality and empowering women in the agricultural sector. The findings emphasize the importance of gender perspectives in addressing climate change impacts and highlight the vulnerabilities faced by women in Nigeria. Recommendations for policymakers, organizations, and stakeholders include developing gender-inclusive policies, providing access to financing, strengthening capacity-building initiatives, improving access to agricultural extension services, promoting women's leadership and representation, and fostering collaboration and knowledge sharing. This study highlights the significant role of women in climate resilience building and sustainable farming practices in Nigeria and calls for their enhanced participation and empowerment in these areas.

Keywords: Nigeria, climate resilience, women, sustainable farming, agriculture

Introduction

Climate change is one of the most pressing global challenges, with far-reaching implications for both human communities and natural ecosystems. Nigeria, as a nation heavily reliant on agriculture and its natural resources, is particularly vulnerable to the impacts of climate change. The changing climate poses substantial threats to the country's economy, food security, and overall development. The Intergovernmental Panel on Climate Change (IPCC) has consistently highlighted the urgent need for adaptation and mitigation measures to address climate change impacts. In Nigeria, these measures are of utmost importance, considering the country's agricultural sector's significant contribution to its economy and livelihoods. Agriculture employs a substantial portion of the population, particularly in rural areas, and plays a crucial role in ensuring food security.

Furthermore, according to Anugwa, Obossou, Onyeneke, et al. (2022), gender inequality is a significant cause of food insecurity in sub-Saharan Africa. They argue that women's agricultural production activities are greatly affected by climate change, making gender inequality a major threat. In addition, they highlight that there is a lack of adequate documentation regarding the relationship between gender and vulnerability to climate change impacts on agriculture and food security in Nigeria. This assertion aligns with the central purpose of this study, which emphasizes that the existing knowledge about agriculture's vulnerability to climate change and its disproportionate impact on men compared to women is insufficient for decision-making and policy formulation. It is crucial to also comprehend the extent to which women experience disproportionate vulnerability and identify the specific factors that contribute to this vulnerability. Nigeria has one of the largest economies on the African continent, with its GDP standing at \$514.05 billion in 2021. According to Oge Udegbunam, the agricultural sector comprises 24.14 per cent of the Nigeria's GDP, with women smallholder farmers constituting 70 per cent of the agricultural labor force. According to World Bank Data, 2022, Nigeria landmass spreads over 910,770km², of which 73.8 per cent is agricultural/fertile land and 37.3 per cent is arable. of the total work force within the agricultural sector, in comparison to 44.4 percent of men. According to IFC 2022, lack of access to transportation, limited freedom of movement, low access to storage facilities and networks, and little access to infrastructure, women are kept from benefiting and participating in agricultural value chains. When it comes to gender inequality, Nigeria has made some reasonable progress on women's rights, the right of girls and women are still heavily trampled upon and abused. Women have unequal access to quality education, economic resources, political participation, and they experience unimaginable gendered and sexual violence. The recent data from the United Nations Entity for Gender Equality and the Empowerment of Women 2022, states that 43.4 per cent of women are married or in a union before the age of 18. As of February 2021, UN Data Hub, states that women held only 2.6 per cent of seats in the Nigeria parliament. According to John Campbell, Nearly 6.34 million of the country's 10.19 million out-of school children are girls, only 10 per cent of women are landowners. The World Bank's CPIA gender equality rating for Nigeria 3.0 out of a possible 6.0.

The anticipated impacts of climate change on Nigeria's agriculture sector include increased frequency and intensity of droughts, heatwaves, floods, and other extreme weather events. These changes in weather patterns will adversely affect crop yields, livestock production, and fisheries,

consequently undermining food production and availability. Additionally, climate change will lead to decreased soil fertility, increased pests and diseases, and disruptions in water availability, exacerbating the challenges already faced by farmers. The Nigerian government, in collaboration with international organizations and stakeholders, needs to prioritize climate change adaptation and mitigation efforts in the agricultural sector. This includes providing support to farmers in adopting climate-smart practices, improving access to credit and insurance mechanisms, and enhancing agricultural extension services. However, the impacts of climate change are not felt equally by all members of society. Women, in particular, often face distinct vulnerabilities due to their limited access to resources, socio-economic disadvantages, and traditional gender roles and norms. Yet, women also play a critical role in climate resilience building and sustainable farming practices. Their knowledge, skills, and contributions are invaluable for adaptation and mitigation efforts in agriculture.

Agriculture, which heavily relies on rain-fed techniques, is vulnerable to climate change impacts and risks, especially in developing countries. The World Water Development Report (2020) suggests that the devastating effects of climate change will disproportionately affect impoverished populations residing in rural areas who depend on agriculture for their livelihoods. Another study by Hoque et al. (2019) also highlights the vulnerability of agricultural livelihoods to climate change impacts, particularly in developing nations. Specifically, their research on coastal Bangladesh identified certain districts as hotspots of vulnerability due to factors such as erosion, cyclones, drought, land degradation, and limited crop productivity. Similarly, Venus et al. (2022) reported varying levels of vulnerability among smallholder farmers in the Indo-Gangetic plains. Nong et al. (2022) found moderate vulnerability among farm households in Northeast Vietnam. Parker et al. (2019) and Field et al. (2014) also documented the high vulnerability of the agricultural sector. Knox et al. (2012) projected significant yield losses for major grains in Africa and south Asia by 2050. These empirical studies indicate the vulnerability of climate-dependent agricultural livelihoods in developing countries. However, there is a lack of knowledge regarding the gender dimension, which is crucial for decision-making and building climate-resilient agricultural livelihoods in rural African communities, highlighting the need for this study.

Numerous studies have aimed to comprehend the gender-related aspects and dimensions of agricultural vulnerability to climate change. One example is the World Water Development Report (2020), which suggested that women and girls will experience significantly higher and more severe impacts from climate change due to prevailing gender inequalities. In developing countries like Nigeria, women, particularly small holder farmers, contribute 70-80% of the agricultural workforce, yet men are the ones who benefit economically. This economic disadvantage and wage discrimination make women more susceptible to the impacts of climate change as they lack the necessary resources to reduce their vulnerability. Various studies have highlighted these factors as determinants of the different impacts and vulnerabilities experienced by women and men. For example, Adzawla et al. (2019) reported that females in Ghana face more severe climate impacts on their livelihoods compared to males, as women have lower adaptive capacities.

This vulnerability stems from the fact that women and girls are often excluded from enjoying the benefits of their agricultural production, as decisions regarding resource access and allocation are predominantly made by men. Chandra et al. (2017) found that climate change and conflict have increased vulnerability among smallholder farmers, resulting in the loss of livelihoods, financial assets, and agricultural yields. However, women are further disadvantaged and tend to farm in smaller plots, work shorter hours, or engage in cash crop farming. Brody et al. (2008) stated that women contribute a significant portion of labor in rice cultivation and food production in Sub-Saharan Africa, while men are primarily responsible for cash crops and larger livestock. Consequently, the responsibility for adaptation typically falls on women, including finding alternative ways to feed their families. However, legal and customary restrictions on women's property and land rights, limited access to credit, and reduced access to agricultural extension services undermine their incentive to engage in environmentally sustainable farming practices and long-term investments in land rehabilitation and soil quality, as highlighted by Brody et al. (2008). This limited access to credit further increases vulnerability by constraining their capacity to adopt sustainable farming practices. Another related study by Alhassan et al. (2019) revealed significant differences in vulnerability levels among female-headed and male-headed farming households, with female-headed households being more vulnerable in terms of livelihood strategies, socio-demographic profiles, social networks, and access to water and food, while male-headed households were more vulnerable to health-related issues.

