

Gendered social capital and adaptive capacity: exploring the role of women farmers in climate adaptation in Aotearoa New Zealand

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ABSTRACT

In this paper we explore the role of gendered social capital in shaping the adaptive capacity of women farmers in Aotearoa New Zealand in response to climate variability and change. Drawing on semi-structured interviews conducted with women farmers across multiple regions in Aotearoa New Zealand, we examine how social networks and gender norms shape women's capacities to adapt to the impacts of climate change. Our findings demonstrate important gender differences in participation within social networks, with women farmers more often relying on informal, community-cantered social networks for both practical and emotional support and encounter marginalisation within male-dominated formal farming networks. These informal social networks proved critical for women sharing knowledge, skills, resources, and strategies, which enhanced their resilience to climate-induced stresses and shocks. However, the persistence of patriarchal norms in formal agricultural settings continue to restrict women's access to critical resources and decision-making roles. In this scoping study we underscore the need for gender-sensitive policies that recognise the significant contributions of women in agriculture and horticulture, support inclusive climate adaptation strategies, and engender more equitable access to social capital. By demonstrating these social dynamics, our study offers insights into the intersection of gender, social capital, and climate adaptation in the Global North, with wider implications for farming communities around the globe.

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1. Introduction

Climate change poses escalating challenges for farmers worldwide by driving more unpredictable weather, more frequent extreme events, invasive species, and water scarcity. The severity of these climate impacts is projected to intensify in the coming years,

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disrupting agricultural and horticultural production at multiple scales (Wheeler and Lobley 2021). Such changes, interacting with other environmental and socio-economic pressures, threaten food security, health, and livelihoods. In response, a growing body of research – including the Intergovernmental Panel on Climate Change (IPCC) Seventh Assessment – emphasises the pivotal role of social capital in building adaptive capacity to climate threats (Omolo and Mafongoya 2019; Pörtner et al. 2022). Relatively little attention has been paid to how social capital functions differently across social groups within climate adaptation. This is especially true with regard to gender differences in agricultural contexts (exceptions include Fletcher et al. 2020; Griffin, Wreford, and Cradock-Henry 2025).

Women farmers constitute a substantial portion of the agricultural workforce and contribute significantly to production and rural communities (Glazebrook, Noll, and Opoku 2020; Horst and Marion 2019). Yet, they face additional challenges compared to men. For instance, women in farming often have more difficulty accessing credit and leadership roles, and they shoulder a greater share of unpaid labour – both household and on-farm – than their male counterparts (Alston, Clarke, and Whittenbury 2018; Annes, Wright, and Larkins 2021). Meanwhile, most research on gender and climate change has focused on the Global South (where women comprise about 43% of agriculturalists), even though women also form a significant share of farmers in the Global North (Glazebrook, Noll, and Opoku 2020). For example, roughly 30% of farm managers in the EU and 28% of Canadian farmers are women, yet their roles in climate adaptation have received far less scrutiny (Glazebrook, Noll, and Opoku 2020). In Aotearoa New Zealand (henceforth referred to as NZ), women likewise manage many farms but remain largely overlooked in climate adaptation research (Griffin, Wreford, and Cradock-Henry 2025; Teather 1996). This oversight is notable given NZ's heavy reliance on climate-sensitive agriculture and its exposure to frequent natural hazards – recent floods, droughts, and earthquakes have highlighted the vulnerability of its farming sector (Griffin, Wreford, and Cradock-Henry 2023; Lawrence et al. 2024; Paulik et al. 2021).

In this paper, we argue that women farmers play a crucial role in building adaptive capacity to climate change. Accordingly, our research asks how women's social networks shape their capacity to adapt. We focus on women farmers in the Global North – specifically in NZ – because their contributions to climate adaptation have been largely overlooked (Ball 2020; Cradock-Henry et al. 2020; Griffin, Wreford, and Cradock-Henry 2023). This oversight is problematic: farm management decisions are often made jointly at the household level (Farmar-Bowers 2010; Luhrs 2016), yet women's perspectives have frequently been excluded or undervalued in agricultural adaptation studies (Alston 2013; Davidson 2016). Indeed, women farmers have historically been rendered “invisible” in agriculture (Carter 2017; Henningham and Morgan 2018), and their work is often taken for granted despite its importance (Alston, Clarke, and Whittenbury 2018; Wright and Annes 2016).

Despite these realities, very little research has specifically examined how women's social networks and social capital shape their adaptive responses to climate risks in developed country contexts (Fletcher et al. 2020; Pallares-Barbera and Casellas 2019). This represents a significant knowledge gap, even as a nascent body of work is beginning to incorporate feminist and intersectional perspectives into climate adaptation studies in rural communities (Casey et al. 2025; Griffin, Wreford, and Cradock-Henry 2025; Johnson, Fisher, and Parsons 2022). We acknowledge that gender is only one axis of identity influencing climate adaptation – factors such as class, race/ethnicity, and Indigeneity

also play important roles (as outlined by Johnson, Fisher, and Parsons 2022 in the context of Māori, the Indigenous peoples of NZ). While a full intersectional analysis is beyond our scope, our study centres on gender with this understanding.

NZ's colonial agricultural history has been marked by large-scale dispossession of Māori land (Boast 2008). In 1840, Māori held all land in the country, but by 2017, they retained only around 5% (Thom and Grimes 2022). Today, Māori hold only a small fraction of NZ's productive farmland and continue to face structural barriers in agriculture – including difficulties in developing Māori land and limited access to capital (Smith et al. 2018). All participants in this study were Pākehā (NZ European) women, so our findings reflect the experiences of that group. Māori and other ethnically diverse women are active in NZ farming but are not represented in our sample.

Against this backdrop, our study shines a light on how social capital contributes to the adaptive capacity of Pākehā women farmers in NZ. In the sections that follow, we first review the key concepts of adaptive capacity and social capital that frame our inquiry. We then describe our methodological approach, present the findings on women farmers' perceptions, strategies, and network engagements, and discuss how gendered social networks shape their adaptive responses to climate change.

2. Literature review

2.1. Adaptive capacity

Climate adaptation research often distinguishes between vulnerability and adaptive capacity, which are closely connected concepts. Adaptive capacity generally refers to the ability of individuals, communities, or systems to adjust to climate variability and change, moderate potential damages, take advantage of opportunities, and cope with consequences (Pörtner et al. 2022). It is frequently characterised as a multifaceted, context-dependent concept involving various domains or resources – for example, one typology outlines assets, flexibility, organisation, learning, and agency as key components (Cinner et al. 2018). In essence, adaptive capacity is not a fixed trait but a broad set of capabilities shaped by social and environmental context (Mortreux and Barnett 2017). Notably, how women develop and exercise adaptive capacity can differ markedly between the Global South and the Global North due to differing socio-economic conditions and gender norms in each context (Bari et al. 2024; Cohen et al. 2016).

