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## Investigating the psychological impact of climate disruption: Deciphering the nexus between climate change and mental health

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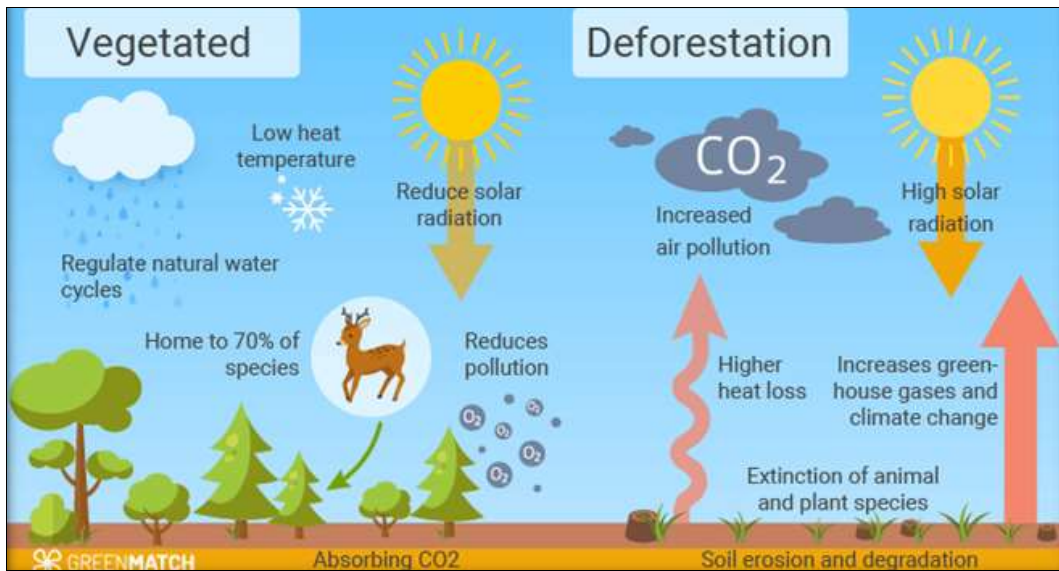
### Abstract

As global temperatures rise and climate patterns shift, the effects of climate transformation on mental health have become an increasingly vital area of research. This exploration investigates how rising temperatures, extreme weather events, and changing landscapes contribute to heightened levels of anxiety, depression, and aggressive behaviors among diverse populations. It also addresses the growing prevalence of climate-related stressors, such as displacement, food insecurity, and loss of livelihoods, particularly impacting vulnerable communities, including low-income groups and marginalized populations. This review emphasizes the urgent need for integrated mental health strategies within broader climate adaptation and mitigation efforts. It delves into the complex relationships between environmental changes and mental health, highlighting the diverse and often interconnected effects of climate change on psychological well-being. Furthermore, it underscores the importance of community-based interventions, support systems, and policy frameworks that prioritize mental health in the context of environmental sustainability and resilience. By fostering collaboration between mental health professionals, environmental organizations, and policymakers, more effective strategies can be created to address the psychological impacts of climate change while promoting overall community well-being and resilience in the face of future environmental challenges.

**Keywords:** Climate change, ecological effects mental health, psychological well-being, vulnerable populations, coping mechanisms

### Introduction

The word "climate" originates from the Greek term "klima," meaning "slope" or "inclination." In ancient times, it described the angle of the Earth's surface in relation to the sun, influencing local weather and temperature<sup>[1]</sup>. Over time, this definition evolved to encompass long-term patterns of temperature, humidity, and precipitation in specific regions<sup>[2]</sup>. Today, climate change represents one of the most pressing global challenges. Driven largely by human activities such as the burning of fossil fuels, deforestation, and industrial processes these actions have led to an unprecedented rise in greenhouse gas emissions. This has resulted in rising temperatures, extreme weather events, and shifting ecosystems (Figure 1)<sup>[3]</sup>.



Courtesy: <https://www.greenmatch.co.uk/blog/environmental-impact-of-deforestation>

**Fig 1:** Climate change: urgent crisis from human actions

The impacts are profound and far-reaching, threatening food security, water supplies, and public health, while exacerbating existing social inequalities [4]. Moreover, the interplay between climate change and mental health is an emerging concern, revealing significant psychological effects stemming from environmental changes [5]. Addressing this crisis demands urgent action and international cooperation. A transition towards sustainable

practices, mitigation of environmental footprints, and investment in renewable energy are essential steps. By embracing these changes, a more resilient future for the planet and its inhabitants can be achieved. As extreme weather events and changing climate patterns become more common, people are experiencing increased stress, anxiety, and trauma (Figure 2) [6].



