

# CLEARING THE AIR: ADDRESSING THE MENTAL HEALTH IMPACTS OF POLLUTION

Kusum Jaswal

University School of Environment Management  
Guru Gobind Singh Indraprastha University

**“Pollutants not only corrupt the environment but also the mind”**

- Anon

The impact of pollution on mental health is a field that is yet to be fully studied but is gaining traction in the scientific community as new research suggests that environmental pollutants not only damage our physical bodies but our minds as well.

In this article, we further explore the effects of pollution on our mental health.

Air pollution also known as the emissions of harmful gases, fine particles, or aerosol above a specific threshold level that is harmful to the environment, economy, and human health is one of the major issues that the entire world faces today. The toxic components of air pollution include heavy metals, volatile organic compounds (VOCs), black coal, environmental tobacco smoke, carbon monoxide (CO), ozone, nitrogen dioxide and sulfur dioxide, particulate matter (PM), and larger particles.

Air pollution is known for its adverse effects on cardiovascular and respiratory health as well as increased risk of early death. However, its impact on the central nervous system has been less understood. New findings state that air pollution is also responsible for an increased risk of cognitive decline and depression.

One research states that air pollution can reach the brain through the nasal nervous system causing systemic inflammation or the toxins can also enter through the vascular system passing the semi-permeable blood-brain barrier that controls the nutrient flow. The balance of the cerebral mechanism faces heavy distortion due to the harmful effects of air pollution.

These effects are observed in the neurons which are a main component of our nervous system. Neurons receive and relay signals to and from different parts of the body and Neurons achieve this with the help of various neurotransmitter molecules that also contribute in the maintenance of our mental health. So, because of the disturbance and imbalance, mental health issues are observed.

Studies have found that air pollution damages the cognitive abilities of children and in adults increases the risk of cognitive decline and depression. Air pollution has also been linked to neurological disorders such as Alzheimer's and Parkinson's disease.

Even though there is no conclusive and sure explanation for these associations, many biological, psychological, and social implications have been proposed and supported to different degrees that state that a small increase in pollution levels has significant physical and functional changes within the regions of the brain that regulate emotions.

Following are some findings from various studies-

1. It has been discovered that human neuro-developmental processes and the Central Nervous System can be significantly impacted by air pollution, which is based on chemical emissions primarily derived from various urban and industrial activities. (CNS).
2. Studies also indicate that PM levels are linked to mental health decline, and prolonged exposure to PM 2.5 can raise the chance of depression and Autism Spectrum Disorder. Additionally,

there have been more instances of depression and anxiety than normal due to the elevated levels of NO<sub>2</sub> in the summer and PM 10 in the winter. Self-harm risk has been shown to rise with short-term increased exposure to NO<sub>2</sub>, PM<sub>10</sub>, and PM<sub>3</sub>.

3. During fetal life, exposure to air pollutants may be a significant risk factor for neurodevelopmental disorders such as autism and major psychoses like schizophrenia.

4. It has also been reported that air pollutants, PM particularly, encourage oxidative stress and children who are exposed to emissions face redox pathways related gene mutations.

5. One study found that in India, children living in urban areas had substantially higher rates of attention-deficit/hyperactivity disorder (ADHD) than children of the same age and gender living in non-urbanized areas.

6. Carbon monoxide (CO) from vehicles, gas stoves, or tobacco smoke which can cause changes in neurodevelopment if exposed during perinatal period can pass through the placenta and get to the growing brain.

7. Increased NO<sub>2</sub> and SO<sub>2</sub> exposure is favorably correlated with poor mental health, anti-anxiety medication prescription, and increased suicidal ideation.

8. Living in heavily polluted regions can cause stress and worry about getting sick, which has a negative impact on mental health. The final theory explains how air pollution indirectly affects mental health by affecting people's physical health and how people who get sick frequently may also experience bad mental health.

Additionally, a person's mental health may be impacted by water pollution. Pathogens, pesticides, fertilizers, heavy metals like arsenic, mercury, and lead, and radioactive minerals like uranium have been found to be present in many water systems and may have acute or chronic effects on our bodies. However, their effects on cognition have not been looked at, with the exception of lead, which has shown that children exposed to lead are more likely to develop psychiatric disorders like depression and schizophrenia as adults.

Another most common source of stress is noise, which can be brought on by the workplace setting, home appliances, airplanes, and city traffic. Noise pollution could be categorized as an indirect pollutant because, despite the possibility of some direct biological processes involving CNS tissues, its effects on mental health are primarily mediated by stress generation. Noise pollution can contribute to mood swings, sleep issues, and depression. Children who live in noisy places have reported difficulties with problem-solving, hearing loss, reading difficulties, and frustration. It has also been reported that excess noise reduces dendritic count, alters the levels of neurotransmitters in various regions of the brain, inhibits cognition and memory, and also raises corticosteroid levels in the blood.

In conclusion, a big step towards lowering some environmental triggers of mental health symptoms is breathing cleaner air and consuming safe water. A better environment can be advantageous for better cognitive performance and greater longevity. As there is no singular treatment strategy for all mental health symptoms, we must be mindful of what we consume and also take appropriate measures to provide a wholesome, healthy life for our current and future generations.

