



Original Research Paper

The Impact of Environmental Changes on Mental Health in Vulnerable Populations Focusing on Depression and Anxiety in Humans and Animals

Aziza Djurabekova^{1*}, Murodulla Karimov², Gulnara Abdiniyazova³,

Azizov Azizbek Sabitkhanovich⁴, Rashid Hamroyev⁵, Mokhira Holmatova⁶

^{1*}Professor, Head, Department of Neurology, Samarkand State Medical University, Samarkand, Uzbekistan. Email: aziza508@mail.ru, ORCID: <https://orcid.org/0000-0001-6397-9576>

²Head, Department of Traumatology, Orthopedics and MFS, Tashkent State Medical University, Tashkent, Uzbekistan. Email: m.karimov@mail.ru, ORCID: <https://orcid.org/0000-0002-9867-2176>

³Senior Researcher, Faculty of Biology, Department Agroecology and Introduction of Medicinal Plants, Karakalpak State University named after Berdakh, Nukus, Uzbekistan. Email: gulnarabd29@mail.ru, ORCID: <https://orcid.org/0000-0002-3792-2522>

⁴Turan International University, Namangan, Uzbekistan. Email: science@tiu-edu.uz, ORCID: <https://orcid.org/0000-0001-9210-7582>

⁵Department of Basic Medical Sciences, Faculty of Medicine, Termez University of Economics and Service, Uzbekistan. Email: rashid_xamrayev@tues.uz, ORCID: <https://orcid.org/0009-0003-0249-3793>

⁶Department of Foreign Languages, Jizzakh State Pedagogical University named after A. Kadiri, Jizzakh Republic of Uzbekistan, Jizzakh, Uzbekistan. Email: mohira2292974@gmail.com, ORCID: <https://orcid.org/0009-0002-6736-3394>

Key Words	Abstract
Environmental change, Mental health, Vulnerable populations, Depression, Anxiety, Animal welfare, Eco-psychology, Resilience, Climate adaptation.	The climate crisis is a major contributor to environmental change, which is a rapidly rising global health challenge with intense mental health effects. Most vulnerable groups are characterized by socioeconomic status, as well as geographical exposure and pre-existing health status, and the latter results in disproportionately high psychological burden that is most often expressed in an increased number of signs of depression and anxiety symptoms. The mechanisms of how environmental stressors (both acute events (natural disasters) and chronic changes (rise in temperature, limited resource availability, etc.) directly and indirectly worsen these mental health disorders are under study in this study. Through an integrative review of international research, the study summarizes the information that proves that intermediate variables like livelihood loss, displacement, and food insecurity are the primary interaction channels between environmental changes and psychological distress. This research also highlights the emerging mental health challenges in animal populations, particularly in species experiencing habitat loss, food insecurity, and other environmental stressors. The major conclusions are that not only acute traumas but also the chronic concern of eco-anxiety have a considerable adverse effect on the well-being of the exposed communities, both human and animal, and therefore, there is a need to respond to it on a special public health level. Our conclusion is that the only way of properly managing this crisis is to urgently incorporate mental health assistance in climate change adaptation policies, with the primary focus on resilience-building and equal resource distribution to curb the growing psychological cost of a shifting climate.

* Corresponding Author's email: aziza508@mail.ru

Received: 10 May 2025; Reviewed: 15 June 2025; Revised: 9 August 2025; Accepted: 28 August 2025

(DOI): [10.70102/AEJ.2025.17.2.28](https://doi.org/10.70102/AEJ.2025.17.2.28)

