

DETERMINANTS OF INDOOR AND OUTDOOR LEVELS OF NO₂ IN A COHORT OF 4-YEARS-OLD CHILDREN

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Background and Aims: Home outdoor NO₂ has been used as a marker of personal exposure to traffic-related air pollution. However, recent studies suggest that exposure to indoor NO₂ may be a risk factor in itself for respiratory health and neurodevelopment. We aimed at assessing the relationship between indoor and outdoor NO₂ levels and their determinants in a subset of the INMA birth cohort of Sabadell, Spain.

Methods: Indoor and outdoor NO₂ levels were measured with passive samplers during two measurement campaigns of one week (1st campaign in fall/winter, 2nd campaign in summer) at home addresses of 96 children. Characteristics of the home surroundings (street configuration, building density, and traffic-related variables) were obtained by the field workers and by Geographic Information Systems (GIS). Information on sources of NO₂ indoor levels (gas appliances, tobacco smoke) and additional variables (e.g. use of extractor fan, air conditioning) were obtained through questionnaires in each campaign.

Results: Mean levels of outdoor NO₂ were 36.7 µg/m³ in fall/winter and 34 µg/m³ in summer, while mean levels of indoor NO₂ were 22.8 µg/m³ in fall/winter and 26 µg/m³ in summer. The correlation between indoor and outdoor levels was lower in fall/winter (r=0.35) than in summer (r=0.51). The main determinants of outdoor NO₂ were the street configuration (continuous buildings on both sides vs. other configurations) and traffic-related GIS variables. Indoor NO₂ levels were influenced by tobacco smoke, time using gas cooking, time opening windows to ventilate, house age, and an interaction between outdoor NO₂ levels and use of air conditioning.

Conclusions: The influence of traffic-related NO₂ pollution on indoor levels is higher in summer than in fall/winter, probably due to differences in ventilation patterns. Gas cooking and tobacco smoke are the main indoor sources of NO₂, whereas ventilation, use of air conditioning, and house age are additional determinants.