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Diabetes mortality and environmental heavy metals in North Carolina counties: An ecological study

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ABSTRACT

Introduction: Arsenic, beryllium, cadmium and nickel have been associated with the prevalence of diabetes mellitus in populations exposed to these elements. However, diabetes mortality has not been evaluated. This ecological study correlated airborne concentrations of these metals with diabetes mortality in North Carolina counties. Methods: County level data were extracted from the 2000 US Census, the 1999 US Environmental Protection Agency National Air Toxins Assessment, and 2001-2005 diabetes mortality rates by county from the North Carolina State Center for Health Statistics. Multivariable linear regression correlated airborne concentrations of each element with diabetes mellitus mortality rates in all 100 North Carolina counties controlling for county-level characteristics. Airborne concentrations were logarithmically transformed to normalize their distribution. Results: The lowest air concentrations detected were beryllium and cadmium, with nickel showing the highest concentration. Logarithmic concentrations spanned from 3.74 to 4.02 orders of magnitude. County-level diabetes mortality rates were negatively associated with median county income, but positively associated with county-level air concentrations of arsenic, beryllium, cadmium and nickel. Conclusions: These results support diabetes mortality effects of air pollution, and agree with other studies correlating arsenic, beryllium, cadmium and nickel with diabetes prevalence. Policy implications include regulating point source air pollution.

KEYWORDS

Diabetes Mellitus; Heavy Metals; Air Pollution; North Carolina

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