

Demographic and behavioral modifiers
of arsenic exposure pathways:
A Bayesian hierarchical analysis
of NHEXAS data

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Abstract

We introduce a Bayesian hierarchical statistical model that describes subpopulation-specific pathways of exposure to arsenic. Our model is fitted to data collected as part of the National Human Exposure Assessment Survey (NHEXAS) and builds on the structural equation-based analysis of the same data by Clayton, Pellizzari and Quackenboss (2002). Using demographic information (e.g., gender or age) and surrogates for environmental exposure (e.g., tobacco usage or the average number of minutes spent in an enclosed workshop), we identify subgroup differences in exposure routes. Missing and censored data, as well as uncertainty due to measurement error, are handled systematically in the Bayesian framework. Our analysis indicates that household size, amount of time spent at home, use of tap water for drinking and cooking, number of glasses of water drunk, use of central air conditioning, and use of gas equipment significantly modify the arsenic exposure pathway.