

THE IMPACT OF THE TRIPLE PLANETARY CRISIS ON MENTAL HEALTH IN LOW AND MIDDLE-INCOME COUNTRIES

**Work conducted for United for
Global Mental Health**

Eloïse Bodin, Céline Charveriat,
Olivia Rowe and Alessandro Massazza

**UNITED
FOR
GLOBAL
MENTAL
HEALTH**

CONTENTS

2. **Executive summary**
3. **Abbreviations**
4. **Introduction**
5. **Background**
7. **Mental health impacts**
 7. **Climate change**
 12. **Pollution**
 14. **Biodiversity loss**
17. **Conclusion**
18. **References**

ABBREVIATIONS

IPCC	Intergovernmental Panel on Climate Change
LMICS	Low- and middle-income countries
PM	Particulate matter
PTSD	Post-traumatic stress disorder
SDGs	Sustainable Development Goals
SIDS	Small island developing states
UNEP	UN Environment Programme
WHO	World Health Organisation



EXECUTIVE SUMMARY

The triple planetary crisis of climate change, pollution and biodiversity loss is an escalating threat to all life on earth. At the same time, there is growing evidence that the crisis is contributing to a range of mental health challenges, including anxiety-, mood-, trauma- and stress-related disorders.

It is time for us to better understand this connection. In this report, we explore the latest literature on how climate change, pollution and biodiversity loss each impact mental health.

Where available, we focus on evidence from low- and middle-income countries (LMICs), where these problems are most pronounced. We consider LMICs' greater exposure and vulnerability to the planetary crisis, and the fragile ability of their mental health systems to cope.

We look at the most vulnerable groups, including children and adolescents, older people, women, Indigenous peoples, people living in poverty and those with pre-existing mental health conditions.

The report largely focuses on describing the impact of the triple planetary crisis on mental health. Our [policy briefs](#) concentrate on some of the many possible interventions and solutions.

As the world seeks to make a just transition to a greener and cleaner future, this report aims to help make sure that transition promotes the mental health of people around the world.



INTRODUCTION

The world is experiencing three interlinked challenges known as the triple planetary crisis: climate change, pollution and biodiversity loss (United Nations, 2022a). This three-pronged crisis has profound human consequences – including for the mental health of people across the world.

Already, an estimated 1 billion people worldwide live with a mental condition. Most live in low- and middle-income countries (LMICs), where they often receive neither a diagnosis nor treatment. The deepening planetary crisis is only likely to make things worse (United Nations, 2022b). Evidence suggests it will cause and exacerbate a range of mental health conditions, including anxiety-, mood-, trauma- and stress-related disorders (WHO, 2022), particularly among vulnerable populations. There is a growing need to better understand the complex relationship between the triple planetary crisis and mental health.

This report aims to provide an overview of the existing literature on the topic. It does not attempt to provide a comprehensive review of the field and did not follow a structured methodology to identify studies. Rather, it aims to provide a snapshot of some key themes at the intersection between the triple planetary crisis and mental health. It is the first step towards developing effective solutions.

BACKGROUND

According to the UN Environment Programme (UNEP), none of the environmental UN Sustainable Development Goals (SDGs) will be achieved without a profound change of direction (UNEP, n.d.). The triple crisis of climate change, pollution and biodiversity loss is only likely to get worse if appropriate action is not taken, with knock-on effects for the physical and mental health of vast numbers of people.

Here is what we mean by each of the three elements of the crisis.

Climate change refers to long-term changes in the Earth's temperature and weather patterns. It is occurring at an unprecedented rate because of human activities, such as the burning of fossil fuels and deforestation. It increases the risks of flooding, prolonged droughts, heatwaves, more frequent and intense extreme weather events and other devastating crises across the world (IPCC, 2023). Climate change is expected to cause approximately 250,000 additional deaths per year – from malnutrition, malaria, diarrhoea and heat stress – between 2030 and 2050. Most of these deaths will occur in LMICs – despite these being the countries least responsible for causing the problem (WHO, 2021a).

Pollution refers to the dispersal of harmful substances – ‘pollutants’ – into the environment. While typically pollution refers to air pollution, it can take many forms, including water and soil pollution (National Geographic Society, 2023). According to the World Health Organisation (WHO), 99% of the world's population breathes air containing unhealthy levels of pollutants. People in LMICs are most affected for various reasons, including rapid recent industrialisation, lack of environmental regulation, the burning of waste outdoors, and using wood stoves for cooking, which contributes to household air pollution (WHO, n.d.-a). The WHO estimates 7 million people die prematurely every year from air pollution.

Biodiversity loss refers to the decline in the diversity of animals, plants and ecosystems. It is mainly driven by human activities like deforestation, pollution and greenhouse gas emissions (United Nations, 2022a). It is already significantly reducing the benefits we derive from healthy ecosystems, such as sustainable access to fresh water, nutritious food and essential medicines (WHO, 2015). LMICs and Indigenous peoples, who rely more directly on nature (Ashworth, 2022), are being hit the hardest by biodiversity loss.

This report discusses the mental health impacts of each planetary crisis in turn. However, it is important to note that climate change, pollution and biodiversity loss are closely interlinked, as are their impacts on mental health. It is well-established that LMICs, having contributed the least to the triple planetary crisis, are most acutely vulnerable to its impacts – and the impact on mental health is no exception.

MENTAL HEALTH IMPACTS

CLIMATE CHANGE

According to the WHO, the ways climate change affects mental health, include:

Stress reactions: Most people experience some form of distress after climate change exposures such as extreme weather events, particularly in LMICs where people's basic needs – including the need for security – are harder to meet. For most people, this distress will improve over time.

Strained social relationships: Climate change can damage interpersonal relationships, increasing rates of intimate-partner violence, separating families and disconnecting vulnerable people from social support systems. According to a study in Somaliland, for example, drought saw children sent to larger towns by their parents, who stayed in rural areas to continue making a living (UNICEF, 2019). Similarly, gender-based violence was found to increase during or after extreme weather events, according to most relevant studies in one systematic review (van Daalen et al., 2022).

Increased incidence of mental health conditions: Mental health conditions, including anxiety-, mood-, trauma- and stress-related disorders, have been reported to increase following extreme weather events (Goldmann & Galea, 2014). For example, a review found that, in most studies, exposure to climate-related disasters such as floods and storms was associated with higher rates of mental health disorders such as PTSD (Sharpe & Davison, 2021).

