"Cli-fi can deepen understanding, help process emotions, trigger action" **HOWARD FRUMKIN**
"Change is inevitable. Hence the need for an expanded medical ethics" **JULIAN SHEATHER**
PLUS Protecting the world's children; altering the mindset around the climate crisis

OPINION Simon J Piatek and colleagues

How do we tackle the threat of false information?

As health narratives in the climate change discourse become more visible, the intersection of health and climate change will soon become a critical area vulnerable to misinformation and disinformation campaigns.

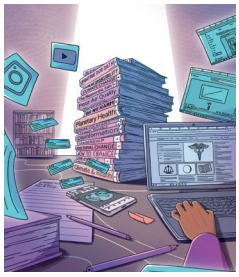
Misinformation (inaccurate information spread without malicious intent) and disinformation (deliberately deceptive information) in health are not new. The rapid spread of false covid information during the pandemic undermined public trust in science and public health interventions. In the UK, people's intent to "definitely" take the covid vaccine dropped by 6.2 percentage points after participants were exposed to misinformation.

False information also pervades the climate change debate. The World Health Organization has identified climate change as the greatest threat to global health in the 21st century, but the public's understanding is often clouded by conflicting narratives. A significant portion of climate related health misinformation focuses on the severity and causes of climate change. Common myths include the belief that climate change is a natural phenomenon, unaffected by human activity, or that the risks are exaggerated. Disinformation, often supported by fossil fuel interests, propagate these myths, impeding efforts to mobilise public support for necessary policy changes.

Climate change poses numerous health risks, including higher incidence of heat related illnesses, respiratory disorders from deteriorating air quality, vectorborne diseases, and mental health problems arising from climate induced displacement and stress. Vulnerable populations, particularly in low income regions, are disproportionately affected. However, misinformation can lead to inadequate preparation and response, as seen in the underestimation of risks associated with extreme weather events.

Similarly, dis- and misinformation about the efficacy and safety of vaccines have hindered the fight against diseases such as dengue, which are projected to spread owing to changing climate conditions.

Some false narratives suggest climate interventions, such as renewable energy projects or carbon reduction policies, are harmful or part of a broader conspiracy. Others provide inflated net costs for mitigation by omitting the costs of failing to tackle dangerous climate change under business-as-usual projections—or by focusing on the costs but not the benefits. These arguments can discourage support for essential action.



The medical community has a pivotal role to play

Social media platforms have become major conduits for health related climate disinformation, and the advent of artificial intelligence (AI) has added a new dimension. AI technologies can create highly realistic and persuasive fake content, including text, images, and videos, further muddying the waters of public discourse.

The medical community has a pivotal role in tackling the issue of misinformation on health and climate change. We recommend the following strategies to consider.

Our recommendations

We must:

- Strengthen public health communication. Clear, accurate, and consistent messaging from trusted health professionals can counteract misinformation.
- Collaborate with tech companies. Public health and tech company partnerships can develop algorithms that prioritise accurate information and flag false content.
- Leverage AI for good. Machine learning algorithms can help to identify and flag false content, while AI driven analytics can track misinformation and inform countermeasures.
- Include education on climate change and its effects on health in public health curriculums. Empower people with critical thinking skills to discern credible information.
- Advocate, as medical professionals, for policies that tackle both climate change and misinformation. This includes supporting regulations to limit the spread of false information and promoting transparency in health research.
- Focus on community engagement. Localised health campaigns that consider cultural contexts can be effective.

Health professionals adopting a multifaceted approach can mitigate the impact of misinformation to ensure the public is well informed on the health impact of climate change.

Simon J Piatek, digital lead, Vaccine Confidence Project
Andy Haines, professor of environmental change and public health
Heidi J Larson, professor of anthropology, risk and decision science, London School of Hygiene and Tropical Medicine

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OPINION Howard Frumkin

Cli-fi—helping us manage a crisis

Climate fiction may help us deal with the emotional turmoil the crisis triggers

Reading fiction is one of the sublime ways to experience art. Stories engage us, absorb us, and stay with us. The reader may be transported cognitively and emotionally, and experience images more vivid than those in real life. This can be transformative; a compelling narrative may change a reader's point of view.

Indeed, stories are an integral part of all cultural traditions. Stories shape collective memories, define social identity, and—importantly in the context of contemporary crises such as climate change—frame the possibilities people perceive for the future.

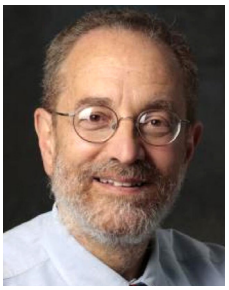
In recent years, the genre known as climate fiction—or "cli-fi"—has blossomed. "We decide what to do based on the stories we tell ourselves," says Kim Stanley Robinson, author of *The Ministry for the Future* (2020), "so we very much need to be telling stories about our responses to climate change and the associated massive problems bearing down on us and our descendants." Dozens of authors have answered the call.

Cli-fi varies widely. Some stories and books centre on the climate crisis; in others, conventional plots unfold, with climate change forming the background. Some accounts are set in the next decade or two, others in the more distant future. Some cli-fi is dark and feeds despair; other works are hopeful, depicting pathways to human survival and even thriving. Much cli-fi is just plain good storytelling.

Why should health professionals care?

Cli-fi may be important for our patients as they come to grips with the looming climate crisis—a hyper-object too vast to grasp, a threat too frightening to confront directly, a challenge that can feel paralysing. Indeed, health professionals may find cli-fi helpful in the same way. Cli-fi may function in at least three relevant domains: cognitive, emotional, and behavioural.