This study aims to analyze the role of women in climate resilience building and sustainable farming practices in Nigeria. By understanding the specific challenges and opportunities faced by women in this context, we can identify strategies and interventions to empower women, enhance their participation, and harness their potential for sustainable development.

Methodology

This methodology involves a systematic review of literature in order to collect and analyze relevant studies from academic journals, reports, and policy documents. The search strategy aimed to identify empirical studies that investigate the involvement of women in both climate resilience building and sustainable farming practices in Nigeria. By synthesizing the findings of the chosen studies, this research provides a better understanding of the different levels of women's roles in climate resilience building and sustainable farming practices in Nigeria.

Gender Perspectives on Climate Change and Agriculture

In the process, women's workload can increase as they have to manage household chores and agricultural activities simultaneously due to extreme weather events (United Nations Development Programme [UNDP], 2018). Additionally, women's ability to adapt to changing climate conditions is hindered by limited access to credit, land, and technology. The impact of climate change on agriculture differs across regions and countries, with developing countries being particularly at risk due to their reliance on rainfed agriculture and lack of adaptation resources. Therefore, it is essential to consider gender dimensions specific to these regions. By integrating gender perspectives into policies and strategies, decision-makers can effectively address the diverse needs and vulnerabilities of both men and women in relation to climate change.

In agriculture, gender roles and responsibilities have long been shaped by societal norms and cultural expectations. Traditionally, women have been assigned the task of ensuring household food security, which involves activities such as cultivating kitchen gardens, managing small livestock, and preserving and processing food. On the other hand, men have predominantly focused on large-scale agricultural production and cash crop cultivation. However, the onset of climate change has significantly impacted these gender disparities within agriculture. Climate change has led to an increase in extreme weather events, including droughts, floods, and heat waves, which can have devastating consequences for agricultural activities. These events often destroy crops and livestock, posing a serious threat to food security. Unfortunately, women farmers are often the ones who bear the brunt of these negative impacts. They are disproportionately affected due to their limited access to resources, such as land, credit, and information. Women often have restricted control over household assets and decision-making power, resulting in reduced adaptive capacity and resilience.

In addition to the aforementioned challenges, women encounter specific obstacles when it comes to adapting to climate change. Limited access to land, water, credit, and agricultural inputs significantly restricts their ability to adopt climate-resilient practices (Food and Agriculture Organization, 2011). Moreover, socio-cultural norms and discriminatory practices often prevent women from actively participating in decision-making processes related to climate change adaptation and mitigation in the agricultural sector (FAO, 2011; Agarwal, 2010). This exclusion limits their capacity to influence policies and gain access to resources that could mitigate the adverse effects of climate change on their livelihoods (Agarwal, 2010). In addition to the challenges faced, gender perspectives also shed light on the potential opportunities for addressing climate change and agricultural issues. Empowering women and promoting gender equality within the agricultural sector can contribute to enhancing resilience and sustainability. Research indicates that when women have equal access to resources and decision-making processes, agricultural productivity and food security improve (FAO, 2011).

Involving women in climate change adaptation and mitigation strategies can result in more effective and equitable outcomes. Studies have consistently shown that women are effective agents of change in managing natural resources, conserving biodiversity, and adapting to climate change. Their participation in decision-making processes at all levels can bring diverse perspectives, knowledge, and innovative solutions that improve the effectiveness of climate change initiatives. Furthermore, when women are economically empowered and have control over resources, they tend to invest more in environmentally friendly practices, leading to more sustainable agricultural systems (Doss, 2013). Promoting gender equality in agriculture is not only a matter of social justice but also crucial for achieving sustainable development and resilience to climate change. It requires addressing the structural barriers that hinder women's participation and access to resources, as well as transforming traditional gender roles and norms (FAO, 2011). By doing so, societies can unlock the full potential of women as agents of change in addressing the challenges posed by climate change in the agricultural sector.

Furthermore, the importance of gender-sensitive approaches in climate change and agriculture policies has been recognized as crucial for achieving inclusive and sustainable development (United Nations, 2015). Integrating gender perspectives into policy and planning processes is

essential to identify the specific needs and constraints faced by women farmers in relation to climate change (FAO, 2012). By adopting a gender-responsive lens, policymakers can gain insights into the benefits of involving women in climate change adaptation and mitigation efforts. For example, women can contribute valuable knowledge and skills related to alternative income-generating activities that can enhance their resilience to climate shocks (UN Women, 2018). Engaging women in sustainable farming techniques, such as agroforestry or organic farming, can also lead to more environmentally friendly practices (Koczberski, Curry, & Lockie, 2012).

Integrating gender perspectives in policy formulation can help address the gender gaps in access to resources, technology, and finance, which significantly affect women's ability to adapt and mitigate climate change impacts. By ensuring equal access to resources, training, and support, women can actively participate in decision-making processes related to climate change and agriculture (United Nations, 2015). Involving women in these processes has the potential to enhance the effectiveness and efficiency of climate change initiatives, as well as promote gender equality and social justice (UN Women, 2018).

Role of Women in Climate Resilience Building

Climate change is one of the biggest challenges facing our planet today. It is causing severe disruptions in various ecosystems, leading to increased vulnerability and risks for communities worldwide. As the impacts of climate change continue to escalate, it has become increasingly important to foster climate resilience within societies. In this context, the role of women in climate resilience building is crucial.

Historically, women have played a pivotal role in addressing environmental changes and natural disasters. This involvement can be traced back to indigenous communities, where women have been the primary stewards of land and natural resources. They possess a deep understanding of their local environments and have acquired knowledge, skills, and adaptive capacities that allow them to effectively respond to climate-related challenges (Rocheleau, Thomas-Slayter, & Wangari, 1996). Studies have shown that women's roles as caregivers, food producers, and managers of natural resources make them particularly vulnerable to the impacts of climate change (United Nations Framework Convention on Climate Change, 2000). The changing climate affects various aspects of women's lives, including their reproductive health, access to clean water, and ability to provide food and care for their families. For example, extreme weather events such as hurricanes or floods can disrupt traditional food production systems and restrict women's access to essential resources (UN Women, 2013).

