

Perspectives in Public Health

Special issue: Climate Change and Health – Tackling Global Inequalities

- Will lessons from the global COVID-19 response strengthen commitment to sustainable development?
- Biodiversity and human health: the case for public health action
- Climate justice: One planet, One people, One health
- The role for public health in building local partnerships to improve air quality and reduce health inequalities

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Guest editorial

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While climate change is the 'biggest global health threat of the 21st century',¹ it is also the biggest opportunity for public health.² The COP26 (Conference of Parties) in Glasgow in November 2021, delayed by COVID-19, is a fundamental opportunity for recommitment to combat climate change and to demonstrate that climate is a public health issue. In this Special Issue of *Perspectives in Public Health*, we examine approaches and actions to address the climate crisis and how public health professionals can act and advocate.

The COVID-19 pandemic has exposed deep global and local inequalities and inequities – in most countries, the poorest and most vulnerable have suffered most. We are rapidly learning about the wicked complexity of the pandemic and its impacts on socio-economic, political and environmental systems, and about potential interventions. There is growing recognition of COVID-19 as a syndemic³ – an aggregation of interacting diseases and the social and environment factors that promote and exacerbate the negative effects of these interactions. These are linked to patterns of inequality that are deeply embedded in our societies. Wellbeing and inclusiveness are at the centre of Build Back Better.⁴

In his article, *Dr Farhang Tahzib*, chair of the public health ethics committee of the UK Faculty of Public Health, summarises the evidence and the urgency for action and links climate action, the response to the pandemic, and other global public health emergencies with the need for a new set of values that embody a sense of solidarity and global justice.

In their article *Prof Selena Gray and Dr Maria van Hove* highlight the unprecedented loss of biodiversity and possible areas for action at individual, regional, national, global and planetary levels. The UN Biodiversity Conference in October 2021 is another opportunity to demonstrate the links to human health.

Drs Emily Dobell and Neil Squires from the Global Public Health Division of Public Health England demonstrate how Sustainable Development Goal (SDG) 13 – 'take urgent action to combat climate change and its impacts' – interconnects with all the other SDGs. They describe actions by local government areas in England in aligning public health strategies with the SDGs.

In her analysis of the growing movement organisations working on climate change and health in England, *Dr Rita Issa* concludes that health professionals' voice and messaging could contribute more to the climate movement and calls for better coordination and collaboration.

Helen Johnston and Dr Paul Pilkington explore the role of public health in partnerships in England and Wales to address air quality and related inequalities. From Scotland *Drs Jackie Hyland and Harpreet Kohli* describe the importance of having public health specialists on the boards of public bodies with environmental responsibilities.

Dr Yannish Naik argues for more complex systems modelling to provide better evidence for new forms of economic policies that will address climate change and improve health and wellbeing.

In her article, *Dr Megan Evans* describes the connections between climate, conflict and health across Africa's arc of instability.

The contributors to this Special Issue raise profound challenges for the public health community. While many organisations have made declaration on the climate emergency, the responses to the pandemic show what can be achieved in a short time. We echo calls for a public health movement that frames climate change as a health issue that affects all of humanity. People working in public health should consider the implications of climate changes across the domains of every day practice.

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Fiscal and monetary policies: the cutting edge of advocacy and research on population health and climate change

This article outlines the likely mechanisms through which fiscal and monetary policies affect health and the environment, summarising innovative policies that may hold promise for planetary and population health.

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INTRODUCTION

The recent pandemic, along with the pressing challenges of climate change and biodiversity loss, has led to increased recognition of the need for new forms of economic policy that prioritise people's health and the environment.¹

Macroeconomic policy includes fiscal and monetary policy.² Fiscal policy involves choices around government revenue and spending and the balance between the two. Monetary policy includes setting interest rates and purchasing government securities or other assets. A wide range of such policies have been deployed following COVID-19.³

This article advocates complexity modelling as an innovative approach to study these policies given the multiple relevant mechanisms of effect. It then draws conclusions for future research priorities and public health action.

HOW FISCAL AND MONETARY POLICY AFFECT POPULATION HEALTH AND CLIMATE CHANGE

Fiscal and monetary policy can significantly affect population health and environmental outcomes, for example through their influence on economic growth, which is often associated with improvements in population health.^{4,5} Beneficial effects of economic growth are thought to be due to increased government investment in services and infrastructure that promote good health, as well as increases in employment opportunities and household income. However, economic growth is currently also a driver of climate change and biodiversity loss, both of which have negative implications for population health and for economic

growth itself.^{1,6} There is a substantial debate about the ongoing focus on economic growth, including whether there may be limits to this growth,⁷ or whether it is possible to 'decouple' it from resource use and carbon emissions.⁸

Fiscal and monetary policies may also affect health and health inequalities through their impacts on other macroeconomic factors such as inequality and poverty.⁹ There are complex relationships between these various macroeconomic factors, and their collective influence on health outcomes has not been robustly conceptualised or extensively studied. More direct mechanisms include changes in consumption such as reduced fossil fuel use and concomitant air pollution due to carbon taxes.¹⁰

INNOVATIVE FISCAL AND MONETARY POLICIES

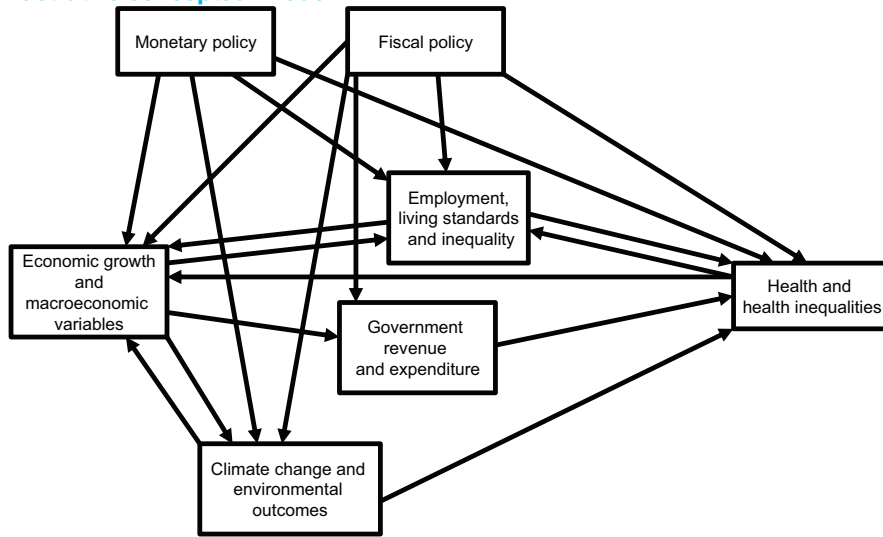
Many innovative fiscal and monetary policies have been proposed to address climate change.¹¹ These include reducing subsidies to fossil fuel companies, or central banks reallocating resources to sustainable economic sectors. The Green New Deal is a combination policy designed to address climate change and social inequality through government investment in a greener and more equal society with a focus on good jobs.¹² The Green New

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Figure 1

Illustrative conceptual model



Deal is one example of such innovative policies that has been gathering support from health advocates.¹³

There is no integrated view of how these different fiscal and monetary policies influence health and environmental outcomes that takes into account the distinct and overlapping mechanisms of effect. It is therefore not currently possible to develop a robust appraisal of the likely health impacts of these innovative policies, or to assess how individual policies or combinations of them might result in synergies or trade-offs across health and environmental outcomes.¹⁴

An illustrative conceptual model summarising some of the mechanisms and policies described above is provided in Figure 1.

