

AMBIENT AIR POLLUTION MODELS: IMPACT ON ESTIMATED EXPOSURE AND RELATIONSHIP WITH FETAL GROWTH, THE EDEN MOTHER CHILD COHORT

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Background and Aims: We previously reported that, although moderately correlated, nitrogen dioxide (NO₂) atmospheric levels estimated by air quality monitoring stations (AQMS) and a geostatistical model, showed similar associations with birth weight (BW). We extended this comparison by also considering a dispersion model, and PM₁₀ levels.

Methods: We focused on women from the Eden cohort recruited in two French maternity hospitals, living less than 5km away from a permanent monitoring station in two areas of about 500km² in which we implemented dispersion and geostatistical models. NO₂ and PM₁₀ pregnancy average levels were available for 770 and 452 women, respectively. We estimated Kappa coefficients of concordance (K) to compare the exposure estimates (categorized in tertiles), and used adjusted linear regression to estimate the association between exposure levels and BW.

Results: Mean \pm sd exposure levels ($\mu\text{g}/\text{m}^3$) during pregnancy were 29 ± 10 for NO₂ and 19 ± 2 for PM₁₀, as estimated by the AQMS model, 24 ± 8 , and 18 ± 3 respectively for the dispersion model, and 24 ± 5 for NO₂ as estimated by the geostatistical model. The dispersion model showed a stronger agreement with the geostatistical ($K_{\text{NO}_2}=0.52$) than with the AQMS model ($K_{\text{NO}_2}=0.37$, $K_{\text{PM}_{10}}=0.41$). Agreement between dispersion and AQMS models improved within 2 and 1km of an AQMS. Each PM₁₀ increase by $10\mu\text{g}/\text{m}^3$ during the pregnancy was associated with an adjusted BW decrease of 123g (95% confidence interval, -273; 27g) as estimated by the AQMS model and 79g (-202; 44g) as estimated by the dispersion model. Results for NO₂ showed statistically weaker associations with BW, but were consistent among the three exposure models.

Conclusion: Dispersion model NO₂ estimates were in moderate agreement with the geostatistical model but exhibited similar associations. PM₁₀ levels from the AQMS and the dispersion models were fairly concordant, and associations with BW were somewhat statistically stronger for the AQMS model.

Reference

Lepeule J, Caïni F, Bottagisi S, Galineau S, Hulin A, Marquis N, Bohet A, Siroux V, Kaminski M, Charles MA, Slama R, and the EDEN Mother-Child Cohort Study Group. Maternal Exposure to Nitrogen Dioxide during pregnancy and offspring Birth Weight: Comparison of two exposure models. *Environmental Health Perspectives* 2010; 118 (10): 1483-1489