

# PM2.5 AND THE PUBLIC HEALTH IMPACTS IN SIOUXLAND

Updated January 2025

## What is PM2.5?

Particulate matter 2.5, also known as PM2.5, are tiny inhalable solid and liquid mixture particles. They are so small that they can only be detected with an electron microscope.

At 2.5 microns ( $\mu\text{m}$ ) wide or smaller, these particles are 30 times smaller than the diameter of an average human hair, which is 50-70  $\mu\text{m}$ .<sup>1</sup>

## Sources and Levels of PM2.5

While some come from wildfires, agricultural activities, and construction sites, most PM2.5 are formed in the atmosphere due to reactions of chemicals such as nitrogen oxides and sulfur dioxide. These are emitted from fossil fuel power plants, industrial processes, and combustion engine vehicles.

Sioux City in Woodbury County suffers from poor air quality. The city's primary air pollutant is PM2.5, where its 2021-2023 average annual value is at 8.6 micrograms per cubic meter ( $\mu\text{g}/\text{m}^3$ ).<sup>2</sup> This sits just below the Environmental Protection Agency's (EPA) standard of 9  $\mu\text{g}/\text{m}^3$  but exceeding the international standard of 5  $\mu\text{g}/\text{m}^3$  set by the World Health Organization.<sup>3,4</sup>

Siouxland's air pollution, driven by nearby coal power plants, industrial hubs, and agricultural sites, remains critically under-monitored, particularly in areas near these high-emitting facilities.



**Woodbury County, home to MidAmerican Energy's two coal plants, suffers from harmful particle pollution**

## Health Impacts

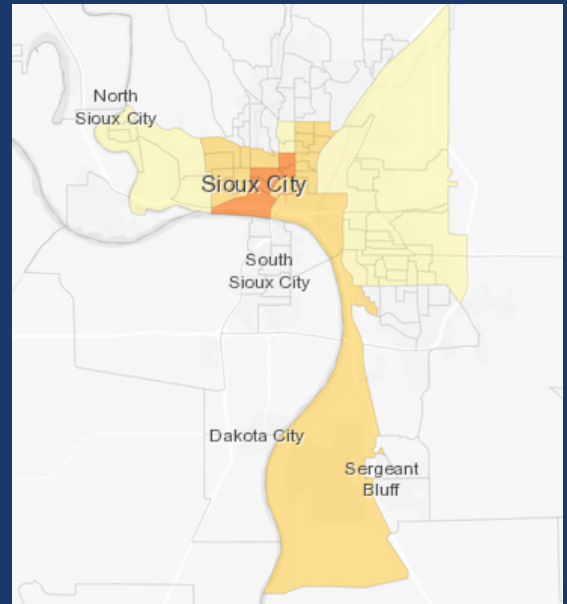
Long- and short-term exposures to PM2.5 can lead to health harms such as asthma attacks, cardiac failures, lung cancer, chronic obstructive pulmonary disease, neurological impairments, and premature death.

While humans' natural defenses allow coughing or sneezing some coarse particles out of our bodies, they do not keep smaller fine particles from penetrating the lungs and entering the bloodstream.<sup>5</sup>

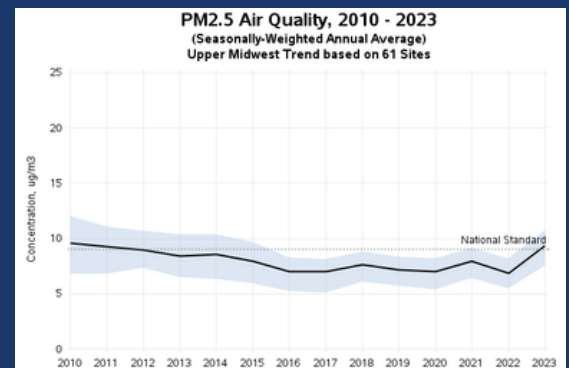
## Health Impacts

Pregnant women, infants, and children are especially vulnerable to particle pollution:

- Heightened PM2.5 exposure during pregnancy raises the risk of babies being born small for their developmental age. These effects occur throughout pregnancy, including the second and third trimesters, highlighting the consistent impact of PM2.5 on fetal growth, such as low birth weight, preterm delivery, and increased infant mortality.<sup>6</sup>
- Infants are particularly susceptible to air pollutants due to their relatively high metabolic rate with under-developed respiratory systems.<sup>7</sup> Ambient air pollution can harm their developing organs and systems, posing lasting risks to their physical and mental health.
- Particle pollution can negatively affect lung development and hinder the immune system maturation in children, who make up 25% of Siouxland's population.<sup>8</sup> Children with severe asthma in Woodbury County, which has the highest asthma rates in the state, face an elevated risk of worsening health from increased PM2.5 exposure.<sup>9</sup>



This map shows high asthma rates in Sioux City, especially in the south and central regions, at 80-90 and 90-95 percentiles respectively.<sup>10</sup>



PM2.5 average levels show a sharp incline in the Upper Midwest — from 6.8 to 9.4 µg/m<sup>3</sup> — from 2022 to 2023, exceeding the standard.<sup>11</sup>

## HOW YOU CAN TAKE ACTION FOR CLEANER AIR

Due to insufficient air quality data, enforcing standards for polluters like MidAmerican Energy remains a significant challenge. The fossil fuel corporation has burdened Iowans with over \$900 million in public health costs from one of its two Sioux City coal plants between 2015 and 2023.<sup>12</sup>

While the Iowa Department of Natural Resources needs to hold entities like MidAmerican Energy accountable, residents are also taking matters into their own hands by installing air monitors throughout the city, especially in areas with high concentrations of pollutants and asthma rates.

The Citizens Air Monitoring campaign will help generate reliable data that enables residents and leaders to make more informed decisions about air quality and public health improvements.

Find more ways to get involved  
at [cleanupmidam.com](https://cleanupmidam.com).  
Questions? Email  
[iecmal@iaenvironment.org](mailto:iecmal@iaenvironment.org).

# SOURCES

1. United States Environmental Protection Agency, [Particulate Matter Basics](#)
2. Iowa Department of Natural Resources, [Iowa Fine Particulate Monitoring Network Design Values 2021-2023](#)
3. United States Environmental Protection Agency, [National Ambient Air Quality Standards \(NAAQS\) for PM](#)
4. World Health Organization, [WHO Global Air Quality Guidelines](#)
5. American Lung Association, [Particle Pollution](#)
6. National Library of Medicine, [Effects of Pollution on Pregnancy and Infants](#)
7. National Library of Medicine, [Ambient Air Pollution and Infant Health](#)
8. American Lung Association, [Sioux City, IA-NE-SD](#)
9. Iowa Environmental Council, [Coal in Siouxland](#)
10. United States Environmental Protection Agency, [EPA's Environmental Justice Screening and Mapping Tool](#)
11. United States Environmental Protection Agency, [Particulate Matter \(PM2.5\) Trends](#)
12. RMI, [Uneconomic Dispatch Health Impacts](#)