Courtesy: <https://hceegalitarian.com/5540/news/harvey-could-impact-victims-mental-health/>

**Fig 2:** Symptoms of mental health

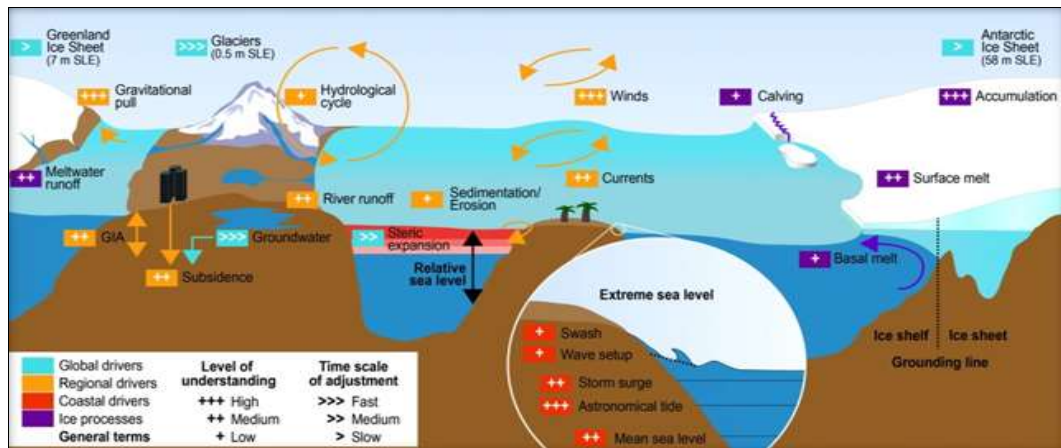
Climate change means long-term changes in weather patterns, like rainfall and temperature, and is recognized as a major global problem mainly caused by human activities [7]. In recent decades, the average temperature around the world has gone up by about 0.5 °C due to human emissions, and

predictions for 2100 suggest it could rise by 2.4-5.8 °C [8]. This warming is linked to the melting of ice caps, rising sea levels, and extreme weather events, such as floods and droughts, which affect developing countries the most (Figure 3, 4) [9].



Courtesy: <https://theunitedindian.com/news/blog?Climate-change-in-India&b=97&c=1>

**Fig 3:** Global warming leading to melting of glaciers

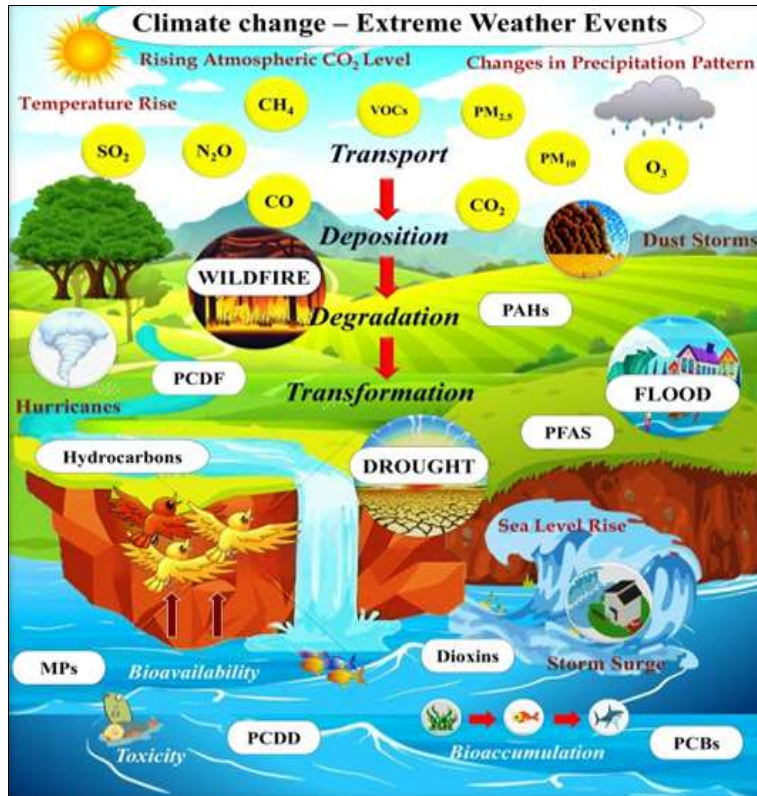


Courtesy: <https://www.ipcc.ch/srocc/chapter/chapter-4-sea-level-rise-and-implications-for-low-lying-islands-coasts-and-communities/>

