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Associations between prenatal exposure to outdoor PM2.5 and NO2 and childhood respiratory symptoms

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Background:

Prenatal and early-life air pollution exposures have shown to play an important role in childhood respiratory and allergic diseases development. Our aim was to assess the effect of prenatal exposure to air pollution on several respiratory outcomes up to 12 years old.

Methods:

We included 2054 children from the PELAGIE mother-child cohort in Brittany, France, followed-up at 2-, 6- or 12-years. Parents reported children's respiratory health history, family lifestyle and children immediate environment. PM2.5 and NO2 mean concentrations throughout the pregnancy were modelled at residential address using land use regression models. Ever asthma, rhinitis, allergic rhinitis and eczema at 12-years follow-up, considered as outcomes of interest, were defined using validated questionnaires. A multimorbidity phenotype was also constructed. We performed adjusted logistic regressions per increase of one interquartile range (IQR).

Results:

Participating mothers' mean age was 30 years (SD 4.1), 88% did not smoke during pregnancy, and 82% lived in rural areas. Fifty percent of children were boys; 55% of them had parents with history of asthma and/or allergies. Pregnancy concentrations of NO2 were $18.74 \pm 7.72 \mu\text{g}/\text{m}^3$ (IQR = 9.66) and PM2.5 $15.11 \pm 2.21 \mu\text{g}/\text{m}^3$ (IQR = 3.38). Prevalence of asthma, rhinitis, allergic rhinitis and eczema was 28%, 11% and 38% respectively at 12-years follow-up. Overall, no significant associations were found with asthma, rhinitis or eczema, nor with the multimorbidity phenotype.

Discussion/conclusions:

Prenatal exposures to ambient PM2.5 and NO2, at relatively low concentrations, did not show any significant associations with children's respiratory and allergic outcomes. Further analysis including logistic models stratified by sex and urban-rural area, and clustering approaches will be performed to assess if specific profiles of environmental exposures during pregnancy and early childhood are associated with childhood respiratory and allergic diseases.

Key messages:

- The prenatal and postnatal periods are major vulnerability windows for children's respiratory health.
- An exposome approach provides a better understanding of a larger set of urban/rural exposures and their associations with childhood respiratory and allergic diseases.