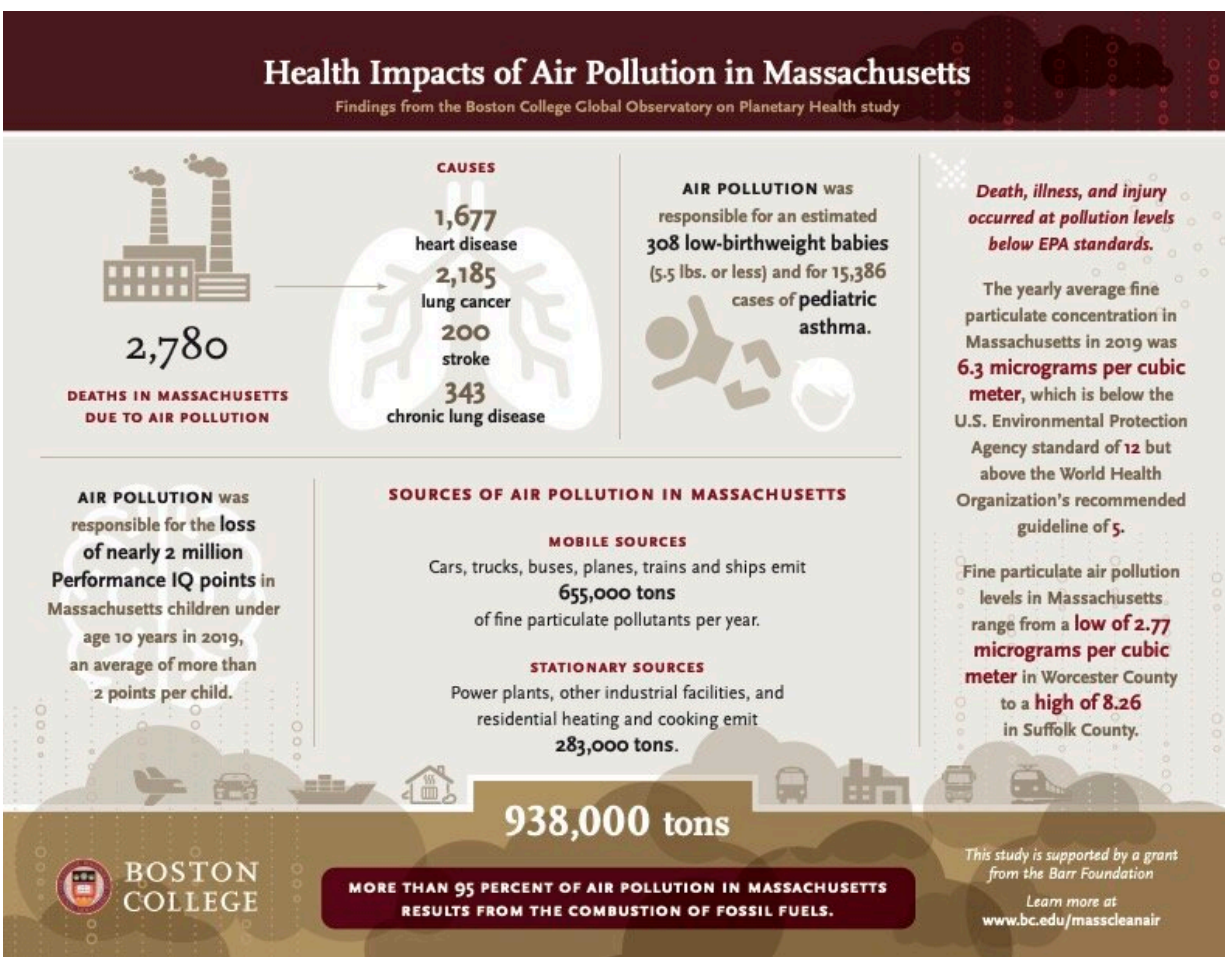


Air pollution caused 2,780 deaths, illnesses, and IQ loss in children in Massachusetts in 2019

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Air pollution, climate change, and public health are closely linked, as a new study from Boston College researchers shows. The report in the journal *Environmental Health* is the first to detail on a town-by-town basis the deaths and illnesses caused by air pollution in Massachusetts, and also outlines steps to curb

fine particulate pollutants. Credit: Boston College

Air pollution remains a silent killer in Massachusetts, responsible for an estimated 2,780 deaths a year and for measurable cognitive loss in Bay State children exposed to fine particulate pollutants in the air they breathe, according to a new study by researchers at Boston College's Global Observatory on Planetary Health.

The study was supported by the Barr Foundation and is the first to examine far-reaching public health consequences of [air pollution](#) in the state on a town-by-town basis. The study found air-[pollution](#)-related disease, death and IQ loss occur in every city and town regardless of demographics or [income level](#). Highest rates were in the most economically disadvantaged and socially underserved cities and towns.

The Boston College team estimates the cumulative impact on childhood cognitive development in Massachusetts in 2019 was a loss of almost 2 million Performance IQ points, or more than 2 IQ points for the average child, according to the report, published today in the journal *Environmental Health*. IQ loss impairs children's school performance and reduces graduation rates, the team noted.

