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The impact of climate change on mental health and emotional wellbeing: current evidence and implications for policy and practice

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Headlines

- Climate change is negatively affecting the mental health and emotional wellbeing of people around the world.
- The literature shows that:
 - There is a clear relationship between increased temperatures and number of suicides;
 - There is clear evidence for severe distress following extreme weather events;
 - People who meet criteria for mental illness are more vulnerable to the effects of climate change on physical as well as mental health;
 - The climate crisis threatens to disrupt the provision of care for people with a mental illness diagnosis;
 - Climate change exacerbates mental distress, particularly among young people, even for individuals who are not directly affected (e.g. ‘eco-anxiety’).
- These impacts:
 - Will get worse without meaningful interventions, driving and exacerbating health and social inequalities which themselves worsen mental health;
 - Are currently ‘hidden costs’, unaccounted for in policy and planning;
 - Are likely to be vastly underestimated as despite the serious effects, this has been a neglected area of research.
- There are win-win opportunities (co-benefits) for improving mental health and emotional wellbeing associated with taking actions to reduce greenhouse gas emissions and adapt to a warming climate.

Key recommendations:

- Establish an international network including key stakeholders (e.g. government, healthcare systems, community groups, academics, emergency responders) to catalyse knowledge-sharing, target research efficiently, and identify and scale up successful interventions.
- Conduct robust, interdisciplinary and collaborative research to fully understand the true impact of climate change on mental health and emotional wellbeing.
- Ensure that the cost of climate change on mental health, and the multiple benefits of climate action are fully considered in the decision-making process.
- Prioritise successful climate mitigation and adaptation actions that have co-benefits for mental health and reducing social inequalities. Such actions could include: improving air quality, providing equitable access to nature and improving the energy efficiency of housing.
- Implement appropriate strategies to manage and reduce the severity of any negative mental health impacts when they do occur.

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Grantham Briefings analyse climate change and environmental research linked to work at Imperial, setting it in the context of national and international policy and the future research agenda. This paper and other publications are available from www.imperial.ac.uk/grantham/publications

Executive summary

Climate change and mental health are two of the most significant and pressing challenges facing societies across the world. Yet, growing awareness of these global issues has not been met with sufficient action to mitigate their impacts. Mental illness – or the disabling effects of distress – already affects around a billion people globally^{1,2}, while the effects of climate change are increasingly apparent³. Both of these issues are projected to increase and stand to affect many more people without sufficient action^{4,5}. Climate change has been recognised by governments, academics, advocacy groups and medical professions as a health emergency^{6–9}, though, to date, the focus has been largely on physical health. In contrast, mental illness, “the most neglected of all human health conditions”¹⁰, and emotional wellbeing have been overlooked in their interplay with climate change. Policymakers stand to benefit from identifying the opportunity of potential common solutions, stemming from some common causes, to these two global challenges. Policymakers, health systems and communities have not yet recognised and responded to the threat that climate change poses to our mental health and health systems, and there is much to be gained by proactively building resilience in individuals, communities and health systems.

The available evidence suggests that climate change has a significant and multi-faceted impact on mental health and emotional wellbeing. Data shows that there is a clear relationship between experiencing the effects of climate change – such as rising temperatures or more frequent and severe extreme weather events – and worsening mental health, even resulting in more suicides^{11–13}. Experiencing the effects of climate change first-hand, for example by a flooding event, directly raises the risk of experiencing post-traumatic stress disorder (PTSD), depression or low mood, and extreme distress. Individuals meeting criteria for mental illness are also more vulnerable to impacts of the changing climate, such as high temperatures, which worsen their physical as well as mental health. Damage to infrastructure and supply chains arising from climate change impacts also risk disrupting the provision of mental healthcare. Hence the overall picture is one of increasing demand with simultaneous reductions in the ability of the health system to cope and respond. The true costs of climate change on mental health and emotional wellbeing remain largely unquantified in policy and practice. This is particularly concerning considering that the number of cases of psychological trauma arising from a disaster can exceed physical injury cases by 40–1¹⁴.

Groups already affected by social inequalities such as those with existing mental illness or living in poorer countries are more likely to be affected by climate change, are less likely to have access to support and resources to mitigate against the

emotional impacts of climate change, and are at higher risk of negative mental health and wellbeing outcomes^{15–17}. The effects of climate change on mental health are therefore a driver and compounder of health and social inequality.

Even for those not yet directly affected by its impacts, awareness of the climate crisis can exacerbate mental and emotional distress. Young people seem particularly affected by such distress, perhaps as their futures will be highly affected by a changing climate, but they feel limited control over the actions taken by those in positions of power^{18–21}. The range of ways individuals respond psychologically and emotionally to the climate crisis not only has implications for mental health but also for the actions people take individually and collectively^{22–24}.

The evidence for the multiple impacts of climate change on mental health and emotional wellbeing warrants this issue to be given much greater prominence within public policy and public discourse. These impacts are currently ‘hidden costs’, unaccounted for in policy and planning. Specifically, greater action is required to: prevent the impacts of climate change on mental health by addressing the root causes of climate change; proactively address predicted mental health impacts while building resilience; mitigate and respond to the impacts on mental health and emotional wellbeing already occurring; and innovate in response to these challenges through evidence-based interventions for policy and practice. This paper proposes a detailed set of recommendations to stimulate greater knowledge, awareness and action.

There is good news, as there is still an opportunity to turn this from a vicious to a virtuous cycle. Actions that address climate change will have an even greater return than currently expected, as they will prevent or reduce adverse effects on mental health that have not yet been considered in policies and budgets. For example, burning fossil fuels causes climate change and poor air quality, and hence cutting back on fossil fuels reduces a) climate change, b) the impact of warming temperatures on mental health, and c) the mental health impacts associated with poor air quality. Such action provides opportunity to build more equitable societies (itself vital for improving mental health and wellbeing), with individuals in poorer areas more likely to be affected by, for example, poor air quality associated with fossil fuel burning. Further, when individuals take action to address and respond to climate change, this may also be protective for their mental health^{25–27}. Policy responses can therefore make multiple gains, win-win opportunities or ‘co-benefits’, by leveraging common solutions to the dual challenges of climate change and mental health.

Introduction

Key message

- Climate change has been shown to create a range of threats to health, but the interactions between, and common causes for, climate change and mental health issues have been largely neglected. There has been insufficient research, attention and conversations on this important issue which together have led to a lack of necessary and urgent action.

There is increasing awareness that climate change is a human health and healthcare emergency. The World Health Organization (WHO) has pursued a work plan on climate change and health since 2015²⁸ and in the United States, the Centers for Disease Control and Prevention (CDC) established a programme on the topic in 2010²⁹. The National Health Service (NHS) in England was the first national health system to commit to achieving net zero emissions of carbon dioxide³⁰. In its 2020 World Innovation Summit for Health (WISH) report “Health In The Climate Crisis: A Guide For Health Leaders”³¹, the Institute of Global Health Innovation (IGHI) at Imperial College London called on the health community to contribute to tackling climate

change and proposed a framework to map the health impacts of climate change (Figure 1). It also highlighted the negative impacts of the climate crisis on healthcare delivery and on the global efforts to ensure that every person has access to quality healthcare (universal health coverage). This briefing paper builds on the findings of that report and is intended as a first step to recognise and address the gaps in knowledge and awareness about the relationships between climate change and mental health and emotional wellbeing. The following sections provide context on both issues individually before discussing the interlinkages between them.



Figure 1: The health threats resulting from current and anticipated climate change impacts. Climate change results in threats to health including food and water insecurity, storms and floods, and social and economic instability. These in turn produce detrimental physical health outcomes (e.g. malnutrition and heat stress) and mental health outcomes (e.g. depression). From World Innovation Summit for Health report: “Health In The Climate Crisis: A Guide For Health Leaders” (2020)³¹ and the Centers for Disease Control and Prevention (CDC) “Climate effects on health” (2020)³².

Climate change

Invisible gases in the Earth's atmosphere including carbon dioxide and methane act as a blanket, trapping warmth from the sun and making our planet a habitable temperature. However, human activities – such as burning fossil fuels for energy, transport and manufacturing, and changing natural landscapes for agricultural crops and farming animals – are increasing the amount of these 'greenhouse gases' and global temperatures have risen by over 1°C since 1850 as a result³³.

The influence of human activities on the climate is clear and recent increases in global temperatures have already had widespread impacts on physical, biological and human systems³⁴. These include an increase in the frequency and intensity of various extreme weather events (acute events e.g. heavy rainfall, high winds, storm surges) and extreme climate events (chronic events e.g. drought) and the effects associated with these events such as flooding and wildfires³⁴. The present and future risks from climate change vary across the world (see Figure 2) and include reduced water availability in North Africa, an increased risk of flooding in Europe, wildfires in North America and the bleaching of coral reefs in Australia³⁴. Such climate impacts are expected to become increasingly severe and/or frequent with rising temperatures³⁴, so reducing greenhouse gas emissions (climate mitigation) is essential to minimise global temperature rise while societies try to build resilient infrastructure, and anticipatory policies and behaviours suitable for a warming planet (climate adaptation).

The causes of climate change are rooted in human behaviour and hence human psychology, with action to tackle climate change requiring a reshaping of societal and individual choices and lifestyles that minimise the emission of greenhouse gases. It is important to understand the range of psychological responses – thoughts and feelings – that individuals and communities have in relation to climate change in order to appropriately engage communities in climate adaptation and mitigation efforts while supporting mental health and emotional wellbeing.

Mental health

Mental health is an all-encompassing term – just like physical health, everyone has mental health that can generally be better or worse at any one time, as ups and downs in thoughts, feelings and ability to cope with life. Hence, good mental health is not just the absence of illness or disorder, but positive wellbeing that leads to flourishing and resilience to adversity³⁶. Other terms such as emotional wellbeing are also increasingly used in an attempt to avoid pathologizing the range of human emotions and experiences. In this briefing, mental health is used as shorthand for 'mental health and emotional wellbeing'. The term 'psychological responses' is used to indicate the range of thoughts and feelings, including different emotions, concerns or distress, people may have to climate change.

Individuals who experience changes in thoughts, emotions, perceptions or behaviours that cause significant distress and/or interfere with their daily lives may be diagnosed with a mental illness or mental disorder (often used interchangeably). The most common are anxiety or depression, but other conditions include post-traumatic stress disorder (PTSD), substance abuse, eating disorders or psychosis. Developmental disorders such as autism, and degenerative disorders such as dementia also fall under the umbrella of mental disorders³⁷. Individuals with mental illness are at higher risk of physical illness and vice versa (referred to as a comorbidity)³⁸.