In many countries of the Global South, discussions of women's adaptive capacity focus on empowerment and improving access to resources and support networks. Strong gender disparities often mean that agricultural services assume farmers are male, leaving women farmers' needs unmet (Jost et al. 2016). Numerous studies across Africa and Asia show that women's caregiving roles and limited resource access heighten their vulnerability during climate extremes (Omolo and Mafongoya 2019; Otieno et al. 2021; Phan, Jou, and Lin 2019). For instance, women farmers in parts of Ghana and Bangladesh are often expected to remain at home caring for the family during floods or droughts, which constrains their ability to implement adaptive strategies outside the household (Garcia, Tschakert, and Karikari 2020; Nahar 2025). Such findings underscore that women's "vulnerability" in these contexts is largely socially constructed, a product of inequitable access to information, finance, and institutional support, rather than an

inherent lack of adaptive capacity (de la Torre-Castro et al. 2022). At the same time, feminist scholars caution against portraying women as mere victims of climate change (Arora-Jonsson 2011). They highlight women's agency and point to evidence that when given the opportunity and resources, women often adopt innovative and effective adaptation practices (Alston 2013; Alston, Fuller, and Kwarney 2023; Jerneck 2018). In other words, women are not passive in the face of climate threats; they can be effective adaptors, but their options are shaped by the social and institutional contexts in which they live.

By contrast, in nations of the Global North, adaptive capacity challenges for women tend to centre on issues of inclusion, equity, and resource access. Securing a voice in decision-making and an equitable share of responsibilities and resources are recurring themes (Johnson, Fisher, and Parsons 2022; Mortreux and Barnett 2017). Historical and cultural contexts play a significant role in these challenges. During the late nineteenth and early twentieth centuries in NZ, Pākehā (European) farm women were viewed merely as "helpers" or "farmers' wives", not as farmers in their own right (Parsons and Fisher 2021). Although much has changed since then, contemporary Māori women in agriculture continue to experience climate change impacts in distinct ways influenced by their cultural and socio-economic position (Johnson, Parsons, and Fisher 2023; 2022). These differences are partly attributable to top-down adaptation approaches that have historically overlooked Indigenous knowledge systems and diverse perspectives in planning (Macpherson et al. 2024). In neighbouring Australia, farm women's contributions were likewise long stigmatised or ignored – they were historically described only as "housewives" or "helpmates" and even left out of official farm censuses (Henningham and Morgan 2018). Recent efforts in Australia have begun to redress this invisibility and highlight women's participation in agriculture and that women in agriculture continue to experience climate-related impacts in disproportionate ways despite higher-income settings (Casey et al. 2025; Fletcher 2017; Walker et al. 2019).

Such gender-differentiated climate change impacts directly affect women's capacity to build and enact adaptive responses (Cutter 2017; Phan, Jou, and Lin 2019), which undermines women's ability to develop social capital, the networks and relationships which in turn influences their overall adaptive capacity (Azad and Pritchard 2023; Pelling and High 2005). Recent work from NZ reinforces this point: women dairy farmers contribute significantly to on-farm climate adaptation strategies, yet their unique knowledge and needs are frequently overlooked in industry decision-making, reflecting persistent gender biases in agricultural planning (Griffin, Wreford, and Cradock-Henry 2025). More generally, multiple facets of identity (including gender, age, financial status, and land ownership) intersect to enable or constrain how farmers adapt (Griffin, Wreford, and Cradock-Henry 2023; Smith et al. 2018) and highlight the need for diverse and equitable voices in adaptation planning (Griffin, Wreford, and Cradock-Henry 2025; Lawrence et al. 2024). Women are both negatively affected by the social and institutional contexts in which they live (Huyer and Partey 2020; Walker et al. 2022); but conversely, they can be empowered when their capacity to devise and implement adaptation strategies is strengthened (Alston 2013; Buchanan, Reed, and Lidestav 2016; Bunce et al. 2016; Johnson, Fisher, and Parsons 2024). Taken together, these intersecting challenges underscore that social capital is a critical mechanism shaping women's adaptive capacity in agriculture; particularly the gendered distribution of network access, support, and influence (Azad and Pritchard 2023; Khalil, Jacobs, and McKenna 2021; Morita et al. 2025; Pelling and

High 2005). We therefore turn next to social capital theory to clarify how social networks can enable (or constrain) adaptive responses and outcomes under climate risk.

2.2. Social capital

Social capital is both shaped by and instrumental to women's adaptive responses and adaptive outcomes. As the preceding section suggests, gendered roles and structural barriers influence women's ability to build and mobilise networks (Griffin 2009; Otieno et al. 2021); in turn, these networks shape access to information, support, and influence for adaptation. Broadly defined as the resources and advantages individuals gain from their social networks and relationships, social capital is widely recognised as a crucial element of adaptive capacity in the face of climate change (Adger 2010; Pelling and High 2005). Bourdieu (2010) conceptualises social capital as an asset embedded in an individual's network ties and social standing, which people can mobilise to access resources and exert influence. As such, social capital is unevenly distributed, tied to one's social position, and can be accumulated or inherited, much like economic capital (Buck-McFadyen et al. 2019; Carpiano 2007). In contrast, Putnam (1995) describes social capital as an emergent property of communities grounded in mutual trust, reciprocity norms, and dense civic engagement networks. In either conception, social ties can provide significant benefits, from information exchange to informal support and mutual aid, which enhance a group's capacity to respond to challenges, benefits which contribute to overall adaptive capacity (Cofré-Bravo, Klerkx, and Engler 2019; Wang et al. 2021).

Emerging research also shows social capital is a critical factor in how communities cope with and adapt to climatic impacts. Alongside tangible resources and knowledge, social cohesion and network ties are pillars of a community's adaptive capacity (Parsons et al. 2018; Pelling and High 2005), making them better able to organise collectively for climate adaptation and disaster responses (Azad and Pritchard 2023; Chan et al. 2019). For instance, at the household level, farmers embedded in robust social networks can learn about and implement new climate-resilient farming practices by observing peers or exchanging ideas (Chaudhuri et al. 2021; Cofré-Bravo, Klerkx, and Engler 2019).

