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# Artificial intelligence and climate migration equity

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In recent years, there has been a significant increase in the number of people displaced by climate-related damage to the physical and social environment. These migrants are more exposed to climate-related environmental damage than others and more vulnerable to its social and health impacts because they possess fewer resources for mitigation and adaptation. Emerging artificial intelligence (AI) tools and approaches may help improve understanding of climate migration and immobility and support more timely, equitable interventions to reduce avoidable harm before, during, and after displacement. While AI systems have already been applied to climate modeling, disaster forecasting, and public health surveillance, their adaptation to the context of climate-induced displacement remains under-studied and unevenly implemented. Specific AI applications can address the lived realities and systemic vulnerabilities of climate migrants, such as anticipatory relocation, equitable health service provision, and sustainable infrastructure in host regions. However, we must first address certain issues such as the risk of fostering greater inequality through inherent biases in training data; developing public-private-academic collaboratives to collect and integrate high-resolution, localized and open-access datasets tailored to address disparities; prioritizing energy-efficient algorithms and hardware and balancing performance with environmental sustainability; and developing responsible models of AI governance that capture co-design and co-ownership of the design process with climate migration stakeholders including vulnerable and affected communities. We therefore call for empirical research to document the effectiveness of current and proposed initiatives to apply AI in supporting climate migration equity and overcoming methodological and operational limitations and implementation risks. By aligning technological innovation with human-centric values and global justice, AI may contribute to shifting climate mobility policy from crisis response toward resilience-building, if paired with rights-based governance and accountable implementation. While most applications remain pilot-based, context-specific, and unevenly evaluated, this article advances a structured framework to guide future empirical research and governance.

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## Introduction

It is generally believed that climate-related sea level rise and extreme weather events and their social, economic, and political consequences will result in some form of displacement for hundreds of millions of people (IPCC, 2023; Clements, 2024), with the majority living in or from the Global South (Almulhim et al., 2024). Climate migration refers to "the movement of a person or group of persons who, predominantly for reasons of sudden or progressive change in the environment due to climate change, are obliged to leave their habitual place of residence, or choose to do so, either temporarily or permanently, within a State or across an international border" (IOM, 2019). Climate migration can take numerous forms—temporary or permanent, voluntary or involuntary, unplanned and rapid or strategic and managed, local or regional or international (i.e., cross-border or transboundary)—that are associated with several factors, including place of origin, sociodemographic characteristics, social impacts of climate change (extreme poverty, food insecurity, unemployment, and civil conflict), and type of climate event (e.g., acute extreme weather event versus long-term sea level rise and prolonged drought) (Palinkas, 2020 ; Waters, 2025). These dynamics unfold within highly uneven legal, political, and institutional migration regimes, meaning that climate mobility cannot be treated as a comparable phenomenon across regions. Empirical estimates of climate-related mobility vary substantially due to differences in geography, exposure, vulnerability, governance capacity, and definitions, underscoring persistent uncertainty in projecting future displacement (Kaczan and Orgill-Meyer, 2020). While recognized as a key driver of human mobility, climate change often operates as a distal factor, interacting with and amplifying more immediate causes such as conflict, food insecurity, and loss of livelihoods (Parrish et al., 2020). Some communities may remain "trapped" due to lack of resources, mobility constraints, or legal barriers (Waters, 2025), while others may choose to stay and adapt in place, particularly where cultural ties to land are strong or support systems exist (Boas et al., 2019; Parrish et al., 2020). Given the complex and context-dependent nature of climate migration, an alternative focus on "climate mobilities", which includes immobility as a response to climate change (Boas et al., 2022), better captures the continuum of movement and emphasizes the role of power, inequality, and adaptive capacity in shaping mobility outcomes.

The use of migration as a viable adaptation strategy requires a concerted effort to predict, prevent, and mitigate the harm to climate migrants in host communities equitably and inclusively (Black et al., 2011). For the most part, these individuals are more exposed to the environmental damage associated with climate change than others and are more vulnerable to its social and health impacts because they possess fewer resources for mitigation and adaptation. These include residents of low- and middle-income countries and low-income residents of high-income countries that are less likely to be prepared for, and recover from, environmental disasters (Collins, 2013), and more likely to experience adverse climate-related and migration-related physical and mental health impacts (Schwerdtle et al., 2018). Children are particularly vulnerable to health, well-being, and development threats due to their physiology, increased exposure to infectious diseases and malnutrition, and reliance on climate-impacted adults for caregiving and nurturance (Proulx et al., 2024). Climate migrants are less likely to have the resources to build resilient and sustainable communities both before and after their displacement. Although these climate migrants bring economic benefits, they are often perceived as challenging cultural homogeneity and the existing social and economic order of host communities (Boas et al., 2019). What is unclear, however, is whether there are solutions that can provide environmental justice for this vulnerable population.