Introduction and Literature Review

Background and Problem Statement

The complexity of the interdependence between the natural environment and the psychological health of a human being is at its breaking point with the growing speed of the global environmental change, becoming an important, novel aspect of the public health discourse. Their effects are not only physical risks, but also the high level of morbidity of psychological nature, which, in the first place, is the increased incidence of depression and anxiety. More importantly, this effect is not evenly distributed, with vulnerable populations, such as those in resource-poor environments, indigenous people, children, and older people, having enhanced exposure and diminished ability to handle such ensuing psychological stress factors (Mahmood et al., 2025). This essay is devoted to a strict analysis of how environmental shifts, both immediate, as occurs during natural calamities, and slow, as the desertification process, essentially contribute to the escalation of risk and intensity of specific mental health issues, i.e., depression and anxiety, in these pre-existing marginalized populations. It is global in its scope since it recognizes the various forms in which vulnerability can be expressed in ecological and social settings (White et al., 2023). Moreover, the interaction between environmental stressors and mental health issues is not limited to human populations alone; animal populations, particularly those affected by habitat loss and other climate-induced challenges, also exhibit signs of psychological distress, including anxiety and behavioral changes (Palanza, 2001).

Understanding the shared vulnerability of both humans and animals in the face of environmental changes is crucial for developing holistic health strategies that address the broader ecological impact on mental well-being (Berry et al., 2010).

Review of Existing Literature and Research Gaps

The mass of literature overwhelmingly agrees that environmental shifts, especially those blamed on anthropogenic climate change, are potent agents of psychological distress on the planet (Nori-Sarma & Galea, 2024). The repeated patterns of linking the acute environmental events, e.g., wildfires and hurricanes, with the immediate psychological trauma and the ensuing long-term disorders, e.g., PTSD, anxiety, and depressive disorders, are systematic. More so, the changes that develop gradually, such as increasing temperatures and prolonged droughts, add to the cumulative stress, the sense of loss, and the peculiar formation of eco-anxiety, an unremitting concern about the future of the planet.

An important conclusion in various research is the mediatory effect of socioeconomic status: poverty lowers the ability to recover from the ecological shock dramatically, and loss of livelihood is a key factor in chronic depression and anxiety. Moreover, certain groups, including women and children, tend to be disproportionately affected by their mental health as a result of the disproportionate lack of resources and higher caregiving expenses in times of crisis. As such, the main aim of the research is to use this background to present a contextual, inferential synthesis that sheds light

on the exact mechanisms through which environmental factors are turning out to be central, unfair determinations of mental health outcomes among vulnerable populations. It is an overall assumption that psychological well-being should not only be considered as a by-product, but as a fundamental element of environmental sustainability and climate justice (Benevolenza & DeRigne, 2019).

Research Methodology and Data

Sources

The study utilized an integrative review method of rigor to combine various scholarly materials regarding the multifaceted nature of the relationship between environmental changes and the mental health of vulnerable populations.

Search Strategy and Inclusion Criteria

The sample was found through extensive searches in major academic online databases, where structured Boolean operators were applied to find out the relevant studies using the following: climate change, environmental exposures, mental health, depression, anxiety, and vulnerable populations. The inclusion criteria mainly targeted articles, systematic reviews, and meta-analyses published in the last 20 years that clearly described the psychological effect of environmental or climatic stress factors on specific vulnerable groups. The review outlined and used a number of major systematic reviews, which provided general, high-level evidence on the subject matter (Cianconi et al., 2020).

Data Source Analysis and Integration

Moreover, to make the methodology relevant, literature that covers the specialized settings, including the problem of climate-sensitive workers occupational mental health, was incorporated. Lastly, a limited body of conceptually similar studies (but not specifically on climate change, e.g., pandemic vulnerability, biomechanical assessment) was also incorporated so as to help the assessor understand the vulnerability and stress in general populations more holistically, as a way of understanding methodological and population-level effects. This methodology and multi-layered strategy played a crucial role in developing a strong and convincing evidence base on which to construct the analysis and discussion that follows in the study.

Mechanisms of Influence

The psychological effects of environmental modifications work in a complex system of causal mechanisms that go way beyond immediate, direct trauma.

Direct Impacts, Trauma, and Acute Stress

Direct Impacts are typified by the immediate acute mental distress during an occurrence that causes severe and immediate effects (e.g., the terror, injury, and grief caused by a natural disaster, e.g., a hurricane, wildfire, etc.), and this directly causes conditions such as Acute Stress Disorder and then Post-Traumatic Stress Disorder (PTSD). This is a direct channel and tends to be traumatizing to the point of overwhelming, and as a result, it remains the

most evident channel of the environment to mental health.