It can help us understand the climate crisis, including its health dimensions. While climate science relies heavily—and appropriately—on modelling and forecasting, these quantitative methods tell no stories. No numerical tables or coloured maps can pack the punch of the infectious diseases in Sherri Smith's *Orleans* (2014) or T C Boyle's *Blue Skies* (2023), the drought in Paolo Bacigalupi's *The Water Knife* (2015) or Claire Vaye Watkins's *Gold Fame Citrus* (2015), the rising sea levels in Kim Stanley



Fiction can cultivate empathy, hope, and action

Robinson's *New York 2040* (2023), or the wildfires in Sarah Ruiz Grossman's *A Fire So Wild* (2024). The vivid imagery in these books stays with you long after you finish reading, in ways that scientific papers rarely do. Simply stated, fiction is an effective tool for learning facts.

Cli-fi may help us deal with the emotional turmoil the climate crisis triggers. Psychologist Thalia Goldstein points out that reading fiction offers a way to process difficult emotions such as grief: "In fiction we can experience emotions without need for self-protection, and thus we can allow ourselves to feel more than we would feel in real life." In the context of climate change, empathy for future generations is in short supply and needs to be cultivated; it is the bedrock of responsible climate policy. Identifying with a

OPINION Thomas D Lee

Treating the symptoms of climate anxiety

When I started writing *Perilous Times*—a novel in which Arthurian knights return from the dead to save Britain from peril in an exaggerated post-Brexit dystopia—I was suffering from an acute case of climate anxiety.

Writers of cli-fi are largely preaching to the choir, because climate change has (regrettably) become a hotly contested theatre in the culture war. Anyone brave enough to don a hazmat suit and wade into the one-star Goodreads reviews for *Perilous Times* will quickly see what I mean. I don't think there's a recorded case of ostrichitus (otherwise known as "head-in-the-sand" syndrome) being cured by the quick administration of a really profound and insightful piece of climate fiction, although I'd be happy to be proved wrong.

Suffice it to say, I didn't write *Perilous Times* with the expectation that it would change anything. I wrote it with the primary intention of making people laugh. There's something deeply camp and absurd about the Arthurian mythos, captured so brilliantly by Monty Python and *Spamalot*. The original legends are full of bizarre incidents, talking animals, and convoluted tests of chivalry. Even the legend of Arthur's messianic return, coming to England's aid in its hour of greatest need, is funny when you stop to think about it. Why hasn't he returned from Avalon to protect the realm from ecological devastation? Of course, even if he did, he would not be particularly useful.

This seemed like a sufficiently amusing concept to serve as the basis for a novel. And, as it developed, I realised it could serve as a vehicle for serious commentary on the climate crisis. Why do we allow ourselves to get distracted by factionalism instead of uniting to protect the planet? Why are we so willing, even eager, to abdicate our communal responsibilities and wait for a

young person who is struggling to survive in an altered world in 2070 may create powerful intergenerational solidarity.

Fiction can also cultivate another essential emotional response: hope. Cli-fi accounts of successfully tackling the climate crisis, such as Robinson's *The Ministry for the Future* (2020) or Neal Stephenson's *Termination Shock* (2021), even if they don't predict all the details accurately (how could they?), offer the reader a bracing dose of hope.

Finally, cli-fi can motivate action. Educator Annie Schultz describes works of fiction whose protagonists engage in struggles, often of a political nature, "informed by a contemplative focus on inner consciousness." Through such journeys to political consciousness, Schultz argues, "reading and thinking can become emancipatory activities and ones that might precede meaningful civic action and participation."

We have only a few studies of the effects of cli-fi on readers, and the findings are equivocal. We need to know more. But from all we know of literature more generally, there is every reason to think that cli-fi can deepen understanding, help process emotions, and trigger constructive action—all useful outcomes as we address the climate crisis. Ideally, we will read climate fiction, be transported, and be stirred to action, before it ceases to be fiction.

Howard Frumkin, professor emeritus, University of Washington

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We can yield to despair or we can try to nurture a few bright sparks of joy

strongman to come along and solve all of our problems? What does a hero look like in the 21st century? These became the central questions of the book.

When faced with grim headlines and an uncertain future, we can yield to despair or we can try to nurture a few bright sparks of joy and merriment in the darkness, and I think this has always been the primary duty of storytellers. Climate fiction can't be used as a cure for climate breakdown, but it can be used to treat the symptoms of climate anxiety. It can serve as a source of joy, comfort, solace, and catharsis in perilous times.

Thomas D Lee, author of fantasy fiction and visiting lecturer at City, University of London

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OPINION Sarah S Grossman

Writing towards a healthier future amid climate disaster

Weeks after I moved to the California Bay Area, I woke up to smoky skies. It was autumn of 2017, and on my bike to work at *HuffPost*'s downtown San Francisco office, I pedalled past people with scarves over their mouths, N95 masks. My throat scratched, a headache blossoming. At my desk, I saw the reports: a historic blaze had torn through the cities of Sonoma and Napa. I went home, got in my car and drove an hour north, towards a thickening cloud of ash. What I saw there floored me—and became the seed of what would later be my first novel, *A Fire So Wild*.

The neighbourhood of Coffey Park in Santa Rosa, once filled with row after row of charming two storey houses and pristine lawns, had turned to ash. A few people walked around, gingerly stepping through piles of still-hot metal where their homes were, just the day before. They had fled the fire in the night and had come back to find everything gone. One woman told me, "Everything that we had is charcoal." I cried in my car and reported back from the scene, covering the first of what would be many stories over the years of tracking the worsening heat and fires in California, wrought by our human made climate crisis, driven by fossil fuel.

At a certain point, reporting individual stories didn't feel like enough to do justice to the breadth and grief of the crisis; the way that deadly heat combined with unequal conditions of our capitalist systems left people on the brink. A lack of affordable housing had pushed people out of rental accommodation and into living in the streets, where their lungs filled with the ash of nearby blazes. Outdoor workers were made to labour under inhuman heat, bearing the brunt of the climate crisis in their bodies as they toiled in construction or in fields to harvest food for others.