**Fig 4:** Rising of sea level due to melting of glaciers

The health effects of climate change are diverse [10]. They include the spread of insect-borne diseases, injuries and deaths from severe weather, heat-related illnesses, and waterborne diseases worsened by flooding and warmer coastal waters [11]. Lower agricultural yields can lead to malnutrition [12]. Importantly, mental health is also significantly affected, particularly in developing nations, highlighting the urgent need to address both physical and mental health issues related to climate change. As temperatures rise, heat waves are expected to become more common [13]. Studies have found that higher temperatures are linked to mental health issues, including increased aggression and violent behavior, which can lead to higher

crime rates during hot summer months [14]. Furthermore, higher temperatures have been associated with rising suicide rates, especially violent suicides [15]. These worrying trends are likely to get worse as temperatures continue to rise, emphasizing the mental health challenges associated with climate change [16]. Extreme heat can cause both physical and mental exhaustion. Research shows that heat stress in the workplace is connected to greater psychological distress among workers [17]. Disasters linked to climate change, such as floods (Figure 5), hurricanes (Figure 6), and wildfires (Figure 7), often have significant psychological effects, frequently resulting in stress-related mental health disorders [18].



**Courtesy:** Posada-Baquero R, Fernandez-López C, Hennecke D, Ortega-Calvo JJ. Integrating bioavailability measurements in persistence testing of partially biodegradable organic chemicals in soil. *Sci Total Environ.* 2024; 909:168460

**Fig 5:** Interrelationship between disaster and climate change



**Courtesy:** <https://www.usatoday.com/story/life/health-wellness/2022/09/30/hurricane-ian-mental-health-struggles/8135291001/>

**Fig 6:** Hurricanes



**Courtesy:** <https://www.npr.org/2021/09/11/1035241392/climate-change-disasters-mental-health-anxiety-eco-grief>  
 People facing life-threatening situations have a greater chance of developing post-traumatic stress disorder (PTSD), which can show up as flashbacks, heightened anxiety, and avoidance of reminders of the trauma (Figure 8) [19]

**Fig 7:** Anxiety and depression due to wildfire

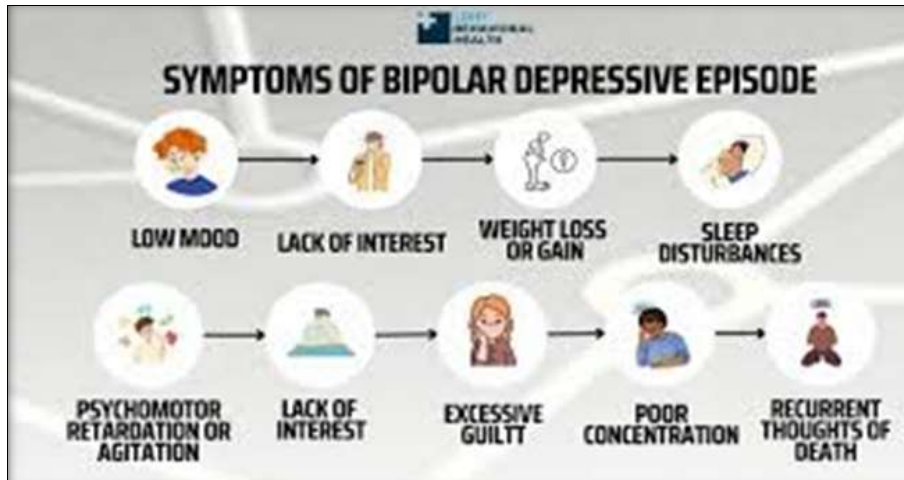


**Courtesy:** <https://www.climatecentral.org/climate-matters/climate-change-and-mental-health>

**Fig 8:** Symptoms of PTSD

Symptoms of PTSD might not appear until months or even years after a disaster, negatively affecting quality of life [20]. Extreme heat impacts more than just the body; exposure can lead to increased hospital and emergency room admissions for individuals with mental health or psychiatric conditions, a rise in suicide rates, and greater alcohol use to cope with stress. Over time, rates of depression and PTSD rise, along with increased substance abuse, child abuse, and domestic violence [21]. Ultimately, the number of individuals experiencing mental health problems as a result of a natural disaster often outweighs those with physical injuries by an astounding 40 to 1 [22]. Such impacts are referred to as “population-level traumas,” similar to the COVID-19 pandemic, systemic race-based violence, and pervasive

forms of injustice [23]. Population-level traumas, alongside climate change and environmental injustice, create a widespread need for mental health support and effective coping strategies [24]. This involves cultivating resilience along with emotional and cognitive transformation, seeking new ways to navigate a changing reality. Building mental and emotional resilience alongside physical resilience in systems is essential as communities face increasingly frequent climate disasters. Individuals exposed to these disasters are also at increased risk for acute stress reactions and adjustment disorders, which may improve over time with proper care. Other stress-related conditions may include acute psychosis and relapses of bipolar disorder (Figure 9) [25].



