

## Mini Review Article

## MENTAL DISORDERS EMERGING FROM THE CLIMATE CHANGE: A NEED TO MITIGATE THE ECO-ANXIETIES

SAMAN SHAHID<sup>1\*</sup>, MUHAMMAD ANWAR CHAUDARY<sup>2</sup>,  
ASMA MAJEED<sup>3</sup> AND RANA AATIF SIDDIQUE<sup>4</sup>

<sup>1</sup>Department of Sciences & Humanities, National University of Computer & Emerging Sciences (NUCES),  
Foundation for Advancement of Science & Technology (FAST), Lahore, Pakistan.

<sup>2</sup>Punjab Institute of Neurosciences (PINS), Lahore General Hospital (LGH), Lahore Pakistan.

<sup>3</sup>Department of Environmental Science, Faculty of Agriculture & Environment,  
The Islamia University of Bahawalpur, Pakistan.

<sup>4</sup>Shahida Islam Medical and Dental College, Bahawalpur Road Lodhran, Pakistan.

\*Correspondence: Email: drshahidsaman@gmail.com; saman.shahid@nu.edu.pk

### خلاصہ

پاکستان کی آب و ہوا خطرے سے دوچار ہے اور گرین ہاؤس گیسوں کے اخراج سے متعلق آگاہی اور ہنگامی تیاریوں کی اشد ضرورت ہے۔ پاکستان میں، اعداد و شمار کا تعلق انتہائی موسم اور آب و ہوا سے ہونے والی ذہنی بیماری سے بہت کم ہے۔ شدید گرمی کی لہروں کے دوران گرم موسم کے نتیجے میں دماغی صحت کے امور کا جائزہ لیا جانا چاہئے۔ ماحولیاتی تبدیلی سے گلوبل وارمنگ شہری اور دیہی دونوں آبادی کے لئے ابھرتا ہوا خطرہ ہے۔ ذہنی یا اعصابی پیچیدگیاں کا اندازہ کرنے کی سخت ضرورت ہے جو صحت عامہ کے لئے ماحولیاتی ماحول کو تباہ کن ماحول سے پیدا ہو رہی ہے۔ انسانوں میں اچھی ذہنی اور اعصابی حیثیت اور نقصان دہ اثرات سے بچنے کے لئے ماحولیاتی ایچے حالات تجویز کیے جاتے ہیں۔ ماحولیاتی آب و ہوا کے شدید حالات سے پیدا ہونے والے ذہنی صحت کے خطرات سے نمٹنے کے لئے پاکستان میں طریقوں، ماڈل اور ٹیکنالوجی کو نافذ کیا جانا چاہئے۔ فوسل ایندھن کے استعمال پر انحصار کو محدود کرتے ہوئے، توانائی سے موثر آلات کا استعمال کرتے ہوئے، کاربن کے نقشوں کو کم کرنے اور صحت سے متعلقہ امور کو کم کرنے کے ذریعے پاکستان میں آب و ہوا کی تبدیلی کے اثرات کو کم کرنے کے لئے آگاہی اور موثر تربیتی پروگرام چلائے جائیں۔ ماحولیاتی تبدیلی کی شدید صورت حال کے اثرات کو کم کرنے کے لئے تمام متعلقہ ایک ماحولیاتی فریم ورک کی منصوبہ بندی کی جانی چاہئے۔ ہم قومی رپورٹس پیش کرنے اور تیار کرنے پر زور دیتے ہیں جس سے ذہنی عارضے کی نشاندہی ہوتی ہے، جو خطوں میں موسمیاتی تبدیلی اور متنوع عالمی درجہ حرارت میں اضافے کے نمونے سے ابھر رہے ہیں۔ یہ مضمون آب و ہوا میں تغیر پذیری کے نمونوں سے پیدا ہونے والے ذہنی امور کی دستاویز کرنے کی تحقیقات کر رہا ہے۔ ہمیں عوامی بیداری پروگراموں کے ذریعے منفی آب و ہوا کے انسانی ذہنی اثرات کو کم کرنے کے لئے حصہ لینا چاہئے۔

