Fostering leadership and gender equality in climate action among underserved, rural and Indigenous women: a qualitative exploration of opportunities and limitations in Peru

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Summary

Background Climate change has profound impacts on women's health and wellbeing, particularly in the Global South, which is disproportionately affected by environmental threats. Peru, one of the most biodiverse and culturally rich countries worldwide, is uniquely vulnerable to these effects due to its diverse ecosystems each facing distinct climate challenges. Yet research on the lived experiences of rural and Indigenous Peruvian women facing these impacts is scarce. We aim to explore the perspectives and experiences of underserved Peruvian women regarding the effects of climate change, and the needs, assets, and community responses to these threats.

Methods Between April and May 2022, we conducted 48 in-depth walking interviews with adult women from the Peruvian north coast, Amazon rainforest, and central and southern Andes regions. Using purposive and iterative snowball sampling, we recruited community key informants. We analysed the data thematically.

Findings Our analysis identified four main themes: (1) Local understanding of environmental changes, (2) Gendered impacts of climate change, (3) Women's participation in environmental governance, and (4) Pathways for gender-responsive climate action. Participants described vivid observations of environmental shifts, often attributing these to local human activities. Women reported increased caregiving responsibilities and economic vulnerabilities due to climate-related events. Barriers to women's participation in environmental decision-making were identified, including traditional gender roles and lack of voice in community forums. Participants highlighted the need for capacity building, leadership development, and integration of indigenous knowledge in climate action.

Interpretation This study underscores the imperative of centring gender equity and social justice in climate change adaptation and environmental governance. Findings highlight the urgent need to address systemic barriers, rebuild institutional trust, and adopt an intersectional, community-centric approach responsive to marginalised women's realities and priorities. Health systems should prepare for the mental health impacts of climate-related events on women, particularly increased anxiety and depression linked to resource insecurity and caregiving burdens. Policymakers should develop gender-responsive disaster preparedness plans, strengthen women's representation in environmental decision-making bodies, and create culturally appropriate climate communication strategies that integrate Indigenous knowledge systems. Implementation of targeted leadership training programs for women and establishing community-based environmental monitoring systems would enhance climate resilience while addressing gender inequities.

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Keywords: Gender equity; Environment; Climate change; Qualitative research; Peru

Research in context

Evidence before this study

We conducted a comprehensive literature review using PubMed, Scopus, SCIELO, and Google Scholar databases from inception to June 2023. Search terms included combinations of "climate change," "gender," "women," "Peru," "Indigenous," "rural," "adaptation," and "governance." Studies were included if they addressed gender dimensions of climate change in Peru or comparable Andean contexts. Prior research documented the disproportionate climate change impacts on women in the Global South, with particular vulnerabilities stemming from gender inequalities. In Latin America and the Caribbean, women's traditional roles in agriculture and water management were increasingly challenged by changing climate patterns. However, significant gaps remained in understanding how gender intersects with indigeneity and climate impacts across Peru's diverse ecological contexts. Limited qualitative evidence existed on the lived experiences of rural and Indigenous women facing these impacts, and barriers to women's participation in local environmental governance remained understudied in the Peruvian context.

Added value of this study

This study provides context-specific insights into the gendered dimensions of climate change across four distinct Peruvian ecological regions through in-depth qualitative research with rural and Indigenous women. It reveals how environmental disruptions intersect with socioeconomic inequities, exacerbating vulnerabilities among marginalised communities. The research highlights the complex interplay between local ontologies, gender roles, and climate change perceptions. Importantly, it uncovers emerging strategies these women employ to circumvent traditional barriers to participation in environmental governance. By identifying critical pathways for enhancing gender-responsive climate action -including capacity building, leadership development, addressing institutional distrust, and recognising Indigenous knowledge-this research provides valuable insights for policy-makers and practitioners working in the Peruvian context.

Implications of all the available evidence

The findings of this study, combined with existing evidence, underscore the need for gender-responsive and socially just approaches to climate change strategies in Peru. These must address the intersectionality of gender, ethnicity, and socioeconomic status to effectively support the most vulnerable populations. A critical implication is the urgent need to rebuild trust in public institutions through culturally responsive approaches to enhance engagement with climate-related initiatives.

The study underscores the importance of incorporating Indigenous cosmologies, traditional practices and women-led collective action into climate adaptation planning.

Collectively, these implications underscore the need for a paradigm shift in climate change response strategies. They point towards approaches that centre the voices, experiences, and leadership of Indigenous and rural women in frontline communities, making climate action more inclusive, effective, and sustainablefor those most affected by environmental changes.

Introduction

Climate change poses severe threats to marginalised populations worldwide,[1,2] with disproportionate effects on those in low—and middle-income countries.[3] Slow-onset events like droughts and glacier retreat, and fast-onset events such as floods and landslides significantly impact communities and ecosystems.[1]

Interdisciplinary scientific discourse acknowledges the importance of a systemic perspective when examining these impacts, including connections between human behaviours, and greenhouse gas emissions while considering costs to vulnerable populations. This allows us to examine how gender roles, socioeconomic factors, and cultural practices interact with climate change impacts, shaping women's vulnerabilities and adaptive capacities in Peru.