Trusting relationships with peers or local officials can ensure that important climate information (such as early warnings or new techniques) reaches those who need it (Bruce, Jackson, and Lamprinopoulou 2021; Fletcher et al. 2020; Isaac and Matous 2017). Thus, in rural communities, social networks are support systems that enhance learning, innovation, and coordinated *trusted* action for emergency management and climate adaptation (Griffin 2009; Otieno et al. 2021).

Yet, social capital is not universally accessible, nor is it an unalloyed good; its automatic construction of being "positive" obscures the ways it can sometimes reinforce inequality (Di Falco and Bulte 2011; Ganapathy 2020). The hierarchies within which social capital is located determine who can benefit from network resources (Bourdieu 2010; Grenfell 2009; Pichler and Wallace 2009) and engender inequity, as individuals with greater privilege or higher social status are often able to derive more benefits from networks than those who are less privileged (Cleaver 2005; Lee, Jahng, and Kim 2020; Phan, Jou, and Lin 2019; Woroniecki et al. 2019).

Group memberships can reinforce existing norms and boundaries, sometimes becoming insular "clubs" that uphold the status quo (Di Falco and Bulte 2011; Ganapathy 2020).

For example, wealthier or high-status farmers might network in elite agricultural forums that amplify their voices in policymaking, whereas lower-income or women farmers might be confined to more marginal groups with little political influence (Bruce, Jackson, and Lamprinopoulou 2021; Po and Hickey 2020). This potential “dark side” of social capital can perpetuate socio-economic and gender inequities rather than alleviate them (Cleaver 2005; Phan, Jou, and Lin 2019).

Relying on communities’ social capital alone as an adaptation solution may, therefore, overlook how power imbalances limit who actually benefits from collective resources, which adds a crucial analytical dimension to climate adaptation studies. It prompts us to ask: whose social capital is being mobilised and whose benefit? Recent scholarship calls for a critical examination of this “dark side” of social capital in climate adaptation contexts to better understand how power and inequality mediate networks’ benefits (Ganapathy 2020; Phan, Jou, and Lin 2019). In other words, it is not enough to simply note that a farming community has “strong networks” without probing how those networks operate – who is included or excluded, whose knowledge counts in those exchanges, and who guides collective decisions (Dapilah, Nielsen, and Friis 2020; Gareau et al. 2020; Mekonnen, Gerber, and Matz 2018). Social capital cannot thus be decoupled from its social context; it is embedded in the same institutional, economic, political, and socio-cultural power dynamics that shape vulnerability and adaptive capacity (Bari et al. 2024; Bunce et al. 2016; Parsons et al. 2018) and that ensures that certain members (such as women or minority groups) can remain marginalised in adaptation efforts (Johnson, Parsons, and Fisher 2023; Pomeroy 2021). Therefore, a nuanced, critical approach to social capital is necessary when considering its role in building climate resilience.

However, relatively few studies have investigated how gender norms shape farmers’ networking and access to social capital, particularly in high-income countries (exceptions include Fletcher et al. 2020). Emergent recent studies in NZ (Griffin, Wreford, and Cradock-Henry 2025) and abroad have begun examining the gender dimensions of climate adaptation (e.g. Fletcher (2017); Georgiadou and Syed 2021; LaLone 2012; Walker et al. 2019). We do know from existing literature that gender norms can profoundly influence individuals’ and communities’ adaptive capacities in diverse ways (Cohen et al. 2016; Griffin, Wreford, and Cradock-Henry 2025; Reed et al. 2014). Studies have shown that women and men often experience climate change impacts differently due to divergent household responsibilities, resource access, and social expectations. These differences extend to their social networks: women’s networks are frequently smaller or more localised, which can limit their access to diverse information, external contacts, and resources for adaptation (Alston, Clarke, and Whittenbury 2018; Beaumier, Ford, and Tagalik 2015; Cramer et al. 2016; Pallares-Barbera and Casellas 2019).

Patriarchal power structures and gendered social expectations can also constrain women’s participation in formal farmer groups and leadership (Alston and Wilkinson 1998; Ball 2020; Glazebrook, Noll, and Opoku 2020), restricting their influence in decision-making processes and their access to agricultural information or extension services (Alston, Clarke, and Whittenbury 2018; Carter 2017). Prior research thus indicates that gender differences in farming networks (Annes, Wright, and Larkins 2021; Pini 2005; Shortall 1994) may translate into differences in adaptive capacity, not because women inherently lack the ability to adapt, but because their social environment offers them fewer opportunities to build and leverage social capital for resilience and adaptive

actions. Notably, much of this scholarship has focused on developing countries (Po and Hickey 2020; Sprout 2022) or general patterns (Ganapati 2012); few studies have explicitly compared women's and men's networking and adaptation in Global North agriculture (Bruce, Jackson, and Lamprinopoulou 2021).

There is a clear need to understand these gendered dynamics in contexts like NZ to support climate adaptation in developed worlds more effectively. Our study responds to this gap by examining how gendered social networks shape the adaptive capacity of women farmers in NZ. In the following sections, we build on the above theoretical insights to explore empirical evidence from women's experiences. By focusing on whose voices are heard in farming communities, how support networks operate, and what barriers or enablers women encounter in adapting to climate impacts, we aim to develop a more gender-responsive understanding of adaptive capacity that can inform both adaptation theory and practice.

3. Methods

3.1. Research design

We adopted a qualitative, exploratory research design with a feminist lens to centre the experiences of women farmers. Our study was guided by the question: *How do social networks and gender norms influence the adaptive capacity of women farmers in Aotearoa NZ in response to climate change?* To address this question, we defined several research objectives:

- Analyse the role of social networks in shaping women farmers' adaptive capacity in NZ
- Examine how gender norms affect women's participation in agricultural social networks
- Investigate how social networks help women farmers adapt to climate-related impacts

We conducted in-depth semi-structured interviews and applied reflexive thematic analysis to meet these objectives. This qualitative approach aligns with our feminist aim of highlighting women's often-overlooked perspectives. Ethical approval for the study was obtained from the lead author's university (Ref. #2730).

3.1.1. Participants and recruitment

Participants were recruited across NZ via advertisements (posters, social media, and emails through farming organisations). Initially, we invited both women and men to participate, but very few men responded (only three interviews were completed, but these interviews did not form part of our analysis). Given the limited research undertaken into women farmers and climate adaptation in the Global North and the 13 women who volunteered to take part in our study, we decided to adjust our study to focus exclusively on the adaptive capacity of farming women.

