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Respiratory and irritant health effects of ambient volatile organic compounds. The Kanawha County Health Study.

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ABSTRACT:

Kanawha County, West Virginia, is one of the largest chemical manufacturing centers in the United States. In 1988, a survey of respiratory and irritant symptoms was administered to all third grade to fifth grade children attending 74 elementary schools in Kanawha County, and concentrations of 15 volatile organic compounds were measured at each school. Exposures were characterized by school location, by the sum of the concentrations of five petroleum-related compounds, and by the sum of the concentrations of 10 compounds more specific to industrial processes. Children enrolled in schools within the valley had higher rates of doctor-diagnosed asthma (odds ratio (OR) = 1.27, 95% confidence interval (CI) 1.09-1.48) and a higher score on a composite indicator of five chronic lower respiratory symptoms (OR = 1.13, 95% CI 1.02-1.26) than children who were enrolled in schools outside of the valley. The incidence of chronic respiratory symptoms was also positively associated with the concentrations of volatile organic compounds. The estimated change in the odds ratio for chronic lower respiratory symptoms associated with a 2-micrograms/m³ change in process-related compounds was 1.08 (95% CI 1.02-1.14). No consistent pattern was found between acute irritant symptoms in the 2 weeks preceding questionnaire administration and either proximity to industry or exposure to volatile organic compounds. The authors conclude that exposure to volatile organic compounds, including emissions from chemical manufacturing plants, is associated with increased rates of chronic respiratory symptoms characteristic of reactive airways.

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