Indirect Impacts, Resource and Livelihood Mediators

The most widespread indirect, Resource-Mediated Impacts are damage by the environment, which results in the loss of essential resources and stable social structures. This also involves destruction of home and infrastructure, forced displacement and chronic instability, and the disappearance of traditional livelihoods (e.g., farming, fishing) as a result of ecological degradation. The subsequent economic insecurity, as well as precarity, is closely linked to the development and perpetuation of major depression and generalized anxiety (Ridley et al., 2020).

Psycho-Social and Existential Impacts

The Psycho-Social and Existential Impact pathway is the one with the chronic, non-specific stress that occurs due to the realization of the danger posed by climate change and environmental degradation itself. Such constant anxiety and the sense of losing the future are among the reasons for the emergence of the phenomenon of eco-anxiety, which causes a deep mental state of distress and hopelessness (Soomro et al., 2024). It is essential to identify such inter-relationships because the interventions should focus on the lack of resources and psycho-social implications, and not only the acute trauma (Fritze et al., 2008).

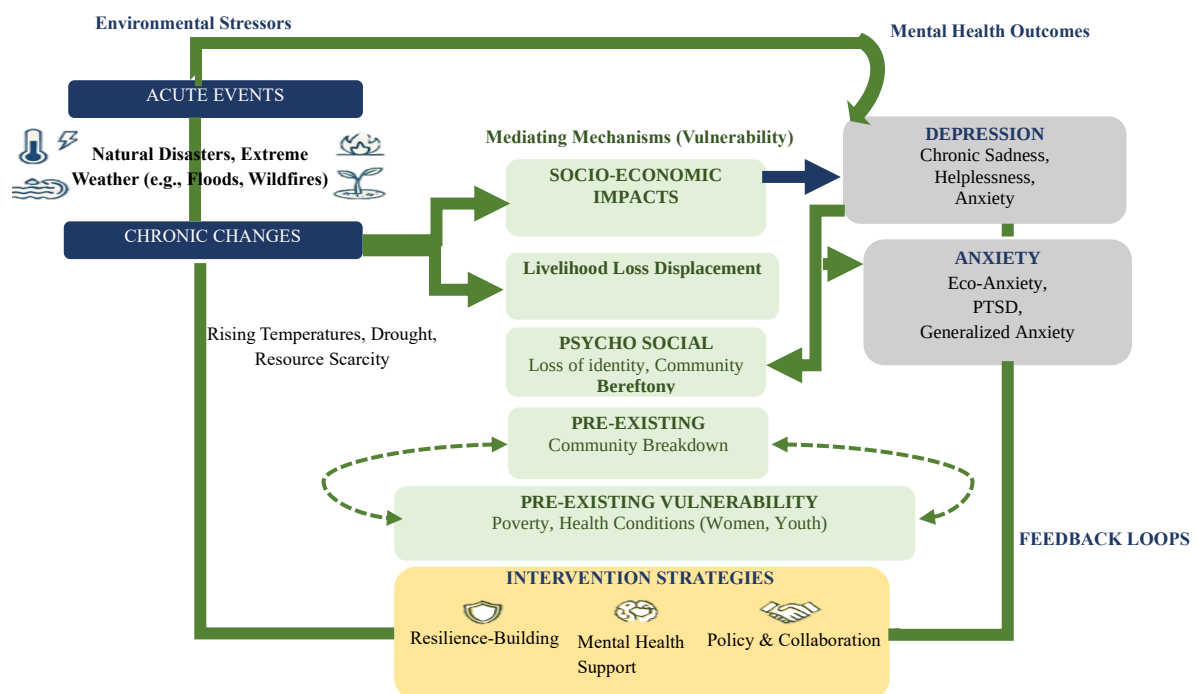


Figure 1: Causal Pathways: Environmental Change & Mental Health

The Figure of Causal Pathways diagram of the correlation between environmental change and mental health outcomes among vulnerable