In late 2020, after covering California's deadliest fire in a town called Paradise, a story started to take shape in the form of three families in the progressive city of Berkeley, California. One family in a house up in the hills. Another in affordable housing down in the flat area. And a couple living in their van by the shore. A wildfire slowly growing in the distance. My novel, *A Fire So Wild*, is about a wildfire that creeps towards Berkeley and the people whose lives are upended as the heat and smoke descend, exposing the injustices lying under the city's surface. The book was a way to work through my climate grief, channelling my questions about how we can build meaningful lives in a world on fire.

As a writer, words are the best tool I have to work through the paradoxes of our fragile existences on this planet that we are actively wrecking, to try to imagine a more just future. And I believe each one of us has our own role to play; as health professionals, your job is among the most important, on the front lines of how the climate crisis affects people's bodies.

You may wonder what one person can genuinely do when faced with the massive scale of the climate crisis—the reality that, as individuals, our behaviour makes such a small dent compared with the corporations and governments whose actions need to shift at a massive scale to stave off the worst of what is to come. I will share with you what one climate scientist I interviewed told me: it is all hands on deck. Onward.

Sarah S Grossman, writer, Los Angeles

Cite this as: *BMJ* 2024;387:q1825

Words are the best tool I have to work through the paradoxes of our fragile existences on this planet

Redefining medical ethics for the planet

New ethical obligations to tackle the climate crisis are needed—but these must be specified carefully

In 2023, scientists at Stockholm University quantified all nine processes that guarantee the stability of the Earth's regulatory systems. Six are breached. Of the remaining three, ocean acidification and atmospheric aerosol loading are under pressure. Only one, stratospheric ozone depletion, is unstressed.

The drivers of these changes are human economic activity: we may quibble as to whether we have entered the Anthropocene but there is no argument left as to whether these breaches of the planet's boundaries are anthropogenic. Nor can there be any doubt about the threat they pose to human health.

I have worked for many years with medical professional and regulatory bodies in the UK. I have also worked in modest ways with global bodies seeking to define and redefine ethical obligations among health professionals. Most health professionals know the seriousness of the threats to health that we are facing from climate change and are pushing for changes to core ethical obligations. Many representative bodies agree—but not all of them, and the opposition is important and illuminating.

We need to rededicate health professions to ensuring the integrity and durability of the planetary systems that underpin our survival

In my experience, resistance to these changes draws on fears that environmental obligations will either be so expansive that they are meaningless, or so prescriptive as to result in excessive regulation. Harried and overworked health professionals fear that expanded obligations will result in further exposure to regulatory censure.

This fear no doubt lay behind push back to the modest recent change to *Good Medical Practice* by the GMC. According to the new guidance, doctors should "choose sustainable solutions when you're able to, provided these don't compromise care standards. You should consider supporting initiatives to reduce the environmental impact of healthcare."

It is unclear how this could be given regulatory leverage, or why the GMC would want it to. The advice invites consideration of environmental impacts and seeks to raise awareness, which is important, but modest. Concerns about scope remain essential, however. Imposing obligations that cannot be fulfilled—or come with a punitive kick—invites burnout or cynicism, possibly both.

Unsurprisingly to modern ears, the earliest systematisation of medical ethics—the Hippocratic oath—has a quaint, quixotic sound, with its talk of Apollo, holiness, and reverence for the master. But this oath set the focus of obligation in medicine firmly on the doctor-patient relationship.

Despite explosive growth in understanding of the complex underpinnings of human health and wellbeing, ethical focus has stubbornly remained in that relationship. When we talk of ethical obligations in medicine, it is almost unquestionable that duties fall on health professionals.

Use of "bio" in bioethics did signal interest in broader processes, acknowledging ecological and evolutionary contributions to health, but with the exception of public health ethics, contemporary bioethics remains focused on the clinic and the test tube: the research and the doctor-patient relationship.

Change is inevitable

The gathering environmental crisis means change is inevitable. Hence the need for an expanded medical ethics. We need to rededicate health professions to ensuring the integrity and durability of the planetary systems that underpin our survival and flourishing. There can be no human health without planetary health.

But a note of caution. When outlining new ethical responsibilities, questions of scope will remain critical. Like all of us who care about the environmental crisis, individual health professionals will ask: what are my duties? What falls to me? What is plausibly, practically, within my scope of agency and what do I have to look to from others?

As an ethics code for the climate crisis is refashioned, both individual and collective obligations should be identified, distinguishing between what falls on individual professionals and what can be addressed operationally, systemically, nationally, and internationally. Health ethics adequate to tackling the climate crisis must acknowledge interconnectedness and collective responsibility. It must not leave individuals isolated, fretting alone about their duties. Nor must it abstract obligations into irrelevance.

Planetary obligations must have meaningful local purchase—and what that means must be spelled out.

Julian Sheather, ethics consultant, World Health Organization

Cite this as: *BMJ* 2024;387:q1965

OPINION Tobias Alfvén and Zulfi Bhutta

Nurturing children and protecting our planet from climate change

The world we live in is changing, and young people are being particularly affected

WORLD HISTORY ARCHIVE/ALAMY

This summer, new temperature records were set all around the world, including the warmest July since global records began in 1850. At the same time, it was also the 14th consecutive warmest month on record. Greenhouse gases from human activities are changing our climate at record speed.

We are crossing planetary boundaries—the boundaries within which humanity can continue to develop and thrive. Key environmental thresholds that if crossed could lead to huge and potentially irreversible environmental changes threaten the health of us all.

Nine planetary boundaries have been described by Johan Rockström and colleagues. They include climate change, biodiversity loss, freshwater use, chemical use, and stratospheric ozone depletion. Taken together these planetary boundaries are said to form the "corridor of life"—a conceptual space where human wellbeing is maintained without breaching the planet's ecological boundaries.

The Anthropocene

Human civilisation has been built within this corridor of life. The past 12 000 years, with its reasonably stable climate, is known as the Holocene. During the Holocene, Earth's systems operated within the planetary boundaries, supporting agriculture, biodiversity, and the development of societies. However, human activities over the past century—marked by industrialisation and the widespread use of fossil fuels—have shifted the planet into a new era known as the Anthropocene, defined by humanity's overwhelming impact on the environment.

