

Publication

Comparing land use regression and dispersion modelling to assess residential exposure to ambient air pollution for epidemiological studies

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Land-use regression (LUR) and dispersion models (DM) are commonly used for estimating individual air pollution exposure in population studies. Few comparisons have however been made of the performance of these methods.; Within the European Study of Cohorts for Air Pollution Effects (ESCAPE) we explored the differences between LUR and DM estimates for NO₂, PM₁₀ and PM_{2.5}.; The ESCAPE study developed LUR models for outdoor air pollution levels based on a harmonised monitoring campaign. In thirteen ESCAPE study areas we further applied dispersion models. We compared LUR and DM estimates at the residential addresses of participants in 13 cohorts for NO₂; 7 for PM₁₀ and 4 for PM_{2.5}. Additionally, we compared the DM estimates with measured concentrations at the 20-40 ESCAPE monitoring sites in each area.; The median Pearson R (range) correlation coefficients between LUR and DM estimates for the annual average concentrations of NO₂, PM₁₀ and PM_{2.5} were 0.75 (0.19-0.89), 0.39 (0.23-0.66) and 0.29 (0.22-0.81) for 112,971 (13 study areas), 69,591 (7) and 28,519 (4) addresses respectively. The median Pearson R correlation coefficients (range) between DM estimates and ESCAPE measurements were of 0.74 (0.09-0.86) for NO₂; 0.58 (0.36-0.88) for PM₁₀ and 0.58 (0.39-0.66) for PM_{2.5}.; LUR and dispersion model estimates correlated on average well for NO₂ but only moderately for PM₁₀ and PM_{2.5}, with large variability across areas. DM predicted a moderate to large proportion of the measured variation for NO₂ but less for PM₁₀ and PM_{2.5}.

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