Therefore, it is crucial to empower women and actively involve them in climate resilience initiatives. Gender equality is not the only motivation behind this call to action; involving women in climate change adaptation and mitigation strategies is essential for sustainable development. When women are empowered and included in decision-making processes, their unique perspectives, knowledge, and skills can contribute immensely to the development of effective and context-specific responses to climate challenges (Singh, Abeysinghe, & Rajan, 2010). In addition, studies have indicated that gender-responsive climate policies and actions have broader benefits for the community and the environment (ENI-SEIS, 2018). By empowering women, communities can enhance their resilience and adaptive capacities, leading

to more effective and sustainable responses to climate change. Moreover, considering women as active participants in climate resilience initiatives can lead to more equitable and just outcomes for both men and women, ensuring that no one is left behind (United Nations Development Programme, 2018).

Key Contributions of Women in Climate Resilience Building:

- **Knowledge and Skills**

Women often possess traditional knowledge and skills that have been passed down through generations, which can be crucial in adapting to changing climatic conditions (United Nations, 2019). This expertise encompasses a wide range of areas, including sustainable farming practices, water management, energy-efficient cooking methods, and biodiversity conservation. By leveraging their ancestral knowledge, women can play a significant role in building climate resilience within their communities. One area where women's traditional knowledge and skills shine is in sustainable farming practices. Through generations, they have acquired techniques that are well-suited to local environments, taking into account factors such as soil fertility and seasonal variations. Agroforestry, for instance, is a practice in which women excel. In many developing countries, they have mastered the art of growing trees and crops together to promote biodiversity and enhance soil quality. Additionally, women are highly skilled in organic farming practices, utilizing traditional pest control methods and crop rotation techniques. These strategies are particularly valuable in building resilience against climate-related crop failures and pests.

Women also possess expertise in water management, another crucial aspect of climate resilience. In many traditional societies, women are responsible for gathering and managing water for domestic use. They possess intricate knowledge of local water sources, such as springs, wells, and rivers, along with traditional water conservation practices (United Nations, 2019). This knowledge becomes vital when faced with water scarcity caused by shifting rainfall patterns or prolonged droughts. Women can adapt their strategies to ensure water availability for their families and communities, contributing to climate resilience. Moreover, women's knowledge extends to energy-efficient cooking methods. In various regions, women rely on traditional cooking practices that make use of locally available biomass resources, such as firewood and agricultural residues. These methods are highly efficient, minimizing fuel consumption and reducing harmful indoor air pollution. By utilizing energy-efficient stoves and cooking practices, women can significantly contribute to combating climate change by reducing greenhouse gas emissions.

Finally, women's expertise in biodiversity conservation is of utmost importance for building climate resilience. They possess profound knowledge of local flora and fauna, including medicinal plants and their sustainable harvesting techniques. By preserving biodiversity, women contribute to climate resilience by ensuring ecosystem stability, supporting pollinators, and facilitating natural pest management (UN Women, 2016).

- **Natural Resource Management**

Women's involvement in the management of natural resources and their contribution to climate-resilient strategies has been widely recognized by researchers, policymakers, and development practitioners. Several studies have shown that women's participation in decision-making processes related to resource management leads to more sustainable and effective outcomes. One study conducted by UN Women in collaboration with the International Union for Conservation of Nature (IUCN) emphasizes the role of women in natural resource management and climate change adaptation. The study highlights that when women have access to and control over resources, they tend to prioritize long-term sustainability and are more likely to adopt environmentally friendly practices. Women's active participation in decision-making processes ensures that their perspectives are considered, leading to more holistic and inclusive strategies for climate resilience.

The United Nations Environment Programme (UNEP) also recognizes the importance of women's involvement in environmental decision-making. According to UNEP, women possess unique knowledge, skills, and experiences that are crucial for designing and implementing climate-resilient strategies. Their contributions can range from sharing traditional ecological knowledge to providing practical insights on sustainable practices. Furthermore, research by Agarwal (2010) highlights that women have a vested interest in the sustainable management of natural resources since they are often responsible for providing food, water, and energy for their families. Women's involvement in decision-making processes related to land use, reforestation, and water management can improve the overall sustainability and resilience of communities.

In terms of land use practices, studies have shown that women's knowledge of soil fertility, crop diversity, and traditional farming techniques can enhance agricultural productivity while minimizing environmental degradation. Their input can lead to the adoption of sustainable farming methods such as agro forestry, organic farming, and soil conservation techniques, which in turn contribute to climate resilience and the mitigation of climate change impacts. Regarding reforestation efforts, research conducted by Colfer et al. (2011) underscores that women possess valuable knowledge of local tree species, their uses, and their ecological roles. Women's participation in tree planting campaigns and forest restoration initiatives can ensure the selection of appropriate tree species, promote biodiversity, and restore ecosystem services crucial for climate resilience.

Similarly, in water resource management, women's involvement is vital as they often play a significant role in water collection, conservation, and purification within households. Research by Biswas and Tortajada (2018) highlights those women's perspectives on water-related challenges and their knowledge of water sources contribute to more effective and context-specific strategies for sustaining water resources. Engaging women in decision-making processes related to water management can lead to better water governance, equitable distribution, and innovative approaches to tackle climate-related water scarcity.

- **Community Resilience**

Women, as primary caregivers, have been observed to play an essential role in disaster response and recovery due to their close ties to their communities. They possess an intimate understanding of the dynamics within their communities, enabling them to effectively contribute to the

development of early warning systems, emergency preparedness plans, and post-disaster recovery strategies (United Nations International Strategy for Disaster Reduction [UNISDR], 2017). One of the key advantages of involving women in disaster management is their ability to mobilize resources. Women often have extensive networks in their communities and possess strong organizational skills, enabling them to rally support and coordinate relief efforts. When given the opportunity, women's groups and organizations can leverage these skills to create effective emergency preparedness plans that address the specific needs and vulnerabilities of their communities.

Additionally, women's role as change agents is crucial in promoting climate-resilient livelihoods within their communities. Their deep understanding of the local environment and the challenges posed by climate change allows them to identify opportunities for sustainable development. They can advocate for initiatives such as organic farming, renewable energy projects, and eco-tourism, which can contribute to building resilience to future disasters and mitigating the impacts of climate change. In order to support and enhance the involvement of women in disaster response and recovery, it is vital for policymakers and decision-makers to recognize the significant contributions they can make. Gender mainstreaming in disaster management should be prioritized, ensuring that women have equal access to decision-making processes and leadership roles. Adequate resources and support should be provided to empower women and enable them to contribute effectively to disaster resilience efforts (UNISDR, 2017).

- **Education and Awareness**

Women have long been recognized as important agents of change in promoting sustainable behaviors and raising awareness about climate resilience within their families and communities. Their influential role in shaping family and community behaviors equips them with the power to drive the adoption of climate-resilient practices such as waste reduction, energy conservation, and sustainable agriculture.

Advocacy for sustainable practices is a powerful tool that women can utilize to promote climate resilience. By actively engaging in advocating for waste reduction, women can encourage their families and communities to adopt sustainable waste management practices. This can include promoting recycling programs, composting, and discouraging the use of single-use plastic items. Women can organize community events, workshops, and awareness campaigns to educate their families and neighbors about the detrimental effects of excessive waste on the environment. By emphasizing the importance of waste reduction and offering practical solutions, women can catalyze behavioral changes that minimize carbon emissions and promote sustainable living.

