



EVIDENCE EXPLAINER

Identifying climate-agriculture-gender inequality hotspots can help target investments and make women drivers of climate resilience

authored by

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Key Messages

- Women in food systems tend to be more negatively impacted by climate risks than men as they are more dependent on agriculture as well as more constrained in responding and adapting to changes in climate because of structural socio-economic inequalities.
- Identifying climate-agriculture-gender inequality hotspots, where climate hazards converge with large concentrations of women participating in food systems and significant structural gender inequalities, enables allocating scarce resources to most-at-risk populations.
- Women's vulnerability to climate risk is highly contextual; this methodology to identify hotspots can be applied to identify subnational hotspots within countries.

- When root causes of women's excess risk to climate change impacts are addressed, women can be agents of change in building climate resilience.

Climate shocks and stressors impact women and men in food systems differently

Food systems in low- and middle-income countries (LMICs), particularly in Africa and Asia, face direct stress from climate-induced changes and house a large population of smallholder farmers who are dependent on their immediate environment for their livelihoods, food and nutrition.

Climate change is a potential threat to gender equality in agriculture and food systems. Women smallholder farmers are more vulnerable than men to climatic shocks and stressors as they tend to be more dependent on agriculture and natural resources and have less diversified livelihoods. Structural gender inequalities impede women's ability to respond to, adapt to or mitigate climate change impacts. Women tend to have fewer and lower-value assets as well as less access to land, capital, labor, agricultural inputs, and social and institutional networks. Coupled with social norms and gender roles that limit their agency, both at the household and community levels, women's access to and use of climate-smart technologies is constrained.

Women, however, can drive efforts to build climate resilience if existing inequalities and the underlying causes are addressed. There is a growing body of evidence of effective ways (<https://gender.cgiar.org/news/building-farmers-resilience-climate-change-means-addressing-gender-inequalities>) to do so.

Identifying climate-agriculture-gender inequality hotspots

Identifying hotspots, where climate hazards converge with large concentrations of women participating in food systems and significant structural gender inequalities, enables investors to allocate limited resources to the most-at-risk, most vulnerable populations.

We developed a methodology (<https://gender.cgiar.org/publications-data/effectively-targeting-climate-investments-methodology-mapping-climate-agriculture>) to identify, rank and map climate-agriculture-gender inequality hotspots. Building on the Intergovernmental Panel on Climate Change's risk framework (<https://archive.ipcc.ch/>) and previous research (<https://link.springer.com/article/10.1007/s10584-018-2350-8>), we define climate-agriculture-gender inequality hotspots as geographical areas where high levels of *climate hazards* converge with high levels of women's (labor) participation in agriculture and food systems (*exposure*) and high levels of women's *vulnerability* due to prevailing gender inequalities (figure 1).