### Abstract

The climate of Pakistan is vulnerable and there is a strong need to initiate awareness and emergency preparedness regarding greenhouse gas emission. In Pakistan, the data is scarce related to mental illness from extreme weather and climate. Mental health issues resulted from hot weather during extreme heat waves should be evaluated. Global warming from climate change is an emerging threat to both urban and rural populations. There is a strong need to evaluate mental or neurological complications which are emerging from disastrous environmental circumstances for public health. Good environmental conditions are suggested for good mental and neurological status in humans and to avoid detrimental impacts. The implicated methods, models, and technologies should be implemented in Pakistan to deal with the mental health threats posed by the severe environmental climate conditions. The awareness and effective training programs should be conducted in Pakistan to mitigate climate change impacts by limiting dependence on fossil-fuel use, using energy-efficient devices, reducing carbon footprints, and mitigating associated health issues. An eco-framework should be planned to provide all relevant guidelines to mitigate the impacts of severe climate change conditions. We emphasize presenting and preparing national reports indicating mental disorders, which are emerging from the climate-change and varied global warming patterns in the regions. This article is probing to document the mental issues arising from climate heat variation patterns, but would also indicate the appropriate preparedness from this emerging issue from the climate changes. We should take part to reduce human mental impacts of the adverse climate through public awareness programs.

**Keywords:** Climate Change, Mental Health, Eco-anxieties, Global Warming, Heat-waves, Eco-framework

## Introduction

A good environmental circumstances are suggested for good mental and neurological status in humans and to avoid detrimental impacts. The Ottawa Charter for health promotion (1986) defined the health and environment as: “*To reach a state of complete physical, mental and social wellbeing, an individual or group must be able to identify and to realize aspiration, to satisfy needs, and to change or cope with the environment. Health is, therefore, seen as a resource for everyday life, not the objective of living. Health is a positive concept emphasizing social and personal resources, as well as physical capacities. Therefore, health promotion is not just the responsibility of the health sector, but goes beyond healthy lifestyles to wellbeing*” (Fritze *et al.*, 2008). The climate of Pakistan is vulnerable and there is a strong need to initiate awareness and emergency preparedness regarding greenhouse gas emissions. In Pakistan, the data is scarce related to mental illness from extreme weather conditions and climate. The mental health issues resulted from hot weather during extreme heat waves should be evaluated. New tools and methods should be learned and implicated in Pakistan to improve eco-anxieties. Global warming from climate change is an emerging threat to both urban and rural populations. There is a strong need to evaluate mental or neurological complications which are emerging from disastrous environmental circumstances for public health. Good environmental conditions are suggested for good mental and neurological status in humans and to avoid detrimental impacts.

## Global Warming and Heat Waves

Globally, climate change's main course is manifested through global warming. The International Panel on Climate Change (IPCC) has reported its adverse consequences on natural resources and health from anthropogenic activities. (Hussain and Mumtaz, 2014). The overall temperature rise in the climates of the earth and atmosphere is due to the extensive burning of fossil fuel which releases a considerable amount of carbon dioxide. The emitted carbon dioxide pile up and deposits heat-trapping toxins into the air and hence the terms global-warming and climate change are used. The average temperature of the earth has been increased by approximately 1.5°F during the last century and this will be continued in upcoming years. The changes in climate and atmosphere induces different environmental hazards such as floods, wildfires, storms, extreme heat-waves, droughts etc. These environmental hazards impact the health significantly. Climate change and associated weather conditions also impact mental health including behaviors, mood disorders, behavioral disorders and psychological states. For proper brain function, a balanced nutrition and environment is required. It has been observed that the extreme heat from the weather can induce depression and mood swings, especially in old people and children (American Public Health Association). It has been concluded that climate and ecological changes are impacting the earth and poses human health risks. Elevation in greenhouse gases is due to anthropogenic activities. There is a great concern of mitigating greenhouse gas emissions in the atmosphere around the globe, to reduce the impacts of climate change. Rising temperatures are modifying the overall planet's temperature and that is why, rise in sea levels, increase in heat waves, and shrinking of ice sheets & glaciers are reported. The average temperature in the US has been raised by 0.83 °C from 1895. The frost-free season has been increasing in the US regions from 6-9 days (Ahdoot *et al.*, 2015; Berry *et al.*, 2011). Pakistan's climate is also found very vulnerable due to the geographical location and as agricultural land. There is a threat of health risks in the form of malnutrition, infections, heat strokes, cardiovascular diseases, and mental disorders from climate change (Malik *et al.*, 2012). Patz (2018) reported that by 2050, various US cities can experience longer duration and frequencies of heat waves. New York may experience a threefold temperature rise as compared to its current temperature. In Illinois, the high temperatures are due to the increased ozone days. These high-temperature days can induce heat-related health disorders such as heat stress, respiration problems, waterborne diseases, vector-borne diseases, gastrointestinal diseases, etc. and mental health diseases, such as even post-traumatic stress (Reichel, 2019). Maughan (2018) reported that by 2030, “approximately 250,000 additional deaths per year are expected”. It was mentioned that wildfires, tornadoes, desertification, and floods can cause mental disorders. Dementia can be developed from the putative biological pathways. In the UK, the number of suicides was increased during the temperature rise in 1995 due to the increased carbon footprints. A short term exposure to extreme weather such as tropical cyclones can worsen mental health.

