

EXPOSURE ASSESSMENT TO AIR POLLUTION IN FOUR SPANISH AREAS. LAND USE REGRESSION APPLICATION

Marisa Estarlich, Spanish Consortium for Research on Epidemiology and Public Health (CIBERESP), Center for Public Health Research (CSISP), University of Valencia, Spain

Ferran Ballester, University of Valencia, Center for Public Health Research (CSISP), Spanish Consortium for Research on Epidemiology and Public Health (CIBERESP), Spain

Ana Fernandez-Somoano, Spanish Consortium for Research on Epidemiology and Public Health (CIBERESP), University of Oviedo, Spain

Inmaculada Aguilera, Center for Research in Environmental Epidemiology (CREAL), Hospital del Mar Research Institute (IMIM), Spanish Consortium for Research on Epidemiology and Public Health (CIBERESP), Spain

Aitana Lertxundi, Depart. of Public Health and Preventive Medicine, University of Basque Country (EHU-UPV), Spanish Consortium for Research on Epidemiology and Public Health (CIBERESP), Spain

Carmen Freire, Spanish Consortium for Research on Epidemiology and Public Health (CIBERESP), San Cecilio University Hospital, University of Granada, Spain.

M^a Dolores Martinez, Public Health Environment Department of Gipuzkoa, Basque Government, Spain.

Adonina Tardón, University of Oviedo. Spanish Consortium for Research on Epidemiology and Public Health (CIBERESP), Spain

Jordi Sunyer, Center for Research in Environmental Epidemiology (CREAL), Hospital del Mar Research Institute (IMIM), Spanish Consortium for Research on Epidemiology and Public Health (CIBERESP), Spain

Carmen Iñiguez, Center for Public Health Research (CSISP), Spanish Consortium for Research on Epidemiology and Public Health (CIBERESP), University of Valencia, Spain

Background and Aims:

Geographical Information Systems (GIS) are powerful tools to assess air pollution exposure in epidemiological studies. The aim is to describe the methodology used to assign levels of exposure to outdoor air pollution (NO₂ and benzene) in pregnant women from four cohorts of the Spanish INMA (Environment and Childhood) study.

Methods:

A total of 2644 pregnant women were recruited between November 2003 and February 2008. Air pollution concentrations were obtained for 302 locations in the four study areas by using passive samplers that were placed during several periods of 7 days. Land use regression (LUR) models were used to predict air pollution levels in the study areas. A GIS was established based on the data: land use, road traffic (traffic intensity and distances), altitude, and distance to industry. Seasonality was assigned to the pregnancy period of each woman by using daily levels of air pollution from the routine monitoring networks.

Results:

Predictor variables were different among cohorts and pollutants. In all the cohorts, models included traffic variables and land use (urban, industrial or agricultural). Other predictor variables were: topography, population density, and distance to industry. Within each cohort, urban levels were higher than rural ones. Exposure estimates by trimester of pregnancy presented medium to high correlations (Spearman rho 0.4-0.8). Residential NO₂ levels throughout the entire pregnancy period correlated well with benzene levels in Gipuzkoa, Sabadell, and Valencia (rho≈0.7) whereas in Asturias, the correlation was moderate (rho: 0.3).

Conclusions:

This work illustrates the possibilities offered by methods that combine spatial modeling and temporal correction in the identification of spatial and temporal patterns of air pollution levels. Assessment of individual air pollution exposure during pregnancy will allow analyzing its effects on health, e.g., fetal growth, neurodevelopment and respiratory problems.

Funded by: ISCIII (G03/176), FIS-FEDER 03/1615, 04/1509, 04/1112, 06/1213, 09/02647 and Fundació Roger Torné