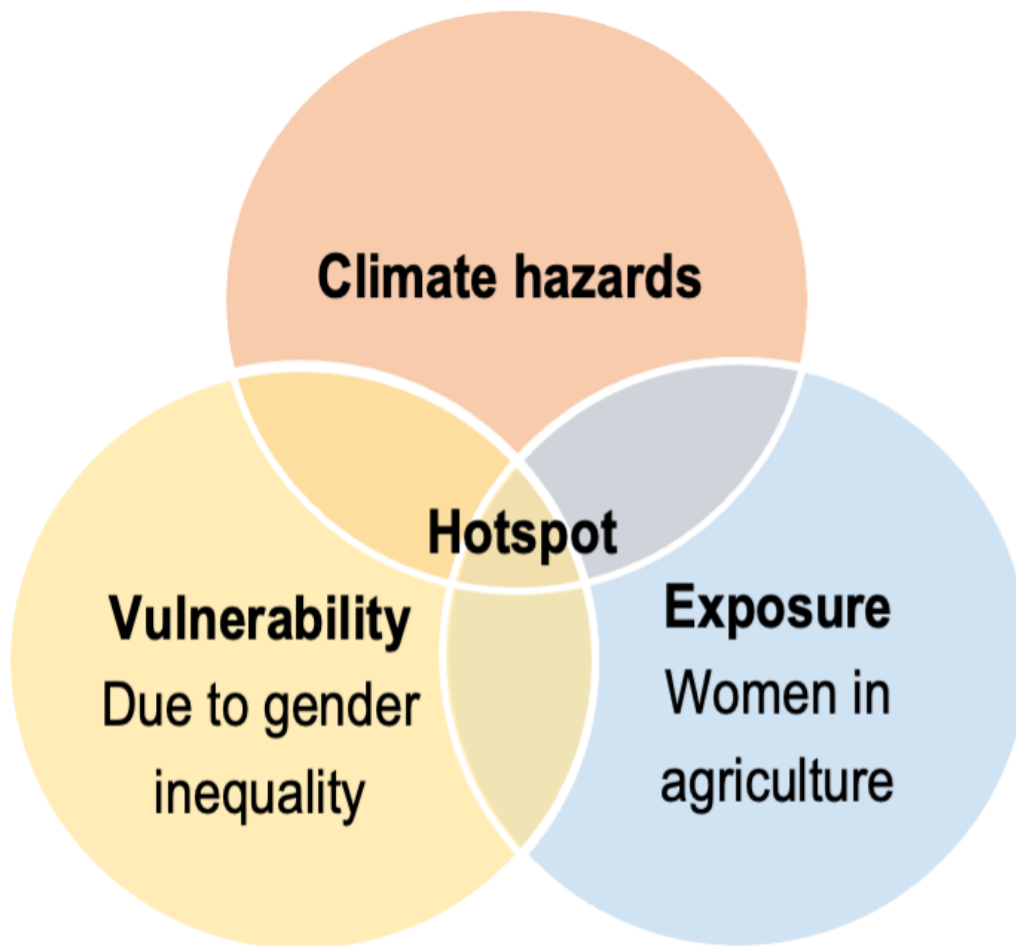


Figure 1 Components of climate–agriculture–gender inequality hotspots.

Our climate–agriculture–gender inequality hotspot index is based on publicly available representative data with geospatial information capturing i) climate hazards, ii) women’s exposure and iii) women’s vulnerability due to gender inequalities. The hazards are measured by the share of rural population likely to face specific climate hazard types, using data from the CGIAR Research Program on Climate Change, Agriculture and Food Security

(<https://cgspace.cgiar.org/handle/10568/113289>). Women’s exposure is measured based on their labor participation and hours worked in agriculture, including the relative importance of the crop or commodity, using Labor Force Survey (LFS) data

(<https://www.ilo.org/surveyLib/index.php/catalog/LFS/about>). Women’s vulnerability due to gender inequalities is proxied by five discriminatory social institutions captured in the Social Institutions and Gender Index (SIGI) 2014

(<https://www.genderindex.org/countries-territories-2014/>). We use principal component analysis to construct an ordinal hotspot index based on those data.

African countries are climate-agriculture-gender inequality hotspots

LMICs were then ranked by the climate–agriculture–gender inequality hotspot index and visualized on a global map (figure 2). Table 1 presents part of the hotspot ranking. For instance, Gabon is the ‘hottest’ as it scores highest on the index.

‘Coolest’ countries are the Dominican Republic and El Salvador. The methodology

was applied at a subnational level to four relatively hot, data-rich countries, including Mali and Zambia in Africa, and the 'hottest' Asian countries, namely Pakistan and Bangladesh.