COMPLEX SYSTEMS MODELLING?

The large number of dynamic relationships and feedback loops linking the economy, population health and environmental outcomes points to these forming part of a complex system.¹⁵ Complex systems require specific research methods, as they are characterised by nonlinear behavioural dynamics – for example stable states and tipping points (where the system undergoes a sudden shift) or emergence (where the behaviour of the whole

system is qualitatively different from the behaviour of its individual components, and therefore whole system behaviour cannot be predicted from studying only the individual parts).

Given the wide range of relevant variables, limited uptake of key policy proposals and the urgent nature of environmental issues, modelling is an ideal strategy to assess the likely impacts of innovative fiscal and monetary policy to aid the further development of policy priorities and proposals. Modelling is particularly able to test a wide range of assumptions when there is uncertainty – as there is in this case.¹⁴

Past models have incorporated the relationships between the economy, the environment and determinants of health such as employment or inequality but to date these models have not considered health outcomes or health inequalities.¹⁶

IMPLICATIONS

Achieving greater clarity on the likely health impacts will require collaboration across disciplines. While the urgency of climate change means we cannot wait for perfect evidence, we argue that increased

understanding about the potential health impacts of monetary and fiscal policies is necessary to help steer policy as it develops. This will only be achieved if research funders prioritise this topic. It will also require interdisciplinary collaborations between public health, economics and environmental scientists. This article has made a case for complex systems modelling as a viable methodological approach for addressing these questions, though it is clear that there is also a need for more social epidemiology that can illuminate the relationships between the diverse variables in question and be used to populate such complex models. Such models can and should also be used to connect with public conversations about shared values that will shape trade-offs and decisions as we build a fairer, greener society and economy.

As health advocates, we should be clear about the evidence base for our policy demands. We should also be transparent about ethical trade-offs between the quality of evidence, levels of uncertainty and the urgent need for action. It seems clear that no single policy can solve climate change and health inequalities, requiring the adoption

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of a broad portfolio of well-aligned fiscal and monetary policies.

Public health agencies will also have a key role to play by working with key government departments such

as finance ministries and central banks to embed health and wellbeing at the heart of fiscal and monetary policy.

CONFLICT OF INTEREST

The author(s) declared the following potential conflicts of interest with respect to the research, authorship, and/or publication of this article: YN was recently the Interim Director at the UK Health Alliance on Climate Change which is calling for policies considered in this article. YN is now employed by London Borough of Merton which accepts no liability for the views expressed in this paper. Other authors report no conflicts of interest to disclose.

Fiscal and monetary policies: the cutting edge of advocacy and research on population health and climate change


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Mapping the movement for climate change and health in England: a descriptive review and theory of change analysis

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Keywords

climate change; sustainability; health; theory of change; social movements; policy change

Abstract

Aims: There are a growing number of organisations working to address the connections between climate change and health. This article introduces the concept of ‘theories of change’ – the methodology by which organisations or movements hope to bring about social change – and applies it to the current climate change and health movement in England. Through movement mapping, the article describes and offers reflections on the climate change and health ecosystems in England.

Methods: Organisations working on climate change and health in England were identified and publicly available information was collated to map movement characteristics, target stakeholders and methodologies deployed, using an inductive, iterative approach.

Results: A total of 98 organisations working on health and climate change (and/or sustainability) were initially identified, of which 70 met the inclusion criteria. Most organisations target two or more stakeholders, with healthcare workers, management structures, and government being most commonly cited. Methodological approaches identified include Formal education programmes; Awareness-raising; Purchasing-procurement power; Advocacy; Financial; Media-messaging; Networking; Knowledge generation; and Policy making, of which education, awareness-raising, and advocacy are most commonly used.

Conclusion: There is a tendency for climate change and health organisations in England to focus on individual level and sectoral change over system change. More could be made of the potential for the healthcare professions’ voice and messaging for the wider climate movement. Given the rapid boom of climate change and health organisations in recent years, a mind-set shift that recognises different players as part of a cohesive ecosystem with better coordination and collaboration may reduce unnecessary work, and facilitate more cohesive outcomes.

INTRODUCTION

The UCL-Lancet commission on climate change and health was published a decade ago,¹ but despite its warning that climate change was the greatest threat to health of the 21st century, the UK government has only achieved 2 of the 31 milestones set out in the Progress Report by the Climate Change Commission, and as of 2018 was ‘off track to meet its own emissions targets in the 2020s and 2030s’.² Globally, the story is no brighter. Countries are far from meeting the targets set out by the 2015 legally binding

intergovernmental Paris Agreement, and predictions point towards a rise in global temperatures of greater than 1.5 degrees Celsius by the middle of the century.³

Awareness and concern regarding climate change – once the domain of climate scientists and fringe groups – has moved into public consciousness, in line with the rise of movements like ‘School Strike for Climate’ and ‘Extinction Rebellion’. In parallel, the medical community has been working through a variety of institutions and methodologies to push for measures to mitigate

Box 1

Theory of change terminology

Theory of change: Individuals and institutions have beliefs and assumptions about how change happens. These beliefs determine who an organisation chooses to influence, the methods that will be deployed to achieve that influence, and the desired outcome. Such beliefs may be conscious or subconscious. These worldviews are ‘theories of change’,⁴ which, when clearly articulated, can clarify expectations, facilitate better planning, and help map change-points within a broader ecosystem.

Movement: Groupings of individuals or organisations that focus on specific social or political issues with an aim to carry out, resist, or undo a social change.⁵

System: An interconnected set of elements coherently organised so that it achieves something; more than the sum of its parts and defined by complexity arising through relationships and feedback loops among the many elements. When applied to political change, the socio-political organisation of a society, including law and public policy as well as economic and social structures.⁴

Advocacy: The process of representing, promoting, or defending a person(s) or cause’s interest or opinion. Policy advocacy is the process of negotiating and mediating a dialogue through which influential networks and decision makers take on ideas and subsequently act upon them.⁶

the climate crisis’ impact on health and the health sector’s contribution to the crisis. In a seeming acknowledgement of these concerns, in 2019 the British government declared a climate emergency, and in October 2020, the Greener NHS England Programme published a target of achieving net-zero by 2040. However, achieving these aims requires ongoing action.

This article introduces the concept of ‘theories of change’ (Box 1) – the methodology by which organisations or movements hope to bring about social change – and applies it to the current climate change and health movement in England. Through movement mapping, this article describes and offers reflections on the climate change and health ecosystems in England.

