



# Gender and Climate Change: The Role of Women in Climate Change Processes

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## Authors' contributions

*This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.*

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## ABSTRACT

Gender and climate change research has revealed that the causes and effects of climate change differ by gender. Women are affected differently by climate change impacts, and this calls for their participation at the decision-making table in climate change discourse processes. Despite their vulnerable position in society, women are seen as change agents in natural resource management, farming, innovation, and caregiving. As a result, in economies which are heavily natural resource reliant, women are critical for establishing resilient systems and ensuring climate change adaptation. In this review, we hypothesize by answering the question, "What roles do women play in the climate change adaptation and mitigation processes?" We uncover evidence to support the

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hypothesis that women act as climate change negotiators, clean technology ambassadors, climate-smart agriculture ambassadors, and climate change activists in the climate change processes using a systematic review system meta-analysis inspired by PRISMA and the Publish or Perish review tool as a form of qualitative analysis. We used over 40 pieces of literature to foster the evidence of the study.

*Keywords: Climate change; gender; climate justice; adaptation; women; mitigation.*

## 1. INTRODUCTION

Climate change has dominated the international environmental agenda since its inception in the mid-1980s. The critical importance of combating climate change has climbed to the top of worldwide agendas. Dankelman [1] Parikh [2] Carvajal et al. [3] and BRIDGE (2008) all discuss the context in which debates about gender perspectives and women's engagement in climate change adaptation have emerged. Women and men are projected to be affected and vulnerable to climate change differently. According to IPCC [4] the poorest populations are more vulnerable to the effects of climate change. Prevailing disparities, like gendered labor division, uneven access to resources, and discrimination in decision-making opportunities, are thought to be at the root of the anticipated gender differential impacts, which may impede climate change adaptation UNFCCC [5] BRIDGE, (2008).

Gender and climate change research have discovered that the effects of climate change differ by gender. The main arguments are that women and men will have different experiences with climate change and that females will be excessively affected by its effects. Scholars of Gender and Environmental Degradation (GED) have argued for decades that women are disproportionately impacted by environmental destruction due to their traditionally female-dominated roles as carers and providers, more so in Africa, where women are the gatherers of water, food, and fuel, and dominate subsistence farming. These duties make them more prone to the socio-economic shocks of prolonged droughts, reduced food production, and severe weather events caused by rising global temperatures as they rely heavily upon natural resources. This makes women inherently vulnerable to climate change because of the socio-cultural structures that deprive women of access to resources and power in decision-making. According to the papers in the special editions of Gender and Development, the effects of climate change differ by gender. Moreover, it

has been found that women have little chance of survival compared to men in situations of natural disasters like Tsunamis, droughts, and floods. According to the World Health Organisation (WHO), women are up to 14 times more likely than their male counterparts to die in natural disasters (World Health Organisation 2003; research by Neumayer and Plumper 2007 largely concurs). Furthermore, evidence suggests climate change will make it more difficult for women to care for and provide for their families. For example, in harsher areas, women may have to go further to acquire clean water and firewood, and they may have to spend more time producing and harvesting food [6] When food shortages occur due to climate change, women frequently compromise their nutrition to ensure that their children have enough to eat [6].

Climate change scholars use actual examples from developing nations to demonstrate how migration's economic and social disintegration worsens women's already insecure status in society. Women constitute 70% of the world's poor. According to UNIFEM, women and children account for 80% of the world's refugees as a result of climate change. According to UNIFEM, governments and international relief organizations are doing insufficient to safeguard women refugees from sexual violence, whether they are on the move or in camps. Women who have not been forced to escape their homes as refugees frequently find themselves caring for and providing for their families on their own after male household members leave to pursue better prospects elsewhere. Research shows that women do not participate in climate decision-making due to their low social status. All of this indicates that economically and socially marginalized populations are more vulnerable to the adverse effects of global warming. According to the Intergovernmental Panel on Climate Change (IPCC), the poor are more vulnerable to the detrimental effects of climate change [7].