Unfortunately, our recruitment strategy did not result in any Māori or non-White ethnic minority participants. Māori farming social networks may differ from those of Pākehā farmers and were likely not reached by our approach. We acknowledge this limitation and note that Indigenous women's perspectives are not represented in our data, as our final sample was composed solely of Pākehā women.

Our final sample consisted of 13 women engaged in diverse farming sectors – including dairy, livestock, cropping, and horticulture – across multiple regions of NZ (see [Table 1](#)). Interviews took place between September 2020 and April 2021. Participants ranged in age from their late 20s to early 70s (median mid-40s). Most were involved in family farm enterprises (often working alongside husbands or other relatives); one participant was a recent migrant farm worker aspiring to become a farm owner; a few held part-time off-farm jobs besides farming, while others farmed full-time. To protect confidentiality in the close-knit farming community, each interviewee was assigned a code (W1, W2, ...), which we use when reporting results. We provide only broad descriptors of each woman's region and farm type, omitting specific locations or personal details to prevent identification.

3.1.2. Data collection: semi-structured interviews

We used semi-structured interviews to allow in-depth exploration of participants' lived realities. This widely used qualitative method permits probing follow-up questions and encourages respondents to share their experiences in their own words. In line with our feminist approach and qualitative best practices (Longhurst 2003), we designed an interview guide around broad themes rather than a fixed questionnaire. This open-ended format empowered participants to steer the conversation toward issues most pertinent to them, helping surface nuances that might otherwise remain hidden.

Each interview began with questions about the participant's farming background and personal history in agriculture, then moved through topics such as experiences with climate variability and extreme weather, perceptions of environmental changes, adaptive strategies, and the various people and institutions in her network (e.g. family, neighbours, farming peers, industry groups, community organisations, government agencies). To avoid potential defensiveness, we initially did not use the phrase "climate change" in our questions. NZ farmers often react sceptically to that term, so we asked generally about weather patterns and environmental changes. Prior research by Tisch and Hamilton

Table 1. List of interviewees.

No.	Interviewee code	Type of farm	Farm location	Approximate numbers of years in the farming industry
1	W1	Cattle farming	Bombay, Auckland	40 years
2	W2	Sheep shearing contracting business and sheep and beef farming	Waikaretu, Waikato	10 years
3	W3	Permaculture	Bombay, Auckland	20 years
4	W4	Permaculture	Maungaturoto, Northland	30 years
5	W5	Sheep and beef farming	Ngaruawahia, Waikato	25 years
6	W6	Sheep and beef farming	North Auckland, Auckland	18 years
7	W7	Sheep and beef farming, cropping	Gisborne and Hawke's Bay	20 years
8	W8	Farm assistant	Taranaki	5 years
9	W9	Sheep and beef farming	Balclutha, Otago	Not recorded
10	W10	Sheep and beef farming	Southland	Not recorded
11	W11	Dairy farming	South Otago, Otago	Not recorded
12	W12	Sheep and beef farming	Winton, Southland	Not recorded
13	W13	Sheep and beef farming	Tapanui, Otago	Not recorded

(Boileau 2017) had observed that NZ farmers often “roll their eyes” at the mention of climate change, preferring to discuss weather conditions and local environmental changes. Therefore, we began our interviews by asking about weather patterns and environmental changes (Tisch and Hamilton 2019). In practice, most interviewees eventually brought up climate change themselves; if a participant did not mention it, the interviewer introduced a direct question about climate change near the end of the interview.

All interviews were conducted remotely via Zoom or telephone (due to COVID-19 travel restrictions) and lasted about one hour each (a few ran up to two hours). We obtained verbal informed consent (including permission to record) at the start of each session, as well as written consent. Remote interviewing posed challenges, such as building rapport without face-to-face contact and occasionally missing non-verbal cues (Self 2021). We mitigated these issues by beginning each interview with an informal chat to put participants at ease and paying extra attention to tone and pauses during the conversation (Khan and MacEachen 2022; Saarijärvi and Bratt 2021). The virtual format also enabled participation from geographically distant regions without requiring travel, broadening the range of farm contexts in the study (De Villiers, Farooq, and Molinari 2022; Saarijärvi and Bratt 2021). The interviews yielded rich narrative accounts of each woman’s farming reality under a changing climate.

3.1.3. Data analysis

With participants’ permission, all interviews were audio-recorded and transcribed verbatim for analysis. We then carried out a reflexive thematic analysis following Braun and Clarke’s approach (Braun and Clarke 2006; 2021). This method is well-suited for systematically and flexibly identifying meaningful patterns across qualitative data. Consistent with our exploratory feminist orientation, we adopted a reflexive stance acknowledging the researchers’ subjectivity and encouraging deep engagement with the data (Braun and Clarke 2019, 593). Our team remained critically self-aware during coding and theme development, recognising how our perspectives could influence interpretation. Rather than seeking inter-coder consensus or assuming themes simply “emerge” from the data, we treated theme development as an active, interpretive process that required transparency and iterative refinement.

We followed Braun and Clarke’s (2006) six-phase procedure for thematic analysis to ensure rigour. These phases included data familiarisation, initial coding, theme construction, refinement, definition, and final reporting. Although described sequentially, the analysis was not strictly linear. We revisited earlier steps as needed – for example, refining codes while reviewing themes or returning to the raw data to verify insights. We did not begin with a predetermined codebook or impose any a priori coding scheme on the data. Instead, codes were developed inductively from the data after thoroughly familiarising with the transcripts, consistent with qualitative coding recommendations and Saldana’s (2016) guidance on emergent coding. Coded text fragments were then grouped into preliminary themes, which we continually reviewed and refined in team discussions. During this collaborative analysis, we compared interpretations and resolved any differences through reflexive dialogue, enhancing our theme development’s credibility. The final set of themes was used to structure our findings.

Throughout the analysis, we remained mindful of our positionality as researchers. Our team’s feminist research stance and insider/outsider backgrounds (as academics familiar

with climate adaptation and, in some cases, with farming communities) inevitably influenced how we interpreted the data. We engaged in reflexive practices such as regular debriefings to examine our assumptions and potential biases at each step (Braun and Clarke 2021). By being transparent about our decision-making and attentive to voices that challenged our preconceptions, we aimed to represent the participants' perspectives in our constructed themes faithfully.

