Learning to treat the climate emergency together: social tipping interventions by the health community

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Accelerating the decarbonisation of local and national economies is a profound public health imperative. As trusted voices within communities around the world, health professionals and health organisations have enormous potential to influence the social and policy landscape in support of decarbonisation. We assembled a multidisciplinary, gender-balanced group of experts from six continents to develop a framework for maximising the social and policy influence of the health community on decarbonisation at the micro levels, meso levels, and macro levels of society. We identify practical, learning-by-doing approaches and networks to implement this strategic framework. Collectively, the actions of health-care workers can shift practice, finance, and power in ways that can transform the public narrative and influence investment, activate socioeconomic tipping points, and catalyse the rapid decarbonisation needed to protect health and health systems.

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Introduction

The foundations of human health and health systems are being destabilised by climate change. Climate disruption directly undermines health through increasing extreme weather events and wildfires, reducing food security, and spreading infectious diseases, and it indirectly undermines health through effects such as sea-level rise, mass migration, and conflict.[1] It affects health systems by increasing demand for services, threatening infrastructure and supply chains, and endangering the health workforce via hazardous and strained personal and professional circumstances.[1] Harms are severe and inequitably distributed.[1] We must learn how to treat the climate emergency through work that addresses adaptation, mitigation, and loss and damage to protect human health and health systems (figure 1).

The focus of this Personal View is climate mitigation. The health community has enormous potential to influence the social and policy decarbonisation landscape. Every fraction of a degree of warming averted reduces the risk of self-perpetuating atmospheric heating and of reaching dangerous tipping points (eg, changes in ocean circulation or rate of ice melt).[2] Fortuitously, many measures that decrease greenhouse gas emissions also enhance wellbeing (table and figure 2).

Health framing of the climate emergency has been shown to motivate populations to action.[40] Health professionals are among those most trusted by society,[46] and health sector purchasing power is immense—it allocates over 10% of gross world product.[47] However, only a minority of medical curricula incorporate planetary health and climate change.[48,49] Due to a lack of time, knowledge, support from colleagues, or confidence in their ability to make a difference, many health professionals feel unprepared to engage with the public or policy makers.[43]

The limiting factor in a low-carbon transition is no longer financial or technological, but sociopolitical.[50] Social tipping interventions—actions with the potential to accelerate so-called contagious spread of new behaviours, social norms, and structural reorganisations—are more likely to create transformative change if a large group coordinates efforts.[51] Mutually reinforcing positive feedback cycles have been shown at micro levels (ie, individual), meso levels (ie, institutional and community), and macro levels (ie, subnational, national, and international),[52] creating the possibility of accelerated impact from networked action across scales. At the micro level, individual pro-climate behavioural change sends a signal to others, shifting social norms, and encouraging learning

Key messages

- The foundations of human health and health systems are being destabilised by climate change
- Health professionals are trusted, and health sector purchasing power is immense: it allocates over 10% of gross world product
- Many measures that decrease greenhouse gas emissions also enhance wellbeing
- Only a minority of medical curricula incorporate planetary health and climate change, leaving many in the health community motivated to help but unsure of how to respond
- Modelling in a coupled climate–social system shows the potential for non-linearities and tipping points associated with connections at individual, community, national, and global scales to be decisive in achieving policy and emissions outcomes
- We assembled a multidisciplinary, gender-balanced group of experts from six continents to develop a framework for maximising the social and policy influence of the health community on decarbonisation, focusing on measures that have co-benefits for health
- To aid in rapid mobilisation, we provide practical strategies to implement the recommended actions, focusing on strategic target selection, effective communications, compassionate teamwork, and the use of existing and new networks to accelerate movement building
- A coordinated global approach by the health community has the potential to create healthier communities and transform health facilities into anchor institutions of sustainability, leading to shifts in social norms, policy, and investment that activate socioeconomic tipping points and catalyse the rapid decarbonisation needed to protect health and health systems

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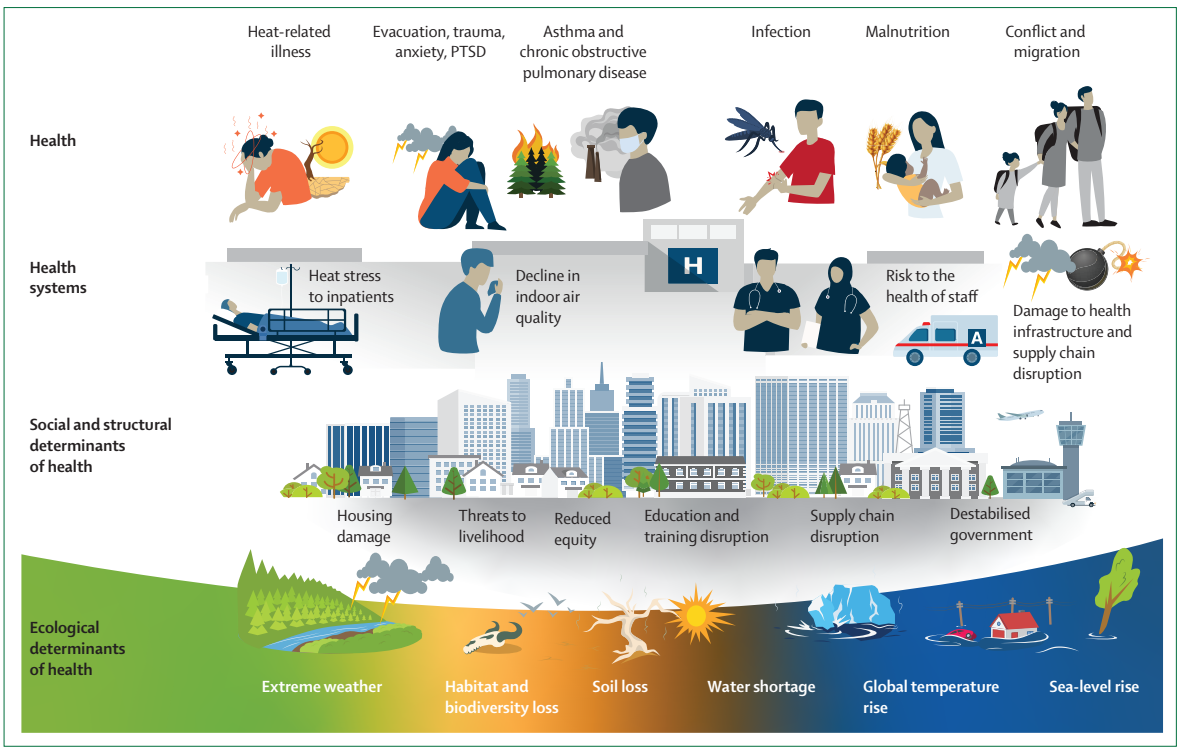

Figure 1: **Climate change-related impacts on health and health systems**
PTSD=post-traumatic stress disorder.