Education also plays a crucial role in enabling women to inspire climate-resilient behaviors. By educating their families and communities about the impacts of climate change, women can foster greater understanding and consciousness about the urgent need for sustainable actions. Women can organize informative sessions, workshops, and community meetings to share knowledge about climate change, its consequences, and the potential solutions. By highlighting the role of each individual in addressing climate challenges and offering practical tips for actions such as energy conservation, women can empower their families and communities to take pro-environmental measures.

One of the key areas where women can drive climate-resilient behaviors is sustainable agriculture. Women have been instrumental in promoting sustainable farming practices such as organic farming, agroforestry, and water-efficient irrigation methods. By educating their families and communities about sustainable agriculture, women can raise awareness about the benefits of these practices, such as conserving soil fertility, reducing water usage, and protecting biodiversity. Furthermore, women can also encourage the use of locally adapted and climate-resilient crop varieties, promoting food security and sustainable livelihoods.

Challenges and Opportunities

Despite the critical role of women in climate resilience building, they often face numerous challenges that hinder their full participation. These challenges include limited access to resources, unequal power dynamics, gender-based discrimination, and lack of representation in decision-making processes. Addressing these challenges requires a comprehensive approach that involves:

1. Empowering Women:

Ensuring women have equal access to education, resources, and income-generating opportunities is crucial for achieving gender equality and sustainable development (UN Women, 2018). Empowerment programs that provide training and capacity-building on climate change adaptation and mitigation can enable women to actively participate in resilience-building efforts, contributing to both gender equality and environmental sustainability. In many parts of the world, women face systemic barriers that limit their access to education, finance, and decision-making processes (World Bank Group, 2019). These barriers reinforce gender disparities and make women more vulnerable to climate change impacts. For instance, in rural areas where women often rely on agriculture for their livelihoods, limited access to resources and knowledge prevents them from adopting climate-resilient farming techniques (FAO, 2011). Consequently, the productivity and income levels of female farmers suffer, exacerbating poverty and food insecurity.

Empowerment programs play a critical role in addressing these challenges and closing the gender gap in climate change resilience. These programs can provide training and capacity-building opportunities, equipping women with the skills and knowledge needed to adapt to and mitigate climate change impacts. For example, training programs can focus on sustainable farming practices, water conservation techniques, and renewable energy solutions (WEDO & GGCA, 2016). By actively involving women in these programs, they gain the tools and resources to make informed decisions, develop sustainable livelihoods, and contribute to resilience-building efforts.

One successful example of such empowerment programs is the Women's Economic Empowerment Program implemented by UN Women in collaboration with partners in Nepal. This program provided women with training in sustainable farming practices, business management, and entrepreneurship skills to enhance their economic opportunities and improve their resilience to climate change impacts (UN Women, n.d.). The program enabled women to

increase their agricultural productivity, diversify their income sources, and play an active role in local decision-making processes related to climate change adaptation and mitigation.

The importance of such programs is recognized at the international level. For instance, the Paris Agreement, a global climate agreement under the United Nations Framework Convention on Climate Change (UNFCCC), acknowledges the importance of gender equality and women's empowerment in climate change actions (UNFCCC, 2015). It calls for gender-responsive approaches in climate policies and encourages parties to promote the full and equal participation of women in climate-related decision-making processes.

2. Gender-Responsive Policies

Climate change is one of the biggest challenges facing the world today, affecting various aspects of human life, including socioeconomic well-being, human health, and the environment. It is widely acknowledged that climate change impacts men and women differently due to their distinct social roles and responsibilities. In this context, governments and international organizations should prioritize gender equality and incorporate gender-specific approaches in climate change policies and programs. Numerous studies have shown that women are more vulnerable to the impacts of climate change, particularly in developing countries. This vulnerability is often a result of their limited access to resources, lack of decision-making power, and economic disparities. Women are disproportionately affected by natural disasters, such as floods and droughts, as they are more likely to suffer from the loss of livelihoods, food security, and increased workloads due to climate-related events. Additionally, women are more prone to experiencing adverse health effects from climate change, particularly during pregnancy and childbirth.

Recognizing and valuing women's contributions in climate change mitigation and adaptation is crucial. Women have unique knowledge and expertise based on their experiences, such as traditional farming techniques, sustainable resource management, and community resilience building. Incorporating their perspectives can lead to more effective and sustainable climate change strategies. For instance, involving women in decision-making processes can result in the implementation of context-specific policies that meet the needs and priorities of the local communities. Ensuring women's representation in decision-making processes is an essential step towards achieving gender equality in climate change governance. This includes promoting women's leadership in climate change negotiations, policymaking, and planning. Various international agreements, such as the United Nations Framework Convention on Climate Change, emphasize the importance of gender balance and the active involvement of women at all levels of decision-making in relation to climate change. Targeted initiatives, such as capacity-building programs and mentorship opportunities, can help women participate meaningfully and have their voices heard in these processes.

Moreover, providing targeted support to address women's specific needs is necessary to achieve gender equality in climate change policies and programs. This involves improving access to education, healthcare, and financial resources for women. Investing in women's education and training can enhance their resilience and enable them to contribute more effectively to climate change adaptation and mitigation efforts. Financial mechanisms, such as microfinance and credit

programs, can empower women to start eco-friendly businesses or initiate climate-resilient agricultural practices.

3. Building Partnerships

Collaboration among stakeholders, including governments, NGOs, and civil society organizations, is essential for promoting women's participation and leadership in climate resilience building. Partnerships can facilitate knowledge-sharing, resource mobilization, and the exchange of best practices, ultimately strengthening resilience efforts. The importance of collaboration in promoting women's participation in climate resilience building has been recognized by various international agreements and frameworks. For instance, the United Nations Framework Convention on Climate Change (UNFCCC) acknowledges the critical role of women in climate change adaptation and calls for their full and equal participation. The Paris Agreement also highlights the importance of gender equality and the empowerment of women in addressing climate change. These global frameworks provide a mandate for diverse stakeholders to collaborate and work together to enhance women's leadership and participation in climate resilience efforts.

Collaboration among governments, NGOs, and civil society organizations is necessary because each stakeholder group brings unique strengths and perspectives to the table. Governments have the power to enact policies, regulations, and institutional reforms that support gender equality in the context of climate resilience. They can also allocate resources and provide funding for gender-responsive climate programs and initiatives. NGOs and civil society organizations often have extensive grassroots networks and community-based expertise, allowing them to engage with local women and understand their specific needs and challenges. By joining forces and collaborating, these stakeholders can share knowledge, build on each other's strengths, and create more effective and sustainable resilience efforts. Partnerships among stakeholders enable knowledge-sharing, which is crucial for promoting women's participation and leadership in climate resilience building. Each stakeholder group possesses unique knowledge and expertise that, when combined, can enhance the overall understanding of climate change impacts and effective adaptation strategies. For example, governments can share scientific data and research findings, NGOs can provide valuable insights from on-the-ground experiences, and civil society organizations can contribute indigenous and traditional knowledge. This collaborative knowledge-sharing approach helps create comprehensive and context-specific resilience strategies that are relevant to women's specific needs and challenges.