Climate change impacts are not experienced uniformly.[1] Gender is a significant factor in determining vulnerability and resilience,[4] with women facing unique challenges and disproportionate impacts.[5] In Latin America, women are often more vulnerable due to gender inequalities in resource access, decision-making power, and social mobility.[6] Women's traditional roles in agriculture and water management are increasingly challenged by changing precipitation patterns and glacial retreats.[7] However, a significant gap remains in understanding the intersection of gender, indigeneity, and climate change across diverse ecological contexts within Peru.[8]

These climatic events exacerbate threats to women's agricultural livelihoods, household food and water

security, infectious disease burdens, and safety.[5] Gender-based discrimination limits women's options to prepare, respond, and recover.[1] Climate-induced displacement elevates risks of violence.

Hazardous exposures, including heat and air pollution, amplify health effects over women's life courses, particularly during pregnancy or while providing care work. Women's livelihoods often directly depend on threatened natural resources, while losses from extreme events increase poverty and worsen mental health.[5]

Intersecting factors like gender, ethnicity, disability, and socioeconomic inequalities magnify climate vulnerability, further marginalising groups like Indigenous people and rural women with limited assets.

Environmental health research remains limited despite escalating climate threats disproportionately affecting Latin America.[9] In Peru, environmental changes are compounded by existing socioeconomic inequalities and limited adaptive capacity.[10] Women's experiences facing these stressors remain understudied, particularly among peri-urban and rural groups in the Global South.

Peru, despite accounting for only 0.3% of global carbon emissions,[10] is particularly vulnerable to climate change,[11] with hydrometeorological threats constituting 72% of national emergencies. Glacial surface loss impacts water sources for 62% of the population, and only 7% of high-altitude wetlands, key for biodiversity and water supply, are protected from mining concessions. Social and political crises exacerbate these challenges amidst diverse environmental stressors.

While sustainability laws progress, gaps persist in achieving gender equality.[12] Despite their impact, women's knowledge and leadership remain underutilised in governance and community-related decision-making.[13]

This study aims to 1) explore women's experiences facing climate change effects, 2) describe needs, risks, assets, and transformative action factors at individual and community levels, and 3) identify similarities and differences in women's experiences across Peru's diverse regions. We report qualitative data from adult women across peri-urban, semi-rural and rural regions to gain insights into their unique challenges experiencing climate hazards in different geographical and socioeconomic contexts.

In this study, peri-urban areas represent interfaces between city and countryside with mixed land use; semi-rural settlements maintain significant agricultural activities while having some urban characteristics; and rural areas are sparsely populated regions where agriculture predominates often with limited access to services. These contexts present unique challenges in facing climate impacts, influenced by varying degrees of urbanisation, economic activities, and resource access.

Methods

Study design

We conducted an exploratory qualitative study using semi-structured walking interviews with 48 key female community informants across four regions of Peru between April and June 2022 (See Table 1 - Sample Characteristics). 'Key female community informants' were women actively engaged in local activities including neighbourhood committees, government programs, subsistence farming, health/women's groups, or small entrepreneurship. Qualitative methods allowed for in-depth investigation based on firsthand accounts. Walking interviews enabled participants to discuss and showcase their physical surroundings,[14] pointing out specific areas of concern or witnessed environmental change(s) surrounding homes or work areas. The physical showcase data was coded as specific environmental features and their perceived changes over time. We used reflective thematic analysis[15] to gain insights into needs and experiences at individual and community levels.

Study setting—the contrasting Peruvian contexts

Peru ranks third globally in biodiversity and is home to 55 indigenous groups speaking 48 different native languages.[16] We purposefully sampled participants across distinct geographical regions to capture diverse climate contexts and reliance on threatened natural resources.[10]

a) *Piura Region:* Northwest Peru with dry tropical climate and temperatures from 15°C to 34 °C. Livelihoods depend on agriculture, fishing, and extractive industries. Key environmental challenges include recurrent floods, droughts, and coastal erosion. We engaged mestizo, Spanish-speaking women in eight semi-rural and peri-urban settlements across Cura Mori, Catacaos, and La Union districts.
b) *Puno Region:* Southern Andes, with altitudes from 3827 m to 6000 m and temperatures between –4 °C and 17 °C. Primary livelihoods include small-scale agriculture and tourism. Key challenges are droughts, floods, and freezing temperatures. We interviewed predominantly Quechua and Aymara Indigenous women in Amantani Island and El Collao, Puno, and Chucuito districts.
c) *Ucayali Region*: Central Peruvian Amazon, with tropical climate and temperatures from 22°C to 34 °C. Main livelihoods include forestry and agriculture. Key challenges are deforestation, flooding, and increasing temperatures. We engaged women of mixed heritage and Indigenous Yine and Shipibo ethnicities in settlements around Pucallpa.
d) *Ayacucho Region:* South-central Andes, between 2761 m and 3829 m altitudes with temperatures between 11°C and 16 °C. Primary livelihoods are farming and livestock rearing. Key challenges