There are many different definitions and important debates surrounding terms used for mental health and mental illness. The following mental health outcomes are defined by widely used framings:

- **Worsened population mental health and emotional wellbeing:** An increase in the number of people with poorer mental health or emotional wellbeing such as persistent distress, in either the short or long term.
- **Increased risk of meeting the criteria for a mental illness or mental disorder:** More people with a diagnosable mental illness or mental disorder as per current standards for diagnosis.
- **Poorer outcomes for those who have already been diagnosed with or who meet the criteria for mental illnesses:** An increase in symptoms or more severe symptoms, and/or poorer physical health, and/or an increased risk of death for individuals who meet the criteria for diagnosis of a mental illness.
- **Increase in suicidal thoughts (suicidality), suicide attempts or completed suicides:** An increase in the number of completed or attempted suicides.

The increasing unmet mental health needs and cases of mental illness in people across the world constitutes an urgent global health challenge. Depression is a leading cause of disability worldwide³⁹, and the global economic cost of mental disorders (from direct healthcare costs and indirect costs in productivity) was estimated in 2010 at \$2.5 trillion⁴⁰, while the Lancet Commission on Global Mental Health and Sustainable Development predicts a cost to the global economy of \$16 trillion between 2010 – 2030⁴¹. There is a large unmet need or 'treatment gap' globally^{42,43}, with mental health often lagging behind physical health; an issue the NHS across the United Kingdom (UK) seeks to address through its aim for "parity of esteem"^{44,45} between physical and mental health. This is a system already under strain, where increased burden or further reduced capacity would have large societal and financial impacts. Crucially, 75% of mental illness has been estimated to start before the age 24⁴⁶, a relevant statistic to consider when young people are the generation growing up with full awareness of the climate crisis and with the largest burden to shoulder to adapt and respond to its effects throughout their lives.

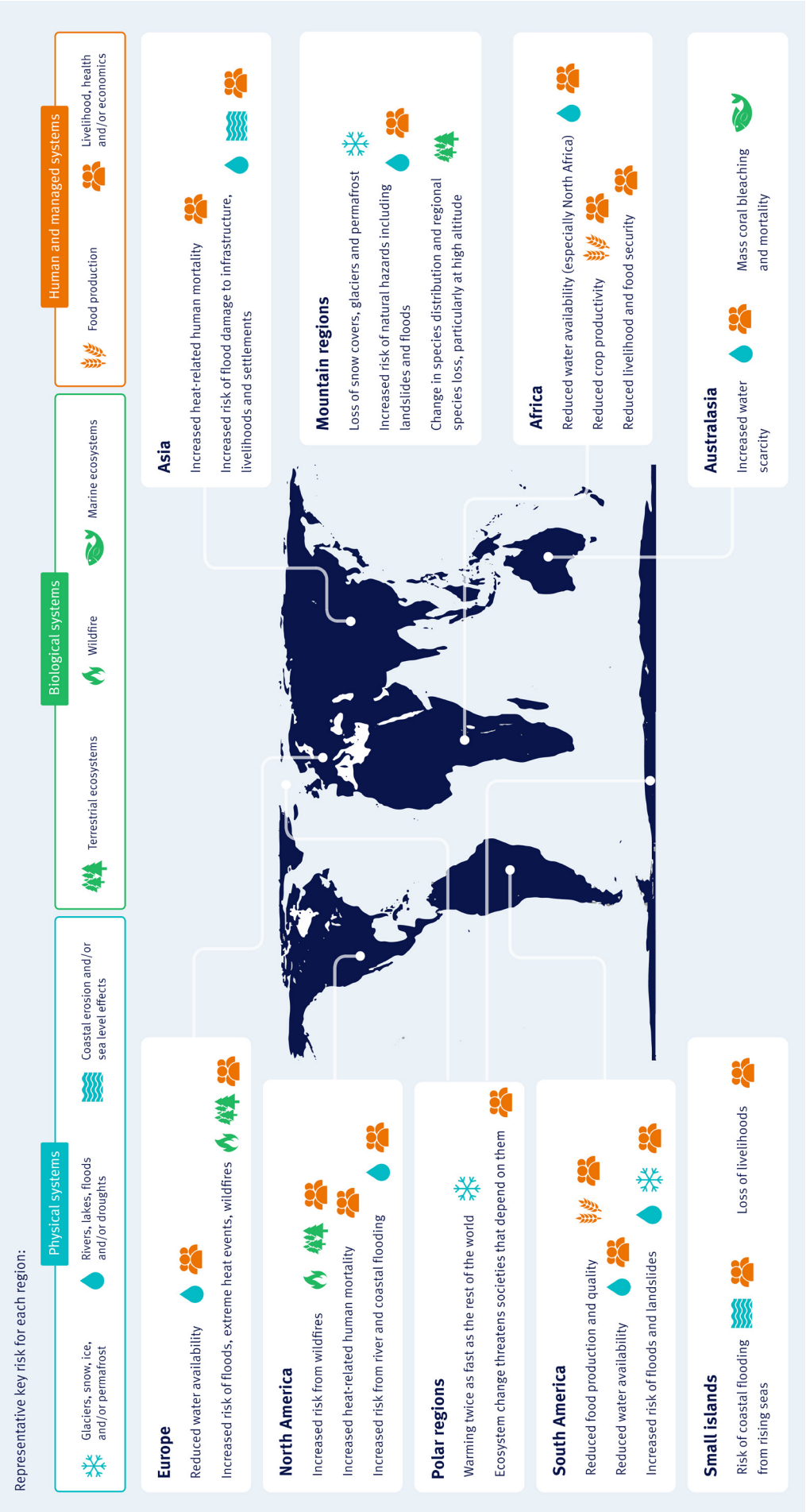


Figure 2: Key near term (2030–2040) risks to physical, biological, human and managed systems resulting from climate change across different regions of the world. Risks include reduced water availability in South America, reduced food security in Africa and changes in species distribution and regional species loss in mountainous areas across the world. Adapted from Figure SPM.8 of the IPCC Fifth Assessment Report Summary for Policymakers (2014)³⁵.

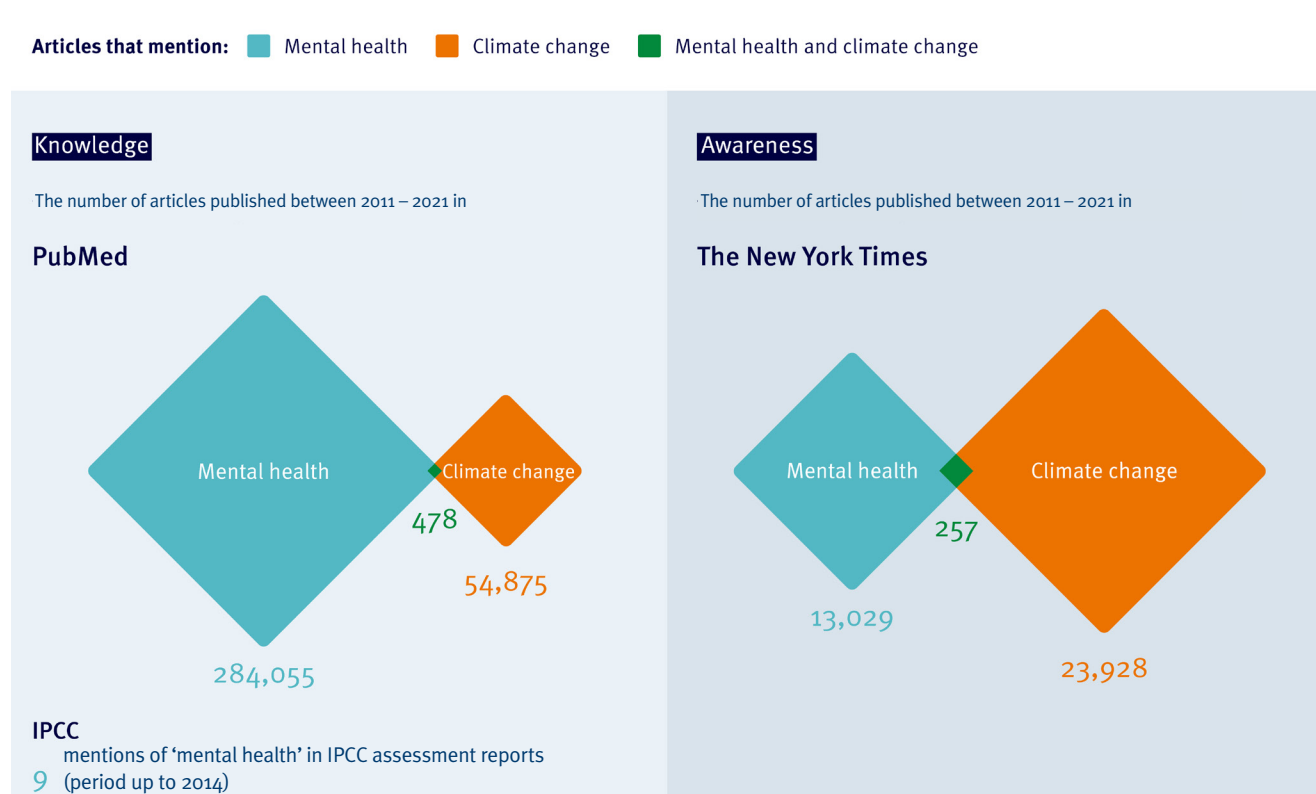


Figure 3: Illustrative comparison of coverage considering the connection between climate change and mental health, compared with coverage of climate change and mental health as separate topics, across settings reflecting levels of knowledge and awarenessⁱ.

ⁱ Specifically, the PubMed database from 2010 to 2020 was searched as a proxy for academic evidence or knowledge generation. It is noted that PubMed has a focus on biomedical literature and hence will not cover climate change fully as a standalone issue but it does provide useful context for how frequently climate change and mental health are considered together. Search terms: “Mental health” + MeSH terms, “Climate change” + MeSH terms, “Mental health” AND “Climate change” + MeSH terms, search date 02/02/21. A search of the New York Times from 2010 to 2020 was used as a proxy for media coverage of the topics related to greater public awareness. Search terms: “Mental health” (articles containing), “Climate change” (articles containing), “Mental health” “Climate Change” (articles containing), search date 02/02/21.

In considering the social and economic cost of mental health and mental illness, it is worth noting the recent Dasgupta Report on the Economics of Biodiversity (2021) which suggests that “we must change how we think, act and measure success”⁴⁷. A vision and action plan for a mentally healthy world must “recognise that wellbeing depends on enabling every person to lead a life of dignity and opportunity, while safeguarding the integrity of Earth’s life-supporting systems”⁴⁸. Good mental health (i.e. flourishing) and protection against mental illness is known to depend on and be supported by equitable and connected communities and a healthy environment^{26,49–61}.

Climate change and mental health – an overlooked issue

While progress has been made on recognising the physical health impacts of climate change (as illustrated in Figure 1), the effects on mental health have been called an “invisible

injustice”⁵⁷. As emphasised by our own analysis (see Figure 3), the lack of research and awareness is startling. As proxy indicators of relative knowledge and awareness, the academic journal database *PubMed* and the *New York Times* were searched for mentions of climate change and mental health, first separately and then together. While these are raw measures, the dearth of results on the interactions between these issues accurately reflects the reality of this field and may help to explain why there has been insufficient action on this issue. For example, mental health has never been a subject of discussion in any official side events at the Conference of Parties (COP) of the United Nations Framework Convention on Climate Change (UNFCCC) to date. This is particularly concerning considering that **cases of psychological traumas from any form of disaster exceed those of physical injury by 40–1¹⁴**.



