

CGIAR FOCUS Climate Security Position Paper Series

The Gender-Climate-Security Nexus: Conceptual Framework, CGIAR Portfolio Review, and Recommendations towards an Agenda for One CGIAR

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CGIAR aims to address gaps in knowledge about climate change and food security for peace and security policies and operations through a unique multidisciplinary approach. Our main objective is to align evidence from the realms of climate, land, and food systems science with peacebuilding efforts already underway that address conflict through evidence-based environmental, political, and socio-economic solutions. The views expressed in this document cannot be taken to reflect the official position of the CGIAR or its donor agencies.

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List of Acronyms

CCAFS	Climate Change, Agriculture and Food Security Research Program
CGIAR	Consultative Group on International Agricultural Research
CSA	Climate Smart Agriculture
GARDIAN	The Global Agricultural Research Data Innovation Platform
GCS	Gender-Climate-Security
GTA	Gender Transformative Approach
IPCC	Intergovernmental Panel on Climate Change
MENA	Middle East and North Africa
NAP	National Adaptation Plan
NAPA	National Adaptation Program of Action
SDG	Sustainable Development Goal
SIDA	Swedish International Development Cooperation Agency
UN	United Nations
UNFCCC	United Nations Framework Convention on Climate Change
UNFPA	United Nations Population Fund

Glossary

Climate and Climate Change: The Intergovernmental Panel on Climate Change (IPCC) refers to climate as the “average weather” or more rigorously, as “the statistical description in terms of the mean and variability of relevant quantities over a period of time ranging from months to thousands of years” (2018). This position paper refers to the impacts of climate change, defined as “a change in the state of the climate that can be identified (e.g., by using statistical tests) by changes in the mean and/or the variability of its properties and that persists for an extended period, typically decades or longer” (ibid., p. 544).

Gender: refers to the socially constructed system of classification that ascribes qualities of masculinity and femininity to people, often based on their biological sex. Gender characteristics can change over time and are different between cultures (Vinyeta et al., 2015). It encompasses the roles, behaviours, and activities deemed acceptable for people of different genders and influences the relationships between the people who fall within these groups. These attributes and relationships are socially constructed (UNFPA, 2005; UN Women Training Centre, 2017). “Gender determines what is expected, allowed and valued” (UN Women Training Centre, 2017) in a particular context at a given time, recognizing that this is changeable (NAP Global Network & UNFCCC, 2019, p.7).

Gender-Climate-Security Nexus: refers to a conceptual framework that unites gender issues, climate, and human security. Within the gender-climate-security nexus, there are two reinforcing pathways to describe how these phenomena are interconnected. The first pathway details how existing gender inequalities (and other intersecting aspects of social inequalities) and relationships impact and/or constrain resilience to climate shocks. The second pathway details how climate impacts interact with gender inequalities to produce gendered climate-related security risks, including resource scarcity, loss of livelihoods, mobility/migration, and intrahousehold and communal conflict.

Gender equality: refers to equal rights, responsibilities and opportunities for women and men, girls, and boys (UN Women Training Centre, 2017), as well as for individuals with non-binary gender identity. Gender equality does not mean that people of all genders are the same. Rather, it is a situation where people’s rights, responsibilities and opportunities do not depend on whether they were born male or female (UN Women Training Centre, 2017) or whether they fit within a binary definition of gender (NAP Global Network & UNFCCC, 2019, p.7).

Gender responsive: refers to approaches that examine and actively address gender norms, roles, and inequalities (World Health Organization [WHO], 2009). Gender-responsive approaches go beyond sensitivity to gender differences—they actively seek to promote gender equality (CARE & International Center for Research on Women, 2007; WHO, 2009). This often involves specific actions to empower women in their households and communities as well as broader policy and planning processes (Burns & Lee, 2015).

Gender transformative: refers to approaches actively striving to examine, question, and change rigid social and gender norms, cultural values and to address power inequalities between persons of different genders and the root causes of gender inequality and discrimination as well as seeking to redefine systems and institutions that create and perpetuate inequities. This approach aims to transform adverse gender norms and power dynamics into positive ones, thus accelerating the achievement of gender equality. In the context of climate change adaptation, it refers to approaches that “actively strive to examine, question, and change rigid gender norms and imbalances of power to increase people’s resilience. Gender-transformative activities encourage critical awareness among men and women of gender roles and norms; promote the position of women; challenge the distribution of resources and allocation of duties between men and women; and/or address power relationships between women and others in the community, such as service providers or traditional leaders” (CARE, 2010, p.3).

Intersectionality: refers to how unique lived experiences resulting from multiple identities and interacting with marginalizing structures, norms, and narratives interact (Colfer et al., 2018). The concept of intersectionality attempts to capture the complexity of social difference and how the experiences of individuals differ based on their multiple identities. It recognizes that gender intersects with other socio-cultural characteristics such as race, ethnicity, disability, sexual orientation, and age (Swedish International Development Cooperation Agency [SIDA], 2015; UN Women Training Centre, 2017) and that these intersections yield a unique set of norms. An intersectional approach recognizes the differences among people of the same gender that must be understood for gender equality to be achieved (NAP Global Network & UNFCCC, 2019, p.7).

One CGIAR: refers to a dynamic reformulation of CGIAR’s partnerships, knowledge, assets, and global presence, aiming for greater integration in the face of the interdependent challenges facing today’s world. It comprises (i) a sharper mission statement and impacts focus to 2030, aligned with the Sustainable Development Goals (SDGs), in particular, SDG2 – Zero Hunger; (ii) unified governance; (iii) institutional integration, including a One CGIAR Executive Management Team, common policies and services, and a unified country and regional presence; (iv) a new research modality; as well as (v) more, and pooled, funding.

Human security: in the context of climate change, it refers to a condition that exists when the vital core of human lives is protected and when people have the freedom and capacity to live with dignity (Adger et al., 2014). This definition encompasses the security of survival, which entails mortality risks, and level of health; the security of livelihoods such as food, water, energy, shelter, income-generating opportunities, and environmental security; and dignity, which includes the protection of basic human rights, capacities, and participation in decision-making processes (Dankelman, 2010).

Executive Summary

Climate change and conflict affect millions of people worldwide, but not equally. Deeply rooted gender and social norms, relations, and inequalities shape, and are shaped, by the impacts of both climate and conflict and influence how women and men of different backgrounds (e.g., age, race/ethnic community, class/caste) adapt to and respond to these shocks. While there has been growing attention to the gender dimensions of both climate change and conflict in recent years, gender is still at the margin of climate security research and policymaking. This is in the context of growing recognition by international institutions and development practitioners that a gender lens is crucial to understand the complex interconnections between climate change and conflict.

To move towards an integrated perspective to address these processes, this position paper **introduces a new conceptual framework – the Gender-Climate-Security nexus – that meaningfully integrates gender analysis into climate security issues.** To operationalize the framework in terms of how gender, climate and security issues are connected, we identified two pathways of interactions. The first pathway details how existing gender inequalities (and other intersecting aspects of social inequalities) and relationships impact and/or constrain resilience to climate shocks. The second pathway details how climate impacts interact with gender norms, relations, and inequalities to create gender-specific human security risks related to resource scarcity, loss of livelihoods, mobility/migration, and intrahousehold and communal conflict.

Resource scarcity. Gender norms, relations and inequalities in land ownership, resource rights, use of resources and participation in natural resource management deepen the impact climate shocks have on women and marginalized groups. Deteriorating ecological conditions and resulting competition over dwindling resources often lead women to have limited access to fertile land, clean water, and livestock, generating both economic insecurity and food insecurity. The gendered division of labour, particularly around the collection of water and fuelwood, heightens gendered-climate risks, including increased risk of sexual and gender-based violence. Despite being the guardians of natural resources and repositories of traditional ecological knowledge in many cultures, women often lack the voice to provide solutions to resource scarcity – this lack of participation can compound gender inequalities in the allocation of scarce resources.

Loss of livelihoods. Due to climate impacts on agriculture and food production, worsening conditions are likely to lead to different livelihood and security outcomes for women and men. Gendered differences in income and education often lead women to have fewer capacities to diversify their livelihoods in times of climate-induced economic hardship, generating both food insecurity and risks for sexual and gender-based violence. Given that women often have lower incomes and are more likely to be economically dependent than men, they have less of a “buffer” of savings during difficult times, and along with other assets, makes it harder for them to invest in alternative livelihoods. Managing climate-related risks to agricultural production requires new information, skills, and technologies, such as seasonal forecasts, risk analysis, and water-saving agricultural practices. Men are more likely to

have access to these resources than women and the power to use them, and are, therefore, better equipped to adapt.

Mobility and migration. Gender is a key factor in shaping mobility and migration decisions and abilities. Gendered differences in the resources required to move and gender norms that mediate women's mobility shape adaptive capacity and opportunities to migrate, generating gender-differentiated environmental and economic insecurities. Used as a coping strategy from climate shocks such as floods/natural disasters and long-term impacts on livelihoods from drought/variable rainfall, out-migration from agricultural communities has tended to focus on men's out-movements, which frequently leads to the 'feminization of agriculture' for the women and girls left behind to manage the farm in addition to their usual tasks. Women's lack of mobility has direct implications for their security – women who cannot rely on mobility/migration as an adaptive strategy are directly exposed to climate risks, which further compromises their ability to cope with and recover from environmental shocks.

Intrahousehold and communal conflict. Resource scarcity, the disruption of traditional gender roles/norms due to loss of livelihoods, and changing migratory patterns heighten the risk of intrahousehold and communal conflict. Masculine norms can create and perpetuate intrahousehold and communal conflicts that target both women and men through rigid interpretations of masculinity/socially appropriate behaviour for men. This generates risks related to sexual and gender-based violence, post-traumatic stress disorders, and intrahousehold and communal violence. In addition to open conflicts, less visible gendered violence in the form of femicide and attacks on women environmental defenders is a key issue at the heart of the gender-climate-security nexus.

A review of the CGIAR gender portfolio was used to further explore the gender dimensions of climate-related security risks. The findings reveal that CGIAR has extensively contributed to improving evidence and understanding about specific vulnerabilities, risks and opportunities for disadvantaged people affected by climate-induced resource scarcity and loss of livelihoods. However, less attention has been paid to explore gendered dynamics and challenges associated with climate-related mobility and migration. Communal violence and resource-related conflicts have yet to be analysed from a gender lens. The results also show that **targeting women and marginalised groups with climate-smart solutions increases the likelihood of achieving not only gender equality but also strengthening resilience and social cohesion.** Thus, socially inclusive climate responses designed and implemented by CGIAR can support dual processes of promoting gender equality and increasing resilience to climate-related security risks.

Based on the findings from the portfolio review and broader literature, this paper formulates a number of **recommendations for the One CGIAR and its partners** on how to move this agenda forward.

- Apply an intersectional lens to the gender-climate-security nexus
- Address knowledge gaps within the nexus, particularly intrahousehold and communal conflict
- Expand the geographical focus to MENA and Latin America

- Moving from purely diagnostic towards more transformative gender research
- Explore the opportunities for women's empowerment that could be gained in the context of climate-related security risks
- Focus on women's and marginalised people's agency and put their voices, knowledge, and experiences at the heart of the solutions
- Design socially inclusive responses to climate-related security risks through collective action and participatory approaches
- Mainstream gender-transformative goals into climate change adaptation and mitigation policies
- Ensure that gender equality policy frameworks at all levels account for climate-related security risks
- Build women's and marginalized groups' resilience to climate-related security risks through gender-responsive climate finance mechanisms

The Gender-Climate-Security nexus provides an analytic lens to understand the gender-differentiated drivers and human security risks of climate change and conflict. Climate and conflict-related risks are not gender-neutral. Ignoring the role of gender in shaping vulnerability and resilience to these shocks threatens to disempower and exclude socially marginalized people in interventions and policies. While 'women' are never a homogenous category, and research is emerging that highlights women's resilience to climate and security impacts, existing gender gaps/inequalities indicate that women not in positions of power in their communities may experience heightened or differential vulnerability to climate-related security risks than men.

The Gender-Climate-Security nexus facilitates gender-transformative research and policy approaches. By addressing the root causes of gender and intersecting social norms, relations, and inequalities, the gender-climate-security nexus identifies the processes through which these dynamics shape vulnerability and resilience to climate shocks and how climate impacts, interacting with these existing gender and social dynamics, create gender-specific human security risks. Using such a framing provides space for generating policy strategies towards addressing underlying inequalities/power dynamics and creating policy aimed at transforming harmful norms that inhibit equality.