Women are seen as change agents in domains such as natural resource management, farming, innovation, and caregiving despite their

vulnerable position in society. As a result, they are critical to climate change adaptation [8]. In several sectors, including water management, forest management, and biodiversity management, women have traditionally been the custodians and carriers of information. Women's lived experiences have taught them vital lessons that will assist them in identifying effective strategies for adaptation and mitigation if given the opportunity [8]. Whether women's role as climate change negotiators will gain traction in global negotiations is a matter for the future. This movement must gain traction in the age of the SDGs. Women's political leadership and participation are critical components of any global warming debate [9]. They must have a seat at the table whenever environmental decisions are made, regardless of the degree of decision-making. Women, on the other hand, continue to struggle for leadership roles in climate change discourse processes, as well as a place at all the negotiating tables.

## 2. METHODOLOGY

### 2.1 Assessing the Role of Women in Climate Change Processes

Women play a vital role in the climate change processes as they experience climate change impacts differently from men. In this review, we limit our focus to the roles women play in building community resilience and adapting to the negative impacts of climate change.

### 2.2 Review Inclusion and Exclusion Criteria

To better understand the links between gender and climate change processes, a systematic review approach was used to study gender and women's involvement in climate change adaptation processes from 2002 to 2023. Scopus, a large online database for screening abstracts and citations of various thematically specialized scientific publications, was also searched for supplementary reference materials for the systematic review approach [10]. The systematic review method was used to collect reliable, unbiased studies for further examination. To compile our data, we used the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) standards, an evidence-based approach developed for the purpose of critically assessing and reporting system reviews and meta-analyses [11]. We included the most relevant sources in our analysis and left out the rest.

## 3. REVIEW

A review of a number of literature materials indicates that to prevent the harmful effects of climate change, women must be included in decision-making and leadership roles. Not only does this include running for political office, but also planning and executing sustainable natural resource management practices. The engagement of women and girls is critical to the success of disaster risk reduction, which is the process of methodically studying and mitigating disaster causes. This includes limiting risk exposure, prudent land and environmental management, plummeting the vulnerability of people and property, and fostering readiness and early warning for disastrous events [12]. And they should be given credit for it. According to recent studies, women in leadership and decision-making roles have a positive impression on climate adaptation initiatives as well as resource management initiatives [13]. Female adolescents and young adults have an important role to play in future climate reduction and adaptation efforts, and their voices should be incorporated into advocacy and decision-making activities [14]. Research indicates that women play key roles in climate change processes including being negotiators, educators, activists, clean energy ambassadors, and smart agriculture champions.

In Africa, women are playing a crucial role in climate change processes, particularly in the scope of climate adaptation. Their involvement spans various countries, showcasing their resilience, innovation, and determination to address the challenges posed by a changing climate.

### 3.1 Women as Climate Change Negotiators

The issue of women's meaningful participation in climate negotiations, such as the UN Framework Convention on Climate Change (UNFCCC), remains a vital concern. While progress has been made in recognizing the importance of gender equality in addressing climate challenges, there is still work to be done in ensuring that women are not just present at the table but are also empowered to contribute in an accountable manner. This requires creating spaces for diverse voices, promoting women's leadership, and addressing barriers that hinder their active involvement. When women's perspectives are fully integrated into climate negotiations, it

enhances the effectiveness and inclusivity of climate policies, fostering solutions that resonate with a wider range of experiences and needs.

Initially, women were not participating in climate conferences, and the UN Framework Convention on Climate Change (UNFCCC), adopted at the Rio Earth Summit in 1992, did not recognize gender as a critical issue in climate change [15]. Historically, male players dominated the climate negotiating area, and climate change has been viewed primarily through the perspectives of science, technology, economics, and national security. However, research on women's engagement in UNFCCC climate negotiations has "barely gone beyond noticing that women are underrepresented" [16].