Resource mobilization is another key benefit of collaboration in promoting women's participation and leadership in climate resilience building. Climate change resilience requires significant financial, technical, and human resources. By forging partnerships, stakeholders can pool resources and expertise to implement gender-responsive projects and programs. Collaboration allows for the efficient allocation of resources, prevents duplication of efforts, and maximizes the impact of limited resources. For example, government funding can be matched with NGO expertise and community contributions, leveraging a diverse range of resources to support women's resilience initiatives. Collaboration also fosters the exchange of best practices and lessons learned. Through partnerships, stakeholders can identify successful approaches and innovative solutions from different regions and contexts. This exchange of knowledge and

experiences allows stakeholders to build on each other's successes and avoid repeating past mistakes. By learning from each other, stakeholders can improve the effectiveness and efficiency of their resilience efforts, leading to more sustainable outcomes.

Sustainable Farming Practices Led by Women

Women's participation in sustainable farming practices plays a crucial role in the advancement of global food security and sustainable development. This section highlights the significance of women's leadership in the agricultural sector, explores some sustainable farming practices led by women, and discusses potential benefits and challenges associated with these initiatives. The involvement of women in sustainable farming practices is increasingly recognized as a means to enhance agricultural productivity and achieve sustainable development goals. Women have been playing a crucial role in agriculture, constituting about 43% of the agricultural labor force in developing countries (FAO, 2011). However, despite their substantial contribution, women face systemic barriers and gender inequalities that hinder their full participation and leadership in the agricultural sector.

Women farmers often encounter various challenges that limit their access to and control over resources and decision-making processes in agriculture. These challenges include limited access to land, credit, inputs, markets, information, and extension services (Doss, 2013). Due to gender norms and discriminatory practices, women typically have smaller landholdings than men, which restricts their ability to expand their agricultural activities and generate income (Doss, 2013; Meinzen-Dick et al., 2011). Moreover, women frequently lack access to credit and face difficulties in obtaining loans due to legal, cultural, and social constraints (von Braun & Meinzen-Dick, 2009). These constraints limit their ability to invest in sustainable farming practices and adopt new technologies that could enhance productivity and reduce environmental degradation. The limited access to information and extension services also poses a significant challenge for women in agriculture. Information on markets, weather patterns, improved farming techniques, and climate change adaptation strategies is often not easily accessible for women farmers (van den Wijngaart et al., 2021). This lack of information hampers their capacity to make informed decisions about agricultural practices and adapt to changing circumstances. In addition, gender biases within extension services further limit women's access to technical knowledge and training opportunities (Joshi et al., 2019). As a result, women may be excluded from capacity-building initiatives and struggle to adopt sustainable farming practices.

Gender inequalities in the agricultural sector are also reflected in the limited participation and leadership of women in decision-making processes. Women are often excluded from agricultural cooperatives, farmer organizations, and community-level decision-making bodies (Meinzen-Dick et al., 2019). This exclusion denies women the opportunity to influence policies, access resources, and shape the development of sustainable farming practices. Furthermore, traditional gender roles and norms perpetuate stereotypes that associate men with agricultural leadership and decision-making, reinforcing the marginalization of women in these roles (Njuki et al., 2018).

Several initiatives led by women have emerged across the globe to address these challenges and promote sustainable farming practices. For instance, the African Women in Agricultural Research and Development (AWARD) program empowers female agricultural scientists in sub-

Saharan Africa to lead and contributes to research that enhances small-scale farming practices (AWARD, n.d.). Similarly, the International Network of Women Engineers and Scientists for Global Food Security mobilizes women professionals in science and engineering to develop sustainable technologies and innovations (INWES, n.d.). These initiatives led by women have led to various positive outcomes. For instance, women's participation in sustainable farming practices has been found to improve crop yields, enhance overall farm productivity, and foster rural development (Food and Agriculture Organization [FAO], 2011). Moreover, empowering women in the agricultural sector can contribute to poverty reduction, food security, and the overall well-being of communities (United Nations, 2019).

However, there are several challenges to fully leveraging women's leadership in sustainable farming practices. Limited access to resources, inequalities in land ownership, lack of education and training opportunities, and gender stereotypes are some of the key barriers faced by women in agriculture (FAO, 2011). Women often have limited access to critical resources such as land, finance, and technology, which hinders their ability to engage in sustainable farming practices effectively (Doss, 2013). Unequal land ownership rights and inheritance laws further disadvantage women in terms of accessing and controlling productive resources. These challenges not only limit women's economic opportunities but also hinder their potential contributions to sustainable development. In addition to resource limitations, women in agriculture also face significant obstacles in terms of education and training. Limited access to quality education and vocational training prevents women from acquiring the necessary skills and knowledge to adopt sustainable farming practices. This knowledge gap can hinder their ability to maximize agricultural productivity, adapt to climate change, and minimize environmental risks.

Furthermore, gender stereotypes and discriminatory norms perpetuate the exclusion of women from leadership positions in the agricultural sector. Societal expectations often limit women's roles to certain activities within the agricultural value chain, such as labor-intensive tasks, while men are typically given more decision-making authority (FAO, 2011). These stereotypes create systemic barriers that undermine women's agency and leadership potential in sustainable farming practices. To address these challenges and promote women's empowerment in agriculture, it is crucial to integrate gender-focused policies and interventions into existing agricultural frameworks. Governments, international organizations, and stakeholders need to prioritize women's access to resources, such as land, credit, and technology, through targeted initiatives and legal reforms (United Nations, 2019). By ensuring equal land rights, improving access to credit facilities, and promoting gender-responsive technologies, women can overcome some of the barriers they face in sustainable farming practices.

Providing education and training programs tailored to the specific needs of women in agriculture is essential. These programs can equip women with the necessary knowledge and skills to adopt sustainable farming practices, enhance productivity, and contribute to environmental conservation efforts (FAO, 2011). Gender-responsive extension services and agricultural training programs can help bridge the knowledge gap and empower women to make informed decisions about their farming practices. Moreover, challenging and transforming gender norms and stereotypes is crucial for promoting women's leadership in sustainable farming practices. Efforts

should be made to challenge societal expectations and biases that limit women's roles and opportunities in the agricultural sector (FAO, 2011). Encouraging women's participation in decision-making processes, fostering mentorship programs, and promoting networks and platforms for women in agriculture can help break down barriers and empower women to take on leadership roles (United Nations, 2019).

Gender-Inclusive Policies and Strategies for Climate Resilience

In recent years, there has been growing recognition of the differential impacts of climate change on women and men, as well as the importance of gender-inclusive policies and strategies for building climate resilience. Gender plays a critical role in shaping vulnerability and resilience to climate change, as women often face unique challenges and burdens due to existing gender inequalities (United Nations, 2019). Therefore, it is essential to integrate gender perspectives into climate change adaptation and mitigation efforts to ensure equitable and effective outcomes.