Context

In recent years, the nexus between climate change and security has gained considerable international attention. The overarching argument that climate is a threat multiplier that can exacerbate a wide range of conflict drivers has been central to international and multilateral debates around the security implications of climate change (Busby, 2021). Policymakers and practitioners have increasingly indicated climate shocks affecting agricultural production and livelihoods (Vesco et al., 2021), food and resource security (Raleigh, Choi & Kniveton, 2015) as factors contributing to conflict and insecurity. Climate risks are expected to be more severe in contexts where they interact with other sources of state fragility, and people are less capable of responding, adapting to, and recovering from climate impacts. In these settings, worsening livelihoods conditions can fuel tensions over dwindling resources and lead to clashes between farmers and pastoralists, as well as widespread violence and recruitment into non-state armed groups. Recent studies demonstrate that the interaction between climate shocks and plausible drivers of vulnerability, such as ethno-political exclusion (Ide et al., 2020; von Uexkull et al., 2016), high agricultural dependence (Bretthauer, 2015; Fjelde, 2015), and poverty (Blattman & Annan, 2016; von Uexkull, 2014), puts some groups at greater risk.

Largely missing from these studies is discussion of the gender dimensions and implications embedded in climate and security issues (Ide et al., 2021; Csevár, 2021). This is surprising given that gender norms, relationships, and power inequalities have been shown to shape vulnerability, adaptive capacity, and resilience to climate change (Huyer & Partey, 2020), and that robust correlations exist between gender inequalities and conflict onset (Olsson & Forsberg, 2016). A recent literature review of existent academic research highlighted this dearth, finding that only 2 out of 67 empirical studies on climate security included gender inequality as a scoping condition (CGIAR, 2020). This can be partially attributable to the fact that the traditional conceptual focus on conflict neglects more holistic dimensions of insecurity that people and individuals experience as a result of climate (Adger et al., 2021) and that are shaped by gender and other social markers (Tanyag & True, 2019).⁴

Given that a comprehensive understanding of gender is central to determining what shapes individual and group vulnerabilities and capacities to respond to conflict and climate change, there is a need to better understand the connections between gender, climate change, and security, specifically how existing gender norms, relations, and inequalities influence people's adaptation and resilience to climate change, as well as how these gender dynamics intersect with climate impacts to produce differential security risks for women, men, and non-binary people. Thus, this position paper investigates these connections, tying together these formerly disparate fields towards a unified conceptual framework.

About this position paper

This position paper provides a conceptual framework for the gender-climate-security-nexus, a CGIAR portfolio review of work related to the nexus, and recommendations towards an agenda for One CGIAR in addressing the nexus. We anticipate the paper will help inform the One CGIAR and its stakeholders towards an understanding of the connections between gender, climate, and security through case study examples of the gender dimensions of climate-related security risks, a review of the CGIAR work to date on the gender-climate-security nexus and how this work can be used to promote gender transformative goals in climate security research, policy, and programming, as well as recommendations for One CGIAR on what actions should be taken to inform future research and policy in addressing gendered climate impacts and associated threats to human security.

The intended audience for this position paper is the One CGIAR and its partners, including donor organizations, researchers, governmental officials, policymakers, civil society groups, and other stakeholders and the public who are interested in learning more about how climate-related security risks shape and are shaped by gender and intersecting social norms, relations, and inequalities.

1. Introduction

Climate impacts and their related human security risks, such as displacement, food insecurity and health risks, are not gender neutral. Droughts, floods, and extreme weather events interact with existing gender and social norms, relations and inequalities in a way that disproportionately exposes marginalized groups to new and multi-faceted forms of insecurity. For example, in rural regions, natural resource scarcity due to changing climatic conditions may force women and girls to walk longer distances to collect water and fuel, making them particularly susceptible to various forms of sexual and gender-based violence (Castañeda Camey et al., 2020). Similarly, transgender, intersex and non-binary people often face increased protection risks during and after natural disasters due to unequal access to emergency reliefs and shelters (Gaillard et al., 2017).

However, current research streams have yet to produce a comprehensive theoretical understanding of the mechanisms through which climate impacts amplify and reinforce gender inequalities to affect human security. Similarly, little is known on the more holistic and different dimensions of insecurity that women and men of different backgrounds (e.g., age, race/ethnic community, class/caste) experience due to climate shocks. To fill these gaps, this position paper explores the linkages between gender, climate, and human security.

In doing so, we develop a unified conceptual framework – the “Gender-Climate-Security Nexus” – to investigate the overarching pathways through which gender-specific vulnerabilities and insecurities intersect with climate impacts to produce differential security risks for women, men, and non-binary people. We identify four gendered human security risks of climate impacts: resource scarcity, loss of livelihoods, mobility/migration, and intra-household/communal conflict. While these gendered human security risks of climate impacts materialize and interact in different ways based on local context, they facilitate investigation of the key drivers of climate impacts and gender inequalities using a holistic approach. We anticipate this conceptual framework can be used towards projects and interventions aimed at promoting gender transformative goals and inform future agenda-setting in the Gender-Climate-Security nexus.

This position paper focuses on three key objectives, underscored by four research questions (RQs):

Objective 1: To create a conceptual framework to explore the connections between gender, climate, and security, that would enable analysis of both how climate interacts with gender and intersecting inequalities to affect human security and identify the gender-specific human security challenges of climate impacts.

RQ1: How does climate interact with gender and intersecting inequalities to affect human security?

RQ2: What are the gender-specific human security challenges of climate impacts?

Objective 2: To engage in a Portfolio Review of the CGIAR to review the extent to which, and how, the CGIAR has engaged with the gender-climate-security nexus, and how this work can be used to promote gender transformative goals in climate security research, policy, and programming.

RQ3: To what extent and how has CGIAR engaged with the gender and climate security nexus, and how does this work can be used to promote gender transformative goals in climate security research, policy and programming?

Objective 3: To identify the gaps in how CGIAR has tackled gender-specific vulnerabilities and insecurities, and what actions should be taken to inform future research and policy.

RQ4: Where do gaps lie in how CGIAR has tackled gendered climate-related security risks, and what actions should be taken to inform future research and policy?

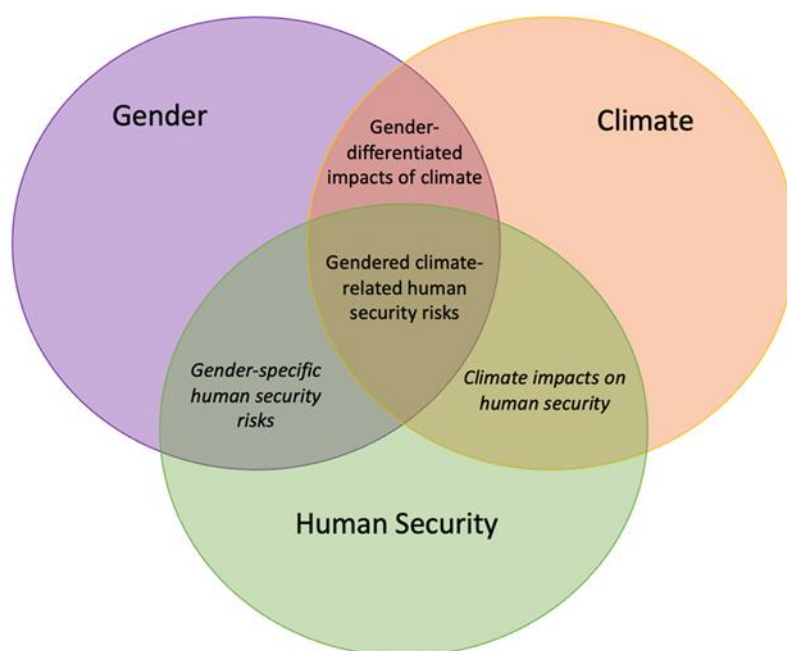
The remainder of the paper is organized as follows. The next section presents the conceptual framework, which addresses how climate interacts with gender and intersecting inequalities to affect human security and identifies several gender-specific human security challenges of climate impacts. The methodology and results from the CGIAR Portfolio review follow. The final section provides research, programming, policy, and finance recommendations emergent from the conceptual framework and CGIAR Portfolio Review.

2. The Gender-Climate-Security Nexus: A New Conceptual Framework

2.1. Introducing the framework

While recent strides have been made towards integrating theory around the interconnections between gender, climate, and conflict (see Ide et al., 2021, Smith et al., 2021), gaps remain in its conceptualization and operationalization using a human-security framing. A human-security framing goes beyond a simplistic notion of ‘conflict’ to encompass the security of survival, including issues related to health, livelihoods, natural resources, and human rights (Dankelman, 2010). This holistic approach, tied together with a gender perspective, is necessary to better understand the security implications of climate change and expand the conventional notions of what climate-related conflict looks like (Ide et al., 2021), to capture both the gender-differentiated impacts of climate-related conflicts, and to identify the gendered climate-related human security risks that materialize based on existing gendered and social inequalities, relations, and norms. Figure 1 presents a visual representation of the Gender-Climate-Security Nexus.

Figure 1. Visual representation of the Gender-Climate-Security Nexus



Within the gender-climate-security nexus, there are two reinforcing pathways to describe how these phenomena are interconnected. The first pathway (Figure 2) details how existing gender inequalities (and other intersecting aspects of social inequalities) and relationships impact and/or constrain resilience to climate shocks. By capturing the additional intersecting aspects of social inequalities, the framework facilitates analysis of how people’s multiple identities interact with marginalizing

structures, norms, and narratives to produce potentially different experiences and outcomes. This pathway addresses how gender norms, relationships, and power inequalities shape vulnerability, adaptive capacity, and resilience to climate change (Huyer & Partey, 2020) and climate-related conflicts (Ide et al., 2021). For example, in climate emergencies such as floods, existing gender norms around women’s mobility, unequal intra-household relationships, and disparities in access to climate information often constrain women’s ability to adapt, making them more vulnerable (CARE, 2010). At the same time, intersex, transgender, and non-binary people and men’s insecurities and vulnerabilities have been largely ignored, though they are equally important to understand. For example, men are also destabilized by loss of livelihoods from climate emergencies due to underlying gender norms that make them unable to address their emotional vulnerabilities/or rebuild their ‘breadwinner livelihood roles’ in post-disaster situations. During these times, men may lose their status in society, become depressed and/or abusive (Dominelli, 2020).

Figure 2. Visual representation of how gender and intersecting social dynamics affect vulnerability and resilience to climate shocks (Pathway 1)



The second pathway (Figure 3) details how climate impacts interact with gender and intersecting social norms, relations, and inequalities to produce gendered human security risks. Climate impacts interact with existing gender and social norms, relations and inequalities in a way that disproportionately exposes marginalized groups to new and multi-faceted forms of insecurity. This second pathway arose from the need to broaden the focus of human security to include specific gender considerations.

Figure 3. Visual representation of how climate impacts interact with gender and intersecting social dynamics to produce gendered human security risks (Pathway 2)



2.2. Exploring Pathway 1: How do gender and intersecting social dynamics affect vulnerability and resilience to climate shocks?

“Disasters [and climate change] encompass not only the physical reality of an eroding environment but also reveal and exacerbate the underbelly of gender inequalities” (Alston, 2021, p.343).

Climate impacts are not gender neutral. Gender, along with class, race, age, and other intersecting social identities contribute to shaping the roles, power, and resources available to women and men in

any culture (CARE, 2010), including the resources necessary to adapt to climate change. Climate is a risk multiplier, and further impacts and reinforces existing inequalities, leading to uneven impacts amongst different groups of people. For example, gender inequalities in decision-making, access and use of productive resources, workloads, and collective action affect the level of adaptive capacity women and men have towards dealing with climate shocks.

The first pathway has already been explored in the existing literature on gender and climate change. Three key themes/discourses have emerged from this literature: women's vulnerability, structural drivers of inequality, and gendered coping strategies and resilience. Each of these themes is synthesized below.

2.2.1. From women's vulnerability to gender-differentiated impacts

The dominant theme for many years within the gender and climate change literature was that vulnerabilities related to climate and its effects on community are gendered (Morchain et al., 2015; Moosa & Tuana, 2014; Goh, 2012). The main arguments are that women and men are affected differently by adverse climatic conditions and that women and girls are generally more vulnerable than men, especially in developing countries where they directly depend on natural resources for livelihoods and subsistence income (Cooper 2018; Beuchelt and Badstue 2013; Dankelman 2010). However, 'women' are not a homogeneous group nor are inherently vulnerable to climate shocks (Arora-Jonsson, 2011). Rather, differences in vulnerability and coping strategies are influenced by social and economic structures that ascribe distinct roles to women and men and dictate how access to income, resources, and decision-making is distributed (Rao et al., 2019). However, to date, far less attention has been paid to men's vulnerabilities, although there are a few notable exceptions, including the work of Alston and Whittenbury (2013), who have drawn attention to the collapse of male farming identities and increase in male suicides following a ten-year-long drought in Australia's agricultural basin.