Several formal and informal processes have been put in place to guarantee that gender is taken into consideration in climate change debates since the representation of women means a representation of their interests. The UNFCCC has started tracking the number of male and female delegates, advocating for more fair representation of both sexes among state delegates, and hosting workshops on the subject. In 2011, a coalition of women's networks battled for and achieved constituency status for women and gender groups, granting them official observer status and participation privileges [17]. Women's issues are reflected outside of formal organizations through the Women for Climate Justice Network (Gender CC), a 'gender day' is conducted at each COP meeting, and gender seminars are occasionally given at COPs. However, in the context of climate negotiations, this approach marginalizes gender and pushes the burden of lobbying for decreasing climate change's disproportionate consequences on women to men. When women constitute most of a climate delegation, their interests are expected to be represented. Women's activist organizations, on the other hand, are likely to wield power from the periphery despite being barred from the main talks.

Nonetheless, UNFCCC laws that reinforce sexism have received little attention. Women are expected to have fewer possibilities to participate in discussions if, for example, membership requirements require negotiators to be accredited diplomats and delegation chiefs to be parliamentary ministers. While there is no overt sexism in these legislations, the possible consequences for women should be carefully considered [18]. As Chappell [19] shows, formal

and informal rules not only limit or prescribe membership, but they also produce gendered results in legislation, policies, and pledges.

Due to the complexities of the arena, it might be difficult to exert influence from a seat at the table during climate negotiations. There is no single 'top' or 'leader' in climate discussions. Lessons from women's political participation imply that overemphasizing individual autonomy may backfire, as it did when representation was prioritized over a gendered assessment of institutional rules [20,15]. No single woman can effect change, and research shows that female politicians are just as likely as their male colleagues to follow the party line on an issue as they are to seek to represent women [21]. When it is presumed that individual women would represent women's practical interests, little consideration is given to the diversity of women or the ways in which intersecting experiences shape their identity, views, and values. Coalitions of important persons have already shown helpful in promoting gender equality in politics and government [22,20]. Gender equality affects all stakeholders, not just women, and this must be acknowledged for change to occur [15].

To accomplish a climate change accord, numerous parties must coordinate their activities. Behind the scenes, negotiators, scientists, non-governmental organizations (NGOs), media, and coalition organizers put in a lot of work, while delegation leaders get all the credit. Women take on a variety of responsibilities as representatives for their countries at climate conferences, where negotiations can move swiftly, and decisions can have far-reaching implications for national security, economic policy, and environmental policy. Multilateral climate talks rely heavily on interstate coalitions, and any negotiator will tell you that obtaining an agreement with so many different parties is a hard task. This leads to many female negotiators taking on the additional burden of advocating for women on a global basis. According to research released in 2015 by Kronsell and Manusdottir [15] equal representation of women on the Swedish negotiating team did not result in a greater comprehension of the gendered effects of climate change or the need for gender-sensitive and inclusive policy. According to Carter & Howard [23] we must recognize that social science and gender analysis abilities are not required for women to serve on negotiation teams in fields such as science and international law.

Women negotiators were recognized as valuable during COP13. According to Resurrección [24] a global network of groups evolved under the GenderCC at COP13 in Bali, Indonesia, after a series of kick-start initiatives. Women for Climate Justice is one of these organizations, as is the Global Gender and Climate Alliance (GGCA), which has over 25 (global) member organizations, including WEDO, UNEP, UNDP, and IUCN. Following the UNCED/CSD (Commission on Sustainable Development) stakeholder paradigm, the UNFCCC has had an official Women and Gender Constituency since 2009. These coalitions were formed formally in order to offer a clear gender/feminist agenda to UNFCCC deliberations. Both the Indonesian government and the UNFCCC's local hosting committee gave optimistic signals before to COP13 in Bali, indicating their support for women's participation [24]. At a number of concurrent meetings, the gender and social components of adaptation, vulnerability, mitigation, financing energy, and emerging climate regimes were extensively discussed [25]. For the first time this year, the COP included a Women's Caucus alongside a Climate Justice Caucus. Indeed, finding common ground on the concept of climate justice set the foundation for a new degree of civil society participation in UNFCCC operations. Prior concerns about critical disparities in energy consumption patterns between the North and South, payments for adaptation programs in light of earlier investments in mitigation efforts, and risky trade-offs between new efforts at carbon sequestration and community livelihoods have given rise to the discourse of climate justice in a future climate regime.