Helplessness, fear and grief: Worries about the future, a sense of helplessness and feelings of distress have been documented in the face of climate inaction (Hickman et al., 2021). Shifting climate patterns forced pastoralists in Kenya, Somalia and Tanzania to abandon their lands and livelihoods to migrate to urban areas, costing them their herds, possessions and community ties. This forced migration has led to feelings of hopelessness and helplessness, which are likely to result in poorer mental health (Atwoli et al., 2022).

Increased risk of suicidal behaviour: Exposure to rising ambient temperatures has been found to increase the risk of suicide (Thompson et al., 2023). For instance, a 2017 analysis based on 47 years of suicide records and climate data in India, where one-fifth of the world's suicides occur, concluded that high temperatures increased suicide rates among farmers during India's growing season, when heat reduces crop yields. The study estimated that warming temperatures over the last three decades may have been partly responsible for more than 59,000 suicides throughout India (Carleton, 2017).

Alcohol and substance use: The impacts of climate change on mental and physical health, as well as socioeconomic circumstances, can increase the risk of harmful coping strategies, such as substance misuse (Vergunst et al., 2022). For example, surveys of communities affected by Hurricane Katrina in the US and the Black Saturday bushfires in Australia reported a significant rise in alcohol consumption following each of the disasters, particularly among the communities hardest hit (Beaudoin, 2011; Bryant et al., 2014).

Ecological grief, eco-anxiety and 'solastalgia': Some new terms are being used to describe the mental health impacts of our planetary crises. Ecological grief is a feeling of deep sorrow or loss about environmental devastation (Ojala et al., 2021). Eco-anxiety – otherwise known as climate anxiety or climate distress – is a sense of unease or anxiety about the planet's future and environmental issues (Crandon et al., 2022). Children and young people appear to be particularly likely to feel anxious about climate change (Hickman et al., 2021). 'Solastalgia' is a form of existential distress, homesickness or nostalgia in people with deep emotional connections to a place that has been altered or destroyed by environmental change, including climate change (Albrecht et al., 2007).

These terms should not be used to pathologise feelings of distress about the planetary crisis. They are often normal, and even constructive, reactions to an abnormal situation (Ojala et al., 2021). Importantly, these reactions have been shown to be associated with higher engagement in pro-environmental behaviours in some people (Ogunbode, et al., 2022).

The specific effects of climate change on mental health are likely to vary according to the type of environmental problem to which people are exposed:

Extreme heat: The impacts of extreme heat include increased rates of suicide and suicidal behaviour, worsened symptoms of mental health conditions and poor sleep (Thompson et al., 2023). One study showed a rise in suicide rates of 0.7% in the US and 2.1% in Mexico because of a 1°C increase in monthly average temperatures (Burke et al., 2018). It also estimated that by 2050 there may be between 9,000 and 40,000 additional suicides in the US and Mexico if efforts to tackle climate change are not stepped up.

Drought and prolonged periods of low rainfall: Drought can lead to water scarcity, crop failure and economic hardship. These conditions can contribute to stress, anxiety and depression among farmers and other people who rely on agriculture to make a living. For example, a systematic review identified drought as a key contributing factor to the severe mental health crisis in Somalia (Ibrahim et al., 2022). One other study of a pastoralist community in Ethiopia found that water insecurity led to extreme worry and fatigue (Cooper et al., 2019). The social tension, conflicts and compromised quality of life resulting from water scarcity further contribute to mental distress (Drage O'Reilly & Snyder, 2022). Again, it is LMICs that are hardest hit. An estimated quarter of a billion people in Africa experience high levels of water-related stress and the problem is set to get worse: 80% of African countries are unlikely to have sustainably managed water resources by 2030 compared to around 50% today (WMO, 2022).

Wildfires: The widespread destruction caused by wildfires has been associated with anxiety, depression and post-traumatic stress disorder (PTSD) (To et al., 2021). Even those not directly affected by the fires may experience stress and anxiety due to the smoke and air pollution that can linger in the air for days or even weeks afterwards. While the physical and mental health impacts of wildfires are most closely studied in high-income countries, 67% of the area affected by wildfires in 2022 was in Africa (Radford, 2022).

Floods: Heavy rainfall and flooding can lead to property damage, displacement and loss of life – all of which can cause or exacerbate mental health conditions, such as depression and PTSD and increase levels of psychological distress (Cruz et al., 2020). An estimated 50% of children affected by the 2022 floods in Pakistan showed signs of distress due to the loss of their homes, the lack of a school routine, an absence of adequate protection and vulnerability to other psychological issues. The likelihood of being separated from their parents or carers makes children more vulnerable to

physical, verbal and sexual abuse after natural catastrophes like floods (Cheema et al., 2023), which can in turn worsen mental health.

Sea-level rises: There are few studies on the mental health impacts of sea-level rises. In the Solomon Islands, nearly all 60 participants in a study reported that rising sea levels were causing personal and community-wide fear and worry (Asugeni et al., 2015). A study of 100 people in Tuvalu, a Pacific island nation particularly vulnerable to sea-level rise, yielded similar results, with a high proportion of respondents reporting psychological distress after experiencing and hearing about the impacts of climate change (Gibson et al., 2020). Small island developing states (SIDS) have been found to be particularly vulnerable to the impacts of climate change on mental health (Kelman et al., 2021).

Storms and hurricanes: Anxiety, difficulties sleeping and depressive symptoms can be common responses before, during and after storms and/or hurricanes (SAMHSA, 2023). For example, a cohort study of people affected by the 2006 typhoon Xangsane in Vietnam found that general mental health significantly worsened post-typhoon (Amstadter et al., 2009).

Communities more vulnerable to the mental health impacts of climate change include:

People with pre-existing mental health conditions: Those who already have a mental health condition are significantly more vulnerable to the negative mental health impacts of climate change – tending to be at higher risk of dying during heatwaves, for example (Woodland et al., 2023) – and are likely to require increased access to care (Hrabok et al., 2020). Some research suggests people who take psychotropic medication are more likely to be admitted to hospital with heat-related illnesses during heatwaves (Martin-Latry et al., 2007). This may be because some psychotropic medication can interfere with people's ability to regulate their own body temperature.

Children and adolescents: UNICEF argues climate change is the number one threat facing children and young people in the world today. It says that they “are less able to survive extreme weather events and are more susceptible to toxic chemicals, temperature changes and diseases” (UNICEF MENA, 2022). A global survey of 10,000 young people across 10 countries found nearly 60% of respondents felt ‘very worried’ or ‘extremely worried’ about climate change. The countries with the highest proportion of respondents who felt ‘very worried’ or ‘extremely worried’ by climate change were LMICs: the Philippines (84%), India (68%) and Brazil (67%) (Hickman et al., 2021).



