Influence of Geographic Location in Modeling Blood Pesticide Levels in a Community Surrounding a U.S. Environmental Protection Agency Superfund Site

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In this study we evaluated residential location as a potential determinant for exposure to organochlorine compounds. We investigated the geographic distribution characteristics of organochlorine levels in approximately 1,374 blood samples collected in 1974 from residents of a community with a potential organochlorine source. Street addresses of Washington County, Maryland, residents were obtained and geocoded in a geographic information system. We used multivariate linear regression models to characterize the blood organochlorine levels of these residents that had been analyzed as part of previous studies using both environmental- and individual-level covariates. This was done to evaluate if the geographic distribution of blood levels in participants was related to the environmental source in the community. Model inference was based on generalized least squares to account for residual spatial variation. A significant inverse relationship was found between blood dieldrin levels and residential distance from the potential source. For every mile of distance from the source, blood dieldrin levels decreased 1.6 ng/g in study participants (p-value = 0.042), adjusting for age, sex, education level, smoking status, and drinking water source. 1,1-Dichloro-2,2-bis(p-chlorophenyl)ethylene (DDE) levels in the blood did not change significantly based on residential distance from the source, taking the same covariates into account. However, these results are limited by the inability to account for several potential confounders. This study demonstrates that spatially distributed covariates may play an important role in individual exposure patterns. Spatial information may enable researchers to detect a potential exposure pattern that may not be revealed with only nonspatial variables. *Key words:* biomarkers, DDE, DDT, dieldrin, geostatistics, organochlorines, spatial statistics, Superfund.