## Realities

Obradovich *et al.*, (2018) combined the climate and meteorological data and reported neurological deficits in US residents during 2002-2012. It was concluded that mental & psychological health risks are anticipated from different environmental stresses. Psychological disorders can further impact immunological functions in humans. Warm temperatures can increase the frequency of other natural disasters which can lead to traumas and physical injuries. The incidences of floods, wildfires, and hurricanes can even induce depression and post-traumatic stress (Obradovich *et al.*, 2018; Reichel, 2019). Developing countries are especially expected to suffer from the intense weather heat due to poverty and lack of emergency preparedness facilities. In US adults, a rise in temperature is likely to increase mental health problems by 0.5%. Weather events of extreme heat waves have

been found associated with mental ailments such as dementia, depression, cognitive disorders, anxiety, stress, schizophrenia, etc. (Reichel, 2019; Berry *et al.*, 2010). The Australian Medical Association has recently announced climate change as a health emergency and suggested taking rapid action in this regard. American Psychological Association (APA, 2017) has mentioned the effects of climate change on mental health such as depression and anxiety (Hayat, 2019). Therefore, there should be sufficient and effective environmental policies and guidelines related to climate variations and mitigation. The assessment of mental health risks from environmental stresses and detriments are extremely important in order to reduce socio-psychological changes in populations (Wilcox *et al.*, 2013). US Global Change Research Program has issued a report related to the policies of climate change and health. Climate change probes the weather-related disasters and mental health consequences such as psychological dysfunctions, trauma, depression, and anxiety are evident (Weir, 2016; Berry *et al.*, 2010). Mental health is an important component of overall health as indicated by the World Health Organization (WHO) in 1948 and defined as, “a state of complete physical, mental and social wellbeing and not merely the absence of disease or infirmity” (Berry *et al.*, 2010). It should be noted that different types of climate variations induce different mental health impacts. Post-traumatic stress disorder is reported from floods, forest fires, and heatwaves. Psychological exhaustion is reported from extreme events of heat waves and this likely to increase in hot regions of the world. The physical injuries from the environmental extreme weather can also develop issues (Berry *et al.*, 2010).

### **Challenges for Pakistan**

The Asian Development Bank has also mentioned regarding challenges faced by Pakistan. In the past fifty years, Pakistan’s annual average temperature has raised approximately by 0.5°C. Also, the heat-wave days have increased five times in 30 years. The annual average temperature in Pakistan is anticipated to increase at least 3°C. Pakistan’s future climate change is expected to worsen due to the variations in river flows from increased precipitation and melting of glaciers. Due to increased warm temperatures, the increased use of air-conditioners is demanded, which increased the burden of nuclear and thermal power plant power generation. Significant mortalities are expected from severe heat waves. In 2012, the National Climate Change Policy of Pakistan had documented climate change policies to achieve sustainable development. Pakistan aimed to decrease 20% of the greenhouse gas emission by 2030 as described by Nationally Determined Contribution to the Paris Agreement under the United Nations Framework Convention on Climate Change. For Asian regions, the IPCC has mentioned the threats posed by climate change in agriculture-based countries such as Pakistan due to poverty, vulnerability, socioeconomic factors and specific demographics (Chaudhry, 2017). Hansen *et al.*, (2008) reported a positive correlation between high temperatures and hospital admissions from mental disorders such as neurotic stress, schizophrenia, dementia, schizotypal mood disorders, and other psychological issues.

### **Climate Anxieties**

Since 2017, and particularly since autumn 2018, there has been an increase in media coverage of eco-anxiety and climate anxiety. Greta Thunberg, a teenage climate activist who has openly expressed her concern about climate change, has been a focal point in this debate. Climate anxiety has become the most widely discussed form of environmental concern, particularly among young individuals. In the year 2020, books for the general public began to appear, offering self-help and social action solutions to ease eco-anxiety, particularly climate anxiety. The ecological catastrophe, particularly the climate crisis, leads to troubled feelings of insecurity, unpredictability, and uncontrollability, and all of which are difficult to manage (Panu, 2020). Eco-anxiety and climate anxiety are hot topics in the news these days, and they're generating a lot of research. However, a proper lack of manifestations of these events is lacking. Panu (2020) examined the diverse perspectives on environmental anxiety from a variety of professions. Empirical investigations on various forms of eco-anxiety have been discussed using insights from various anxiety theories. The majority of eco-anxiety appears to be non-clinical, although there are some examples of “pathological” eco-anxieties (Panu, 2020).