Older people: As people age, their bodies become less efficient at regulating their body temperature, making them more susceptible to heat stress. Older people often live on fixed incomes, limiting their ability to adapt to the impacts of climate change. They may also lack access to air conditioning or may not be able to afford to cool their homes during heatwaves (Hansen et al., 2011). Older people living with dementia are particularly vulnerable to the impact of heatwaves, as they are less able to recognise and respond to changing temperatures. Research in England estimates that for every 1°C rise above 17°C, there is a 4.5% increase in the risk of dementia-related emergency hospital admissions (Gong et al., 2022).

Women: Women are more vulnerable to the health impacts of climate change due to a combination of social, economic and cultural factors, such as gender-based violence and unequal access to resources (Dunne, 2020). The majority (80%) of those displaced by the 2005 Pakistan floods were women. Pregnant women and their foetuses are particularly vulnerable to the impacts of climate change (EPA, 2022).

People living in poverty: There is strong evidence demonstrating a vicious cycle between poverty and mental ill health (Lund et al., 2010). Poor people are more likely to live in areas vulnerable to climate change-related hazards – such as floods, droughts and storms – and have limited resources to cope with their impacts (McCarthy, 2020).

Indigenous peoples: There are an estimated 476 million Indigenous people worldwide, most of whom live in LMICs (United Nations, n.d.-b). Indigenous people are particularly vulnerable to both the direct and indirect mental health impacts of climate change, including through socioeconomic disadvantage, food insecurity and the sense of loss associated with the destruction of their land (Vecchio et al., 2022).

Urban vs rural communities: In rural areas, many people rely on agriculture and natural resources to make a living. That makes them vulnerable to the tendency of climate change to worsen food insecurity, poverty and displacement. Rural communities may also have limited access to essential services, such as healthcare and clean water, making them yet more vulnerable to the impacts of climate change (European Environment Agency, 2022a). In urban areas, climate change can increase the frequency and severity of heatwaves (through 'heat island' effects), urban flooding and water scarcity. Poorer urban communities may be particularly vulnerable, lacking access to air conditioning, for example, or the infrastructure to handle increased flooding.

People at risk of forced displacement: Climate change can exacerbate existing drivers of forced displacement, such as conflict over resources or political instability. It can also create new drivers, such as sea-level rises or desertification.

Forced displacement can disrupt social networks and cultural practices, leading to increased isolation and mental health issues (WHO, 2021b). The magnitude of forced displacement in some LMICs is already overwhelming. According to the WHO, more than 7.1 million Bangladeshis were displaced by climate change in 2022 and, by 2050, that number could rise to 13.3 million. Populations that are not able to relocate to avoid environmentally risky locations, so-called trapped populations, can also experience negative psychological impacts in the face of increased environmental problems they cannot escape, as shown for example in the case of people living in the slums of Dhaka, Bangladesh (Ayeb-Karlsson et al., 2020).

Research investigating the displacement of Indigenous communities, specifically the Sahariya in central India, found that (Snodgrass et al., 2016):

“ **The loss of homeland compromises mental health - and especially the highest level of positive emotional well-being related to happiness, life satisfaction, optimism for the future, and spiritual contentment - in ways not easily repaired by even well-intentioned relocation programs focused on material compensation and livelihood re-establishment.** ”



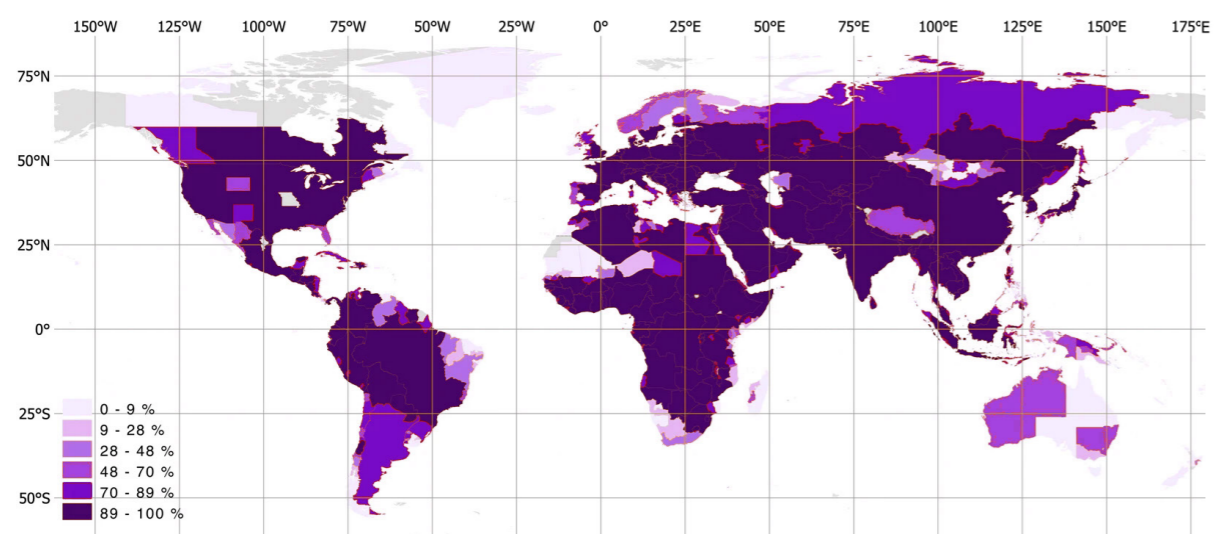
POLLUTION

Air pollution

Almost every human being – 99% of the global population – breathes air that exceeds the WHO recommended limit for long-term exposure to ‘particulate matter’ (PM) – very tiny airborne droplets or particles seriously harmful to health. As shown below in Figure 1, air pollution affects LMICs more significantly than high-income countries due to:

- less stringent environmental regulation
- household air pollution from cooking and heating practices
- limited resources to address pollution
- Increased reliance on polluting industries such as manufacturing and mining (WHO, n.d.-a).

Figure 1: Share of population exposed to concentrations of air pollution over the WHO recommended limit (Rentschler & Leonova, 2022)



Air pollution can have many impacts on mental health. It has been linked to an increased risk of mental health problems, including depression and anxiety (Braithwaite et al., 2019). One UK study found that people living in areas with high levels of air pollution were 40% more likely to experience depression than those who lived in places with cleaner air (Roberts et al., 2019). Exposure to air pollution can also lead to increased stress and sleep disturbances, which can be detrimental to mental health (Liu et al., 2020). Quite how these relationships work is yet unclear, warranting further research. Different potential biological mechanisms have been proposed – from increased levels of neuroinflammation to the disruption of the hypothalamic-pituitary-adrenal axis, which contributes to regulating the body’s stress responses (Isobel et al., 2023).