populations is explained in a pictorial way in Figure 1. It demonstrates the manner in which Environmental Stressors (Acute Events such as

disasters and Chronic Changes such as increase in temperatures) and Mediating Mechanisms (Vulnerability), which encompass socioeconomic effects (lifestyle loss, displacement) and psycho-social impact (loss of identity), interact. These are direct pathways that result in the Mental Health Outcomes (Depression and Anxiety) that are observed. Most importantly, Pre-existing Vulnerability (poverty, health) produces a feedback loop, which exacerbates the effects. The last layer outlines Intervention Strategies that need to be addressed, which are related to resilience-building and policy cooperation (Trombley et al., 2017).

Socio-Demographic Vulnerability and Differential Impact

The psychological cost of environmental transformation is typified by massive inequity, and the effects are being unevenly distributed among the already vulnerable populations.

Socioeconomic and Geographical Factors

One of the key aspects is the socioeconomic status: poor people cannot be financially resilient enough to overcome the impact of environmental shocks, which increases their stress duration and moves them faster through the acute anxiety to chronic depression stages. Geographical vulnerability applies to people who live in marginalized or exposed ecological areas, including the population of the coastal regions or the population of developing countries, where the institutional and infrastructural capabilities of responding to the disaster are insufficient.

Gender, Age, and Occupational Sensitivity

Moreover, gender and age are also essential factors; research points out that women are highly vulnerable because of more caregiving tasks and socioeconomic challenges to recovery, which exacerbates their risk of eco-anxiety and depression (both to them and their children) (Rothschild & Haase, 2023). Certain work groups, like those in the agricultural sector or other work-related sectors sensitive to weather conditions, too, have a special dual stress of occupational environmental hazard and occupational job insecurity, and they play an essential role in the occupational mental health burden (Tang & Ho, 2025).

General Stressors and Baseline Fragility

In non-climate conditions, reviews support that vulnerable populations, such as youth, experience increased adverse mental health outcomes when their social supports and routines are disrupted, indicating an overall vulnerability that environmental shocks capitalize on (Reiriz et al., 2023). This dissimilar effect highlights the moral necessity of measures based on a social justice prism, in which the distribution of resources and mental health care focuses on the most significant degrees of structural and environmental susceptibility (Ausderau et al., 2023).

Results and Discussion

Observed Mental Health Outcome

The synthesis of reviewed evidence confirms that there is a powerful relationship between

exposure to change in the environment and significant changes in clinical outcomes of depression and anxiety among vulnerable groups. In the post-disaster period, acute stress has always been reported to be high after an acute environmental disaster, which often progresses to chronic Generalized Anxiety Disorder (GAD) and Major Depressive Disorder (MDD), especially in cases of long-duration recovery that is accompanied by poverty (Nicholas et al., 2020). Slow progression and chronicity of climate change led to the specific psychological syndrome of eco-anxiety, the symptoms of which include existential dread and chronic concern that impede everyday activities and directly lead to depressive symptoms (Taylor, 2020). Moreover, the economic cost of the damage to the environment, loss of agricultural spaces, and infrastructure demolition is directly associated

with a high prevalence of MDD due to the financial lack of confidence, which demonstrates a strong indirect causal relationship. Although the literature centers on human populations, the overall requirement of predictive and protective models in high-risk, resource-dependent systems, including the environmental optimization of aquacultural systems, highlights the societal requirement for proactive environmental stress reduction to safeguard the ecosystems and human living standards (Geetha, 2024). Likewise, health wearable sensors are starting to deliver granular, objective information on the physical stress (e.g., weight lifting in yoga), implying future opportunities of quantitative measurement of body-based responses to stress, such as yoga, based on the environmental pressure (Surendar, 2025).