Figure 4: The physical and mental health threats resulting from current and anticipated climate change impacts. Adapted from World Innovation Summit for Health report: “Health in the climate crisis: A guide for health leaders” (2020) to further illustrate examples of the mental health outcomes (psychological traumas) expected from the threats arising from climate change. The threats to health such as food and water insecurity, storms and floods and social and economic instability can directly and indirectly impact mental health. Direct impacts include trauma, grief and loss, increased suicide rates and cases of anxiety, depression and post-traumatic stress disorder (PTSD). Impacts experienced even when not directly exposed to a climate-related disaster include emotional and mental distress, grief, loss and anxiety that have been termed ‘eco-anxiety’, ‘climate grief’ and ‘solastalgia’ (see definitions in Table 1). Note that poorer physical health is also a cause of poorer mental health.

What is known?

Key messages

- There is limited and incomplete evidence on the links between climate change and mental health and emotional wellbeing
- However, the evidence that does exist clearly suggests that all the major threats to physical health linked to climate change also have negative effects on mental health. Experiencing the effects of climate change first-hand is psychologically traumatic, and this shows up as a direct and severe impact on mental health outcome figures, including for rates of suicide, PTSD, depression, and extreme distress.
- In particular, the literature shows that:
 - There is a clear relationship between higher temperatures and number of suicides
 - There is clear evidence for severe distress (increased mental illness onset) following extreme weather events (e.g. PTSD following flood events)
 - People who meet criteria for mental illness are more vulnerable to the effects of climate change on physical as well as mental health
 - The climate crisis threatens to disrupt the provision of care for people with a mental illness diagnosis
 - Climate change exacerbates mental distress, particularly among the young, even for individuals who have not been affected directly yet (e.g. eco-anxiety)
 - The effects of climate change on mental health are a driver of health and social inequality
 - There is a hidden and unquantified economic cost associated with the impacts of climate change on mental health
 - There are win-win opportunities (co-benefits) for improving mental health associated with taking action on climate change.

How does climate change affect mental health?

All the major threats to physical health from climate change also have detrimental effects on mental health. This is not surprising as mental health and physical health are tightly linked, with high rates of comorbidities (multiple conditions that occur at the same time in the same person)^{38,62–65} and at the population level, good physical health and good mental health are strongly correlated⁶⁶. The following section describes how climate change threatens the mental health of citizens around the world, either directly or indirectly. Figure 4 shows a further iteration of the framework on the health impacts of climate change from the WISH report (Figure 1), which expands the illustration of the relationships between climate change impacts and mental health.

High temperatures worsen a range of health outcomes. They have been shown to increase rates of suicide^{67–69}, mental distress^{70–75}, and hospitalisations for mental health conditions^{76–80}, and to have negative consequences for physical and mental health including increased mortality of people who meet the criteria for mental illness^{81–87}. Heatwaves and extreme high temperatures have been associated with a range of negative societal outcomes and increased risks, which may in turn influence mental health. These include reduced economic outputs⁸⁸, increased conflict and societal violence⁸⁹, and disturbed sleep^{90,91}. Temperature change can also lead to changes in the body, for example affecting blood flow and the central nervous system⁹¹, which can in turn lead to cognitive and emotional changes that can negatively impact mental health and emotional wellbeing.

Experiencing the direct impacts of **extreme weather events**, including intense storms and floods, is associated with extreme psychological stress for some individuals, with longer term

distress in some cases. These experiences are most commonly described as post-traumatic stress disorder (PTSD), depression and anxiety^{92–103}. There is also evidence that these events can cause increased substance abuse and a higher risk of suicide^{104–107}. For some individuals, the effects on mental health have been shown to persist or increase even years after the events^{17,108–111}. Reoccurring disasters, such as if one's house or business is repeatedly flooded, have been shown to have a particularly damaging psychological impact¹¹². Figure 5 illustrates examples of the mental health impacts caused by extreme weather events, which will become increasingly frequent or severe without meaningful and urgent action to reduce emissions of greenhouse gases.

The **social and economic disruption** caused by climate change, including for example **migration**, has a negative impact on mental health. Forced displacement or evacuation after climate-related disasters has been linked to depression^{122,123}, anxiety¹²², and PTSD¹²³. Longer-term forced migration resulting from climate-related threats can also lead to higher rates of diagnosed mental disorders and worsening mental wellbeing^{113,124}.

Food and water insecurity also have implications for mental health. Drought and crop failures lead to economic losses, hunger, and thirst, which clearly can lead to distress and desperation, i.e. poor mental health and wellbeing^{95,125}, with increased suicide rates for farmers affected by drought^{95,126}. A lack of clean water can also affect mental health and emotional wellbeing, with a disproportionate effect on women, including due to the need for water to manage menstrual hygiene^{127,128}.

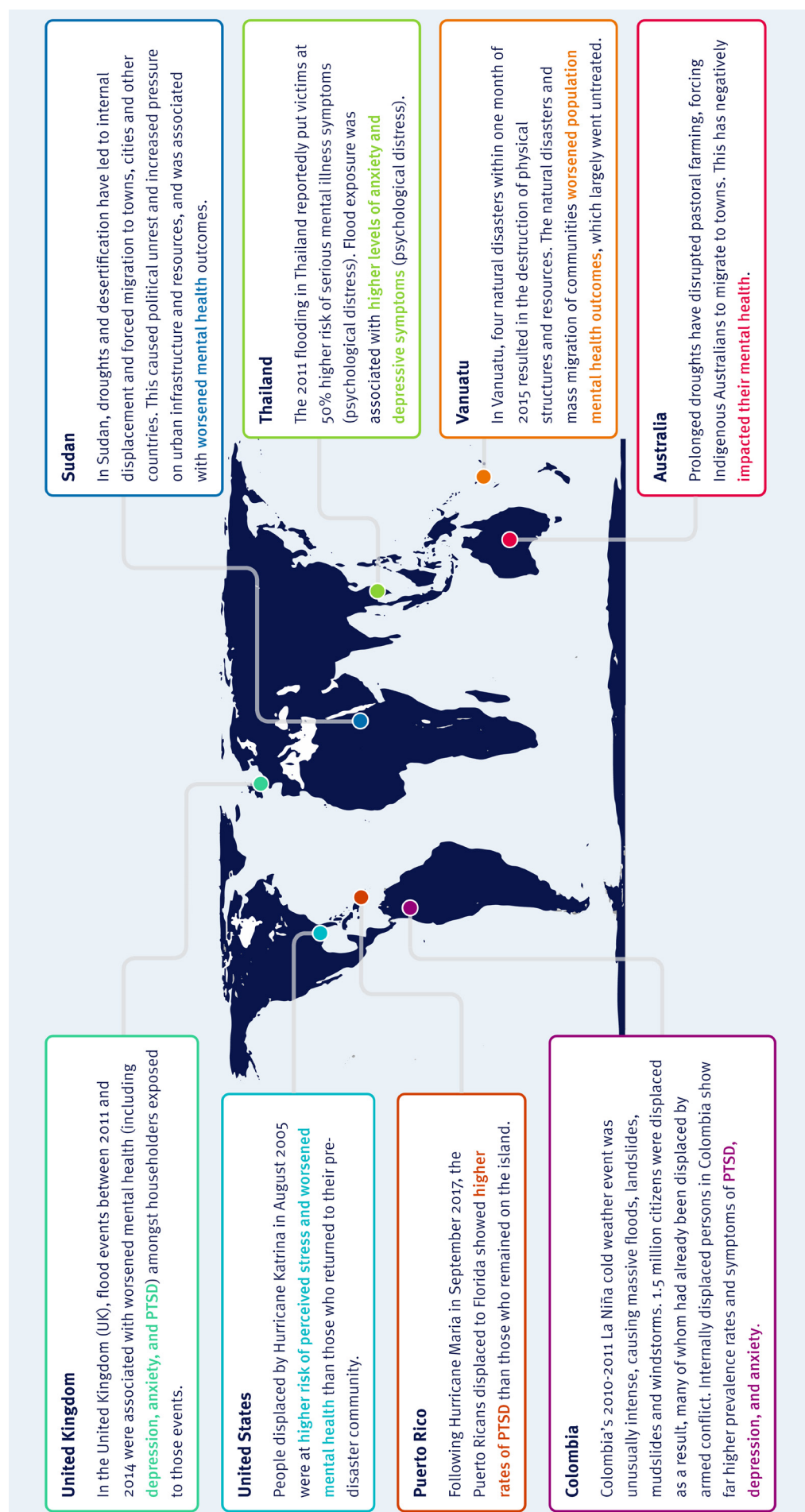


Figure 5: Examples of the impact of extreme weather events on mental health across the world (United Kingdom^{111,110,112}, United States^{17,105,113}, Puerto Rico¹¹⁴⁻¹¹⁷, Colombia¹¹⁸, Sudan¹¹⁸, Thailand¹¹⁹, Vanuatu¹¹⁸, and Australia^{120,121}). Extreme weather events including floods, hurricanes and droughts have produced increases in depression, anxiety, PTSD, psychological distress and worsened population mental health and wellbeing. Climate change will increase the frequency and/or severity of such events.