Courtesy: <https://urpbehavioralhealth.com/bipolar-disorder/bipolar-disorder-signs-symptoms/>

**Fig 9:** Symptoms of bipolar disorder

After losing homes, environments, or loved ones, individuals often experience grief and depression, especially pronounced in small rural communities compared to larger urban areas. As the impacts of climate change grow, more people are likely to face these mental health challenges <sup>[26]</sup>. Climate change is expected to exacerbate drought

conditions, leading to increased farmer suicides as the pressures of diminishing resources take a severe toll on mental health and livelihoods (Figure 10). Changes in rainfall patterns may lead to flooding in some regions and extended droughts in others <sup>[27]</sup>.

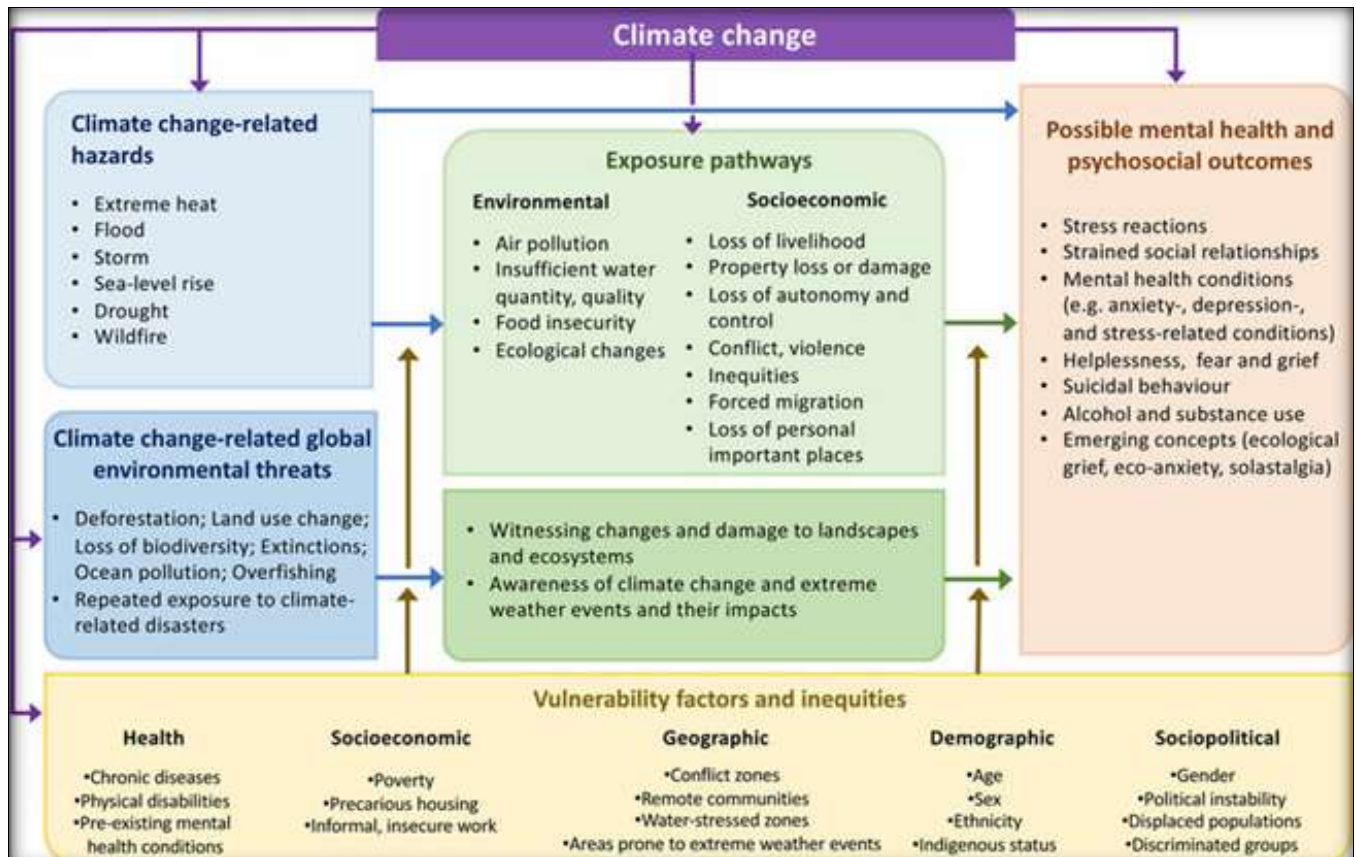


Courtesy: <https://www.munichre.com/en/risks/natural-disasters/droughts-heatwaves.html>

**Fig 10:** Climate change and drought: mental health crisis for farmers

Research has established a troubling link between drought occurrences and farmer suicides in both developed countries, like Australia, and developing nations such as India <sup>[28]</sup>. Crop failures due to unexpected droughts significantly increase suicide attempts among farmers, underscoring the urgent need for mental health support in agricultural communities <sup>[29]</sup>. Climate change poses severe risks to food security and mental health, particularly in vulnerable populations. Reduced arable land can lead to food shortages and malnutrition; especially among children <sup>[30]</sup>. Nutritional deficiencies are closely tied to mental health issues, including depression and cognitive decline <sup>[31]</sup>. The economic fallout from failed crops often traps farmers in a cycle of debt, making it difficult to support their families

<sup>[32]</sup>. Rising food prices further exacerbate malnutrition and health risks in regions with limited social services <sup>[33]</sup>. Moreover, prolonged exposure to extreme weather conditions, such as drought, correlates with increased suicide rates. The stress of relocating or seeking new employment compounds mental health challenges, particularly among farmers. Addressing these interconnected issues necessitates prioritizing mental health support and enhancing healthcare access in rural areas. This review explores the psychological impacts of climate disruption, highlighting the connection between climate change and mental health challenges, particularly in vulnerable populations facing economic instability and environmental stress (Figure 11) <sup>[34]</sup>.