2.2.2. Intersectionality and structural drivers of inequality

Several studies have explored the structural drivers of gender inequalities in climate change vulnerability and resilience, focusing on how gender intersects with other social factors to determine adaptive capacity (Kristjanson et al., 2017; Mishra and Pede, 2017). Intersectional analyses have revealed that low-income women and female-headed households are hindered in responding to and recovering from climate impacts based on financial and resource constraints compared to higher-income and married women (Davidson, 2016; Tall et al., 2014; Twyman et al., 2014). For example, educated women from powerful, wealthy, and/or high caste households are less likely to face the risks associated with collecting water or firewood and can draw on alternative resources, to enhance their resilience to the impacts of climate-change (Ide et al., 2021) compared to relatively poorer/less powerful women. In many developing countries, customary laws and institutions perpetuate unequal power relations between women and men in ownership and access to assets such as land and water rights, livestock, and agricultural inputs (Chigbu, 2019; Carr & Thomson-Hall, 2014). Accordingly, rural

women often control less and lower quality land than men, and land tenure insecurity excludes them from agricultural credits and extensions that are crucial for implementing adaptive practices (Jost et al., 2016). Gender disparities in wage and employment are other important facets of inequality and vulnerability (Rao et al., 2017). Moreover, the gender division of labour often places the responsibility for household care work on women by tending subsistence crops and small livestock and collecting firewood and water to ensure household well-being (FAO, 2003). These gendered roles amplify women's vulnerability, making them highly reliant on natural resources and taking their time away from income-generating productive activities (Eastin, 2018; Huyer, 2016).

2.2.3. Gendered coping strategies and women's contributions to community resilience

“An overemphasis on women's vulnerability can obscure the leadership qualities, unique skill sets, and important perspectives women bring to issues of climate change, security, and natural resource management” (Smith et al., 2021, p.14).

Despite their vulnerabilities to climate change, rural women can be important agents of change and innovators (Huyer, 2016b; Jost et al., 2016; MacGregor 2010). Unfortunately, within the international climate policy discourse, there has been less emphasis on supporting women to actively address and participate in adaptation and mitigation actions and far greater attention on women's vulnerability (i.e., the attitude of women as victims of climate change in need of 'saving') (Huyer, 2016b). This is a shame considering women have proactively adopted many different types of specific climate-smart practices, technologies, and livelihoods changes as coping strategies. These strategies, including those that have used collective action, have contributed towards household and community level resilience, in the form of enhanced food security, increased capacity, and leadership.

2.3. Exploring Pathway 2: What are the gender dimensions of climate-related security risks?

Through a brief scoping study of the relevant literature, we identified four gendered human security risks, including resource scarcity, loss of livelihoods, mobility/migration, and intrahousehold and communal conflict, each of which is discussed and summarized below. While we acknowledge that there is significant overlap between these risk areas (e.g., resource scarcity accelerates loss of livelihoods which can result in migration and/or lead to intrahousehold/communal conflict), they are distinct enough to warrant individualized discussion.

2.3.1. Resource scarcity

Climate variability and extreme weather events worsen the resource base and alter resource access, with dire effects on people that are directly dependent on rain-fed agriculture and pastoralism for their livelihoods. While both women and men are impacted by climate change, socially constructed gender roles and power relations generate differential vulnerabilities and resilience to withstanding

climate impacts (Muchacha & Mushunje, 2019; Chandra et al., 2017; Arora-Jonsson, 2014), with women across all types of households generally facing unique risks compared to men based on their position in their households and communities (Nyantakyi-Frimpong & Bezner-Kerr, 2015; Perez et al., 2015). These gendered security risks related to resource scarcity are evident across several gender issues:

Gender norms, relations and inequalities in land ownership, resource rights, use of resources and participation in natural resource management deepen the impact climate shocks have on women and marginalized groups (Ribot, 2013; Buechler, 2009). Deteriorating ecological conditions and resulting competition over dwindling resources lead women to have limited access to fertile land, clean water, and livestock (Kristjanson et al., 2010), generating both economic insecurity and food insecurity (Karmakar, 2021).

The gendered division of labour, particularly around the collection of water and fuelwood, heightens gendered-climate risks, including increased risk of sexual and gender-based violence. Worldwide, in almost two-thirds of households, women are responsible for fetching water for drinking, cooking, and sanitation (FAO, 2011). This gender division of labour makes women highly sensitive to changing climatic conditions, as during dry seasons, they need to travel longer distances to gather water, as well as food and fuelwood (Resurreccion, 2013). Thus, any instances of resource scarcity increase women's workload and may place new or intensify domestic and agricultural burdens on girls, resulting in them missing or leaving school (Yadav & Lal, 2017; Swarup et al., 2011). Several examples reveal that women and girls disproportionately suffer from violence as a spill-over effect of water insecurity, ranging from domestic violence over the amount of water brought home to harassment, sexual assault, and rape on their way to collect it (Sawas, Anwar & Anjum, 2020; Le Masson, Benjouidi & Reyes, 2019).

Due to their reliance on the environment, indigenous women and women in resource-dependent communities are often the first to feel climate impacts via the reduction of resources through environmental degradation and climate variability. Despite being the guardians of natural resources and repositories of traditional ecological knowledge in many cultures, women often lack the voice to provide solutions to resource scarcity. This lack of participation can compound gender inequalities in the allocation of scarce resources (Lau et al., 2021). Given that women's knowledge of natural resources contributes to community and cultural resilience (Tavener, 2018), new strategies for integrating their knowledge and strategies into more formal natural resource management policies and practices are essential. A growing body of research dedicated to this objective, with strategies aimed at engaging men/masculinities in approaches to more gender-responsive natural resource management (Bonatti et al., 2019; Men Engage Alliance, 2019; Dunn, 2016).

2.3.2. Loss of livelihoods

Due to climate impacts on agriculture and food production, worsening conditions are likely to lead to different livelihood and security outcomes for women and men (Kristjanson et al., 2014; Peterman et al., 2014). Much of the literature on loss of livelihoods in agrarian contexts has focused on women's increased vulnerability to climate shocks based on existing gender and social norms, relations, and inequalities (Glazebrook et al., 2020; Call & Sellers 2019; Chanamoto & Hall, 2015). For example, in

many agrarian contexts, men have greater access to agricultural credits, markets and technical assistance, which increases their capacity to cope with changing climatic conditions (Jost et al., 2016). Conversely, women farmers often face barriers in accessing productive resources, climate and agricultural information, training opportunities, and technologies crucial to sustaining livelihoods under climate stress (Huyer et al., 2015). Moreover, women are not always considered to be farmers, and this, in turn, limits their participation in adaptation decision-making, implying that their specific needs in farming are rarely addressed (Davidson, 2016).

Despite their significant contribution to the agricultural labour force, women generally hold lower-wage, part-time and informal positions, meaning that they are less able to invest in new livelihood strategies or purchase agricultural inputs to reduce production volatility (Rao, 2012). Moreover, customary law often does not guarantee the same access to land and other assets such as wells and livestock to women and men, and insecure land tenure further constrains women's livelihood coping mechanisms (Tuana, 2013). These dynamics lead to major economic and food insecurity, subjecting women to severe food shortages, gender-based violence and, in some instances, to join an armed group or entering prostitution to secure their access to food and staple commodities (Chandra et al., 2017). Overall, much of the existing literature has focused on how the loss of traditional means of production amplifies women's economic insecurity and leaves them with fewer capacities to cope with and recover from climate extremes (McKune et al., 2015; Serna, 2011).

Men's loss of livelihoods due to climate change and climate-related conflict has not been explored to the same extent, although this trend appears to be changing, as evidenced by recent studies (Dominelli, 2020). Men and boys often are privileged in terms of access to resources and skills, however, when these are unavailable, young men may be forced to migrate into urban areas or turn to illegal sources of economic gains to sustain themselves and their families. For example, in Chad, men farmers and pastoralists who cannot easily find alternative livelihoods during droughts are exposed to recruitment by armed groups (UNHCR, 2020). While less is known as to the situation in fragile contexts/less-developed countries, the social impacts associated with long-term climate changes in the form of drought are well-documented in Australia, with a significant body of work dedicated to the impact of loss of farming livelihoods on men's sense of self and expressions of masculinity (Alston & Whittenbury 2013). For example, during the ten-year Millennium Drought in the Murray-Darling Basin, men lost their 'masculine' identities as farmers as many were bankrupted due to livestock death and no longer able to serve as 'breadwinners' for their families. As a result, they became socially isolated due to the constant need to hand feed and water livestock, and they experienced significant rises in levels of stress, anxiety and other health impacts, including a four-fold increase in male suicides (Alston & Whittenbury, 2014).

It is, therefore, clear that for both women and men, climate is transforming rural communities' economic activities that have historically relied on farming through off-farm income for economic stability and mitigation. Recent studies have begun to engage with what these transformations mean for gendered livelihoods in terms of the disruption of traditional gender norms and the possibility of women's empowerment through livelihood change (Casey et al., 2021; Cely-Santos et al., 2021). For example, entrepreneurship has become a central feature of the diversification of rural labour.

However, there is still a need to document how rural women and men operationalize entrepreneurship in their communities, and how these practices challenge traditional norms and potentially generate new opportunities for equality. Documenting these types of livelihood transformations and transitions as opposed to relying on generic narratives that paint all women as ‘victims’ is necessary to better capture the stabilizing role that women often play in their household and communities and the role they play in strengthening community resilience through collective action (Huyer et al., 2021).

2.3.3. Mobility and Migration

Along with other socioeconomic and cultural differences, gendered differences in resources required to move and gender norms that mediate women’s mobility shape adaptive capacity and opportunities to migrate, generating gender-differentiated environmental and economic insecurities (Bettini & Gioli, 2016; Chikandar, 2012). Used as a coping strategy from climate shocks such as floods/natural disasters and long-term impacts on livelihoods from drought/variable rainfall, out-migration from agricultural communities has tended to focus on men’s out-movements (Sams, 2019; Tiwari & Joshi, 2016), which frequently leads to the ‘feminization of agriculture’ for the women and girls left behind to manage the farm in addition to their usual tasks. Interestingly, recent figures suggest that households in rural areas have more or less equal rates of international migration between young women and men (ILO, 2021), which suggests a critical gap in the literature on women’s migration practices. While studying the linkages between climate, gender inequality and migration in East Africa, Abebe (2014) found that rural women's immobility was due to a lack of assets, property ownership, employable skills and social networks. Furthermore, even when adequate resources are available, women are likely to remain in the environmentally affected areas to live up to their prescribed reproductive and caregiving obligations (Pandey, 2019; Velan & Mohanty, 2015). This is because traditional gendered roles often circumscribe women's work to the household and the farm while placing the responsibility of providing for their families on men (Lama, Hamza & Wester, 2020).

Unequal gender relations may restrict women's mobility as they dictate how access to resources, income, and decision-making power is distributed between each social group (Sultana, 2013). Women’s lack of mobility has direct implications for their security – women who cannot rely on mobility/migration as an adaptive strategy are directly exposed to climate risks, which further compromises their ability to cope with and recover from environmental shocks (Gioli et al., 2014; Hunton & Davis, 2009). For example, the literature on gender and disasters offers many examples of women being disproportionately affected by floods and other extreme weather events because of cultural norms preventing them from leaving the house or learning how to swim (Neumayer & Plumper, 2007). Male outmigration can have dramatic consequences for rural households, especially for those who do not benefit from remittances sent from male migrants (Le Masson et al., 2019). Changes in the family composition increase women's workload; they have to fulfil their traditional domestic responsibilities and engage in income-generating activities to maintain the household in the absence of men workforce (Gioli et al., 2014; Bhatta et al., 2015). Economic uncertainty, poverty and resulting deteriorating livelihood conditions may cause women to experience severe food shortages and expose them to physical and sexual abuse as they scramble for depleting commodities or enter early marriage (Chandra, 2017). Moreover, when women take on new roles in the absence of men,

when they return to their households and communities, this can generate intrahousehold conflict and disruptions with the expectation that women will return to their traditional roles. These dynamics push back on women's gains in status and economic empowerment.

Box 1. Are climate-related security risks gendered? A case study of internal migrants from the Ganges delta of Bangladesh and India

By Tanaya Dutta Gupta

In the Ganges delta, the loss of agricultural production due to cyclones, storm surges, and saltwater intrusion has forced landless marginal labourers to migrate to urban areas within Bangladesh and India. Each year, hundreds of thousands of male and female migrants are reported to arrive in Dhaka—the sprawling capital of Bangladesh—where they typically find informal work in brick kilns and garment factories. Men often become rickshaw pullers and women domestic workers in urban residences. Labour exploitation and hazardous working conditions or indebtedness to predatory contractors or agents are experiences commonly faced by many migrants. For those who mainly worked in fields and relied on natural resources, the abrupt change in the type of work available in urban areas likely put their health and well-being at risk.