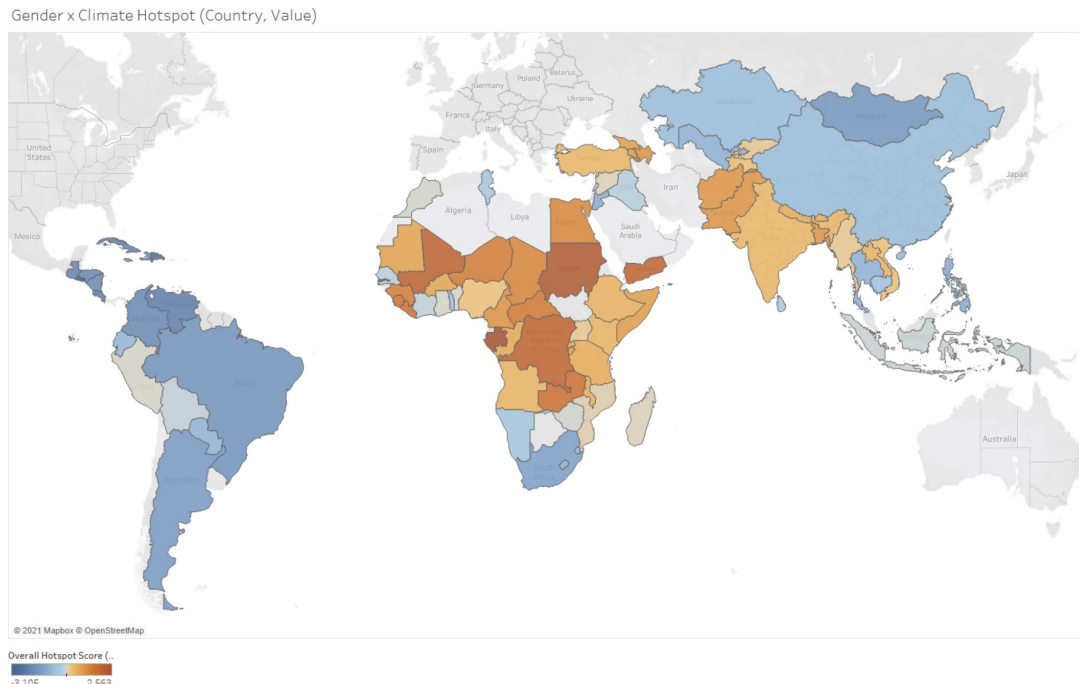


Figure 2. Climate-agriculture-gender inequality hotspot LMICs across the globe.

Note: Darker, orange-colored countries are 'hotter' with higher risk as they have a relatively high hotspot index value. Darker, blue-colored countries are relatively low risk with lower hotspot index values; therefore, they are 'colder'. LMICs with a light grey color have not been ranked due to data limitations.

RANKING	COUNTRY	OVERALL HOTSPOT SCORE (THE HIGHER, THE HOTTER)
1	Gabon	2.563
2	Sudan	2.328
3	Gambia	2.100
4	Mali	2.028
...		
7	Zambia	1.639
...		
16	Pakistan	1.029
17	Bangladesh	1.026
...		
33	Kenya	0.523
...		
36	India	0.474
...		
86	Dominican Republic	-2.725
87	El Salvador	-3.105

Table 1. Examples of countries' rankings by climate-agriculture-gender inequality hotspot index.

Zooming in on climate-agriculture-gender inequality hotspot areas within countries

To identify crop/category specific climate-agriculture-gender inequality hotspots at the first administrative subnational level (e.g., province or region) in the four selected countries, we used a similar approach, but slightly different data. We used the same indicator of *climate hazards*, but at a finer grid. For women's *exposure*, we used LFS data, but included women's share in labor participation and share of hours worked for six specific crops or categories. The indicator of women's *vulnerability* due to gender inequalities uses similar components as the SIGI 2014, but derived from other data representative at subnational level, more specifically, the Gender Development Index (2019) (<https://globaldatalab.org/shdi/sgdi/>), child marriage prevalence (based on LFS data), domestic violence prevalence (demographic and health surveys) and son bias (census data).