According to Röhr & Hemmati [25] and Skutsch [26] the North's emphasis on efficiency in mitigation efforts and the South's emphasis on vulnerability differentiation provide fertile ground for gender studies and reaction. During the Bali meeting, a group of powerful environmental women made a key proposal as follows: "Ensure that women and gender specialists are involved in all climate-related decisions, as they are powerful change agents and their full participation is critical in adaptation and mitigation policies and programs" [27].

According to Röhr and Hemmati [25] many negotiators are attentive to women and gender issues because "the notion that women are the most vulnerable victims of climate change and its impacts is what makes many negotiators

receptive to women and gender aspects." The challenges of adaptability and vulnerability have rekindled the WED discourse. Women are a particularly vulnerable group, needing action and retaliation [24]. Their significance in the utilization of natural resources is stressed once more, this time in the context of the hazards posed by climate change-caused droughts and more powerful cyclones. They have been accorded important agency and stakeholder status in the fight against and adaptation to climate change as a result of their unique relationship to the land and its resources. As a result, the insertion of the term "vulnerability" into the lexicon of climate change adaptation is a second component in the persistence of women-environment discourses [24]. The notion that women are an especially vulnerable group in climate change discussions has gained popularity at both the international and national levels.

### **3.2 Women as Clean Technology Ambassadors**

According to Karlsson [28] climate change is intimately linked to energy access, and women have untapped potential in this area. Almost three billion people worldwide cook their food over open flames or on traditional stoves. Women are mostly victims of gender-based violence because they are in charge of cooking and spending hours collecting fuel each week. Women and children under the age of five are most vulnerable to the consequences of smoke exposure, which is estimated to cause two million deaths worldwide each year [28]. When utilizing a cookstove, GHG and particles such as black carbon are emitted to the atmosphere. The engagement of women is critical to resolving this issue of climate change as they will use cooking techniques that doesn't emit these GHG to the atmosphere. Including women in the supply chains of clean energy materials will empower them and give them a platform to encourage many other women to use the items like cookstoves. According to Daka [29] women's spending on needs such as food, medical care, and education has a multiplier effect on their communities.

Renewable energy sources are often acknowledged as a primary strategy for addressing climate change, making the energy sector particularly crucial. Most people envision electricity being used to power devices and machinery, gasoline and diesel fuels being used to power motors and vehicles, and oil being

transported in order to make natural gas. Because of the stereotypically muscular character of the work involved, power generation and fuel distribution are often viewed as male or masculine occupations [28]. Women are less likely to be involved in discussions about energy policies and plans because of these issues, and they are treated less favorably in the workplace. As a result of this bias, women are excluded from decision-making and the formulation of important initiatives to tackle climate change. In many developing nations, particularly in the poorest communities, women are mainly responsible for collecting and handling traditional biomass fuels such as charcoal, wood, and agricultural waste. As a result, 'gender-blind' (that is, not taking gender into account) energy policies don't address the most pressing issues affecting developing countries' capability to adapt to and alleviate climate change because they fail to identify the role of women in the energy segment.

Nearly two billion people in developing nations rely on traditional biomass fuels for heating, cooking, and lighting, and these are the countries with the most evident links between gender roles, energy supplies, and climate change [28]. Women in these countries are expected to gather fuel and food for their families, regardless of the time or distance involved. According to Daka [29] women will continue to spend long hours (or even more time) gathering firewood, getting water, cultivating the land, and grinding cereal grains as climate change accelerates. With so much on their shoulders, it is critical that women in developing countries have a say in national energy policy. More women's contributions are required to successfully manage energy supply in the face of climate change and to lessen communities' reliance on biomass fuels, which will help them escape extreme poverty [28].