OTHER FORMS OF POLLUTION

Water pollution

Water pollution is a significant problem in many LMICs, where access to safe drinking water is often limited (WHO, 2019). Inadequate sanitation and waste-management practices can contribute to the contamination of water sources and the spread of waterborne diseases (CDC, 2020). Exposure to toxins in polluted water has been associated with elevated symptoms of mental health and neurodevelopmental disorders in young people (Theron et al., 2022). Finally, the stress and anxiety associated with the fear of exposure to polluted water, as well as the frustration and anger that can come from feeling helpless to address the problem, can all contribute to poor mental health (Cuthbertson et al., 2016).

A study of 225 men and women from four Awajún Indigenous communities in the Amazonas province, Peru, revealed that water insecurity resulting from water pollution was associated with higher levels of stress (Tallman, 2019):

“Considering that Awajún community members spend a significant portion of their daily lives using the rivers for transport, washing, bathing, and drinking, any variables that complicate this access could create distress through a feeling of unpredictability. Perceived stress scores, as well as depressive symptoms, such as ‘feeling hopeless’, may also be connected to perceptions of unfairness in terms of the contamination of local water sources with pollutants from upstream extractive industries.”

There is also emerging evidence of links between other forms of pollution and mental health. For example, [soil pollution](#) is extremely widespread, but very few studies explore its potential links with mental health (European Environment Agency, 2022b). Additionally, according to the European Environment Agency, [noise pollution](#) can cause stress and anxiety, especially when it is loud, unpredictable or prolonged (European Environment Agency, 2020). [Light pollution](#) – the presence of artificial light in the environment – can harm people’s mental health by disrupting their sleep, for example (Cao et al., 2023; Tancredi et al., 2022). A body of literature also highlights the relationship between [chemical pollutants](#), such as lead and mercury, and worsened neurological and mental health outcomes (Reuben et al., 2019). And exposure to [chemical, biological, radiological and nuclear disasters](#), such as the 1984 Bhopal disaster in India, can have devastating consequences for mental health (Gouweloos et al., 2014).



BIODIVERSITY LOSS

Biodiversity loss refers to the decline in the diversity of animals, plants and ecosystems. It is mainly driven by human activities like deforestation, pollution and greenhouse gas emissions (United Nations, 2022a).

Across the world, our natural environments are under threat: 178 million hectares of forest have been lost in the last 30 years, which is an area about the size of Libya. Additionally, within decades, around 1 million plant and animal species could face extinction unless stronger action is taken to curb biodiversity loss (IPBES, 2019; United Nations, 2020).

Biodiversity loss is already having a significant impact on the benefits we derive from healthy ecosystems, such as a sustainable supply of fresh water, nutritious food and essential medicines (WHO, 2015). There is also emerging evidence that biodiversity loss could significantly harm physical and mental health. For example, if pollinators like bees disappear from our ecosystems, it would create vitamin deficiencies in tens of millions of people from low-income countries (Smith et al., 2015). This doesn't just matter for physical health – nutrition is an essential building block for good mental health (Muscaritoli, 2021).

A rich diversity of species has been shown to have a positive association with mental health. In some studies, for example, a national epidemiological study in Germany found significant benefits for wellbeing stemming from a rich diversity in bird species (Methorst et al., 2021). The authors suggested that this impact may work via two possible pathways: (i) via the direct visual and auditory experience of birds and/or (ii) through experiencing landscapes with characteristics that promote a rich diversity in bird species as well as human wellbeing.

Finally, biodiversity loss can impact mental health indirectly by worsening food security for people who rely on natural sources of food, such as Indigenous peoples, and agricultural and fishing communities.

It is important to note that biodiversity loss is not happening in parallel with the climate crisis but is deeply interconnected, and in fact inseparable. The climate is influenced by the natural environment and its ability to act as a carbon sink, and in turn the climate influences the health of ecosystems (United Nations, n.d.-a).

Access to nature and mental health

According to the WHO, nature is our greatest source of health and wellbeing (WHO, 2020). But over half of the world's population now lives in cities, with fewer opportunities to experience nature – and this proportion is growing quickly (Cox et al., 2017; WHO, n.d.-b).

There is a strong evidence base supporting the positive association between nature (e.g., green and blue spaces) and mental health, although this evidence is often limited to high-income countries (White et al., 2021). For example, a study in Auckland, New Zealand, found that access to green space was a protective factor against mental health conditions like anxiety and depression (Nutsford et al., 2013). Another study of more than 3,700 people in Europe found that visiting green space was associated with improved mental health (van den Berg et al., 2016). There is an emerging literature on the positive influence of blue spaces – i.e. water environments – on mental health too (Britton et al., 2020).

Spending time in nature has been shown to support mental health both directly, by increasing happiness and a sense of wellbeing, and indirectly, by reducing risk factors for mental illness – for example, by reducing stress and improving sleep (Bratman et al., 2023). Globally, protected green and blue spaces, that is national parks, provide mental health benefits worth US\$6 trillion per year, a conservative global estimate calculated using quality-adjusted life years (Buckley et al., 2019).

Deforestation and mental health

Deforestation is also having a significant negative impact on mental health. For example, a study conducted across 230 countries found increased forest cover is associated with a lower prevalence of mental health conditions (Bolton et al., 2022). In a systematic review of the literature, exposure to forests has been found to boost mental health and wellbeing, regardless of forest type (Clark et al., 2023). Deforestation can also impact mental health indirectly by worsening physical health, for example by leading to an increased spread of infectious disease by removing natural barriers between humans and animals carrying microorganisms or by worsening respiratory conditions because of deforestation-related fires (Reddington et al., 2015).





Vulnerable groups

Indigenous peoples, young people, women, coastal communities, and marginalised urban populations are particularly exposed to the destruction of nature (Al Mubarak, 2021; Roe et al., 2019; Williams et al., 2023). For instance, biodiversity loss threatens Indigenous communities' food security, access to medicinal plants, and cultural and spiritual connections to the land (Middleton et al., 2020). A study conducted among Indigenous populations in the Circumpolar North found their mental health to be strongly influenced by their connection to the land (Cunsolo Willox et al., 2015):

“Disruptions to the land and land-based activities, such as hunting, herding, fishing, foraging, and travelling, may drive various climate-related mental health impacts. [...] Many Indigenous populations in the Circumpolar North continue land-based lifestyles and experience an interdependent relationship with the land, where identity, self-confidence, and socio-cultural and socio-spiritual significance emerges, in part, from one's connection to the land and to place.”