The corridor of life concept can be compared with homeostasis in the human body. As physicians we know how narrow the lines are between health and ill health, and even death. Our bodies need to maintain the right temperature; the right levels of glucose, sodium, and potassium; the right pH; and many other variables. And when we get patients who are ill—for example, when the body's temperature, glucose, or sodium levels are too high or too low—we try our best to understand why and find a treatment, to get the body back to a state of balance. Moreover, we try to keep the balance from the start.

As physicians we need to be much better at understanding the corridor of life for our planet. This corridor is integral to the health and survival of children today and tomorrow. Rockström's framework of planetary boundaries highlights the risks of exceeding critical environmental thresholds. We have now crossed six of the nine planetary boundaries.

Climate change is already here and is already changing the world we live in. A recent report from Unicef highlights that children are particularly vulnerable to environmental hazards because of a combination of physiological, psychosocial, and behavioural factors, as well as their reliance on caregivers.

The remarkable strides in improving child health are now under severe threat

The world has made remarkable strides in improving child health over the past several decades. Globally, under 5 mortality has decreased from 93 per 1000 live births in 1990 to 37 in 2022. This progress is under severe threat, however, from the growing impacts of climate change and other environmental hazards, which not only endanger these hard won gains but exacerbate existing vulnerabilities. Evidence is rapidly mounting, and recent research underscores the impact of climate change on excess neonatal mortality and adverse perinatal outcomes.

Climate change influences children's lives in myriad ways. It is slowing, and at times reversing, global progress on ending child malnutrition.

Extreme weather events like droughts and floods, along with declining agricultural yields, reduce access to nutritious food, worsening malnutrition and increasing stunting. Furthermore, extreme weather events, such as floods, droughts, and wildfires, are becoming more frequent and intense, disrupting schooling and causing learning losses, dropouts, and other long term impacts. Rising temperatures also inhibit learning, particularly in regions already experiencing extreme heat.

Stress and distress

Moreover, children and adolescents feel their concerns are not taken seriously. Climate anxiety and dissatisfaction with government responses are widespread among children and young people across the world and impact their daily lives. Perceived failure by governments to respond to the climate crisis have been reported to be associated with increased mental health stress and distress.

Despite these severe consequences for different aspects of children's lives, and urgent calls for action, there is limited inclusion of child specific measures in national adaptation policies. To counter this, governments must prioritise children, prepare for a warmer world, and at the same time start to change politics so we can create a global way of life that remains within the corridor of life.

We need urgent systems transformations so that we can protect the planet and nurture our children, the children of today and tomorrow, everywhere.

Tobias Alfvén, Karolinska Institutet, Stockholm, Sweden

Zulfiqar A Bhutta, Hospital for Sick Children, Toronto, Canada

Cite this as: *BMJ* 2024;387:q2056

How healthcare professionals can change the systems damaging our climate

How we frame problems to our patients and communities can help shift the cultural mindset

For many of us working in health systems across the world, what connects us is the motivation to care for and improve the health of individuals, communities, and wider society. Because a healthy environment and climate is a building block of health, acting to tackle climate disruption is a core feature of responsible and helpful healthcare systems.

But many of us face substantial barriers to action. For some, the conditions of work offer us little time or energy. Others might find the systems that hold climate damaging conditions in place are not changed by the evidence base.

Where does this leave health professionals with a commitment to help? Often frustrated and fatalistic. But we do have the means to drive systemic change. Understanding how systems come to be constructed, and what holds them in place, shines a light on how we can change the systems damaging our climate.

Constructing and deconstructing systems

All human systems are created by decisions made by people. These decisions flow, not from logic, but from the invisible assumptions cultures are built on and the cognitive and physical processes that have evolved to protect these assumptions.

These assumptions—variously called cultural mindsets, mental models, cognitive schemas—provide all of us with unconscious explanations about how the world works. These models are "physically realised in neural circuits in the brain." Neural circuits that tell us what our roles are in the world, how we should relate to each other and the world, how problems should be solved, what should even be considered a problem.

I worked on research about shifting modes of transport and climate, for example. My co-authors and I identified a powerful shared mindset that we coined "transport is cars." When asked in broad terms about transport in New Zealand (Aotearoa), people would frequently mention their role as a car driver and relate to transport matters through driving. The need for more and better roads was the most frequent problem identified. People thought about active modes of transport infrequently. They also did not consider pedestrians or the

We identified a powerful mindset that we coined "transport is cars"

idea that roads could serve a purpose other than to move vehicles. Transport was almost never thought of in relation to climate or health issues. These mindsets are set and enforced by people and organisations in our information environment—the car industry, for example, has a large role in framing "transport is cars."

These models are also embedded in our institutions that set the framework for policy makers to determine policy goals and tools and consider the evidence and the nature of a problem. Air pollution is a major cause of excess mortality in New Zealand. Vehicle emissions are a major contributor to air pollution, as well as climate change. The evidence is clear about the benefits to human and environmental health that a stronger policy approach would bring. Yet many policy makers fail to see air pollution as a problem in need of solving. Shallow assumptions about private vehicle use (transport is cars) and air quality (invisible both literally and metaphorically) set the framework more than the evidence—facts simply do not penetrate the unconscious model and the mental shortcuts our minds use to protect what is "known."

To shift and maintain policies, practice, relationships, funding, and behaviours that comprise a system, we must shift the cultural assumptions informing them. One powerful tool we have is our communication—how we frame discussion about climate disruption to change how people see the problem and solutions.

All our communication activates some cultural mindsets, while deactivating others. Every day, health professionals make choices about how to present a topic to patients. The language, metaphors, and stories we choose are how we frame information and how the neural circuits are activated.

In research I worked on, we observed a frequent way of framing information used around climate change was the consumer frame—people's roles as consumers. Local government officers, for example, often present climate change matters to communities through their role as "tax payers" or "property owners," asking them to take on individual consumer behaviour, such as buying e-cars, choosing to cycle, or maintaining their property.