METHODS

Organisations currently working on addressing health and climate change (and/or sustainability) were identified through the authors’ prior knowledge and expanded by (1) crowd-sourcing submissions and recommendations for organisations through climate and health networks on Twitter,⁷ and (2) Google and Ecosia search engines using keywords, ‘Climate change’ or ‘Sustainability’ and Health. Organisations were defined according to the criteria in Box 2. Publicly available organisational information was inputted into an online spreadsheet and reviewed by two authors, with disagreements reviewed by a third

author. The information included in the spreadsheet was designed to help meet the study aims and included year founded, website, organisational size, membership demographics (if applicable), target stakeholder(s), methodology, and organisational aims. Ethical approval was not required as the study utilises data in the public domain.

A framework outlining the health system in England and change pathways for climate change as it relates to and interacts with health was developed based on the structure of NHS England and the author’s experiences of working in climate change and health advocacy, and an inductive and iterative approach was taken when defining and mapping the categories of the methodological approaches and stakeholders targeted by different organisations. An inductive approach was chosen because it can help elicit new themes, frameworks, and unexpected findings in a relatively understudied area.⁸

RESULTS

A total of 98 organisations working on health and climate change (and/or sustainability) were initially identified, of which 70 met the inclusion criteria. Once similar groups had been combined – (1) NHS Trust-based advocacy groups, (2) groups working through the Royal Colleges, and (3) higher education institutions – 32 groups remained for analysis. There is a steady increase in the number of organisations founded (Figure 1).

Identified target stakeholders and their relationships are mapped in Figure 2. Of the organisations analysed, most target two or more stakeholders. A total of 19 organisations included healthcare workers among their targets, with 17 organisations targeting management structures (Trusts, Clinical Commissioning Groups (CCGs) replaced by Integrated Care Systems), and 15 organisations aiming to influence Government (Figure 3).

Groups employ a variety of different methods in order to achieve their impact on the target stakeholders (Box 3), with up to four different methods being used by each organisation. Most frequently used methods included ‘Awareness Raising’ (14), ‘Advocacy’ (13), and ‘Education’ (12) (Figure 4).

DISCUSSION

There are a range of organisations working across England, using different methodologies and targeting different stakeholders to influence action on climate change and health. The rapid rise in the number of organisations working on these themes over recent years shows increasing interest and opportunity: from a small number of fore-runner/early advocate organisations who worked in relative isolation on what was viewed as a ‘fringe’ issue, to representation today which spans academia, hospital trusts, the royal colleges, social movements, and specialised NHS bodies. These organisations hold different theories of change, which may be implicit or explicit. No one theory of change can be applied

Box 2

Inclusion and exclusion criteria*Inclusion criteria*

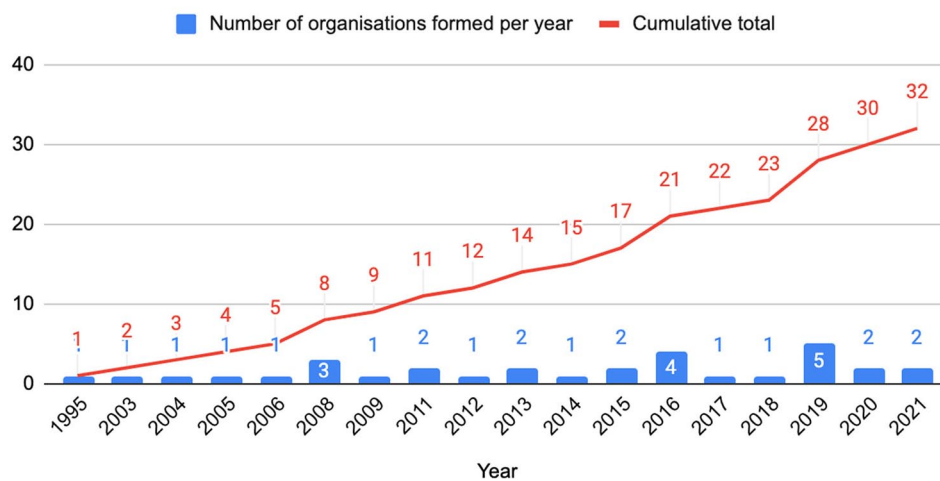
- Organisations, groups, or networks of two or more people with an online presence
- Currently (wholly or in part) working on the relationship between climate change and/or sustainability, and health
- Organisational aims can be found online, or are provided on approaching the organisation
- Operating in England

Exclusion criteria

- Climate change and health are not a key part of the organisational or campaign aims
- Groups with no online presence
- Group with no clear aims
- Not explicitly (in part or wholly) working to impact climate change or sustainability, even when an organisations work will have indirect impact on these issues (e.g. advocating for plant-based diets for health benefits only)
- Groups which have completed a project(s) on Climate Change and Health, and not currently undertaking further work
- Organisations based outside of England, including those based in and focusing solely on the other nations of the UK

Note that groups using similar methodologies within similar institutions have been combined for the purposes of analysis, including NHS Trust-based advocacy groups, and groups working through the Royal Colleges, and higher education institutions.

Figure 1

Organisations working on climate change and health, by year founded

to this 'climate change and health' movement, and as such, this discussion explores different theories of change by delineating the movement based on the target *domain* of influence (individual vs sectoral vs systems change), and the *means* of change across these domains (Figure 5). While the broad movement around climate change is multifaceted and spans in focus from individual-level action to radical system or structural change, the climate change and health space is somewhat skewed towards actions at the individual and sectoral levels.

Action at the individual level

Individualised actions to address the climate crisis aim to encourage individuals to change their lifestyle voluntarily to reduce their CO₂ emissions. This includes promoting recycling or active travel, purchasing green and re-usable products, and consuming a vegetarian or vegan diet. The assumption is that if a sufficiently large number of people can be persuaded to change their behaviour, a large-scale reduction in emissions can be achieved. There is some tension arising from differing

theories of change about whether the focus should be individual or structural change.

The world's richest 10% produce around half of the world's CO₂ emissions, and someone from the richest 1% of the world's population uses on average 175 times more carbon than someone from the bottom 10%. The NHS is responsible for 5.4% of the UK's total carbon emissions. Given that this is the case, particular theories of change would posit that influencing the course on climate

Mapping the movement for climate change and health in England: a descriptive review and theory of change analysis

Figure 2

Stakeholder map for the climate change and health space in England

At the time of writing, the public health landscape in England is undergoing significant change with the announcement that Public Health England will be removed and its roles divided between existing and new organisations. In particular, the new UK Health Security Agency will take over responsibility for public health protection and infectious disease capability across the UK.

Note: Professional bodies are interchangeably referred to as 'Royal Colleges' in the text.

