

Chicago ranked 2nd for worst air pollution in 2023 among major US cities, global report says

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Chicago. Credit: Unsplash/CC0 Public Domain

Chicago ranked second among major U.S. cities with the worst air pollution in 2023, its average annual concentration of dangerous fine

particulate matter almost three times global guidelines, according to a recent report. Even as national standards have tightened, pollution levels in the city still surpassed old regulations.

At one point last summer, Chicago had the poorest [air quality](#) recorded among 95 cities in the world. Experts say a major recurring issue and leading cause was pollutants carried by winds across borders and contaminating air elsewhere—such as smoke from forest fires in the Canadian province of Quebec, which blew into Chicago and other U.S. cities.

"Wildfires in Canada devastated air quality, not only in Canada itself," said Frank Hammes, global CEO of the Swiss air quality technology company IQAir. "But (they) caused a hazardous level of air quality in the United States, where multiple cities in the Midwest and Northeast saw significantly increased levels of polluted air."

According to the U.S. EPA's Region 5 office—which includes Illinois, Ohio, Indiana, Wisconsin, Michigan, Minnesota and 35 tribal nations—the wildfire smoke that this portion of the country experienced in 2023 was unprecedented.

"Historically, we have never seen anything like this in our region," said Krista Thomason, a physical scientist with Region 5's Air and Radiation Division, who participated in a panel Wednesday on Midwestern air quality. "The western portions of the United States do deal with this more frequently, but for us, it's a pretty rare phenomenon."

Sooty smoke from the wildfires reached as far south as Virginia, prompting state and local agencies to issue alerts and caution residents to reduce time outdoors. According to a new IQAir report released Tuesday, the annual concentration of small particulate matter in Chicago last year averaged 13 micrograms per cubic meter of air. In the month of

June, it averaged 28.4 micrograms per cubic meter.

This fine particulate matter, or PM_{2.5}, is smaller than or equal to 2.5 micrometers, about 30 times smaller than the width of a strand of human hair. The World Health Organization advises countries to stay below an annual average of 5 micrograms of PM_{2.5} per cubic meter of air. On the national level, the U.S. Environmental Protection Agency recently lowered annual air quality standards from 12 micrograms to 9 micrograms per cubic meter of air.

For IQAir's 2023 World Air Quality Report, scientists studied information from over 30,000 air quality monitoring stations and more than 7,800 locations in 134 countries and territories across the globe. More than 17,000 hours of data from each station was grouped by cities and weighted by population.

Because of time differences and depending on the number of monitors in a city, an average worldwide index might not paint a complete picture, according to experts such as Trent Ford, the Illinois State climatologist.

"But in general, to see cities like Chicago—which don't, citywide, have this kind of perennial problem with air quality—at the top of that list, just gives you an idea of how unusual the conditions are," Ford previously told the Tribune.

In Chicago and the Midwest

IQAir found the most polluted city, not based on size, in the United States in 2023 was Beloit, Wisconsin, which borders Illinois. Columbus, Ohio, was ranked as the most polluted major U.S. city, ahead of Chicago and Indianapolis was third. PM_{2.5} levels at the 10 most polluted major U.S. cities all exceeded WHO guidelines.

With eastern parts of Canada experiencing more wildfires than usual, the Midwest was enveloped in thick smoke as a [weather system](#) moving counterclockwise pushed air from Quebec and Ontario toward the Great Lakes.

"It was just smoke plume after smoke plume," Thomason said.

Produced by vehicle exhaust, industry emissions and forest fires, PM_{2.5} can harm human health and sometimes be deadly. Initially, this particulate matter may cause a burning sensation in the eyes and nose. But because of its small size, it can settle deep in the lungs and cross into the bloodstream.

"It is the most harmful and common air pollutant and causes the most pollution-related deaths. PM_{2.5} penetrates every cell of our bodies, from the cells in our skin to cells deep in our lungs, and even in our brain," Hammes said. "With an estimated 7 million premature deaths worldwide every year, air pollution is the greatest environmental threat to human health."

Concerns about wildfire smoke can compound Chicago's existing problems with pollution, especially in neighborhoods and parts of the city historically affected by heavy industry.