**Courtesy:** Corvalan C, Gray B, Villalobos E, Prats E, Sena A, Hanna F, Campbell-Lendrum D. Mental health and the global climate crisis. *Epidemiology and Psychiatric Science* 31. 2022; 31:e86

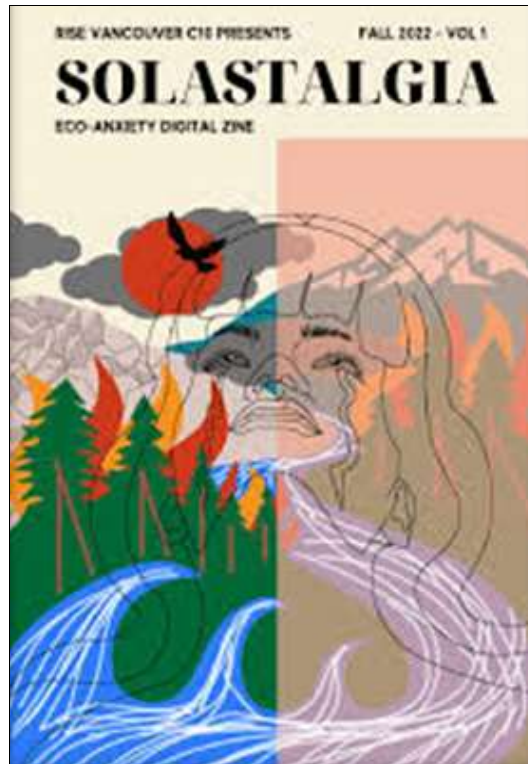
**Fig 11:** Vulnerable populations and mental health challenges

**Discussion**

The psychological impacts of climate disruption are profound, leading to economic instability and heightened stress. Understanding these effects is essential for developing effective interventions, particularly for those facing the dual burdens of climate change and mental health challenges [35]. Individuals with pre-existing mental health conditions are particularly vulnerable to extreme weather events, and the disruptions to health services can exacerbate their struggles. Additionally, many experience eco-anxiety ongoing stress about the future which is most prevalent among young people [36]. The economic impacts on agricultural communities are significant. Rising sea levels, droughts, and flooding threaten arable land, while extreme heat can diminish productivity due to worker fatigue [37]. Declining agricultural yields adversely affect related industries, intensifying economic challenges and exacerbating mental health issues [38]. Research indicates that drought-prone areas often have lower socioeconomic status, heightening feelings of distress and helplessness [39]. Prolonged droughts contribute to worsening economic conditions, leading to increased depression and demoralization [40]. Adolescents in these regions report rising distress levels, and economic pressures can erode social capital, undermining overall well-being [41]. Women, in particular, may be vulnerable to these declines, especially when migrating for work, which can further impact family

welfare [42]. Financial constraints limit access to healthcare, particularly mental health services, and during economic hardships, communities often struggle to provide adequate treatment. This results in insufficient care options, especially in developing countries, perpetuating a cycle of mental health challenges and economic instability [43].