Achieving equity for climate migrants requires addressing five critical dimensions of inequality: (1) disaster preparedness and response, (2) health disparities, (3) community sustainability, (4) resettlement, and (5) child development. Examples of key actions for achieving equity in these five areas of focus are provided in Table 1 below. By addressing these five areas, we can lay the foundation for a more just and resilient world for climate migrants and society. In this comment, we argue that a wide range of emerging artificial intelligence (AI) tools and approaches may have a crucial part to play in this endeavor if used cautiously in order to avoid the bias of technologies designed to facilitate management of populations through the use without caution of quantitative or complex statistical analysis (Jasanoff and Kim, 2016; Fejerskov, 2022). However, the empirical evidence supporting the use of AI to assist in achieving equity for climate migrants is lacking, suggesting a need for research to provide such evidence and address the potential constraints to its use, especially in the Global South.

## Emerging opportunities

A conceptual framework of the application of AI to develop and implement policies to predict, prevent, and mitigate the consequences of climate migration in an equitable manner is illustrated in Fig. 1. Drawing upon the experience of the application of AI tools to date in the fields of health care and public health, climate and weather forecasting, and migration prediction and management, we posit that these tools may promote climate migrant equity by enhancing decision-making capacity to assist in pre-migration prediction and prevention, thereby reducing disparities in the risk of displacement in vulnerable communities, and post-migration mitigation of the social, physical and psychological consequences of displacement experienced by climate migrants.

While many AI applications (e.g., ecological monitoring, disaster response systems, and health vulnerability assessments) are not unique to climate migration per se, their deployment becomes highly consequential when applied in contexts where migration is both a response to and a driver of vulnerability. This framing makes clearer how AI tools must be adapted and governed differently when used in displacement-affected regions. We have therefore structured this commentary to show not just generic AI capabilities but their specific relevance to migration-related challenges.

AI does not automatically generate equitable outcomes, but it can reshape decision-making by changing when risks become visible, whose data counts as evidence, and how early interventions are coordinated. Evidence from health and disaster contexts suggests such mechanisms can improve equity and well-being, though whether they do so in climate migration contexts remains an open empirical question.

**Disaster preparedness and response**. AI-driven systems already aid disaster preparedness by providing early warnings for hurricanes, wildfires, droughts, and other extreme events (Albahri et al., 2024). Google DeepMind and Huawei have developed AI models that outperform conventional weather models in predicting hurricane tracks and weather patterns while using less computation. Google DeepMind's GenCast, for example, is an ML learning weather prediction method that applies graph neural networks (GNN) to meteorological data (Price et al., 2025). Such predictions are critical to the development of plans to prepare for and respond to disasters like climate-related extreme weather events. However, such systems are not readily available worldwide, especially in low-income countries and small island

**Table 1 AI-assisted actions for achieving equity on climate change-related population displacement.**

| Area of focus | Key actions for achieving equity | Specific AI solutions |
|---|---|---|
| 1. Disaster preparedness and response | • Improve early warning of extreme weather events and environmental hazards for communities at risk of migration.<br>• Monitor environmental changes that could lead to migration from under-resourced areas (e.g., LMICs) | • ML weather and migration prediction models<br>• AI tools for environmental monitoring and planning<br>• Weather and environmental data from LMICs |
| 2. Health disparities | • Focus on at-risk populations affected by climate-related environmental changes in under-resourced areas.<br>• Implement culturally appropriate digital interventions for mental and behavioral health.<br>• Improve access to quality healthcare for chronic and infectious diseases exacerbated by climate change. | • ML temperature change prediction models and environmental monitoring<br>• ML disease outbreak prediction models<br>• Use of GenAI in mental health treatment apps<br>• ML, NLP, and other AI tools for clinical decision-making, caregiving, and administrative management |
| 3. Community sustainability | • Reduce the need to migrate and strengthen the resilience of climate migrant communities of origin.<br>• Promote the social, economic, and environmental sustainability of climate migrant host communities | • AI methods for monitoring and reducing carbon emissions and managing energy consumption.<br>• LLMs and DTs to enhance climate risk communication<br>• ML and other AI methods in the digitization of urban environments to develop mixed-use neighborhoods for climate migrants and established residents |
| 4. Resettlement | • Model and monitor migration movements to identify destinations<br>• Identify and deliver services to climate migrants during and post migration<br>• Forecast needs of host communities most likely to be impacted by the influx of climate migrants. | • ML methods for modeling human migration in response to climate change<br>• AI-supported models to identify suitable resettlement locations |
| 5. Child development | • Improve access to technology designed to improve literacy, language, and self-directed learning skills of climate migrant children<br>• Prevent and mitigate disease and malnutrition that adversely impacts development of potential child climate migrants<br>• Address the mental health needs of climate migrant children | • AI-supported ICT adapted for climate migrant children<br>• AI methods for predicting and monitoring risks for infectious disease and malnutrition<br>• AI-supported digital mental health interventions |