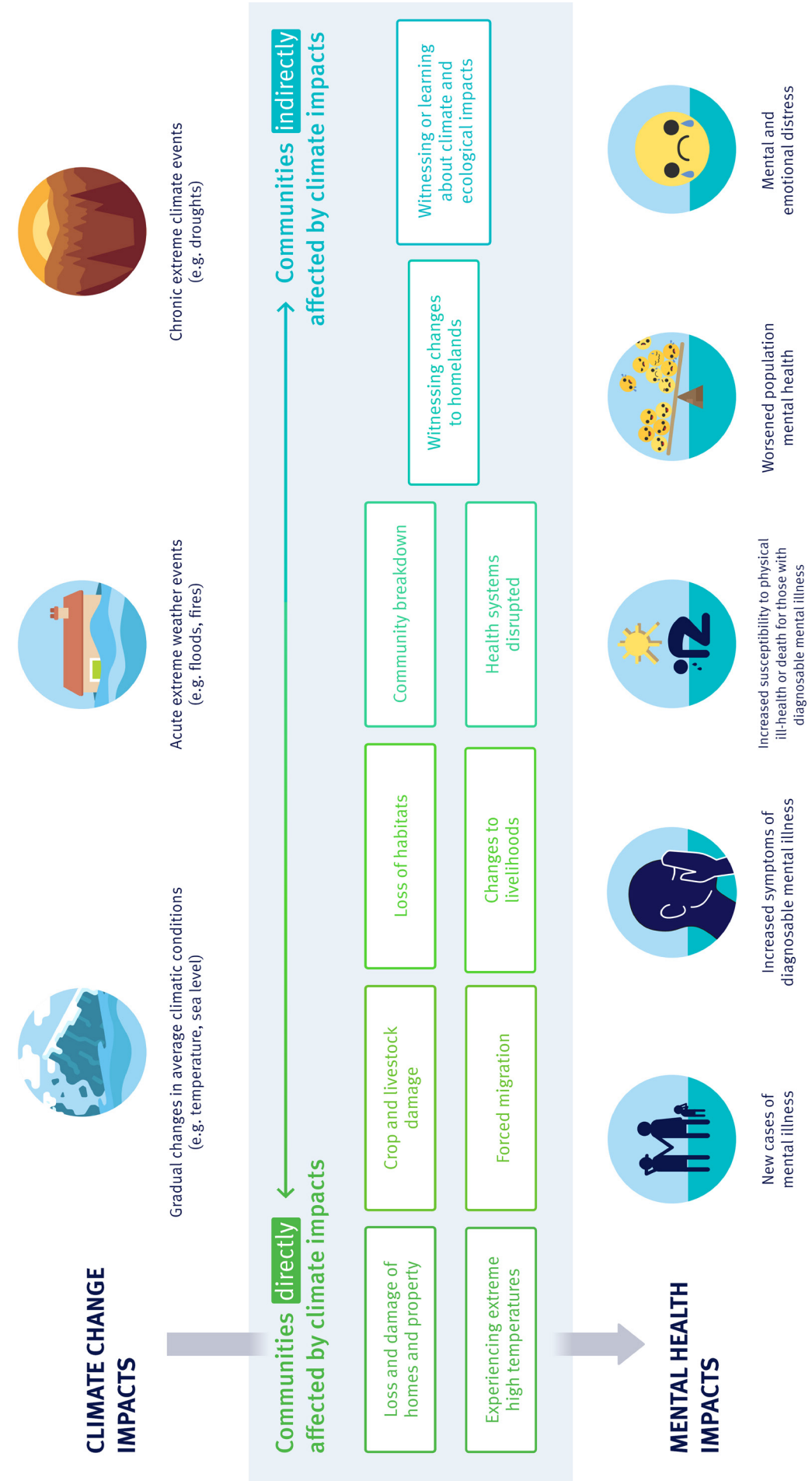


Figure 6: Examples of the continuum of impacts that climate change has on mental health outcomes. Climate change impacts (top row of circles) including rising temperatures and sea level, and extreme weather events such as floods or droughts, lead to mental health impacts (bottom row of circles) including new cases of mental illness, mental and emotional distress, and increased susceptibility to physical illness or death for those who meet the criteria for mental illness. This occurs directly and indirectly via a variety of pathways represented here as a continuum, from direct experiences (left hand side of shaded box) for example of extreme high temperatures or home loss in a wildfire, to indirect experiences of climate impacts (right hand side of shaded box) for example by reading about such events in the media.

The impact of **communicable diseases** on mental health has never been more clearly apparent. The COVID-19 pandemic highlights the increased mental health needs that epidemics and pandemics produce, due to a combination of health, economic and social pressures^{2,129}. Climate change will increase the risk of infectious diseases spreading over a greater geographical area, which is expected to ultimately exacerbate distress, i.e. mental health impacts¹³⁰.

Air and noise pollution are often attributable to actions that also cause climate change, such as transport and industry. There is emerging evidence that links higher levels of air and noise pollution with poorer mental health, including increased levels of depression, anxiety, psychosis, bipolar disorder, schizophrenia, suicide, and worsened mental wellbeing^{131,132}.

Direct and indirect impacts of climate change on mental health

Climate change can impact mental health in multiple ways which can be grouped as direct or indirect effects. **Direct** effects arise from first-hand experiences of climate change, whereas **indirect** effects stem from awareness or bearing witness to changes caused by the climate crisis. It is important to note that healthy psychological processing of crisis, trauma, uncertainty, change and loss can be part of the response to both direct and indirect experiences, and with appropriate support may not create or exacerbate mental illness or poor mental health. Direct and indirect impacts are not isolated from one another, instead they span a continuum as illustrated in Figure 6, which aims to aid in thinking holistically about the ways that climate change impacts mental health. To illustrate further, Figure 7 takes the example of an extreme weather event such as a flood, and shows the multiple routes by which this one event can directly and indirectly impact upon mental health and emotional wellbeing in both the immediate and longer term.

Evidence for impacts on specific mental health outcomes

Suicide

Increased suicide rates with increasing temperatures have been reported globally, from low- to high- income settings. Analyses suggest that there is approximately a **1% increase in the number of suicides for each 1°C temperature increase**, once the temperature passes a threshold that is unique to each location^{133,134}. The exact relationship depends on contextual factors such as humidity or demographic variables^{70,135}. Research has estimated that if climate change continues at its current rate, rising temperatures will lead to **22,000 extra suicides (95% confidence interval 9,000 – 40,000)** across the United States and Mexico alone by 2050⁶⁷.

There is also evidence that air pollution¹³¹ and extreme weather events such as a wildfire or hurricane^{17,104,106} can both contribute towards higher rates of suicide.

Increased new cases of mental health problems

Climate change increases the risk that people will experience prolonged distress that meets criteria for mental illness, including PTSD, depression, anxiety and substance abuse. Climate change increases the likelihood of extreme weather and climate events which can damage local environments and the communities that depend on them (as outlined in Figure 2). Such events are associated with stressors and traumas (e.g. displacement, food insecurity, grief and loss) that may increase mental health burden and reduce wellbeing.

Experiences of psychological trauma, including new cases of individuals reaching the criteria for mental illness, have been understandably observed following extreme weather events including floods, hurricanes and bushfires^{94,104,136} but also in response to slower acting climate events such as droughts^{95,97} and rising sea level¹³⁷. Worsened mental health including new cases or worsened symptoms of PTSD, depression, anxiety and substance abuse have been observed in citizens of all ages as well as healthcare professionals working in disaster relief^{102,103,105,138–140}.

There could be as many as 200 million climate refugees by 2050 as a result of climate change and the associated flooding, rising sea level, droughts and growing shortage of food and arable land¹⁴¹. People will increasingly be temporarily evacuated or locally displaced by climate-related disasters, such as those who had to temporarily flee or permanently lost their homes in the Australian bushfires. All these forms of displacement or migration triggered by the effects of climate change come with mental health burdens^{114,118,122–124}.

Worse outcomes for people with mental illness

People who experience mental illness are more vulnerable to the effects of climate change on physical as well as mental health. **People with pre-existing mental illness, particularly psychosis, dementia and substance abuse, have a two to three times higher risk of death during heatwaves than people without**^{76,81–83,142}.

Higher temperatures have been associated globally with increased risks of hospital admissions – including in the emergency department – for experiences diagnosed as bipolar disorder, schizophrenia, alcohol and substance misuse, dementia, and self-harm^{77,143–146}. This could be explained, in part, by side-effects of medications for mental illness, because they impair the body's ability to regulate temperature, leading to higher risk of severe physical symptoms^{84,87,91} particularly among the elderly^{84,147}. There may be insufficient awareness of this risk among those on such medication or indeed among healthcare and first aid practitioners^{85,86}. High temperatures can lead to poorer sleep, altered blood flow and other physiological processes that underlie cognition, which in turn can worsen the symptoms of mental illness and reduce mental wellbeing^{148,149}.

Population health and wellbeing

The climate crisis affects the mental wellbeing of hundreds of millions of people around the world. Beyond the more severe outcomes described above, there is evidence that increased temperatures are also associated with: increased psychological distress⁷⁰, negative emotions¹⁵⁰, mental distress⁷⁰, fatigue¹⁵⁰, sleep difficulties and feeling unable to cope¹⁵¹, ‘depressive’ language used in social media posts⁷⁴, crisis support-seeking behavior¹⁵², reported mental health difficulties^{72,153}, and reductions in positive emotions⁷¹ and wellbeing^{71,151}. Humidity seems to worsen the negative effects of heat, while moderately warm weather or more hours of sunshine may benefit peoples’ wellbeing in some cases^{74,75}.

Climate change causes significant concern even among those who don’t experience the direct impact of climate change first hand (See Figure 6). In the UK in 2019, it was found to be the most important issue for young people and among the top five for the whole population, ranking more important than terrorism and housing¹⁵⁴. In the US in 2020, 66% of people were at least ‘somewhat worried’ about global warming and 26% were ‘very worried’¹⁵⁵. 72% of 18–34 year old Americans sometimes have distressing emotional reactions to negative news stories about the environment (anxiety, racing thoughts, sleep problems, a feeling of uneasiness)²¹. Climate-related anxieties and strong emotional responses have also been identified in the UK, Australia, and United States in large proportions (44–82%) of university students^{156,157} and children^{20,158,159}, though data is still lacking and the trends painted from limited existing research suggests this is an issue that is underestimated in society.

Younger adults show especially high levels of anxiety about climate change and environmental degradation, which some research has found to be associated with more generalised anxiety and depression¹⁶⁰. Experiences of anxiety, grief and distress related to awareness of the climate and ecological crises have been increasingly reported by mental health practitioners, parents, teachers and the mainstream media^{161,162}. This has given rise to a new lexicon to describe ‘eco-emotions’¹⁶³ (see definitions, Table 1). These may most helpfully be regarded not as new forms of ‘mental disorder’ but as shorthand terms for understandable responses to concerns about climate change. Despite a recent increase in interest^{164–167}, there remains a relative dearth of robust supporting data on the prevalence, nature and severity of the mental health impact of awareness about the climate crisis. Importantly, strong emotional responses and even distress can be considered a “rational response to the facts” and is not a pathology^{168,169}. Support to enable people to process the strong emotions and loss evoked by climate change may help to protect their mental health and wellbeing.

Notably, evidence suggests that individual and collective action on climate change may support good mental health and reduce climate-related psychological distress and anxiety^{25–27,170,171}. Strategies that help people to engage their values and goals in ‘meaning-focussed’ activities and appraisals, can induce positive emotions that aid them to constructively cope with distress and anxiety. Such ‘meaning-focussed coping’ strategies may help children and young people to constructively cope with and act on climate change^{2,17}.

How people behave as individuals or collectively in response to the threat of climate change depends on the way they think and feel about it – their psychological response^{173–175}. Climate denial and fatalism are psychological responses that may help individuals cope emotionally with the threat but reduce taking action to mitigate it^{176–178}. Decision-makers should consider these factors carefully in order to provide the necessary conditions for individuals and communities to take and support climate action while enhancing community resilience to climate threats.