Olga Bautista, executive director of the Southeast Environmental Task Force, who also participated in the Midwest panel, said harmful air quality events disproportionately affect communities that have long struggled with air pollution.

"Southeast Side of Chicago residents are experiencing higher incidences of (chronic obstructive pulmonary disease), higher incidences of heart disease," Bautista said. "And then, we're also a community that is medically underserved. So you have a lot of sick people and not a lot of

places to get help."

One of her relatives often takes days off work to stay with her son, who has missed 50 to 60 school days every academic year because of concerns about pollutants in the air; sometimes this includes emergency room visits, she said.

"But it's not just (her)," Bautista said. "A lot of families talk about how they're being impacted."

Health issues and wage losses are often connected as people skip work or quit their jobs to care for themselves or their loved ones.

Addressing the problem

Experts and advocates say that reducing PM_{2.5} should start by addressing it at one of its primary sources: fossil fuel burning.

On Wednesday, the Biden administration and the U.S. EPA announced new emissions standards for passenger vehicles to reduce greenhouse gases and air pollutants such as PM_{2.5}.

Once in the atmosphere, the dispersal of fine particulate matter is driven mainly by weather patterns, which can be altered by climate change.

"Major weather events played a huge role in air pollution in the last year," said Christi Chester Schroeder, air quality science manager at IQAir. "With catastrophic weather events becoming more severe and frequent, projections indicate air quality issues will also become more severe."

She added that drier and hotter climate conditions make vegetation "a tender bed" for wildfires.

"The interconnected nature of climate change and air quality is pretty complicated," she said. "Wildfires are a natural phenomenon. However, they are becoming more frequent and more severe because of the effects of climate change, and what happened in Canada (last) year is a great example. As some regions are experiencing less and less rainfall, vegetation dries out and wildfires become more intense and more severe."

The problem creates a vicious cycle: As [climate change](#) increases wildfire intensity and frequency, more aggressive wildfires release more carbon dioxide into the atmosphere. More heat-trapping gases contribute to hotter temperatures, which in turn dry out vegetation and allow for more wildfires.

Because of this increased severity, early wildfire detection and response systems are crucial to reducing air pollution. Washington state, for example, has installed a network of AI-assisted cameras in remote areas to detect wildfires and proactively control them.

In California, municipalities are giving out air purifiers to residences and schools close to rail yards or busy shipping ports so they can control air quality indoors. And schools around the world that monitor air quality on-site can also use this information to limit students' time outdoors or schedule around high-pollution events.

Over 400 schools in different countries use air quality monitors and share their findings with IQAir; even that is a small portion of the data the company collects and analyzes. Still, their 2023 report doesn't include a few dozen countries because of a lack of monitoring in those locations.

"Expanding the global air quality monitoring network is crucial because data collection is really the first step in achieving meaningful impact and

addressing air pollution," Chester Schroeder said. "Data empowers communities to advocate for change and informs policy decisions."

Encouraging more citizens to engage in air quality monitoring with low-cost sensors can also fill in the gaps from limited government instruments.

The U.S. EPA Region 5 office has a loan program for portable particulate matter sensors available to individuals, community groups, schools and other organizations. In Illinois, the Morton Arboretum in Lisle and the Pontiac Public Library also provide sensor loans and training.

"The accuracy and the representativeness of what's being measured by citizens these days is good enough to give governments a very good opportunity to understand what's going on," Hammes said.

Schools and libraries can also participate in the Air Quality Flag Program, raising a colored flag according to how clean or polluted the air is on a given day. The colors—green, yellow, orange, red and purple—match the EPA's Air Quality Index scale from good to very unhealthy.

Increasing public interest and knowledge can also help people make daily choices to protect themselves. For instance, fog is generally considered poor but mostly harmless weather, however, it can also be indicative of harmful particulate matter in the air.

"A lot of people are under the assumption that they can just look ... outside and think that they understand what that means about the quality of the air. But that's actually a huge misconception," Chester Schroeder said. "So we really encourage people to look at air quality data and treat it just like you would the weather in preparing for your day."

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