CONCLUSION

The triple planetary crisis will magnify existing mental health challenges and create complex, cumulative and far-reaching new ones. Unless the world changes course, by 2030 the combined global impact of climate-related hazards, air pollution and reduced access to green space on mental health conditions is predicted to reach an annual cost of nearly US\$47 billion (Kumar et al., 2023).

Particular groups are especially vulnerable to the mental health impacts of the planetary crisis: people living in ecologically sensitive areas, or whose livelihoods are closely tied to the environment, or who have chronic health issues, or who experience systemic inequities and marginalisation.

The literature reviewed for this report highlights the urgent need to give more attention to the mental health impacts of the triple planetary crisis. As environmental degradation and climate change accelerate, we must take steps to understand and address their mental health consequences. By bringing together insights from across the field, this report aims to contribute to a deeper understanding of the complex relationship between the triple planetary crisis and mental health.

We would not be where we are today if countries had taken more decisive action to tackle climate change, pollution and biodiversity loss. The landmark Paris Climate Agreement in 2015 saw countries around the world commit to limiting global warming well below 2°C compared to pre-industrial levels (UNFCCC, n.d.). Several years later and the UN Environment Programme has reported that there is now no credible pathway to a 1.5°C limit (United Nations, 2022c). A just transition to a greener and cleaner world is long overdue – it is also paramount to protecting the mental health of people around the world.

Solutions exist: from disaster early warning systems to improved access to mental health services. For more on the opportunities for action to address the mental health impacts of the planetary crisis, you can consult our [policy briefs](#).

REFERENCES

- Al Mubarak, R. (2021, April 28). Why women have an essential role in biodiversity conservation.
- Albrecht, G., Sartore, G.-M., Connor, L., Higginbotham, N., Freeman, S., Kelly, B., Stain, H., Tonna, A., & Pollard, G. (2007). Solastalgia: The distress caused by environmental change. *Australasian Psychiatry*, 15(1_suppl), S95–S98. <https://doi.org/10.1080/10398560701701288>
- Amstadter, A. B., Acierno, R., Richardson, L. K., Kilpatrick, D. G., Gros, D. F., Gaboury, M. T., Tran, T. L., Trung, L. T., Tam, N. T., Tuan, T., Buoi, L. T., Ha, T. T., Thach, T. D., & Galea, S. (2009). Post-typhoon prevalence of post-traumatic stress disorder, major depressive disorder, panic disorder, and generalized anxiety disorder in a Vietnamese sample. *Journal of Traumatic Stress*, 22(3), 180–188. <https://doi.org/https://doi.org/10.1002/jts.20404>
- Ashworth, J. (2022, December 9). Indigenous Peoples call for co-operation to conserve the world's biodiversity. Natural History Museum.
- Asugeni, J., MacLaren, D., Massey, P. D., & Speare, R. (2015). Mental health issues from rising sea level in a remote coastal region of the Solomon Islands: current and future. *Australasian Psychiatry*, 23(6_suppl), 22–25. <https://doi.org/10.1177/1039856215609767>
- Atwoli, L., Muhia, J., & Merali, Z. (2022). Mental health and climate change in Africa. *BJPsych International*, 19(4), 86–89. <https://doi.org/DOI: 10.1192/bji.2022.14>
- Ayeb-Karlsson, S., Kniveton, D., & Cannon, T. (2020). Trapped in the prison of the mind: Notions of climate-induced (im)mobility decision-making and wellbeing from an urban informal settlement in Bangladesh. *Palgrave Communications*, 6(1), 62. <https://doi.org/10.1057/s41599-020-0443-2>
- Beaudoin, C. E. (2011). Hurricane Katrina: Addictive behavior trends and predictors. *Public Health Reports*, 126(3), 400–409. <https://doi.org/10.1177/003335491112600314>
- Bolton, A. V., Montag, D., & Gallo, V. (2022). Global forestry areas, deforestation and mental health: A worldwide ecological study. *The Journal of Climate Change and Health*, 6, 100109. <https://doi.org/https://doi.org/10.1016/j.joclim.2021.100109>
- Bratman, G. N., Anderson, C. B., Berman, M. G., Cochran, B., de Vries, S., Flanders, J., Folke, C., Frumkin, H., Gross, J. J., Hartig, T., Kahn, P. H., Kuo, M., Lawler, J. J., Levin, P. S., Lindahl, T., Meyer-Lindenberg, A., Mitchell, R., Ouyang, Z., Roe, J., ... Daily, G. C. (2023). Nature and mental health: An ecosystem service perspective. *Science Advances*, 5(7), eaax0903. <https://doi.org/10.1126/sciadv.aax0903>