by doing.[52] Contributions such as this can trigger positive feedback processes that persuade more people to support climate policy.[52] Once a critical mass is reached, policy change to reduce adoption costs becomes more likely, which, in turn, deploys increased technology, bringing with it economies of scale and positive feedback cycles.[52] Modelling in a coupled climate–social system shows the potential for non-linearities and tipping points associated with connections at individual, community, national, and global scales to be decisive in achieving policy and emissions outcomes.[52]

The potential of health networks to focus work on identified social tipping interventions has not been looked at in detail. Social tipping interventions proposed for stabilising Earth's climate include eliminating fossil fuel subsidies, incentivising low-carbon energy generation, building carbon-neutral cities, divesting from fossil fuels, revealing the moral implications of fossil fuels, strengthening climate education, and disclosing information on greenhouse gases.[5] A similar concept, sensitive intervention points, includes the financial disclosure of risks related to a low-carbon transition and climate impacts, investment in solar photovoltaics and wind, and mobilisation of a silent or non-vocal pro-climate majority.[38] Related work on sustainability leverage points emphasises presenting low-carbon visions of a good life, reducing consumption and waste, enhancing latent values of responsibility, and attending to inequalities, justice, externalities from trade, responsible technology, innovation and investment, education, and knowledge generation.[6]

This Personal View seeks to guide health community action on climate mitigation at this moment of high potential. CODA Change, an educational charity centred around an international cohort of emergency and critical care professionals, most of whom are new to working in planetary health, was tasked by its community with developing an approach that harnesses the power of the collective health community to decrease greenhouse gas emissions and improve health. Leaders of practice and of existing networks, including of the Global Climate and Health Alliance (117 global organisational members) were invited to consider how to best channel this energy. To facilitate a rapid transition from education on health and health system impacts of climate change to effective work in service of a healthy climate, we provide practical strategies to support a learning-by-doing approach focused on strategic target selection, effective communications, compassionate teamwork, and network building.

Overall approach to treating the climate emergency: target-based change making

When a patient requires care, clinicians do not simply describe the steps involved—they mobilise people and resources to ensure treatment is carried out. Similarly, treating the climate emergency requires moving beyond telling people things (an information-deficit model of change making) to leading change

	Action items from micro to macro scales	Greenhouse gas reduction (tCO_2e per person)*	Health co-benefits	Social mobilisation including public narrative
Planetary Health Hippocratic Oath for the Anthropocene	Reimagine your duty of care: take the Planetary Health Hippocratic Oath for the Anthropocene, and calculate and reduce your carbon footprint	Potential global impact: Project Drawdown identifies 30 behavioural solutions that could mitigate 19·9–36·8% of overall emissions[3]	Relieves normative conflict for health workers by validating awareness of a gap between the way the world is and the way the world needs to be;[4] can be empowering and reduce the feeling of being overwhelmed by generating a sense of group-based efficacy[4]	Shifting norms and values is identified as a social tipping intervention and leverage point for sustainability;[5,6] time to tipping point for this alone is estimated at 30–40 years;[6] the oath enhances a sense of shared social identity, which is the single most important motivation for collective action and the key to generating the feeling of collective efficacy that also motivates participation;[4] as more individuals' opinions change, barriers to action decrease[7]
Calculate and reduce carbon footprint	For a global population expected to reach 8·5 billion by 2030, average emissions need to decrease to 2·8 tCO_2e per person per year by 2030[8]	Mean per person personal emissions:[9] North America 13·4, Europe 7·5, and Africa and Middle East 1·7	Actions that decrease fossil fuel use reduced contributions to the 8·7 million global premature deaths in 2018 attributed to fossil fuel-related air pollution (approximately 18% of total excess deaths)[10]	Information feedback in the form of the availability of greenhouse gas emissions for most products has been identified as a social tipping element with the time to trigger a tipping point estimated at only a few years[5]
Mobility	Change to sustainable personal transport	One less long-haul return flight (1·9); shifting to a hybrid (0·7) or a battery electric vehicle (2·0); living car-free (2·1); shifting to active transport (0·8)[8]	Commuting by bicycle decreases overall mortality;[11] active transport increases physical activity, social contact, and the ability to interact with the natural environment; reduces the risk of cardiovascular disease, type 2 diabetes, colon and breast cancer, and depression[12]	Transportation mode choices are influenced by past habit, perceptions about the difficulty of non-car travel, contextual factors (eg, distance and quality of infrastructure), beliefs about effect on social status, and presence or absence of pro-environmental norms[13]
Residential energy use	Move towards an energy efficient home life, begininning with immediately implementable changes and choosing low-carbon options as transitional opportunities arise	Energy-efficient renovation (0·9); heat pumps (0·9); household use of grid-based and on-site renewable electricity (1·5);[8] improved clean cookstoves: 31·34–72·65 Gt CO_2e reduced or sequestered globally 2020–50[4]	Improved clean cookstoves could help prevent the 4 million annual deaths from exposure to indoor air pollution related to cooking with kerosene and biomass;[14] 8·7 million premature deaths are due to fossil fuel-related air pollution;[10] an estimated 13% of current childhood asthma in the USA is attributable to gas stove use[15]	Most people overestimate energy consumption from highly visible activities (turning off lights) and underestimate the cost of heating, ventilation, air conditioning, and electronics;[13] interventions encouraging energy conservation are more effective if they call on prosocial motives rather than financial ones;[13] social influence has a positive effect on renewable energy generation;[13] seeing nearby photovoltaic installations and discussing them with adopters sparks interest and shortens time to decision making[16]
Healthy and sustainable diets and low food waste	Shift diet towards healthy, local, plant-rich options and develop at-home food systems that reduce food waste	Elimination of extra and wasted food (0·3); and increased local food (0·4), organic food (0·5), vegetarian diets (0·5), vegan diets (0·9);[8] diets with minimal animal-sourced food could reduce emissions by up to 8 billion tonnes per year by 2050[17]	Healthy and sustainable plant-rich diets can prevent up to 11 million premature adult deaths every year[18] and reduce malnutrition, type 2 diabetes, ischaemic heart disease, and prevalence of obesity and overweight;[12] in 2019, an estimated 2 million deaths were attributed to excess red meat, processed meat, and dairy consumption[1]	Embracing diverse visions of a good life centred around wellbeing is identified as a leverage point for sustainability;[6] healthy and sustainable diets celebrate cultural and local traditions
Empower women and girls	Empower women and girls and ensure access to education and sexual and reproductive health services, as well as leadership opportunities for all	Universal education and family planning: 85·42 Gt CO_2e reduced or sequestered globally 2020–50[4]	Increased education and access to sexual and reproductive health services is associated with reduced vulnerability to natural disasters,[19,20] increased farm productivity, which can protect against malnutrition,[21] reduced sexually transmitted infections and related cervical cancer, decreased maternal and child mortality, and increased household income[22,23]	Increases prosocial, pro-health and pro-environmental decisions via increased proportion of women in decision-making roles;[16,24–29] reduction in inequality is identified as a leverage point for sustainability[6]
Divest from fossil fuels	Lead initiatives to divest from fossil fuels, and reinvest in low-carbon solutions	Direct via reduction of resources for extraction and increase in resources for low-carbon options; indirect via removal of social licence from fossil fuel industry and effect on other investors and decision makers[5]	Fossil fuel extraction exposes workers and local populations to increased risk of health problems;[30] it is important to support income and occupational health through a transition to stable employment in low-carbon industries, where jobs outnumbered those in fossil fuel industries in 2020 (more than 12 million employees directly and indirectly employed in renewable energy, exceeding those directly employed in fossil fuel extraction)[1]	Divestment and financial disclosure have previously been identified as potential social tipping interventions, which, by influencing the profitability of fossil fuel exploitation, could trigger tipping within hours at scale[5]

