comment

BRAZIL Climate drives infectious diseases; Building sustainable health systems in the Amazon; Indigenous women's response to covid-19 in the Amazon; Twin crises of biodiversity loss and climate change
PLUS The health risks of climate change and conflict

OPINION Danielle Hanna Rached and colleagues

COP30 is a chance for Brazil to lead on climate

This month the United Nations Climate Change Conference (COP30) is taking place in Belém, the largest city in the Brazilian Amazon region. Belém's selection as the host city is symbolic for several reasons. It highlights the importance of the world's largest and most biodiverse tropical rainforest for the global climate. It also emphasises the social movements and communities, particularly indigenous peoples, who depend on the Amazon and dedicate their lives to protecting it. Many people see COP30 as the last opportunity to push for a higher level of global collective climate ambition and action.


KATHIA XAPIPURÍ

Brazil's role will be challenging

However, Brazil's role as host of COP30 will be challenging. The country will need to tackle complex issues that were overlooked or not adequately resolved at previous COPs.

In addition to these thorny issues, Brazil's leadership will be tested by a profound shift in geopolitics. Donald Trump's return to the US presidency signals a renewed emphasis on nationalism and protectionism.

Brazil's President Lula is moving in a different direction. He has renewed his commitment to international cooperation and multilateralism. In 2024, Brazil held the G20 presidency, and initiated critical discussions on combating hunger, poverty, inequality, and taxing wealth. However, if Brazil is to become a key player in climate politics, it must first tackle the two internal tensions that are holding back progress on the climate agenda.

The first source of tension is economic. As with previous Workers' Party administrations, the Lula government relies on the agribusiness sector and the exploitation of natural resources to stimulate economic growth, despite its green rhetoric. This economic dilemma is exemplified by the pressure that Brazil's environmental agency, IBAMA, has faced to approve the exploration of a new oil frontier in a sensitive ecological area near the mouth of the Amazon River.

The second source of tension is political. Dozens of bills endangering environmental protection and indigenous rights are being fast-tracked through the House of Representatives and the Federal Senate. This is a disappointing setback to Brazil's climate commitments and undermines its climate leadership role heading into COP30.

As more governments move away from multilateralism and decisive climate action, is there a way forward? While a commitment to multilateralism is the correct approach for tackling the current climate emergency, it is also important to consider the state of democracy worldwide. We have witnessed a move away from democracy across the world and a shift towards more right wing, nationalist governments hostile to the climate agenda. It is crucial that the leaders and delegates at COP30 recognise the emerging political challenges to the climate agenda.

However, expectations of increased social participation in this critical summit may be frustrated. The high cost of accommodation in Belém, bureaucratic obstacles, and unclear attendance procedures may limit attendance at the summit. These issues have already had a negative impact on pre-COP30 discussions and could undermine the urgent climate efforts needed to ensure that no one is left behind.

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OPINION Creuza Rachel Vicente and colleagues

Climate change is driving infectious diseases in Brazil

ALL IMAGES BY KATH XAPI PURI

Extreme weather exposes populations to pathogens, disrupts health services, and overwhelms infrastructure

Climate change is no longer a distant threat. It is a present and accelerating driver of infectious diseases in Brazil. Climate change is reshaping the seasonality, intensity, and geographical distribution of infectious diseases across the country.

Brazil has been experiencing record breaking outbreaks of mosquito borne diseases. Dengue is the most stark example: more than 6.5 million cases and 6297 deaths were recorded in 2024. This was a year marked by El Niño, a phenomenon that raises temperatures and alters rainfall patterns, leading to increased reproduction and activity of the *Aedes aegypti* mosquito. This increases the spread of dengue and consequently also chikungunya and Zika. In several regions, these diseases have become a threat all year round, and are no longer confined to traditional epidemic periods.

In addition, yellow fever re-emerged in Brazil's Atlantic Forest during a prolonged drought in 2017, leading to outbreaks in states that had not experienced yellow fever for more than a century. Malaria is resurging in areas where it was previously controlled, owing to higher temperatures which are favourable to mosquitoes. Concerns are rising as Oropouche virus spreads from its endemic zones in the Amazon to other parts of Brazil owing to the widespread distribution of midges. The incidence of leishmaniasis is also increasing as sandfly distribution expands in response to changes in precipitation.

Extreme weather increases the risk of disease outbreaks by exposing populations to pathogens, disrupting health services, and overwhelming infrastructure.

The health risks in Brazil have been worsened by decades of underinvestment in the Unified Health System (SUS), the country's publicly funded health system, which is still recovering from budget cuts and the covid-19 pandemic. Consequently, numerous regions

OPINION Gabriela Di Giulio and colleagues

Amazonian communities demonstrate climate resilience

Historically, public policy has treated the Brazilian Amazon as a vast natural resource for economic exploitation. Development projects have had profound social-environmental and cultural impacts on Amazonian ecosystems.

They have overwhelmed the age-old interactions between traditional peoples and managed nature, pushed indigenous and traditional communities to the fringes of urban centres, and imposed systemic violence.

This has led to a loss of biodiversity and socio-diversity and undermined "buen vivir" principles, which conceptualise wellbeing through community based autonomy, the rights of nature, and social justice

In areas affected by environmental degradation and climate change, food insecurity is more likely, as wildlife harvest rates decline and the natural environment becomes increasingly unsuitable for crop cultivation. Sacred sites for traditional communities—such as forests, mountains, caves, and rivers—have been destroyed. These environmental and cultural losses have contributed to increased physical and mental illnesses among Amazonian communities and reduced quality of life and opportunities. Globally, they represent the loss not only of vital ecological resources and climate-regulating systems, but also of ancestral knowledge and potential solutions to the climate crisis.

Rivers determine access to health services

Amazonian adaptation strategies

The Amazon rainforest can be understood as a subject with agency and rights. Rivers, in particular, determine and restrict access to health services across vast regions. It is essential to think of it as a liquid territory. It is a fluid and dynamic space shaped by the ebb and flow of rivers. This environment influences not only the way of life of indigenous and riverside populations, but also their approaches to healthcare. They require dynamic, context specific, and adaptive care models. This was acutely illustrated during the record droughts in 2023 and 2024, which brought mobility and aid in many areas to a standstill as boats were unable to deliver healthcare and supplies via rivers.

The Amazon river basin covers about 45% of Brazil's national territory. Along its banks, riverine populations organise their lives according to seasonal flooding (November to

struggle to tackle concurrent disease outbreaks, hindering prevention, timely diagnosis, and treatment, leading to an increased incidence of infectious diseases and high fatality rates.

The current and future health challenges posed by climate change have been acknowledged by Brazil's public health sector, and plans are being developed to adapt the SUS to address these new problems.

Brazil must adopt a proactive public health strategy. Firstly, it must strengthen climate informed surveillance systems that integrate meteorological, environmental, and health data to enhance outbreak prediction and preparedness for extreme weather events. Secondly, it must invest in urban and rural infrastructure to improve access to healthcare services and to mitigate exposure risks, particularly through enhanced sanitation, waste management, water drainage, and housing in underserved areas. Thirdly, point-of-care testing must be integrated in resource limited areas and molecular surveillance capacity extended to help track and understand the spread of infectious diseases.

