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# Genetic susceptibility to asthma increases the vulnerability to indoor air pollution

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**Our findings from a South African birth cohort study show an association of indoor air pollution with reduced lung function at 6 weeks and 1 year of age, with a higher susceptibility in children with a genetic predisposition for asthma** <http://bit.ly/2NpkGRr>

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## ABSTRACT

**Introduction:** Indoor air pollution and maternal smoking during pregnancy are associated with respiratory symptoms in infants, but little is known about the direct association with lung function or interactions with genetic risk factors. We examined associations of exposure to indoor particulate matter with a 50% cut-off aerodynamic diameter of 10 µm (PM<sub>10</sub>) and maternal smoking with infant lung function and the role of gene–environment interactions.

**Methods:** Data from the Drakenstein Child Health Study, a South African birth cohort, were analysed (n=270). Lung function was measured at 6 weeks and 1 year of age, and lower respiratory tract infection episodes were documented. We measured pre- and postnatal PM<sub>10</sub> exposures using devices placed in homes, and prenatal tobacco smoke exposure using maternal urine cotinine levels. Genetic risk scores determined from associations with childhood-onset asthma in the UK Biobank were used to investigate effect modifications.

**Results:** Pre- and postnatal exposure to PM<sub>10</sub> as well as maternal smoking during pregnancy were associated with reduced lung function at 6 weeks and 1 year as well as with lower respiratory tract infection in the first year. Due to a significant interaction between the genetic risk score and prenatal exposure to PM<sub>10</sub>, infants carrying more asthma-related risk alleles were more susceptible to PM<sub>10</sub>-associated reduced lung function ( $p_{\text{interaction}}=0.007$ ). This interaction was stronger in infants with Black African ancestry ( $p_{\text{interaction}}=0.001$ ) and nonexistent in children with mixed ancestry ( $p_{\text{interaction}}=0.876$ ).

**Conclusions:** PM<sub>10</sub> and maternal smoking exposures were associated with reduced lung function, with a higher susceptibility for infants with an adverse genetic predisposition for asthma that also depended on the infant's ancestry.