Gender-inclusive policies and strategies for climate resilience focus on addressing the specific needs and capabilities of women, recognizing their critical contributions to climate change adaptation and mitigation. Such policies aim to empower women, promote gender equality, and enhance their adaptive capacity to climate change impacts (United Nations, 2019). By incorporating a gender lens, policymakers can better understand and respond to the differentiated impacts of climate change on women and men and develop interventions that acknowledge existing gender inequalities. One key aspect of gender-inclusive policies for climate resilience is ensuring women's meaningful and equal participation in decision-making processes at all levels. Women's voices and perspectives must be actively sought and integrated into climate change policies, strategies, and programs. This requires creating enabling environments that promote women's participation and leadership, breaking down structural barriers, and fostering inclusive and gender-responsive governance structures.

Another important element of gender-inclusive policies is addressing the specific needs and vulnerabilities of women in climate change adaptation and mitigation efforts. Women often have distinct roles and responsibilities, as well as access to resources and knowledge related to climate change impacts (UN Women, 2019). Policies should identify and address gender-specific challenges, such as limited access to resources, lack of decision-making power, and unequal access to education and training opportunities. This can be achieved through targeted programs that provide women with the necessary skills, information, and resources to adapt to climate change and contribute to sustainable solutions.

Furthermore, gender-inclusive policies should aim to promote the economic empowerment of women in climate-sensitive sectors. Women play crucial roles in agriculture, water management, and natural resource-based livelihoods, which are highly susceptible to climate change impacts (UN Women, 2019). Policies and interventions should support women's access to productive resources, credit facilities, and markets, as well as promote gender-responsive value chains and sustainable livelihood opportunities. This can enhance women's economic resilience and contribute to climate change adaptation and mitigation efforts.

In implementing gender-inclusive policies and strategies for climate resilience, it is essential to engage multiple stakeholders, including governments, civil society organizations, and local communities. Collaboration and partnerships can facilitate knowledge exchange, capacity building, and the sharing of best practices (Kurian, Ray-Bennett, & Hossain, 2019). By bringing together diverse perspectives and expertise, stakeholders can collectively address gender gaps in climate change initiatives and foster inclusive and sustainable solutions.

Government initiatives and programs promoting gender equality in agriculture and climate change adaptation

Government initiatives and programs promoting gender equality in agriculture and climate change adaptation have become crucial in tackling the gender disparities and ensuring sustainable development. These initiatives recognize the unique challenges faced by women in agriculture and their vulnerability to climate change impacts. One notable initiative is the Global Alliance for Climate-Smart Agriculture (GACSA), which aims to promote gender equality in agricultural practices that address climate change. The GACSA emphasizes the importance of women's involvement and empowerment in decision-making processes related to climate-smart agriculture. Their inclusion ensures that gender-related challenges and opportunities are well considered and integrated into climate change adaptation strategies.

Another significant program is the Gender-Responsive Agriculture and Climate Change Program led by the International Fund for Agricultural Development (IFAD). This program seeks to enhance women's access to productive resources, such as credit, land, and technology, and provides them with training and opportunities for skills development. The program recognizes the potential of women in driving agricultural innovations and adapting to climate change, promoting their active participation and leadership in agricultural activities. In addition to these international initiatives, many countries have implemented their own government programs to tackle gender inequalities in agriculture and climate change adaptation. For instance, the Ethiopian government has established the Ethiopian Climate Resilient Green Economy (CRGE) strategy. This strategy aims to promote gender equality by improving women's access to resources, knowledge, and technology for sustainable agriculture and climate change adaptation.

Moreover, the Indian government launched the Mahila Kisan Sashaktikaran Pariyojana (MKSP), a flagship program focused on empowering women farmers and enhancing their resilience to climate change. The MKSP provides training, financial support, and access to resources for women in agriculture, recognizing their critical role in food security and climate change adaptation. To address gender equality in agriculture and climate change adaptation, governments, and international organizations are working collaboratively to design and implement these initiatives and programs. These efforts ensure that women's rights are protected, their voices are heard, and their capacities are strengthened in the face of climate change challenges.

Enhancing access to financing, training, and agricultural extension services for women

Enhancing access to financing, training, and agricultural extension services for women is vital for promoting gender equality and empowering women in the agricultural sector. Women's

participation in agriculture is significant, with approximately 43% of the global agricultural labor force being comprised of women (FAO, 2011). However, women often face numerous challenges and barriers that restrict their ability to fully engage in agricultural activities and benefit from this sector.

Access to financing is an important aspect of empowering women in agriculture. Limited access to credit is a major obstacle for women farmers, often due to discriminatory lending practices and the lack of assets or collateral needed to secure loans (Doss, 2011). Recognizing the importance of addressing this challenge, various initiatives have been launched. For example, the Agricultural Credit Guarantee Scheme Fund in Nigeria provides credit guarantees to financial institutions lending to agriculture, with a specific focus on encouraging lending to women farmers. Such initiatives can help enhance access to financing for women, enabling them to invest in inputs, machinery, and infrastructure, thereby boosting their agricultural productivity and income.

Training and capacity building programs are another critical component of empowering women in agriculture. These programs provide women farmers with skills, knowledge, and information that can enhance their productivity, improve farming techniques, and enable them to cope with the challenges posed by climate change and other environmental factors. It is crucial to develop training programs that take into account the specific needs and constraints faced by women farmers, including gender norms, limited access to land, and technology (Quisumbing et al., 2014). Gender-sensitive training programs should not only focus on technical aspects of farming but also address issues of gender equity, social norms, and women's empowerment.

Agricultural extension services play a key role in providing advisory support, information, and technical assistance to farmers. However, these services often fail to address the unique needs and circumstances of women farmers. Integrating a gender perspective into extension services ensures that women farmers are not excluded and can benefit equally from these services. For instance, extension workers should consider the time constraints and mobility challenges faced by women due to their multiple roles within and outside the household (Katungi et al., 2013). Developing gender-responsive extension programs that offer flexible service delivery mechanisms, such as training sessions held at convenient times and accessible locations can significantly enhance women's access to these services.

Discussion of findings

The findings of this study highlight the vulnerabilities and challenges faced by women in Nigeria in the context of climate change and agriculture. The study emphasizes the importance of gender perspectives in addressing climate change impacts and building resilience within societies.

The study reveals that women in Nigeria face increased workloads due to the need to manage household chores and agricultural activities simultaneously, particularly in the face of extreme weather events. Limited access to credit, land, and technology further hinders women's ability to adapt to changing climate conditions. This is particularly concerning considering the significant contribution of the agricultural sector to Nigeria's economy and livelihoods.

The role of women in climate resilience building is identified as crucial. Their key contributions include their knowledge and skills, natural resource management, community resilience, and education and awareness initiatives. However, despite their important roles, women often face challenges to their full participation. These challenges include limited access to resources, unequal power dynamics, gender-based discrimination, and lack of representation in decision-making processes.