Women in developed countries are more likely than men to support energy efficiency policies, recycle more frequently, and purchase organic food and eco-labelled products [30]. According to European studies, female respondents were more worried about climate change and more willing to accept compromises in the sake of cutting carbon emissions. Women in the U.S are 5% more likely than men to trust climate science [30]. This opportunity can be leveraged to accelerate the transition to a green energy economy.

### 3.3 Women as Climate Change Activists and Leaders

According to Resurrección [24] women are frequently the ones who speak out against powerful interests and huge polluters, despite the dangers such actions pose to their safety, careers, and lives. Many of the most vocal campaigners for climate justice and land and environmental protection are women, from Berta Caceres to Greta Thunberg. Women have organized nonviolent protests to tackle environmental threats ranging from deforestation in India to mining activities jeopardizing rural households' access to water in Latin America. These organizations include Colombia's Fuerza de Mujeres Wayuu and Ecuador's Mujeres Amazónicas. Many of these brave women are speaking out against major corporations that are endangering the planet's sustainability, frequently in collaboration with governments [24].

According to research, female leaders value the well-being of the planet as well as its inhabitants [31]. When women are included in forest decision-making and management, forest conditions and conservation efforts improve considerably. According to a study conducted in India, canopy growth and forest regeneration rates improved even when established in minor, more destructed forests by women [31]. Women are the caretakers of native nurseries and seed banks, in addition to conservation and replanting programs that improve carbon sequestration, avert forest degradation, and protect biodiversity.

The Global Landscapes Forum (GLF) has recognized 16 powerful women for their work to restore and protect natural resources. Sumarni Laman's tree-planting effort, for example, is supporting the restoration of biodiversity in Indonesia [24]. Vandana Shiva established one of the first communal seed banks in India. Navdanya is an open-source initiative dedicated to saving, breeding, and disseminating seeds of native agricultural species. There are approximately 150 community seed banks in 22 states. Many other seed banks, both northern and southern, have since been constructed [24]. All these efforts of activism and women leadership have protected environmental degradation through forest management. In Kenya, Wangari Mathai was an iconic woman leader who championed for environmental protection by all means. She made an impact and modeled many young activists towards

taking care of the environment and voicing concerns about climate change.

### 3.4 Women as Climate Smart Agriculture Champions

Agricultural technology and practice research and dissemination are being conducted all around the world to boost agricultural productivity, improve lives, and alleviate poverty for small-scale farmers [32]. Research into improved agricultural varieties, better farming methods, participatory policy analysis, and the generation of new knowledge has considerably enhanced development advantages [33]. The number of undernourished persons in developing countries reduced by 42% between 1990-1992 and 2012-2014 (FAO, 2014). There are, nevertheless, major geographical differences. South Asia, for example, has made modest progress against poverty and hunger, while Sub-Saharan Africa reversed its trend between 1990 and 1992 (FAO, 2014). According to the FAO of the United Nations (2014), one in every nine of the world's more than 7 billion people is chronically malnourished. Almost all of these folks are from underdeveloped countries. Because climate change has the potential to significantly disrupt food systems and create dangers to the world's food supply, the problem has become urgent. The Paris Agreement which aims to reduce glasshouse gas emissions from wealthy and developing countries is critical to keeping global warming well below 2 degrees Celsius. Increase small-scale farmers' adaptive capacity and the efficiency with which agricultural systems use resources to feed the world's rising population [32].

Climate-smart agriculture (CSA) provides a number of tactics for reorienting and transforming agricultural schemes to provide food security in times of climate change by analyzing potential trade-offs and synergies between agricultural productivity and food security, mitigation benefits, and adaptive capacity [34]. Long-term, when the impacts of climate change become more obvious [32] incremental change may be insufficient to bring about the social adjustments required to mitigate and adapt to climate change while also improving food security. There is an urgent need to scale up from working with a small number of farmers to impacting a large portion of the farming population in an effective and successful manner.