Evidence for impacts to mental health systems and health inequality

Inequality

Both climate change and mental health are linked with social inequality. For climate change, “available evidence indicates... a vicious cycle, whereby initial inequality causes the disadvantaged groups to suffer disproportionately from the adverse effects of climate change, resulting in greater subsequent inequality”¹⁵. Poor mental health is both a cause and a consequence of social inequalities¹⁹⁰, whereby people with poor mental health are more likely to have insecure employment^{191,192}, insecure housing and experience stigma, discrimination and social isolation¹⁹³, while people experiencing social inequalities stemming from financial difficulties, racism, homophobia and/or other injustices are at higher risk of mental illness^{51–53}.

Taken together, climate change and mental health, if not adequately addressed, will exacerbate social inequality across the world. Climate change and mental health disproportionately impact vulnerable people, fragile health systems and poor countries. These people, systems and countries most at risk are typically also those least historically responsible for the causes of climate change. Box 1 provides examples of some of the groups of people who are more likely to experience the worst mental health effects of extreme weather events. It provides a clear picture – the mental health of the most vulnerable in society is particularly at risk.

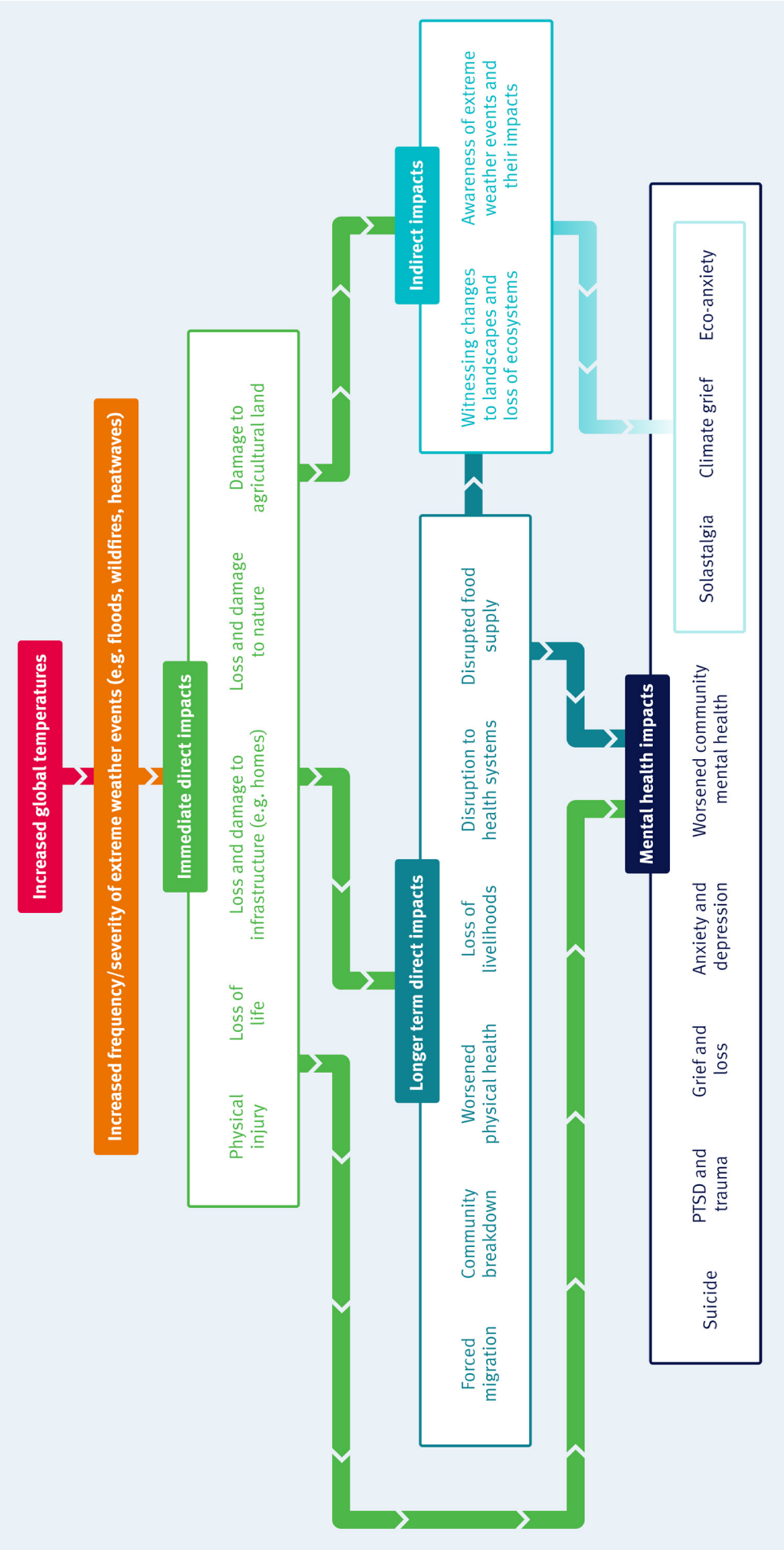


Figure 7: Illustrative pathways by which extreme weather events impact mental health, with arrows indicating direction from cause to effect. Climate change occurs by greenhouse gas emissions increasing global temperatures. This effect ultimately impacts a range of mental health outcomes via many different pathways, and so the mental health impacts of climate change must ultimately be assessed by thinking about entire systems. Example pathways shown here arise from an extreme weather event (e.g. a flood or wildfire), which has immediate direct impacts (e.g. physical injury and loss and damage to homes), longer term direct impacts (e.g. forced migration and disrupted food supply) and indirect impacts (e.g. witnessing changes to landscapes and ecosystems). Each of these impacts or consequences flowing from the climate change-related extreme weather event can impact mental health outcomes. Although mental health outcomes are typically measured in terms of diagnostic categories, in relation to climate change they can all be seen as a form of psychological trauma.

Table 1: ‘Eco-emotions’

Emotions	Definition	Evidence
Eco-anxiety/ Eco-distress	Defined by the American Psychological Association in 2017 as: “the chronic fear of environmental doom” ⁸¹ . May include a range of anxiety, worry, stress, hopelessness, sleep disturbance, irritability, despair, bodily symptoms of anxiety (e.g. awareness of heartbeat, butterflies in stomach, sweaty palms, perceived shortness of breath) and other similar responses.	Eco-anxiety has been observed in children ^{158,179} , adolescents ¹⁷² , students ¹⁵⁶ , and adults ¹⁶⁰ , and may affect young people especially ^{21,160} .
Climate grief/ Ecological grief/ Eco-grief	“The grief felt in relation to experienced or anticipated ecological losses, including the loss of species, ecosystems and meaningful landscapes due to acute or chronic environmental change” ¹⁸⁰ .	Ecological grief has been found to affect those with strong ties to a particular place and those witnessing environmental destruction, including for example indigenous and farming communities ^{180,181} and climate scientists ¹⁸² .
Solastalgia	The distress experienced when someone’s home environment is changing in ways perceived to be profoundly negative, either by events related to climate change but also scenarios such as establishment of a mine or a volcanic eruption. Changes that attack someone’s sense of home, even without dislocation, can create a deep homesickness ¹⁸³ .	Solastalgia has been reported in youth in Indonesia ¹⁸⁴ , Inuit communities in northern Canada ^{180,181} , farmers in the Australian wheatbelt ^{126,185} , residents and tourists of communities around the Great Barrier Reef ¹⁸⁶ , elders in the Torres Strait ¹⁸⁷ between Australia and New Guinea, and Ghanians ^{188,189} .

Economic impact

Mental illness generates a global economic burden of at least \$2.5 trillion in direct and indirect costs, including lost productivity and economic growth⁴⁰. Therefore, **the deterioration in mental health caused by climate change will carry a significant cost, which is currently not being considered**. For example, the 2020 Australian bushfires necessitated a A\$76 million investment in immediate and long-term psychological support for those affected¹³⁶. To our knowledge, there is no research into how big the cost of climate change’s mental health impacts could be. Quantifying it is crucial to ensure that both climate and mental health policy decisions don’t ignore the full costs of climate change, and that the full benefits of climate action are appreciated by decision-makers. Investments to address climate change that also improve mental health will have an additional economic benefit – the WHO estimates that for every dollar invested in mental health, there is a return of four dollars in better health and ability to work²⁰⁶.

Disruption to the provision of mental health services

The climate crisis, through changing temperatures and more frequent and severe weather events, **will not only increase mental health needs but also disrupt systems of mental healthcare**, exacerbating the gap between mental health needs and provision of quality care. Climate change threatens progress towards provision of high-quality healthcare for all by increasing

the number of people in need of support (e.g. by increasing the burden of disease and pushing more people into poverty), by negatively impacting the ability of healthcare systems to provide support (e.g. as extreme weather events damage facilities and disrupt supply chains) and by threatening the proportion of healthcare services freely available (e.g. by negatively impacting economic growth and reducing health budgets)³¹. Already fragile health systems, such as those in countries yet to fully attain universal health coverage, are most vulnerable.

Mental health services are already particularly overstretched and unable to provide the care that people need. It is estimated that up to 50% of people with mental health disorders in high-resource settings and up to 90% of those in low-resource settings receive no treatment at all^{43,207}. Rates of ‘effective coverage’ – good-quality, accessible services that actually work – are even lower. Hence, decision-makers must be proactive in building resilience in mental health systems, including those in low-resource settings who are already most at risk from climate change impacts, to continue to provide care during extreme weather events or other climate-related disasters, and respond to predicted increases in mental health burden. Developing and implementing robust climate adaptation plans that draw on available evidence can mitigate the risk of both short and long-term mental health impacts – such as incorporating community mental health support in the first response to extreme weather events^{208–210}.

Co-benefits of climate action for mental health outcomes

Taking action against climate change could benefit mental health not only by mitigating the mental health effects outlined above, but also through the variety of co-benefits or ‘win-wins’ that are associated with actions that reduce greenhouse gas emissions and/or adapt to a warming climate (see Figure 8).

Co-benefits are “the positive effects that a policy or measure aimed at one objective might have on other objectives”³. Policies to reduce greenhouse gas emissions may bring a number of direct and indirect co-benefits for reducing mental illness and improving population mental health and wellbeing. Identifying and integrating these policies into carbon reduction plans can help decision-makers to make limited budgets go further by achieving multiple policy goals simultaneously. For example, creating ‘green’ and ‘blue’ spaces (i.e. incorporating plants and water) in urban areas can help to limit the global increase in greenhouse gases^{211,212}, while access to such spaces can reduce psychological distress and depression symptoms, and increase happiness and wellbeing^{54,213–218}. Adding ponds and waterways and planting trees, for example, can help to mitigate increasing heat in cities (urban heat islands), which is important for limiting the negative effects of rising temperatures on mental health^{219,220}. Such evidence should be borne in mind when considering the impact of current

inequalities in access to green spaces, highlighted during the COVID-19 pandemic⁵⁵. Public opinion polls have shown the UK public want more green spaces and biodiversity in their local area, recognising its benefits for health and wellbeing^{221,222}. Nature-based solutions to climate mitigation and adaptation, such as tree-planting, can be win-win-wins for boosting economies, protecting urban communities against the impacts of climate change, and creating communities with more resilient mental health^{217,223}.

