Thirty-three percent of new childhood asthma cases in Europe attributable to air pollution

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Up to 11% of new childhood asthma cases could be prevented each year if European countries complied with the WHO PM2.5 air quality

guidelines. Moreover, 33% of new annual cases could be prevented in European countries if they were able to reduce air pollution levels to lowest levels recorded in the literature. Those are the conclusions of a study led by the Barcelona Institute for Global Health (ISGlobal), an institution supported by "la Caixa," and published in the *European Respiratory Journal*.

Asthma is the most common chronic disease in children. Emerging evidence suggests that exposure to air pollution may increase the risk of developing this respiratory disease during childhood. The new study has estimated the burden of childhood asthma in 18 European countries and more than 63.4 million children and has concluded that a large number of cases may be attributable to air pollution exposure. The attributable percentage of new annual cases varies according to each of the three pollutants studied: 33% for PM2.5, 23% for NO_2 and 15% for black carbon (BC).

The study used census population data from 18 European countries and obtained incidence rates of asthma in children from the Global Burden of Disease (GBD) study database. Exposure to the different pollutants was calculated using a harmonized European statistical model (land use regression) based on multiple measurements in Europe. To estimate the burden of childhood asthma, researchers posed two different scenarios: the first one was based on the maximum air pollution levels recommended by the World Health Organisation (WHO) air quality guidelines. The second scenario took as a reference the lowest air pollution levels recorded among 41 previous studies.

The analysis for the first scenario revealed that 66,600 childhood asthma cases (11% of the total incident cases) could be prevented per year if the 18 countries under study complied with the WHO air quality guideline for PM2.5. Compliance with the NO_2 guideline was estimated to prevent 2,400 childhood asthma cases per year (0.4% of the total incident cases).

"The analysis showed that, while meeting the WHO recommendations for PM2.5 would imply a significant reduction in the percentage of annual childhood asthma cases, that is not the case with NO_2, where 0.4% of the cases would be prevented. Therefore, our estimations show that the current NO_2 WHO air quality guideline value seems to provide much less protection than the PM2.5 guideline. We suggest that these values require update and lowering to be better suited in protecting children's health," says David Rojas-Rueda, one of the scientists who led this study at the Barcelona Institute for Global Health.

According to the results of the second scenario, if the 18 countries were able to meet the lowest levels of PM2.5 recorded by previous studies, more than 190,000 annual cases (or 33% of incident cases) could be prevented. The number of new cases that could be avoided per year if the lowest levels of NO_2 and black carbon were achieved would be 135,000 (or 23%) and 89,000 (or 15% of all incident cases), respectively.

Overall, these estimates are in line with two previous studies conducted in the UK which found that the percentage of annual incident childhood asthma attributable to NO_2 was 22%. Another study estimated that 4 million new paediatric asthma cases could be attributable to NO_2 pollution annually, 64% of which occur in urban centres.

Haneen Khreis, lead author of the study and an associated researcher at the Center for Advancing Research in Transportation Emissions, Energy, and Health at the Texas A&M Transportation Institute, believes this new analysis is "a call for urgent action." "Only in the past two years, several analyses on air pollution and onset of childhood asthma have emerged, strengthening the case from different research teams that air pollution is contributing substantially to the burden of paediatric asthma," Khreis

commented. "Largely, these impacts are preventable and there are numerous policy measures which can reduce the ambient levels of, and children's exposures to, outdoor air pollution. We can and should do something about it."

The 18 European countries covered in the study are Austria, Belgium, Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Lithuania, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom. Countries from Eastern Europe were not included due to the lack of air pollution exposure data in the region.

More information: Haneen Khreis et al, Outdoor Air Pollution and the Burden of Childhood Asthma across Europe, *European Respiratory Journal* (2019). DOI: 10.1183/13993003.02194-2018

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