

Publication

Development of NO₂ and NO_x land use regression models for estimating air pollution exposure in 36 study areas in Europe - The ESCAPE project**Journal Article (Originalarbeit in einer wissenschaftlichen Zeitschrift)**

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Estimating within-city variability in air pollution concentrations is important. Land use regression (LUR) models are able to explain such small-scale within-city variations. Transparency in LUR model development methods is important to facilitate comparison of methods between different studies. We therefore developed LUR models in a standardized way in 36 study areas in Europe for the ESCAPE (European Study of Cohorts for Air Pollution Effects) project. Nitrogen dioxide (NO₂) and nitrogen oxides (NO_x) were measured with Ogawa passive samplers at 40 or 80 sites in each of the 36 study areas. The spatial variation in each area was explained by LUR modelling. Centrally and locally available Geographic Information System (GIS) variables were used as potential predictors. A leave-one out cross-validation procedure was used to evaluate the model performance. There was substantial contrast in annual average NO₂ and NO_x concentrations within the study areas. The model explained variances (R²) of the LUR models ranged from 55% to 92% (median 82%) for NO₂ and from 49% to 91% (median 78%) for NO_x. For most areas the cross-validation R² was less than 10% lower than the model R². Small-scale traffic and population/household density were the most common predictors. The magnitude of the explained variance depended on the contrast in measured concentrations as well as availability of GIS predictors, especially traffic intensity data were important. In an additional evaluation, models in which local traffic intensity was not offered had 10% lower R² compared to models in the same areas in which these variables were offered. Within the ESCAPE project it was possible to develop LUR models that explained a large fraction of the spatial variance in measured annual average NO₂ and NO_x concentrations. These LUR models are being used to estimate outdoor concentrations at the home addresses of participants in over 30 cohort studies. (C) 2013 Elsevier Ltd. All rights reserved.

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