On an individual level, taking action to tackle climate change may reduce eco-anxiety and benefit mental wellbeing^{26,27,224}. As well as reducing greenhouse gas emissions or building resilience to climate change impacts, individual and collective actions can also provide a greater sense of agency and control, increase feelings of meaning and empowerment, and provide social support through connection with like-minded communities^{25,170,225}.

While Indigenous communities are some of the most vulnerable to the impacts of climate change, they also offer knowledge and expertise invaluable to mitigate and adapt to its effects²²³, for example ‘caring for country’ projects in First Nation Australian communities, which have dual benefits for climate change mitigation and social and emotional well-being²¹³.

Box 1: People who are particularly vulnerable to the mental health effects of extreme weather events (not exhaustive)

- People with prior experiences of deprivation^{107,194} or mental health issues^{106,195}
- Women (particularly pregnant or postnatal)¹⁹⁶
- Children¹⁹⁶
- Minoritised ethnic groups (for example First Nations Australians and Black Americans)^{97,197}
- People with less social support^{92,99,198,199}
- People experiencing:
 - inadequate medical care^{200–202}
 - inadequate welfare support (e.g. unsafe or unclean accommodation, inadequate food, water, and electricity)^{203,204}
 - financial loss or instability.^{13,199,205}

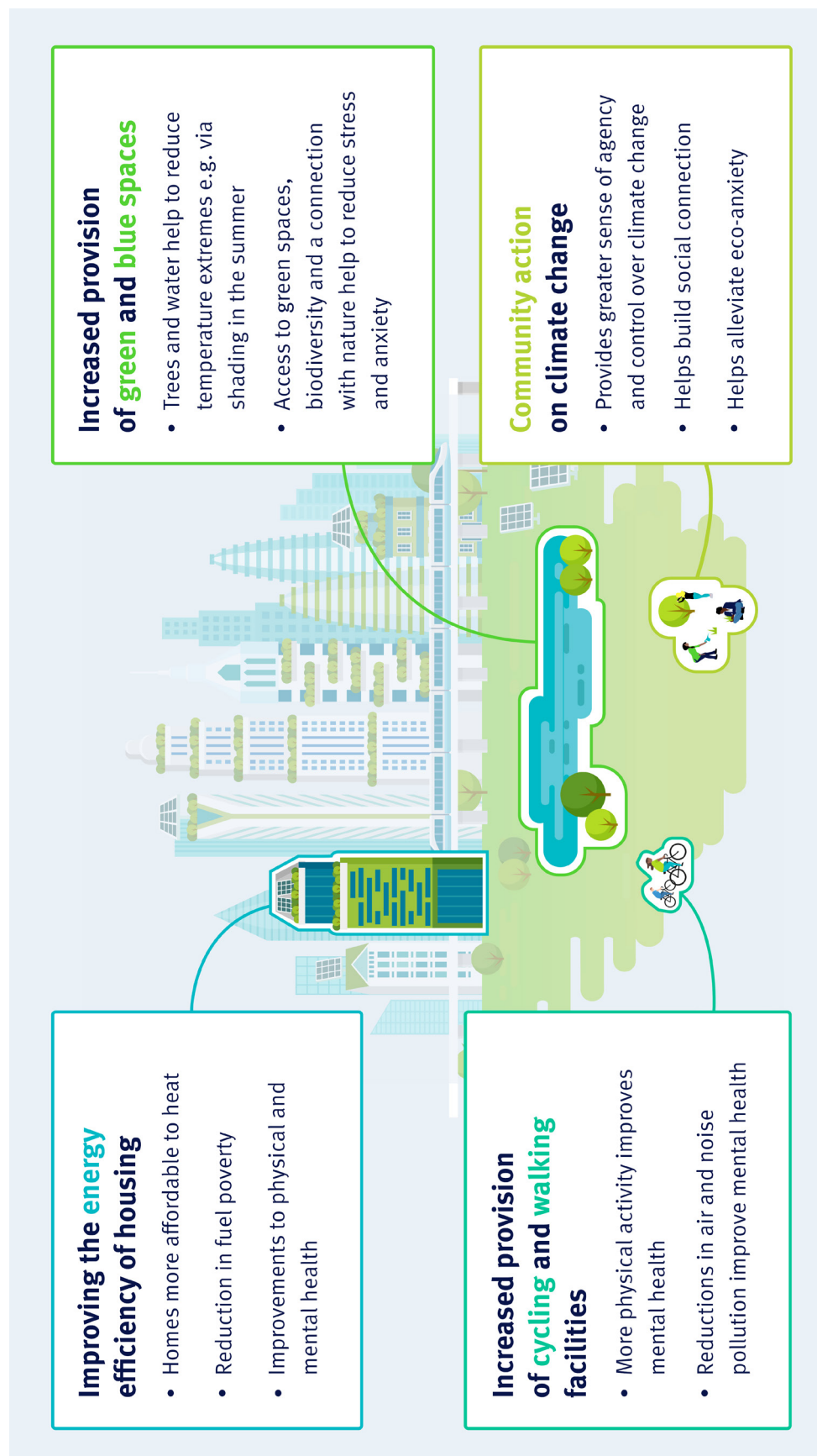


Figure 8: Examples of the co-benefits of climate action for mental health. These include benefits of improving the energy efficiency of houses on reducing carbon emissions, making homes more affordable to heat, reducing fuel poverty and improving physical and mental health.

What can be done about it?

Key messages

- Action on climate change will have the additional benefit of providing positive impacts for mental health. This effect should be properly considered in policy decisions.
- There are a number of actions that communities, policy-makers, researchers, third sector organisations and health care systems can take to mitigate and manage specifically the mental health impacts of climate change.
- Collective knowledge on climate change and mental health must improve. Knowledge can be used to help raise awareness, which in turn can help raise the likelihood of appropriate widespread action.
- Establishment of a new international cross-sector network to bring together relevant researchers, practitioners and decision-makers could catalyse knowledge-sharing, target research efficiently, and identify and scale up successful interventions.
- This section provides specific recommendations for relevant stakeholder groups, including:
 - Health systems leaders and healthcare practitioners
 - Policymakers
 - Researchers, research funders and innovators
 - Third sector and community organisations.

The societal and economic impact of climate change on mental health and emotional wellbeing has been largely overlooked in policy and planning. Considering this health and economic impact in the decision-making process will further strengthen the case for climate action while improving mental health and emotional wellbeing for millions of people.

Given that a certain amount of climate change has already happened and further effects are unavoidable even with rapid mitigation of greenhouse gas emissions, specific action to address the mental health impacts of climate change will still be required. Decision-makers need to support climate adaptation for communities, so that when they experience climate change-related disasters such as flooding, the extent of loss and trauma, and hence the impact on mental health, is minimised.

Proactive measures to build resilience of individuals, communities and support systems to climate change-related events, and offering early and appropriate support, can also minimise the impacts of such events on mental health. Appropriate responses to emergencies such as extreme weather events can reduce the risk of negative mental health outcomes – in both the short and long term. Evaluations of previous responses to extreme weather and climate events or environmental disasters have emphasised the importance of creating multi-sector collaborations and plans that link governments, private sector, and local organisations before events happen, so that emergency responses are organised, efficient and comprehensive^{226–228}, and capitalise on the leadership of community figures such as teachers and religious leaders^{209,210}. Comprehensive support to mitigate the stressful secondary impacts of a disaster (secondary stressors, e.g. insurance or financial difficulties) will reduce the mental health effects of disasters and forced migration¹¹¹, and lead to significant social and economic benefits. Such support can include timely provision of quality accommodation, financial support, and high quality and accessible medical care¹¹¹.

Robust, proactive systems must also be in place to support people when their mental health and emotional wellbeing is affected.

Action by government and community leaders to support individual and community resilience to a changing climate, before disasters occur, may create circumstances more likely to result in post-traumatic growth^{209,226,229} (“positive psychological change that is experienced as a result of the struggle with highly challenging life circumstances”²³⁰). Psychologists have noted that “we do need disaster management, but there’s no way we’re going to respond to every big weather event and treat everyone who is impacted — we can’t even do that now. We know how to help people learn resilience and increase their capacity to cope with uncertainty and trauma. Given what’s coming at us, a major focus has to be on prevention tools”¹⁹⁶.

Co-designed, evidence-based solutions must be developed and/or scaled-up to build individual and societal resilience to our changing climate, using emerging data on psychological responses and mental health needs of different groups. The support provided should incorporate current psychological knowledge and evaluated best practices^{228,231,232}, including the potential benefits of community support, connection with nature or involvement in environmental projects (e.g. volunteering and social prescribing)²³³, and will require tailoring to different cultural and demographic contexts, e.g. Indigenous communities²³⁴. Future research should, for example, aim to reveal relevant differences in mental health impacts for young people from different socioeconomic backgrounds with differing experiences of climate change – whether witnessing first-hand climate related disruptions such as the Australian bushfires and sea level rise in Pacific islands, or watching these events unfold on UK news. The language used to express distress over the direct or indirect impacts of climate change will also likely differ significantly across contexts and settings²³⁵.