*ML* machine learning, *NLP* natural language processing, *LLM* large language models *LMIC* low- and middle-income countries, *ICT* information and communications technology, *DT* digital twins.

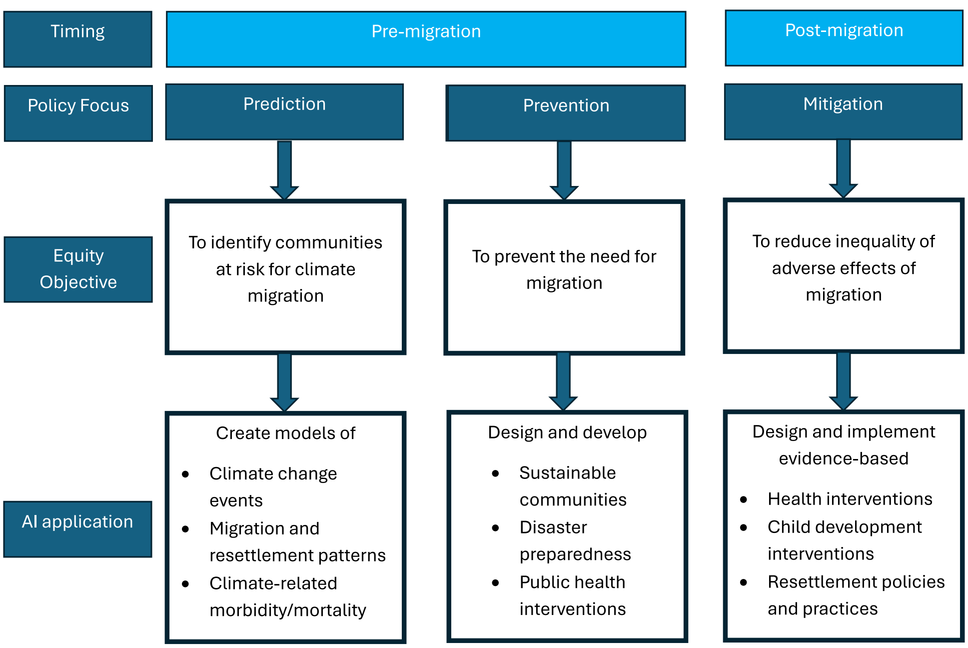


**Fig. 1** Conceptual framework of the use of AI for climate migration.

developing states (Kuglitsch et al., 2024). Countries in the Global South and rural areas report the largest gaps in early warning systems due to limited infrastructure, the digital divide, and warning messages that are not adapted to local languages, knowledge systems, or cultural contexts (Tiggeloven et al., 2025). Moreover, AI's reliance on high-quality datasets raises concerns about data accessibility and bias, as lower-income regions remain underrepresented in AI-driven planning models (Aczel et al., 2025). While these models are not migration-specific, integrating them into disaster preparedness protocols for at-risk communities offers a concrete pathway for anticipatory relocation planning and humanitarian logistics.