"We are talking about the impacts of air pollution at a very local level in Massachusetts—not just statewide," said lead author Boston College Professor of Biology Philip J. Landrigan, MD, director of the Observatory. "This report gives the people in every city and town the opportunity to see for themselves the quality of the air they and their families are breathing and the dangerous health implications for both adults and children as a consequence of air pollution."

"All of these health effects occurred at pollution levels below current

EPA standards," Landrigan noted.

The average level of fine particulate pollution across Massachusetts in 2019 was 6.3 micrograms per cubic meter, and levels ranged from a low of 2.77 micrograms per cubic meter in Worcester County to a high of 8.26 in Suffolk County. The U.S. Environmental Protection Agency standard is 12 micrograms per cubic meter, and the World Health Organization's recommended guideline is 5.

"Clearly, current EPA air pollution standards are not adequately protecting public health," Landrigan said.

Town-by-town air pollution information is not typically available, given there are not enough air quality monitoring stations in the state. The team determined levels for all cities and towns using available data and computer modeling.

While Massachusetts meets federal clean air guidelines and air pollution in the U.S. has declined 70 percent since the passage of the Clean Air Act in the 1970s—when Landrigan and other scientists successfully pushed for the removal of lead from gasoline—unclean air at current levels still poses health hazards to both healthy individuals and those with other ailments or illnesses.

"We do not have the level of air pollution you see in China or India and because it is mostly invisible today people tend to forget about air pollution and we get complacent," Landrigan said. "We hope to break through this complacency and increase awareness. Air pollution is killing 2,780 people in Massachusetts each year, nearly 5 percent of all deaths in the state, and that is a big deal. Air pollution is something we can fix. We know the steps that need to be taken to reduce fatalities and the impact on our children and grandchildren. Now citizens in every city and town across the Commonwealth need to urge our elected officials to take

those necessary steps."

Additional findings include:

- Of the 2,780 deaths attributable to air pollution in Massachusetts in 2019, at least 2,185 were due to lung cancer 1,677 to heart disease, 343 to chronic lung disease, and 200 to stroke.
- Air pollution was responsible for 15,386 cases of pediatric asthma and an estimated 308 low-birthweight babies (5.5 lbs. or less).

More than 95 percent of air pollution in Massachusetts results from the combustion of fossil fuels. Cars, trucks, buses, planes, trains and ships produced two-thirds of pollutant emissions—655,000 tons—in 2017, the most recent year for which data were available. Power plants, industrial facilities, and home heating and cooking produced 283,000 tons. In all, these sources emitted 938,000 tons of pollutants.

Fossil fuel combustion is also the major source of the carbon dioxide and other [greenhouse gases](#) that drive [global climate change](#), which the researchers said should further incentivize Massachusetts to reduce air pollution and [greenhouse gas emissions](#) by transitioning to cleaner fuels.

"Air pollution harms our environment and young people, and these burdens disproportionately impact environmental justice communities," said Kathryn Wright, the Barr Foundation's Senior Program Officer for Clean Energy. "Meaningful action on climate change requires us to swiftly address air pollution from transportation and our energy system and its many harmful effects."

Fine particulate air pollution is linked to multiple non-communicable diseases in adults, including cardiovascular disease, stroke, lung cancer and diabetes. Among infants and children air pollution increases risk for

premature birth, low birthweight, stillbirth, impaired lung development, and asthma.

"All of these adverse health effects occur at fine particulate matter pollution levels below the U.S. Environmental Protection Agency's current annual standard of 12 micrograms per cubic meter," said Landrigan. "So even for a state like Massachusetts, which registered below that standard, air pollution is a formidable public health threat that needs urgently to be addressed."

The report recommends the following solutions:

- City and town officials should convert their fleets to electric vehicles, install [solar panels](#) on public buildings, preferentially purchase green electricity, prohibit gas hook-ups in new construction, and revise building codes to increase energy efficiency.
- Massachusetts authorities must urge the US Environmental Protection to tighten federal air quality standards for fine particulate pollution to better protect health. It is not acceptable that pollution should be causing disease and premature death in Massachusetts residents at legally permissible levels.
- Massachusetts must set targets and timetables for reducing air pollution emissions.
- The Massachusetts Department of Environmental Protection (DEP) must add more air monitoring stations with priority to placing monitors in economically disadvantaged and socially vulnerable communities.
- The DEP must publish an annually updated, open-source air pollution emissions inventory
- The Massachusetts Department of Public Health must create an open-access dashboard that on pollution-related disease and death in each county, city, and town in the Commonwealth.

- Massachusetts and the United States must recognize the significant health and environmental impacts of natural gas and reduce reliance on gas for power generation and heating.
- Massachusetts and the United States must accelerate the transition away from fossil fuels to wind and solar power by incentivizing renewable energy and ending tax breaks and government subsidies for the fossil fuel industry.

A web-based application developed by the Observatory offers a searchable database for air pollution impacts in each of the state's 351 cities and towns. It is available at www.bc.edu/masscleanair.

More information: A Replicable Strategy for Mapping Air Pollution's Community-level Health Impacts and Catalyzing Prevention, *Environmental Health* (2022). [DOI: 10.1186/s12940-022-00879-3](https://doi.org/10.1186/s12940-022-00879-3)

Provided by Boston College

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