Finally, Brazil must promote intersectoral coordination using a One Health approach, integrating human, animal, plant, and environmental health, and foster international collaboration and financing to support health system adaptation across Latin America.

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June) and drought (July to October). Water levels determine optimal planting and harvesting periods, which are critical for local food security and urban food supply chains. Rivers also dictate where and how to build homes, balancing proximity to waterways for transportation with protection from strong currents. As rivers are the main arteries for the movement of people and goods, travel distances fluctuate considerably. During the dry season, journeys take longer, leaving communities more isolated. During the flood season, travel is faster via improved navigability. In this watery Amazon, time—rather than geographical distance—is the most accurate measure of access, including to healthcare.

Amazonian communities have developed sophisticated, place based, adaptation strategies grounded in deep ecological knowledge and seasonal observation. These practices—such as the use of seasonal calendars for planning, growing flood-tolerant crop selection to maintain food security, and adaptive shifts between farming, gathering, fishing, and hunting—illustrate a form of climate resilience (and resistance) that could inform broader adaptation strategies. These practices could also inform how to integrate climate adaptation to ecological solidarity, by recognising human and more-than-human interdependencies.

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OPINION Nathália Nascimento and Raquel Tupinambá

Health system governance needs to adapt

Indigenous peoples have inhabited the Amazon for more than 12 000 years, playing a fundamental role in safeguarding and managing the forest. In Brazil, traditional peoples are legally recognised as socioeconomically and culturally distinct groups, with their own forms of social organisation and strong ties to territory and nature.

The Amazon is home to approximately 45% of Brazil's indigenous population, as well as hundreds of Quilombola, Ribeirinho, and extractivist communities. These communities are mostly distributed along the rivers, in regions inaccessible by roads or railways.

Indigenous medicine, grounded in distinct cosmologies, understands illness as an imbalance that goes beyond the physical body, encompassing spiritual and environmental dimensions. The strength of these practices, combined with logistical constraints, means that many communities turn to the official healthcare system only when traditional methods have proved insufficient. Recently, the intensification of environmental degradation has threatened the interdependent system that involves physical, spiritual, and environmental dimensions.

It is vital to understand the complexity of the Amazon

The impact of climate change effects, such as increasingly severe and prolonged droughts, has resulted in water and food insecurity and has worsened access to healthcare, owing to the poor navigability of the rivers that prevented travel to healthcare centres and access to medicines.

Healthcare systems in the Amazon face numerous challenges, such as geographic isolation, a lack of financial resources, limited medical specialties, insufficient coverage of health centres, and a lack of respect for interculturality. These challenges are reflected in the region's status as the most precarious in health in the country. These systems also fail to recognise traditional care practices and indigenous medicine.

Healthcare systems need to adapt to meet the needs of the Amazon's culturally diverse community. There are several successful examples of initiatives, such as boat hospitals and boat ambulances (floating medical units), which periodically bring healthcare to remote areas to complement indigenous medicine. Indigenous Health Agents (AIS, in Portuguese) play a key role in translating and adapting guidelines from the Unified Health System (SUS, in Portuguese) to local realities. Nevertheless, despite ongoing progress, substantial cultural barriers remain when traditional populations access the official healthcare system, because the understanding of illness and emergency care often diverge.

It is vital to understand that the complexity of the Amazon demands solutions that cannot be based solely on replicating the prevailing biomedical model. It is essential to build a system that recognises the inseparability of human health and environmental health.

This new system requires integrated public policies, designed through active listening to Amazonian peoples, and the effective participation of their leadership in decision making processes. It also requires strengthening community care networks, investing in primary healthcare strategies, and intersectoral actions aimed at protecting ecosystems as structural determinants of health.

Finally, promoting health in the Amazon will not be achieved solely by building more hospitals, but through preserved ecosystems, protected territories, and dialogue to connect knowledge of indigenous and local peoples with academic knowledge. Rethinking Amazonian health demands that we recognise that caring for nature is the first and most fundamental act of caring for life.

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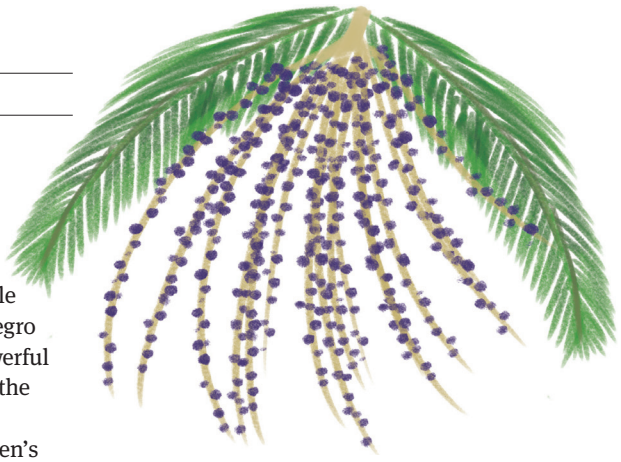
OPINION José Miguel Nieto Olivar and colleagues

Indigenous women's leadership in the Amazon



Global discussions on preparedness for health emergencies are increasingly framed by the planetary "triple crisis" of climate change, biodiversity loss, and pollution. The Amazon stands out, not only as a threatened ecosystem but also as a reservoir of knowledge and care. Its protective power is especially visible in the leadership of Indigenous women and how they responded to the covid-19 pandemic. Many lessons from this response could be applied to overcome future crises, including the threats posed by the climate emergency.

The covid-19 pandemic in Brazil unfolded amid difficult political conditions. The government's response to the pandemic was poor and often promoted anti-public health practices. Existing inequalities and vulnerabilities in Brazil were exacerbated by the pandemic, with dire predictions for Indigenous populations. In this hostile environment, women from the Rio Negro basin in the Amazon organised a powerful counterstrategy of care to respond to the pandemic.

Between 2020 and 2021, the Women's Department of the Federation of Indigenous Organisations of the Rio Negro (DMIRN/FOIRN) launched the campaign called *Rio Negro, nós cuidamos* ("Rio Negro, we care"). Faced with limited engagement from male leaders, federal neglect, and the shortcomings of public health protocols to protect against covid-19, women took the lead in regional governance, grounding their actions in the concept of "care."

The "Rio Negro, we care" campaign reached more than 70 000 people, mostly from Indigenous communities from 23 ethnic groups. It covered a territory larger than Portugal (over 100 000 km^2) in the heart of the Amazon rainforest. The campaign was led by women and forged alliances with Indigenous organisations and state institutions.

The campaign engaged with politically weakened health institutions to reach all communities by using a multimodal communication strategy and several languages. This ensured a widespread understanding of the situation and greater adherence to "physical isolation" measures to reduce the spread of the virus. The campaign members produced tens of thousands of masks, secured thousands of food baskets, and overcame major logistical challenges to distribute them across the vast territory.