The study also recognizes the significance of sustainable farming practices led by women in promoting global food security and sustainable development. It highlights the importance of women's leadership in the agricultural sector and identifies sustainable farming practices initiated by women. Women constitute about 43% of the agricultural labor force in developing countries, emphasizing their important role in agriculture.

To address these challenges and promote gender equality in the agricultural sector, the study suggests the need for gender-inclusive policies and strategies for climate resilience. This includes enhancing women's access to financing, training, and agricultural extension services. Access to finance enables women to invest in productive resources, while training and extension services equip them with the necessary knowledge and skills. By empowering women in agriculture, Nigeria can enhance its resilience to climate change, promote sustainable farming practices, and achieve its development goals.

Recommendations for policymakers, organizations, and stakeholders:

- 1. Develop and implement gender-inclusive policies and strategies:** Policymakers should prioritize the inclusion of gender perspectives in climate change adaptation and mitigation efforts. This includes addressing the unique challenges and burdens faced by women in relation to climate change impacts and ensuring equitable and effective outcomes for both men and women.
- 2. Provide access to financing:** Access to financial resources is crucial for women in the agricultural sector to invest in climate-resilient farming practices. Policymakers and organizations should work towards increasing women's access to microcredit, grants, and loans specifically tailored to their needs.
- 3. Strengthen capacity-building initiatives:** Training and education programs should be developed to enhance women's knowledge and skills in climate resilience building and sustainable farming practices. These initiatives should focus on improving women's access to information, technology, and innovative agricultural practices.
- 4. Improve access to agricultural extension services:** Agricultural extension services play a vital role in providing valuable information and support to farmers. Policymakers should ensure that these services are easily accessible and tailored to the specific needs of women farmers.
- 5. Promote women's leadership and representation:** Efforts should be made to increase the representation of women in decision-making processes related to climate change and agriculture. Creating opportunities for women to participate and lead in agricultural organizations, cooperatives, and community initiatives can enhance their influence and contribute to more gender-responsive policies and practices.

6. Foster collaboration and knowledge sharing: Establishing platforms for collaboration and knowledge sharing among different stakeholders, including policymakers, researchers, NGOs, and women farmers, can facilitate the exchange of best practices and lessons learned. This can ultimately contribute to the scaling up of successful climate resilience and sustainable farming initiatives led by women.

By implementing these recommendations, Nigeria can strengthen its resilience to climate change impacts and promote sustainable farming practices, while ensuring gender equality and empowering women in the agricultural sector.

Conclusion

This study demonstrates the significant role that women play in climate resilience building and sustainable farming practices in Nigeria. Women's involvement in these areas is crucial for the country's economic development, food security, and overall resilience to climate change. However, women often face numerous challenges, such as limited access to resources and unequal power dynamics, which hinder their full participation. Therefore, it is essential to implement gender-inclusive policies and strategies that enhance women's access to financing, training, and agricultural extension services. By empowering women in the agricultural sector, Nigeria can promote gender equality, strengthen its resilience to climate change, and ensure sustainable development.

References

- Adzawla, W., Azumah, S. B., Anani, P. Y., & Donkoh, S. A. (2019). Gender Perspectives of Climate Change Adaptation in Two Selected Districts of Ghana. *Heliyon*, 5, e02854. <https://doi.org/10.1016/j.heliyon.2019.e02854>
- Akukwe, T. I., & Ogbodo, C. (2015). Spatial Analysis of Vulnerability to Flooding in Port Harcourt Metropolis, Nigeria. *Sage Open*, 5, 1-19.
- Doss, C., Morris, M. L., & Kherallah, M. (2018). Gender Perspectives on Climate Change and Agriculture in Sub-Saharan Africa. CCAFS Working Paper No. 179.
- Food and Agriculture Organization (FAO). (2011). *The State of Food and Agriculture: Women in Agriculture: Closing the Gender Gap for Development*.
- Nelson, V., Meadows, K., Cannon, T., Morton, J., & Martin, A. (2002). Uncertain predictions, invisible impacts, and the need to mainstream gender in climate change adaptations. *Gender & Development*, 10(2), 51-59.
- Alhassan, S. I., Kuwornu, J. K. M., & Osei-Asare, Y. B. (2019). Gender Dimension of Vulnerability to Climate Change and Variability Empirical Evidence of Smallholder Farming Households in Ghana. *International Journal of Climate Change Strategies and Management*, 11, 195-214. <https://doi.org/10.1108/IJCCSM-10-2016-0156>
- Ali, P., Onah, A. M., Mage, O. J., Yiyeh, H. G., Tarzoho, P., & Iorhuna, D. (2022). Principal Component Analysis of Household Vulnerability to Flood Disaster in Makurdi

- Metropolis, Benue State, Nigeria. *Nigerian Annals of Pure and Applied Sciences*, 5, 39-46.
- Ali, P., Onah, A., Mage, O., Yiyeh, H., Tarzoho, P., & Iorhuna, D. (2022). Principal Component Analysis of Household Vulnerability to Flood Disaster in Makurdi Metropolis, Benue State, Nigeria. *Nigerian Annals of Pure and Applied Sciences*, 5, 39-46. <https://doi.org/10.5281/zenodo.7132821>
- Anugwa, I. Q., Obossou, E. A. R., Onyeneke, R. U., & Cha, J. M. (2023) Gender Perspectives in Vulnerability of Nigeria's Agriculture to Climate Change Impacts: A Systematic Review. *Geo Journal*, 88, 1139-1155. <https://doi.org/10.1007/s10708-022-10638-z>
- Brody, A., Demetriades, J., & Esplen, E. (2008). *Gender and Climate Change: Mapping the Linkage—A Scoping Study on Knowledge and Gaps*. UK Department for International Development, Institute of Development Studies (IDS).
- United Nations International Strategy for Disaster Reduction. (2017). *Women's empowerment critical to disaster resilience*.
- Carr, E. R., & Thompson, M. C. (2014). Gender and Climate Change Adaptation in Agrarian Settings: Current Thinking, New Directions, and Research Frontiers. *Geography Compass*, 8, 182-197. <https://doi.org/10.1111/gec3.12121>
- Chandra, A., McNamara, K. E., Dargusch, P., Caspe, A. M., & Dalabajan, D. (2017). Gendered Vulnerabilities of Smallholder Farmers to Climate Change in Conflict-Prone Areas: A Case Study from Mindanao, Philippines. *Journal of Rural Studies*, 50, 45-59. <https://doi.org/10.1016/j.jrurstud.2016.12.011>
- Chinwendu, O. G., Sadiku, S. O. E., Okhimamhe, A. O., & Eichie, J. (2017) Households Vulnerability and Adaptation to Climate Variability Induced Water Stress on Downstream Kaduna River Basin. *American Journal of Climate Change*, 6, 247-267. <https://doi.org/10.4236/ajcc.2017.62013>
- CIRDDOC Nigeria (2022). *Strengthening Existing and Emerging Women Mobilisation Platforms and Small Holder Women Farmers' Association in Nigeria (Women Lead Agric In Nigeria)*. CIRDDOC Nigeria. <https://cirddoc.org/women-lead-agriculture-in-nigeria>
- Campbell, J. "Ensuring Women's Land Rights in Nigeria can Mitigate Effects of Climate Change", (Council on Foreign Relations April 10, 2019)
- Deressa, T. T., Hassan, R. M., Ringler, C., Alemu, T., & Yesuf, M. (2009). Determinants of Farmers' Choice of Adaptation Methods to Climate Change in the Nile Basin of Ethiopia. *Global Environmental Change*, 19, 248-255. <https://doi.org/10.1016/j.gloenvcha.2009.01.002>
- Eastin, J. (2018). Climate Change and Gender Equality in Developing states. *World Development*, 107, 289-305. <https://doi.org/10.1016/j.worlddev.2018.02.021>