Natural region (Department)	ID	Age (years)	Occupation/*community role*	Education	Ethnicity
Southeastern Andes (Puno)	PUN-01	33	Subsistence farming, eco-tourism host, traditional artisan	Complete Secondary	Quechua
	PUN-02	32	Subsistence farming, eco-tourism host, traditional artisan/*Delegate–"Glass of Milk" government program*	Complete Secondary	Quechua
	PUN-03	22	Subsistence farming, eco-tourism host, traditional artisan	Complete Secondary	Quechua
	PUN-04	52	Subsistence farmer, small cattle breeder	Incomplete Primary	Aymara
	PUN-05	50	Owner of grocery store, subsistence farmer	No qualifications	Aymara
	PUN-06	22	Teacher (currently between jobs)	Complete Tertiary	Aymara
	PUN-07	68	Pensioner, Subsistence farming	No qualifications	Aymara
	PUN-08	25	Hospitality graduate, law student, intern at district attorney's office/*Member of local Feminist association*	Complete Tertiary	Mixed/Other
	PUN-09	68	Former municipal mayor, congress candidate, political leader	Complete Tertiary	Mixed/Other
	PUN-10	28	Owner grocery store, trout fish farmer, subsistence farmer	Complete Secondary	Aymara
	PUN-11	54	Owner of grocery store, former trout fish farmer	Complete Secondary	Mixed/Other
	PUN-12	48	Subsistence farmer, former trout fish farmer/*Former neighbourhood leader*	Complete Secondary	Aymara
Eastern Amazonian rainforest (Ucayali)	PUC-01	46	Homemaker/*Delegate–"Glass of Milk" government program*	Incomplete secondary	Mixed/Other
	PUC-02	54	Owner of grocery store, subsistence farmer	Incomplete Primary	Mixed/Other
	PUC-03	37	Obstetrician at the local health centre	Complete Tertiary	Mixed/Other
	PUC-04	37	Owner grocery store/sells homemade food/*Voluntary at "Glass of Milk" government program.*	Incomplete Tertiary	Mixed/Other
	PUC-05	26	Housekeeper	Incomplete Tertiary	Mixed/Other
	PUC-06	48	Community health agent/*Head of local neighbourhood committee*	Complete Technical	Mixed/Other
	PUC-07	49	Independent trader/*Community health agent/Treasurer at Local Health Administration Community (CLAS)*	Complete Technical	Mixed/Other
	PUC-08	34	Housekeeper/Community health agent	Incomplete Tertiary	Quechua
	PUC-09	40	Housekeeper/*President–local "Glass of Milk" government program & district coordinator for the municipality*	Complete Secondary	Ashaninka
	PUC-10	39	Homeowner, traditional artisan	Incomplete Tertiary	Shipibo-Koniko
	PUC-11	34	Sells homemade food	Incomplete Secondary	Mixed/Other
	PUC-12	30	Deputy Manager of Green Area and Municipal Environmental Management	Complete Tertiary	Mixed/Other
Southcentral Andes (Ayacucho)	AYA-01	55	Housekeeper/*Volunteer community leader (defence)*	Complete Secondary	Quechua
	AYA-02	60	Subsistence farmer/Housekeeper/*President of civil association*	Complete Secondary	Quechua
	AYA-03	50	Subsistence farmer/Housekeeper/*President of civil association*	Complete Secondary	Quechua
	AYA-04	30	Subsistence farmer/Housekeeper/*President "Glass of Milk" government program/ President local "Juntos" program*	Incomplete Secondary	Quechua
	AYA-05	35	Subsistence farmer/Housekeeper/*Prosecutor local "Juntos" government program*	Complete Secondary	Quechua
	AYA-06	35	Owner of grocery store/subsistence farmer/*Volunteer community leader (defence)*	Complete Secondary	Quechua
	AYA-07	35	Subsistence farmer/Housekeeper/*Former president of Women Entrepreneurship Association*	Complete Secondary	Quechua
	AYA-08	50	Primary level teacher	Complete Tertiary	Quechua
	AYA-09	50	NGO director/director of agriculture and Livestock Development Centre	Complete Tertiary	Quechua
	AYA-10	30	Student/Housewife	Complete Tertiary	Quechua
	AYA-11	60	Coordinator government commission (CNAM)	Complete Tertiary	Quechua
	AYA-12	60	Director regional Indigenous Women Federation/community *leader*	Complete Secondary	Quechua

(Table 1 continues on next page)

include water scarcity and land degradation. We approached Indigenous Quechua speaking women from eight communities in La Mar and Ayacucho districts.