3.1.4. Limitations of the study

This study's sample size was relatively small (13 participants), limiting the statistical generalizability of our findings. Our aim was depth of insight rather than breadth, and qualitative research prioritises depth over breadth when exploring complex phenomena. The intimate scale of the project enabled a detailed, focused analysis in which each interview contributed meaningfully to theme development. Another major limitation is that all our interviewees were Pākehā (NZ European), with one White English migrant. Since the inception of NZ, Indigenous Māori have been involved in agriculture and horticulture, while Chinese own and worked in horticulture operations (see Johnson, Parsons, and Fisher 2023 and Boileau 2017 for further information), with other ethnicities also involved in farming in NZ. Our recruitment method failed to reach non-White women farmers. Thus, our findings are not universally generalisable; they offer nuanced insights into Pākehā women farmers' adaptive capacity in the NZ context (see the map showing the locations of interviewees in Figure 1).

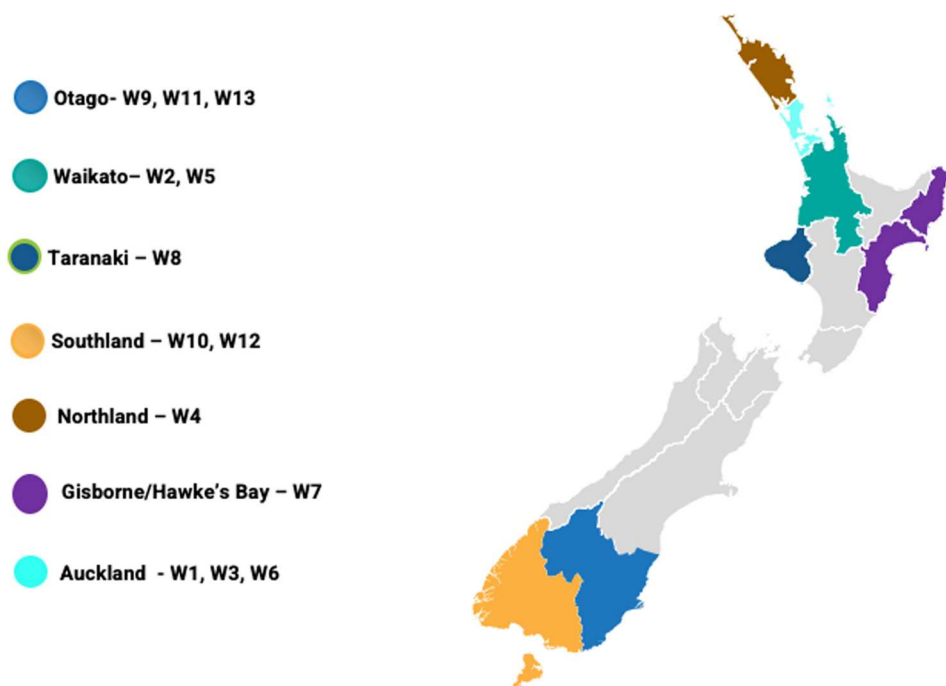


Figure 1. Map showing regions where interviewees live.

4. Findings

In this section, we present an analysis of women farmers' adaptation strategies and their social networks. We find many nuances that embody place-based experiences of climate risk for women farmers and that their genders and social networks shape them. We also present the adaptive strategies they deployed and the challenges they faced.

4.1. *Climate change perceptions and adaptation strategies*

Many women farmers in our study observed increasing weather variability and more frequent extremes on their farms (W7, Gisborne, 2020; W1, Auckland, 2020; W6, Auckland, 2020). However, they often discussed these changes in practical terms of weather and farm management rather than using abstract "climate change" language. Participants spoke about shifting weather patterns in interviews, noting drier summers, longer droughts, flooding, extreme rainfall, hailstorms, and generally unpredictable seasons. All interviewees acknowledged that climate change was a driver of increasing climate variability and extremes, with farmers keen on implementing adaptation measures, which they framed as part of conventional good farming practices rather than something new to them (W1, Auckland, 2020; W4, Northland, 2020; W6, Waikato, 2020).

The women deployed various adaptive strategies on their farms to cope with climatic variability. These measures were usually reactive, short-term steps crucial to day-to-day management. For instance, one Waikato farmer explained that she would start "destocking before the problems", reducing herd size in anticipation of a tough summer to avoid overburdening fragile pastures (W2, Waikato, 2020). Others described stockpiling extra feed and supplements during droughts and wet spells to maintain livestock conditions when grazing became insufficient. On mixed-crop and horticultural operations, women emphasised soil conservation and land management techniques to boost resilience – from rigorous soil maintenance and crop rotation to even arranging land swaps with neighbouring farms so that no single property bore the full brunt of a localised drought or flood (W3, Bombay, 2020). These practical actions helped ensure their operations could withstand seasonal climatic fluctuations.

Some participants also invested in longer-term measures to strengthen their farms' ecological resilience. For example, one Auckland farmer (W1) began planting native trees and fencing off waterways on her property as far back as the 1990s. By establishing "native bush as a buffer zone" on her farm, she observed the welcome return of native bird species and noticed that her land became more resilient to drought.

However, despite the clear environmental benefits of such proactive steps, all the women emphasised a lack of institutional support for on-farm adaptation. W1 bluntly noted that her family received "no support from the government – either information or financial" for these efforts, forcing them to hire an ecologist at their own expense – a "huge financial drain" (W1, Auckland, 2020). Other interviewees echoed that any available government programmes were not reaching them or were not perceived as useful. Nonetheless, they pursued these adaptations out of stewardship and necessity. As W1 put it, she wanted to "look after the land ... and leave it better than [she] received it" (W1, Auckland, 2020), even if it meant shouldering the costs herself.

Importantly, while these strategies are adaptive responses to current climatic challenges, the women themselves often saw them simply as good farm management rather than explicit climate change adaptation. Much of what they were doing to cope with extreme weather was reactive and incremental, focused on the variability they already faced. Few interviewees described making transformative changes aimed at possible future climate scenarios. None had considered drastic measures like relocating their farm or switching to entirely new production systems – steps they felt were not yet necessary or feasible. This perspective highlights a potential gap between climate change projections and on-farm decision-making. The women's adaptations are essentially responses to existing conditions and recent extremes, which may leave them under-prepared for more severe long-term changes. Their focus remains on managing the climate impacts that are already tangible rather than proactively planning for a markedly different future climate.

4.2. Social networks as adaptive resources

Social networks emerged as a cornerstone of these women's adaptive capacity. Nearly every participant emphasised that her ties to community networks – both formal farmer organisations and informal peer groups – were key to sustaining her operation through environmental changes. Many were active in formal organisations such as Rural Women NZ, the Country Women's Institute, the Dairy Women's Network, or local Young Farmers clubs. At the same time, all engaged in various informal networks, including neighbourhood farming discussion circles, school or church communities, and loosely organised groups of nearby farmers and friends who regularly exchange advice (W7, Gisborne, 2020). The women uniformly credited these networks with helping them access timely information, new ideas, and moral support, all of which informed their farm decisions and adjustments.

