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Association Between Short-term NOx Exposure and Asthma Exacerbations in East London: A Time Series Regression Model

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Abstract : Background: There is strong interest in the relationship between short-term air pollution exposure and human health. Most studies in this field focus on serious health effects such as death or hospital admission, but air pollution exposure affects many people with less severe impacts, such as exacerbations of respiratory conditions. A lack of quantitative analysis and inconsistent findings suggest improved methodology is needed to understand these effectsmore fully. Method: We developed a time series regression model to quantify the relationship between daily NO_x concentration and Asthma exacerbations requiring oral steroids from primary care settings. Explanatory variables include daily NO_x concentration measurements extracted from 8 available background and roadside monitoring stations in east London and daily ambient temperature extracted for London City Airport, located in east London. Lags of NOx concentrations up to 21 days (3 weeks) were used in the model. The dependent variable was the daily number of oral steroid courses prescribed for GP registered patients with asthma in east London. A mixed distribution model was then fitted to the significant lags of the regression model. Result: Results of the time series modelling showed a significant relationship between NO_xconcentrations on each day and the number of oral steroid courses prescribed in the following three weeks. In addition, the model using only roadside stations performs better than the model with a mixture of roadside and background stations.

Keywords : air pollution, time series modeling, public health, road transport
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