OPINION David Nogués-Bravo and Helena Alves-Pinto

The Amazon is one of Earth's major climate stabilisers—we must protect the rainforest and its biodiversity

The accelerating loss of biodiversity worldwide threatens climate stability, food security, and human health. Human pressures have driven biodiversity loss at rates 30-120 times higher than natural background extinctions over the past century.

Since 1900, land-use change alone has resulted in the loss of about 2.3% of species globally. Models project that under combined land-use, and with current rates of climate change, global biodiversity could decline by up to 5% each decade this century, with especially severe losses in tropical regions.

At the same time, nature's ability to regulate essential ecosystem services—such as pollination, water quality, and soil protection—has diminished. This decline weakens nature's capacity to manage and buffer against diseases and threats to health. For example, local warming driven by deforestation has been responsible for an estimated 28 000 excess deaths from extreme heat annually since 2001 across the tropics.

Loss of biodiversity and climate change are two faces of the same coin. They amplify each other. At the 30th UN climate summit (COP30), nature based solutions should be central to discussions and agreements. This is especially true in countries such as Brazil, where biodiversity is not only under severe threat but also holds global ecological importance. Over the past few decades, the Amazon has lost 20% of its forest cover, mostly due to land being used for cattle pasture and soy cultivation. A further 17% of

Global biodiversity could decline by up to 5% each decade this century

forests have been degraded by logging, fire, windthrow, and roads, with degradation now responsible for ~73% of above-ground carbon loss—surpassing deforestation. Climate extremes such as severe droughts and floods are also intensifying—these are now being experienced more than twice the frequency of the previous century.

Meanwhile, the Cerrado and other ecosystems continue to shrink under agricultural expansion, mining, and urbanisation. These changes not only threaten ecosystems but also human health. In Brazil, forest fires have been linked to a 38% increase in respiratory diseases, and land-use change has been associated with an increased risk of emergent zoonotic diseases.

The Amazon is not just a cradle of biodiversity, it is also one of Earth's major climate stabilisers, a "tipping element" in the Earth system. Unfortunately, alarming signals are already visible, with southeastern Amazonia becoming a net carbon source.

Projections for the future estimate that by 2050, 10% to 47% of Amazonian forests will be exposed to drought, fire, and fragmentation that may trigger rapid ecosystem transitions. At the same time, the decline of seed-dispersing animals threatens the forest's ability to regenerate and store carbon, reducing its role in climate mitigation.

The Amazon is rich in terms of biodiversity, but it also hosts a

A fundamental element of the campaign's success lay in the political concept of "territory." The Women's Department is part of the Federation of Indigenous Organisations of the Rio Negro: one of the country's oldest, strongest, and most respected Indigenous movements, dedicated to rights and territorial defence, with extensive credibility and rooted presence across the Rio Negro territory. The protection of the Amazon rainforest and the forms of life it sustains is central to this movement, and it is precisely this biosocial materiality—of bodies and territories—that helps explain the campaign's effectiveness.

The protected territory sustains everyday life and healthcare. The effectiveness of Indigenous healing is directly tied to these protected spaces. Communities living in biodiverse forest environments have stronger resources for care than those displaced into urban areas or territories under agrarian, military, or mining pressure. Preparedness, therefore, is not only about laboratories, vaccines, or surveillance; but also sustaining the conditions of biosocial life itself.

In the Rio Negro, nine Indigenous territories remain protected. The inhabitants live in respectful co-existence with the forest, and, in turn, the Amazon rainforest itself provided protection during the pandemic. There was space for people to move and isolate in small groups; they had access to water, natural foods, and an abundant "living pharmacy" of plant and animal substances to support bodily strengthening and care.

Women took the lead in regional governance, grounding their actions in the concept of "care"

Pandemics are not only the spread of a virus worldwide. They are social and political events that impact and interact in different ways with different bodies and territories.

The success of the campaign offers vital lessons for responding to future crises, such as the climate emergency. Its impact stemmed from grounding the pandemic and its response in culture—in regional networks, histories, and knowledge systems—while also engaging scientific evidence and political realities. This made protection meaningful for communities, expanding practices of care beyond both traditional repertoires and narrow biomedical guidelines.

The climate crisis is both a reality and a threat. Despite decades of abundant evidence regarding the importance of the Amazon rainforest for the present and future possibilities of life on the planet, and for epidemic control, pressure on the forest and its devastation persist. Legal recognition of Indigenous peoples remains precarious, and their knowledge of care and healing continues to be undervalued and marginalised within biomedical health systems.

To prepare for future crises, global health must look beyond technocratic frameworks and recognise the protective capacities embedded in Indigenous lands and knowledge. Without safeguarding these biosocial resources and the indigenous conditions of life, we risk perpetuating the social segregation and the loss not only of ecosystems but also crucial possibilities for surviving the emergencies to come.

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ALL IMAGES BY KATH XAPI PURI

variety of cultures. Indigenous groups are among the most impacted by biodiversity loss—ecologically, socially, and culturally. This erosion of biodiversity also threatens cultural continuity, disrupting the transmission of traditional health knowledge and the personal management of wellbeing.

The pressures facing Indigenous and rural communities—deforestation, displacement, urban poverty, and violence—are closely linked to the climate crisis and deepen existing environmental injustices. Yet, these same groups play a vital role in the conservation of biodiversity and thus the global climate by reducing deforestation, maintaining ecosystem services, and promoting the sustainable use of wild species. Their knowledge has contributed to agroforestry, local conservation strategies, and ecological restoration—offering a model for sustainable land governance.

Brazil is a hotspot of biocultural diversity. Medicinal plants—an expression of biocultural diversity—are the primary source of healthcare for about 66% of the world's population, particularly vulnerable rural and Indigenous communities. The global export value of medicinal and aromatic plant species rose between 2010 and 2023 and reached a value of ~$4bn (£3bn) during that period.

However, this growing demand, combined with climate change, land-use conversion, and language loss, threatens medicinal plant species and the traditional knowledge required to use them. The decline in medicinal plant species is just one example of biodiversity loss that can have ecological, socioeconomic, and cultural impacts in Brazil and elsewhere.

We hope that COP30 delivers more than declarations. Governments must commit to protecting and enhancing biodiversity as a solution for stabilising the climate. This means stopping deforestation and forest degradation, increasing the funds available for climate and biodiversity action, and supporting nature based approaches that improve both the wellbeing of humans and the health of ecosystems. In parallel, social precarity, violence, and environmental injustice continue to affect Amazonian communities, particularly Indigenous peoples and rural populations. Tackling these challenges will require local realities and voices to be included in decision making. Prioritising the rights of Indigenous and local communities, who have proven to be highly effective guardians of biodiversity, is non-negotiable.

Climate resilience depends on nature—and both are vital for the health of communities everywhere. A degraded biosphere puts both at risk.

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ALAMY

OPINION Laura Clarke and Hugh Montgomery

Big emitters must be held responsible for deaths caused by climate change

What role can the medical profession play in helping to attribute blame?