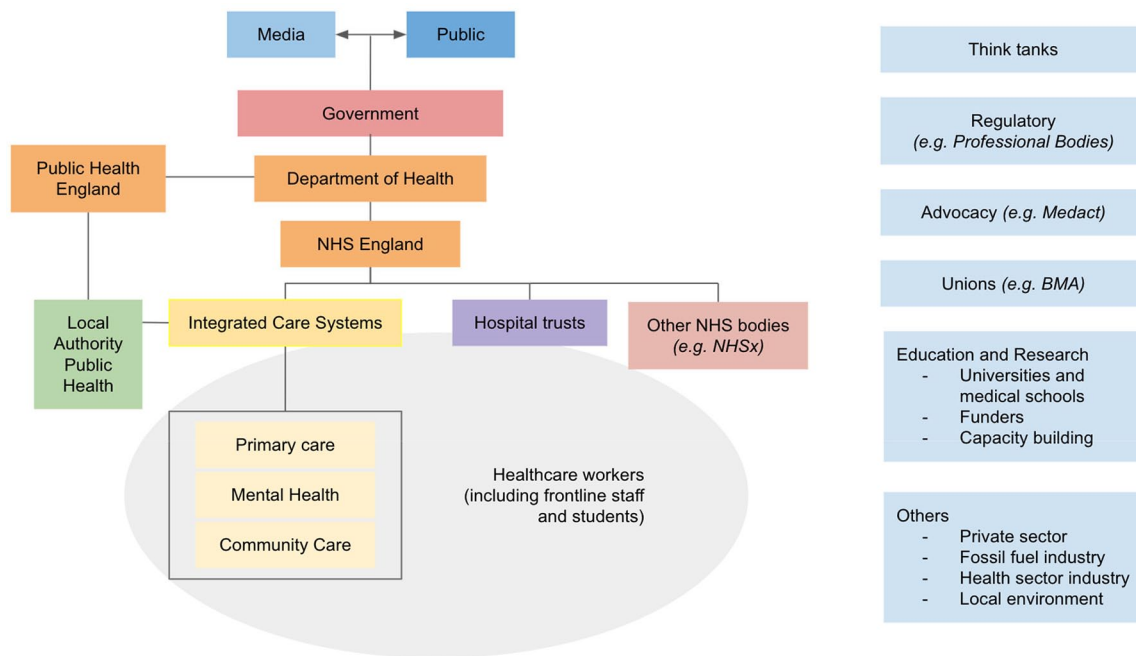


Figure 3

Target stakeholders for organisations working on climate change and health in England

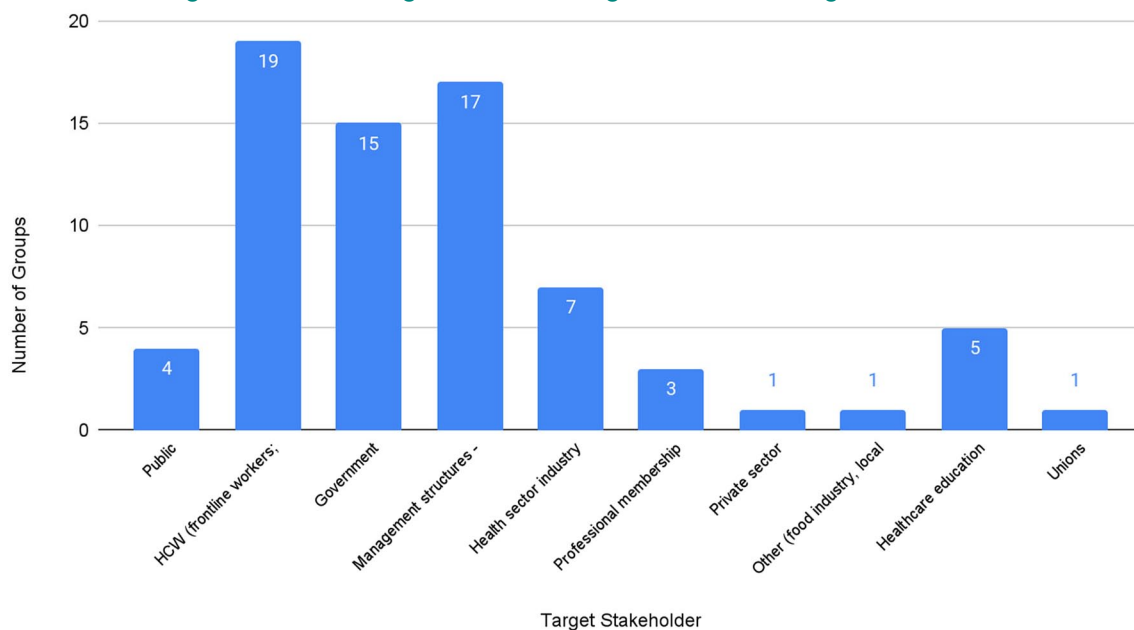
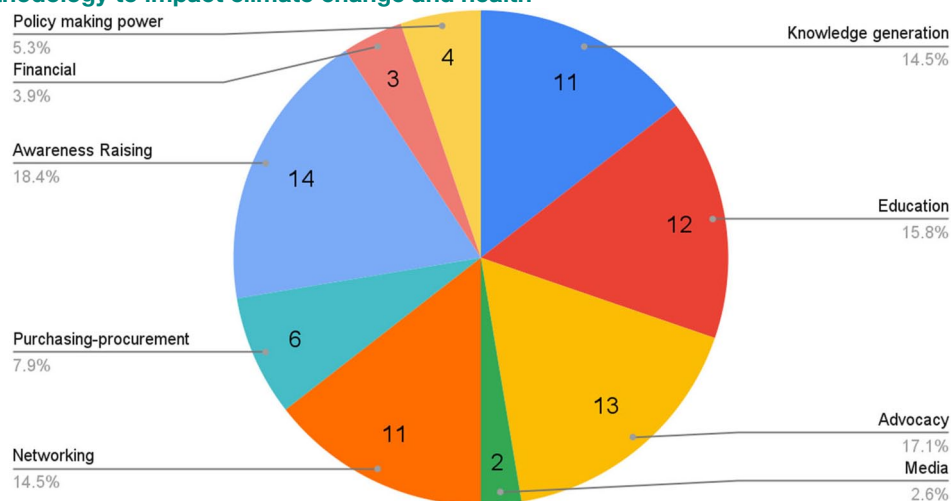


Figure 4

Organisational methodology to impact climate change and health

Box 3

Methodological approaches used by the organisations identified

Formal education programmes: such as courses offered by the *Centre for Sustainable Healthcare*, or conferences, aimed at increasing healthcare workers and students' knowledge and practice of sustainable healthcare.

Awareness-raising: activities aimed at increasing awareness of climate change, its impacts on health, and sustainable practice; targeted at individuals with the assumption that increased awareness will lead to behaviour change.

Purchasing-procurement power: changing the medicines, devices, and equipment purchased by individuals or a health institution to be more sustainable/ecological – for example, reducing single-use plastic items.

Advocacy

Declare climate emergency: a symbolic action whereby institutions can publicly declare that there is a climate emergency (+/- commit to measures in response)

Direct communication with policy makers: using negotiation and other 'soft power' skills to influence the creation and development of public policy.

Financial pressure: seeking change by exerting economic pressure on institutions or systems – for example, divestment or boycott.

Media-messaging: using the media as an advocacy tool and/or public health framing to influence public opinion, with the overall aim of policy change.