Female participants in Korail, one of the largest slums in Dhaka, report the disproportionate burden they carry to provide for their families, using the meagre wages they could earn as garment factory labourers or domestic workers while also taking care of their children and household chores. As Arifa, a female participant who works in a garment factory after relocating to Dhaka due to a devastating flood, says: *“I would walk a long distance to work, did not even have few pennies for the bus ticket. After coming here [in Korail], I could not pay the rent... How else would I feed the children? My husband was ill.”*

Human security risks related to food, nutrition, health, and income for women in Korail slum are compounded by overcrowded living conditions and daily struggles to access basic facilities like electricity, gas, water, and sanitation. Additionally, sexual and gender-based violence, including domestic abuse, child marriage, and harassment in public places, threaten women and girl migrants, as explained by Nusrat, a community leader and chairperson of a community-based organization in Korail.

That climate-related insecurity risks are gendered is further revealed by the COVID-19 lockdown in India. Male migrant workers strand in various urban areas without adequate food, shelter, and income support, returned to their villages in the Indian part of the delta region. The lockdown disproportionately affects these migrants, as they face serious financial precarity and food insecurity. Kailash, a male participant, returning from another state, remembers the conundrum many found themselves in: *“We did not have enough food or anything else; we had to communicate with our homes for money to be able to eat.”*

Upon their return, migrants were further confronted by the devastating effects of cyclone *Amphan* that made landfall in the region during the pandemic. The compounding of multiple crises exacerbated livelihood insecurity for the return migrants, who also felt socially isolated from the rural community due to COVID-related fears surrounding their return. As Bikash, another male participant reflected: *“those who had come from outside, they were not treated like before.”* In contrast to their status as remittance senders, these men were now being regarded as potential carriers of the virus. Instances like this can stoke perceptions of discrimination and social exclusion, with negative implications for male self-esteem and worth in a patriarchal society.

Gendered experiences of intertwined crises and insecurities call for adopting an intersectional lens to advance understanding of the climate security nexus in regions like the Ganges delta.



2.3.4. Intra-household and Communal Conflict

Resource scarcity, the disruption of traditional gender roles/norms due to loss of livelihoods, and differential patterns of climate-induced migration heighten the risk of intrahousehold and communal conflict. Masculine norms can create and perpetuate intrahousehold and communal conflicts that target both women and men through rigid interpretations of masculinity/socially appropriate behavior for men. This generates risks related to sexual and gender-based violence, post-traumatic stress disorders, and intrahousehold and communal violence.

The loss of livelihoods due to climate and other environmental changes may be the starting point of communal conflicts over natural resources (Fjelde & von Uexkull, 2012; Raleigh, 2010). Gender norms can act as a conduit to conflict in situations of environmental degradation due to climate change and threatened livelihoods (Ide et al., 2021). Although the literature exploring the gender dimensions of climate-related conflicts is somewhat limited, valuable insights can be drawn from the considerable body of work on gender and conflict (Krause, 2019; Cohen & Nordås, 2014). Conflicts have gender-differentiated impacts that depend on the specific position assigned to each group in the respective social structures (Fröhlich & Gioli, 2015). Existing research refers to women and men's 'traditionally' different roles in conflict: men and boys are more likely to actively participate in the fighting while women and girls are expected to maintain the household in men's absence (Bandarage, 2010; Wood, 2008). The fact that women during combat are responsible for their families makes them particularly susceptible to violence. For example, Omolo (2010) argued that conflicts over dwindling water supplies between pastoralist communities in north-western Kenya were major sources of insecurity for women, as they cannot flee during raids because of their caregiving roles. Moreover, conflict sites often include areas inhabited by women, as in the case of several farmer-herder conflicts in Nigeria, thereby exposing them to direct attacks and sexual abuse (Ademola-Adelehin et al., 2018).

Another branch of research on gender, conflict and peace focuses on patterns of sexual violence in conflict, although there is still poor systematic understanding of how it affects women and men (Gizelis, 2018). The work of Cohen and Nordås (2014) offers some valuable insights. Firstly, sexual violence patterns vary significantly across and within conflicts, meaning that not all armed organizations engage in rape and other forms of sexual violence (Cohen, 2013; Wood, 2009). Secondly, conflict-related sexual violence targets both men and women, although the latter remains the largest percentage of victims (ibid). Gender and sexual-based violence against women and girls occurring in villages where men are away combating is a striking example of the gendered-impacts of climate-related conflicts (Brody, Justina and Esplen, 2008). For instance, evidence from Northern Nigeria reveals that rape of women and adolescent girls is often considered a tactic of conflict perpetrated by both farmer and pastoralist men (Nagarajan, 2020). Violence against women and sexual exploitation, in some instances, are found to intensify conflict dynamics as masculine norms impel to retaliate when their families' wealth is endangered (Nagarajan, 2020; Ademola-Adelehin et al., 2018). Moreover, women often bear the brunt of the consequences of conflict (Krause, 2020). Raids and killings lead several women to lose their husbands and sons, and this experience can cause trauma and post-

traumatic stress disorders (PTSD), which manifest in poor mental and physical health and difficulties in managing the household (Krause, 2019; Ettang & Okem, 2016). The loss of male family members places a heavy economic burden on women left to generate income for their families. Female-headed households are likely to face severe food and livelihood insecurity as they have poor customary rights to land, wells, and livestock (Omolo, 2010). In addition to open/civil conflicts, the hidden conflict of femicide among attacks and assassinations of women environmental defenders is a key issue at the heart of the gender-climate-security nexus. For example, in the Amazon, attacks and assassinations on women environmental defenders have become commonplace (Orwen, 2021).

Some studies indicate that peacekeeping and peacebuilding are much more effective in societies where women have relatively high status and participate in post-conflict reconstruction (Gizelis 2009; 2011). Women's political inclusion positively impacts both the quality and the durability of peace. For instance, Krause and colleagues (2018) provide evidence that peace agreements with women signatories show a significantly higher number of peace agreement provisions aimed at political reform and higher implementation rates of these provisions than those not signed by women. Mechkova & Carlitz (2021) report that increased female representation in the legislature is associated with more gender-equitable political choices. Moreover, higher proportions of women legislators make durable peace after ceasefire or negotiated settlement more likely (Shair-Rosenfield and Wood, 2017).

3. Addressing the Gender-Climate-Security Nexus: CGIAR Portfolio Review

Building on CGIAR's tradition of gender research, we reviewed CGIAR past and ongoing portfolio to investigate to what extent and how it has engaged with the gender-climate-security nexus and further expand understanding of the gender-differentiated vulnerability, risks and opportunities associated with the impacts of climate.

3.1. Methodology

This portfolio review provides an overview of CGIAR gender-oriented research and programming as it relates to climate security. The purpose is to analyse CGIAR contributions to address the gender dimensions of climate-related security risks and explore how this work inform gender-responsive approaches to climate security research and policymaking. Moreover, this review sets out to understand gaps in CGIAR engagement and draws a set of targeted recommendations for future investments and research priorities based on these gaps.

3.1.1. Identification and selection of publications

First, we developed a comprehensive list of keyword combinations to help identify relevant publications. Keyword combinations were then entered into two CGIAR digital databases, the GARDIAN³ and the CCAFS publication repository⁴, which returned 2581 information products. The first screening of publications based on their titles and abstracts expelled 2163 publications, leaving 418 items. We then examined the remaining publications by reading the entire piece to assess their eligibility according to four criteria.

Firstly, the publication must focus on low and middle-income countries with an emphasis on Africa, Asia, MENA, and Latin America. This is because these regions are marked by relatively high levels of climate exposure, state fragility and gender inequality (Boyer, Meijer & Gilligan, 2020). Secondly, the publication must be published between 2011 and 2021 as CGIAR gender research has increased significantly since the first system wide CGIAR gender strategy in 2011 (Paez Valencia et al., 2019). This also ensures that the findings are relevant to ongoing discourses and developments in the field of climate security, which has seen a rapid expansion in the last decade (von Uexkull & Buhaug, 2021).

The third inclusion criterion was that the publication must explore some aspect of the relationship between climate change and conflict. Although most CGIAR research does not directly address this nexus, it frequently deals with the environmental, economic, social, and political processes assumed to influence the causal pathways linking climate and violent conflict (see Liebig et al., forthcoming). Therefore, we included publications focusing on one or more of these processes. Our final criterion

³ <https://gardian.bigdata.cgiar.org/#/>

⁴ <https://ccafs.cgiar.org/resources/publications>

was that the publication must suggest at least one gender equality outcome defined in terms of greater gender parity and increased women’s agency across key domains/areas of gender power inequalities (see Table 1 below). This condition was used to ensure that publications aligned with our operationalisation of the gender-climate-security nexus and adopted, albeit implicitly, a human security perspective.⁵ Indeed, the gender equality outcomes are meant to reflect one or multiple dimensions of human security identified in our conceptual framework.

The screening procedure with the four criteria identified 211 relevant publications. We then expanded the sample by consulting the CGIAR Gender Platform⁶ to ensure the inclusion of all relevant publications. The overall selection process led to the inclusion of 234 publications.

Table 1. Gender equality outcomes and how they relate to the GCS nexus

Gender Equality Outcomes	Description of relation to the GCS nexus
Access to, use, and control over resources	Greater gender parity and women’s increased agency in access to, use, and control over productive resources (such as agroclimatic information, technology, livelihoods, and credit) enhance resilience to climate change and mitigates gender-specific human security risks related to resource scarcity and loss of livelihoods.
Income and economic opportunities	Greater gender parity and women’s increased agency in income and economic opportunities (such as formal and informal labour market opportunities, diversified income streams) enhance resilience to climate change and mitigates gender-specific human security risks related to loss of livelihoods.
Work burden and time allocation	Greater gender parity and women’s increased agency in time allocation (such as climate-smart agricultural technologies and practices for adaptation that reduce workloads and negative impacts on women) enhance resilience to climate change and mitigates gender-specific human security risks related to resource scarcity and migration/mobility.
Participation in decision-making	Greater gender parity and women’s increased agency in decision-making at all levels (community, intrahousehold) enhance resilience to climate change and mitigates gender-specific human security risks related to loss of resources, livelihoods, and migration/mobility.
Enhanced food security	Gender parity and women’s increased agency towards enhanced food security enhances resilience to climate change by ensuring access, availability, and consumption of nutritious and culturally appropriate food and mitigates gender-specific human security risks related to resource scarcity and loss of livelihoods.

⁵ The gender equality outcomes were developed by connecting multiple framings. First, Huyer and Gumucio (2020) present a framework for the prioritisation of gender issues in climate policy that highlights four critical dimensions of gender in/equality in climate-resilient agriculture: (1) participation in decision-making at all levels; (2) work burden; (3) access to and use of productive resources; and (4) collective action. We then expanded it following Evans and Nambiar (2013) and Dankelman (2010) to ensure that all dimensions of human security identified in our conceptual framework were reflected.

⁶ <https://gender.cgiar.org/publications-data>

Collective action	Gender parity and women’s increased agency in collective action to address and mitigate climate impacts enhances resilience to climate change by creating a platform for access, agency, and voice, and mitigates gender-specific human security risks related to loss of livelihoods and intra-household/communal conflict.
Freedom of movement	Gender parity and women’s increased agency in freedom of movement enhances women’s resilience to climate change and mitigates gender-specific human security risks related to immobility.
Freedom from violence	Gender parity and women’s increased agency in freedom from violence enhances women’s resilience to climate change and mitigates gender-specific human security risks related to intra-household/communal conflict.
Transforming gender norms	Transforming gender norms addresses how the root causes of gendered inequalities influence both vulnerabilities and resilience to climate change, thus creating opportunities for policies and interventions to be gender-responsive/gender-transformative in mitigating gender-specific human security risks related to resource scarcity, loss of livelihoods, migration/mobility, and intra-household and communal conflict.

3.1.2. Information extraction

We established several fundamental categories to extract information from each of the information products included in the review. Firstly, key publications attributes (e.g., gender groups targeted, thematic and action area, year and geographical focus, type of publication and methodology used) were recorded to provide an overview of CGIAR gender portfolio. Secondly, each publication was classified based on the risk area (i.e., resource scarcity, loss of livelihoods, mobility and migration, and intrahousehold/communal conflict), and data on the key gender issues at stake were collected. Finally, information on the gender equality outcome was reported to provide a comprehensive picture of how CGIAR has contributed to addressing the gender-climate-security nexus. It is important to underline that, depending on the nature of the information product analysed (see Table 2 below), the gender equality outcomes were presented either in the form of a recommendation to move towards greater gender parity or as tangible outcomes, as in the case of project reports.