In October the Lancet Countdown on Health and Climate Change reported that between 2012 and 2021 an average of 546 000 people died worldwide each year from heat, up 63% from 1990 to 1999.

Extreme heat is just one impact of climate change. Lives and livelihoods are also lost to droughts, floods, rising sea levels, storms, and wildfires. Climate change threatens our economy, society, and civilisations. Over the coming years the predictability of our food supply will no longer be reliable and we face the loss of 50% of global domestic product, and even of the entire economy, without immediate action.

Attribution science already allows us to demonstrate the damage done by high emission countries or companies, the so called "big emitters." It shows, for example, that a quarter of the 213 heatwaves in the years 2000 to 2023 would have been "virtually impossible" without anthropogenic climate change, and emissions from fossil fuel and cement producers contributed to half the increase in heatwave intensity since 1850-1900.

Advances in attribution science mean that the big emitters can more readily be held accountable.

Once-in-a-generation legal decisions

This year, which marks the midway point of the "decisive decade" for climate action and the 10th anniversary of the Paris agreement, has seen two apex courts provide landmark decisions setting out the responsibilities of states, under international law, to tackle climate change.

Big emitters can no longer feign ignorance about the impacts of their activities

The Inter-American Court of Human Rights found that governments must do more to tackle the climate crisis for the sake of current and future generations, and that governments are required to regulate and monitor corporate emissions.

The International Court of Justice (ICJ) followed this in July 2025 with an advisory opinion that said a healthy environment is the foundation for human life and that if states fail to curb the production and consumption of fossil fuels or to regulate companies' climate impacts, they could be in breach of international law. The ICJ went further to say that historical emitters have a greater responsibility to tackle the climate crisis and there is a potential route to reparations for states enduring the worst of the climate impacts.

Thus, big emitters, whether states or companies, can no longer feign ignorance about the impacts of their activities, or avoid being held to account. So called "polluter pays" cases are already under way. Some 80 of these cases were filed between 2015 and 2024, including 11 in 2024.

As attribution science strengthens further we expect to see more class actions and damages claims brought by climate affected communities, which will change the calculations and business models of big emitters.

What role does the medical profession play?

We know that a healthy environment is essential for people to survive and thrive, and in 2022 the UN recognised a universal human right to a clean, healthy, and sustainable environment.

We also know that the climate crisis is a health emergency.

Health professionals can help by characterising and appropriately attributing causes of death and disease resulting from the direct and indirect impacts of climate change. This measurement and attribution might be applied to the direct health consequences of heatwaves, for instance, on kidney and heart disease, or reproductive health. Emergency medicine clinicians can already contribute such data.

Other such systems might be rapidly developed and deployed. We can start to add international classification of disease (ICD-10) codes for heat impacts (T67.1-T67.9). The X30 code can be used when a patient's condition, such as asthma or a cardiovascular disease, is worsened by heat, even if it's not the primary reason for a healthcare visit, and the X31 code likewise for cold exposure. Codes for heat related illnesses (T67.0-T67.9) and exposure to pollution (Z77.110-Z77.118) can also be applied.

Attribution to socioeconomic impacts will require the development of new models, to which health professionals can contribute.

Medical professionals should also advocate for climate action—and they can drive that action by helping to support legal interventions where those responsible for high greenhouse gas emissions are wilfully indifferent or unresponsive.

As political, corporate, and civil society leaders gather in Belém, Brazil, for the United Nations Framework Convention on Climate Change conference of the parties (COP), we encourage them to take stock of the recent landmark court decisions to champion ambitious new climate laws, by which they can be held accountable. If we are to make progress on emissions, action will require holding big polluters to account through the courts. Medical professionals everywhere should play their part in this process.

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LETTERS Selected from rapid responses on bmj.com

DENYING REFUGEES BRITISH CITIZENSHIP

"Crackdown on illegal working" will cause further harm

Burnett and Haoussou say that denying refugees British citizenship "will create hostility and harm some of the most vulnerable people in our society, condemning them to a life on the margins" (Opinion, online 21 March).

In July 2025, against the backdrop of hostile environment policies, the UK Home Office announced a further policy that risks increasing marginalisation: sharing the locations of hotels housing people seeking asylum with food delivery companies to "crackdown on illegal working."

People seeking asylum are banned from working while their claims are processed, unless they have been waiting over 12 months or were previously on a visa permitting employment. This announcement should concern health professionals because it shows the government remains focused on restricting rights rather than protecting the safety and mental health of people seeking asylum.

Refugees and people seeking asylum experience high rates of mental disorders. Living in hotels has a further negative effect on mental health, owing to factors such as social isolation, lack of autonomy, and a sense of imprisonment. Major financial constraints (people seeking asylum are only given £49.18 a week, or £9.95 if meals are provided) and violent protests outside hotels further deepen social isolation. Allowing people seeking asylum to work could mitigate some of these mental health harms. It would also promote integration and could save the government up to £6.7bn a year.

"Crackdowns on illegal working" do nothing to resolve the international crisis of increasing forced displacement driven by conflict, political oppression, and climate change. People seeking sanctuary have the right to protection under international law. By extension, they should be welcomed and supported to integrate. Instead, the UK government continues to conflate this issue with "illegality." We support recommendations to allow more people seeking asylum to work. This would prevent or mitigate mental health difficulties while also benefiting the economy and promoting social cohesion.

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CAN A DIGITAL NHS BE EQUITABLE?

AI can't substitute compassion and trust

Morley and colleagues warn that AI driven NHS reform risks compounding health inequalities (Editorial, 12-19 July). The fundamental problem is the false assumption that technology can substitute compassion and trust. Care is a relational, emotional, and contextual act. Yet policy treats it as an engineering problem.

Community health and wellbeing workers are ideal for bridging digital tools and people. Case studies of these workers in rural and urban communities show that outcomes are improved not through better access to information, intervention, or technology, but through working alongside a person at their own pace, building trust, regular communication, and personalised care.

AI cannot build trust, offer presence, understand context, notice that someone is off colour today, or gently and uncover what's really wrong. It can't tell when silence matters more than speech.

People need health and social care workers who have permission, space, and capacity to care, otherwise AI risks scaling harm faster than ever.

Cornelia Junghans Minton, academic GP; Matthew Harris, clinical reader in public health, London; Laura Rodriguez-Benito, GP, Sutton

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DECLINE IN CHILDHOOD VACCINE UPTAKE

Disrupting the status quo

The BMJ editorial on declining childhood vaccine uptake is sobering (Editorial, 26 July - 2 August). I urge a radical, systemic response—one that reframes the entire vaccine ecosystem.

Let's pilot "vaccine broker" hubs: hyperlocal, interdisciplinary teams embedded in schools, community centres, and pharmacies. These hubs would not just deliver immunisations but also build authentic relationships with families—leveraging data science to predict hesitancy, tailor outreach, and triage barriers in real time.

Digital transformation remains underused—the future lies in intelligent scheduling and AI driven nudges embedded into the everyday digital footprint of families. Imagine vaccine appointments that self-optimise around family routines.