**Migration and acculturation stress:** Climate change is expected to trigger shifts in habitats and ecosystems worldwide [44]. The submergence of coastal areas, hurricanes, floods, and prolonged droughts are likely to drive both regional and international migration [45]. Mental health research suggests that migration is associated with acculturation stress, which can lead to psychiatric disorders [46]. For instance, migrants often experience higher rates of schizophrenia compared to both the host population and their communities of origin [47]. The reasons behind migration can significantly influence the likelihood of developing psychological issues; individuals compelled to move due to conflict or disasters are more susceptible to psychiatric conditions than those who migrate voluntarily [48]. People typically form strong attachments to their environments, and "solastalgia" describes the distress that arises from the degradation of familiar surroundings (Figure 12) [49].



Courtesy: <https://www.placeness.com/solastalgia-or-the-distress-caused-by-the-loss-of-familiar-places/>

**Fig 12:** Understanding solastalgia: emotional impact of migration

This discomfort is expected to intensify with climate change as ecological balances shift and climatic conditions evolve across vast regions of the globe [50]. Solastalgia is a term coined in 2003 by Australian professor Glenn Albrecht to refer to the "place-based distress" that people experience when their living environments are negatively impacted by environmental changes over which they have no control [51]. This concept has rapidly gained recognition as a way to describe various forms of eco-anxiety and psychological

syndromes associated with both artificially and naturally caused environmental damage, especially in relation to climate change [52].

**Connection between physical illnesses and mental health:** Mental health is intricately linked to physical health (Figure 13). Poor physical well-being and medical conditions can lead to a diminished quality of life and psychological distress [53].



Courtesy: <http://spaceforgrowthclinic.com/sociology/climate-change-mental-health-mental-wellbeing-affected-world-around-us/>

**Fig 13:** Linking physical and mental health interrelationship



Often, the emotional turmoil stemming from medical illnesses does not meet the criteria for a severe psychiatric disorder but may warrant a diagnosis of adjustment disorders [54]. Nevertheless, the anxiety and depressive symptoms associated with physical illnesses require attention and can be effectively addressed through treatments like antidepressants and counseling. It is widely acknowledged that many physical illnesses are likely to increase with climate change [55]. Events related to heat,

drought, and flooding are expected to contribute to higher rates of cardiovascular, respiratory, gastrointestinal, and renal disorders [56]. Environmental factors such as pollen, smoke, dust, and stagnant water resulting from heat, drought-related fires, and floods are likely to negatively impact human health, leading to chronic physical diseases (Figure 14). The occurrence of chronic physical disorders can directly or indirectly affect mental health due to the strain on coping mechanisms [57].



**Courtesy:** Stowell JD, Anenberg S, Zaitchik BF, Tong DQ, Horwell CJ, Stolle DP, *et al.* Health-damaging climate events highlight the need for interdisciplinary, engaged research. *GeoHealth*. 2024; 8:e2024GH001022.

**Fig 14:** Impact of climate events on health

**Effect of adaptation and mitigation measures:** Adaptation and mitigation measures aim to make individual adept to the changing environment and attempt to reduce environmental change in the future, respectively [58]. Such measures by themselves may lead to change-related mental health risks through various causal pathways. For example, adaptation to the work situation can have some risks to mental health [59]. For places which do not have air-conditioners, increase in ambient temperatures might lead to decreased productivity in the day time when the temperatures are high [60]. For workers who are paid subsistence rates in developing countries, avoidance of work in excess heat may result in reduced incomes and growing poverty [61]. If they attempt to compensate with extending their work hours or at night, it may impair their family and social relations, leading to reduced buffer for development of mental illness [62]. Similarly, traveling between continental cities through trains and buses for the purpose of work may reduce the carbon emissions due to airlines. However, it may result in time expense and less actual time for the business purpose [63]. This might also mean greater time spent on travel which could have been rather utilized with other family members or friends, or for cultivating recreation. Having lesser time for social interaction in a familiar and desirable situation is likely to have an impact on mental health secondarily [64]. In light of the likelihood that climate change will influence

