

Association Between Arsenic in Private Drinking Well Water and Diabetes Prevalence in North Carolina

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Inorganic arsenic (iAs) is a naturally occurring metalloid that currently contaminates the drinking water of hundreds of millions of individuals, and exposure to iAs has been linked to risk of diabetes in populations around the world. However, the relationship between iAs and diabetes in North Carolina has not been assessed. To address this research gap, we performed an ecologic study examining the correlation between mean levels of iAs in private well water tests (log-transformed) and crude prevalence of diabetes in a census tract (restricted to tracts which had ≥ 4 well water iAs tests). Generalized linear regression analyses assessed the relationship between census-tract mean iAs levels measured in the NCWELL database in relation to census-tract prevalence of diabetes assessed in the PLACES study. iAs was significantly associated with diabetes prevalence ($\beta=1.63$, $p<0.005$) in the crude model. When adjusting for age (percent of

persons over age 64 in each tract) and the Index of Concentration at Extremes (ICE) values, iAs was still significant ($\beta=1.17$, $p<0.005$). ICE is an indicator of racial economic inequality. Highlighting obesity's role as a critical factor on the etiologic pathway in iAs-associated diabetes, the model that included obesity, age, and ICE shows iAs as significantly negatively correlated with diabetes ($\beta=-0.5$, $p<0.005$). These data show a positive association between iAs levels in private drinking well water in NC and diabetes prevalence using an ecologic analysis. Future epidemiological studies assessing individual-level exposure and individual diagnosis of diabetes outcome are necessary to further support these results.