Faith leaders, sports coaches, and youth ambassadors must be trained and resourced as primary vaccinators of confidence. A modest investment in these grassroots "confidence multipliers" could dwarf the impact of official campaigns.

Lastly, let's recentre children—including children in programme design may provide insights that adult professionals miss entirely.

Y Tony Yang, endowed professor and associate dean, Washington, DC

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MENTAL ILL HEALTH

Specific measures are needed to prevent suicide

O'Dowd reports the results of an NHS survey, which found that the prevalence of mental ill health was worsening, with young people in particular needing more help (Medical news in brief, 12-19 July).

Japan's view has been that mental health problems among young people require a prompt and specific response. The total number of suicides among elementary, junior high school, and high school students reached a record high in 2024. The government has cited "awareness by teachers," "a child's request for help," and "an improved counselling system" as key measures to prevent death by suicide in children. But these measures may be ineffective if specific responses are not indicated to teachers and children.

Public agencies need to compile more data on suicide and countries need to consider measures to prevent mental ill health among young people. Multiple professions and disciplines need to work together to devise and implement specific preventive measures.

Yasuyuki Fujita, professor; Takuji Inagaki, professor; Sultana Razia, doctor; Masanori Kamura; Haruo Takeshita, professor, Shimane, Japan; Yuri Murayama, doctor, Gunma, Japan; Ken Inoue, professor, Kochi, Japan

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RAVEENDRAN/AFP/GETTY IMAGES

ANALYSIS

Responding to rising heat in workplaces and homes of low income workers

Robert Meade and colleagues highlight the need for research and solutions aimed at reducing heat at both work and home to protect the most vulnerable workers

April 2025 brought an intense and unusually early heatwave to India and Pakistan, exposing hundreds of millions to temperatures approaching postulated limits for human heat tolerance.[1]

The previous year, extreme heat gripped northern India from April to June, leading to over 40 000 cases of heat stroke and 360 deaths, though experts suspect that the official statistics substantially undercount the true toll.[2 3] Deadly heat has become an annual reality across much of the global south, with the burden falling most heavily on those least able to protect themselves. People in working poverty—defined by the International Labour Organization (ILO) as people whose earnings are insufficient to achieve a decent standard of living[4]—are disproportionately exposed yet unable to afford essential protections such as adequate housing, cooling, and healthcare.

Despite major reductions in working poverty in many regions of the global south, large numbers remain at risk. Even in India, where poverty has fallen sharply over recent decades, nearly 80 million people (around 9% of working age people) were classified as living in working poverty in 2024,[5] with millions more living just above the poverty line.

Governments and labour representatives have begun taking steps to protect workers from the growing threat of extreme heat. These have mainly centred around regulations aimed at limiting worksite heat exposure.[6] However, unless such efforts consider the nature and scale of the daily exposures of people in working poverty—not only at work but in their homes—many will be left unprotected, especially those outside formal regulations (eg, informal and gig workers).

KEY MESSAGES

- Workplace regulations are evolving to better protect workers from extreme heat, but at-risk groups, particularly low income workers in the global south, remain unprotected
- Low income workers in India experience oppressive heat and humidity in both workplaces and homes, day and night, with little access to evidence based protections
- Meaningful climate adaptation will require protecting vulnerable workers from all heat exposure, not just workplaces
- Collaborative research with community organisations serving at-risk workers offers a critical opportunity to generate needed evidence on effective solutions

Evolving workplace regulations are insufficient

Workplaces are a key focus of heat adaptation efforts because of the well documented and growing effects of heat on worker health, safety, and productivity. The ILO estimates that among 2.4 billion workers exposed to excessive workplace temperatures globally in 2020, heat was responsible for nearly 19 000 deaths, 23 million injuries, and productivity declines amounting to $361bn.[6] The highest rates of heat attributable fatal injuries were in South and South East Asia (8-9% of all injuries in India), North Africa, the Middle East, and Central and South America. The ILO also reported 26 million cases of heat related chronic kidney disease.

Occupational heat risks are unequally distributed, with those in precarious and physically demanding trades facing the highest exposures.[6] While agriculture and construction have received the most attention, heat is a growing concern across sectors relying heavily on low wage labour, including street vending, salt-pan work, waste recycling, and manufacturing. To illustrate these risks, we re-analysed summer thermal conditions across 19 workplaces in south India spanning a range of sectors.[7]

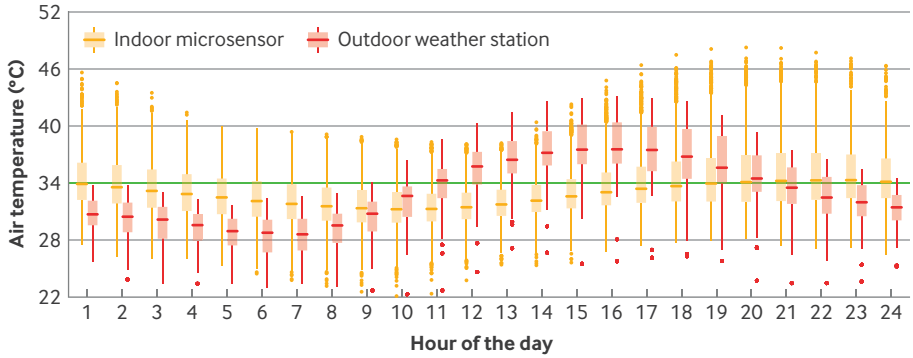

Fig 1 | Diurnal variation in summer indoor and outdoor air temperature measured in 51 low income homes in New Delhi, 1 May to 31 June 2016.[15] The middle line of each box is the median temperature, the lower and upper edges of the box denote the 25th and 75th percentile of the distribution, and the whiskers extend 1.5 times the interquartile range from the edges of the box. Points indicate data falling outside the whiskers. The green line indicates the summer average limit for thermal comfort (90% acceptability threshold) estimated using the India model for adaptive comfort (roughly 34°C)[21]

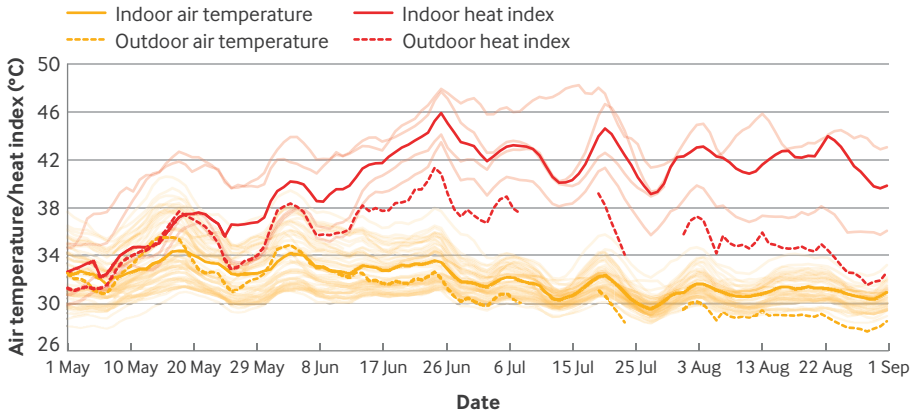

Fig 2 | Daily average indoor and outdoor air temperature and heat index measured from midsummer through the end of monsoon season in New Delhi, May-September 2016.[15] The dark solid lines depict the indoor median. The light solid lines are for individual households