human mental health in various ways, it is vital to implement actions to either reduce global warming over time or develop strategies to address the challenges through adaptation [65]. Mitigating greenhouse gases involves decreasing dependence on fossil fuels, developing and utilizing alternative energy sources, minimizing encroachment on green spaces, and enacting similar measures [66]. An increasing global consensus underscores the necessity of lowering the carbon footprint per person in the coming decades while addressing disparities between affluent and less wealthy nations [67]. Addressing the challenges posed by climate change requires cross-sectoral and international collaboration to establish policies aimed at reducing greenhouse gas emissions. Countries such as India have also outlined their approaches to tackle the impacts of climate change [68]. The National Action Plan on Climate Change (NAPCC) details the Indian government's strategy on this issue. The eight missions emphasized by the NAPCC include the National Solar Mission, National Mission for Enhanced Energy Efficiency, National Mission for Sustainable Habitat, National Water Mission, National Mission for Sustaining the Himalayan Ecosystem, Green India Mission, National Mission for Sustainable Agriculture, and National Mission on Strategic Knowledge for Climate Change (Figure 15) [69].



Courtesy: <https://www.pmfias.com/national-action-plan-climate-change/>

**Fig 15:** Eight key missions of India's NAPCC

Each mission aims to mitigate climate change or lessen its impacts. The effectiveness of these policies will need to be evaluated. In the meantime, it is crucial to provide adequate treatment facilities for managing mental health issues, particularly those related to natural disasters, when vulnerability to stress is heightened [70]. Existing treatment infrastructures may be compromised during disaster situations, necessitating support from professionals in other regions. Promoting positive mental health is another approach to alleviating psychological distress linked to climate change [71]. Human resilience and coping strategies can help mitigate mental health stressors. Techniques such as yoga can serve as indigenous and culturally acceptable methods for managing stress [72]. Additionally, measures to reduce suicide rates resulting from the secondary effects of climate change may include debt relief or economic assistance for farmers [73]. Establishing cooperatives and protecting farmers from loan sharks could decrease suicide rates associated with crop failures [74]. Furthermore, providing subsidies and guaranteed income during drought seasons might alleviate the economic and psychological stress faced by farmers [75]. Responses to climate change can encompass multiple perspectives. It may be beneficial to combine the most effective solutions to create a coherent, implementable, and impactful response to the challenges posed by climate change. Continuous refinement of these solutions should be guided by systematic evidence gathered over time [76].

**Mental health needs in India:** Despite the widespread mental health needs, millions of people in India live in areas lacking sufficient mental health professionals. The country's mental health and human services systems are not equipped to support the significant number of individuals who experience mental health issues. This gap is expected to widen over time, compounded by barriers such as high treatment costs, stigma, systemic injustices, and other factors that discourage individuals from seeking help [77].

**Community initiatives:** Recognizing these challenges, various organizations in India are advocating for enhanced public health and community-based initiatives aimed at fostering mental wellness and resilience [78]. The goal of these community-based mental health initiatives is to build pre-traumatic mental resilience and strong social connections that support individual well-being during times of stress, whether from climate change, violence, or other pervasive societal issues [79]. Several targets have been developed to facilitate this: To effectively address mental health needs, it is crucial to promote universal awareness across all age groups through education, workshops, community gatherings, and public messaging [80]. Mapping social and physical vulnerabilities within communities will help tailor responses to their specific needs. Establishing diverse and culturally relevant trauma healing opportunities such as support groups, healing circles, expressive therapies, and nature-based therapies can resonate with various demographics [81]. Targeted initiatives for marginalized populations, including pregnant women, children, Indigenous communities, and those with pre-existing health conditions, are essential. Additionally, implementing environmental strategies to enhance community resilience, like water management, green space preservation, and ecosystem restoration, can create local employment opportunities [82]. Training community leaders on historical traumas and equipping organizations with evidence-based skills for self-regulation and community building is vital. Continuous feedback from community members should be encouraged to refine strategies, while leveraging social and traditional media can further spread awareness and engage the community effectively [83].

**Legislative initiatives:** On a legislative level, there is a push for new policies that support community mental wellness and resilience in India. Initiatives may include establishing grant programs to create or expand community-based mental health programs using a public health approach.

These proposals aim to enhance community capacity to address the mental health impacts of natural disasters and the broader effects of climate change [84].