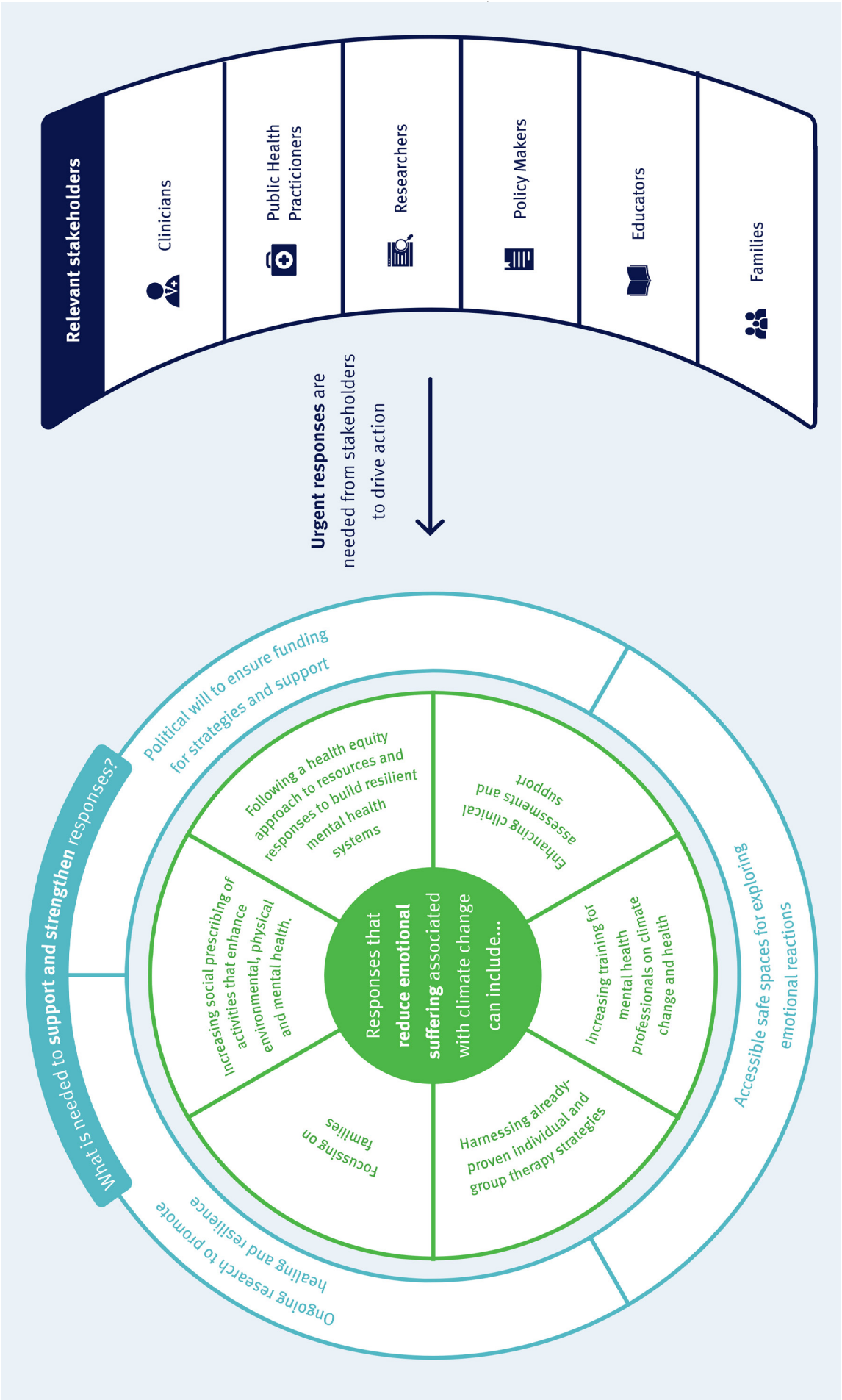


Figure 9: Examples of responses by stakeholders to reduce the impacts of indirect impacts of the climate crisis, particularly emotional and mental distress associated with climate crisis awareness (sometimes known as eco-anxiety or climate grief). These include social prescribing and increasing training for mental health professionals. Such responses would be strengthened by political support to ensure funding for the implementation of relevant strategies and ongoing research. Adapted from Cunsolo et al. (2020)⁶⁹.

Development of interventions and support will be significantly bolstered by drawing on expertise across sectors and fields, including knowledge of how to best support grief and loss, adaptation to uncertainty and change, secondary trauma, and resilience²³⁶. While the climate crisis has unique features, there will be learnings from other crises (e.g. the COVID-19 pandemic) that may contribute to planning appropriate mental health provision for the climate crisis. Strategic investment in the development of appropriate individual and community support, tailored to the range of psychological needs, could potentially reduce mental health burden arising from multiple crises including climate change and future pandemics. Identification, evaluation and scale-up of current interventions, many of which have developed informally, could provide a rich starting point. Such investment will reduce longer term mental health burden, and should be mirrored by changes in the mental healthcare system to mitigate against and respond to the mental health impacts outlined in this paper. As noted by Bourque and Cunsolo, “mental healthcare professionals would (also) benefit from further training and guidance in assessing and providing assistance to people suffering from climate-related psychological distress and mental health problems”²³⁷.

The response to the current and anticipated mental health needs outlined in this paper must happen against a background of currently inadequate provision of mental health prevention and care services almost everywhere in the world²³⁸. This is particularly the case in poorer communities that also tend to be more vulnerable to the effects of climate change^{41,239,240}. “Social factors, such as poverty, urbanisation, internal migration, and lifestyle changes, are moderators of the high burden of mental illness in many low and middle income countries”²⁴¹; climate change is likely to exacerbate these factors. Work to address these underlying inequalities and accelerate provision of appropriate and accessible community care for mental health and psychological distress²⁰⁶ is even more urgent in the context of a changing climate. There is no silver bullet, and innovation is therefore necessary to solve this challenge²³⁸ (e.g. via the provision of digital mental health training for community workers²⁴²), and learning must be inclusive, to draw upon expertise and successful approaches in all countries and settings²⁴³. Mental health and care leaders need to fully leverage proven or innovative approaches and technologies that could scale up to meet the huge needs for support, that will only be exacerbated by climate change.

Collective knowledge needs to improve, starting with defining the key questions that need to be answered, reached through expert consensus. A particular research priority will be to develop indicators of the impact of climate change on mental health that can be tracked over time to measure progress. It is important that such research is communicated with policymakers, innovators and the public in an accessible way, to inform decisions and motivate action. Such engagement across sectors should be two-way, such that research priorities and directions are informed by expertise from all relevant stakeholder groups.

The final section of this paper provides recommendations for the major stakeholder groups. It is important that these priorities are pursued collaboratively. Our recommendation is to establish an international network including key stakeholders (e.g. government, healthcare systems, community leaders, vulnerable groups, academics, emergency responders) to catalyse knowledge-sharing, target research efficiently, and identify and scale up successful interventions. Figure 9 provides an example of stakeholder responses that can reduce the impacts of climate change upon mental health and emotional wellbeing, in this case in the context of the indirect impacts of climate change, as previously described in Cunsolo et al.¹⁶⁹.

Conclusions

Climate change poses an under-appreciated threat to mental health and emotional wellbeing. The evidence presented here highlights the multiple pathways by which climate change can affect mental health, and the interrelationships between these two pressing global challenges. Extreme weather and climate events lead to severe psychological trauma, which can show up as increased suicide rates, new cases and worsened symptoms of mental illness, and worsened mental health and emotional wellbeing in the population. Further, climate change exacerbates inequalities such that individuals with diagnosable mental illnesses are more vulnerable, including to the threat of high temperatures on physical health and mortality. Awareness of current and future climate change threats, and/or witnessing related damage to local environments, ecosystems and societies can be distressing for many people. The impact of such emotional and mental distress is under-researched, but terminology such as eco-anxiety, climate grief and solastalgia has been used in attempts to capture these experiences.

The impacts of climate change on mental health have been largely ignored when accounting for the costs and benefits of climate action and planning climate mitigation and adaptation responses. The good news is that climate action is likely to yield even greater benefits than previously considered, when accounting for the opportunities to prevent poor mental health outcomes and to improve mental health through win-win scenarios such as reduced air pollution and the wellbeing benefits to the individuals involved in community responses to climate change. Further targeted research is needed to understand the interrelationships between climate change and mental health, but action must start now, with cross-sectoral collaborations to support individual and community resilience, proactively mitigate against and support negative mental health impacts, and provide opportunities to process psychological responses to our changing world in moving societies from climate awareness to climate action.

Recommendations

The following recommendations have been compiled for each group of relevant stakeholders: health system leaders and healthcare practitioners; policymakers; researchers, research funders and innovators; and third sector and community organisations. Some duplication of recommendations between each stakeholder group is included deliberately – this design allows for each stakeholder to have a clear map of all relevant priorities for their sector. Figure 10 provides illustrative examples of how implementation of these recommendations can help to break some of the pathways by which climate change can worsen mental health, alleviating some of the mental health burden by preventing or responding to increased needs.

Health system leaders and healthcare practitioners

1. **Advocate for climate mitigation and adaptation, and take action within health systems** to reduce greenhouse gas emissions and therefore prevent the impacts of climate change on physical and mental health. Examples of actions to “be the change” and “lead the change” are provided in Figure 11 adapted from the WISH report on Climate Change and Health. It is also suggested that mental health system leaders and practitioners use evidence of the impact that climate change has upon mental health and emotional wellbeing as part of the rationale for why climate action is needed.
2. **Raise awareness of the mental health impacts of climate change among the general public** through government and health system messaging (e.g. public health campaign on heat vulnerability) to increase individuals’ ability to recognise and manage these impacts on themselves and their community.
3. **Train healthcare workers to identify, manage and speak out about the impacts of climate change on mental health**, for example to:
 - a. Screen for mental health burden generated by climate distress;
 - b. Respond to temperature-induced symptoms of mental ill-health or physical heat stress in those with pre-existing mental illnesses;
 - c. Develop proactive responses to natural disasters that mitigate mental health impacts.
4. **Collaborate with researchers to strengthen the evidence base** on climate change and mental health.
5. **Facilitate or join cross-organisational and cross-sector collaborations** to develop, evaluate, share and scale-up successful interventions and best practices that support those experiencing mental health impacts due to the direct and indirect effects of the climate crisis. For example:
 - a. So that mental health practitioners can share best practice on supporting those experiencing mental distress in response to climate crisis awareness;
 - b. To guide effective and proactive interventions across social and emergency services and mental health systems to mitigate the mental health impacts of extreme weather events such as wildfires or floods;
 - c. So that proactive support for climate migrants is effective and culturally sensitive (i.e. collaboration between healthcare and aid provision).
6. **Include the voices of those particularly vulnerable to, and with lived experience of, climate change impacts**, (e.g. those affected by flooding) in the development and delivery of services in response to climate change and related mental health needs.
7. **Incorporate the evidence for the mental health impacts of climate change in risk assessment and forecasting needs, including identifying currently ‘hidden costs’**. For example:
 - a. Incorporate an understanding of the mental health impact of heat into structural response planning and clinical practice;
 - b. Include climate migration scenarios in forecasting the future requirements of local mental healthcare systems.
8. **Build resilience into the mental healthcare system** so it is prepared for disruptions due to climate-related disasters and can continue providing care during times of disaster (e.g. through the provision of digital mental health services).

Polymakers

1. **Prioritise climate mitigation policies that:**
 - a. Simultaneously provide mental health benefits and greater resilience to climate change (co-benefits);
 - b. Alleviate existing inequalities and their associated mental health impacts.
2. **Direct proactive adaptation interventions** to reduce mental health burden **to communities that are most vulnerable** to climate-related threats. For example:
 - a. Provision of support to reduce the vulnerability of communities susceptible to flooding (e.g. early warning systems, flood prevention equipment (e.g. sandbags) and personal flood plans);
 - b. Support those with mental illness to ensure they have adequate access to cool environments during periods of excess heat (e.g. via provision of urban green spaces).
3. **Include the voices of those particularly vulnerable to and with lived experience of climate change impacts**, alongside mental health professionals and other clinicians, in the development of all policies related to climate change and mental health.
4. **Allocate funds to relevant research and required actions by health system leaders** to build resilience and manage the impact of climate change on mental health as well as helping to identify and quantify these hidden costs.
5. **Ensure that the co-benefits of climate action for mental health are adequately incorporated into cost-benefit calculations** for climate-focused policies and vice-versa for health-focused policies.
6. **Work closely with a range of researchers in the relevant fields to learn from the current evidence** and how it intersects, integrates, and can be applied in practice.
7. Consider the evidence for how **individuals may respond psychologically and emotionally** to narratives around climate change and climate action when developing and promoting policy, to facilitate desired individual and collective action and protect mental health (e.g. ensure that climate change and climate action is communicated in a way that minimises the risk of prompting an emotional response of hopelessness and maximises the chance of encouraging action).