Networking: connecting individuals, groups, and causes to build collaborations and momentum.

Knowledge generation: research, evidence-finding, and policy generation – generally conducted by research and educational institutions, and think tanks.

Policy making: the development and introduction of new policies by policy-making bodies, such as the government or the Department of Health.

change will require cumulative individual behaviour and norm change within the populations and sectors that are most consumptive. Shifts in social norms can often underpin change by guiding individual behaviour; individual behaviours, in turn, influence social norms.⁹ This is the case with the phenomenon of 'flight shame', where domestic air travel in Sweden

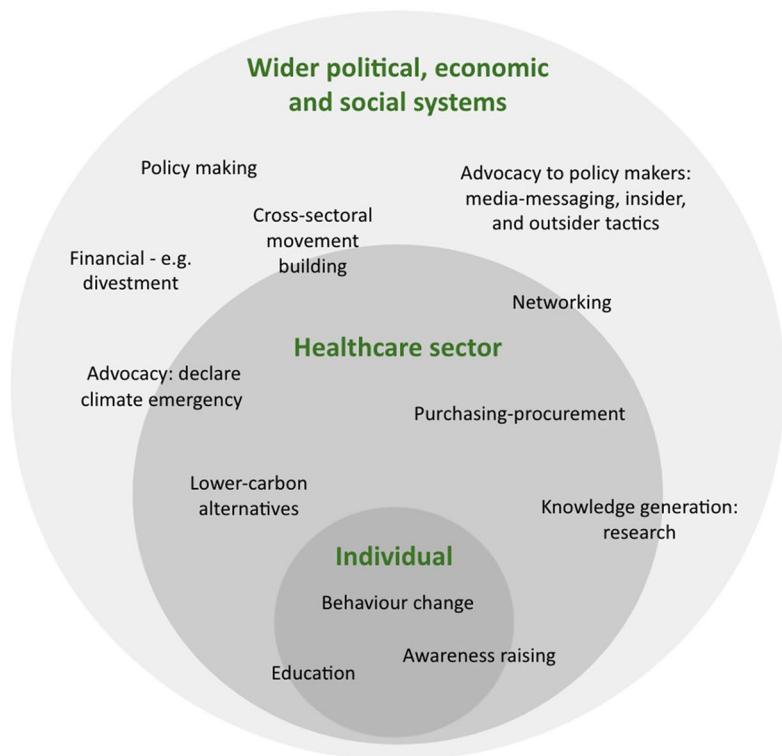
decreased by 15.4% per month between 2018 and 2019¹⁰ in response to a social norm shaming the environmentally harmful impact of flying. Flight shame is an example of 'self-categorisation theory';¹¹ the phenomenon whereby individuals self-categorise as part of a group and produce behaviours associated with that group to signal membership (in this

case, with the identification of being 'environmentally conscious').

For the climate change and health movement, individual-level action is represented by groups such as Eco Medics, who utilise social media to influence individual behaviour.¹² However, achieving the substantial shift to bring about change at the speed required may not be met through individual action and

Figure 5

Domains and means to influence change



normative change alone, nor is it feasible for vast sections of the population.¹³ This focus on individual action – as seen in the wider climate movement – is unsurprising. ‘Climate change helplessness’ or ‘climate anxiety’¹⁴ may lead to a focus on personal behaviour – empowering when faced with structural or systems-based approaches to change that may be perceived to be time-consuming, difficult to engage with, and overwhelming. The concept of ‘individual responsibility’¹⁵ is already pervasive in healthcare – for example taking an individual versus systems view on ‘lifestyle’-driven diseases, and there may be a sense that individuals can’t take action on a systems level, or would be hypocrites to try, until sufficient personal change has been made. Finally, given historical and present-day examples of health workers and institutions engaging in the political realm, action at the systems level may also be deemed by health workers to be too ‘political’, tying in to concerns of professional accountability, duties of care, and a

professional respectability that is nominally ‘apolitical’.

Action at the healthcare sector level

Climate change and health groups in the UK are working through and targeting stakeholders from across the NHS, including within their places of work, managerial structures, regulatory bodies, and Royal Colleges (Figure 2). There are a significant number of groups working at the hospital trust level (e.g. Greener Barts), through local general practice networks or directly in GP practices (e.g. Greener Practice), and to exert speciality-specific influence through Royal Colleges, advocacy organisations, or in local regions (e.g. the RCEM special interest group, GASP (Greener Anaesthesia and Sustainability Project), or ‘Sustainable Anaesthesia in Peninsula’ respectively). Many of these groups set their target stakeholders within the ‘health’ space, for example, influencing NHS procurement, other health workers, or Royal Colleges. Working to influence

individual trusts or practices is an extension of the individualised theories of change outlined above which focus on individual behaviours over structural reform; however, given the significant contribution of the health sector to carbon emissions, these approaches may be ultimately impactful, especially if groups with similar targets across geographical regions or within the same speciality engage in cross-collaboration, skill-sharing, and lessons learnt, to reduce duplication of work, inefficiencies, and burn-out, and maximise chances of success.¹⁶

The benefits of a national health service mean that coordination and collaboration can be facilitated centrally. The Sustainable Development Unit was established in 2008, and the Greener NHS campaign was launched in 2020 to ‘build on the work of trusts, share ideas on how to reduce the impact [of climate change] on public health and the environment, save money and reach net carbon zero’.¹⁷ The formation of these centralised initiatives means the UK health service is heralded as being one of the most progressive in the sustainable healthcare field, as the only healthcare system globally to have estimated its carbon footprint and set reduction targets.

Declaring a climate and ecological emergency

The growing number of healthcare organisations declaring a climate and ecological emergency (CEE) – including 10 hospital trusts since 2019 – is a product of the success of a mass movement towards climate action. Declaring a CEE can be an important step for an institution, particularly for those without a record of climate action. For members and organisations, it can be a direct way to ‘act within your sphere of influence’ to achieve tangible – and comfortable – goals. There are limitations to the effectiveness of this strategy, however. Declaring an emergency is merely a symbolic act unless followed up with further concrete action. For example, the Canadian government signed up to the expansion of an oil pipeline the day after becoming the second country to declare a climate

Box 4

Insider and outsider approaches²²

Insider organisations work to influence and effect change inside political institutions, with engagement that is participatory and aimed at achieving cooperation. As such, insider approaches are more likely to call for incremental change, where demands are more aligned with political consensus and with the leadership within the healthcare community. Insider tactics include lobbying, expert information, official hearings, and other direct communication with decision makers.

Outsiders, in contrast, work to effect social change from outside political institutions, often by challenging these institutions and their policies. This may be because they lack close links with policy-makers, or are reluctant to engage in direct contact with institutions in order to maintain a critical, oppositional role able to call for more radical change. Outsider strategies include demonstrations, petitions, civil disobedience, boycotts, media visibility, and other forms of communication and pressure in the public sphere.