Table 1: Synthesis of Environmental Stressors and Mental Health Outcomes in Vulnerable Populations

Environmental Stressor	Vulnerable Group	Mental Health Outcome (Depression/Anxiety Focus)
Acute Natural Disasters (Floods, Heatwaves)	Displaced Persons, Low-Income Communities	Increased Acute Trauma, Chronic Depression, GAD
Chronic Climate Stressors (Drought, Ecological Decline)	Farmers, Youth, Indigenous Communities	Eco-Anxiety, Existential Dread, Chronic Depressive Symptoms
Socioeconomic Impacts (Livelihood Loss, Precarity)	Women, Poverty-Stricken Populations	MDD and GAD are tied to financial and resource insecurity
Occupational Risk (Hazard and Uncertainty)	Climate-Sensitive Workers, Industry	Elevated Anxiety and Depression due to job instability and exposure

The main findings on the psychological impacts of the environmental change are summarized in Table 1. This synthesis illustrates that the burden of mental health is not equally distributed, but instead it is focused on specific vulnerable populations. Natural disasters are closely related to more chronic cases of depression and generalized anxiety disorder (GAD) in the low-income groups and displaced

populations (Benevolenza & DeRigne, 2019). On the other hand, the existential dread and eco-anxiety of farmers and youth are created by chronic stressors such as extended drought. Also, Major Depressive Disorder (MDD) is highly motivated by the socioeconomic stress caused by the loss of livelihood, and employees working in climate-sensitive industries experience high anxiety levels in the workplace as a result of job

insecurity and environmental risk. These results highlight the importance of specific mental health assistance in climate change response plans.

Resilience-Building and Mitigation Strategies

The debate highlights the need to shift the process of observation to practical mitigation and resilience-building measures. Since causal pathways are clearly articulated, the interventions will have to focus on the social determinants that have led to vulnerability (Berry et al., 2010). Mental health assessment should be included in the disaster preparedness and response plans in the framework of the public health policies so that the services of anxiety and depression are accessible directly and culturally sensitive (Hayes & Poland, 2018). It is reported that the promotion of hope and transformation in the community through the power of action and empowerment is a crucial process of fighting the despair of fatality in eco-anxiety. In addition, there is a necessity of integrating the awareness of mental health in the frontline services like emergency departments to help in the early identification of at-risk persons during or after an environmental crisis. It is, in the end, necessary to adopt a multidisciplinary strategy that will encompass mental health practitioners, environmental scientists, and sociologists to empower the ecological systems to withstand the mounting forces of environmental change as well as human psychological capability.

Policy Implications and Research

Directions

Policy Recommendations

The implications of the findings for local and international governance are highly substantial. First, the policymakers should see mental health as part of climate change adaptation and mitigation planning and allocate specific resources to psychological support and resiliency programs. Second, there is a necessity to put mental health equity in the center, which requires the non-proportional distribution of resources among the most vulnerable communities revealed in this overview, primarily in developing areas (Lewins et al., 2025). Third, since the problem is inter-sectoral, it is necessary to have policies that support cross-sectoral collaboration between the environmental agencies, the public health departments, and the social service providers. Such frameworks need to change their approach to responding to crises to eliminate the risks before they affect the psychological well-being.

Research Directions

Longitudinal studies that monitor mental health outcomes during many years in communities that repeatedly experienced environmental changes should be given a higher priority in the future to gain a better insight into chronic stress and recovery patterns (Fahrudin et al., 2025). The effectiveness and validity of community-based models of resilience, specifically in African and other high-risk areas, should be investigated further to create effective and scalable interventions. Finally, it is necessary

to design uniform mental health indicators that are incorporable into the current climate and health vulnerability assessments to enhance lead time and planning.

Conclusion

The study conclusively proves that the increasing environmental changes are a substantial, unfair predisposing factor to mental health that causes the risk and burden of depression and anxiety to hit the vulnerable populations in the world at a very high level. The study has followed the intricate causal processes systematically showing that psychological distress is not just a direct result of the acute events, but in most cases is a product of the chronic and resource-mediated strains of loss of livelihood and displacement. The facts reiterate the dire necessity of urgent policy intervention to correct this crisis, especially by incorporating specific mental health services in all climate change adaptation and disaster preparedness models. More importantly, any viable response should be through a prism of social justice, whereby the equitable distribution of the available resources to the most socio-economically and geographically disadvantaged communities assumes a high priority in creating psychological strength and ability to recover. With the integration of the current literature in the world, the study forms a critical call to action to confirm that there is no way of protecting mental health without the objective of environmental sustainability. Furthermore, this research underscores the importance of considering both human and animal mental health within the broader context of