Sample and recruitment strategy

Eligibility criteria were 18+ years, permanent local residency, Spanish fluency, and to provide informed consent. We employed purposive and snowball sampling to recruit 12 adult women per region engaged in local activities, enabling comparisons aligned with study objectives. This sample was based on previous research suggesting thematic saturation in relatively homogeneous populations. While practical, this sampling strategy does not aim to represent all Peruvian women. The local research team consisted of experienced and trained four

Natural region (Department)	ID	Age (years)	Occupation/*community role*	Education	Ethnicity
(Continued from previous page)					
Northwestern coast (Piura)	PIU-01	42	Housekeeper/*President–local "Glass of Milk" government program & Volunteer at "CunaMas" government program*	Complete Primary	Mixed/Other
	PIU-02	59	District Councilor/*Neighbour Committee leader* & Meal kitchen leader	Incomplete Secondary	Mixed/Other
	PIU-03	43	Lieutenant governor/Teacher/*Disaster brigade volunteer*	Complete Secondary	Mixed/Other
	PIU-04	37	Social actor/*Anaemia surveyor*	Complete Secondary	Mixed/Other
	PIU-05	29	Labourer/*Social actor*	Complete Secondary	Mixed/Other
	PIU-06	58	President of local soup kitchen/*Coordinator of disaster drains*	Incomplete Primary	Mixed/Other
	PIU-07	54	Lieutenant governor/*Leader–"Juntos" government program*	Complete Secondary	Mixed/Other
	PIU-08	33	Secretary school parent's association/*Street delegate*	Complete Secondary	Mixed/Other
	PIU-09	44	Lieutenant governor/Housekeeper	Complete Secondary	Mixed/Other
	PIU-10	34	President school parent's association/*Leader–"Juntos" government program*	Complete Secondary	Mixed/Other
	PIU-11	20	Volunteer International plan program/Classroom coordinator	Complete Secondary	Mixed/Other
	PIU-12	42	Labourer/*President–local "Glass of Milk" government program/Treasurer classroom* committee	Incomplete Primary	Mixed/Other

Table 1: **Sample Characteristics.**

research assistants from the studied regions with knowledge of local customs and languages. Recruitment relied on their connections with community leaders linked to environment, health, or government programs. Each initial interviewee then provided 1–2 local references they considered suitable informants and were later invited to participate, confirmed after a team discussion. Of those approached, only three persons refused citing lack of time or competing responsibilities. Data saturation was assessed through ongoing analysis, considered reached when new interviews yielded no substantially new insights.

Data collection

We developed a semi-structured thematic topic guide collaboratively (Supplementary S1) based on existing literature and local insights, informed by social-ecological systems framework[17] and feminist political ecology.[18] The guide explored four main themes: i) perceptions of climate and environmental issues; ii) gender engagement, risks and barriers; iii) local priorities and responses; and iv) persistent gaps and assets. We piloted the guide with the local Peruvian partners and was refined before data collection.

Most participants opted for walking interviews, while some preferred seated interviews due to health concerns. Interviews of 40–80 min were audio-recorded and transcribed verbatim using HappyScribe© transcription software, which ensures data privacy compliance. As an additional precaution, we removed all identifying information before uploading audio files. The first and second authors verified transcription accuracy with analysis using the original Spanish transcripts.

Data analysis

The first author and local team engaged in immediate post-interview discussions to foster critical reflection and assessed thematic saturation. We employed deductive and inductive coding, initially assigning codes based on the topic guide (Supplementary S2) while allowing emergent codes on new topics.[19] Analysis followed Braun and Clarke's six phases of thematic analysis: data familiarisation, generating initial codes, searching for themes, reviewing themes, defining and naming themes, and writing up.[15] The first author conducted a preliminary analysis to identify emergent themes for an initial codebook. Through iterative coding and codebook refinement, additional themes were incorporated to capture nuanced constraints and opportunities expressed by participants. Analysis was conducted using Spanish transcripts to ensure cross-cultural meaning was preserved. Only the final quotes were translated to English.

Patterns were examined based on environmental factors, geography, age, and individual contexts, with final themes were reviewed with local partners to validate interpretations.

Ethics

The study received ethical approval from the Peruvian Comite de Etica Prisma ONG (Letter CE0134.22) and the LSHTM Research Ethics Committee (Ref.26912). Participants provided voluntary informed consent with an agreement to audio recording. Confidentiality was ensured through data anonymisation with unique codes. While no monetary compensation was provided, we acknowledged participants' time and shared knowledge by offering refreshments during interviews and providing a summary of findings upon study completion.

Positionality statement

The first author is Peruvian but has lived in the U.K. for over nine years. The local team comprised four

experienced and trained research assistants from each studied region. This composition ensured deep knowledge of local customs, languages and cultural and contextual insights. Our approach was guided by a feminist intersectional theoretical framework,[20] which recognises the complex interplay of social identities in shaping experiences of environmental change (Supplementary S2–full positionality).

Role of the funding source
This study was supported by the Gordon and Betty Moore Foundation through a Planetary Health Fellowship at the London School of Hygiene & Tropical Medicine (LSHTM) in partnership with Stanford University. The fellowship was awarded to Elaine C. Flores. The funding body had no role in the study design, data collection, data analysis, data interpretation, or report writing. The authors made the decision to submit the article for publication independently.