Although seemingly opposed, Insider and Outsider approaches can be complementary and have been integral to the success of a number of social movements: for example, outsider groups calling for more radical demands help shift the Overton window – the range of policies politically acceptable to the mainstream population at a given time – which facilitates the ‘soft power’ of insider groups to lobby for stronger policies.

emergency in June 2019.¹⁸ The vast majority of CEE declarations avoid being prescriptive about specific policies in order to be palatable to a wider range of the political spectrum. As such, the declaration of an emergency needs to be followed by a detailed plan of implementation. By declaring a climate emergency, health organisations publicly acknowledge the gravity of the crisis and realign their organisational goals in line with an overarching aim of cutting carbon emissions. If this is an introspective pursuit and the goal is to just act on institutional or specialty behaviour, the implied assumption is that other organisations will come on board with similar approaches, otherwise, the overall impact is negligible. However, the declaration of a CEE gives the institution the backing of its members to pursue broader advocacy: communicating with members and the public about the public health dimension of the climate crisis, and putting pressure on policy-makers through political advocacy, though it may still fall short of political discourse aimed at transforming public policy in the way necessary to meet the climate crisis.

Networking

There is an implied assumption that the early adopters of public statements such as declaring a CEE will be joined by other players in the ‘network’ – hospital trusts, royal colleges, and organisations – to achieve a critical mass and norm change across institutions. Utilising networking as a theory of change methodology

draws from coalition theory,¹⁹ where coalitions come together by agreement over shared core beliefs about policies, and who can then explore and pursue multiple avenues for change – for example, by engaging in legal advocacy or working on changing public opinion – often simultaneously, to find a route that will bear fruit. A number of organisations exist to formally facilitate such networking and skill sharing, for example, the UK Health Alliance on Climate Change (UKHACC)²⁰ – which connects established health organisations, and ‘Health Declares’,²¹ which connects regional and speciality groups – made up of members – through a framework of action to influence institutions providing healthcare (such as Trusts) as well as governing bodies (such as the Royal Colleges). In these examples, we note how groups operating at a similar ‘level’ of influence (e.g. member groups vs organisational governing bodies) seem to benefit from organisations that facilitate networking, but that networking seems relatively constrained to being *within* but not *across* these levels.

Action at the systems level

Of the organisations identified, relatively few are focused on changing economic and political systems beyond the healthcare sector. Those that do may broadly share certain aims, for example, the need to reduce greenhouse gas emissions, but have differing views on how decarbonisation should be achieved, as well as at what speed.

Many of these groups also differ greatly in the methods they employ to achieve their aims. Organisations exist on a spectrum between ‘incremental system change’ and ‘radical system change’, which maps to the tactics utilised, including ‘insider’ and ‘outsider’ approaches (Box 4).

Advocacy to policy makers: media-messaging

Relatively few organisations formally seek to reframe climate change as a public health issue in the public domain, though this may be a ‘side-effect’ of the work of research institutions and other campaigning organisations. When campaigners successfully articulate a political frame that ‘resonates’ with sufficient numbers of people in society, large-scale change is possible.²³ Research suggests that broad sections of the population respond positively to taking action on climate change when the issue is presented through a public health framing: it generates support for efforts at mitigation and adaptation to climate change among groups who are unresponsive to its traditional presentation as an ‘environmental issue’,²⁴ and in some cases has been cited as the most convincing argument to take action. From the 1990s onwards, the healthcare profession helped to reframe smoking in enclosed venues from being a matter of personal choice to being a public health concern, paving the way for the 2007 smoking ban in England. These approaches draw on a

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'messaging and frameworks' theory of change, which understands that individuals develop different preferences based on how options are presented or framed; and 'diffusion theory',¹⁹ where policy makers are influenced by new ideas which have been accepted by a critical mass of the population, having been communicated by trusted messengers.

Healthcare professionals are among the most trusted professions;²⁵ there is therefore scope for healthcare leaders to be persuasive advocates. However, few organisations were identified that included using the healthcare voice or messaging for the wider climate change movement in its aims or methodology. Doctors for Extinction Rebellion, a subgroup of the 'Extinction Rebellion' movement who have sought to make the connection between the climate crisis and public health 'visible' in this way, using 'outsider' tactics such as street action and stunts to gain media coverage. Medact members are building cross-sectoral collaboration through the campaign 'Health for a Green New Deal', which provides a public health framing for the creation of green jobs, offering a 'health-voice' to strategically build social pressure in support of key policies at both local and national levels of government.

Advocacy to policy makers: insider approaches and knowledge generation

Groups engaged in political action on climate change and health exhibit one of two broad political approaches for addressing the social determinants of health, as described by Dennis Raphael.²⁶ The first is a 'professionally-oriented' approach that involves the dissemination of knowledge and advocacy by healthcare professionals with the aim of convincing policy-makers to enact health-supporting policies. This corresponds to what political scientists term a 'pluralist' understanding of the political process as relatively open and responsive to competing interest groups and guided by the quality of ideas in the public arena, and draws on the 'policy window'¹⁹ theory of change whereby problems, policies and politics converge, and where policy options developed

through research and publications have the opportunity to be adopted. These approaches generally require good relationships and reputations, both of which are generally afforded to and the remit of 'insider' organisations, who influence change by working directly with those with power to influence decision making.¹⁹ Such approaches are generally aligned with incremental system change, as utilised by organisations like the UKHACC, who uses its position as a network of established health organisations to exert sort power and influence on decision makers, with demands that are relatively in line with political consensus. There are nonetheless limitations to a professionally oriented approach focused purely on engaging policy-makers and other elite stakeholders with scientific findings. It may be that policy-makers are not receptive to these findings or that the prescribed policy solutions conflict with core tenets of their ideology. Alternatively, fossil fuel companies and other powerful corporate actors who benefit from the status quo may 'veto' any proposed change through the informal power they wield over the policy-making process.

Movement-building and 'outsider' advocacy

The second political approach for addressing the social determinants of health is a 'movement-based' one²⁶ that mobilises collective political action as a means to confront power-holders and drive change. A movement-based approach aims to mobilise public opinion and shift social norms through action that takes place outside official institutions, and more often (though not exclusively) aligns with 'outsider' tactics, and with a more radical view on change. Such tactics have been used by groups such as Doctors for Extinction Rebellion, whose use of nonviolent direct action (NVDA) with varying degrees of success in creating 'dissensus politics',²⁷ or the 'positive effects of polarisation',²⁸ provokes those with power to clarify their position on a particular issue and shift popular opinion either in support of or in opposition to them. Other movement-based organisations – such

as Medact – may also be more radical in their climate targets and are more likely to be 'intersectional', linking the climate crisis and policy demands to broader interconnected social and economic issues.

Financial systems and divestment

Actions demanding health institutions divest any holdings in the top 100 fossil fuel companies saw a degree of success in the mid 2010s and moved from being a relatively 'outsider' issue to a 'norm' adopted by professional institutions such as UKHACC and the BMJ. Presently, though there are active divestment campaigns targeting medical indemnity organisations, the number of health institution divestment campaigns has declined, and despite previous divestment campaigns – such as the 2015 Wellcome Trust divestment campaign led by Medact and the Guardian²⁹ – institutions still maintain investments in fossil fuels at odds with their organisational priorities, which may be reflective of the ongoing dominance of the fossil fuel economy.

