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Researchers quantitatively link traffic pollution to four million annual cases of childhood asthma

Researchers at the George Washington University Milken Institute School of Public Health have published the first quantitative study that links nitrogen dioxide (NO_2) in traffic pollution and new cases of asthma in children ages 1-18 years. "Global, national, and urban burdens of paediatric asthma incidence attributable to ambient NO_2 pollution: Estimates from global datasets," appeared in *The Lancet Planetary Health*.

"The study is the first to quantify the worldwide burden of new pediatric asthma cases linked to traffic-related nitrogen dioxide by using a method that takes into account high exposures to this pollutant that occur near busy roads," explained Susan Anenberg, PhD in an interview with *GW Public Health*. Anenberg is the senior author of the study and an associate professor of environmental and occupational health at the Milken Institute SPH.

"Before this study, leading estimates of the risk factors affecting global public health have not included the impacts of air pollution on asthma," she also told *The GW Hatchet*. "Our research shows that the public health consequences of air pollution are more far-reaching than previously thought."

Methods: A brief summary

According to *The GW Hatchet*, the research team "linked global datasets of NO_2 concentrations, pediatric population distributions and asthma incidence rates with epidemiological evidence relating traffic-derived NO_2 pollution with asthma development in children." This enabled them to estimate the number of new pediatric asthma cases in children ages 1-18 that could be attributed to NO_2 pollution. The study examined 194 countries plus 125 major cities worldwide.

A link between traffic pollution and childhood asthma

The researchers found that an estimated four million children worldwide developed asthma each year from 2010 to 2015 due to exposure to NO_2 pollution, which primarily comes from motor vehicle exhaust. An estimated 13 percent of annual pediatric asthma incidence worldwide was linked to NO_2 pollution. In addition, they estimated that 64 percent of the new asthma cases occurred in urban areas. The researchers noted their results may underestimate the true levels in many poorer nations where asthma often goes undiagnosed. In general, they found that cities with high NO_2 concentrations also had high levels of greenhouse gas emissions. Additional findings are shown in Table 1.

More research needed

While the findings showed that NO_2 was the key pollutant linked

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to pediatric asthma, the researchers explained they cannot rule out other pollutants, such as fine particulate matter, as a contributing factor. They also believe additional research is needed to more conclusively identify the causative agent in complex traffic emissions and that air pollution monitoring and epidemiological studies in data-limited countries would help refine estimates of new asthma cases tied to traffic emissions.

Revisiting WHO air quality guidelines?

The World Health Organization (WHO) has established air quality guidelines for NO_2 and other air pollutants. The researchers estimated that approximately 97 percent of children in the study lived in areas with NO_2 concentrations below the current WHO guideline of 21 parts per billion on annual average. However, their results showed that approximately 92 percent of the new pediatric asthma cases attributed to NO_2 occurred in areas that met the WHO guideline. Therefore, in their *Lancet Planetary Health* article, the researchers suggested "the adequacy of the guideline might need to be revisited." As Pattanun Achakulwisut, a postdoctoral scientist and first author of the study, told *GW Public Health*, "That finding suggests that the WHO guideline for NO_2 may need to be re-evaluated to make sure it is sufficiently protective of children's health."

Additional recommendations from researchers

The researchers suggested that a substantial portion of pediatric asthma incidence could be avoided by reducing NO_2 pollution in both developed and developing countries, especially in urban areas. Further, in their *Lancet Planetary Health* article, they stated, "We also found that countries and cities with higher CO_2 emissions from fossil fuel combustion tend to have higher NO_2 exposures, providing further support that alignment of policy initiatives to mitigate air pollution and climate change can have multiple public health benefits."

"Traffic pollution appears to be a substantial risk factor for childhood asthma incidence in both

Table 1

Additional Findings

Countries with the highest rates of childhood asthma cases linked to traffic pollution:

- Kuwait 550 per 100,000
- United Arab Emirates 460 per 100,000
- Canada 450 per 100,000

Largest number of asthma cases attributable to traffic pollution were estimated to be in:

- China 760,000 cases
- India 350,000
- US 240,000
- Indonesia 160,000
- Brazil 140,000

Countries with the highest percentage of pollution-related childhood asthma cases:

- South Korea 31%
- Kuwait 30%
- Qatar 30%
- United Arab Emirates 30%
- Bahrain 26%

Among the 125 cities, NO_2 accounted for 6% (in Orlu, Nigeria) to 48% (in Shanghai, China) of pediatric asthma incidence.

The top 10 highest NO_2 contributions to pediatric asthma were estimated for 8 cities in China (with 37-48% of pediatric asthma incidence) and for Moscow, Russia and Seoul, South Korea at 40%.

In the US, the top 5 cities with the highest percent of pediatric asthma cases linked to air pollution were Los Angeles, New York, Chicago, Las Vegas and Milwaukee.

The contribution of NO_2 to pediatric asthma incidence exceeded 20% in 92 cities located in both developed and emerging economies.

Sources: *BBC News* and *GW Public Health*

developed and developing countries, and especially in cities, and should therefore be a target for exposure-mitigation policies," Achakulwisut said in an email to *The GW Hatchet*.

"Our findings suggest that millions of new cases of pediatric asthma could be prevented in cities around the world by reducing air pollution," Anenberg told *GW Public Health*. "Improving access to cleaner forms of transportation, like electrified public transport and active commuting by cycling and walking, would not only bring down NO_2 levels, but would also reduce asthma, enhance physical fitness, and cut greenhouse gas emissions."

References

Content for this article was based on and excerpted from:

- Pattanun Achakulwisut, Michael Brauer, Perry Hystad, Susan C. Anenberg. Global, national, and urban burdens of paediatric asthma incidence attributable to ambient NO_2 pollution: Estimates from global datasets. The Lancet Planetary Health. Volume 3. April 10, 2019. Available at: https://www.thelancet.com/journals/lanplh/article/PIIS2542-5196(19)30046-4/fulltext.
- BBC News. One in 10 child asthma cases "linked to traffic pollution." April 11, 2019. Available at: https://www.bbc.com/news/health-47882038.
- CARE2. Traffic pollution causes 4 million childhood asthma cases every year. April 16, 2019. Available at: https://www.care2.com/causes/traffic-pollution-causes-4-million-childhood-asthma-cases-every-year.html.
- GW Hatchet. Milken researchers link traffic pollution to 4 million annual cases of childhood asthma. April 18, 2019. Available at: https://www.gwhatchet.com/2019/04/18/milken-researchers-link-traffic-pollution-to-4-million-annual-cases-of-childhood-asthma/.
- GW Public Health. New study finds millions of children worldwide develop asthma each year due to traffic-related air pollution. April 10, 2019. Available at: https://publichealth.gwu.edu/content/new-study-finds-millions-children-worldwide-develop-asthma-each-year-due-traffic-related-air.
- Grist. Traffic pollution leads to 4 million child asthma cases every year. April 11, 2019. Available at: https://grist.org/article/traffic-pollution-leads-to-4-million-child-asthma-cases-every-year/.
- The Independent. Traffic pollution results in 4 million child asthma cases every year, research suggests. April 11, 2019. Available at: https://www.independent.co.uk/news/health/asthma-traffic-air-pollution-child-uk-nitrogen-dioxide-a8864466.html.