Results
Our analysis identified four overarching themes, each with several subthemes supported by illustrative participant quotes (Table 2. Representative quotes—Key Subthemes; Supplementary S3—Themes, categories, and codes).

1. Local understanding of environmental changes: a. Observed environmental shifts; b. Attribution of causes; c. Impacts on daily life and livelihoods;
2. Gendered impacts of climate change: a. Increased caregiving responsibilities; b. Economic vulnerabilities; c. Agricultural challenges; d. Health and safety concerns;
3. Women's participation in environmental governance: a. Barriers to engagement; b. Current forms of participation; c. The perceived value of women's involvement;
4. Pathways for gender-responsive climate action: a. Capacity building needs; b. Leadership development; c. Addressing institutional barriers; d. Integrating Indigenous knowledge.

While distinct, these themes are interconnected, reflecting how climate change intersects with existing social, economic, and cultural structures (See Fig. 1 for a thematic map).

Sample
Interviews were conducted with 48 women aged 20–68, all residing in their respective locations for at least five years. Participants held various roles: community leaders, subsistence farmers, neighbour committee members, government program coordinators, self-employed workers, and homemakers. Data saturation was achieved with 12 individuals per region. Table 1 presents participants' characteristics, including region, occupation/community role, education level, self-reported ethnicity, and age range. To ensure confidentiality, participants are identified using coded abbreviations: Region abbreviations (PUC: Pucallpa, PUN: Puno, AYA: Ayacucho, PIU: Piura) followed by the consecutive interview number. While our analysis focused on overarching themes, we noted regional variations in experiences and priorities.

Local understanding of environmental changes
While participants were generally unfamiliar with scientific terminology like "climate change" or "global warming", they clearly described drastic and increasingly unpredictable environmental shifts using tangible, locally relevant markers. Women across all study regions demonstrated a nuanced, experiential understanding of climate-related impacts.

Most participants attributed these changes to human activities, with explanations showcasing a complex interplay between local and global factors.

1. Local, direct human actions like deforestation and pollution
2. Broader, societal-level human influences.

Some expressed uncertainty about root causes, while others drew on spiritual beliefs to make sense of the changes. Participants described tangible impacts on public health, food security, and ecological systems.

Such accounts challenge decontextualised framings of climate change, revealing how communities experience environmental disruptions as compounding existing vulnerabilities.

Gendered experiences and impacts
The data reveals distinct gendered impacts of climate change, deeply rooted in women's social and economic roles. While some participants initially stated that "*disasters make no difference,*" further probing elicited vivid accounts of women's unique vulnerabilities and burdens.

- Increased caregiving responsibilities emerged as a central theme, reflecting how traditional gender roles amplify women's climate-related challenges.

Other key findings included greater responsibility for household resource management, heightened economic vulnerability during extreme events and intensified agricultural labour.

While men are also affected by climate change, particularly in agricultural work, women bear a disproportionate burden due to their multiple roles, exacerbated in the context of male outmigration.

This reveals the complex dynamics of climate-induced migration and its gendered implications in increasingly challenging environmental conditions.