(Table continues on next page)

	Action items from micro to macro scales	Greenhouse gas reduction (tCO_2e per person)*	Health co-benefits	Social mobilisation including public narrative
(Continued from previous page)				
Fossil Fuel Non-Proliferation Treaty	Sign the Fossil Fuel Non-Proliferation Treaty and encourage institutions and decision makers to do the same	Governments plan to produce over twice the amount of fossil fuels in 2030 than would be consistent with limiting global surface temperature warming to 1·5°C[31]	Reduced understudied local toxic health impacts of fossil fuel extraction[30]	Supply-side policies are likely to have positive feedback effects, by mobilising supportive political constituencies domestically and fostering cooperation internationally;[32] greater public acceptability than demand-side interventions as a result of easier accounting and because they land closer to industry;[32] positive feedback loops between policy and further decisions[33]
Enhance nature-based solutions	Work to enhance nature-based solutions in your community: protect forests, support Indigenous land tenure, offer nature prescriptions, and encourage sustainable plant-rich local food systems	Globally, reduced or sequestered emissions (in Gt CO_2e) from 2020 to 2050: restoration of tropical forests (54·45–85·14); restoration of temperate forests (19·42–27·85); Indigenous Peoples' forest tenure (8·69–12·93); protection of forests (5·52–8·75)[3]	Reducing the urban heat island effect decreases harm from heatwaves;[1] increased nature exposure is associated with improved self-reported wellbeing, positive mood, and aspects of cognitive function, and decreased mental illness, salivary cortisol, heart rate, diastolic blood pressure, risk of preterm birth, type 2 diabetes, stroke, hypertension, and asthma, as well as reduced cardiovascular and all-cause mortality;[34] protection of forest ecosystems can reduce risk of future pandemics[35]	Strengthening climate education and engagement[5] is a social tipping intervention with an estimated 10–20-year timeframe to trigger tipping[6]
100% renewable institutional electricity and low emission health-care-related transport	Lead initiatives to transition your institutions to 100% renewable electricity and use this to help power low and zero emissions health-care-related transport	In National Health Service England, 10% of emissions come from staff, patient, and visitor travel; onsite renewables were estimated to ensure faster greenhouse gas reduction than a reliance on a gradual decarbonisation of the electrical grid[36]	Health care is responsible for 2·8% of PM;[37] 8·7 million premature deaths are due to fossil fuel-related air pollution[10]	Decentralised energy production previously identified as a social tipping intervention with <10 years estimated time to trigger tipping;[5] solar photovoltaic and wind power are at or near the tipping point where they are competitive with fossil fuels; focused investment could change political priorities and create economies of scale leading to rapid, investment-driven cost declines to outcompete incumbents[38]
Reduce super-pollutants	Lead initiatives to rapidly reduce super-pollutants in your institutions starting with inhaled anaesthetics, metered-dose inhalers, refrigerants, and natural gas	Strong and sustained reductions in methane are necessary to promote rapid cooling;[7] switching from metered-dose inhalers to dry powder inhalers in a two-dose per day combination corticosteroid and long-acting β-2 agonist plus salbutamol regimen is similar to carbon reductions per person obtained by switching from a meat-based diet to a plant-based diet or from a fossil-fuelled car to a hybrid vehicle[39]	Methane reductions contribute to improved air quality by reducing global surface ozone;[40] sustainable plant-rich diets can prevent up to 11 million premature adult deaths every year[18]	The diffusion of inspiring success stories and best practices convey a signal that the low-carbon transition is not only possible, but already happening[41]
Net zero emissions health care	Advocate for institutional and national commitments to net zero emissions health care as soon as possible (by 2045 at the latest) and for progressive procurement policies that require equivalent mitigation ambition by suppliers by 2030	Reduce the 5·2% of global greenhouse gases attributable to health care[1]	Health care is responsible for 2·8% of PM;[42] 8·7 million premature deaths were due to fossil fuel-related air pollution in 2018;[10] increased support for active travel to and from health-care sites and plant-rich diets on site will reduce morbidity and mortality[12]	The existence of a non-vocal pro-climate majority within health care[43] and beyond creates the possibility of a social intervention point in terms of political mobilisation;[38] large-scale demonstrations of carbon-neutral buildings can be a social tipping intervention with respect to human settlements, with an estimated time needed to trigger tipping of approximately 10 years[5]
National 100% renewable electricity grid	Advocate for exclusive use of 100% renewable electricity as soon as possible in your nation: prioritise transitioning from coal-fired power directly to wind, water, solar, and energy storage	Fossil fuel combustion in the energy system is the biggest source of greenhouse gases[1]	Reduce the estimated 561 000 premature deaths attributed to ambient $PM_{2·5}$ from coal in 2020[1]	Shifting investment patterns can affect the demand for low-carbon technologies and alter the power balance between fossil fuel and clean energy corporate lobbying in a country[41]

(Table continues on next page)

through methods supported by evidence in the health sciences, behavioural change, communications, movement-building, and policy making.[53]

Leadership can be defined as "the practice of accepting responsibility to enable others to achieve shared purpose under conditions of uncertainty".[54] Marshall Ganz's head,

	Action items from micro to macro scales	Greenhouse gas reduction (tCO_2e per person)*	Health co-benefits	Social mobilisation including public narrative
(Continued from previous page)				
Ambitious nationally determined contributions to the Paris Agreement	Advocate for ambitious nationally determined contributions to the Paris Agreement and enhanced climate finance from redirected fossil fuel subsidies, with health co-benefits costed and included in budgeting	For nationally determined contributions evaluated by the Global Climate and Health Alliance and healthy nationally determined contribution scorecard, only Costa Rica, Morocco, the UK, Kenya, and Nepal are aligned with keeping warming within the 2°C upper bound of the Paris Agreement target 2°C, and none were aligned with 1·5°C;[44] financing from wealthy countries who have typically emitted more greenhouse gases is necessary to support decarbonisation in countries most susceptible to the health impacts of climate change[44]	Compared with a current pathway scenario, implementing health-focused policies consistent with the goal of the Paris Agreement for nine countries accounting for over 70% of global emissions could result in an annual reduction of approximately 1 645 000 air pollution-related deaths, 6 436 000 diet-related deaths, and 2 088 000 deaths due to physical inactivity[45]	Global climate governance is a multi-level structure in which domestic political forces determine the mandates that governments must make into international commitments;[41] current context for UN climate governance has been evaluated as being more favourable than at any point since the turn of the millennium; challenges exist in the form of fossil fuel dependence in key countries and risk of authoritarian populist movements;[41] shift of fossil fuel subsidies to influence relative price of fossil fuel-free energy is a social tipping intervention with an estimated 10–20-year time period to tipping;[5] identification and alignment of incentives such as subsidies with sustainability has been identified as a sustainability leverage point[6,33]