environmental change. Animals, particularly those in vulnerable habitats, are similarly subjected to stressors that contribute to anxiety and behavioral shifts, making it essential to adopt a comprehensive approach that includes both species in climate change mitigation efforts. The next wave of work should be on the translational research and novel community-based interventions to protect the psychological well-being of both human and animal populations suffering from the increasing ecological crisis.

Future work

The knowledge gained from this synthesis is essential to the making of sound policy and turnaround towards making sure that the movement to environmental sustainability encompasses the preservation of psychological well-being. The priority of future work should be longitudinal studies to monitor the development of acute anxiety to chronic depression in regularly affected communities and research the effectiveness of community-based resilience models in high-risk areas. The research should also be used in developing common mental health indicators to be integrated into climate vulnerability to enhance proactive planning and allocation of resources.

References

- [1] Ausderau, Karla K., Ricki J. Colman, Sabrina Kabakov, Nancy Schultz-Darken, and Marina E. Emborg. "Evaluating depression-and anxiety-like behaviors in non-human primates." *Frontiers in Behavioral Neuroscience* 16 (2023): 1006065.

- <https://doi.org/10.3389/fnbeh.2022.1006065>
- [2] Benevolenza, Mia A., and LeaAnne DeRigne. "The impact of climate change and natural disasters on vulnerable populations: A systematic review of literature." *Journal of Human Behavior in the Social Environment* 29, no. 2 (2019): 266-281. <https://doi.org/10.1080/10911359.2018.1527739>
- [3] Berry, Helen Louise, Kathryn Bowen, and Tord Kjellstrom. "Climate change and mental health: a causal pathways framework." *International journal of public health* 55, no. 2 (2010): 123-132. <https://doi.org/10.1007/s00038-009-0112-0>
- [4] Cianconi, Paolo, Sophia Betrò, and Luigi Janiri. "The impact of climate change on mental health: a systematic descriptive review." *Frontiers in psychiatry* 11 (2020): 490206. <https://doi.org/10.3389/fpsy.2020.00074>
- [5] Fahrudin, Adi, Wanda Kiyah George Albert, Mari Esterilita, Uut Hanafi Rochman, Nazera Nur Utami, Siti Hajar Abdul Rauf, Azlini Chik, and Laila Meiliyandrie Indah Wardani. "Impact of Climate Change on Mental Health Among Vulnerable Groups: A Systematic Literature Review." *Journal of Lifestyle and SDGs Review* 5, no. 1 (2025): e02671-e02671. <https://doi.org/10.47172/2965-730X.SDGsReview.v5.n01.pe02671>
- [6] Fritze, Jessica G., Grant A. Blashki, Susie Burke, and John Wiseman. "Hope, despair and transformation: Climate change and the promotion of mental health and wellbeing." *International journal of mental health systems* 2, no. 1 (2008): 13. <https://doi.org/10.1186/1752-4458-2-13>
- [7] Geetha, K. "Digital Twin-Enabled Predictive Maintenance and Environmental Optimization Framework for Recirculating Aquaculture Systems (RAS)." *National Journal of Smart Fisheries and Aquaculture Innovation* 2, no. 1 (2024): 28-34.
- [8] Hayes, Katie, and Blake Poland. "Addressing mental health in a changing climate: Incorporating mental health indicators into climate change and health vulnerability and adaptation assessments." *International journal of environmental research and public health* 15, no. 9 (2018): 1806. <https://doi.org/10.3390/ijerph15091806>
- [9] Lewins, Amy, Alasdair Churchard, and Patrick Kennedy-Williams. "The mental health impact of the climate and ecological crisis on vulnerable populations in Africa." *Cogent Mental Health* 4, no. 1 (2025): 1-46. <https://doi.org/10.1080/28324765.2025.2500747>
- [10] Mahmood, Ridha, Philippa Clery, Justin C. Yang, Liying Cao, and Jennifer Dykxhoorn. "The impact of climate change on mental health in vulnerable groups: a systematic review." *BMC psychology* 13, no. 1 (2025): 1-30. <https://doi.org/10.1186/s40359-025-03497-z>