AI-powered ecological monitoring efforts also have a part to play in climate migration prevention. For instance, the International Organization for Migration (IOM) and Microsoft are collaborating to address climate-induced migration by using AI through innovative pilot projects with Microsoft's AI for Good Lab in the Maldives, Ethiopia, and Libya (IOM, 2024). In Ethiopia, 700,000 people and 1.5% of the country's croplands were found by this method to be at risk of flooding. This information has enabled IOM to exercise anticipatory action in planning more effective interventions, supporting displaced populations and reducing the need for migration by strengthening resilience to future challenges and the likelihood of future displacement. Data collected by satellites or networks of autonomous sensors can also be analyzed in real-time using deep-learning models, Random Forests (RF), support vector machines, cloud based platforms like Google Cloud AI, and big data analytics tools like Hadoop and Apache Spark to map and predict the spread of pests, changes in soil quality, or rapid degradations in habitat quality (Olawade et al., 2024). Bayesian networks, neural networks, RFs, and decision-trees (DT) have been identified as the most used ML methods to provide timely insights into biodiversity and habitat quality that can help communities to safeguard their food and water security and livelihoods (Mu et al., 2024).

However, there are potential risks associated with the convergence of AI and emergency responses, as AI agents could inadvertently exacerbate the damage sustained by hazard-impacted communities, potentially exceeding the initial hazards themselves. Furthermore, decision-making by these AI agents during emergency response campaigns may unintentionally perpetuate societal inequality across hazard-affected communities. Without vigilant oversight, their actions could unwittingly exacerbate existing disparities (Sun et al., 2024).

**Health disparities**. AI and big data analytics may help to address public and global health needs and reduce health disparities in low- and middle-income countries (LMICs) most impacted by climate change (Qoseem et al., 2024). These include ML algorithms (TF, deep neural network [DNN], and Gaussian process) using temperature change and carbon emissions data to predict vulnerability to health risks associated with heat waves and air pollution (Côté et al., 2024), collection and analysis of environmental and sociodemographic data to predict disease outbreaks, mitigation or treatment of climate-related mental health burdens prior to, during, and post-migration, and improving access to healthcare for chronic and infectious diseases exacerbated by climate change.

In Bangladesh, ML models such as long short-term memory (LSTM) networks and RF using remote sensing and environmental data have been employed to predict disease outbreaks following floods, with real-time alerts issued to public health authorities (Khan et al., 2025). RF and Convolutional neural networks (CNNs) and mobile phone data have shown promise in predicting diarrheal disease risk in under-5 children in Ethiopia (Zemariam et al., 2024).

AI ML applications like neural networks, DT, and ChatGPT are also being widely used in health services delivery, including medical imaging and diagnostics, virtual patient care, patient engagement and adherence to treatment, and rehabilitation (Al Kuwaiti et al., 2023). Digital health technologies that utilize AI tools such as ML, distributed ledger technology, and natural language processing (NLP) have been recommended for addressing the physical and mental health care needs of migrants and displaced persons (IOM, 2022; Matlin et al., 2025). One example is the Digital REACH Initiative of seven East African countries that created a regional roadmap for digital health to deliver quality health services and public health regulations to migrants and border communities (East African Health Research Commission, 2017). However, additional research is required to determine whether these applications can be scaled and sustained in migrant or displaced populations. To date, there has been limited empirical evidence that AI-driven health interventions have reduced morbidity, improved continuity of care, or narrowed health inequities among displaced populations over time.

**Community sustainability**. Much of the evidence base for AI-enabled urban sustainability is concentrated in higher-income settings, with more limited applicability to rural and informal contexts where many displaced populations originate and settle (Aczel et al., 2025). AI can be applied to reduce the need to migrate in response to climate change and strengthen the resilience of climate migrant communities of origin by contributing to smart recycling, carbon capture, and geoengineering, and nudge consumers to adopt conservation measures and create more awareness about the environmental and climate impact of their consumption habits (Stern et al., 2025). Large language models (LLM) and digital twins (DT) can enhance communication of climate risks to communities, helping to influence decisions and raise awareness about potential impacts (Reichstein et al., 2025). These tools can also be used to move transportation systems to less carbon emissions and more efficient energy management and routing (car traffic, shipping, etc.), track deforestation and carbon emissions by industry, or improve predictions of energy needs and manage energy consumption (Vinuesa et al., 2020). What remains unresolved is whether these tools can specifically alter migration pressures or outcomes, or can be applied to rural, agrarian, or informal settlements that dominate climate displacement patterns globally.