CO_2e=CO_2 equivalents. PM=particulate matter. *Consumption options with high mitigation potential are in tons of CO_2e/person per year.[8]

Table: **Greenhouse gas reductions, health co-benefits, and social mobilisation potential of action items**

heart, hands method emphasises teaching leadership through practice with an emphasis on analysis to assist heads in choosing goals, storytelling to motivate hearts, and practical instruction to train the dexterous hands required to shape outcomes.[54,55] Previous health sector work in social accountability envisions change targets at micro, meso, and macro levels.[56] Global networks make possible a meta level of influence in which international goals are developed collaboratively, and supports are offered to community-centred initiatives with the goal of creating a wave of change that influences norms, policies, and markets.[57]

Aligned with these, a target-based model outlining elements of change making—strategy, target, story, team, tactics, win—has been successfully used in planetary health advocacy instruction.[57] This target-based model is expanded in figure 3 to encompass the learning and movement-building process. Each element of this change-making model will be addressed to illustrate how the health sector can move together to decrease greenhouse gases.

Strategy: choosing targets

Strategy is how we turn our resources into the power we need to achieve our goals.[58] We define a strategic target as the evidence-aligned change with the most impact achievable by a team with a given set of resources in a specific context.[57] Strategy benefits from a diverse, multidisciplinary decision-making group and the allocation of time to a planning process.[58] An anti-racist, anti-colonial approach that centres human rights and equity is essential.[58,59] Larger objectives can be broken up into small goals. Commitment to a goal demands the allocation of resources needed to see it accomplished.[55] Success generates hope and a sense of collective efficacy that attracts additional team members and resources that facilitate the achievement of more ambitious targets.[60,61]

Inputs to consider include literature from disciplines across the natural and social sciences, the traditional knowledges of Indigenous Peoples,[9] and data from community consultation. Contextual elements include market forces, policy processes, and timing of decision-making moments. The social, political, financial, and human resources available to the team direct ambition.

To strategise a list of high-impact targets that could, if applied globally, generate a meta level of influence on sociopolitical tipping points of relevance to the climate system, we assembled an expert group based on previous work. A survey solicited potential action items in the areas of health care, energy, transport, food, and nature-based solutions. Results were considered at a 2-day in-person workshop by a subset of the initial group selected to ensure gender balance; representation from six continents; and diverse competencies across economics, education, communications, policy, advocacy, public health, nursing, medicine, dentistry, health system logistics, planetary health research, and systems change at local to global levels. Actions were excluded if a case of successful accomplishment of the action by the health sector could not be substantiated.

Actions were considered in terms of effect on greenhouse gas emissions, potential for near-term co-benefits to health and cost savings to health systems, alignment with tipping point and behavioural change literature, and ability to be amplified by existing networks. A ladder of engagement was designed to prioritise health co-benefits, establish new social norms, and create policy feedback loops through both resource effects that decrease structural barriers, and interpretive effects that reflect the fact that policies themselves are new sources of information with

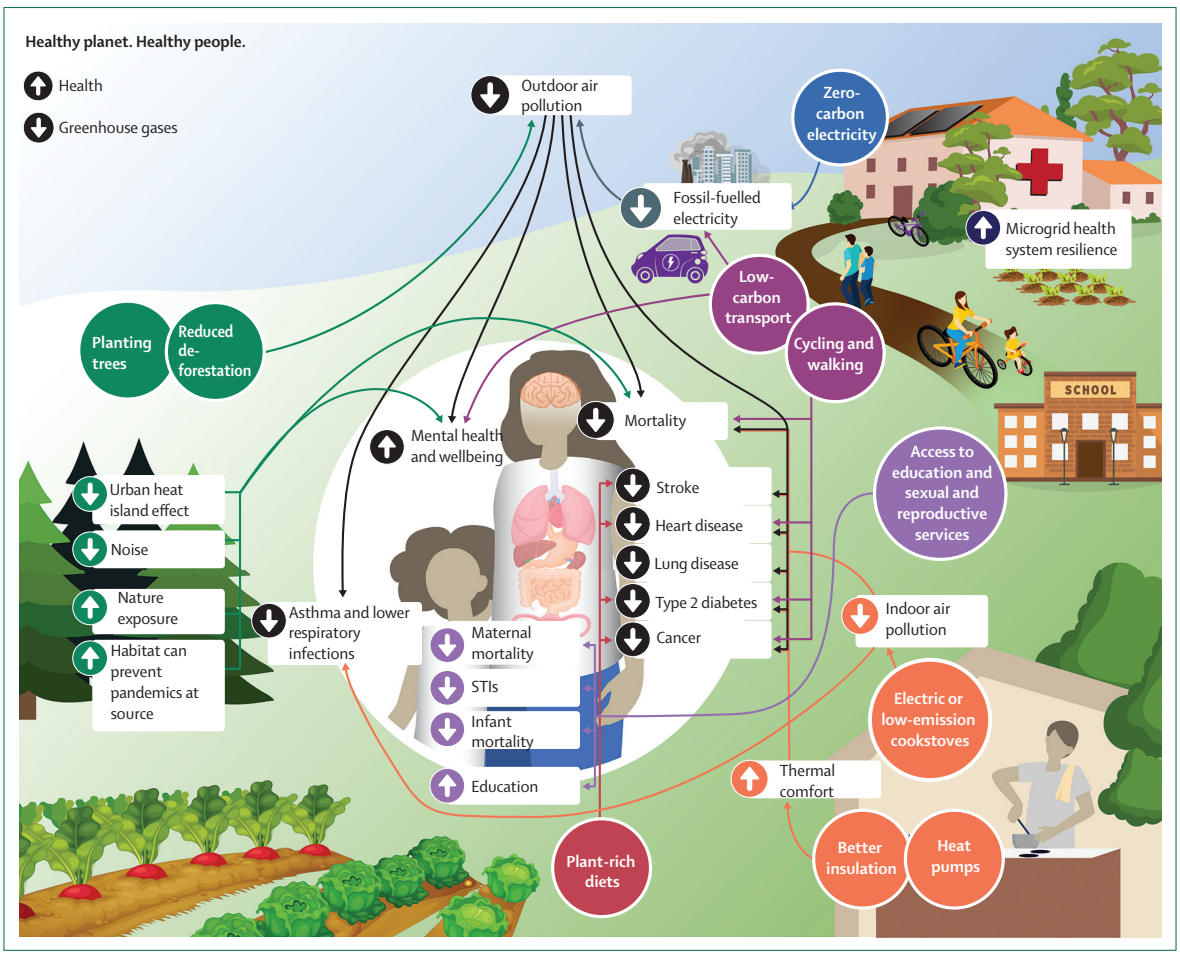

Figure 2: **Health co-benefits of measures that decrease greenhouse gas emissions**
STI=sexually transmitted infection.

the potential to shift understanding and create new norms around our response to climate change (figure 4).[33] The schema is presented to situate each action in the context of work by a powerful sector, enhancing a feeling of group-based efficacy, the sense that together, transformative work is possible.[60]

Engagement begins with a commitment to care, and then moves to the action most strategic for a given individual or team.