- [11] Nicholas, Patrice K., Suellen Breakey, Bradley P. White, Margaret J. Brown, Jenny Fanuele, Roksolana Starodub, and Ana Viamonte Ros. "Mental health impacts of climate change: perspectives for the ED clinician." *Journal of Emergency nursing* 46, no. 5 (2020): 590-599.
<https://doi.org/10.1016/j.jen.2020.05.014>
- [12] Nori-Sarma, Amruta, and Sandro Galea. "Environmental Exposures, Climate Change, and Mental Health: Impacts in Vulnerable Communities." In *Climate Change and Mental Health Equity*, pp. 339-360. Cham: Springer International Publishing, 2024.
https://doi.org/10.1007/978-3-031-56736-0_13
- [13] Palanza, Paola. "Animal models of anxiety and depression: how are females different?." *Neuroscience & Biobehavioral Reviews* 25, no. 3 (2001): 219-233. [https://doi.org/10.1016/S0149-7634\(01\)00010-0](https://doi.org/10.1016/S0149-7634(01)00010-0)
- [14] Reiriz, Manuel, Macarena Donoso-González, Benjamín Rodríguez-Expósito, Sara Uceda, and Ana Isabel Beltrán-Velasco. "Impact of COVID-19 confinement on mental health in youth and vulnerable populations: An extensive narrative review." *Sustainability* 15, no. 4 (2023): 3087.
<https://doi.org/10.3390/su15043087>
- [15] Ridley, Matthew, Gautam Rao, Frank Schilbach, and Vikram Patel. "Poverty, depression, and anxiety: Causal evidence and mechanisms." *Science* 370, no. 6522 (2020): eaay0214.
<https://doi.org/10.1126/science.aay0214>
- [16] Rothschild, Julia, and Elizabeth Haase. "Women's mental health and climate change part II: socioeconomic stresses of climate change and eco-anxiety for women and their children." *International Journal of Gynecology & Obstetrics* 160, no. 2 (2023): 414-420.
<https://doi.org/10.1002/ijgo.14514>
- [17] Soomro, Shazia, Dianen Zhou, and Iftikhar A. Charan. "Investigating associations between climate change anxiety and mental health impact on vulnerable populations: A qualitative analysis." *African Journal of Reproductive Health* 28, no. 8 (2024): 108-121.
- [18] Surendar, A. "Wearable sensor analysis of biomechanics in Yoga Asanas for posture correction." *Journal of Yoga, Sports, and Health Sciences* (2025): 1-7.
- [19] Tang, Wymann Shao Wen, and Cyrus Su Hui Ho. "A systematic review on the impact of climate change on occupational mental health: a focus on vulnerable industries." *Social Psychiatry and Psychiatric Epidemiology* (2025): 1-13.
<https://doi.org/10.1007/s00127-025-02936-x>
- [20] Taylor, Steven. "Anxiety disorders, climate change, and the challenges ahead: Introduction to the special issue." *Journal of anxiety disorders* 76 (2020): 102313.
<https://doi.org/10.1016/j.janxdis.2020.102313>

- [21] Trombley, Janna, Stephanie Chalupka, and Laura Anderko. "Climate change and mental health." *AJN The American Journal of Nursing* 117, no. 4 (2017): 44-52. <https://doi.org/10.1016/j.janxdis.2020.102295>
- [22] White, Bradley Patrick, Suellen Breakey, Margaret J. Brown, Jenny Rand Smith, Amanda Tarbet, Patrice K. Nicholas, and Ana M. Viamonte Ros. "Mental health impacts of climate change among vulnerable populations globally: an integrative review." *Annals of global health* 89, no. 1 (2023): 66. <https://doi.org/10.5334/aogh.4105>