- Braithwaite, I., Zhang, S., Kirkbride, J. B., Osborn, D. P. J., & Hayes, J. F. (2019). Air pollution (particulate matter) exposure and associations with depression, anxiety, bipolar, psychosis and suicide risk: A systematic review and meta-analysis. *Environmental health perspectives*, 127(12), 126002. <https://doi.org/10.1289/EHP4595>
- Britton, E., Kindermann, G., Domegan, C., & Carlin, C. (2020). Blue care: A systematic review of blue space interventions for health and wellbeing. *Health Promotion International*, 35(1), 50–69. <https://doi.org/10.1093/heapro/day103>
- Bryant, R. A., Waters, E., Gibbs, L., Gallagher, H. C., Pattison, P., Lusher, D., MacDougall, C., Harms, L., Block, K., Snowdon, E., Sinnott, V., Ireton, G., Richardson, J., & Forbes, D. (2014). Psychological outcomes following the Victorian Black Saturday bushfires. *Australian & New Zealand Journal of Psychiatry*, 48(7), 634–643. <https://doi.org/10.1177/0004867414534476>
- Buckley, R., Brough, P., Hague, L., Chauvenet, A., Fleming, C., Roche, E., Sofija, E., & Harris, N. (2019). Economic value of protected areas via visitor mental health. *Nature Communications*, 10(1), 5005. <https://doi.org/10.1038/s41467-019-12631-6>
- Burke, M., González, F., Baylis, P., Heft-Neal, S., Baysan, C., Basu, S., & Hsiang, S. (2018). Higher temperatures increase suicide rates in the United States and Mexico. *Nature Climate Change*, 8(8), 723–729. <https://doi.org/10.1038/s41558-018-0222-x>
- Cao, M., Xu, T., & Yin, D. (2023). Understanding light pollution: Recent advances on its health threats and regulations. *Journal of Environmental Sciences*, 127, 589–602. <https://doi.org/https://doi.org/10.1016/j.jes.2022.06.020>
- Carleton, T. A. (2017). Crop-damaging temperatures increase suicide rates in India. *Proceedings of the National Academy of Sciences*, 114(33), 8746–8751. <https://doi.org/10.1073/pnas.1701354114>
- CDC. (2020, March 12). Disease threats and global WASH killers.
- Cheema, H. A., Rehan, S. T., Shahid, A., Head, M. G., Jawad, M. Y., & Shah, J. (2023). The mental health of children in flood-affected areas in Pakistan needs urgent attention. *The Lancet Psychiatry*, 10(1), 7. [https://doi.org/10.1016/S2215-0366\(22\)00381-9](https://doi.org/10.1016/S2215-0366(22)00381-9)
- Clark, H., Vanclay, J., & Brymer, E. (2023). Forest features and mental health and wellbeing: A scoping review. *Journal of Environmental Psychology*, 89, 102040. <https://doi.org/https://doi.org/10.1016/j.jenvp.2023.102040>
- Cooper, S., Hutchings, P., Butterworth, J., Joseph, S., Kebede, A., Parker, A., Terefe, B., & Van Koppen, B. (2019). Environmental associated emotional distress and the dangers of climate change for pastoralist mental health. *Global Environmental Change*, 59, 101994. <https://doi.org/https://doi.org/10.1016/j.gloenvcha.2019.101994>
- Cox, D. T. C., Hudson, H. L., Shanahan, D. F., Fuller, R. A., & Gaston, K. J. (2017). The rarity of direct experiences of nature in an urban population. *Landscape and Urban Planning*, 160, 79–84. <https://doi.org/https://doi.org/10.1016/j.landurbplan.2016.12.006>
- Crandon, T. J., Scott, J. G., Charlson, F. J., & Thomas, H. J. (2022). A social-ecological perspective on climate anxiety in children and adolescents. *Nature Climate Change*, 12(2), 123–131. <https://doi.org/10.1038/s41558-021-01251-y>
- Cruz, J., White, P. C. L., Bell, A., & Coventry, P. A. (2020). Effect of extreme weather events on mental health: A narrative synthesis and meta-analysis for the UK. *International Journal of Environmental Research and Public Health*, 17(22). <https://doi.org/10.3390/ijerph17228581>
- Cunsolo Willox, A., Stephenson, E., Allen, J., Bourque, F., Drossos, A., Elgarøy, S., Kral, M. J., Mauro, I., Moses, J., Pearce, T., MacDonald, J. P., & Wexler, L. (2015). Examining relationships between climate change and mental health in the Circumpolar North. *Regional Environmental Change*, 15(1), 169–182. <https://doi.org/10.1007/s10113-014-0630-z>
- Cuthbertson, C. A., Newkirk, C., Ilardo, J., Loveridge, S., & Skidmore, M. (2016). Angry, scared, and unsure: Mental health consequences of contaminated water in Flint, Michigan. *Journal of Urban Health*, 93(6), 899–908. <https://doi.org/10.1007/s11524-016-0089-y>
- Drage O'Reilly, E., & Snyder, A. (2022, November 17). Water insecurity is stressing mental health. *Axios*.
- Dunne, D. (2020, November 2). Mapped: How climate change disproportionately affects women's health. *PreventionWeb*.
- EPA. (2022, December 13). Climate change and the health of pregnant, breastfeeding, and postpartum women.
- European Environment Agency. (2020). Environmental noise in Europe - 2020.
- European Environment Agency. (2022a). Towards 'just resilience': Leaving no one behind when adapting to climate change.