Micro level

Reimagine your duty of care: take the Hippocratic Oath for the Anthropocene, and calculate and reduce your carbon footprint

The Hippocratic Oath for the Anthropocene acknowledges a duty of care, not only to humanity, but to the natural systems upon which human health and health systems depend.[62] Unleashing latent virtues regarding stewardship of nature has been identified as a leverage point of sustainability.[6] Taking an oath publicly demonstrates that norms are changing,[7] reducing psychological barriers for peers,[63] and enhancing feelings of social identity and group-based[64] belonging crucial to participation.[4,60]

Leading by example in reducing one's carbon footprint allows sustainability to be learned through a real-world experiment in reducing consumption and illustrates global inequity.[6] The top 10% of global income earners generate nearly 50% of total CO_2 consumption-based emissions per person, whereas the bottom 50% of global income earners generate 7%.[65]

Examples of this action: many groups have already taken planetary health oaths, such as a multidisciplinary team in the Philippines,[66] some US nurses,[67] and the Canadian medical community.[68]

Spanning micro, meso, and macro levels

Empower women and girls, and ensure access to education, sexual and reproductive health services, and leadership opportunities for all

Reducing inequality is essential to sustainability.[6] Furthermore, universal access to education and reproductive health services are human rights with considerable health benefits (table).[19,22,23] These actions are

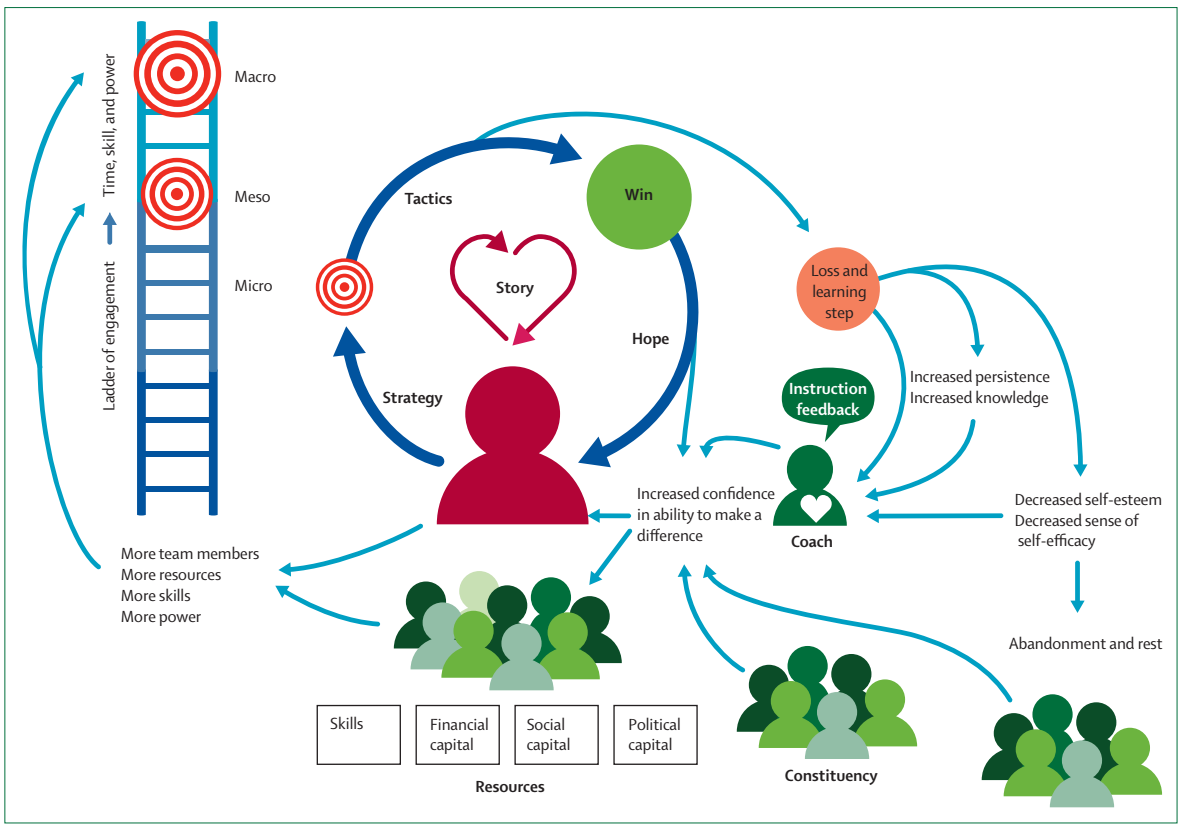

Figure 3: **Leading change together through target-based change making**

crucial to ensuring that women reach their economic potential, which increases power within families and communities, enhancing ability to influence policy.[69,70] The combination results in reduced child and maternal morbidity and mortality,[22] improved yields on smallholder farms managed by women,[21] and reduced vulnerability to natural disasters,[19,71] as well as smaller family size and, by extension, greenhouse gas emissions.[19,22,23]

Women show greater pro-environmental behaviour than men,[16] and women leaders have been shown to make more pro-environmental and pro-health decisions than men,[24,25] with a higher proportion of legislators who are women correlating with improved health outcomes.[25,72]

Practitioners can measure baseline gender representation in leadership at their institution and set targets for gender equity, including gender-diverse individuals. Practitioners can work at all levels to support gender equity in leadership and ensure universal access to education and sexual and reproductive health services.