Theme	Representative quotes
Local understanding of environmental changes	Experiential understanding of climate-related impacts with implications for daily life and livelihoods: *"It is more; the heat is more intense … the cold too, it is colder … a lot, a lot of rain and landslides"(AYA-06)* *"It does not rain on time; we do not have the frosts we used to have … water is scarce, springs dry up"(AYA-09)* *"Before it did not rain like now … before it was raining one day, sunny two days, now it is only rain"(PUC-02)* *"The cold is no longer dry; it is humid. You feel it in the houses, on the walls, in the environment … the climate is completely different, we no longer know it … before we knew when it was sowing time"(PUN-06)* *"Lake Titicaca has never recovered its volume; it has receded enormously, and no one realises"(PUN-09)* Attribution explanations of climate-related impacts: 1. Local, direct human actions like deforestation, pollution, and improper waste management: *"It could be because, sometimes, they cut down trees … that, I think, changes the climate a lot, right?"(PUC-11)* *"Due to environmental pollution … because most of us throw away garbage, burn plastics … "(PUN-01)* *"(The cause is) the same pollution that we create here, in the rivers, in the cochas [lagoons]"(PUC-06)* 2. Broader, societal-level human influences: *"We are the main enemies of nature because everyone talks about climate change, that we must be careful, that no, that no, that what we are doing (polluting) is irresponsible"(PUN-08)* *"Humans are destroyers … cutting down trees, pollution, all of that harms the environment, right?"(AYA-02)* *"They (people) say it is because we do not take care of nature. We … for example, burn garbage"(PIU-03)* 3. Uncertainty, spiritual causes: *"Some say God is punishing us, punishment they say (…) what it will be"(AYA-03)* *"Only God knows why this is happening … those differences in climates, climate change, let's say"(PUC-01)* *"Maybe because God is allowing that … sometimes we as human beings disobey God's creation for us"(PIU-09)* Impacts of environmental changes on public health, food security and ecological systems: *"For example, COVID, first COVID came out, then they say dengue fever, like this"(PUC-11)* *"Plants and crops are affected a lot … now we see countless pests. Now we see that this climate change has brought new mosquitoes, more pests … pests are also coming for the animals … animals die"(PIU-10)* *" … in this (flooded) area, quite a few snakes were killed … they came and stayed … and the men tried to kill them because they lived in that, in the pooled water"(PIU-09)*
Gendered experiences and impacts	Increased caregiving responsibilities: *"As mothers and women, we are the most harmed, I say. Why? Because we stay at home (…) with those sudden climate changes, children are affected, our elderly get sick, and we have to take care of them … at home, take them from one place to another, while they (men) are away"(PUC-06).* Greater responsibility for household resource management: *"It affects us a lot, as women, because we are the ones who see the need within our homes"(PUC-07). "Women care a little more … they cry when they see [their crops losses, and say], oh my farm, now with what am I going to support my son?"(PUN-02).* *"They (men) go to the farm. They do not worry about what you are going to cook. With what water you're going to (do house chores), or from where will you bring it? Or it is a minimal worry for them"(AYA-06)* Heightened economic vulnerability during extreme events: *"Here in 2017, it was terrible; I lost everything … well, I was pregnant with my baby, then … (…) when I came (back) to live in my house, I said no, no, no, you can not live here anymore … we saw that … some bad people took advantage of the situation and stole ….and yes, I lost all my animals"(PIU-08)* Intensified agricultural labour: *"In other words, (she speaks in Quechua) […] we work more. For example, in the morning, we get up, we cook, we give the animals food, from there we go to the farm [to work], we come back to cook, take care of the animals, goats, pigs, all is harder with the climate changes, our job"(AYA-03)* *"Well, here the weather is getting much hotter ….if you go to any place to do any (fieldwork) job … they don't give you 8 h … but 13 h they give you in that job … through that you receive, much fatigue"(PIU-02)* - This is exacerbated in the context of male outmigration. *"Some [men] go for a year, two years, some die there already"(PUN-03)*
Women's participation in environmental governance	Traditional gender roles as a primary obstacle to participation:*"Women take more care of the home, and men take care of the fields" (AYA-09)* *"Women participation is very little, isn't it? In the community meetings, isn't it? They (women attending) are very few, now, more are men, right? done by men"(PUC-04)* Lack of voice in community forums: *"No, it is very low, really. The women do not participate much. If they go to the meetings, they hardly give their opinion; the opinion is more of the man, not the woman, [they] do not speak"(PUC-03)* Despite possessing unique knowledge of household and community needs: *"It affects us a lot, as women, because we are the ones who really see the need within the household, right? And also affects us to be able to feed our children"(PUC-07).* *"I think that we as women discuss these themes … without, without underestimating men, I think that only women think the most (about environmental problems)"(PUC-08)* Persistent machismo and violence against women as key barriers: *" … look, when there is a meeting with men, they [women] no longer go because they [men] will say 'stay at home, don't talk to someone there … do they know that I am a man? So you go to a meeting instead of me? Far from it' ….when there is a soup kitchen meeting you will never see a man (PIU-02)* *"More women are already entering (as union leaders), our sisters from the countryside, from the communities, a little, but the (gender) violence continues. The violence continues."(AYA-12)* Emerging strategies for collective action and communication: *"Within my community, I am always in constant [touch] with women. I have 30 women who are always in communication with me; we even have this WhatsApp group that we use to communicate with"(PUC-09)*

(Table 2 continues on next page)

Theme	Representative quotes
(Continued from previous page)	
Pathways for gender-responsive climate action	A sense of unpreparedness highlights the urgency for targeted solutions: *" ... we are not prepared for these threats, we are not prepared for these changes ... in reality, sometimes we do not even know what to do, we become desperate ... at that moment we don't think anything, right? And our children are the ones who suffer the most at that moment. ... I tell you, we are not prepared"(PIU-07)* Critical areas for intervention: - Capacity-building initiatives and training: *"More training on these issues is necessary for women ... (in the past) some NGOs have supported us with training"(AYA-09)* - Leadership development emerged as a key opportunity: *"I see more commitment in women, right? I perceive that women are more sensitive, and they have, I think, the capacity to search, improve, and learn. Obviously, it is not the same for all women, but I think it surpasses in a greater number a man's commitment and responsibility in these activities."(PUC-12)* - Institutional distrust is a significant barrier to engagement: *"Now people have lost (their) trust, even us [healthworkers] because sometimes they [authorities] come and deceive us. They say one thing, and then they tell us something else."(PIU-09)* *" ... they [authorities] also don't want to give us help because they [illegal loggers] pay them a tax [bribe] for the wood ... "(PUC-02)* *"There is no trust, well, miss, because in the hospital they treat us ... I don't know, they treat us like a dog, well, like that, miss, that's how nurses are ... I do not want to go there anymore ... "(PUN-07)* - Importance of recognising and integrating Indigenous knowledge: *"[we need] more participation, dialogues with women, with the, with the Shipibas, with the Yines, with other ethnic groups, right?"(PUC-10)* *"Indigenous women feel more related to nature because Pachamama [mother nature] is related to them." (PUN-08)* The data also showed examples of grassroots mobilisation and community-led initiatives, such as Indigenous communities organising cultural rituals: *"They have gone up (the mountain), they have organised with my community, my community went to dance the Qashwa dance, at night ... let's all go, they said, to pray to Pachatata, they went to dance at night, they were dancing, in a night vigil, kneeling to Pachatata, to Pachamama ... it rained, but only a little, perhaps that is why now it is raining so strong"(PUN-03)* Or community-led activities such as cleaning waterways before floods: *"Now our (new) community president has come in, we have already done a (garbage) cleanup yesterday, everything, the entire community, everyone who lives here has helped in the river"(PUN-10)*