According to contemporary thermophysiological models[8] adjusted to approximate the clothing and acclimatisation status of Indian workers, conditions regularly approached or exceeded limits for sustained work, placing workers at risk of heat illness and requiring that they reduce work output to limit strain. Specifically, 95% of 1049 measurements analysed exceeded thermal limits for moderate intensity work (eg, factory or restaurant work), 55% exceeded limits for light work (eg, office jobs, health workers), and 46% were ostensibly uncompensable, even at rest (though it should be noted that thermophysiological models have mainly been validated in young adults in North America). Similarly extreme conditions have been recorded across the global south, from sugar cane fields in Brazil[9] to bakeries in Iran.[10]

Governments and labour organisations have begun developing and refining national heat regulations for protecting workers. Proposed interventions include mandating more rest breaks, providing hydration stations and cooled break areas, limiting or prohibiting work during peak heat hours, acclimatisation programmes, and automation or mechanisation where feasible.[6] Despite considerable progress, challenges persist.

Mechanically cooled environments are not accessible to the poorest inhabitants of the hottest countries. Merely negotiating rest breaks, hydration stations, and sanitation facilities has proved difficult,[11] including in high income countries. Proposals to adjust work hours often lead to unintended consequences: communities may oppose morning construction, workers worry about lost wages from afternoon pauses, and evening shifts interfere with family responsibilities.

Beyond difficulties in enforcing workplace regulations, a less discussed but equally daunting challenge is that many workers are informally employed and therefore excluded from formal protections. In fact, up to 98% of the workforce in countries of the global south work in the informal economy (88% in India).[12] Furthermore, formal employment faces an erosion of safeguards as they are displaced by the rapidly growing "gig economy." Because these workers are typically paid at piece or day rates, falls in work productivity translate directly to lost earnings.

Many days of moderate temperatures can be as deadly as shorter exposure to more extreme heat

Homes of low income workers offer little respite

Even as workplace regulations evolve, heat exposure outside the workplace remains largely unaddressed. Low income workers, whether formally or informally employed, often live in urban slums or informal settlements that are constructed from heat trapping materials and lack adequate ventilation or cooling.[15 16] Indoor overheating can lead to many adverse effects, including cardiac strain and blood pressure instability.[17 18] Sustained sweat rates overnight may prevent adequate rehydration, impairing thermoregulation and physical performance, and increasing the risk of heat stroke, injury, and kidney injury on the next workday.[6]

The effects of high night temperatures on sleep and recovery are emerging as a key pathway through which heat affects both physical and mental health.[19] These effects are likely to compound over time. A study across 10 Indian cities found that many days of moderate temperatures can be as deadly as shorter exposure to more extreme heat.[20]

Figure 1 gives an example of the unrelenting heat endured in workers' homes, showing summer air temperatures in low income housing in New Delhi.[15] The measured night temperatures are particularly concerning, often remaining raised (or even increasing) as outdoor temperatures fell, resulting in a relatively constant 24 hour indoor heat stress. Some homes had night temperatures as high as 48°C. Conditions consistently exceeded the 24-28°C indoor temperature upper limits proposed by health agencies in the global north (India does not yet have specific recommendations),[18] and nearly half of all exposure hours surpassed India specific thermal comfort limits (some houses recorded 99% discomfort hours).[21]

The dangers extend well beyond the summer. Across the Indian subcontinent, monsoons in early June signal respite from the heat. However, rapidly rising humidity accompanying the rains results in the heat index ("feels-like temperature" combining air temperature and humidity) increasing from May to August (fig 2).

These analyses have dire implications for workers. After long hours of physically demanding work in extreme heat, hundreds of millions across India and the global south return to homes that remain stiflingly hot

Examples of community involvement in heat response

Community led response

Community organisations are at the forefront of developing and piloting adaptation strategies to protect at-risk workers across India and the wider global south. Promising examples from our experiences in India include:

- The All-India Disaster Mitigation Institute has piloted anticipatory financing for street vendors, florists, and cobblers, who chose to use the funds to invest in practical adaptations such as tarpaulin canopies to provide shade (for both workers and their produce) and water thermoses for hydration. Many recipients reinvested funds into their businesses or diversified their inventories to buffer against losses during heatwaves
- The Self-Employed Women's Association (SEWA), a 3.2 million member union representing female informal workers across India, has leveraged its size to engage in collective bargaining to pilot cool roof coatings and adjustable ventilation hatches ("skylights") to reduce heat stress in members' homes at reduced cost

Community-academic collaborations

Embedding scientific studies within communities provides an excellent opportunity to generate context specific evidence, strengthen local capacity, and ensure proposed adaptations are feasible.

- Collaboration between SEWA, CEPT University, and the South Asia Climate Adaptation Cluster is assessing the day-to-day heat stress experienced by informal workers in both homes and workplaces, and linking those exposures to effects on physiology, productivity, and wellbeing.[22] Building SEWA's capacity to undertake such evaluations will enable it and other organisations to test the effectiveness of proposed interventions such as cool roofs and skylights for protecting worker health and wellbeing before offering them to their members at scale
- A community based cluster randomised trial has been integrated into the Nouna Health and Demographic Surveillance System in rural Burkina Faso.[31] Participants from across 25 villages have been randomised to receive (or not receive) a cool roof coating for their home. Measurements of biomarkers, general health, and mental and social outcomes are made in monthly visits

well into the night, offering little chance for rest or recovery. Sustained high temperatures over entire seasons will represent a serious burden on people already living at the edges of thermal tolerance.

Worker protections must extend beyond the (formal) workplace

Recent years have seen progress on worker protections. However, formal workplace regulations, on their own, will be insufficient to protect the workers who are most at risk.

Developed in conjunction with workplace regulations, heat action plans (HAP) are a cornerstone of heat adaptation in a growing number of cities. The plans, typically developed by state or city governments, help guide the public in action to protect health and facilitate coordination across sectors.[24] However, a survey of Indian HAPs found that although most identify outdoor workers and residents of informal settlements as vulnerable, few include interventions to protect these groups.[24] Successful HAPs, such as those in Phoenix, US, and Ahmedabad, India, incorporate targeted initiatives such as outreach programmes, water distribution, and shade provision for workers, people without housing, and residents of low income housing.[25 26]

Our analyses suggest one of the strongest protections for workers, especially those falling outside the scope of formal regulations,

The potential gains from investment in climate resilient construction warrant serious consideration

is to ensure cooler living conditions. Many infrastructure based solutions in low income settings have focused on immediate and inexpensive approaches such as "cool roofs" and ventilation ports or hatches.[13] Cool roofs encompass interventions ranging from simple white paints that reflect solar radiation to living "green" roofs, and may reduce summer indoor temperatures by around 2°C.[27] Advances in material science are leading to more sophisticated coatings that enable passive daytime radiative cooling and promise greater reductions in indoor temperatures.