Examples of these actions: (1) in 2018, 18 editorial advisory boards in *Lancet* journals were comprised of only 30% women. As of 2020, *Lancet* editorial advisory boards were comprised of 51% women.[73] (2) A population, health, and environment approach was taken in Ugandan Lake Victoria communities to improve health services and access to contraceptive use alongside interventions to facilitate women's income generation. Their outcome of annual couple-years of protection with contraception more than doubled and women's power within the family increased.[25]

Lead initiatives to divest from fossil fuels and reinvest in low-carbon solutions

Large-scale divestment from the fossil fuel industry and reinvestment in low-carbon solutions could trigger tipping in the financial system within hours.[5] Profiting from fossil fuel investments is inconsistent with the ethics of health-oriented organisations; an estimated 18% of global premature deaths in 2018 were linked to fossil fuel-related air pollution.[74] Fiduciary responsibility aligns with divestment: the International Energy Agency's net zero pathway is inconsistent with new fossil fuel investment after 2021.[75] Climate-related financial risks are grossly underestimated by financial markets, with groups such as the Task Force for Climate-related Financial Disclosures working to align financial flows with low greenhouse gas pathways.[76] Stranding of fossil fuel assets could amount to a discounted global wealth loss of US$1–4 trillion, similar to the 2008 financial crisis.[77]

Examples of these actions: The British Medical Association, American Medical Association, Royal Australasian Colleges of Physicians and Surgeons, and

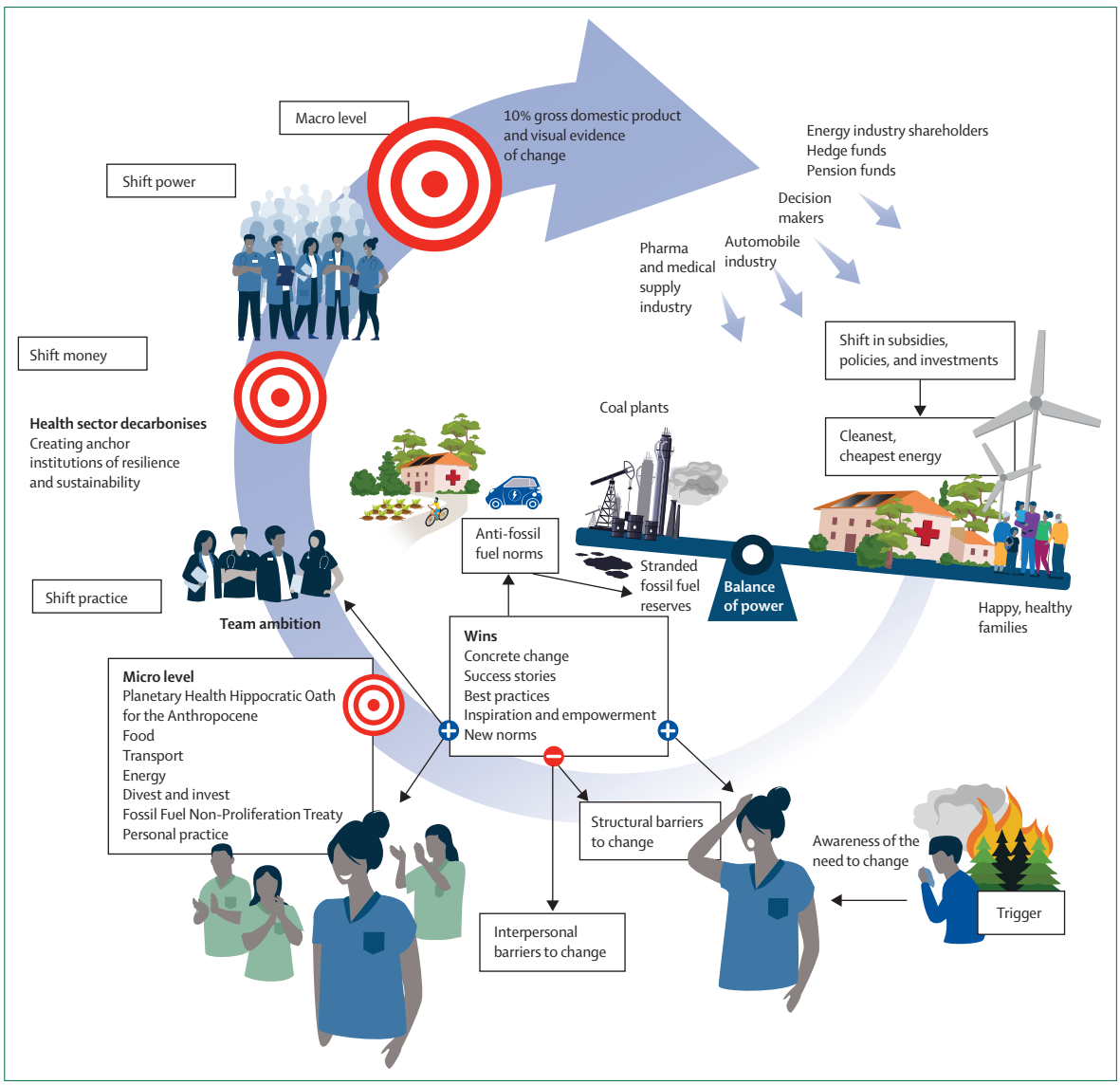

Figure 4: **Social tipping interventions by the health community to stabilise Earth's climate**

others committed to divest from fossil fuels.[1] The Canadian Medical Association has completed divestment of its more than CA$2 billion portfolio, and reinvested in renewable energy.[78]

Sign the Fossil Fuel Non-Proliferation Treaty and encourage institutions and decision makers to do the same

Governments plan to produce over twice the amount of fossil fuels in 2030 than would be consistent with limiting global surface temperature warming to 1·5°C.[31] The local health effects of fossil fuel extraction are of concern,[79] and understudied, particularly in Indigenous communities and low-income and middle-income countries.[30]

A Fossil Fuel Non-Proliferation Treaty has been proposed to promote leaving fossil fuels in the ground. Support can be indicated via sign-on at the individual, organisational, or jurisdictional levels.[80] The non-proliferation pillar requires the creation of a global public register to map fossil fuel reserves and regular analysis to identify whether aggregate production phase-down policies align with a 1·5°C scenario.[81] A fair phase-out pillar would coordinate the accelerated decline of fossil fuel infrastructures.[81] A just transition pillar requires money from redirected fossil fuel subsidies or a global carbon tax to be distributed through a new Global Transition Fund to support the massive expansion of clean energy technology in low-income and middle-income countries.[81]

An example of this action: in 2021, organisations in south Asia representing 100 000 physicians endorsed the Fossil Fuel Non-Proliferation Treaty.[80]

Meso level

Work to enhance nature-based solutions in your community: protect forests, support Indigenous land tenure, offer nature prescriptions, and encourage sustainable plant-rich local food systems

Protecting forests, planting trees, and optimising land use through plant-rich diets decreases CO_2 levels while supporting habitat and biodiversity, and reducing unsustainable flows of nitrogen and phosphorus.[18] It can also reduce the likelihood of zoonotic spillover of new pathogens, helping to prevent pandemics.[35]

Indigenous Peoples currently live on 20% of the Earth's surface, in relationship with more than 80% of biodiversity, making Indigenous rights and land tenure important to environmental stewardship.[9,82]

Nature prescriptions involve health-care providers writing recommendations for meaningful contact with nature, often in 20 min increments adding up to at least 2 h per week in alignment with evidence that this dose is associated with improved self-reported wellbeing.[83] Urban greenspace reduces air and noise pollution and disrupts the urban heat island effect, reducing heat-related mortality.[1]