Table 2. Publications based on type of source and information product analysed

<i>Type of source</i>	<i>Research</i>	<i>Project</i>	<i>Tools</i>	<i>Partnership</i>
	N	N	N	N
	158	56	18	2
<i>Information product type</i>				
<i>Journal articles</i>	51	2	-	-
<i>Policy and research briefs</i>	28	29	6	-
<i>Working and discussion papers</i>	38	6	2	-
<i>Reports</i>	19	15	2	2
<i>Books, manuals and guides</i>	16	-	6	-

<i>Posters and presentations</i>	4	4	2	
<i>Conference papers</i>	2	-	-	-

1.2. Results and discussion

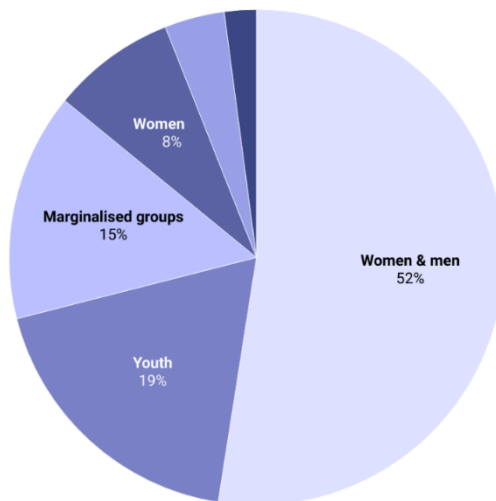
This section presents and discusses the results of the descriptive analysis. It begins by briefly synthesising key attributes of the publications reviewed, followed by findings for each of the risk area identified in our proposed conceptual framework. Finally, the key findings related to the gender equality outcomes are provided.

Gender groups targeted

Figure 4 below shows which gender groups within our sample of 234 publications were the most targeted. As can be seen, information products that targeted both women and men were the largest group (52%), followed by youth (19%), marginalised groups (15%), and women-only (8%). Ethnic minorities and other groups, including the elderly and disabled made up 4% and 2%, respectively. There were no information products mentioning non-binary people. These results indicate that, while some information products have used a broader analytic lens to examine other intersecting identities/inequalities, they represent a minority in terms of how the CGIAR has engaged with more diverse targeting in the Gender-Climate-Security nexus.

Figure 4. Distribution of publications across gender groups targeted (in percentages)

■ Women & men
 ■ Youth
 ■ Marginalised groups
 ■ Women
 ■ Ethnic minorities
 ■ Other groups



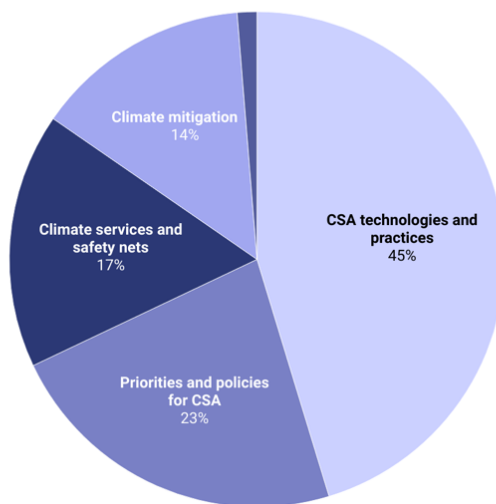
Thematic and action areas

Figure 5 shows that the majority of CGIAR contributions to the gender-climate-security nexus dealt with the CSA technologies and practices thematic area (45%), followed by priorities and policies for CSA (23%), climate services and safety nets (17%), and climate mitigation (14%). Only three publications focused on climate finance, accounting for 1% of the sample.

On the one hand, it is positive that gender issues have been explored across these diverse CGIAR thematic areas, as this illustrates the effective mainstreaming of gender concerns more broadly into agenda-setting. However, this mainstreaming has been uneven, with climate mitigation and climate finance representing the minority of the sample. These results are perhaps unsurprising, as climate change mitigation has been identified as an area where women are very much absent, except as providers of labour for carbon reduction programs (Huyer et al., 2021), and climate finance remains an important albeit relatively novel concept in the gender literature (Atmadja et al., 2020). Clearly, much more needs to be done to support women’s agroforestry activities and low-emissions development strategies in low-carbon frameworks, and to explore the role of climate finance in promoting gender equality in climate change adaption and mitigation.

Figure 5. Distribution of publications by thematic area (in percentages)

■ CSA technologies and practices
 ■ Priorities and policies for CSA
 ■ Climate services and safety nets
■ Climate mitigation
 ■ Climate finance



Regarding the gender action areas, information products displayed a certain degree of heterogeneity (Table 3). Most publications were diagnostic in nature aimed at either exploring gendered preferences, needs and priorities for adapting to/mitigating climate change (30%) or investigating the gender-differentiated impacts of climate change and resource degradation (7%). Others were instead concerned with gender-transformative goals, such as gender equality and women’s empowerment in climate policies and interventions (23%), as well as social inclusion and intersectional approaches to

gender equality in climate change policies/interventions (16%). Finally, 23% of the sample consisted of information products that integrated gender to strengthen resilience to climate change.

These findings are in line with broader observations that most gender research in the area of climate-resilient agriculture has focused on diagnostic analysis of women’s vulnerability, and on differences in how women and men perceive, are affected by, and respond to climate change (Kristjanson et al., 2017, cited in Huyer et al., 2021). Huyer et al. (2021) has argued that given the existing strong empirical base of diagnostic research, more attention should be paid towards research in gender action areas that actively promote gender equality, women’s agency, and transform harmful gender norms, as well as in exploring successful approaches /best practices towards these goals. While not all resilience research/programmes are aimed at transforming gender norms, at minimum they should be gender-aware, and when possible, gender-responsive.

Table 3. Number of publications by gender action area

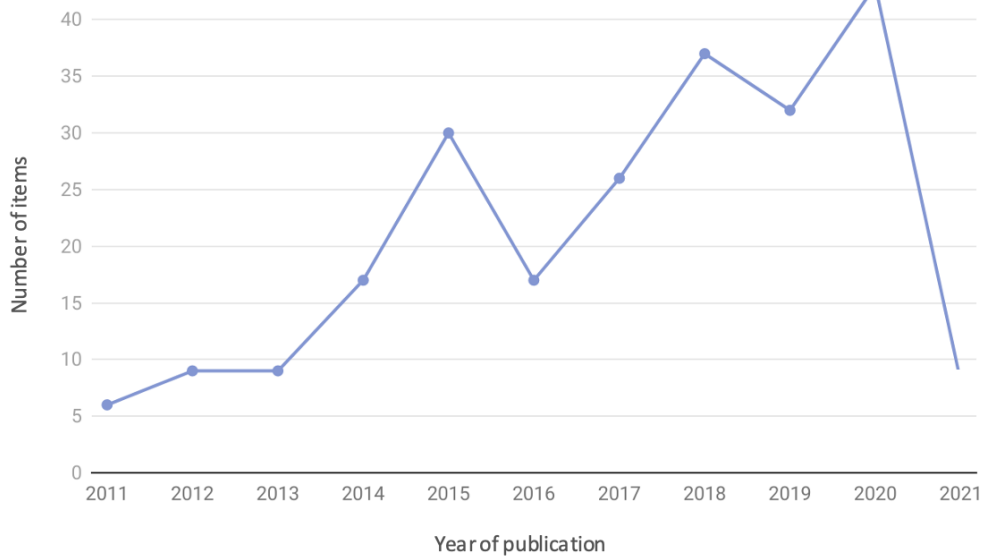
Gender action area	Number of publications
Gendered preferences, needs, priorities and barriers for adapting to/mitigating climate change	70
Gender equality and women’s empowerment in climate policies/interventions	54
Integrating gender to strengthen resilience to climate change	54
Social inclusion and intersectional approaches to gender equality in climate policies/interventions	38
Gendered impacts of climate change and resource degradation	18

Year of publication

Figure 6 illustrates trends in the number of items being published that dealt, albeit implicitly, with the gender-climate-security nexus. As can be seen, since 2011, the evidence base has grown exponentially, with a seven-fold increase between 2011 and 2020.⁷

⁷ It is important to highlight that the online keyword search was performed in July 2021; information products published afterwards have not been included in this review.

Figure 6. Number of items by publication year

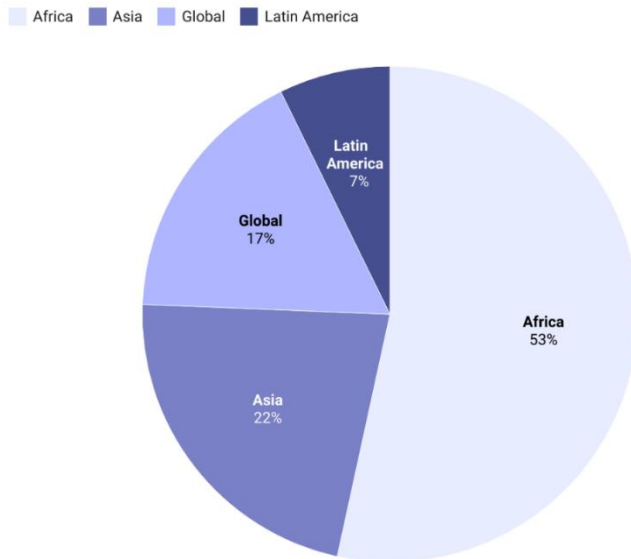


Geographical focus

Figure 7 shows the geographical coverage of the information products analysed, indicating whether they focus on a specific continent or have a global focus, meaning that they are cross continent

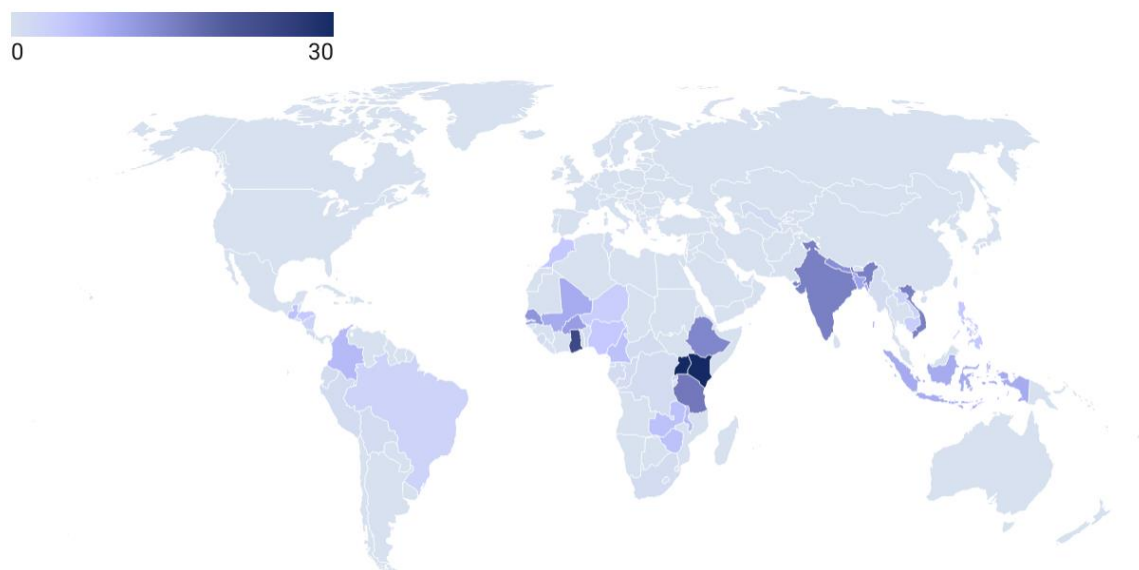
publications or have no explicit geographical focus (e.g., manuals, toolkits, and guidelines). More than half of the publications has tended to cluster in Africa (53%), while others are distributed across Asia (22%), Latin America (7%) or are based on a global sample (17%).

Figure 7. Distribution of publications based on their geographical focus (continent level)



Within these continents, certain regions have received more attention than others. For example, East and West Africa were the most targeted, comprising 26% and 17% respectively. Research and projects conducted in Asia have primarily focused on South Asia (12%) and Southeast Asia (10%). Meanwhile Central and South America have a similar distribution of publications, accounting for 4% and 3%, respectively. Finally, publications focusing on the MENA region were extremely small in number, accounting for only the 1% of the total. At the country-level (see Figure 8), Kenya and Uganda were the most frequently targeted (both 30 items), followed by Ghana (24 items), as well as Tanzania (16 items) and India and Vietnam (both 15 items).