Participation in both formal and informal groups often led directly to on-farm innovations. One woman from a sheep farm on the east coast of NZ of the North Island, enthusiastically described the value of local discussion meet-ups: "It's really good for sharing ideas and experience ... when you see somebody doing something differently ... they will tell you the good part and the bad part – so you can decide whether you want to try it" (W7, Gisborne, 2020). Insights gained through such peer exchanges frequently translated into concrete changes on the women's farms. Seeing other farmers experiment with new techniques – and hearing frank discussions of the pros and cons – gave many the confidence and knowledge to try similar adaptations themselves. In this way, network membership encouraged innovation and farm diversification strategies that helped reduce risks from climate and economic shocks. By engaging with their networks, the women effectively built resilience together; sharing tips, resources, and emotional support to cope with change. This mutual aid also fostered social capital in their communities, creating a stronger safety net for everyone involved. The importance of informal social networks is further illustrated by recent disasters in NZ; for instance, community social ties were central to adaptive responses following the 2016 Kaikōura earthquake and Cyclone Gabrielle in 2023 in NZ (Cradock-Henry, Fountain, and Buelow 2018; Goode et al. 2025; Thorpe et al. 2025).

In addition to local peer connections, most participants had links to broader networks and professional contacts beyond their immediate area. Several mentioned regular

communication with farmers in other regions who ran similar operations and with agricultural consultants, industry experts, or veterinarians (W6, Auckland, 2020; W7, Gisborne, 2020). These wider contacts were invaluable for dealing with weather variability and navigating market fluctuations, regulatory changes, or other challenges. In other words, women's support networks were not limited to climate issues – they formed a multifaceted system that the farmers could draw on whenever they faced a problem on the farm.

4.3. Community support and mental well-being during extreme events

The interviews revealed that strong social ties became an essential lifeline during extreme events such as severe droughts or floods. Women described how their networks mobilised to help them endure these crises, providing practical aid and emotional support. One interviewee explained how a “Rural Coordination Group” was started in her area during a drought to proactively check on farming families: “We cannot do anything about the grass [not growing], but we can support people to be robust. We emotionally support each other as a community – get together by having BBQs and ‘Drought Shout’ things like that” (W7, Gisborne, 2020). These kinds of grassroots initiatives, often organised through the Rural Support Trust or ad-hoc local committees, helped farmers feel less isolated and more “in it together” when disaster struck. For example, a community event nicknamed a “Drought Shout” brought dozens of farming families together for an evening of food, laughter, and mutual support – offering a few hours of respite from the stresses of the drought (W8, Taranaki, 2020). Such gatherings encouraged people to check in on one another's well-being and reinforced a sense of solidarity across the rural community.

Our interviewees consistently observed that robust social ties helped blunt the negative impacts of climatic extremes on both mental health and farming operations. Knowing that neighbours and peers were facing the same ordeal made women feel less alone and more capable of coping. As one farmer put it, when drought struck, “everybody [was] facing the same situation ... we [could] emotionally support each other” (W2, Waikato, 2020).

In practical terms, their networks also mobilised assistance – whether it meant lending equipment, sharing surplus feed, or collectively lobbying for outside aid. Many women pointed to women-focused farming groups and wider community organisations as crucial parts of their adaptive capacity. Indeed, all but one of the farmers we interviewed described having extensive support networks that spanned informal relationships (family, friends, neighbours, local schools, church groups) and formal affiliations. These connections provided a strong foundation of social support they could draw on when crises hit, significantly cushioning the mental and emotional toll of droughts, floods, and storms.

4.4. Gender and social capital dynamics

Gendered social dynamics influenced how and where women farmers built the networks underpinning their adaptive capacity. Women in our study tended to be more involved in community-centred informal networks (school committees, neighbourhood groups, local discussion forums). In contrast, men have historically dominated the membership and leadership of nationwide formal farming organisations such as Federated Farmers or

DairyNZ. Some of these large bodies have tried to include more women in recent years, but traditional gender norms still linger in farming communities. Several participants recounted moments when they were implicitly treated as “lesser” farmers due to their gender – for instance, visitors to the farm assuming the woman present must be “the farmer’s wife” rather than a primary farmer or expressions of surprise upon encountering a female farm owner. Such deeply ingrained perceptions, rooted in a long history where women on farms were viewed as helpers or homemakers rather than farmers, continue to reverberate in rural NZ. Our interviews confirm that these lingering norms significantly influence how women engage in networks and build (or struggle to build) social capital, affecting their overall capacity to adapt to climate challenges.

A recurring theme was that women often felt marginalised or “on the outside” in male-dominated farming circles, even when no formal rules barred their participation. The informal dynamics in mixed-gender settings frequently left them feeling that their voices did not carry equal weight. One Gisborne woman observed that subtle factors – like women’s heavier family commitments, different priorities, or even communication styles – often “hampered [women] farmers’ capacities to fully participate” in traditional farm groups (W7, Gisborne, 2020). Another farmer from South Otago shared that she felt “not welcome” in the general (male-led) discussion group she had joined, a discomfort she “did not feel” when attending her women-only network meetings (W11, Otago, 2021). Similarly, others noted they were hesitant and “scared to speak out” in male-majority forums specifically because they were women in an otherwise male space (W8, Taranaki, 2020). In contrast, those feelings of otherness disappeared in women-only groups, where they felt free to share experiences, ask questions, and discuss problems openly without judgment. Many interviewees said they felt far more supported and heard in women-centric circles than traditional mixed-gender agricultural forums.

Some older participants reflected on how these gender dynamics have deep historical roots. One Auckland farmer in her 60s (W1, Auckland, 2020) recalled attending farming association meetings with her husband in the 1970s and 1980s, where women were typically relegated to supportive roles. “I was always the one asked to take notes or make the tea. The men did the talking”, she recounted, noting that even though she managed the farm accounts (and was arguably more knowledgeable about the finances), the men in the group never acknowledged her as an equal farming partner. Decades later, W1 observed that attitudes have shifted somewhat – more women now openly identify as farmers and actively participate in farming organisations – yet remnants of past assumptions persist. For example, when agricultural industry representatives visit her farm, they routinely mistake her adult son for “the farmer” and overlook her, even though she has been the sole farm decision-maker since her husband’s death over a decade ago. Other women shared similar stories of constantly proving their expertise in the face of others’ gendered assumptions.