When the neural pathways relating to the consumer frame are switched on our roles as citizens, parents, leaders, care givers, and community members are switched off. It makes it harder for people to see the relevance of actions that don't involve exchanges of money or goods. Therefore some activities that local governments want people to engage in—such as local level planning for flooding—are much more likely to be treated as irrelevant.

What framing tools can we use?

The first and best action we can take is to be aware of how we frame information with the people we care for and in the health systems we work in. We need to become more aware of the language, metaphor, and framing choices we make. A switch away from the consumer frame to the community or citizen frame is one powerful action we can take.

Framing our communications through people's prosocial values, such as responsibility, helpfulness, and care for others and the places we love, connects people to climate matters through their deepest motivations which are located in cultural mindsets that allow for people to consider climate change solutions.

Our work means we have unique insights to offer on health and the climate. Using effective framing in all our roles is an opportunity to contribute to climate action across all the communities we are part of.

Jessica Berentson Shaw, co-founder narrative and strategy, The Workshop, Wellington, New Zealand

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LETTERS Selected from rapid responses on bmj.com

LETTER OF THE WEEK

A new perspective on time

Powell and Rao discuss climate activism (Opinion, online 6 October 2023). Proposed solutions to mitigate the environmental and health crises have largely failed to have the desired effect. This calls for a re-examining of society's current organisation of time and the drivers behind it—that is, the hegemonic thinking of control and determination of time that underpins western society. The concept of time held by western society disconnects people from nature and becomes a form of societal control. This approach to time is intrinsically linked to the current planetary health and environmental crises. By contrast, indigenous peoples have a symbiotic relationship with the environment, in synchrony with the planet's natural cycles.

The way society is organised influences the time schedules of our activities. Chronobiology—the study of how living organisms incorporate time and synchronise with environmental events—shows the consequences of the temporal organisation of society on health. Public health and environmental policies should recognise that the development of an organism and its surroundings is not merely the execution of an autonomous internal programme, but the product of an interaction between patterns of internal responses of the organism and its environment.

The temporal organisation of society is crucial to human health, affecting numerous aspects including cognitive functioning and subjective wellbeing. Hartmut Rosa refers to "social acceleration," where time pressure leads to the use of technology, which, in turn, increases the amount of time spent working as opposed to resting or enjoying leisure. The drive for greater productivity to meet growing consumption fuelled by capitalism has deleterious consequences for the environment, with rampant urban sprawl. Changing the way time is organised in society to reduce time pressure on people and promoting a call for social deceleration are associated with a more conscious approach in terms of consumption, production, and way of life.

Claudia R C Moreno, professor, São Paulo

Cite this as: *BMJ* 2024;386:q2106

RETHINKING SINGLE USE PLASTICS AT MEDICAL SCHOOL

Bioplastics need to be properly evaluated

Perreau-Saussine calls for a rethink of the use of single use plastics in medical schools to improve the environmental sustainability of healthcare (Opinion, online 4 July).

The article presents bioplastics as a favourable alternative to single use plastics. But students and health professionals should exercise caution before promoting their use in the curriculum and in healthcare facilities.

Beyond the cost of developing a circular economy with bioplastics, there are planetary health matters to consider. Bioplastic production might have important effects on planetary boundaries. It could, for example, lead to an expansion of agricultural land and increased consumption of water, fertilisers, and pesticides. It could also compete with the food production system.

Like conventional petroleum based plastics, bioplastics can break down into microplastics and nanoplastics throughout their life cycle. These can contain chemical additives and interact with hazardous contaminants. The medical literature is increasingly focusing on the problem of microplastics and nanoplastics, and research into their potential health effects will undoubtedly increase.

Rethinking the use of single use plastics at medical school, as well as auditing plastics use in healthcare, is essential. Health professionals should tackle unnecessary and unjustified uses now. But alternatives to petroleum based plastics should not be promoted until a transdisciplinary assessment has ensured that their use is beneficial to human and planetary health.

Nicolas Faure, GP, Le Bouscat

Cite this as: *BMJ* 2024;386:q1891

A one health, one earth, one ocean approach

Perreau-Saussine is right that medical students should be environmental stewards.

The huge and growing contamination of seas and oceans by micro and nanoplastic particles (MNPs) is a major concern. "More plastic than fish in marine ecosystems by the year 2050" is the catastrophic forecast of the World Economic Forum.

Attention should also be paid to the role of MNPs as powerful "attractors and concentrators" of persistent environmental pollutants (PEPs), including heavy metals and organic xenobiotics such as dioxins. This could exert a destabilising effect on filter feeding organisms, including large vertebrates such as whales, whose position as secondary (zooplankton) consumers in the marine food web would consequently end up mimicking the feeding behaviour of "apex predators."

PEPs have well known immunotoxic, neurotoxic, and endocrine disrupting roles, so increased exposure might have severe adverse health effects in whales. MNPs are carriers of microbial pathogens that affect cetaceans' health and conservation across the globe. This includes antibiotic resistant bacteria that benefit from the horizontal transfer of genes involved in antimicrobial resistance between the bacterial communities that colonise MNPs.

A "one health, one earth, one ocean" approach would be the best strategy to properly assess and then counteract the detrimental effects of PEP loaded MNPs on the increasingly threatened health and conservation status of free ranging whales and dolphins, the most reliable "sentinels" of our seas and oceans.

Giovanni Di Guardo, former professor of general pathology and veterinary pathophysiology, Teramo

Cite this as: *BMJ* 2024;386:q2095

ANALYSIS

Potential of urban health systems in climate response is being overlooked

Carlos Dora and colleagues argue that primary healthcare systems in cities are vital for creating resilient and equitable responses to climate change

The chapter on cities, settlements, and infrastructure in the 2022 report of the Intergovernmental Panel on Climate Change (IPCC) outlines health issues and the climate related consequences of urban heat, water scarcity, drought, and floods, intersecting with other urban health risks.

