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## THE GUPTA GUIDE

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## When Air Quality Improves, So Do Kids' Asthma Symptoms

— Reduced air pollution linked to fewer respiratory problems

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Declining levels of air pollution in Southern California were linked to reduced rates of asthma and other respiratory conditions in children, a small longitudinal study showed.

Reductions in ambient air pollution over the course of 20 years were associated with significant reductions in bronchitic symptoms among all children. A 47% decrease in levels of particulate matter was linked to a 32% reduction in the likelihood of bronchitic symptoms in 10-year-old children with asthma (OR 0.68,  $P=0.002$ ) and a 21% (OR 0.79,  $P<0.001$ ) reduction among 10-year-olds without asthma, reported [Kiros Berhane, PhD](#), of the University of Southern California in Los Angeles, and colleagues.

Similar results were observed for nitrogen dioxide, as a 49% decrease in the air pollutant was associated with asthmatic children being 21% less likely (OR 0.79,  $P=0.007$ ) and non-asthmatic children 16% less likely (OR 0.84,  $P<0.001$ ) to develop bronchitic symptoms.

The authors published their findings in the [Journal of the American Medical Association](#).

This was another finding linking reduced air pollution to improved child respiratory health from the Children's Health Study -- a study examining three cohorts (1993-2001, 1996-2004, and 2003-2012) in eight Southern California communities. A year ago, the study found that improvements in air quality were linked to [increased lung capacity in children](#).

Berhane told *MedPage Today* via email that while there is evidence that levels of air pollution have gone down in California, there was no scientific evidence that this has led to significant health benefits in children's respiratory health.

"Chronic respiratory symptoms in children are of significant public health and clinical concern and detrimental effects of air pollution on children's respiratory health are now well established, as manifested in an increased diagnosis of asthma, more respiratory symptoms, and impaired lung development," he said. "This evidence is based on several studies from around the world, including our own research over the last 20-plus years."

As previously described, the [Children's Health Study](#) examined 4,602 children in eight Southern California communities. Researchers measured the mean level of ambient air pollutants nitrogen dioxide, ozone, and two types of particulate matter. The families were given an annual questionnaire regarding the prevalence of bronchitic symptoms (daily cough, congestion, or phlegm other than when accompanied by a cold or bronchitis) and were included if data from two or more annual follow-up questionnaires were available.

The observed improvements in air quality from the reduction of pollution were associated with a reduced likelihood of bronchitic symptoms in both asthmatic and non-asthmatic children. Specifically, Berhane and colleagues found that associations with nitrogen dioxide and one form of particulate matter (PM 2.5) were significantly larger among asthmatic boys (OR 0.72,  $P < 0.001$ ) and asthmatic children with a family dog (OR 0.71,  $P < 0.001$ ).

While not involved with the research, [Jay Portnoy, MD](#), of Children's Mercy Hospital in Kansas City, Mo., noted that these associations remained significant even after adjusting for other factors such as race, income, obesity, exposure to tobacco smoke, having pets, and health insurance coverage.

"The lesson from this is that policies like the Clean Air Act, which provided much of the motivation to improve air quality, can lead to significant positive health benefits," Portnoy wrote in an email to *MedPage Today*. "If you have any doubts about this, you should visit Delhi, India or Beijing, China -- two beautiful cities that unfortunately do not have effective environmental regulations. Personally, I would recommend that you breathe carefully if you do so."

Overall, 892 (19.4%) of the cohort had asthma at age 10. Demographically, the sample was a mean age of 8.0 years at baseline, and was comprised of 49.3% girls and 45.2% Hispanic whites. Notably, the most recent cohort (2003-2012) had a significantly lower proportion of exposure to secondhand smoke or history of in utero exposure to maternal smoking, as well as a lower prevalence of pet ownership than the mean of the two earlier cohorts.

Limitations to the study include that the outcome measure is questionnaire-based reporting, which is relatively imprecise, as well as that possible false-positive misclassification of asthma may have underestimated the true effect of air pollution, since children with asthma are more sensitive than non-asthmatic children.

Berhane said that these health benefits of the effect of reduced air pollution on children's respiratory health have immediate clinical relevance, as well as economic, quality-of-life, and overall societal benefits.

"Health benefits were stronger in children with asthma, which could lead to better asthma control and management. But these benefits were also significant in children without asthma," he noted. "So, the health benefits are not limited to children with asthma -- all children have benefited from the improvements in air quality."

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