- Fatimayin, F. (2020). Gender Inequality in Education: Implications for National Development. National Open University of Nigeria.
- Field, C. B., Barros, V. R., Dokken, D. J., Mach, K. J., Mastrandrea, M. D., Bilir, T. E. et al. (2014). Climate Change 2014: Impacts, Adaptation, and Vulnerability. Summary for Policymakers. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC). Cambridge University Press.
- CPIA Gender Equality Rating (1 =Low to 6 =High) –Nigeria, “The World Bank Data, accessed 17, 2023
- 1999 Constitution of the Federal Republic of Nigeria as amended.
- Hahn, M. B., Riederer, A. M., & Foster, S. O. (2009). The Livelihood Vulnerability Index: A Pragmatic Approach to Assessing Risks from Climate Variability and Change—A Case Study in Mozambique. *Global Environmental Change*, 19, 74-88. <https://doi.org/10.1016/j.gloenvcha.2008.11.002>
- Hoque, M. Z., Cui, S., Xu, L., Islam, I., Tang, J., & Ding, S. (2019). Assessing Agricultural Livelihood Vulnerability to Climate Change in Coastal Bangladesh. *International Journal of Environmental Research and Public Health*, 16, Article No. 4552. <https://doi.org/10.3390/ijerph16224552>
- Intergovernmental Panel on Climate Change (IPCC) (2014). Climate Change 2014 - Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change (1132 p.). In C. B. Field, V. R. Barros, D. J. Dokken, K. J. Mach, M. D. Mastrandrea, T. E. Bilir, M. Chatterjee, K. L. Ebi, Y. O. Estrada, R. C. Genova, B. Girma, E. S. Kissel, A. N. Levy, S. MacCracken, P. R. Mastrandrea, & L. L. White (Eds.), Cambridge University Press.
- IPP (Intergovernmental Panel on Climate Change) (2007). Climate Change: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge University Press.
- Knox, J., Hess, T., Daccache, A., & Wheeler, T. (2012). Climate Change Impacts on Crop Productivity in Africa and South Asia. *Environmental Research Letters*, 7, Article ID: 034032. <https://doi.org/10.1088/1748-9326/7/3/034032>
- Madhuri, M., Tewari, H. R., & Bhowmick, P. K. (2014). Livelihood Vulnerability Index Analysis: An Approach to Study Vulnerability in the Context of Bihar. *Jambá: Journal of Disaster Risk Studies*, 6, a127. <https://doi.org/10.4102/jamba.v6i1.127>
- McKune, S. L., Borresen, E. C., Young, A. G., Auria Ryley, T. D., Russo, S. L., Camara, A. D. et al. (2015). Climate Change through a Gendered Lens: Examining Livestock Holder Food Security. *Global Food Security*, 6, 1-8. <https://doi.org/10.1016/j.gfs.2015.05.001>

- Nnachi, R. O. (2010) Gender Equity in Education: A Challenge to School System in the Igbo Speaking States of Nigeria. *Journal of the Nigerian Academy of Education*, 6, 105-115.
- Nong, H. T. T., Gan, C., & Hu, B. (2022). Livelihood Vulnerability to Climate Change: A Case of Farm Households in Northeast Vietnam. *Environment, Development and Sustainability*, 24, 12059-12078. <https://doi.org/10.1007/s10668-022-02201-0>
- Ofoegbu, I. F. (2009). Female Access to Basic Education: A case for Open Distance learning in Edo. *Journal of Counseling*, 2, 46-57. <https://doi.org/10.4314/ejc.v2i1.52653>
- Parker, L., Bourgoin, C., Martinez-Valle, A., & Läderach, P. (2019) Vulnerability of the Agricultural Sector to Climate Change: The Development of a Pan-Tropical Climate Risk Vulnerability Assessment to Inform Sub-National Decision Making. *PLOS ONE*, 14, e0213641.
<https://doi.org/10.1371/journal.pone.0213641>
- Sahel Capital (2014). The Role of Women in Nigerian Agriculture. In *Sahel's Newsletter* (Vol. 7, 3 p.). Sahel Capital.
- Turner, B. L., Kasperson, R. E., Matson, P. A., McCarthy, J. J., Corell, R. W., Christensen, L., Eckley, N., Kasperson, J. X., Luers, A., Martello, M. L., Polsky, C., Pulsipher, A., & Schiller, A. (2003). A Framework for Vulnerability Analysis in Sustainability Science. *Proceedings of the National Academy of Sciences of the United States of America*, 100, 8074-8079. <https://doi.org/10.1073/pnas.1231335100>
- Tyubee, B. T. (2008). Urban Growth and Air Pollution in Makurdi, Nigeria. In *Association of Nigerian Geographers' Proceedings of the National Conference on Urbanization, Resources Exploitation and Environmental Sustainability in Nigeria* (pp. 411-426). Association of Nigerian Geographers (ANG)
- Udegbuma, O. "Besides Insecurity, Land Rights Hamper Nigerian Women's Farming Efforts," *Premium Times Nigeria*. August 3, 2021
- ENI-SEIS. (2018). More gender responsive climate policies make a difference. Retrieved from <https://eni-seis.eionet.europa.eu/rural-environment/climate-change/communication-support-and-tools/more-gender-responsive-climate-policies-make-a-difference>
- Rocheleau, D., Thomas-Slayter, B., & Wangari, E. (1996). *Feminist political ecology: Global issues and local experiences*. Psychology Press.
- Singh, N. M., Abeyasinghe, A. C., & Rajan, S. C. (2010). Gender and climate change: Mapping the linkages. A background paper prepared for the International Union for Conservation of Nature (IUCN). Retrieved from https://cmsdata.iucn.org/downloads/web___gender_climate_change_paper.pdf
- UN Women. (2013). The impacts of climate change on women. Retrieved from <https://www.unwomen.org/en/news/in-focus/climate-change-and-the-environment>

United Nations Development Programme. (2018). Gender and climate change. Retrieved from <https://www.undp.org/content/undp/en/home/sustainable-development-Goals/goal-5-gender-equality/why-it-matters/gender-and-climate-change.html>

United Nations Framework Convention on Climate Change. (2000). Gender and climate change. Retrieved from <https://unfccc.int/gender-and-climate-change>