- European Environment Agency. (2022b, December 8). Soil pollution and health.
- Gibson, K. E., Barnett, J., Haslam, N., & Kaplan, I. (2020). The mental health impacts of climate change: Findings from a Pacific Island atoll nation. *Journal of Anxiety Disorders*, 73, 102237. <https://doi.org/https://doi.org/10.1016/j.janxdis.2020.102237>
- Goldmann, E., & Galea, S. (2014). Mental health consequences of disasters. *Annual Review of Public Health*, 35(1), 169–183. <https://doi.org/10.1146/annurev-publhealth-032013-182435>
- Gong, J., Part, C., & Hajat, S. (2022). Current and future burdens of heat-related dementia hospital admissions in England. *Environment International*, 159, 107027. <https://doi.org/https://doi.org/10.1016/j.envint.2021.107027>
- Gouweloos, J., Dückers, M., te Brake, H., Kleber, R., & Drogendijk, A. (2014). Psychosocial care to affected citizens and communities in case of CBRN incidents: A systematic review. *Environment International*, 72, 46–65. <https://doi.org/https://doi.org/10.1016/j.envint.2014.02.009>
- Hansen, A., Bi, P., Nitschke, M., Pisaniello, D., Newbury, J., & Kitson, A. (2011). Perceptions of heat-susceptibility in older persons: Barriers to adaptation. *International Journal of Environmental Research and Public Health*, 8(12), 4714–4728. <https://doi.org/10.3390/ijerph8124714>
- Hickman, C., Marks, E., Pihkala, P., Clayton, S., Lewandowski, R. E., Mayall, E. E., Wray, B., Mellor, C., & van Susteren, L. (2021). Climate anxiety in children and young people and their beliefs about government responses to climate change: A global survey. *The Lancet Planetary Health*, 5(12), e863–e873. [https://doi.org/10.1016/S2542-5196\(21\)00278-3](https://doi.org/10.1016/S2542-5196(21)00278-3)
- Hrabok, M., Delorme, A., & Agyapong, V. I. O. (2020). Threats to mental health and well-being associated with climate change. *Journal of Anxiety Disorders*, 76, 102295. <https://doi.org/https://doi.org/10.1016/j.janxdis.2020.102295>
- Ibrahim, M., Rizwan, H., Afzal, M., & Malik, M. R. (2022). Mental health crisis in Somalia: A review and a way forward. *International Journal of Mental Health Systems*, 16(1), 12. <https://doi.org/10.1186/s13033-022-00525-y>
- IPBES. (2019). Summary for policymakers of the global assessment report on biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services.
- IPCC. (2023). Climate Change 2023: Synthesis report. Contribution of Working Groups I, II and III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change.
- Isobel, B., Shuo, Z., B, K. J., J, O. D. P., & F, H. J. (2023). Air pollution (particulate matter) exposure and associations with depression, anxiety, bipolar, psychosis and suicide risk: A systematic review and meta-analysis. *Environmental Health Perspectives*, 127(12), 126002. <https://doi.org/10.1289/EHP4595>
- Kelman, I., Ayeb-Karlsson, S., Rose-Clarke, K., Prost, A., Ronneberg, E., Wheeler, N., & Watts, N. (2021). A review of mental health and wellbeing under climate change in small island developing states (SIDS). *Environmental Research Letters*.
- Kumar, P., Brander, L., Kumar, M., & Cuijpers, P. (2023). Planetary health and mental health nexus: Benefit of environmental management. *Annals of Global Health*, 89(1). <https://doi.org/10.5334/aogh.4079>
- Lee, Y. Y., Chisholm, D., Eddleston, M., Gunnell, D., Fleischmann, A., Konradsen, F., Bertram, M. Y., Mihalopoulos, C., Brown, R., Santomauro, D. F., Schess, J., & van Ommeren, M. (2021). The cost-effectiveness of banning highly hazardous pesticides to prevent suicides due to pesticide self-ingestion across 14 countries: An economic modelling study. *The Lancet Global Health*, 9(3), e291–e300. [https://doi.org/10.1016/S2214-109X\(20\)30493-9](https://doi.org/10.1016/S2214-109X(20)30493-9)
- Liu, J., Wu, T., Liu, Q., Wu, S., & Chen, J.-C. (2020). Air pollution exposure and adverse sleep health across the life course: A systematic review. *Environmental Pollution*, 262, 114263. <https://doi.org/https://doi.org/10.1016/j.envpol.2020.114263>
- Lund, C., Breen, A., Flisher, A. J., Kakuma, R., Corrigall, J., Joska, J. A., Swartz, L., & Patel, V. (2010). Poverty and common mental disorders in low and middle income countries: A systematic review. *Social Science & Medicine*, 71(3), 517–528. <https://doi.org/https://doi.org/10.1016/j.socscimed.2010.04.027>
- Martin-Latry, K., Goumy, M.-P., Latry, P., Gabinski, C., Bégau, B., Faure, I., & Verdoux, H. (2007). Psychotropic drugs use and risk of heat-related hospitalisation. *European Psychiatry*, 22(6), 335–338. <https://doi.org/https://doi.org/10.1016/j.eurpsy.2007.03.007>
- McCarthy, J. (2020, February 19). Why Climate Change and Poverty Are Inextricably Linked. *Global Citizen*.
- Methorst, J., Bonn, A., Marselle, M., Böhning-Gaese, K., & Rehdanz, K. (2021). Species richness is positively related to mental health – A study for Germany. *Landscape and Urban Planning*, 211, 104084. <https://doi.org/https://doi.org/10.1016/j.landurbplan.2021.104084>
- Middleton, J., Cunsolo, A., Jones-Bitton, A., Wright, C. J., & Harper, S. L. (2020). Indigenous mental health in a changing climate: A systematic scoping review of the global literature. *Environmental Research Letters*, 15(5), 053001. <https://doi.org/10.1088/1748-9326/ab68a9>
- Muscaritoli, M. (2021). The impact of nutrients on mental health and well-being: Insights from the literature. *Frontiers in Nutrition*, 8. <https://doi.org/10.3389/fnut.2021.656290>
- National Geographic Society (2023, October 19). Pollution.
- Nutsford, D., Pearson, A. L., & Kingham, S. (2013). An ecological study investigating the association between access to urban green space and mental health. *Public Health*, 127(11), 1005–1011. <https://doi.org/https://doi.org/10.1016/j.puhe.2013.08.016>
- Ogunbode, C. A., Doran, R., Hanss, D., Ojala, M., Salmela-Aro, K., van den Broek, K. L., Bhullar, N., Aquino, S. D., Marot, T., Schermer, J. A., Włodarczyk, A., Lu, S., Jiang, F., Maran, D. A., Yadav, R., Ardi, R., Chegeni, R., Ghanbarian, E., Zand, S., ... Karasu, M. (2022). Climate anxiety, wellbeing and pro-environmental action: Correlates of negative emotional responses to climate change in 32 countries. *Journal of Environmental Psychology*, 84, 101887. <https://doi.org/https://doi.org/10.1016/j.jenvp.2022.101887>
- Ojala, M., Cunsolo, A., Ogunbode, C. A., & Middleton, J. (2021). Anxiety, worry, and grief in a time of environmental and climate crisis: A narrative review. *Annual Review of Environment and Resources*, 46(1), 35–58. <https://doi.org/10.1146/annurev-environ-012220-022716>
- Radford, T. (2022, February 17). Africa hit hardest as wildfires burn 4.23 m square kilometres per year.
- Reddington, C. L., Butt, E. W., Ridley, D. A., Artaxo, P., Morgan, W. T., Coe, H., & Spracklen, D. V. (2015). Air quality and human health improvements from reductions in deforestation-related fire in Brazil. *Nature Geoscience*, 8(10), 768–771. <https://doi.org/10.1038/ngeo2535>
- Rentschler, J., & Leonova, N. (2022). Air pollution and poverty: PM2.5 exposure in 211 countries and territories.
- Reuben, A., Schaefer, J. D., Moffitt, T. E., Broadbent, J., Harrington, H., Houts, R. M., Ramrakha, S., Poulton, R., & Caspi, A. (2019). Association of childhood lead exposure with adult personality traits and lifelong mental health. *JAMA Psychiatry*, 76(4), 418–425. <https://doi.org/10.1001/jamapsychiatry.2018.4192>
- Roberts, S., Arseneault, L., Barratt, B., Beevers, S., Danese, A., Odgers, C. L., Moffitt, T. E., Reuben, A., Kelly, F. J., & Fisher, H. L. (2019). Exploration of NO2 and PM2.5 air pollution