The rapidly warming cities of the global south also present a crucial opportunity to build more resilient housing. In India, more than half the urban housing stock needed by 2070 has yet to be built.[28] Programmes, such as the Pradhan Mantri Awas Yojna,[29] could serve as a benchmark for climate resilient construction. Although such programmes have until now prioritised water and sanitation, the potential gains in worker wellbeing and productivity from investment in climate resilient construction warrant serious consideration. Returns will depend not only on identifying effective heat reducing building solutions but also on tackling persistent challenge of material quality, building practices, and building code enforcement.

Building climate resilience with at-risk communities

A lack of contextually relevant data hinders adaptation planning and implementation. Most evidence on the physiological and epidemiological effects of heat comes from research in the global north. The efficacy of commonly touted interventions such as cool roofs and proposed building solutions has been evaluated mainly by effects on indoor temperature rather than by observing whether the resultant cooling is sufficient to protect health or livelihoods.[27] The effectiveness of HAPs for protecting the most vulnerable communities is even harder to quantify.[24]

Community led organisations are responding to vulnerable workers' needs often with only meagre resources (box). Such groups are uniquely positioned to generate the evidence needed to guide adaptation. In situ assessments embedded in communities provide a critical opportunity to fill gaps in our understanding of the long term effects of heat and to inform the development of equitable worker protections, resilient yet sustainable infrastructure, and comprehensive HAPs.

Evidence generating collaborations between communities and scientists will help optimise limited investments by identifying adaptation solutions that are most meaningful to those at risk. While nascent examples have focused on immediate interventions such as cool roofs, insurance schemes, and work-rest-shade protocols, future studies could evaluate the effects of building material and design on occupant heat stress and strain, providing policy makers with the evidence needed to establish climate resilient building codes. Policies and solutions grounded in contextually intelligent evidence from within at-risk communities are more likely to be adopted, sustained, and effective over time.

Meaningful climate adaptation requires interventions and solutions that tackle both workplace and home exposures. In the coming decades, the survival of hundreds of millions around the world will depend not only on safer worksites but also on cooler homes.

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OPINION Gaia Lisi and Rupert Stuart-Smith

Medical evidence is driving legal action for climate justice

A growing corpus of legal action, grounded in medical and scientific evidence on the harmful effects of environmental pollution, aims to defend human rights to life and health

Rachel Carson's seminal 1962 book *Silent Spring* highlighted research on the health consequences of exposure to the agricultural pesticide dichlorodiphenyltrichloroethane (DDT). The outpouring of public concern that followed led to government restrictions on its use and, ultimately, a global ban. However, such definitive legislative action in the light of scientific understanding of health risks is regrettably rare.

Toxicologists and epidemiologists have shown how exposure to air and water pollution—and to toxic substances such as pesticides—can cause cancer, respiratory, neurological, and cardiovascular diseases, among others. Epidemiological evidence has shown the scale of the mortality and morbidity burdens of many sources of environmental pollution.

Yet pollution is pervasive and relatively unhindered. Some of its health risks have been known since Victorian times, but air pollution remains one of the main environmental health risks in Europe, causing around 300 000 premature deaths annually in the EU.

Even where pollution is regulated, standards often fall short of medical recommendations. For instance, 96% of the EU's urban population is still breathing air that is above the World Health Organization's (WHO) maximum recommended thresholds for fine particulate matter (PM2.5).

Medical experts have a key role in helping courts understand the protections needed

Where policy making has fallen short, medical evidence has proved invaluable in holding public authorities accountable for the impact of unlawful air pollution on people's health. In the UK, the coroner's inquest into the death of Ella Adoo-Kissi-Debrah concluded that exposure to high levels of air pollution contributed materially to the 9-year-old girl's death: the first time an English coroner had named air pollution as a cause of death. The coroner's decision provided evidence for a subsequent personal injury claim by Ella's family against the government, which was settled in 2024 and contributed to strengthening air quality standards in England.

Rulings of the European Court of Human Rights have also strengthened individuals' protections from the detrimental health effects of environmental pollution. The European Convention on Human Rights offers no explicit right to health, but the convention's articles on the rights to life and respect to private and family life have been invoked to facilitate health related claims. The court has shown to be open to health based arguments in environmental cases. In these judgments, the court drew on epidemiological evidence showing that the victims had experienced health impacts due to environmental pollution.

The case of Cannavacciuolo and Others *v* Italy, decided in 2025 by the European Court of Human Rights, provides an important example. The judgment drew from a body of epidemiological evidence showing the health impacts of large scale pollution in the Campania region in Italy, including peer reviewed research and studies conducted by the Italian Senate and the WHO.

The court used this scientific evidence to establish a "real and imminent risk" to life and held for the first time that failure to limit pollution constituted a violation of the right to life under Article 2 of the European Convention on Human Rights. Similar scientific grounds and legal bases could offer routes to climate justice as well.

Advances in attribution science

Advances in attribution science, combined with existing health research methods, can demonstrate the extent to which climate change is harming health. Relatively few studies attributing health impacts to climate change have been published so far; but as this research field matures, methods are becoming more widely recognised, opening up new routes for climate accountability.

Legal cases are being filed in domestic and regional human rights courts arguing that inadequate climate targets are contravening states' obligations to protect claimants' rights against the adverse effects of climate change, including on their physical and mental health. Scientific evidence could prove crucial to meet the "especially high threshold" to establish the victim status for individual applicants established by the European Court of Human Rights.

In lawsuits concerning environmental pollution, medical experts have had a key role in helping courts understand the protections needed to uphold health related laws. Scientists and medical practitioners can be appointed as court experts, submit third party evidence to a case, or conduct research that provides the evidentiary basis for legal arguments by parties. Improved understanding of the health consequences of climate change could have a similar effect, clarifying the extent to which states are meeting their legal obligations to protect health, and opening up routes for climate justice where they fall short.

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OPINION Barbora Šedová and Andrew Haines

Complex links: climate change, conflict, and health

AFP/GETTYIMAGES

Climate and conflict seriously threaten human health. From 1995 to 2015, more than 10 million child deaths were attributed to conflict, while women of reproductive age in high intensity conflict zones experienced mortality rates three times higher than those in peaceful areas.

Additionally, more than 60 000 heat related deaths occurred in 32 European countries during both the exceptionally hot summers of 2022 and 2024, with women substantially more affected than men. Beyond direct loss of life, climate and conflict hazards threaten health indirectly, such as by damaging health infrastructure, disrupting supply chains, threatening the safety of health workers, as well as by reducing access to food and essential services, including water and sanitation—escalating the risk of undernutrition and spread of infectious diseases.

Although climate hazards and conflicts each pose serious health risks on their own, their intersection can produce synergistic effects, leading to more severe and complex outcomes. Climate hazards can also amplify conflict risks through indirect pathways, particularly in contexts marked by high societal vulnerability including where health and health systems are already fragile.