AI can also be used to promote the social and economic as well as environmental sustainability of host communities. For instance, AI methods such as ML can be integrated into the digitization of the 15-min city approach to reducing the energy demands and carbon footprints of urban areas across the globe (Moreno et al., 2021). The use of AI-driven smart technologies can also facilitate social and economic sustainability by developing mixed-use neighborhoods that bring together climate immigrants and established residents for social and economic gains, leading to increased social coherence (Allam et al., 2022). AI-driven smart city interventions risk exacerbating exclusion where migrants lack legal status, digital access, or political voice. Without safeguards, such systems may reinforce surveillance and service rationing rather than inclusion (Aczel et al., 2025).

**Resettlement**. While AI and statistical models have been employed to predict extreme weather events, environmental degradation, and health risks that may serve as drivers of climate migration, they can also be employed to predict migration patterns and outcomes, including how many people are moving and where they are moving to (Beduschi and McAuliffe, 2021; Hossain et al., 2023). For instance, Robinson and colleagues (2020) coupled models of sea level rise (SLR) with Artificial Neural Networks (ANN) and eXtreme Gradient Boosting (XGBoost) ML methods for modeling human migration to predict migration patterns in the United States. Aoga and colleagues (2024) applied DT and XGBoost to examine the association between weather shocks and intention to migrate, using data from the Standardized Precipitation-Evapotranspiration Index of six Western African countries and data from the Gallup World Poll between 2009 and 2015. ML models like LSTM and XGBoost may also help predict whether people will choose to migrate or stay in place when faced with climate risks (Hossain et al. 2023). Furthermore, ML approaches may also be used to identify and deliver services for climate migrants in need, including assistance with asylum and visa applications, language translation, employment, health and welfare, education, social integration and housing security (Fan et al., 2018), identify suitable resettlement locations (Bansak et al., 2018), and forecast migrant resource needs to help communities prepare for their arrival (Beduschi and McAuliffe, 2021). For instance, the United Nations High Commissioner for Refugees (UNHCR) has been leveraging LLMs and GenAI models to predict refugee movements and allocate housing, food, and medical aid resources accordingly (UNHCR, 2025). However, globally, AI-assisted allocation systems raise concerns about privacy, security, vulnerability, transparency, migrant preferences, cultural continuity, and resettlement outcomes (Beduschi, 2021; Nalbandian, 2022).

**Child development**. Climate change and climate-related population displacement pose a threat to three essential requirements for healthy child development: safety, permanency, and well-being (Clark et al., 2020). The application of ML and LLM models in education platforms found to result in improved social, cognitive, and language development in early childhood (Xu et al., 2025) may be tailored to meet the learning needs of vulnerable populations, including climate migrant children (UNESCO, 2022), thereby reducing disparities in development. AI tools such as speech recognition, computer vision, and LLMs have been incorporated into information and communications technology (ICT) such as mobile apps that have demonstrated great potential for facilitating literacy, language learning and self-directed learning for immigrants, refugees, and internally displaced persons (UNESCO, 2022). ML algorithms like CNNs and LLMs like generative pre-trained transformer 4 (GPT-4) have also demonstrated great promise in predicting, preventing, and managing emerging infectious diseases and undernutrition related to climate change in children in LMICs who are at risk for displacement and migration (Torres-Fernandez et al., 2024; Zemariam et al., 2024). AI methods such as ML, deep learning, and NLP techniques also offer promising avenues to promote resilience and mitigate climate-related mental health burdens in children and adolescents prior to, during, and post-migration (Parnes and Weiss, 2025). Although trauma, disrupted caregiving, language loss, and legal precarity often limit the effectiveness of digital interventions for displaced children, several empirical studies have documented the effectiveness of these interventions in reducing symptoms and stigma and improving mental health literacy among displaced refugees in general (Liem et al., 2021) and displaced youth in particular (Raknes et al., 2024). However, there are numerous technical, ethical, equitable, privacy, and data security challenges to AI applications for the development of displaced children that point to the need for more in-depth research on the subject (Campbell et al., 2025; Xu et al., 2025).

## Outstanding challenges

Responsible AI governance in climate migration contexts requires enforceable mechanisms rather than aspirational principles alone. At minimum, this includes mandatory algorithmic auditing, transparency requirements for public-sector AI procurement, clear appeal and redress mechanisms for affected populations, and participatory oversight structures that allow displaced communities to contest or veto AI-supported decisions. The absence of such mechanisms represents not merely a technical limitation but a structural governance failure that future research and policy must address. Furthermore, digital exclusion, surveillance risks, and data protection concerns remain particularly acute for displaced children and must be treated as governance issues rather than technical limitations.

