

## Publication

## Annual and seasonal spatial models for nitrogen oxides in Tehran, Iran

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Very few land use regression (LUR) models have been developed for megacities in low- and middle-income countries, but such models are needed to facilitate epidemiologic research on air pollution. We developed annual and seasonal LUR models for ambient oxides of nitrogen (NO, NO<sub>2</sub>, and NO<sub>x</sub>) in the Middle Eastern city of Tehran, Iran, using 2010 data from 23 fixed monitoring stations. A novel systematic algorithm was developed for spatial modeling. The R<sup>2</sup> values for the LUR models ranged from 0.69 to 0.78 for NO, 0.64 to 0.75 for NO<sub>2</sub>, and 0.61 to 0.79 for NO<sub>x</sub>. The most predictive variables were: distance to the traffic access control zone; distance to primary schools; green space; official areas; bridges; and slope. The annual average concentrations of all pollutants were high, approaching those reported for megacities in Asia. At 1000 randomly-selected locations the correlations between cooler and warmer season estimates were 0.64 for NO, 0.58 for NO<sub>x</sub>, and 0.30 for NO<sub>2</sub>. Seasonal differences in spatial patterns of pollution are likely driven by differences in source contributions and meteorology. These models provide a basis for understanding long-term exposures and chronic health effects of air pollution in Tehran, where such research has been limited.

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