Researchers, research funders and innovators

1. **Raise awareness of the evidence of the impact of climate change on mental health**, including by engaging with policymakers and health system leaders (for example at international climate or health/mental health summits and communicating with the press and the public). Such evidence can support the case for climate mitigation and adaptation that protects mental health.
2. **Develop and communicate a research agenda for climate change and mental health**, identifying priority research questions through a consensus-building process with members of the public, experts and policymakers.
3. **Fund and conduct robust, interdisciplinary and collaborative research**, for example to understand:
 - a. The economic burden caused by climate change's impact on mental health and emotional wellbeing, to make clear the currently hidden costs and enable the true cost/benefit of climate action to be considered in decision-making;
 - b. How and to what extent the climate crisis impacts populations' mental health, who is affected, and to identify corresponding stressors, protective factors, support needs, and at risk groups;
 - c. How climate change threatens to exacerbate inequalities through its effects on mental health and wellbeing;
 - d. Associations and underlying mechanisms relating temperature and mental health outcomes;
 - e. Psychological responses (healthy and unhealthy) to the climate crisis in different groups, and their relationship to mental health, climate action, information messaging, and resilience.
4. **Include the voices of those particularly vulnerable to and with lived experience of climate change impacts** alongside psychologists and other clinicians in all research and innovation activities.
5. **Learn from individuals and communities who are already responding to climate-related impacts on mental health**, to understand needs, coping mechanisms and how to build resilience.
6. **Develop, identify, evaluate and support the scaleup of effective programs and interventions** to reduce the harmful effects of climate change on mental health, and support individuals and communities whose mental health is at risk from or has been affected by the climate crisis.
7. **Develop training programmes** for relevant stakeholders to increase awareness, share effective interventions and best practices, and build capacity to prevent and respond to the mental health impacts of climate change.
8. **Communicate research findings** with policymakers, innovators and the public in an accessible way, to help inform decisions and motivate action.

Third sector and community organisations

1. **Stimulate, support and amplify the efforts of health systems, policymakers and researchers** to mitigate and adapt to climate change to reduce its impacts on mental health (see recommendations for those stakeholders) with a particular focus on actions that reduce inequalities and increase climate change resilience.
2. **Fund and raise awareness of the mental health impacts of the climate crisis** among both policymakers and the public, including at international climate and physical or mental health summits.
3. **Ensure that health-related organisations, volunteers providing first aid, mental health crisis responders and those caring for vulnerable groups** are aware of the mental health impacts of climate change and trained to respond. For example:
 - a. First aiders to understand and be equipped to respond to the impact of high temperatures on mental health risks;
 - b. Mental health support organisations to be aware of climate change as a source of mental health distress, particularly in young people, and learn about best practices for supporting these concerns.
4. **Climate change and disaster relief organisations should incorporate mental health as a key pillar of emergency responses**, particularly in assessing risk, planning and responding to climate-related disasters.
5. **Identify and respond to the gaps in efforts by other stakeholders:**
 - a. **On activities that third sector and community organisations are best placed to lead**, for example grassroots programmes such as rewilding of urban spaces that have multiple benefits, including for community mental health;
 - b. **In areas that other stakeholders might be less able to implement the recommendations directed at them without support**, for example where health systems are under-developed or governments lack resources.
6. **Establish cross-organisational and cross-sector collaborations to develop, communicate and replicate successful approaches.** The networks should include community responders, charity and NGO workers, medical professionals, academics, policymakers, clinicians, and members of the public.

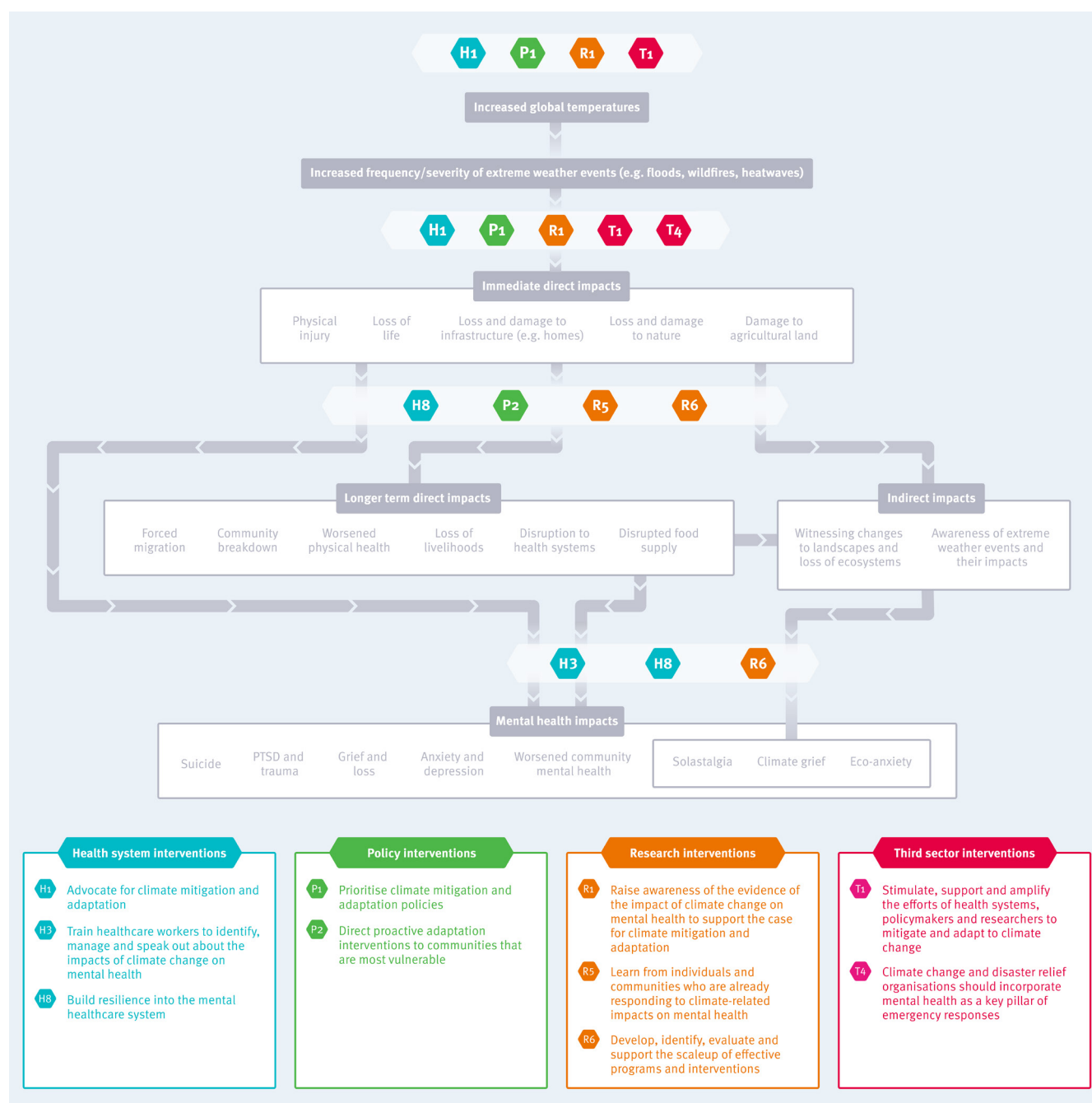


Figure 10: Selected illustrative examples of how the implementation of specific recommendations in this report can help to break the pathway by which climate change negatively impacts upon mental health. The position of each icon illustrates the part of the pathway that can be partially broken by implementing the proposed recommendation. Some recommendations appear in more than one place, for example those focused on climate mitigation and adaptation.

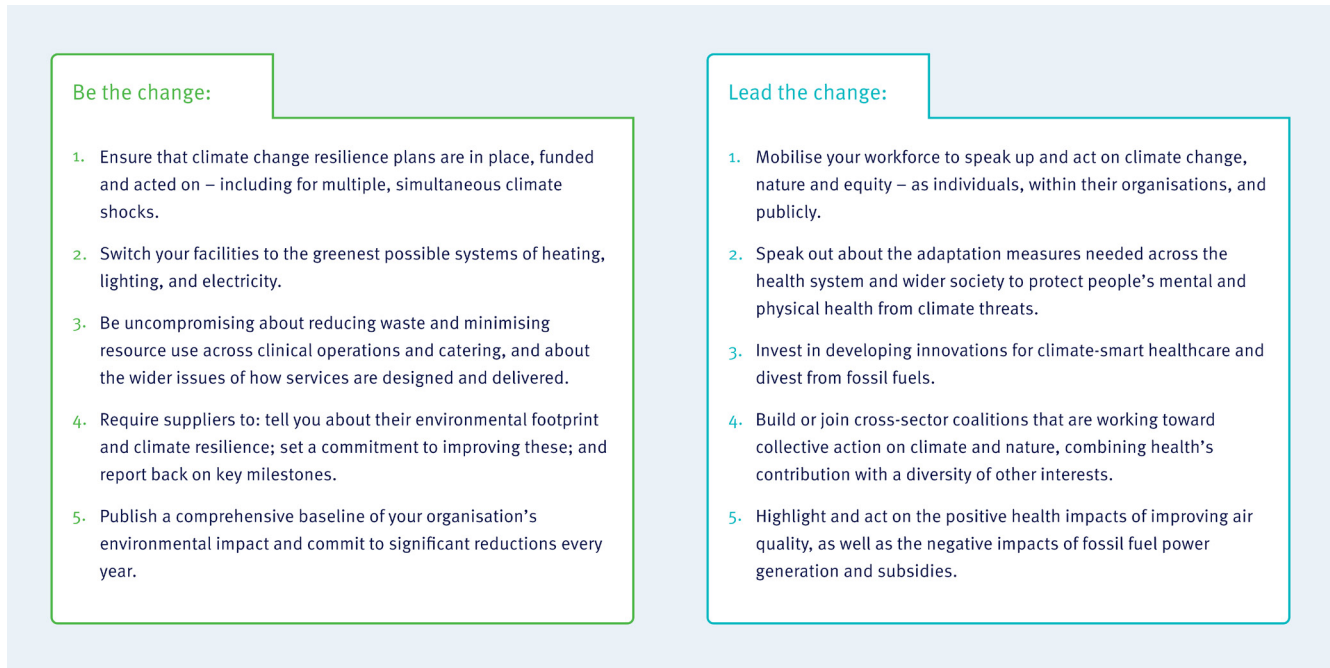


Figure 11: Index card of climate change action for health leaders, as recommended by the WISH report “Health in the Climate Crisis”³¹.

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- Dr Renzo Guinto, Chief Planetary Doctor, PH Lab
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