In response to these challenges, many women have bypassed male-dominated spaces to build support networks. Women of W1’s generation, especially, often avoid general farming forums altogether and instead join or create women-only groups (such as Rural Women NZ the Country Women’s Institute, or regional women-in-agriculture networks) where they feel genuine knowledge-sharing and leadership can occur without gender bias. Our findings suggest that these modes of exclusion and marginalisation help explain why most women farmers rely far more on informal networks (and

women-centric groups) than on formal mixed-gender organisations. If the mainstream forums do not provide an equitable or comfortable space, women naturally seek alternative arenas to get the support and information they need.

Notably, different networks offered different benefits; women were attuned to those differences. One South Otago farmer (W11) who belonged to both mixed-gender and women-only groups observed a stark contrast in each group's focus and atmosphere. The women's farming network she participated in was "more a general discussion group" oriented toward mutual support and personal growth. In contrast, the male-dominated general farming group was "more business-oriented, production-driven", with conversations revolving mainly around profitability and technical issues (W11, Otago, 2021). Neither approach is inherently better, but this contrast suggests that women may not meet all their needs in the existing traditional forums, prompting them to cultivate supplementary support systems. Indeed, many women essentially curated two parallel networks: one to gain farming knowledge and market information (often via formal or mixed-gender channels) and another to receive moral support, encouragement, and a sense of community (often via informal or women-led channels).

Another practical barrier that the women highlighted was time. Women farmers typically juggle multiple roles and responsibilities beyond just farming – they are often the primary caregivers for children or elderly relatives, household managers, and active community volunteers alongside their farm work. Every interviewee described balancing significant paid and unpaid workloads on- and off-farm. This reality means that, in addition to sometimes feeling unwelcome, many simply lack the time to attend traditional networking events. As one woman candidly shared, attending evening meetings or multi-day conferences is often impractical when "you are also responsible for dinner, childcare, or community duties back home" (W4, 2020). These time constraints, layered on top of gender-based marginalisation, further compound the challenge of participating equally in formal farming networks.

Despite these hurdles, the women consistently stressed the importance of receiving and giving support in their lives and livelihoods. Over time, they have cultivated reciprocal support systems by exchanging advice, encouragement, and hands-on help. The social capital accumulated from these networks makes the women feel they can access crucial information from financial management and insurance to drought-resistant pasture species and ecological restoration techniques. In turn, this shared knowledge and support enables them to farm in more sustainable, financially viable ways, and climate-resilient ways. In practice, the women are actively leveraging their social networks to overcome challenges, even as they navigate social norms that sometimes limit their full participation. Their experiences illustrate a nuanced interplay between gender, social networks, and climate adaptation – one where strong community ties serve as both a buffer against climate risks and a pathway to empowerment in the agricultural sphere.

5. Discussion

Our study reveals that even in a high-income, agriculturally advanced context like NZ, gender norms significantly shape the distribution and utility of social capital in farming communities. We found that women farmers actively engage in various formal and informal networks, yet they often experience a diminished voice and agency once traditional

gender roles are in play. In Bourdieu's theory, their ability to leverage social capital is constrained by their position in a male-centric social hierarchy (Bourdieu 2010). While Putnam's community-centric view of social capital emphasises conditions of stable, trust-based networks, our findings demonstrate that stability for some can entail exclusion for others – a reminder that social networks can harbour a “dark side” of reinforcing power imbalances (Putnam 1995; 2001). In practice, ostensibly inclusive formal farming forums sometimes operated in exclusionary ways. For example, women in our study described feeling like “outsiders” in male-dominated discussion groups and noted that their contributions were often undervalued or ignored. This implicit marginalisation meant that, despite holding the same farming roles as men, women derived fewer benefits from membership in formal agricultural organisations. Their ability to fully participate in networks that were ostensibly open to all members was subtly limited.

The patterns of network involvement we observed among women farmers align with trends documented in other research (Pallares-Barbera and Casellas 2019). Prior studies (chiefly focused on post-disasters) show that women often rely on close-knit, grassroots networks (Fernández-Giménez, Ravera, and Oteros-Rozas 2022; Ganapati 2012), while men tend to dominate structured, institutional groups (Alston 2005; Alston and Wilkinson 1998; Magnúsdóttir and Kronsell 2021). Our evidence suggests that women's greater engagement in informal networks is partly a practical response to their dual responsibilities as farmers and primary caregivers (Alston, Clarke, and Whittenbury 2018; Farmer-Bowers 2010). Flexible, community-based groups can better accommodate childcare, household duties, and many women's relational communication styles (Rissing, Inwood, and Stengel 2021; Shortall 1994).

However, women's preference for informal networks is also a symptom of marginalisation rather than purely a matter of choice. Many interviewees described feeling unwelcome or “not taken seriously” in the male-dominated farming clubs and committees they had attempted to join. Subtle barriers exist alongside formal rules, often invisible to insiders and woven into casual interactions. They reinforce gender-biased tacit expectations and long-standing gender biases that rural social scientists have frequently overlooked (Glazebrook, Noll, and Opoku 2020; Mersha and Van Laerhoven 2016).

Our finding reinforces Alston's (2005, 156) observation that in rural communities, masculine dominance can be “overwhelming and yet go so unremarked” that it creates a collective blindness to women's experiences. Similarly, Tyler and Fairbrother (2013) and Pini (2007) find that men's control of local institutions in Australian rural communities curtailed women's influence on decision-making. Our study confirms that such a masculine hegemony persists in contemporary farming networks (Alston 2005). Men's advantage in this regard is about their abilities to join and access the benefits of formal social networks (such as greater political influence, more leadership opportunities, more abilities to access the latest information, technologies, strategies, and so on), which in turn contributes to increased social capital and adaptive capacity (Otieno et al. 2021).

NZ's context demonstrates the tenacity of these power dynamics. Despite being lauded as one of the most gender-equal countries, vestiges of patriarchy remain embedded in everyday rural life (Brookes 2016; Fountaine 2022) and, as such, hinder women's ability to cope with acute stressors and adapt to longer-term climatic changes (Rushton et al. 2020). This is especially concerning because it implies that even well-resourced, progressive societies are not immune to gendered barriers in

resilience-building. While the specific cultural expressions differ – whether it is women in rural Bangladesh expected to stay home and wait for male family members during floods (Nahar 2025) or farm women in Africa lacking recognition by extension services (Bezner Kerr et al. 2019; Ngigi, Mueller, and Birner 2017) – the underlying pattern of women’s marginalisation in agricultural decision-making is widespread.