However, the strategic importance of health vulnerability and of the health systems features needed to drive integrated actions for urban adaptation, mitigation, health equity, and sustainable development are underplayed. The chapter also fails to consider potential urban health risks and benefits from climate change action.[2]

Primary healthcare oriented health systems have an important role to play in achieving integrated adaptation, mitigation, and health equity in cities,[3] as well as contributing to increased resilience in the face of growing geopolitical, military, and economic conflicts. Given the importance of the IPCC report for policy makers, these omissions can lead to inefficiencies, unintended negative consequences, and lost opportunities for climate and health at all levels of governance—local, national, and global.

KEY MESSAGES

- Urban areas are at greatest risk of adverse climate and health equity impacts, particularly in low and middle income countries
- Local health systems have an important role in integrated adaptation and mitigation strategies but have been largely ignored by the IPCC
- Including primary healthcare oriented health systems in urban climate mitigation and adaptation efforts is essential to realise health co-benefits, empower local communities, and work across sectors to ensure health equity

These omissions can lead to inefficiencies, unintended negative consequences, and lost opportunities for climate and health

Cities and climate

Cities have a crucial role in climate action. Globally cities emit 68% of carbon dioxide and 72% of methane emissions.[4] As cities continue to grow urban emissions are projected to double by the middle of the century.[4] On the other hand, cities have resources and influence over local policies affecting climate and health, including those related to transport, housing, waste management, and access to food and energy.[5]

Climate impacts also fall disproportionally on urban communities. People living in smaller and middle sized urban centres in low and middle income countries are particularly affected. One third of urban residents live in unplanned, informal settlements (56% in sub-Saharan Africa). They lack the household resources, social protection systems, infrastructure, and services needed to respond to the climate risks.[1]

Missing links between climate and urban health

Ill health is a driver of climate induced urban vulnerability, compounding the multidimensional poverty, inequality, and exclusion that together make urban households more vulnerable to climate risks. For example, people with asthma or chronic obstructive pulmonary disease are more sensitive to air pollution. Ill health also compromises people's ability to engage in transformations to address climate change and to obtain wellbeing co-benefits.[6 7]

It is also important that climate strategies recognise measures to improve health that enhance mitigation. These include, for example, tackling food deserts through community gardens, or adopting low sugar, low fat, or plant based diets and active mobility for the prevention of non-communicable diseases.[8] However, these health links are overlooked in the IPCC chapter on cities.

The health co-benefits or harms of climate related strategies are also given little attention in the IPCC chapter,[8] even when there is a strong case for integrated responses. For example, introducing electric cars to mitigate climate change reduces air and noise pollution but overlooks continued traffic injuries and barriers to health promoting cycling and walking.

The IPCC chapter focuses on resilient healthcare services to deal with health damage caused by climate change and to help mitigation. While important, this fails to consider health system influences and levers beyond curative care, linking health and non-health sectors at all levels of governance.[14] As the covid-19 pandemic clarified, local health systems have a key role in establishing coordinated cross-sectoral response, engaging affected communities, and addressing urban risk and vulnerability to overcome inequities.[15]

Role of primary healthcare and health systems

Primary healthcare is even better placed than other local institutions to play a major role in integrating health and climate responses and promoting local action.[16] This is because primary healthcare is located near peoples' homes, with services often stretching across the entire city and connected to national health resources. It caters for a specific population group in a given geopolitical context. Primary care is the first and often the only point of contact with the health system for the community, especially for lower socioeconomic groups and informal settlements.[17] Population density and proximity to primary care services facilitates understanding of place and population specific climate and health vulnerabilities. That allows for the identification of contextualised and locally relevant opportunities for health and climate action.[3]

Community health facilities have a vital role in fostering self-organisation and self-governance among residents, while also helping to build medical and public health support networks at various levels. This process ultimately strengthens the community's overall resilience by enhancing skills, processes, and objectives. Primary care services also reduce urban health inequities through coordinating services across the system and promoting cross-sectoral actions, addressing differential needs and cultures in service design and delivery.[18]

Primary healthcare provides a pre-existing means for the implementation of integrated climate, health, and equity action. It is therefore imperative that the IPCC acknowledges the role local health systems already play and levers primary healthcare to address urban climate and health risks (box 1). Primary healthcare oriented health systems must be designated as priority "means of implementation" and equipped and resourced to fulfil that role.

Box 1 | Contributions of primary healthcare oriented health systems to climate and health equity[6-22]

- Improving population health, reducing vulnerability to climate related risks
- Reducing health inequities, thereby reducing inequitable climate impacts
- Encouraging healthy behaviours that are also climate friendly
- Assessing local sources of climate and health vulnerability and articulate response needed
- Engaging with other sectors to ensure their climate mitigation and adaptation actions maximise health
- Influencing public opinion and decision making as a trusted voice
- Adapting and decarbonising local healthcare facilities, contributing to their resilience and to mitigation of climate change

Realising local health systems' potential

Stronger actions for climate and health at the local level in cities requires a clear remit and adequate investment in primary healthcare's capacities and tools, to integrate local climate and health equity actions as a core function. For its greatest impact, primary healthcare needs leadership and support at local, national, and international levels.

Internationally, there is a need to frame and endorse the links between climate, health, equity, and cities. This is still lacking in international policy instruments. For example, no decision document in the UN climate framework recognises that reducing greenhouse gases promotes positive health outcomes or identifies a health sector role in climate negotiations.[23] Only 0.5% of international climate finance goes to health interventions, and health systems lack resources for climate adaptation.

Analyses of national and urban climate strategies show little reference to local health systems,[26] especially in low and middle income countries. Most national adaptation plans remain in environment departments with little health input.[27] Those with a health focus have limited implementation despite recognition of health vulnerabilities from climate change. Most cities' adaptation plans do not include health system adaptation as a policy aim,[28-] with important health risks ignored.