For instance, the subnational mapping for Mali reveals that Tombouctou Region in northern Mali is a hotspot for livestock (figure 3), suggesting that women engaged in livestock keeping are experiencing high climate risk

(<http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.382.4628&rep=rep1&type=pdf>), which is corroborated by other evidence. Tombouctou region is characterized by a pastoralist livestock economy and is experiencing increasingly warm and (extended) dry weather. Women

(<https://www.tandfonline.com/doi/full/10.1080/17565529.2020.1855097>) in pastoralist livelihoods in the Sahel

(<https://genderclimatetracker.org/sites/default/files/Resources/e31c77ad-en.pdf>) contribute a large share of labor to livestock keeping, even if they are less likely to control livestock. Women in Toumbouctou are subject to restrictive norms and roles hindering their mobility and their access to resources, services and diversified livelihoods. They face heavy domestic and care workloads (https://www.spring-nutrition.org/sites/default/files/publications/reports/spring_mali_study_agriculture_nutrition_gender.pdf) , along with increasing productive workloads because of male outmigration.

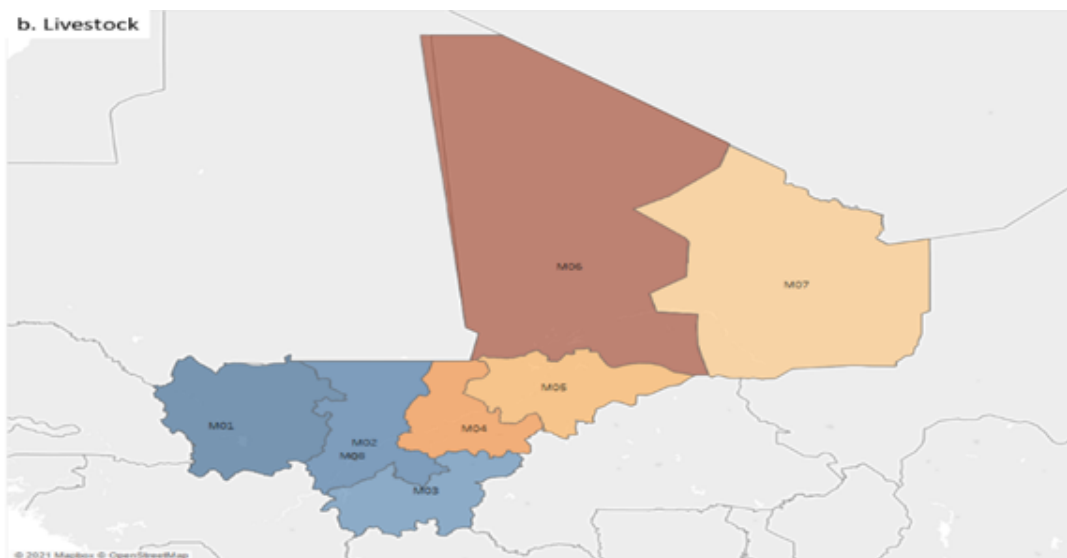


Figure 3. Livestock-specific climate-agriculture-gender inequality hotspot map at sub-national level in Mali

Relevance and use of climate-agriculture-gender inequity hotspot methodology

Mitigating women's disproportionate risk to climate change impacts in agriculture and food systems, and enabling them to be agents of change in building climate resilience, requires addressing root causes of gender inequality. The identification of hotspots can support effective targeting to channel climate resilience-building investments to countries and areas where women are the most at risk. It can be used for national, regional or temporal comparisons and help assess effectiveness of resilience-building policies or programs.

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References

Effectively targeting climate investments: A methodology for mapping climate-agriculture-gender inequality hotspots. CGIAR GENDER Platform working paper 005.

Koo, J., Azzarri, C., Mishra, A., Lecoutere, E., Puskur, R., Chanana, N., Singaraju, N., Nico, G. and Khatri-Chhetri, A. 2022. Effectively targeting climate investments: A methodology for mapping climate-agriculture-gender inequality hotspots. CGIAR GENDER Platform Working Paper #005. Nairobi, Kenya: CGIAR GENDER Platform.