Fragile, conflict affected states

Notably, the most climate vulnerable countries with the weakest health systems are overwhelmingly fragile and conflict affected states (FCS). At the same time, both types of hazard exacerbate the vulnerabilities, creating self-reinforcing cycles of worsening health, conflict, and climate impacts. As climate change intensifies, these dynamics risk becoming even more deeply embedded, underscoring the urgency of immediate action.

Integrating climate and conflict information into health system planning is essential

Climate action—both mitigation and adaptation—is critical for tackling risks to health, but conflicts often disrupt these efforts. The effects of conflict on infrastructure and essential energy, food, health, and other systems undermine their resilience and make adaptation more difficult. Moreover, conflicts divert resources away from climate priorities. For example, in FCS adaptation costs are higher than elsewhere and far exceed domestic capacities. International support is therefore essential. Although adaptation is more cost effective than repeated humanitarian responses, international financing for climate adaptation continues to fall short of what is urgently needed.

Mitigation efforts—critical for reducing long term climate change risks—face similar challenges. Following Russia's invasion, for instance, Ukraine's mitigation investments were substantially reduced as funds shifted to war and reconstruction. Simultaneously, the UK redirected unspent climate finance to a £1bn military aid package for Ukraine, and international donors, including the World Bank and the European Commission, face growing pressure to reallocate climate funds to support reconstruction. In 2024, global military spending surged by 7.4% in real terms, driven by increases in Europe and the Middle East and North Africa. Overall, military spending reached over $2.7tn in 2024—similar to the sum needed to decarbonise the energy sector.

Military activities are a major, but under-reported source of greenhouse gas emissions, conservatively estimated at 5.5% of the global total, with the US the largest contributor. This likely understates the true impact, as most emissions stem from complex, hard-to-track supply chains. In addition, potentially substantial combat related emissions—from fires, reconstruction, and fuel intensive operations—are typically excluded from estimates.

Yet military emissions are not routinely reported to the United Nations Framework Convention on Climate Change under the Paris Agreement, with some countries claiming that disclosure would compromise national security. For climate change mitigation, reporting of military emissions should be mandatory.

To promote sustainable development and peace, decision makers—from local to international—must recognise the interplay between climate, health, and conflict and commit to scaling up climate action including in FCS. Strengthening health systems should be a priority to reduce vulnerability and support climate adaptation.

Deepening vulnerability

FCS are often sidelined because of the high risks and operational challenges. Yet prioritising these contexts is essential to avoid deepening vulnerability and instability, with consequences that reverberate globally. To prevent unintended harm—such as exacerbating inequalities—climate interventions must be conflict sensitive and align with peacebuilding efforts.

Integrating climate and conflict information into health system planning is essential for maintaining resilient health systems and reducing peace and security risks. One promising example is the Climate Conflict Vulnerability Index. This open source tool identifies areas where climate and conflict hazards intersect with social vulnerabilities, including health related vulnerabilities, and could reinforce each other. However, such risk mapping must be paired with detailed, context specific analysis to design interventions that effectively deal with the impact of hazards and the underlying drivers of vulnerability.

Only by integrating climate action with conflict prevention and peacebuilding can we disrupt the vicious cycles of escalating climate impacts, deteriorating health, and rising instability. Strengthening health systems must be central to these efforts.

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EDITORIAL

Placing the Amazon at centre of COP30

Protecting forests and inhabitants will pay health dividends

The Amazon rainforest is the world's largest tropical forest and one of its most vital ecosystems for human health and planetary stability. It stores the equivalent of 15-20 years of global carbon emissions and regulates rainfall patterns critical to food security across Latin America and beyond.[1] The forest's loss could trigger catastrophic warming—up to 14°C—and destabilise climate systems worldwide.[2]

Yet, this vital biome is under siege. Satellite monitoring shows that nearly 20% of the forest has been lost since 1970,[3] with deforestation peaking during 2019-22 under Brazil's climate change denialist government.[4]

The 2025 UN climate conference (COP30), the first to be held in the Amazon, has an opportunity to recentre forests and biodiversity as pillars of the global climate system. The negotiating parties should prioritise mechanisms to empower indigenous and forest communities, protect forest defenders' rights, and strengthen governance and funding for forest protection and restoration.[5]

The primary drivers of Amazon deforestation are agricultural expansion and cattle ranching.[6] Between 2019 and 2023, fires destroyed 5.6 million hectares annually. Roads carved through forest have accelerated degradation, oil extraction has caused great damage in Ecuador, illegal gold mining has poisoned rivers with mercury,[7] and industrial mining zones such as Carajás—larger than Portugal—threaten entire ecosystems. Habitat destruction also drives zoonotic spillover. Surveillance in eastern Amazonia, where deforestation is most intense, has detected emerging arboviruses such as Oropouche fever,[8] which is now infecting humans across South America.

Actions to halt deforestation

Despite these challenges, forest peoples remain the Amazon's strongest defenders. Indigenous and traditional communities possess deep ecological knowledge and sustainable practices that preserve biodiversity and carbon sinks.[9] Their cosmologies recognise the rights of nature, and their livelihoods are rooted in stewardship. Yet they are few, dispersed, and disproportionately affected by environmental degradation and structural racism. Protecting their territories, health, and autonomy is essential to halting deforestation.[10]

Legal frameworks for land demarcation, environmental licensing, and enforcement exist to protect the forest from illegal occupation or invasion by mining and agribusiness, but they are vulnerable to political shifts.[11] Independent research institutions, a free judiciary, and protection for environmental defenders are critical to maintaining accountability. COP30 discussions will focus on a new forest protection fund as well as decentralised governance mechanisms, both of which could strengthen protection and accountability.[12]

A sustainable "socio-bio forest economy" offers a viable alternative to extractivism.[13] Technical support for sustainable forestry, clean energy, ecotourism, and commercialisation of forest products—nuts, oils, seeds, fruits, and handicrafts—can regenerate ecosystems while improving livelihoods. Expanding digital skills, irrigation, agricultural intensification, and firefighting systems is also essential.[14] Brazil has established research and technical support for agriculture in every rural community. A similar centre of excellence with support services for tropical forest communities could be established. Tested models for integrated health coverage and sustainable forest development should be scaled up.[15]

Discussions will focus on a forest protection fund and decentralised governance

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Protecting the Amazon also depends on the urban majority as their votes determine national governments. Public concern over climate change is high, but political mobilisation remains fragile. Holding presidency of COP30, Brazil's proposal of a national mutirão[12]—a collective mobilisation rooted in listening, participation, and local knowledge—invites all sectors of society to contribute to "globally determined contributions," extending climate responsibility beyond states. This participatory model could galvanise civic engagement and reinforce democratic, anti-authoritarian governance.

Finally, COP agendas have historically been dominated by large national and industry interests. Embracing a new decentralised climate agenda that brings local parties to the table could offer tangible benefits, linking emissions reduction to food security, equity, housing, and universal health coverage. This would yield powerful health co-benefits and align environmental investment with social policy. Achieving this would make COP30 a landmark in climate governance and public health history.

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