

Comparison of Nitrogen Dioxide Pollution for Different Commuting Modes in Kaunas

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Abstract : The assessment of air pollution exposure in different microenvironments is important for better understanding the relationship between health effects caused by air pollution. The recent researches revealed that the level of air pollution in transport microenvironment contributes considerably to the total exposure of air pollution. The aim of the study was to determine air pollution of nitrogen dioxide and to assess the exposure of NO₂ dependence on the chosen commuting mode using a global positioning system (GPS). The same travel destination was chosen and 30 rides in three different commuting modes: cycling, walking, and public transport were made. Every different mean of transport is associated with different route. GPS device and travel diary data were used to track all routes of different commuting modes. Air pollution of nitrogen dioxide was determined using the ADMS-Urban dispersion model. The average annual concentration of nitrogen dioxide was modeled for 2011 year in Kaunas city. The geographical information systems were used to visualize the travel routes, to create maps indicating the route of different commuting modes and to combine modelled nitrogen dioxide data. The results showed that there is a significant difference between the selected commuting mode and the exposure of nitrogen dioxide. The concentrations in the microenvironments were 22.4 µg/m³, 21.4 µg/m³, and 25.9 µg/m³ for cycling, walking and public transport respectively. Of all the modes of commuting, the highest average exposure of nitrogen dioxide was found travelling by public transport, while the lowest average concentration of NO₂ was determined by walking.

Keywords : nitrogen dioxide, dispersion model, commuting mode, GPS

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