Figure 8. Distribution of publications based on their geographical focus (country level)



Methodology and methods

The methodology and methods used in the publications are detailed in Table 4. It is important to note that information was not provided for 51 of the 234 items included in the portfolio review, so these findings are based on a sample of 183 information products. As can be seen, the majority relied on qualitative methodology (55%), followed by quantitative (26%) and mixed methodology (19%). In terms of research methods, qualitative publications employed a variety of techniques, the most common of which was document analysis (22%), followed by focus groups (11%), interviews (10%), and a combination of methods (11%). Quantitative items primarily used surveys (21%), while mixed methodology publications mainly relied on a combination of different methods (18%). The use of participatory approaches was observed in 75 publications. Across methodologies, they were mainly used in qualitative publications (25%), followed by mixed methodology publications (13%), and quantitative publications (4%).

Table 4. Publications based on publication methodology and methods

Methodology used	Qualitative		Quantitative		Mixed	
	N	%	N	%	N	%
Information product type	101	55%	47	26%	35	19%
Type of method						
<i>Focus groups</i>	20	11%	-		-	
<i>Interviews</i>	18	10%	2	1%	-	
<i>Surveys</i>	-		39	21%	3	2%
<i>Document analysis</i>	41	22%	-		-	
<i>Document screening</i>	-		2	1%	-	
<i>Participant observation</i>	-		2	1%	-	
<i>Historical analysis</i>	1	1%	-		-	
<i>Combination of methods</i>	21	11%	2	1%	32	18%
Participatory approach	45	25%	7	4%	23	13%

In interpreting these results, the use of participatory approaches in nearly 40% of the publications reviewed is promising, as these approaches are well-suited to unpack the complexities and interconnections of the gender-climate-security nexus, especially in how local gender norms, relations, and inequalities shape climate and security outcomes. The use of mixed methods should be further explored, as this methodology can provide powerful tools and analytics towards exploring the extent of/types of gendered climate security risks (quantitatively), as well as gaining more in-depth qualitative information related to women's, men's, and non-binary people's experiences of climate and conflict. The ability to triangulate data using mixed methods approaches would strengthen the contextual validity of future studies in the gender-climate-security nexus.

Risk areas

Table 5 shows the distribution of publications based on the risk area to which they are related. Most of the information products reviewed dealt with loss of livelihoods (132 items). Fewer but a still

significant number of publications focused on resource scarcity (93 items). Publications dealing with mobility and migration were limited (9 items). While vital to a holistic understanding of the gender-climate-security nexus, information products related to intrahousehold and communal conflict were not identified in this portfolio review. This indicates a crucial gap that needs to be filled through future One CGIAR research.

Table 5. Distribution of publications based on the risk area

<i>Risk Area</i>	<i>Number of publications</i>
Resource scarcity	93
Loss of livelihoods	132
Mobility and migration	9
Intrahousehold and communal conflict	-

Resource scarcity

The portfolio review highlighted two key resources at risk of scarcity: land (predominately agricultural land and to a lesser extent forest land resources) and water. The changing availability of land and water has gendered implications given existing disparities in the quality and quantity of these resources between women and men. As shown in Table 7, two key gender issues emerged from information products reviewed that dealt with resource scarcity: i) unequal access to, use and control over land and water resources; and ii) unequal participation in decision-making, influenced by gender and social norms.⁸

Table 6. Top ten gender issues addressed in publications dealing with resource scarcity

<i>Gender Issues</i>	<i>Frequency</i>
Access to, use and control over natural resources	56
Participation in decision-making	50
Gendered socio-cultural norms	47
Land-ownership inequality	45
Access to inputs and technology	44
GDOL and inequitable work burden	41
Access to information and extension services	38
Membership in local and community institutions	30
Access to education, knowledge, and capacity-building	28
Access to markets and finance	22

Unequal access to, use and control over land and water resources places women at considerable disadvantage with respect to the options available for adaptation (Bamanyaki, 2020). The findings from the review suggest that there is a global gender gap in terms of land ownership, and that when

⁸ A full list of the gender issues is provided in the Annex.

women smallholders do access land for production, whether rented, allocated, or purchased, it is generally of lesser quality and a smaller plot compared to men (Kristjanson et al., 2017; Nelson & Huyer, 2016). Findings from the review also indicate that women have generally less secure land tenure and less decision-making power over land than men (Huyer, 2016). Despite these inequalities related to land, women smallholders generally contribute significant amounts of unpaid labour time to household plots (Sahu, 2012; Rosimo et al., 2018).

When it comes to water, the findings illustrated that women often experience unequal access to, and control over shared (collective) water resources (e.g., irrigation canals, small reservoirs) (Balana et al., 2016) and that when women do have access, their water resources are typically smaller, with poorer water quality than men (Theis et al., 2016). Moreover, men's water sources (often for productive usage) are usually located closer to permanent rivers, while women's sources (for both domestic and productive usage) are often located near seasonal rivers/streams (Bryan & Garner, 2020). Dynamics of gender inequality in access to water are compounded by scarcity and increased competition among users (Ambaw et al., 2019).

Gender and social norms often inhibit women's participation in collective management regimes for natural resources (Yobo, Awono & Ingram, 2020), and in household-level decision-making over resources, including which plots or crops are irrigated and how income from the sale of irrigated produce is spent (Bryan & Garner, 2020). Given that women's contributions to commercial agriculture and water management are often under or unrecognized (Hariharan et al., 2020), women irrigators are discouraged from engaging in decision-making in these areas (Bernier et al., 2015). When women do participate in decision-making, their active and independent participation can be constrained by norms about speaking in front of or disagreeing with men or extended family (ibid.).

When resources are collectively managed, women face challenges in gaining access to and participating in decisions related to the resources (Pham et al., 2016; Mwangi & Evans, 2018). Collective institutions generally allocate certain quantities of water to farmers and may also regulate when farmers get access to irrigation canals. Women's membership in these institutions is frequently limited by exclusive formal or informal factors, including membership contingent on land ownership or household headship, the timing and location of meetings, and social norms that define public participation as the domain of men (McKinley et al., 2016; Nicol et al., 2015). Indirect exclusion of women from collective schemes/ scheme management decisions can occur through rules governing when irrigation water is available (for example only at night, when women do not feel safe working in the field) and where irrigation is available (for example, a canal or a small reservoir may prioritize men's plot) (IWMI, 2014).

Finally, findings reveal that the limited participation of women and marginalised groups in natural resource management processes not only prevents gender and social equity but also affects the resilience of the socio-ecological system. Given that gender division of labour and differential use and access to resources influence the knowledge and skills that women and men have of specific species

(Elias, 2015), excluding women implies that potentially relevant information, experiences, and perceptions are not reflected in management and conservation decisions. Engaging with socially excluded, resource-dependent groups, through the use, for instance, of social learning and participatory approaches, facilitates knowledge sharing and sustainable management of resources while providing socio-economic and environmental benefits to marginalised groups (Hedge et al., 2017).

Empirical and analytic gaps for resource scarcity

-Empirics on how marginalized men (e.g., poor, landless, low-caste/class) experience resource scarcity and how they are also excluded from participation in decision-making bodies, and how these dynamics influence gendered insecurity.

-Additional disaggregation based on how women’s intersecting social identities (e.g., age, ethnicity, marital status, caste/class, wealth status) influence both their access to, use, and control over natural resources and their participation in decision-making bodies. In this vein, using a binary understanding of gender would only partially account for the social dynamics of resource exclusion.

-Specific cases of women’s resilience in navigating resource scarcity as contributing towards community resilience. For example, how women’s traditional ecological knowledge associated with biodiverse natural resources sustains households and communities in times of resource scarcity.

Loss of livelihoods

Climatic shocks to agriculture and food production have differential impacts on women and men farmers given that gender mediates opportunities and challenges for adaptation. This portfolio review highlighted a number of key gender issues that make disadvantaged groups particularly vulnerable to livelihood insecurity (see Table 8).

Table 7. Top ten gender issues addressed in publications dealing with loss of livelihoods

Gender Issues	Frequency
Gendered socio-cultural norms	78
Participation in decision-making	77
GDOL and inequitable work burden	73
Access to, use and control over natural resources	69
Access to inputs and technology	64
Access to information and extension services	62
Land-ownership inequality	52
Access to education, knowledge, and capacity-building	49
Livelihood income inequality	37
Access to markets and finance	32

Findings revealed that women have generally less adaptation options compared to their male counterparts due to gender and social norms that hinder the adoption of CSA practices, such as

agroforestry and irrigation using treadle pumps (Cole, 2020), and access to farm inputs (Silvestri et al., 2014; Kidane et al., 2019) and agricultural training (Nchanji, 2018). Moreover, gender roles and responsibilities can constrain women's ability to participate in adaptation decision-making (Bomuhangi et al., 2016) and the lack of land ownership and other membership requirements can prevent women from joining farmers' groups and cooperatives (Gumucio & Schwager, 2019).

Gendered differences in access to information and agricultural technologies are other important determinants of adaptive capacity (Tall, Davis & Agrawal, 2014; Twyman et al., 2014; Jost et al., 2015; Morgan et al., 2015). For instance, limited access to weather and climate-related information can prevent women and marginal farmers from predicting and mitigating future climate risks (Kyazze, 2012; Tall et al., 2014; Mungai et al., 2017), while restricted access to agricultural information may generate situations where women are not aware of which technologies and practices are available (Naab et al., 2012; Bernier et al., 2015; Nsengiyumva, Kagabo & Gamucio, 2018). These inequalities are further compounded by women's work burden, as time constraints limit women's ability to learn about new agricultural practices (Nelson & Huyer, 2016). Moreover, the additional labour requirements associated with implementing some types of agricultural and CSA practices could increase women's work burden and preclude their uptake (Dinesh et al., 2015; Rosimo et al., 2018; Duyen et al., 2021).

Findings from the review suggest that unequal access to credits is a significant constraint to investment in and adoption of agriculture technologies (Perez et al., 2015; Okello et al., 2018; Arora, 2019). Credit is often unavailable or is accessible only on unfavourable terms to small farmers. For women, limited ability to provide collateral, less favourable repayment terms, and credit agencies' discrimination in the application process often make this constraint more pronounced. In addition, definitions of economic versus domestic uses of water may hamper women's access to credits. For example, in Ethiopia, some rural financial institutions do not extend credit for household wells because they are not considered economically productive, even though they are used for homestead gardening and critical livelihood activities (Hadgu et al., 2019).

Another cluster of findings highlighted how women's access to, and adoption of technologies could be hampered by gender-blind intervention design that did not consider factors such as affordability, cultural acceptability, and suitability for women's specific needs (Gumucio, Twyman & Clavijo, 2017; Mastenbroek et al., 2020). For example, with regards to land-based interventions, men's and women's preferences for household irrigation and crops are quite often different, given differences in the crops they cultivate, unequal access to land, credit, information, labour, and markets (Nchanji, 2018). Similarly, for water-based interventions, irrigation practices are often designed without taking into consideration their appropriateness for women's diverse uses of water, including drinking, cooking washing, agricultural production, and other economic livelihood activities (Colgan et al., 2019).

Empirical and analytic gaps for loss of livelihoods

-Data related specifically to the impacts of men’s loss of livelihoods due to climate change and climate-related conflict at the individual and community level were absent from the review. This reflects the dearth in the broader literature that has not explored how men and masculinities are implicated in these risks. Filling this gap is crucial to a more holistic understanding of the social impacts of loss of livelihoods.

-Intersectional differences between women and men in how loss of livelihoods is experienced, including intra-household positioning, class/caste, ethnicity, and age, are largely unaccounted for. Loss of livelihoods among intersex, transgender, and non-binary people have not been documented at all.

-Loss of livelihoods are creating rapid economic and social transformations in rural and peri-urban agrarian communities. Changing employment patterns and technologies have knock-on effects on gender roles, relations, and norms. However, what these gendered livelihood changes mean in the context of other human security risks (especially migration and intrahousehold and communal conflict) have yet to be investigated.

Mobility and migration

Mobility and migration have been framed as gendered adaptive strategies to diversify livelihoods and secure income. While climate was not the sole driver of migration, all publications referred to climatic factors as increasingly mediating/intensifying other socioeconomic pressures, the most being decreased food and agriculture production. Different types of labour migration were observed (e.g., temporal, seasonal, and permanent migration) although a common characteristic across the publications analysed was that migration was mainly undertaken by men. As shown in Table 9, two key gender issues emerged from information products that dealt with mobility and migration: i) gender and social norms inhibiting women’s mobility out of rural life; and: ii) increase in women’s work burden following male out-migration.