Study limitations

A whole system mapping would ordinarily include groups who would impact a system even if not explicitly aiming to do so; however, we excluded groups not directly aiming their work at influencing climate change and health – such as those working on plant-based diets – from our analysis. Combining trust groups, Royal College groups, and educational institutions skewed our figures in terms of numerical values, though still hold weight in qualitative analysis. As with any research, there is potential influence from the authors. The majority of the authors of this article are active within the field of climate change and health, and as such, have their own potential biases and assumptions; however, we have attempted to mitigate for this by ensuring the representation of a number of different types of organisations in the authorship team, and by a process of self and collective reflection during the writing process.

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CONCLUSION

Ecosystem mapping the climate change and health movement in England has highlighted a number of key themes for consideration. Overall, there is a focus on individual level and sectoral change, over system change. For groups working at the local level – be it through CCGs, GP practices, specialities, and/or Royal Colleges – there may be benefit from better coordination, collaboration, and a degree of centralisation for certain tasks, which may be fulfilled by the Greener NHS as it becomes more established. Similarly, certain activities could focus on centralised policy change for expediency and impact: for example, lobbying NICE to introduce an ecological component to prescribing guidelines versus working to change the prescribing choices of GPs on a practice-by-practice basis. For organisations operating to influence change on a systems level, many unsurprisingly utilise the insider influence that is afforded to the health professions resulting from respectability and societal

position. More could be made of the potential to utilise the healthcare professions voice for the climate movement more broadly – through the media, or to support in wider messaging to influence public opinion and policy – in light of the evidence that a public health framing on the climate works. A shortcoming of the ‘movement’ is that it may not see itself as such and thus not take steps to work in a coordinated manner. What remains is an amorphous, complex system of multiple, passionate players left exposed to the ‘tyranny of structurelessness’ – where an apparent lack of structure can result in unaccountable leadership. Recognising that there is value in working to influence change across various points in an ecosystem, and given the rapid boom of climate change and health organisations in recent years, there may be benefit in a mind-set shift within the climate change and health space in England: with more coordination and collaboration to reduce unnecessary work and duplication, better

identify movement gaps, and lead to more cohesive outcomes.

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Climate change, health, and conflict in Africa's arc of instability

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INTRODUCTION

Climate change lies at the heart of many complex humanitarian emergencies and emerging global health challenges, with Sub-Saharan Africa (SSA) identified as one of the most vulnerable regions to the impacts of climate change.¹ An arc stretching from Somalia and Eritrea in the east to Mauritania in the west forms a band of countries that are particularly vulnerable to the consequences of climate change (Figure 1).² This arc experiences a devastating combination of state fragmentation, Islamist insurgency, and climate change, undermining livelihood strategies across the region. A climate injustice exists; despite contributing relatively little to the anthropogenic causes of climate change, individuals living in these countries face the most severe impacts.³

CONTEXT: CLIMATE CHANGE AND HEALTH

The consequences of climate change are diverse, severe, and predicted to worsen over the coming years (Figure 2). Even if temperature changes are maintained in line with the Paris Agreement (that is to limit temperature increases to below 2°C, and preferably below 1.5°C, compared to pre-industrial levels), there will be significant impacts on biodiversity, water availability, food security, and health.⁵

In SSA, extreme weather events including storms, floods, droughts, and heatwaves are increasing in frequency, influencing health in a number of ways.⁵ Although the epidemiological distribution of specific infectious diseases varies dependant on organism and context, in general, increased temperature and extremes of precipitation have been associated with increased risk of diarrhoeal illness,⁶ which is a leading cause of mortality in Africa.⁷ Vector-borne diseases, which are especially sensitive to changes in climatic and weather conditions, represent a particular cause for concern. Dengue, transmitted by *Aedes* mosquitoes, is one of the fastest spreading infectious diseases and has been identified by the World Health Organization (WHO) as one of the top 10 threats to global health.⁸

Temperature changes mean dengue incidence is predicted to increase across large parts of SSA and may eventually contribute a greater burden of disease than malaria.⁹

Changing climate and weather events affect regional food security. Yields of crops such as wheat and maize have been adversely affected by climate change in many lower-latitude areas.¹⁰ This is predicted to worsen over the next 50 years, yet the European Commission report that 37 million people in the Sahel region are already severely or moderately food insecure.¹¹ Pastoralism represents a common livelihood strategy in countries along the arc; these systems are extremely vulnerable to the effects of climate change. Droughts and floods have disrupted livelihoods and decimated crops and livestock.¹² Dwindling natural resources, decreased animal and pasture productivity, and loss of biodiversity have contributed to rising pressure in the region, exacerbating underlying social and political tensions and at times erupting into violent conflict.

As a consequence of these factors, many millions of people living along the arc have been forced to migrate. Earlier this year, the United Nations High Commissioner for Refugees (UNHCR) reported that some 2 million people have been displaced within the Sahel region.¹³ Many seek shelter within neighbouring countries, while others attempt dangerous sea journeys to Europe. The displacement of populations has the potential to spread infectious diseases into previously immuno-naïve areas and expanding refugee camps can also lead to outbreaks of diseases. There is increasing recognition of the impact of forced migration and the use of refugee camps on mental health and of the possibility of sexual assaults.¹⁴ However, these issues are not frequently acknowledged as potential consequences of climate change.

We can best illustrate the issues described above by first focusing narrowly on one region of a country affected, Darfur in Sudan. Following this, we consider the broader view by examining the similarities of three Sahelian countries in the arc of instability: Mali, Niger, and Burkina Faso.