Examples of this action: (1) the Tzu Chi Buddhist Medical Foundation in Taiwan now exclusively serves vegetarian meals and the on-site gardens are used as rehabilitation sites for patients.[84] (2) A non-profit project in Borneo carried out in partnership with Indigenous communities provides health-care, training in organic agriculture, and small business financing to reduce logging. Results after 10 years show 0·59 Tg of carbon loss avoided, a 90% decline in illegal logging households, habitat protection for 3000 orangutans, and a 67% decline in infant mortality and a 54% decline in births per mother in the local population.[74]

Lead initiatives to transition your institutions to 100% renewable electricity and use this to help power low and zero emissions health-care-related transport

Decentralising energy production has been identified as a social tipping intervention with less than 10 years' estimated time to trigger tipping.[5] A low-carbon economy requires a transition to clean, renewable electricity, with application to end uses such as heating and transport.[69] Renewables are projected to account for 95% of the net increase in global power capacity up to 2025; however, existing electricity production is primarily powered by fossil fuel.[75]

Tipping towards fossil fuel-free electricity begins when it yields higher financial returns than the incumbent.[5] Solar photovoltaic and onshore wind are now the cheapest ways of adding electricity in most countries.[85] Participation in on-site or community renewable energy installations can ensure adequate capacity to meet power demand, increase resilience to severe weather, and align with hospital and university mandates to serve as anchor institutions that model healthy practices.

Solar panel installation appears catching—ie, the more concentrated the solar photovoltaic in a region, the greater the likelihood of additional installations.[63] Peer effects operate passively through observation and actively through engagement with adopters.[63]

Examples of this action: (1) Gunderson Lutheran hospital, Wisconsin, USA has implemented over a dozen renewable energy projects and offers assistance with such transitions via their website.[26] (2) National Health Service (NHS) England ensured that all leased or purchased vehicles have low or ultra-low emissions in 2020–21 with a plan for 90% of the fleet to be low, ultra-low, or zero emission by 2028.[27] A hydrogen-electric hybrid ambulance was unveiled at the 26th UN Climate Change conference (COP26).[27]

Lead initiatives to rapidly reduce super-pollutants in your institutions starting with inhaled anaesthetics, metered-dose inhalers, refrigerants, and natural gas

The term super-pollutant refers to materials with high global warming potential (GWP) measured relative to CO_2 equivalents (CO_2e) including black carbon (ie, soot), methane (the dominant component of natural gas), hydrofluorocarbon propellants in metered-dose inhalers, and some inhaled anaesthetics.[2,28] In addition to CO_2 reductions, deep reductions in super-pollutants are essential to averting planetary tipping points.[29,86]

The health sector can champion low-emission options.[39] Desflurane has a lifecycle greenhouse gas impact 20–50 times (depending on clinical use) that of sevoflurane.[28] Hydrofluorocarbon propellants in metered-dose inhalers result in a 20–30 times larger carbon footprint than dry-powder inhalers.[39] Methane has a GWP of 81 over a 20-year timeframe,[2] and can be reduced while improving health by implementing non-ruminant diets.[1]

Examples of this action: (1) NHS England has launched a primary care incentive scheme to support a shift away from high-carbon inhalers to reduce emissions (currently making up 3% of NHS England's total emissions).[27] (2) Desflurane (GWP_{100} 2540 CO_2e) was eliminated from the Yale New Haven Health System (New Haven, CT, USA) formulary in 2013, saving an estimated US$1·2 million and 1·6 million kg CO_2e (the equivalent of 360 passenger vehicles) annually from the flagship hospital alone.[87]

Meso to macro level

Advocate for institutional and national commitments to net zero emissions health care and for progressive procurement policies for suppliers

Institutional and national bodies should aim to reach net zero emissions health care as soon as possible—by 2045 at the latest. Given that delivering on this target requires decarbonising the supply chain, progressive procurement policies should require equivalent mitigation ambition by suppliers by 2030. The health

sector is responsible for 5·2% of global greenhouse gas emissions,[1] the majority of which originate in the supply chain.[36] The initiative to decarbonise England's NHS grew to scale after the Sustainable Development Unit decreased emissions by 18·5% between 2007 and 2017 while simultaneously saving money.[88] NHS England has now committed to achieving net zero emissions internally by 2040 and supply chain emissions by 2045,[27] targets written into UK legislation via the Health and Social Care Act of 2022.[42] First and second year targets for this goal were reached (Watts N, NHS England, personal communication).[27] In a 2017 NHS employee survey, which received 6214 responses, 98% of respondees said they believed it was important that the health and care system works in a way that supports the environment.[89] Responsibility for delivering emissions reductions is allocated level by level to health trusts, hospitals, and individuals.[27]

Work at this scale can shape policy and market forces. Suppliers were advised that by 2023 they will need carbon reduction plans to qualify for NHS contracts valued at over £5 million, and that by 2025 they will be contractually required to show alignment with a 2045 net zero target.[27] During COP26, a multinational group pledged to meet this challenge[90] and seven global pharmaceutical companies have announced near-term targets aligned to a 1·5°C pathway.[91]

Global examples of this action: (1) 62 countries have now signed onto the WHO Health Programme for climate resilient, low-carbon health systems, with 20 national health systems committed to net zero.[92] (2) The Alliance for Transformative Action on Climate and Health, a WHO-hosted network, has been created to spread best practices.[92]

Advocate for exclusive use of 100% renewable electricity as soon as possible in your nation: prioritise transitioning from coal-fired power directly to wind, water, solar, and energy storage

Phasing out coal-fired power is a priority given its climate impact and high associated morbidity and mortality. An estimated 561 000 global deaths were associated with related particulate matter emissions in 2020.[1] Natural gas is not a transition fuel; if the leak rate of methane during extraction and transport equals or exceeds 3%, a given amount of electricity produced from natural gas causes more global heating than coal over a 20-year timeframe.[2]

Examples of this action: (1) Health workers in the UK and Canada centred narratives on reducing air pollution-related asthma, stroke, heart disease, cancer, and chronic lower respiratory disease in successful efforts to persuade policy makers to phase out coal-fired power.[57] (2) Canada and the UK then co-founded the Powering Past Coal Alliance, a climate club whose pro-social structure helps accelerate international progress.[41]

Advocate for ambitious nationally determined contributions (NDCs) to the Paris Agreement and enhanced climate finance from redirected fossil fuel subsidies, with health co-benefits costed and included in budgeting

NDCs outline countries' commitments under the Paris Agreement and can serve as national frameworks to ensure integration of health considerations.[45] Incorporating externalities into decision making is a leverage point for sustainability.[6] One step towards this is to cost out the health and health systems co-benefits of mitigation.