**Global perspective:** Globally, programs such as COP2 (Care of People x Planet) are working to create a network of regional hubs to build psychological resilience, with a target of reaching billions of individuals. The focus of these efforts is to provide expertise and funding for locally relevant and innovative work that connects people to their communities and environments, fostering long-term care for the earth and its inhabitants. Overall, addressing the mental health

challenges posed by climate change and societal stressors in India requires a multi-faceted approach that prioritizes community resilience and well-being [85].

**Solutions:** Addressing the nexus of climate disruption and its psychological impact requires a multifaceted approach. First, implementing community-based mental health support programs tailored to those affected by climate-related events can provide essential services [86]. Education and awareness campaigns are crucial for promoting understanding of the psychological effects of climate change, helping to destigmatize mental health issues (Figure 16) [87].



Courtesy: <https://www.psychiatry.org/news-room/apa-blogs/public-mental-health-challenge-climate-change>

**Fig 16:** Transforming mental health responses to climate disruption

Additionally, resilience training workshops can equip individuals with coping strategies for managing climate-related stressors. Financial assistance and resources should be provided to affected communities to alleviate economic pressures tied to climate disruption. Strengthening community support networks fosters social connections and mutual support among those impacted [88]. Ongoing research and data collection will enhance our understanding of the psychological impacts of climate change, informing effective interventions [89]. Promoting sustainable agricultural practices can mitigate the effects of climate change, benefiting both the environment and farmers' mental well-being. Finally, policy advocacy is essential to ensure that efforts addressing climate change and mental health are integrated, creating comprehensive solutions to these interconnected challenges [90].

**Future prospects:** As climate change intensifies, understanding the intricate connections between environmental disruptions and mental health becomes increasingly vital. Future research should focus on several key areas:

- 1. Longitudinal studies:** Investigating the long-term psychological effects of climate-related disasters on affected communities to identify trends and potential interventions.
- 2. Vulnerability assessments:** Determining which

populations are most susceptible to mental health issues stemming from climate change, particularly marginalized and low-income groups.

- 3. Preventive measures:** Developing and promoting mental health resources and support systems for communities facing climate-related challenges.
- 4. Policy integration:** Advocating for the inclusion of mental health considerations in climate action plans and disaster preparedness strategies.
- 5. Community resilience:** Exploring how community engagement and social support can mitigate psychological impacts and enhance resilience amid climate disruption [91].

Enhancing studies on the effects of specific climate-related events such as extreme weather and prolonged droughts will help identify vulnerable populations and high-risk areas [92]. Integrating mental health services into climate adaptation and disaster response strategies is essential, alongside training mental health professionals to address climate-related issues [93]. Strengthening social cohesion through initiatives that foster resilience and participation can further alleviate the psychological impacts of climate change [94]. Special attention should be given to marginalized groups, such as farmers and low-income populations, providing tailored mental health support to meet their unique challenges [95]. Public awareness campaigns highlighting the

mental health impacts of climate change will empower communities to recognize and address these issues<sup>[96]</sup>. Advocacy for policies linking environmental sustainability with mental health is crucial, encouraging collaboration among governments, non-governmental organizations (NGOs), and mental health organizations to prioritize mental health in climate action plans<sup>[97]</sup>. Additionally, leveraging technology such as telehealth and mental health apps can improve access to care, especially in rural and underserved areas, facilitating early intervention and ongoing support for those affected by climate-related stressors<sup>[98]</sup>. By proactively addressing these areas, communities can better prepare for the mental health challenges posed by climate change, fostering resilience and promoting overall well-being in a changing environment<sup>[99]</sup>.

### Conclusion

Climate change is expected to impact mental health in various ways. Droughts, floods, rising sea levels, and increasing temperatures can lead to heightened psychological distress through several mediators. These include economic strain, migration and acculturation stress, reduced social capital, and traumatic events, among others. To address the challenges posed by climate change, enhancing access to mental health services and implementing strategies for climate change mitigation will be essential responses in the future. The intricate relationship between climate change and mental health highlights the urgent need for comprehensive strategies to address this crisis. Climate-related events threaten both physical and mental well-being, leading to increased anxiety, depression, and other psychological disorders, particularly among vulnerable populations facing displacement or loss. To effectively mitigate these impacts, a multifaceted approach is essential. This includes enhancing community-based mental health support, raising awareness about the psychological effects of climate change, and fostering resilience through education and resource accessibility. By prioritizing mental health within climate action frameworks, we can better support affected individuals and communities. Addressing this nexus is crucial for safeguarding public health and ensuring a sustainable future.

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