Figure 1

Africa's arc of instability follows the Sahel region⁴

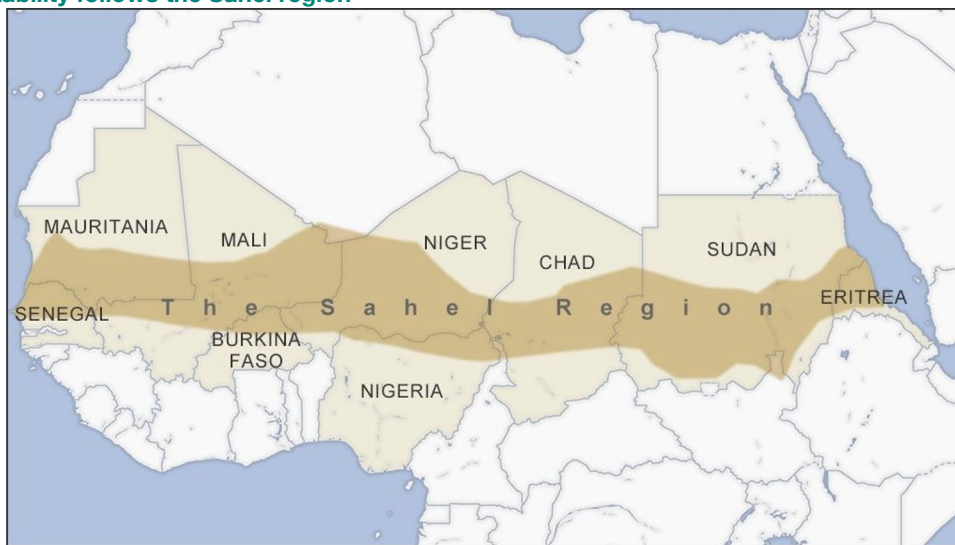
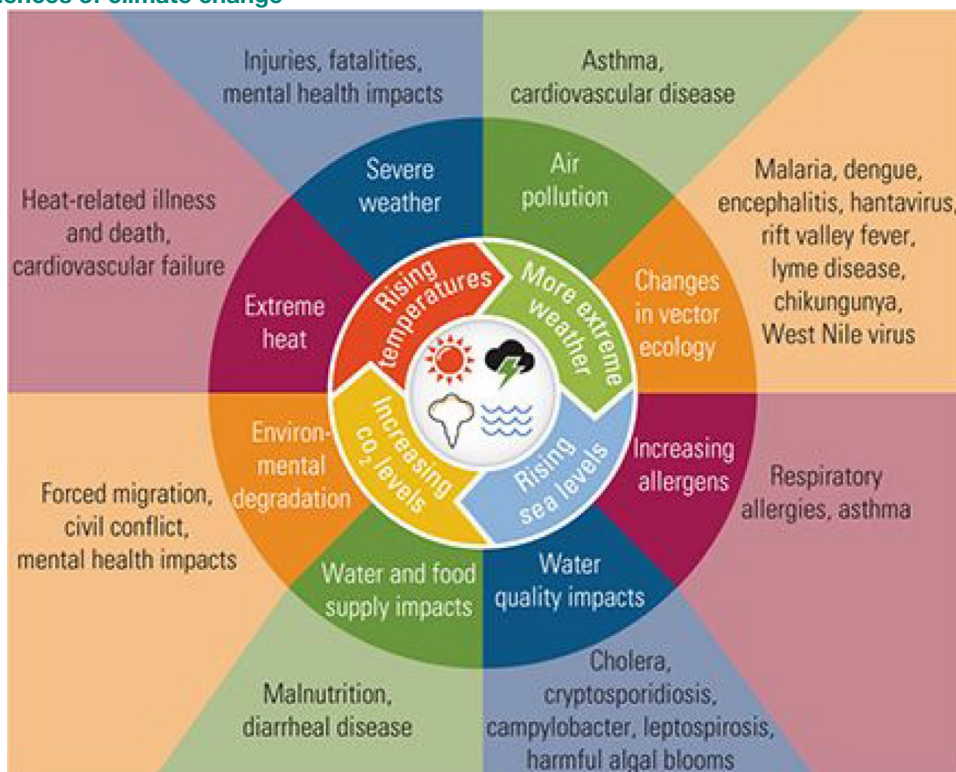


Figure 2

Potential consequences of climate change¹⁵



DARFUR

'Darfur's landscapes have a cruel beauty'.¹⁶ Darfur, in western Sudan, has been heavily afflicted by both climate

change and conflict. Some consider the violence in the region to represent the first genocide of the 21st century, others suggest it embodies the first climate

change war.¹⁷ Over the last 40 years, conflict in the region has claimed millions of civilian lives and displaced many more.¹⁷ Reasons for the violence are

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complex, involving an explosive combination of political, social, and environmental factors.

Darfur contains several distinct geographical and climatic zones within which different ethnic groups and livelihood strategies predominate. The edge of the Sahara and the Sahel deserts lie in the northern region of Darfur, where nomadic pastoralism dominates. In the south, crop farming constitutes the main livelihood strategy as the rich, alluvial soil provides ideal conditions for farming. Between the two zones lies a semi-arid region dominated by the Jebel Marra mountains. Migration, intermarriage, and nomadic lifestyles have led to a plurality of cultures and a blurring of ethnic groups between these areas.¹⁸

Nomadic pastoralists from the north have long exerted traditional rights to migrate south for water and grazing land for their cattle, extending into farming areas. However, climate change has led to rising temperatures, desertification, and unpredictable weather patterns affecting crop yields. *'In recent years drought, desertification and soil loss have seen the Sahara creep south into the Sahel, and the Sahel in turn creep south into the Sudanian Savanna'*.¹⁹ Nomadic pastoralists continue to exert their traditional rights, but now there is a scarcity of water and pasture leading to competition over reduced resources and rising tensions between communities.¹⁸

There is debate over whether climate change has precipitated the conflict in Darfur or whether it has exacerbated pre-existing tensions in the region, acting as a 'force-multiplier'.²⁰ In Darfur, the role of ethnicity is closely woven with that of livelihoods. Predominantly, pastoralists are of Arabic ethnicity, while agriculturalists are mostly ethno-African.

The precarious relationship between pastoralist and farmer is gradually eroded, creating tension and violence between groups.¹⁶

MALI, NIGER, AND BURKINA FASO

These three Sahelian countries have become the epicentre of a Jihadi upsurge since 2012 with climate change acting as a powerful compounding factor: weakening livelihoods place pressure on economic and social systems with radicalising political ramifications. The volume of the Niger River has shrunk by a third over the past three decades.²¹ Usable arable land is declining as the population increases.²² This obliges many farmers to no longer use fallow, interrupting the historical passage across their land by herders of cattle after the harvest; now the herders destroy crops on the old routes and also change migration patterns impacting other farmers.²³ Governments favour farmers over herders, creating a pastoralist recruiting ground for Jihadis, such as among the Tuareg and Fulani populations.²⁴ In essence, climate change is facilitating the fusing of pastoralist grievances with Jihadi politics.²⁵

Weak states, artificial frontiers, and pastoralist livelihood systems facilitate militia groups spreading their influence across the borders of the three states.²⁶ In the Western Sahel in 2019, attacks increased 86% over the previous year causing 5000 deaths with 5.1 million needing humanitarian assistance in the form of nutrition, health care, and shelter.²⁷ Weak states leave a vacuum in the periphery, worsened by a failed decentralisation strategy which decimated services and security.²⁸ As rebel forces gained recruits, military

retaliation on local communities created further disaffection,²⁹ aiding Jihadi recruitment of the Fulani. Jihadists offer a rule of law where none exists, and an alternative livelihood strategy where climate change and misgovernment have taken away other options.

CONCLUSION

Climate change is exerting a multiplier impact on health challenges and conflict in the Sahel region. An arc of instability has been created stretching from the Atlantic to the Red Sea and Indian Ocean. Many health issues can only be tackled in the long term if climate change adaptation and mitigation globally become a priority. Humanitarian healthcare delivery, currently under attack,³⁰ will need to be strengthened and supported in the Sahel region. As livelihood strategies are obliged to change, poverty alleviation efforts are also needed to reduce the human costs of Jihadist violence and government repression. Forced migration currently from the Sahel region has widespread global ramifications.


DECLARATION OF CONFLICTING INTERESTS

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