Our study links this global literature to a Global North setting and provides evidence that the fundamental issue of gendered exclusion exists in a country with relatively advanced gender rights (Brookes 2016). By doing so, we address a notable gap in climate adaptation research, which has often focused on the Global South and seldom interrogated the gender dynamics of adaptive capacity in wealthier nations (Glazebrook, Noll, and Opoku 2020; Reed et al. 2014).

At the same time, our results highlight that women are not passive victims of these structures – they actively leverage social networks as resources for adaptation wherever possible (Johnson, Fisher, and Parsons 2022; 2024). Parallel studies from both the Global North and Global South show that robust informal networks can build social capital to enhance resilience (Crease, Parsons, and Fisher 2019; Mbuli and Fletcher 2021). By exchanging knowledge and labour and by simply reassuring each other that they were not alone in facing droughts or floods, the women’s informal social networks we studied helped bolster their members’ confidence and capacity to cope and adapt. Indeed, social scientists have long noted that communities with dense bonds of communication and trust are often better able to organise and respond to environmental stresses (Adger 2010; Pelling and High 2005).

Finally, social capital, understood here as the goodwill, information, and mutual aid flowing through relationships, emerged in our study as a key enabler of adaptive capacity (Pelling and High 2005). Women embedded in supportive networks felt more empowered to experiment with new farming techniques (e.g. trying drought-resistant crops after hearing success stories from peers). They were quicker to seek help or advice when confronting extreme weather. Thus, even in our relatively small sample, we see evidence that social capital can be a lifeline during climate challenges.

This corroborates recent research on Global North agriculture. For example, Fletcher et al. (2020) found that farmers’ social ties in rural Canada positively contribute to their capacities to cope with and adapt to droughts and floods. Likewise, studies of NZ Māori communities have emphasised that strong social ties (genealogical connections) between Māori individuals and their wider kin group (iwi/hapū) underpin their collective resilience and capacities to adapt to climate extremes and changes (Cram 2021; Smith 2020). Our contribution here is to show that these well-known benefits of social networks are not gender-neutral – they depend on who is connected and how: women and men often have different social networking patterns and opportunities (Mekonnen, Gerber, and Matz 2018; Pallares-Barbera and Casellas 2019). We extend this understanding by demonstrating the implications of those differences: gendered network structures can either support or impede individual and community adaptation. In other words, it is not enough for a farming community to have “strong networks” in general; our findings stress that we must ask whose knowledge and support circulate in those networks and who might be left at the margins.

Our analysis also carries several broader implications for theorising social capital and climate adaptation. In NZ, social capital’s benefits are unevenly distributed along gender lines within farming networks, which exemplifies how structural power inequities

operate subtly, an insight firmly grounded in feminist theory (Alston, Clarke, and Whittenbury 2018). It echoes gender historians' critiques of the historical invisibility of farm women's contributions (Henningham and Morgan 2018) and confirms that even today, ostensibly egalitarian rural communities contain embedded patriarchal biases (Bradshaw, Enarson, and Pease 2016; Fletcher 2017). By applying a feminist lens, we were able to uncover how certain norms (e.g. the notion that a "real farmer" is male or that women belong in auxiliary roles) continue to pervade social interactions and institutions. These findings reinforce the importance of intersectional and gender-conscious analyses in fields traditionally treating farmers as a homogenous group (Walker et al. 2019). They also validate Bourdieu's (2010) conceptualisation of social capital as an asset entwined with social status: gender is a status that mediates access to resources and influence. Women's weaker position in the farming social hierarchy meant that the same network membership yielded different returns than men, a dynamic consistent with Bourdieu's argument that capital often reproduces existing social stratifications (Bourdieu 2010). Our study contributes to theory by illuminating the gendered mechanisms through which adaptive capacity is constructed. We answer recent calls for more nuanced gender perspectives in climate adaptation research (Casey et al. 2025; Griffin, Wreford, and Cradock-Henry 2025), providing empirical evidence that challenges any gender-neutral (Reggers 2019) approaches to adaptation.

6. Conclusion

This study examined how gendered social capital shapes the adaptive capacity of women farmers in NZ. The research confirmed that gender dynamics are integral to climate adaptation processes: women farmers in our study actively innovate and cope with climate variability through diverse strategies and supportive social networks. However, they operate within social environments that do not fully value or support their contributions, reflecting persistent gendered barriers. By documenting these dynamics in the context of a developed country, our work begins to fill a crucial gap. It demonstrates that even in high-income farming communities, who gets a seat at the table and whose knowledge counts can determine adaptive outcomes. In short, empowering women's participation and recognising their informal networks emerged as key to strengthening collective resilience.

These findings have practical implications for policy, agricultural extension, and community initiatives. At the policy level, they highlight the need for gender-responsive adaptation strategies, and policymakers should ensure women farmers are equally included in decision-making forums, resource allocation, and leadership roles related to adaptation. The results underscore the importance of inclusive outreach and support for agricultural extension services. Extension programmes should engage women farmers proactively, value their knowledge, and tailor training to bolster their networking and adaptive skills. At the community level, fostering inclusive farmer groups and supporting women-led networks can harness under-appreciated strengths in information sharing and mutual aid. Initiatives facilitating women's discussion forums or mentorship schemes and encouraging male allies to advocate for women's equal participation could enhance community-wide resilience.

Notwithstanding its contributions, this study has several limitations. The sample size was relatively small and focused on one national context, which may limit the

generalizability of the findings. Our qualitative, in-depth approach prioritised rich insight over broad representativeness, so the patterns observed should be interpreted as exploratory rather than universally representative. Additionally, our focus on women's perspectives means that comparative insights with male farmers were beyond scope. These boundaries point to clear directions for future research. Larger-scale studies (including quantitative surveys or cross-context comparisons that include male farmers as participants) are needed to test whether the gendered patterns identified here hold across diverse farming populations and regions. Longitudinal research would be valuable to track how social capital and gender roles in agriculture evolve over time or under crisis conditions, indicating whether progress is being made or interventions are required. Future work should also evaluate targeted interventions to foster inclusive social capital, such as establishing new women farmer networks or training programmes that promote gender equity in farm organisations to identify effective, equitable, and just adaptation measures. Ultimately, advancing gender equity is a matter of social justice and a practical necessity for sustainable and climate-resilient farming communities. When women farmers are fully recognised, supported, and empowered, their communities are better equipped to adapt to climate challenges, ensuring that resilience is truly a shared endeavour.

Disclosure statement

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