Table 8. Top five gender issues addressed in publications dealing with mobility and migration

Gender Issues	Frequency
Gendered socio-cultural norms	7
Male out-migration	6
GDOL and inequitable work burden	6
Land-ownership inequality	5
Participation in decision-making	5

Deeply rooted gender and social norms often constrain women’s and girls’ mobility capacity. For example, a cross-country study conducted by Chaudhury and colleagues (2012) showed that in Chandpur, Bangladesh, cultural taboos do not allow unmarried women to travel, and in Kyengeza, Uganda, women’s mobility is limited because of patriarchal norms that stigmatize women who migrate abroad to work. Social norms and power relations also affect women’s access to the financial and social resources required to move (Djouidi & Brockhaus, 2011). Other frequently cited gender issues inhibiting women’s migration were gendered division of labour (Najjar, 2021), family

obligations, such as childrearing and taking care of the elderly, and lack of job opportunities outside the domestic sectors (Basnett, 2013).

Findings show that increased work burden for women and marginalised people left behind is the most likely outcome of male out-migration. Women carry out more labour both on and off farm; indeed, in addition to domestic work, they often take on activities that were previously in the male domain, such as marketing, livestock and irrigation (Djouidi & Brockhaus, 2011; Basnett, 2013; Najjar, 2021). Results reveal that growing workload was a challenge mainly faced by poorer socioeconomic groups as wealthier women tend to compensate labour shortages by hiring workers from outside (WLE, 2017). The same holds for remittances. For households that did not take loans and incur debts to send family members abroad, male out-migration can generate opportunities to empower women and increase their control over household decision-making and cash (Karn et al., 2020; Simelton, Doung & Houzer, 2021). This suggests that an intersectional lens is crucial to explore the gendered impacts of male out-migration.

When remittances are not available, as it is increasingly the case of rural-to-urban migration of marginal and landless farmers, male out-migration can have negative impacts on women's livelihoods. Findings show that the feminization of agriculture oftentimes translate into low agricultural productivity and additional layers of socioeconomic marginalisation (Sudgen et al., 2014; Najjar, 2021). For example, in Nepal, women were not able to access agricultural technology in the absence of men and work in the public sphere (WLE, 2017). Results suggest that increased agrarian labour combined with unequal access to resources, and decision-making power worsens women's food security (Najjar, 2021), and difficulties in managing both the house and the farm can increase women's mental and health stress (Sudgen et al., 2014).

However, women left behind can be powerful agents in coping with labour deficiency. For instance, Djouidi & Brockhaus (2011) found that in Mali, women developed a variety of local strategies, including technological improvement in daily activities, such as mills for millet, and diversification of livelihoods based on charcoal, livestock, and handicraft to overcome heavy workload. While male out-migration can potentially create positive shifts in gender roles and opportunities for women's empowerment (Karn et al., 2020), results suggest that this must be accompanied by policies and interventions that support women's increased role in farming (Najjar, 2021).

While three fourths of the publications reviewed focused on gendered impacts of male out-migration and broader implications for agricultural productivity, two publications included in the review focused on youth out-migration. Climate change is reported to be an important mediating factor in shaping the movement of youth out of the agriculture sector, especially when combined with changing cultural aspirations, such as limited interest in becoming farmers (Nansambu & Sudgen, 2017). Youth often face challenges in accessing productive resources like land, finances, and farm inputs and this significantly increases their incentives to migrate.

Findings suggest that youth are more likely to engage in international migration compared to other members of the community as they are often unencumbered by family and social responsibility. While for both female and male migrants, securing formal sector employment can be challenging, Bezu and colleagues (2020) showed that young women face greater economic insecurity in the destination areas compared to their male counterparts due to fewer skills and education. Similarly, women, especially single women, are more exposed to trafficking and sexual abuse during international migration (Bezu et al., 2020).

Empirical and analytic gaps for mobility and migration

- Despite contributions to improve understanding of the human security challenges faced by women (mainly from poorer households) following male outmigration, future CGIAR research should explore how other “trapped” groups (e.g., marginal farmers, youth, and the elderly) experience insecurity in the context of a changing climate.
- More evidence is needed on how male outmigration and resulting feminisation of agriculture can offer opportunities to empower women and provide them with more autonomy and decision-making power (even when men return to work on-farm).
- Given that women and men landless farmers are increasingly migrating as a survival strategy to overcome crop failure, an intersectional lens should be applied to analyse the lived experiences of insecurity faced by migrants in destination areas, and how these experiences vary according to gender, ethnicity, religion, class, and age conditions. This is crucial to inform more inclusive social protection schemes.

Gender equality outcomes

The distribution of publications based on the gender equality outcomes is depicted in Table 10. The most frequently reported outcome was access to, use and control over resources, followed by participation in decision-making, transforming gender norms, income and greater economic opportunities, collective action, enhanced food security, and work burden and time allocation. Freedom from violence was the least reported outcome, while freedom of movement did not appear in the publications reviewed. A brief synthesis outlining the key points of each of these gender equality outcomes is provided below.

Table 9. Publications grouped by gender equality outcome

<i>Gender equality outcome</i>	<i>Frequency</i>
Access to, use and control over resources	172
Participation in decision-making	137
Transforming gender norms	98
Income and greater economic opportunities	93
Collective action	49

Enhanced food security	32
Work burden and time allocation	26
Freedom from violence	4
Freedom of movement	-

Access to, use and control over resources

The most commonly occurring gender equality outcome, greater gender parity and increased women’s access to, use and control over resources was articulated as fundamentally vital to ensure local and global food security. Within the review, many information products (Huyer, 2016; Kristjanson, 2017; Nchanji, 2018; Chanana & Aggarwal, 2020) included data related to the necessity of closing the gender gap in agricultural productivity to enhance resilience at both individual and community levels. Gender equality outcomes linked to access to, use and control over resources tended to focus on both natural resources (land and water) as well as productive resources, including training, information, inputs, technologies, irrigation, credits, assets, and markets. The publications reviewed tended to focus more on improving the productivity of already accessed natural resources, as opposed to looking at how women and marginalized groups may be excluded from accessing natural resources/alternative sources. The information products were highly clustered as pertaining to either the resource scarcity or loss of livelihoods climate-related gender security risks.

For example, a project implemented by CCAFS and partners in the climate-smart village of Kapa-Zarma, in Niger, supported women to address the negative impacts of resource scarcity (Ouèdraogo et al., 2018). As women had access to poor and degraded lands, the introduction of the zaï techniques improved degraded land productivity and empowered women. Instead, the leaves of the *Cassia tora* were used for human consumption and contributed to reducing the food shortage faced by vulnerable farmers during the dry months.

An example related to the loss of livelihoods was a USAID funded project in Madhya Pradesh, Uttar Pradesh, and Bihar states of India that aimed at scaling up climate-smart agriculture through the CCAFS’s Climate-Smart Village (CSV) approach (Chanana et al., 2018). This provided an enabling platform for women to manage and lead climate change adaptation and mitigation interventions in their villages. Local women’s self-help groups (SHGs) and other women-led groups were included in the design and implementation of the project to ensure effective dissemination of the CSA practices and strengthening women’s agency and voice. The SHGs participated in Village Climate Management Committees (CHCs) to manage and implement climate-smart agriculture. Women-led custom-hiring centers were set up to rent out climate-smart technologies at affordable rates. Women farmers became aware of and implemented new practices learned through agro-advisory and weather information services. They also participated equally—or in some cases more than men—in capacity-building, technology prioritization and community consultations. This project increased women’s and households’ productivity, reduced women’s workload, and enhanced their capacity to participate in community decision-making. Moreover, women no longer relied solely on their social networks and

regularly accessed ICT advisories for weather, practices, and technology information (Chanana et al., 2018).

Participation in decision-making

The information products reviewed suggested gender equality outcomes related to participation in decision-making across different scales (e.g., intra-household, community, and national levels), strategies related to climate-smart agriculture (e.g., adaptation and mitigation strategies), and decisions related to agricultural production and natural resource management. Within these diverse information products, several key themes emerged. First, at the institutional level, arrangements and linkages which facilitate multistakeholder engagement should be put in place (Sills et al., 2014; Bomuhangi et al., 2016; Arwida et al., 2017; Aura et al., 2017). This will work to ensure equal representation in community-decision making bodies, and to include the voices of historically underrepresented groups including women, youth, and other marginalized groups. Indeed, evidence from the review suggests that limited participation of women and marginalised groups in natural resource management processes not only prevents gender and social equity, but also affects the resilience of the socio-ecological system (Elias, 2015; Pham et al., 2016; Hadgu et al., 2019). By engaging in participatory approaches to natural resource management and agriculture that engage with all resource-users (both in decision-making and access, and control over resources), increased social cohesion and the reduction of degradation and deforestation could effectively promote sustainable use of resources (Hedge et al., 2017).

A powerful example of these dynamics was illustrated in a project implemented by CIFOR and partners in the districts of Mpigi, Rakai and Masaka in central Uganda, aimed at enhancing women's involvement in forest management and promoting equitable benefit-sharing (CIFOR, 2018). Using a process called Adaptive Collaborative Management (ACM), all resource-dependent users were brought together to develop shared visions, plan, and implement them. Local government, domestic and international NGOs, and private-sector forest owners were also involved in the process. Following the ACM processes, action plans were developed for income-generating projects such as beekeeping, tree nurseries, fish farming and restoring degraded forests. Having become effectively engaged in the process, non-community actors provided resources and support to help with implementation, such as training in tree nursery management and apiculture. They also supplied development funds, which were invested in income-generating projects outside of the forest. Overall, women were given leadership roles and strong support within mixed-gender ACM project groups so that their capabilities were made visible and apparent. They led planting projects in the Central Forest Reserve adjacent to the villages, which they co-managed with the National Forest Authority (NFA) and to which they hold harvesting rights. More than 50,000 trees were planted on 33 hectares of degraded forest reserve through the project — over 8,500 of these by women. Following their leadership experiences in the project, women began to lead in other spheres; for the first time ever in the region, they were elected to leadership roles at group and local government level, and in executive committees.

Transforming gender norms

The relatively high frequency of this outcome is perhaps unsurprising as interventions and initiatives aimed at increasing women's and marginalised groups' resilience to climate-related security risks are unlikely to succeed without transforming harmful gender norms that inhibit equality. However, it should be noted that, in the publications reviewed, gender transformative approaches to climate change, agriculture and natural resources interventions, policies and regulations were only reported in the form of a recommendation instead of as a tangible outcome. For example, a cluster of findings (Paudyal et al., 2019; Bamanyaki, 2020) focused on current policy gaps in achieving gender equality and social inclusion in national and sub-national adaptation and mitigation policies. While across contexts these frameworks have become increasingly gender responsive, they often equate gender issues with "women's issues" and focus on addressing the symptoms of gender inequalities rather than the root causes, which would be foundational to a gender-transformative approach. Several of the publications (Bernier et al., 2015; Godek & Garcia, 2018; Deering et al., 2019) included recommendations for actions towards more gender-transformative policies and interventions, including gender budgeting mechanisms and gender quotas for women in leadership positions.

There were examples in the review of how empowering women's groups, increasing their access to information and ITCs and economic opportunities that could change the perception of women, which could lead to broader gender transformative changes at the household and community level (Cole et al., 2016; Gumucio & Schwager, 2019). Another example was related how increased access to irrigation can create shifts in traditional gender roles in ways that enhancing women's strategic decision-making and agency (Theis et al., 2016). While the importance of engaging with men and the broader community to support more equitable changes in gender relations has been highlighted outside the review as important, this perspective was missing from the sources reviewed.

Income and greater economic opportunities

Gender equality outcomes related to greater gender parity and women's increased agency in income and greater economic opportunities were evidenced in several facets of the review. Increased revenue from CSA practices and economic benefits from increased agricultural productivity were commonly cited as contributing towards women's empowerment (Palanisami et al., 2015; Najjar, Abubakr & Alma, 2016; Gumucio, Hansen & Huyer, 2017). Indeed, women's ability to add value to their agricultural and livestock activities and diversify their income opportunities was framed as a key climate resilience strategy (Mbosso et al., 2018; Tavenner, Crane & Saxena, 2021). However, constraints regarding women's investment capacity and the types of market and employment opportunities available (e.g., entrepreneurial activities, value addition, new products) were also cited as inhibiting economic stability, particularly in the absence of social safety nets.