In 2019, 69 (80%) of 86 countries analysed provided a net subsidy to fossil fuels.[1] These net subsidies exceeded 10% of national health spending in 31 countries, and 100% in five.[1] Shift of fossil fuel subsidies to influence the relative price of fossil fuel-free energy is a social tipping intervention with an estimated 10–20-year time period to tipping.[5]

An example of this action: Costa Rica is co-leading international discussions around fossil fuel subsidy phase out[93] and its NDCs included commitments to reach 100% renewable energy in 2022 and impose a moratorium on oil extraction from 2021 to 2050.[82]

Story—communicating climate change and health effectively

Being able to communicate why people should support a given initiative at a particular time is essential to creating relationships, motivating teams, and seeing change targets realised. Stories can transform values into the emotions needed to drive change, with anger helping overcome apathy, hope conquering fear, solidarity alleviating isolation, and inspiration found in stories of successful change making, which yield the sense that individuals can make a difference.[55] Resonant communication requires an awareness of an audience's degree of understanding, potential to contribute, and motivations. Rehearsal of succinct, compelling explanations is essential.

Evaluation of a communicator's credibility is based on their perceived competence and intent.[94] Marshall Ganz's public narrative framework encourages beginning with a story that describes the source of your values and motivation for the work.[55] Did your patients have asthma exacerbations due to wildfire smoke? Were older patients harmed by heat?

An awareness of the emerging climate and health communications evidence base is essential. Mention of measures that decrease greenhouse gas emissions and entail health co-benefits help health professionals understand how they can contribute to sustainability,[64] and increase support for mitigation.[95] Particularly effective are three-part messages that communicate climate change-related impacts on health, health co-benefits of mitigation, and specific calls to action.[95] Health-related rationales have been used in successful efforts by health-care professionals to encourage the phase-out of coal-fired power,[57] to support carbon

pricing,[96] and to make the case for a plant-rich national food guide.[97]

Community engagement and message testing in specific contexts help identify shared values and narratives based on respect for different perspectives. Climate Visuals provides a free bank of evidence-aligned images that can be combined with work by artists for compelling communications.[98] Reach will be greatest with skilled use of social media and the help of relationships developed over time with people working in conventional media.[99]

Team

Working in isolation on the climate emergency can feel like providing bystander cardiopulmonary resuscitation in the field—lonely and uncertain. Despite these feelings, it can deliver invaluable results, and motivate others to contribute. If you feel alone, reach out to local networks, and if these do not yet exist, request assistance from the global community. A lack of faculty familiarity with the topic makes co-developed initiatives emphasising student and faculty partnership key.[100–102]

It will require the work of every profession that makes up the health sector—eg, pharmacists, administrators, architects, engineers, economists, artists, medical device suppliers, pharmaceutical companies, and decision makers—to achieve optimal outcomes. As outlined in the São Paulo Declaration on Planetary Health, "We invite you to consider yourself a partner in planetary healing."[103] To facilitate interdisciplinary and intercultural work, avoid jargon and acronyms, be generous in attributing good intent, and agree upon group norms around confidentiality, reporting structures, and mechanisms for norm-correction at the outset of work.

The climate crisis is one in which each of us is both a patient and a potential healer. Ecological grief, eco-anxiety, and ecological anger are normal responses that can affect our mental health as well as our likelihood to take action.[104,105] Wellbeing is enhanced during work for a healthy climate via new friendships and empowerment that comes from tangible progress.[4,60,61]

Learning to treat the climate emergency provides an avenue to agency that can align values with action and reduce moral injury-related drivers of burnout. However, unrelenting work worsens both wellbeing and performance. Sleep, nutritious food, exercise and time in nature and with loved ones must be supported as contributory to the transformative work required for both planet and people to thrive.[106]

Failure-friendly learning environments encourage action with a growth mindset that reframes losses as opportunities for learning.[54] This shift in outlook can enhance the desire to refine an idea and try again (figure 3).[61] As in clinical work, sharing stories of the advantages and pitfalls of adventures in advocacy can provide comfort while enhancing group learning.

It is helpful to envision coaching roles within teams (figure 3). Members can transition from coach to coached and vice versa depending on expertise to provide strategic advice, skill-set instruction, and emotional support during moments of perceived failure or personal attack.[54] Work for environmental justice carries risks that vary from country to country and with one's position on an intersecting wheel of privilege.[107] Pushback from powerful bodies must be anticipated, and is an additional reason for individuals to reach out to networks, as collectives are better placed to provide legal and emotional support. Teams can help individuals choose roles aligned with their risk threshold and life circumstances. Community helps foster courage.

The nurturing of teams, organisations, and networks requires stewardship and resources. Financial and organisational support for secretariats and coordinating networks is required to catalyse a rapid health sector-led shift.

Tactics

Tactics are the activities that make your strategy materialise and should be chosen in such a way as to move you closer to accomplishing your target.[58] For instance, work to reach a commitment to phase out coal-fired power might use the release of an evidence-based report detailing the projected lives saved through a transition to renewables as a tactic to generate media interest before a crucial decision point.[57] Commissioning a poll, bringing forth a motion at a meeting, organising a day to lobby decision makers, and launching a communications campaign are all tactics that require resources and skill and best sit within an overarching strategy.

Clinical teaching emphasises the rehearsal of high-risk skills in simulated situations. Planetary health educators can adopt a similar approach to intimidating situations such as media interviews and lobbying.

Wins

The nature of networked efforts is that progress is the result of the work of many people. Attribution of wins to any one group or action is difficult. That said, it is important to celebrate progress and to acknowledge contributions, as these provide inspiration.

The approach outlined in this Personal View was finalised in January, 2022. Presentations have been given to thousands of participants in multiple countries, and downloadable PowerPoint slides based on the figures and content of this Personal View are available in the appendix to facilitate work at the micro level and meso level. The Global Climate and Health Alliance, best able to coordinate work at the macro level in association with its network of international and in-country partners, has joined the Powering Past Coal Alliance to amplify the health voice in coal phase-out efforts and led an international campaign that saw 250 health organisations, including WHO and thousands of health professionals, endorse the call for a Fossil Fuel Non-Proliferation Treaty. Shortly after WHO support was announced, Vanuatu became the first nation-state to call for such a treaty.

See Online for appendix

Tuvalu soon followed, and the EU parliament adopted a resolution in support.

Conclusion

The stewardship of networks, strategic target selection, adoption of communications best practices, and development of compassionate team environments can help the health community learn to treat the climate crisis together. A coordinated approach has the potential to shift practice, finance, and power to transform the public narrative and influence investment, activating socioeconomic tipping points and catalysing the rapid decarbonisation needed to protect health and health systems.

Contributors

CH led the project, reviewed the literature, wrote the first draft, and coordinated edits. AJM led the health systems group, contributed to the project design, and helped draft and edit. FH led the energy group, contributed to the project design, and helped draft and edit. LA, KC, RdA, RH, BJ, EM, LM, FM, JM, MN, DP, SR, JDS, JV, and HY contributed content and network knowledge, and helped draft and edit. HM provided oversight of the project, and helped draft and edit.

Declaration of interests

We declare no competing interests.

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