Climate change has a negative impact on food supply, accessibility, utilization, and the stability

of food systems. Women farmers in developing countries are responsible for 45 to 80 percent of the nation's food supply, depending on region. Agriculture is projected to employ more than 90% of working women in certain African countries [34]. In the face of climate change, traditional food supplies become more irregular and scarcer. Loss of money and harvests pose a threat to women, who frequently rely only on these commodities for survival. Rising food prices disproportionately affect the poor, particularly women and girls, whose health has been found to deteriorate faster during food shortages than men's. Furthermore, women are rarely included in debates about the allotment of land and other resources critical to their survival [32]. This is why it is critical to safeguard rural women's rights to appropriate nourishment, equitable access to economic opportunities, and a say in public affairs.

Women are better able to act towards climate change mitigation when they have access to land ownership. Women who own their own land are more likely to engage in sustainable agriculture, which benefits the environment [32]. Providing women with land rights and farming resources might significantly improve local and global climate change goals, yet women are often prevented from owning land or participating in community decisions about land management in many countries. When women have the legal right to own property, they can make more decisions about it and use it more effectively than when men rule and are accountable for making such decisions [34]. This is essential because women may use the land to obtain loans and other necessities for productive farming. Because women do not understand climate change concerns as men do, but nevertheless live with the problem as primary providers for their families, having women at policy formulation tables can help advocate for women's land ownership rights.

When agricultural climate change solutions, such as climate-smart agriculture, are designed with women in mind, they can be effective combatants against climate change [35]. Women are in a unique position to manage the harvest through rainy and dry years because they are often the sole or principal breadwinners in their households. They are the most vulnerable to the impacts of climate change, therefore it seems to reason that they would be the ones to devise sustainable agricultural solutions to ensure consistent high food productivity [34]. Women

have gone above and beyond simply adapting to climate change by encouraging others to do the same through climate-smart farming practices.

Women are champions for climate-smart agriculture as a means of reducing climate change effects because agriculture is responsible for over 80% of the causes of deforestation and, by extension, many related repercussions such as loss of biodiversity, desertification, and increased CO<sub>2</sub> in the atmosphere [33]. However, when current agricultural areas and forest management are improved, there is less pressure to deforest further territory. Furthermore, in contrast to chemically intensive ways, women's agricultural practices are more often regenerative and holistic, resulting in enhanced carbon storage in soil and trees as well as improved water quality. Furthermore, communities with gender quotas in local forest management have greater success with conservation efforts and more evenly distributed money, lessening poverty-driven environmentally destructive practices [34]. As a result, if more people practice sustainable agriculture, fewer greenhouse gases will be emitted into the atmosphere, slowing global warming [36].

### **3.5 Women as Health Champions in Africa**

In Africa, women are emerging as health champions, playing pivotal roles in shaping health perspectives, and drawing upon traditional knowledge to promote holistic well-being. Their involvement spans across communities, where they blend ancestral wisdom with modern healthcare approaches to address health challenges in a culturally sensitive manner.

Women's role as health custodians is deeply rooted in traditional knowledge, which anchors many of the African societies. Passed down through generations, this wisdom encompasses herbal remedies, healing practices, and preventive measures that have sustained communities for centuries. Women are often the keepers of this knowledge, responsible for preserving and disseminating it within their families and communities. Their ability to integrate traditional remedies with modern healthcare approaches makes them instrumental in bridging the gap between heritage and contemporary well-being or human welfare.

Within the context of health, women in Africa are often the primary caregivers, nurturing their

families physically, emotionally, and spiritually. Their understanding of the interconnectedness between these aspects of health contributes to a more comprehensive approach to well-being. Women's unique roles as mothers, daughters, and community leaders place them at the heart of healthcare decisions, enabling them to influence practices that directly impact the health of their families and communities.

