

Air pollution and children's health

By Veronica Penney

A program in the Eastern United States to reduce greenhouse gas emissions from power plants also has significant health benefits for children in the region, according to a new study led by researchers at Columbia University.

The emissions program, known as the Regional Greenhouse Gas Initiative, was established in 2009 and sets a cap on planet-warming carbon dioxide pollution, giving plants emissions allowances via permit auctions and allowing them to trade those allowances.

According to the study, which was published Wednesday in the journal *Environmental Health Perspectives* and included researchers from Boston University and private groups, the program may also have reduced the number of underweight births in the region and lowered the incidence of asthma and autism by hundreds of cases.

Scientists say that's because the tiny pollution particles known as fine particulate matter, a byproduct of burning fossil fuels, when inhaled by a pregnant mother, can cross the placenta barrier and interfere with fetal development.

Frederica Perera, the lead researcher on the study, said that fine particulate matter can wreak havoc on the rapid and "highly choreographed" development of unborn babies.

The study built on earlier estimates of how much more polluted air in Eastern states would have been without the agreement. Researchers paired that data with population measurements and estimated that cleaner air between 2009 and 2014 could have prevented nearly 100 children in the region from developing autism spectrum disorder, and over 500 from developing childhood asthma. The study also found that more than 100 preterm births and more than 50 cases of low birth weight may have been avoided.

The regional initiative includes Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Rhode Island and Vermont.

The researchers looked at county-level data in those states and some neighboring downwind states. Neighborhood-level analysis would most likely have shown disparities in exposure to pollution based on race and income, Dr. Perera said, but air quality measurements at that level are generally unavailable outside big cities and would have been too

expensive for researchers to compile.

Jonathan Buonocore, a research scientist at the Harvard T.H. Chan School of Public Health, said that the study's methodology was sound, but if anything, it undercounted the value of health benefits. "If a child has a disability and needs special care and doesn't have the same life as an adult as they would have had they been born at normal birth weight, that's not included," Dr. Buonocore said.

The emissions program, often referred to as "Reggie" because of its acronym, has already surpassed its 2020 goal for carbon reductions. Proponents say it has allowed states to invest in clean energy and impose limits on big polluters. Critics counter that it could distract states from pursuing more aggressive carbon reduction policies.

The study estimated that air quality improvements in the region and subsequent child health improvements have resulted in \$200 to \$350 million in economic benefits. That's in addition to the \$5.7 billion estimated by a 2017 study of the carbon dioxide initiative's health benefits for adults.

"Dollars cannot possibly capture the cost in terms of the psychological cost and the disruption of the family" when it comes to children with serious health problems, Dr. Perera said. But she and her colleagues decided that it was important to include economic projections in the study to counter what she called false arguments against pollution rules and regulations.

She cited the example of catalytic converters in cars, which automakers used to help meet requirements set by the Clean Air Act. The benefits of converters and other technology are estimated to have outweighed the costs 30 to 1, according to the Environmental Protection Agency.

"We've gone ahead and done it, simply because we think it does reach some people when you say, 'Not only do we have this health benefit, but we are saving money,'" Dr. Perera said.

"There are many of these exercises that really blow up that theory of false dichotomy, between health and expenditure."