Climate change has a terrible psychological effect that has hitherto been labeled as unhappiness or concern (Stanley *et al.*, 2021). Although studies have shown that climate change causes sadness and anxiety, little attention has been dedicated to fury and wrath, or to disentangling the effects of diverse emotional responses to the climate issue on human health. Environmental anxiety and sadness were discovered to be less adaptive and associated with a lower feeling of well-being. Stanley *et al.* (2021) revealed anger as a crucial adaptive emotional driver of climate crisis participation and raised concerns about the mental health of people who are more frightened and unhappy about climate change. It has been mentioned that eco-anger occurs in conjunction with eco-depression and eco-anxiety and that each eco-emotion plays a distinct role in (de)motivating collective action behavior (Stanley *et al.*, 2021). Although the topic of climate change generally conjures up with the altered images of environmental effects and physical health problems, it also has an influence on people's mental health. It is known for a long time that climate change-related weather events and natural catastrophes have a negative influence on our mental health; these occurrences create problems including insomnia, stress, anxiety,

sadness, and the development of posttraumatic stress disorder and suicidal thoughts. However, there is little study on the mental and emotional effects of being aware of slow and steady changes in the environment of climate change. We are less conscious of the long-term consequences of climate change, such as the impact on agriculture and the viability of cities, as well as the influence on our mental health (Warsini *et al.*, 2014; Pihkala, 2018; Clayton *et al.*, 2017; Usher *et al.*, 2019). Personal concerns and the international economy, as well as personal difficulties and the corona virus, were evaluated alongside pathological anxiety and anxiety about global warming. In both pieces of research, there was a statistically significant link between pathological anxiety and concern about global warming. When the other two sources of anxiety were taken out of the equation, the link was no longer significant (Verplanken *et al.*, 2020).

### Future Implications

Following steps should be taken for research and mitigation of mental ailments arising from climate change. The data relating to the heat-intensities variations should be gathered. The data on temperature, humidity, wind speed, cloud cover, precipitation, etc. should also be collected. The respective satellite remote-sensing maps should also be collected to develop a graphical representation of the data regarding heat-variation patterns. The data should be collected related to the admission of those patients who were admitted to hospitals due to heat-wave-related mental illnesses. The data should identify the neurological issue in the local residents by interviewing through written and informed permission voluntarily. The data should consist of various questions related to the experience of any mental health issue such as anxiety, mood swing, depression, etc. An eco-framework should be planned to provide all relevant guidelines to mitigate the impacts of severe climate change conditions. The analyzed data should be used to prepare a national report indicating mental disorders, which are emerging from the climate-change and varied global warming patterns in the regions. The report should not only document the mental issues arising from climate heat variation patterns but would also indicate the appropriate preparedness from this emerging issue. The report would also document the plans for how to achieve the national goal of mitigating mental ailments arising from climate changes. The successful outcome from such researches would enable us to help reduce the mental impacts of climate and environmental disasters through public awareness programs. The generated report will help in eliminating the harmful mental impacts from severe environmental climates. A healthcare plan would be advised to help those who have been suffered from poor environmental climates and extreme weather. The results may be shared with the psychologists for further suggestions and advice.

Authors report no conflict of interests.