Conversely, health systems have not yet made investments on climate and health at the scale they have done for certain diseases (AIDS, malaria, tuberculosis) or for vulnerable population groups (children). Yet even where health professionals are aware of health and climate links and want to take responsibility to advise, they lack time, guidance, and training.[30]

These deficits can be addressed by health systems defining functions and capacities for linked urban climate and health interventions, and harnessing information systems to track climate related health effects and to plan interventions.[4] A focused effort to maximise synergies with other sectors is essential. Box 2 proposes policies and measures needed to achieve these changes, drawing on the evidence on primary healthcare's contributions to urban health equity and climate mitigation.

Box 2 | How health systems can identify and influence cross-sectoral action for climate and health co-benefits

- Securing leadership and resources to drive an integrated climate and health agenda for cities
- Making intersectoral action on climate change a core, resourced, strategy for national and local health systems and within primary care, with attention to social inequalities and urban conditions
- Harnessing and sharing evidence on risk and vulnerability across sectors and through urban planning processes, to evaluate and propose urban climate policies that also improve urban health equity
- Strengthening co-planning and innovation across disciplines and sectors, with participatory engagement of affected population groups and of the health workforce
- Updating laws and regulations to implement and ensure compliance with cross-sectoral health and climate linked policy and strategies, providing authority for measures such as health impact assessments and regulation of commercial organisations
- Establishing or strengthening sub-national finance, risk sharing, and accountability mechanisms across sectors to factor in risks and co-benefits
- Defining and ensuring roles, capacities, and leadership in the health sector to engage within cross-sectoral urban governance to maximise climate and health co-benefits

Integrated response

The 2022 IPCC cities chapter raises important urban health equity issues. Its muted position on the role of health systems echoes the poorly developed articulation of the link between cities, climate, and health equity at global and national levels. This oversight could stem from an assumption—frequent in environment debates—that mitigation will automatically benefit health, with no need to engage the health sector specifically.[36]

There is an urgent need to equip urban primary healthcare and wider health systems to fully integrate equitable climate and health risk reduction into their core functions. Simultaneously other sectors aiming to improve urban climate resilience need to value the critical role of health systems to further their collective efforts. Such institutional realignment requires prioritisation and investment in local level capacities to plan for and respond to climate and health.[22] While such investment necessitates institutional change at global, national, and local scales, integrated urban climate and health policies are an essential response to the largest threat to public health in the 21st century.

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OBITUARIES

Julian Mervyn Roberts

Psychiatrist (b 1925; q Edinburgh 1948; FRCPsych OBE), died of subdural haematoma on 25 June 2024

Julian was born in Penketh, Cheshire and chose to study medicine at Edinburgh University. After studying for a diploma in psychological medicine at Leeds University he did his national service at the Royal Victoria military hospital in Southampton. He then accepted a post as senior registrar at Leeds University's department of psychiatry. In 1960 Julian was appointed consultant psychiatrist at St James's University Hospital in Leeds, where he stayed until his retirement. In 1970 he was appointed to the Yorkshire Regional Health Authority where he spent 12 years developing psychiatric services in the region. In retirement he enjoyed walking, genealogy, and botany. His wife, Edna, died in 2017. Julian is survived by four children and six grandchildren.

Sasi Mahapatra

Cite this as: *BMJ* 2024;386:q2063

Howard Allison

Consultant haematologist (b 1932; q Manchester 1955), died from old age on 15 August 2024

Howard was born in Sunderland and was evacuated during the war to York and Barnard Castle. He joined Manchester Medical School at the age of 17. After several jobs in the north west, he took a post as a consultant haematologist working for much of his career at Leighton Hospital, Crewe. He married Mary (née Walker) whom he met when they were both medical students at Manchester University. His interests included politics, environmental matters, working on his allotment, and volunteering at National Trust properties in Guildford, where he lived following his retirement. He is survived by Mary, four children, four grandchildren, three great grandchildren, and three step grandchildren.

Mary Rose Allison

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Sotirios Zalidis

GP (b 1950; q Athens 1973; MRCP), died of complications of an endocrine tumour of the pancreas on 5 July 2024

Sotirios came to the UK from Greece in 1974 and became a GP, joining the Well Street Practice in London. There he helped many patients with physical symptoms related to emotional distress. He joined the Balint Society, which explores the doctor-patient relationship. He helped found the University College London psychosomatic workshop and was also one of the leaders of the first UK medical student Balint discussion group at University College Hospital. His parents and grandfather were doctors, and Sotirios had many happy memories of childhood holidays in Pelion, Greece. He was proud of his heritage and was a keen reader of the Greek classics. He is survived by his wife Lynn, their daughter Katerina, son in law Stefan, and grandson George.

Peter Shoenberg

Cite this as: *BMJ* 2024;386:q2079

Mazin Mirza

Internal medicine trainee (b 1992; q Hull/York 2020), died from metastatic pancreatic cancer on 21 July 2024

Mazin was raised in Leicester, son to Ather and Badri Mirza. He attended the University of Leicester where he studied medical genetics, graduating with a first. He then secured a place at Hull York Medical School in 2015. After qualifying Mazin completed foundation training in Birmingham and then underwent internal medicine training. Mazin volunteered with the Maasai in Kenya, trekked to Everest base camp, and worked with refugees in Greece. He was a keen chess player. He also loved poetry and writing. Mazin had a positive outlook. He completed a diploma in infectious diseases and his only remaining career ambition was to volunteer for Médecins Sans Frontières. Sadly, he became unwell in early 2024. He was supported by his family and his fiancée Umika, a trainee GP.