- and mental health problems using high-resolution data in London-based children from a UK longitudinal cohort study. *Psychiatry Research*, 272, 8–17. <https://doi.org/https://doi.org/10.1016/j.psychres.2018.12.050>
- Roe, D., Seddon, N., & Elliott, J. (2019). Biodiversity loss is a development issue.
 - Rother, H.-A. (2021). Pesticide suicides: what more evidence is needed to ban highly hazardous pesticides? *The Lancet Global Health*, 9(3), e225–e226. [https://doi.org/10.1016/S2214-109X\(21\)00019-X](https://doi.org/10.1016/S2214-109X(21)00019-X)
 - Sakib, S. N. (2022, November 29). Climate change displaced millions of Bangladeshis in 2022: WHO.
 - SAMHSA. (2023, September 6). Hurricanes and tropical storms.
 - Sharpe, I., & Davison, C. M. (2021). Climate change, climate-related disasters and mental disorder in low- and middle-income countries: A scoping review. *BMJ Open*, 11(10), e051908. <https://doi.org/10.1136/bmjopen-2021-051908>
 - Smith, M. R., Singh, G. M., Mozaffarian, D., & Myers, S. S. (2015). Effects of decreases of animal pollinators on human nutrition and global health: A modelling analysis. *The Lancet*, 386(10007), 1964–1972. [https://doi.org/10.1016/S0140-6736\(15\)61085-6](https://doi.org/10.1016/S0140-6736(15)61085-6)
 - Snodgrass, J. G., Upadhyay, C., Debnath, D., & Lacy, M. G. (2016). The mental health costs of human displacement: A natural experiment involving indigenous Indian conservation refugees. *World Development Perspectives*, 2, 25–33. <https://doi.org/https://doi.org/10.1016/j.wdp.2016.09.001>
 - Tallman, P. S. (2019). Water insecurity and mental health in the Amazon: Economic and ecological drivers of distress. *Economic Anthropology*, 6(2), 304–316. <https://doi.org/https://doi.org/10.1002/sea2.12144>
 - Tancredi, S., Urbano, T., Vinceti, M., & Filippini, T. (2022). Artificial light at night and risk of mental disorders: A systematic review. *Science of The Total Environment*, 833, 155185. <https://doi.org/https://doi.org/10.1016/j.scitotenv.2022.155185>
 - Theron, L. C., Abreu-Villaça, Y., Augusto-Oliveira, M., Brennan, C., Crespo-Lopez, M. E., de Paula Arrifano, G., Glazer, L., Gwata, N., Lin, L., Mareschal, I., Mermelstein, S., Sartori, L., Stieger, L., Trotta, A., & Hadfield, K. (2022). A systematic review of the mental health risks and resilience among pollution-exposed adolescents. *Journal of Psychiatric Research*, 146, 55–66. <https://doi.org/https://doi.org/10.1016/j.jpsychires.2021.12.012>
 - Thompson, R., Lawrance, E. L., Roberts, L. F., Grailey, K., Ashrafian, H., Maheswaran, H., Toledano, M. B., & Darzi, A. (2023). Ambient temperature and mental health: A systematic review and meta-analysis. *The Lancet Planetary Health*, 7(7), e580–e589. [https://doi.org/10.1016/S2542-5196\(23\)00104-3](https://doi.org/10.1016/S2542-5196(23)00104-3)
 - To, P., Eboeime, E., & Agyapong, V. I. O. (2021). The Impact of wildfires on mental health: A scoping review. *Behavioral Sciences*, 11(9). <https://doi.org/10.3390/bs11090126>
 - UNEP. (n.d.). Global Environment Outlook 7.
 - UNFCCC. (n.d.). The Paris Agreement.
 - UNICEF. (2019). “No mother wants her child to migrate”. Vulnerability of children on the move in the Horn of Africa.
 - UNICEF MENA. (2022). The impact of climate change on children in the Middle East and North Africa.
 - United Nations. (n.d.-a). Biodiversity - our strongest natural defense against climate change.
 - United Nations. (n.d.-b). We need indigenous communities for a better world.
 - United Nations. (2020, July 21). Deforestation has slowed down but still remains a concern, new UN report reveals.
 - United Nations. (2022a, April 13). What is the Triple Planetary Crisis?
 - United Nations. (2022b, June 17). Nearly one billion people have a mental disorder: WHO.
 - United Nations. (2022c, October 27). Climate change: No ‘credible pathway’ to 1.5C limit, UNEP warns.
 - van Daalen, K. R., Kallesøe, S. S., Davey, F., Dada, S., Jung, L., Singh, L., Issa, R., Emilian, C. A., Kuhn, I., Keygnaert, I., & Nilsson, M. (2022). Extreme events and gender-based violence: A mixed-methods systematic review. *The Lancet Planetary Health*, 6(6), e504–e523. [https://doi.org/10.1016/S2542-5196\(22\)00088-2](https://doi.org/10.1016/S2542-5196(22)00088-2)
 - van den Berg, M., van Poppel, M., van Kamp, I., Andrusaityte, S., Balseviciene, B., Cirach, M., Danileviciute, A., Ellis, N., Hurst, G., Masterson, D., Smith, G., Triguero-Mas, M., Uzdanaviciute, I., de Wit, P., van Mechelen, W., Gidlow, C., Grazuleviciene, R., Nieuwenhuijsen, M. J., Kruize, H., & Maas, J. (2016). Visiting green space is associated with mental health and vitality: A cross-sectional study in four European cities. *Health & Place*, 38, 8–15. <https://doi.org/https://doi.org/10.1016/j.healthplace.2016.01.003>
 - Vecchio, E. A., Dickson, M., & Zhang, Y. (2022). Indigenous mental health and climate change: A systematic literature review. *The Journal of Climate Change and Health*, 6, 100121. <https://doi.org/https://doi.org/10.1016/j.joclim.2022.100121>
 - Vergunst, F., Berry, H. L., Minor, K., & Chadi, N. (2022). Climate change and substance-use behaviors: A risk-pathways framework. *Perspectives on Psychological Science*, 18(4), 936–954. <https://doi.org/10.1177/17456916221132739>
 - White, M. P., Elliott, L. R., Grellier, J., Economou, T., Bell, S., Bratman, G. N., Cirach, M., Gascon, M., Lima, M. L., Löhmus, M., Nieuwenhuijsen, M., Ojala, A., Roiko, A., Schultz, P. W., van den Bosch, M., & Fleming, L. E. (2021). Associations between green/blue spaces and mental health across 18 countries. *Scientific Reports*, 11(1), 8903. <https://doi.org/10.1038/s41598-021-87675-0>
 - WHO. (n.d.-a). Air pollution.
 - WHO. (n.d.-b). Urban health.
 - WHO. (2015). Connecting global priorities: Biodiversity and human health: A state of knowledge review.
 - WHO. (2019, June 18). 1 in 3 people globally do not have access to safe drinking water.
 - WHO. (2020, June 5). Nature is our greatest source of health and well-being.
 - WHO. (2021a). Climate change and health. Fact sheets. <https://www.who.int/news-room/fact-sheets/detail/climate-change-and-health>
 - WHO. (2021b, September 31). Mental health and forced displacement.
 - WHO. (2022). Mental health and climate change: Policy brief.
 - Williams, P. C. M., Beardsley, J., Isaacs, D., Preisz, A., & Marais, B. J. (2023). The impact of climate change and biodiversity loss on the health of children: An ethical perspective. *Frontiers in Public Health*, 10. <https://doi.org/10.3389/fpubh.2022.1048317>
 - WMO. (2022). State of the climate in Africa 2021.
 - Woodland, L., Ratwatte, P., Phalkey, R., & Gillingham, E. L. (2023). Investigating the health impacts of climate change among people with pre-existing mental health problems: A scoping review. *International Journal of Environmental Research and Public Health*, 20(8). <https://doi.org/10.3390/ijerph20085563>

unitedgmh.org