Table 2: **Representative quotes—Key Subthemes.**

Women's participation in environmental governance

Our findings revealed significant barriers to women's engagement in local environmental actions and decision-making processes. Traditional gender roles emerged as a primary obstacle, with persistent gender division of labour confining women's perceived roles to the domestic sphere, Lack of voice in community forums was another common barrier.

The data also showed a paradox: while women are often excluded from formal decision-making, they possess unique knowledge of household and community needs, suggesting untapped potential for more effective, gender-inclusive environmental governance.

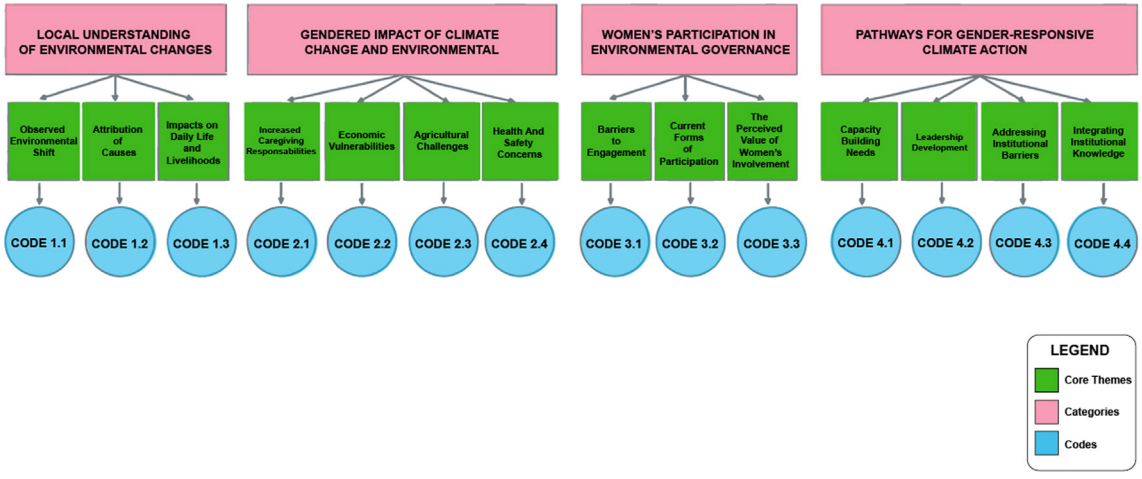

Fig. 1: Thematic map.

Persistent machismo and violence against women emerged as another critical barrier.

Despite these challenges, our data revealed emerging strategies women employ to circumvent traditional barriers, like messaging groups to discuss shared challenges and amplify their voices.

Pathways for gender-responsive climate action

Our analysis identified four critical pathways for enhancing gender-responsive climate action: capacity building, leadership development, addressing institutional distrust, and recognising Indigenous knowledge. A sense of unpreparedness to confront escalating environmental threats pervaded women's accounts.

There was a growing recognition of women's leadership potential in climate action, challenging traditional gender norms. However, deep-seated institutional distrust poses a significant barrier to engagement.

This mistrust, rooted in historical experiences of marginalisation and deception, highlights the need rebuild trust as key in any gender-responsive climate action.

The data also showed examples of grassroots mobilisation and community-led initiatives, such as Indigenous communities organising cultural rituals, or cleaning waterways before floods.

These community-driven efforts signal the potential for participatory, gender-responsive adaptation rooted in indigenous knowledge systems.