### References

- Ahdoot, S. and Pacheco, S. E. (2015). Global climate change and children's health. *Pediatrics*, 136(5), e1468-e1484.
- American Public Health Association and ecoAmerica. Available: <[https://www.apha.org/~media/files/pdf/topics/climate/climate\\_changes\\_mental\\_health.ashx](https://www.apha.org/~media/files/pdf/topics/climate/climate_changes_mental_health.ashx)>
- Australian Medical Association (AMA). Extreme weather and psychological distress. Available: <<http://theconversation.com/the-rise-of-eco-anxiety-climate-change-affects-our-mental-health-too-123002>>
- Berry, H. L., Bowen, K. and Kjellstrom, T. (2010). Climate change and mental health: a causal pathways framework. *International journal of public health*, 55(2), 123-132.
- Berry, H. L., Hogan, A., Owen, J., Rickwood, D. and Fragar, L. (2011). Climate change and farmers' mental health: risks and responses. *Asia Pacific Journal of Public Health*, 23(2\_suppl), 119S-132S.
- Chaudhry, Q.Z., (2017). Climate change profile of Pakistan. Asian Development Bank.
- Clayton, S., Manning, C., Krygman, K. and Speiser, M. (2017). Mental health and our changing climate: impacts, implications, and guidance. *Washington, DC: American Psychological Association and ecoAmerica*.
- Fritze, J. G., Blashki, G. A., Burke, S. and Wiseman, J. (2008). Hope, despair and transformation: Climate change and the promotion of mental health and wellbeing. *International journal of mental health systems*, 2(1), 13.
- Hansen, A., Bi, P., Nitschke, M., Ryan, P., Pisaniello, D. and Tucker, G. (2008). The effect of heat waves on mental health in a temperate Australian city. *Environmental Health Perspectives*, 116(10), 1369-1375.
- Hayat, S., (2019). Is climate change depressing you too? Available: <<https://www.dawn.com/news/1493630>>
- Hussain, M. and Mumtaz, S. (2014). Climate change and managing water crisis: Pakistan's perspective. *Reviews on environmental health*, 29(1-2), 71-77.
- Malik, S. M., Awan, H. and Khan, N. (2012). Mapping vulnerability to climate change and its repercussions on human health in Pakistan. *Globalization and health*, 8(1), 31.

- Maugha, D., (2018). Climate change: a decade of difference. Royal College of Psychiatrists. Available: <<https://www.rcpsych.ac.uk/news-and-features/blogs/detail/sustainability-blog/2018/12/18/climate-change-a-decade-of-difference>>
- Obrovich, N., Migliorini, R., Paulus, M. P. and Rahwan, I. (2018). Empirical evidence of mental health risks posed by climate change. *Proceedings of the National Academy of Sciences*, 115(43), 10953-10958.
- Panu, P. (2020). Anxiety and the ecological crisis: An analysis of eco-anxiety and climate anxiety. *Sustainability*, 12(19), 7836.
- Patz, J. A., Frumkin, H., Holloway, T., Vimont, D. J. and Haines, A. (2014). Climate change: challenges and opportunities for global health. *Jama*, 312(15), 1565-1580.
- Pihkala, P. (2018). Eco-anxiety, tragedy, and hope: psychological and spiritual dimensions of climate change: with Karl E. Peters, "Living with the Wicked Problem of Climate Change"; Paul H. Carr, "What Is Climate Change Doing to Us and for Us?"; James Clement van Pelt, "Climate Change in Context: Stress, Shock, and the Crucible of Livingkind"; Robert S. Pickart, "Climate Change at High Latitudes: An Illuminating Example"; Emily E. Austin, "Soil Carbon Transformations"; David A. Larrabee, "Climate Change and Conflicting Future .... *Zygon*®, 53(2), 545-569.
- Reichel, C., (2019). The mental health effects of climate change. Journalist's Resources, Harvard Kennedy School, Shorenstein Center on Medic, Politics and Public Policy. Available: <<https://journalistsresource.org/studies/environment/climate-change/mental-health-climate-change-research/>>
- Stanley, S. K., Hogg, T. L., Leviston, Z. and Walker, I. (2021). From anger to action: Differential impacts of eco-anxiety, eco-depression, and eco-anger on climate action and wellbeing. *The Journal of Climate Change and Health*, 1, 100003.
- Usher, K., Durkin, J. and Bhullar, N. (2019). Eco-anxiety: how thinking about climate change-related environmental decline is affecting our mental health. *International journal of mental health nursing*.
- Verplanken, B., Marks, E. and Dobromir, A. I. (2020). On the nature of eco-anxiety: How constructive or unconstructive is habitual worry about global warming?. *Journal of Environmental Psychology*, 72, 101528.
- Warsini, S., West, C., Ed, G. D., Res Meth, G. C., Mills, J. and Usher, K. (2014). The psychosocial impact of natural disasters among adult survivors: An integrative review. *Issues in mental health nursing*, 35(6), 420-436.
- Weir, K., (2016). Climate change is threatening mental health. Available: <<https://www.apa.org/monitor/2016/07-08/climate-change>>
- Willox, A. C., Harper, S. L., Ford, J. D., Edge, V. L., Landman, K., Houle, K., . . . Wolfrey, C. (2013). Climate change and mental health: an exploratory case study from Rigolet, Nunatsiavut, Canada. *Climatic Change*, 121(2), 255-270.
- World Health Organization (1948) World Health Organization Constitution. Geneva.
- World Health Organization (WHO) (1986). *Ottawa Charter for Health Promotion* First International Conference on Health Promotion, Ottawa.