The FoodSTART project implemented by the International Potato Center (CIP) and partners in the Philippines aimed to strengthen farmers' entrepreneurial capacity (CIP-FoodSTART+, 2018). The project applied the Farmer Business School (FBS) approach, which promotes farmer groups'

participation in agricultural value chains through a series of group-based experimental learning activities over a production marketing cycle, including interactions with chain actors and stakeholders. The FBS was implemented with more than 80 farmer groups, which received the livelihood assistance fund for developing the new agri-enterprises. As a result, 1,387 farmers enrolled in the learning processes, of which 83% were women, and FBS groups launched their new micro-enterprises focused on root crops. This project empowered women and men while enhancing trust and collaboration between farmers and other value chain actors.

Collective action

Women's groups, cooperatives and organizations play an instrumental role in addressing gender differences in climate change adaptation and mitigation (Huyer & Gumucio, 2020), as they generate initiatives that reflect women's needs and constraints, provide a platform for accessing information and training, and increase women's agency and voices. Nevertheless, this outcome was reported in a relatively small number of publications; this perhaps reflects current gaps in the broader literature on gender and agriculture where still little is known on the role of women's collective action in building gender equality in climate-resilient agriculture (Huyer, 2021). A notable exception was the project implemented by CCAFS and partners in the climate-smart village of Daga-Birame, in Senegal, which offers a striking example of how collective action can mitigate the gendered human security risks associated with loss of livelihoods (Ouèdraogo et al., 2018). Women and men were provided equal participation in a local forest management committee, and a women-run microenterprise was established to process and sell fruit powder made from local baobab trees. In addition, marketing and income management were carried out exclusively through the women-run enterprise, with a village savings pool set up to invest in community resilience activities. As a result, women's resilience and control over livelihood revenue increased as well as their participation in decision-making. Moreover, ensuring the equal participation of all resource-dependent users in decisions related to the resources led to improved forest management and environmental conservation. By strengthening social cohesion, empowering women, and increasing socio-ecological resilience, this example shows how a collective action approach could potentially mitigate human security risks related to intrahousehold and communal conflicts.

Enhanced food security

Although food security as a tangible outcome was observed in a small number of publications, this result should be interpreted in perspective, given that, in this review, research outputs significantly outweighed specific reporting on programming contributions. However, the findings shed light on potential ways to support dual processes of addressing human security risks associated with resource scarcity and loss of livelihoods and promoting gender equality. For instance, a project implemented by the International Potato Center (CIP) in the Southern Nations, Nationalities and Peoples' (SNNP) region in Ethiopia, improved the food and security nutrition of drought-affected smallholder farmers while creating momentum for empowering women (Lemage, 2019). Women and men farmers were provided access to improved seed potato and sweet potato and equally engaged in capacity-building activities to ensure effective dissemination and build long-term community resilience to drought. As

potato and sweet potato cultivation expanded, women were involved in production and marketing, thus increasing their income, and enabling them to play a greater role in household decision-making (Lemage, 2019).

Work burden and time allocation

While work burden alleviation is a crucial dimension of gender equality in climate-resilient agriculture (Huyer & Gumucio, 2020), it was only reported in a relatively small number of publications. It is unclear whether this is because gender-responsive labour-saving technologies are still being identified in certain sectors of climate-resilient agriculture (e.g., low-emissions dairy development), or because most publications analysed were diagnostic in nature rather than promoting gender transformative goals. Nevertheless, some actionable insights can be drawn on the potential for gender-responsive technologies and practices to reduce women's heavy workload and negative livelihood impacts associated with resource scarcity and male out-migration. For instance, agroforestry and clean cookstoves can reduce fuelwood collection time (Libaisi & Njenga, 2018; Sanou et al., 2019; Khatri-Chetri, 2020), while irrigation through solar pumps can reduce the time women spend in fetching water (Bryan & Garner, 2020). Moreover, the use of these technologies has important human security benefits, including health risk reduction, and more time for education and engaging in income-generating and leisure activities (Huyer & Gumucio, 2020). The CCAFS-supported "Women-led agroforestry and improved cookstoves" project in Honduras is a striking example of how clean cookstoves and fuel can promote women's empowerment and provide women with more free time (Hottle, 2015). Women and men smallholder farmers were involved in the design and implementation of the "Eco-Justa" model cookstoves, a relatively simple stove which leads to cleaner burn, and trained on how to use it. Women reported significant benefits associated with the use of cookstoves, including decreased cooking time, cleanliness, and lower household expenditures on cooking fuel.

Freedom from violence

Despite this outcome being only marginally reported in the publications reviewed, findings suggest that the use of cookstoves and biogas technology have the potential to reduce the risk of sexual violence and harassment by reducing either the time women spend collecting firewood or the distances women have to travel to buy or collect it (Njenga & Mendum, 2018).

Recommendations

“If climate actions do not identify, address, and confront the discriminatory social norms and structural causes that are creating gender inequalities in the first place, the gender equality initiatives and policies will likely neither be sustainable nor reach their maximum potential” (Acosta, 2021).

This section provides recommendations for the One CGIAR and its partners, including donor organizations, researchers, and policymakers, on how the gender-climate-security nexus can be applied towards developing inclusive, gender-responsive solutions to address climate-related security risks. The implications of the portfolio review findings and broader literature are synthesized to provide methodological, and climate risk-specific recommendations were relevant and to highlight key priority areas for future action and investments. While the gender-climate-security nexus is helpful towards identifying different climate and conflict-related risks faced by women and men, the framework also provides space to explore the opportunities for enhancing gender equality and empowerment of marginalized people towards strengthening resilience.

Research

- **Apply an intersectional lens to the gender-climate-security nexus.** Despite contributions from the broader gender and climate change literature highlighting the importance of recognizing other axes of social differentiation that intersect with gender in ways that influence development outcomes (Wood et al., 2021; Tavenner et al., 2019; Gonda, 2017), intersectional analyses have been largely absent in climate and conflict research. By virtue of capturing the nuances that exist between gender and other social identities, using an intersectional lens will enhance the social inclusivity of research programming and inform more inclusive approaches to address the gender dimensions of climate-related security risks.
- **Address knowledge gaps within the gender-climate-security nexus, particularly intrahousehold and communal conflict.** While CGIAR has contributed significantly to improving understanding of the vulnerability and human security risks associated with resource scarcity and loss of livelihoods, future research (within and outside CGIAR) should build better and more localized evidence on the gendered dynamics and impacts of climate-related migration and intrahousehold/communal conflict. This is particularly important considering the increasing number of resource-related conflicts and the role that gender relations and distinct norms of masculinity can play in amplifying or mediating hostilities (Ide et al., 2021; Ensor, 2013). Hence, a more nuanced understanding of the gender dynamics of communal violence has important implications for conflict prevention and local peacebuilding and can create momentum for gender equality.

- **Expand the geographical focus to MENA and Latin America.** While more research on the gender-climate-security nexus is needed across the global landscape, the portfolio review highlighted a few critical geographical gaps in CGIAR work. For example, the MENA is an extremely water-scarce region with the women's lowest level of land ownership in the world, yet CGIAR has only marginally explored gender-specific human security challenges and opportunities associated with climate variability and water scarcity in the region. The same applies to Latin America, where the interaction between compounded climate-fragility risks and gender and social inequalities exposes women and indigenous minorities to multiple layers of marginalization and discrimination. Given that the gender dimensions of climate-related security risks vary considerably across contexts, case study analysis is of foremost importance to provide a comprehensive understanding of this triple nexus.
- **Moving from purely diagnostic towards more transformative gender research.** The majority of CGIAR work to date has focused on diagnostic gender research, which has been used to identify agricultural practices and preferences between women and men (oftentimes using sex-disaggregated surveys). While these studies have provided an important empirical foundation for gender dynamics in agriculture, research in the gender-climate-security nexus must move beyond a diagnostic focus to consider the ways in which power, institutional, and structural dynamics of gender relations shape and are shaped by climate-related security risks.
- **Explore the opportunities for women's empowerment that could be gained in the context of climate-related security risks.** Climate-related security risks create/heighten the conditions for disrupting traditional gender norms. While much of the existing literature has been framed around women's vulnerability in these disruptions, there is much to be gleaned from how climate-related security risks may generate new opportunities for women's resilience and empowerment. For example, how risks may facilitate women's participation in traditionally male-dominated occupations/community leadership positions or allow them to pursue entrepreneurship opportunities in emerging sectors. The gender-climate-security nexus offers opportunities to identify entry points for expanding women's agency and empowerment across different risk areas.

Programming

- **Focus on women's and marginalised people's agency and put their voices, knowledge, and experiences at the heart of the solutions.** Thought must be given to which groups of women and which groups of men (based on their ethnicity, social status/economic class, and age) might be excluded based on these intersecting identities, and whose voices need to be empowered through targeted actions to have them represented based on their role in project-relevant activities. For example, if a project identifies that a specific group of women, such as women from indigenous and/or natural resource-dependent communities, are primarily

responsible for safeguarding natural resources, then the project must address the barriers that specifically hinder them from fully participating and benefiting from relevant interventions.

- **Design socially inclusive responses to climate-related security risks through collective action and participatory approaches.** Qualitative discussion tools can contribute to effective planning, problem identification, and prioritization in programming aimed at tackling gendered climate security risks, and aid discussion around the community power dynamics that reinforce vulnerability, the challenges and adaptation priorities for different intersectional/intergenerational groups, and what opportunities exist for increasing climate resilience across different populations. These activities provide the basis for planning at the local level, which may contribute to gender-transformative adaptation responses that reflect the different needs and aspirations among different intersectional groups.

Policy

- **Mainstream gender-transformative goals into climate change adaptation and mitigation policies.** While over the past years, international and national climate change policies have become more comprehensive and gender-sensitive, they have yet failed to achieve gender equality (Huyer et al., 2021; Acosta et al., 2015). The common tendency to focus on women's greatest vulnerability to climate change has led to inconclusive policies targeting practical "gender symptoms" rather than addressing the structural causes of gender inequalities. To move towards this perspective, policy should be designed and implemented in a way that supports women's agency in climate adaptation and mitigation processes and transforms gender relations and power imbalances between women and men.
- **Ensure that gender equality policy frameworks at all levels account for climate-related security risks.** Despite recognition that gender equality, climate resilience and security are inextricably linked, climate change and conflict issues have been treated as separate – oftentimes siloed – agendas in policy responses for gender equality and women's empowerment. At the international level, coordinated and integrated initiatives are needed to increase awareness and understanding of the climate-related human security challenges. Moreover, ensuring that policy frameworks have transparent and actionable commitments made in terms of allocating appropriate budgeting to these areas is vital. At the national level, climate security considerations should be integrated into policy instruments to promote gender equality and the pivotal role of women's collective action in addressing these risks should be supported.

Finance

- **Build women’s and marginalised groups’ resilience to climate-related security risks through gender-responsive climate finance mechanisms.** Due to inequality in eligibility criteria, such as assets ownership, business skills, access to information, and membership in cooperatives, women and disadvantaged groups often face significant barriers in accessing climate financing (Atmadja et al., 2020). Thus, to avoid widening inequalities between women and men, the rich and the poor, climate finance mechanisms should ensure that gender responsiveness is mainstreamed in their design, implementation, and monitoring and frameworks. By increasing women’s and marginalised men’s/non-binary people’s ability to manage risks by, for example, diversifying crops, storing food, or saving seeds or putting money into savings, climate finance could play a pivotal role in achieving gender equality and poverty reduction.

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ANNEX 1

List of keyword combinations used for the online search

Keyword combinations

Gender AND disasters

Gender AND fragility

Gender AND resilience

Gender AND vulnerability

Gender AND peace

Climate AND youth

Climate AND gender AND intersectionality

Climate AND gender AND agriculture

Climate AND gender AND food security

Climate AND gender AND resources

Climate AND gender AND information

Climate AND gender AND water

Climate AND gender AND technology

Climate AND gender AND participation

Climate AND gender AND land

Climate AND gender AND risks

Climate AND gender AND livestock

Climate AND gender AND decision-making

Climate AND gender AND income

Climate AND gender AND market

Climate AND gender AND forestry

Climate AND gender AND fisheries

Climate AND gender AND migration

Climate AND gender AND credit

Climate AND gender AND collective action

Climate AND gender AND conflict

Climate AND gender AND security

Climate AND gender AND violence

ANNEX 2

Frequency distribution of gender issues (full sample)

<i>Gender Issues</i>	<i>Frequency</i>
Gendered socio-cultural norms	132
Participation in decision-making	132
Access to and control over natural resources and assets	128
GDOL and inequitable work burden	120
Access to inputs and technology	109
Land-ownership inequality	102
Access to information and extension services	100
Access to education, knowledge and capacity-building	79
Membership in local and community institutions	66
Access to markets and finance	55
Livelihood income inequality	46
Productivity gap	35
Male out-migration	30
Livelihood diversification strategies	23
Access to social networks	21
Inequitable working conditions	20
Access to state and basic services	18
Gender-based violence	5