Discussion

This qualitative study offers insights into the gendered dimensions of climate change impacts within diverse Peruvian contexts. By centring on women's lived experiences, the findings highlight how environmental disruptions intersect with socioeconomic inequities, exacerbating vulnerabilities among marginalised groups, particularly Indigenous and rural women. Despite many participants achieving secondary or tertiary education, their occupations and socioeconomic status revealed poverty's multidimensional nature, reflecting Peru's precarious education system that often failed to equip graduates with degrees for formal employment. Our findings underscore the importance of environmental justice, defined as the fair treatment and meaningful involvement of all people in environmental laws, regulations, and policies. The unequal distribution of environmental burdens and limited access to decision-making processes highlight the systemic nature of the challenges faced by these communities.[1]

A key contribution is grounding climate change discourse in local communities' experiential understanding. Women conveyed vivid, place-based accounts of environmental transformation, attributing shifts to human activities. This approach aligns with growing calls to prioritise local ontologies and epistemologies in climate change communication and response strategies, fostering more contextually relevant climate action.

The findings underscore the gendered ways environmental threats disrupt women's social, economic, and caregiving roles. Accounts of intensified workloads, financial losses, and heightened care burdens echo studies highlighting the "feminisation of environmental responsibility".[4] These gendered impacts intersect with other axes of marginalisation, compounding vulnerabilities of the most marginalised. This aligns with previous research in Peru,[21] where women had fewer opportunities to adapt to climate stressors and access public-funded adaptation programmes designed primarily for Spanish-speaking male landowners. Addressing these intersectional factors is crucial for improving adaptation capacity.[22]

The study uncovers contrasting perspectives between attributing climate change to anthropogenic drivers versus supernatural forces. This dichotomy reflects the complex interplay between Indigenous cosmologies and modern extractive activities.[23] Bridging this epistemological divide is crucial for developing culturally resonant adaptation strategies that harmonise environmental stewardship with sustainable livelihoods.[24,25]

Structural barriers impede women's meaningful participation in decision-making and climate action. Entrenched gender norms, unequal domestic responsibilities, and dismissal of women's knowledge relegate them to the margins of community governance, a phenomenon documented across diverse contexts.[26] Overcoming these constraints is essential for inclusive climate action.

Despite these challenges, findings highlight women's resilience and emergent efforts to assert their unique perspectives, evidenced in community-led initiatives, like cultural rituals and collective waterway cleaning. The concept of transformative empowerment emerges, referring to processes that challenge gender inequalities in climate change contexts.[27,28] This was illustrated by women's formation of messaging groups to discuss shared challenges. Our findings resonate with studies emphasising the transformative potential of women's collective action in climate adaptation. Supporting these grassroots initiatives through empowerment programmes and supportive policy frameworks could catalyse women's leadership in environmental stewardship. A critical barrier identified is the profound lack of trust in public institutions due to past mistreatment and cultural incompatibility. This eroded trust poses a significant obstacle to women's engagement with climate-related programmes. Rebuilding trust through culturally responsive approaches is a pressing priority, as seen in other contexts where distrust has hindered adaptation measures.[29]

Despite widespread recognition of climate change impacts, there is a belief that women do not need to be at the forefront of solutions. This points to persistent gender-based inequities constraining women's participation in environmental governance. Evidence shows that women's leadership enhances resilience to climate change, leading to better policy outcomes.[30] Failure to include women carries substantial costs, hindering practical efforts to address climate challenges.

Limitations and future directions

While providing rich insights, this study's qualitative nature and limited sample constrain generalisability. Future research could explore gendered dimensions of climate change impacts through larger-scale, mixed-methods approaches incorporating quantitative health and livelihood data. Additionally, deeper intersectional analyses could yield important insights.

Policy implications and recommendations

These findings underscore the imperative of centring gender equity in climate actions. Key recommendations include: 1) Targeted capacity-building and leadership development initiatives challenging restrictive gender norms and empowering women as active agents of change. 2) Rebuilding trust in public institutions through culturally responsive, community-centric approaches to enhance uptake of climate-related initiatives. 3) Integrating Indigenous knowledge into climate change adaptation planning to develop culturally resonant strategies that harmonise environmental stewardship with sustainable livelihoods. 4) Improving climate change communication through locally grounded approaches by collaborating with community members to co-create culturally appropriate responses.

Centring the voices of marginalised women underscores their disproportionate burdens and their resilience. Addressing systemic barriers, rebuilding institutional trust, and adopting an intersectional approach is essential for developing climate responses responsive to frontline communities' realities and priorities. This research emphasises the transformative potential of women-led, community-driven climate action in pursuing more equitable futures.

Contributors

ECF, RK: conceptualisation. RK: Supervision. ECF, AFF, BAD, RCC, EML, FOC: investigation. ECF: preliminary analysis. ECF, AFF, BAD, RCC, EML, FOC: data verification, access to raw data, collaborative analysis and data curation. ECF: writing-original draft. ECF, AFF, BAD, RCC, EML, FOC, RK: writing-review and decision to submit for publication.

Data sharing statement

Per our ethical approval constraints, individual participant qualitative data from this study will not be publicly available. However, we encourage interested researchers with sound methodological proposals to reach out for potential collaboration. Proposals can be directed to the corresponding author at elaine.flores@lshtm.ac.uk.

Declaration of interests

The authors declare no competing interests.

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Appendix A. Supplementary data

Supplementary data related to this article can be found at https://doi.org/10.1016/j.lana.2025.101109.

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