Prior to implementing this vision, however, certain issues must be addressed. First, there are huge inequalities in existing systems, and while AI has the potential to improve equity through more data-driven and transparent decision-making, safeguards must be implemented to prevent it from fostering greater inequality through black box decisions and inherent biases in training data (Cowls et al., 2023). Correction of biases in AI models is a complex enterprise, as there are numerous examples of attempts to adjust image generation models to produce more inclusive outputs, while maintaining accuracy and relevance (Mehrabi et al., 2021).

Second, the data available for most potential AI applications in this space is insufficient and doesn't account for variation at finer scales that might be essential (Eyring et al., 2024). Continuing efforts to collect and integrate high-resolution, localized data are critical to developing actionable insights for climate migrant communities if equity in climate migration or mobility is to be achieved. Unless care is taken in designing the AI pipeline, the limits of biased training data and data scarcity, particularly from under-resourced regions in the Global South (Almulhim et al., 2024), can result in AI models that reproduce structural inequities rather than redress them, limiting their effectiveness for displaced or vulnerable populations (Mohamed et al., 2020; Birhane, 2021). However, AI pipelines can also be explicitly designed to bring the benefits of high-data regions to low-data regions by training in high-data regions and fine-tuning in low-data regions, thus improving the quality and timeliness of predictions in areas inhabited by communities with increased vulnerability due to historical environmental injustices (McGovern et al., 2022).

Third, the high energy use and environmental impact of AI models must be addressed in relation to climate migration (Cowls et al., 2023). While AI may hold great potential for climate adaptation, there is a presumed paradox that its development can exacerbate the very environmental stressors, such as rising temperatures, water scarcity, and infrastructure degradation, that drive population displacement. A single training run for an LLM has been estimated to emit as much carbon as five cars over their lifetimes (Strubell et al., 2020). Moreover, environmental impacts do not end at training. During deployment, the energy consumption, carbon emissions, and water usage associated with inference—generated by each user query—accumulate rapidly, especially at scale (Luccioni et al., 2024). These emissions compound existing climate burdens, particularly in vulnerable regions already facing low adaptive capacity. The inequity here is stark: communities least responsible for carbon-intensive AI development are often those most affected by its downstream impacts.

To address this, AI researchers and policymakers must prioritize energy-efficient algorithms and hardware, invest in low-emission data infrastructure, assess and mitigate the full lifecycle impacts of AI systems, and embed climate equity considerations into the design, deployment, and procurement of AI technologies. For instance, our own team's research has demonstrated that training bespoke AI models with data relevant to the use-case takes drastically less computation (and therefore electricity) than the use of huge industrial AI models (Luccioni et al., 2024). Right-sized, task-specific AI models designed for targeted climate applications offer greater energy efficiency and are more easily fine-tuned to local contexts than general-purpose foundation models such as LLMs trained on broad internet-scale corpora. In the domain of weather forecasting and projecting future climate scenarios, which are relevant to climate migration, AI models actually consume orders of magnitude *less* energy than the state-of-the-art physics-based model, e.g., after a one-time training cost, AI weather predictions now take seconds vs. hours to produce.

Aligning AI systems with global climate goals, such as those outlined in the Paris Agreement, and with just migration frameworks also requires intentional efforts to reduce their ecological footprint while ensuring their outputs do not reinforce existing inequalities. At present, such governance mechanisms remain weakly institutionalized in humanitarian and migration systems, particularly in low-capacity settings. AI must not only support predictive insight but also uphold principles of global justice and shared responsibility, particularly for those displaced by climate shocks they did not cause. Effective governance of AI for climate migration equity will require regulatory frameworks like the EU's Artificial Intelligence Act (European Commission, 2024) and others based on principles for developing such frameworks established by the World Health Organization (WHO, 2021; WHO, 2023) that set standards for accountability, transparency, and equity. Multi-stakeholder platforms, such as public–private–academic consortia, offer a practical model for collaborative governance and inclusive design.

