

Curbing coal-burning emissions translates to health gains for children

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Residential heating by coal has for decades been the major contributor to the high levels of air pollution in Krakow, Poland. New research finds a nearly 40% decline in the annual average concentration of respirable particulate matter (PM_{2.5}) in Kraków, Poland, between 2010 and 2019 following the implementation of policies targeting emissions from the

burning of coal and other solid fuels.

Researchers show the improvement in [air quality](#) translated to substantial benefits for children's outcomes, including fewer cases of asthma and better birth outcomes.

The findings by researchers at Columbia University Mailman School of Public Health and Jagiellonian University Medical College in Krakow [appear](#) in the journal *Environmental Research Letters*.

The researchers modeled [health](#) gains that would have occurred in 2010 if PM_{2.5} had been at the lower level achieved in 2019 through policy changes. The benefits included 505 fewer new cases of asthma in the 1-14 age group (a 35.7% decline), 81 fewer preterm births (16.8% decrease), and 52 fewer cases of low birth weight (12.3% decrease).

They also modeled gains based on a second hypothetical, which assumed that city had adhered to the WHO's 2005 guidelines on PM_{2.5}. They found this scenario of a 74% reduction in PM_{2.5} would have avoided 780 new asthma cases in the 1–14 age group (54.5% decrease), 138 preterm births (28.3% decrease), and 90 cases of low birth weight (21.2% decrease).

In 2021, Krakow was ranked 28th out of 858 European studies in air pollution related-mortality in the ISGlobal-Ranking of Cities survey. These high levels of pollution have been attributed largely to the use of coal-burning ovens in residential spaces, and to a lesser extent transportation and power plant emissions.

Government interventions, including a co-financing program to replace coal-burning stoves in the 1990s, markedly improved the city's air quality, positively impacting children's health outcomes. However, according to researchers, levels of human-derived air pollution, such as

emissions from motor vehicles, is still a concern.

"Fetuses, infants, and children are uniquely vulnerable to air pollution," explains study senior author Frederica Perera, Ph.D., DrPH, professor of environmental health sciences and director of translational research at the Columbia Center for Children's Environmental Health at Columbia Mailman, "Our results show very large benefits can be achieved for children's health by curbing fossil fuel emissions."

"This is one of the first studies describing the impact of pollution on the Polish pediatric population," noted study first author Agnieszka Pac, MSc., Ph.D., chair of Epidemiology and Preventive Medicine at Jagiellonian University Medical College, Krakow, Poland.

"New policies must take into account children's health, especially given that children often engage in vigorous outdoor activities, making them vulnerable to higher doses of pollutants."

In earlier studies, the researchers reported a significant improvement in air quality based on personal air monitoring in our Kraków cohort study of pregnant women and their children based on personal air monitoring. They also identified links between air pollution exposure and birth outcomes, growth trajectories, lung function, developmental delays, behavioral problems, and cancer risk.

More information: Health benefits to the pediatric population from reduction of ambient particulate matter in Krakow, Poland, *Environmental Research Letters* (2024). [DOI: 10.1088/1748-9326/ad2e75](https://doi.org/10.1088/1748-9326/ad2e75)

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