

# Daily Variations in Respiratory Symptoms Associated with Fluctuations in Air Pollutants among Schoolchildren in Durban, South Africa

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**Objective:** To investigate associations between exposures to common ambient air pollutants and variation in daily respiratory symptoms among both children in a large metropolitan city in South Africa.

**Materials and Methods:** The study was conducted among 432 schoolchildren, selected from seven communities in Durban, South Africa. Logistic regression models were used to examine associations between daily mean levels of ambient air pollutants (NO<sub>2</sub>, NO, SO<sub>2</sub>, and PM<sub>10</sub>) and respiratory symptoms (cough, wheeze, shortness of breath and chest tightness) as recorded on daily logs for the full school week over a three week period in each of four seasons. Models adjusted for age, gender, race/ethnicity, school, caregiver smoking, caregiver education, household income, and season. Asthma severity was considered as an effect modifier. Lag effects (1 to 5 days), as well as 5-day averages, were modeled.

**Results:** Mean daily NO<sub>2</sub> concentrations varied from a low of 11 ppb in non-industrial areas to 19 - 24 ppb in the city centre and industrial areas. Average SO<sub>2</sub> concentrations varied from 1 - 3 ppb in non-industrial to 12 - 20 ppb in industrial areas. Mean daily filter-based PM<sub>10</sub> concentrations ranged from 41 – 57 µg m<sup>-3</sup>.

Statistically increased pollutant-related risks were seen for various symptoms, particularly cough, across the various lags analysed. The covariate adjusted risk for cough was particularly strong for lag 0, with ORs of 1.07 (95% CI: 1.02;1.13); 1.11 (1.04;1.17); 1.14 (1.06; 1.22); 1.09 (1.02;1.16) for PM<sub>10</sub>, SO<sub>2</sub>, NO<sub>2</sub> and NO respectively. Most symptoms showed an increased risk at lag 0 for PM<sub>10</sub>, SO<sub>2</sub>, and NO<sub>2</sub>, with the exception of wheeze. Wheeze generally showed no elevated risk, across most lags for all pollutants.

**Conclusions:** Exposures to moderate levels of common ambient air pollutants were associated with increased risk of respiratory symptoms, particularly cough, among schoolchildren in Durban, South Africa. Our findings are strongly suggestive of industrial and vehicular pollution having a negative impact on the respiratory health of these schoolchildren.