The concept of risk in the IPCC Sixth Assessment Report: a summary of cross Working Group discussions

Reisinger, Andy, Mark Howden, Carolina Vera, et al. (2020) The Concept of Risk in the IPCC Sixth Assessment Report: A Summary of Cross-Working Group Discussions. Intergovernmental Panel on Climate Change, Geneva, Switzerland. pp15

Farmers' prioritization of climate-smart agriculture (CSA) technologies

Khatri-Chhetri, A., P.K. Aggarwal, P.K. Joshi, and S. Vyas. 2017. "Farmers' prioritization of climate smart agriculture (CSA) technologies." *Agricultural Systems* 151, 184–191. <https://doi.org/10.1016/j.agsy.2016.10.005>

Towards new scenarios for analysis of emissions, climate change, impacts, and response strategies

Richard Moss, Mustafa Babiker, Sander Brinkman, Eduardo Calvo, Tim Carter, Jae Edmonds, Ismail Elgizouli, Seita Emori, Lin Erda, Kathy Hibbard, Roger Jones, Mikiko Kainuma, Jessica Kelleher, Jean Francois Lamarque, Martin Manning, Ben Matthews, Jerry Meehl, Leo Meyer, John Mitchell, Nebojsa Nakicenovic, Brian O'Neill, Ramon Pichs, Keywan Riahi, Steven Rose, Paul Runci, Ron Stouffer, Detlef van Vuuren, John Weyant, Tom Wilbanks, Jean Pascal van Ypersele, and Monika Zurek, 2008. *Towards New Scenarios for Analysis of Emissions, Climate Change, Impacts, and Response Strategies*. Intergovernmental Panel on Climate Change, Geneva, 132 pp.

Social Institutions & Gender Index

OECD. 2014. *Social Institutions and Gender Index (SIGI)*. Synthesis Report. OECD Development Centre.

Women's Roles in the West African Food System: Implications and Prospects for Food Security and Resilience

Gnisci, Donatella. "Women's Roles in the West African Food System: Implications and Prospects for Food Security and Resilience." (2016).

Differential household vulnerability to climatic and non-climatic stressors in semi-arid areas of Mali, West Africa

Alcade C. Segnon, Edmond Totin, Robert B. Zougmore, Jourdain C. Lokossou, Mary Thompson-Hall, Benjamin O. Ofori, Enoch G. Achigan-Dako & Christopher Gordon (2021) Differential household vulnerability to climatic and non-climatic stressors in semi-arid areas of Mali, West Africa, *Climate and Development*, 13:8, 697-712, DOI: [10.1080/17565529.2020.1855097](https://doi.org/10.1080/17565529.2020.1855097)

Agriculture and Nutrition in Mali through a Gender Lens

SPRING. 2016. Agriculture and Nutrition in Mali through a Gender Lens: A Qualitative Study, Literature Review—2015. Arlington, VA: Strengthening Partnerships, Results, and Innovations in Nutrition Globally (SPRING) project.

Women and climate change in the Sahel.” West African Papers 27

McOmber, C. 2020. “Women and climate change in the Sahel.” West African Papers 27, Paris: OECD Publishing. <https://doi.org/10.1787/e31c77ad-en>

Climate-informed priorities for One CGIAR Regional Integrated Initiatives

Jarvis A, Rosenstock T, Koo J, Thornton P, Loboguerrero A, Govaerts B, Ramírez-Villegas J, Prager S D, Ghosh A, Fuglie K. 2021. Climate-informed priorities for One CGIAR Regional Integrated Initiatives. CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS).

Is adaptation to climate change gender neutral? Lessons from communities dependent on livestock and forests in northern Mali

H. Djoudi, M. Brockhaus, 'Is adaptation to climate change gender neutral? Lessons from communities dependent on livestock and forests in northern Mali', International Forestry Review, vol. 13(2), pp.123-135, Commonwealth Forestry Association, 2011

You can read this article at <https://gender.cgiar.org/news/identifying-climate-agriculture-gender-inequality-hotspots-can-help-target-investments-and> or frame the following QR Code with your mobile phone camera:



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