Matthew Bradbury, Khalid Al-Hashimi

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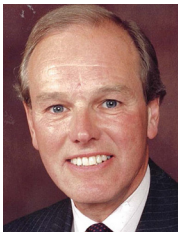
Michael McKendrick



GP (b 1932; q Durham 1956; MBE FRCGP), died following a cerebrovascular accident on 28 March 2024

Mike was born in Newcastle, where he attended the Royal Grammar School and then studied medicine at Durham University. After house jobs at the Royal Victoria Infirmary, he joined the Royal Navy. He joined a GP practice in Hexham in 1960 which, thanks to Mike's lead, became one of the first vocational training and computerised practices in the north east. He expanded it to three male and three female partners and a primary healthcare team of 25. He was regional adviser in general practice and was chairman of the regional medical audit advisory group, helping to set clinical standards for acute and chronic disease care in Northumberland. He was a fine musician and sportsman, sailing and playing many sports including squash. He married Tricia who was a sister at the Princess Mary Maternity Hospital. She survives him along with three children.

Tim Carney

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Dinah Barrie

Consultant microbiologist (b 1936; q London 1959; FRCPath), died from pneumonia on 31 July 2024

Dinah Barrie (née Castle) was born in London. Her father was awarded the Military Cross in the first world war and her mother was a nurse. During the second world war, the family were evacuated to Yorkshire, where Dinah gained a lifelong appreciation of nature. Dinah studied at St Thomas' Hospital Medical School where she was one of just two women in her year. Here she met Herbert Barrie, a paediatrician, and they married in 1963. House jobs at St Thomas' were followed by a senior house officer post in pathology. Dinah was appointed consultant microbiologist to Charing Cross Hospital, London, in 1972. She believed that bacteriologists are not only scientists but clinicians who have a duty to see patients. She retired in 2011 and spent her time gardening and seeing friends. Herbert died in 2017. Dinah leaves her daughter, son, and two grandsons.

Michael Barrie

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Patricia Elliott

Doctor, activist, and campaigner against expansion of Stansted airport

Patricia Mary Elliott (b 26 March 1921; q University College London 1945) died from old age on 27 April 2024

Patricia Elliott was a doctor, activist, and socialist who became general secretary of the Medical Practitioners' Union and drew on her expertise in industrial health to speak out against the expansion of Stansted airport in the early 2000s.

Born in Southampton in March 1921 to Cyrus Lloyd, a merchant seaman, and Clemency Wharton, Patricia was only 9 years old when her mother died from tuberculosis. She was educated at a local primary school and then Southampton Girls Grammar School, where she excelled at science.

Left wing activism was the seam that ran throughout her life—she got an early taste as a teenager in Southampton when she joined a demonstration against Oswald Mosley, the leader of the British Union of Fascists.

Her father later married a wealthy widow who encouraged Patricia to become a debutante and find a husband, but, spurred on by her mother's early death, she decided to study medicine at University College London (UCL), one of the few female medical students in her cohort.

During the second world war much of the UCL site was badly damaged and many students were evacuated out of London—Elliott was sent to Sheffield. After graduating in 1945, she served as a captain in the Royal Army Medical Corps and headed to India, where she treated casualties from the war in Burma (now Myanmar). A brief wartime marriage to Keith Elliott ended in divorce, although she kept this surname for professional use.

On returning to England in 1947, she took up studies in public health at the London School of Hygiene and Tropical Medicine, where she met her second husband, Gordon Evans, a widower with a young daughter. They married in 1949 and moved to Buckingham, where they both worked in public health, with Elliott running community child health clinics.

Evans, who became the first medical adviser to the Trades Union Congress (TUC), shared his wife's political views, and they were active supporters of the Labour Party as well as the Campaign for Nuclear Disarmament. Elliott decided to study law and had recently qualified as a barrister when Evans died suddenly in 1961, leaving her the sole carer of five children, four of whom were under five.

Elliott recognised the link between aviation and climate change

She had been intending to incorporate her legal work into her medical career but was forced to return to work as a GP and then became general secretary of the Medical Practitioners' Union, a trade union for doctors.

A few months later she gave a speech at the TUC conference and in the same year undertook a survey of female doctors with the sociologist Margot Jefferys. The survey highlighted the barriers that female doctors—particularly those with children—faced in the workplace and what could be done to stop them leaving the profession. The report showed that many of those forced to quit did so reluctantly.

Amnesty International

Elliott was an early member of Amnesty International and was involved with its first campaign in the early 1960s to release two imprisoned Portuguese doctors opposed to the dictator António de Oliveira Salazar. She became involved with Amnesty through Neville Vincent, one of the founding members, who was her close friend and neighbour. Another neighbour was Nye Bevan, the architect of the NHS.

In 1962, Elliott married her third husband, Clunie Dale, then the social insurance secretary at the TUC. In the same year, she became medical director of Harlow Industrial Health Service in Essex, where, according to her daughter Julie, she became interested in health and safety in factories and developed an expertise in toxins and the effects of noise on hearing.

She provided occupational healthcare to a huge range of organisations such as hospitals and factories, leading to an interest in the environment. This, coupled with her expertise in industrial health and her lifelong activism, culminated in her campaigning against the expansion of Stansted airport in the early 2000s, when she was in her 80s. Elliott was aware of the polluting and climate change effect of aviation long before it became commonly accepted. Her son remembers accompanying his mother to Hatfield Forest, near Stansted airport, late at night to take air quality samples.

Elliott continued to work into her 70s, both as a locum occupational health consultant and a medical examiner, who frequently challenged the Department for Work and Pensions on mobility allowance claims.

She revised the sixth edition of *First Aid in the Workplace* (Pitmans, 1988), after the death of Stephen Taylor, the book's original author.

Proud of her Welsh heritage

Elliott was proud of her red hair and her Welsh heritage, and her great loves were driving and travel, particularly the combination of the two. Every summer she would drive a large campervan towing a caravan over most of Europe while her husband, Clunie, followed in his Volkswagen Beetle. Her children remember her as an energetic and devoted mother ferrying them around while working full time. She was also a hands-on grandmother, providing childcare with no complaints.

She was predeceased by her three husbands (Clunie Dale died in 2006) and is survived by her five children, Anthony, Julie, Robert, Andrew, and Jane; five stepchildren, Rosemary, Anna, Clare, Richard, and Diana; 18 grandchildren; and eight great grandchildren.

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