Women's health perspectives in Africa are multifaceted, encompassing issues such as maternal health, infectious diseases, and mental well-being. They advocate for accessible and culturally appropriate healthcare services, recognizing that these services must be designed to accommodate local beliefs and practices. Additionally, women are instrumental in fostering health awareness through community engagement and education. Their deep-rooted connections with their communities allow them to communicate health information effectively and dispel myths or misconceptions that might hinder proper care.

However, it is important to acknowledge that women's involvement in healthcare can be hampered by social and structural barriers. Limited access to education, cultural norms, and gender inequality can all impact the extent of their influence. Efforts to uplift women as health champions must, therefore, address these systemic challenges, ensuring that women are empowered to take active roles in decision-making processes and policy development.

Generally, women in Africa serve as health champions by embodying the fusion of traditional knowledge and modern health perspectives. Their roles as caregivers, community leaders, and advocates allow them to bridge the gap between ancient wisdom and contemporary healthcare needs. By recognizing and supporting women's contributions to health, societies can harness their unique insights to create more inclusive, effective, and culturally sensitive healthcare systems that benefit all members of the community.

## **4. CONCLUSION**

Women are critical change agents in the adaptation to climate change impacts. They act as climate change negotiators, clean technology ambassadors, climate smart agriculture ambassadors, and as climate change activists in the climate change processes. As negotiators,



they represent women's interests at the negotiation tables and ensure that their demands are listened to, and actions are taken to mitigate the effects women experience. In the realm of innovation, women's creativity knows no bounds. From developing eco-friendly technologies to crafting ingenious solutions for everyday challenges, they prove that innovation is not confined by gender. This spirit of innovation extends to agriculture, where women are at the forefront of adopting to climate-smart practices, optimizing yields, and ensuring food security for their communities. As health champions, women use centuries of traditional knowledge to promote holistic well-being, adapting ancient wisdom to contemporary healthcare needs. Their caregiving roles extend beyond households, as they actively engage in community health education and advocacy, addressing issues ranging from maternal health to infectious diseases. As the caregivers in their families, women are more likely to adopt clean technology, especially clean energy, and can encourage the community to adopt such technologies, thus combating climate change effects by reducing the production of GHG. Finally, women leaders and activists have fought for years to champion environmental management to combat climate change, and their efforts have greatly helped save the environment. Therefore, this review has showcased women's important roles in climate change adaptation and mitigation processes.

## 5. RECOMMENDATIONS

1. Create adaptation plans for food security and agriculture that consider the many different roles that men and women play in natural resource management at the community, household, and societal levels, as well as at the national, regional, and global levels. An emphasis on women and gender equity in programming and adequate resources to put this vision into action are required for successful implementation.
2. Expand women's access to and control over economic assets like land as well as development resources such as credit, training and outreach, information, and labor-saving and culturally appropriate technology to increase their economic security and resilience to climate change.
3. Close significant gaps in research, knowledge, and data; a thorough investigation of climate change from a gender equity viewpoint is required. Make

certain that data is understood in the context of power relations based on gender. Future studies should focus on vulnerabilities, differentiated adaptation, responses, impacts, and opportunities afforded by climate and other concomitant drivers of change. However, in the context of frequently unequal gender relations, women's needs, priorities, impacts, limits, knowledge, local strategies, and meaningful participation should be prioritized.

4. Make it easier for women to participate in and contribute meaningfully to climate change decision-making and policymaking at all levels, from the neighborhood to the nation to the international community. Long-term adaptation goals should include things like increasing women's and girls' access to social safety nets, encouraging women's leadership roles in decision-making at all government levels, and ensuring that women's rights, agency, and knowledge are fully recognized and supported.
5. Assert the significance of addressing the vulnerability women face in areas prone to flooding, drought, and other natural disasters, through education, training, awareness-raising, and information programs.

## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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