

Title: Association Between Ozone Exposure and Childhood Asthma Hospital Admission in New York City Metropolitan Area, 1991-2001

Keywords: Ozone, Childhood Asthma, GIS, KZ Filter, Time Series

Background: Studies of the association between ozone (O<sub>3</sub>) exposure and childhood asthma have produced mixed results. Most previous studies covered short time periods and/or were limited by small sample sizes.

Objectives: To estimate the temporal variation in O<sub>3</sub> and childhood asthma admission rates in the NYC metropolitan area and the relationship between the two.

Methods: This cross-sectional study includes a totally of 138,449 children aged 0-11 years who resided in the New York City metropolitan area who were admitted to a hospital with a principal diagnosis of asthma between 1991 and 2001. The daily O<sub>3</sub> concentration is the 24-hour average of ambient O<sub>3</sub> measurements linked to daily hospital admission rate. Daily average temperature and humidity were also considered. A Log transformation and KZ<sub>365,2</sub> filter were used to remove the seasonal and short-term component. Linear regression was used to estimate the associations.

Results: A decreasing trend in asthma hospital admission rates and ambient O<sub>3</sub> concentrations was identified for the 11 consecutive years. There is a strong positive relationship between daily O<sub>3</sub> concentration and asthma hospital admission rate. For all 11 years, the adjusted R<sup>2</sup> is 0.5988 (P<.0001). An O<sub>3</sub> increase of 1% is associated with an increase of 3.33 asthma hospital admissions per million people per day. After excluding the data for 1991 and 1992 because of an unusual decrease of O<sub>3</sub> in 1992, the result demonstrated an even higher adjusted R<sup>2</sup>.

Conclusion: The results demonstrate a statistically significant positive association between ambient O<sub>3</sub> concentration and childhood asthma hospital admissions in the NYC metropolitan area between 1991 and 2001.

Evaluation: Other indoor air pollutants, allergens, and socioeconomic changes in this study population were not accounted for due to a lack of data. Further studies using more complete data are needed to test similar hypotheses.

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