Finally, to develop AI for the public good, there is a need to develop responsible models of AI governance that capture co-design and co-ownership of the AI design process with climate migration stakeholders, including vulnerable and affected communities (Strubell et al., 2020). There are ethical dilemmas in AI, such as balancing inclusivity with efficiency, ensuring privacy of climate migrants, and tendency to reinforce existing hierarchies of power (Mohamed et al., 2020), which can be mitigated by valorizing participatory governance models that promote the common good (Cowls et al., 2023) and making certain that their enforcement will not violate fundamental rights (Dumbrava, 2021). Such models could be based on the principles and practice of human-centered design (Cooley, 1989), tripartite responsible governance of humans, nature, and technology through co-design (Özbilgin, 2024), community engagement (Clinical and Translational Science Awards Consortium, 2011), co-creation (Vargas et al., 2022), data feminism (D'Ignazio and Klein, 2020), and decolonial theory (Mohamed et al., 2020). These frameworks should enforce transparency in AI decision-making processes, incorporate local knowledge and grassroots-driven action in the design and evaluation of AI tools, particularly in the Global South (Sinha, 2025), mandate the auditing of algorithms for bias, ensure ethical and responsible decision-making in AI, and ensure that affected communities are involved in co-designing technological solutions. By addressing these foundational issues, the integration of AI into climate migration strategies can be equitable, ethical, effective, and sustainable.

## Next steps

In the face of a rapidly changing climate, integrating artificial intelligence into adaptive strategies offers an unprecedented opportunity to mitigate displacement and promote equity for climate migrants. By leveraging AI tools for data analysis, predictive modeling, and decision making, host communities may be able to better anticipate migration patterns, plan for resource allocation, and develop tailored and transnational solutions that address the unique needs of climate migrants, whether they are moving across borders or within national boundaries.

Nevertheless, to transform the potential of AI to equitably reduce the risks of climate migration causes, processes, and consequences, future research, such as longitudinal evaluation of AI interventions in displacement contexts or comparative studies across climate zones and different forms of migration, is required. Such research should explicitly address the potential risks to inequality associated with AI in this context and prioritize the development and implementation of innovations to AI technology and applications that can reduce the inequalities of existing systems while promoting the health and well-being of populations most threatened by the consequences of climate change and least equipped to adapt to these consequences. Future research is recommended to collect evidence on the following: (1) effectiveness of AI-driven models and tools to reducing health disparities among climate migrant populations; (2) the impact of AI-driven forecasting models on policy uptake, relocation success, or reduced displacement; (3) the capacity of AI systems to address core determinants of environmental justice for displaced communities or communities at risk for displacement, including power relations, land access, legal status, or entitlement to services; (4) the ability of AI tools to overcome known barriers such as legal exclusion, affordability, language, or system fragmentation, which dominate global migrant health outcomes; (5) improved long-term integration, social cohesion, or migrant well-being of AI-enabled resettlement and service allocation; and (6) environmental benefits when AI is institutionalized across migration, health, and disaster systems, especially in low-capacity settings reliant on carbon-intensive infrastructure. Future research is also recommended to determine the extent to which climate migrant communities can exercise co-ownership, veto power, or governance authority in the development and application of AI models designed to reduce inequality in risk and consequences of displacement across varying political and legal contexts, and whether co-design and co-ownership can successfully alter AI outcomes in displacement contexts.

Given the inherent social, economic, political, and legal factors that have shaped the climate migration experience, AI alone cannot be expected to achieve climate migration equity. Nevertheless, by aligning technological innovation with human-centric values and global justice, we may be able to contribute to the transformation of the narrative of climate migration from one of crisis and inequality to one of resilience and empowerment. This alignment must be context-sensitive. It is not sufficient to deploy AI tools generically across climate sectors; instead, they must be tailored to account for the displacement dynamics, social stratification, and adaptive capacity of mobile and immobilized populations. We suggest co-designing new AI models and applications or adapting existing models and applications with climate migrant communities, emphasizing local needs and cultural contexts, and based on the principles and practice of human-centered design, community engagement, and co-creation cited above. AI must not only enhance predictive capabilities but also facilitate actionable solutions, such as resource allocation, access to healthcare, and economic inclusion, that directly benefit those most affected. Strengthening international collaborations, investing in capacity-building initiatives, and incorporating Indigenous knowledge into AI-driven frameworks are critical to ensuring that these strategies are equitable, culturally appropriate, and globally scalable. We must act now to ensure that this transition is equitable and sustainable for all.

## Data availability

No datasets were generated or analyzed during the current study.

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The authors declare no competing interests.

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## Informed consent
This article does not contain any studies with human participants performed by any of the authors.

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