

# LAND USE REGRESSION METHOD TO EVALUATE THE ASSOCIATION BETWEEN PRENATAL EXPOSURE TO PARTICULATE MATTER AND NEONATAL NEUROBEHAVIORAL PERFORMANCE

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**Background and Aims:** Traffic-related air pollutants, such as PAH, PM<sub>10</sub>, and NO<sub>2</sub>, have been reported to cause adverse effects on children's neurobehavioral functions. However, little is known about the effect of prenatal exposure to these pollutants on subsequent neonatal neurobehavioral development. This study aimed at using land-use regression (LUR) model to evaluate residential PM<sub>10</sub> exposure levels during different trimesters of each pregnant woman, and investigate its association with neonatal neurobehavioral performances.

**Methods:** The study subjects were selected from the Taiwan Birth Panel Study which enrolled 442 infant-mother pairs between May 2004 and February 2005. Basic characteristics and living environmental factors were retrieved by professional interviewers using structured questionnaires within 3 days of infant delivery. In the meantime, the physiotherapist evaluated the neonatal neurobehavioral performances using the Chinese-version of Neonatal Neurobehavioral Examination (NNE). Monthly mean PM<sub>10</sub> data were retrieved from 17 Air Quality Monitoring Stations and residential PM<sub>10</sub> concentrations were predicted using LUR model. Candidate predicting variables for LUR model included local land use, population density, road type, and road length. The association between prenatal PM<sub>10</sub> exposure and NNE was evaluated using multiple linear regression model.

**Results:** A total of 141 infants have completed the NNE. The mean (SD) score for tone and motor patterns was 23.16 (1.71), primitive reflexes was 22.31 (1.76), behavioral responses was 24.67 (1.73), and total NNE was 70.17 (3.30). The predicted median (IQR) PM<sub>10</sub> concentration during first, second, and third trimester were 56.35 (13.7), 46.36 (18.9), and 53.43 (8.5) µg/m<sup>3</sup>, respectively. The results showed significant negative association between PM<sub>10</sub> levels at third trimester and primitive reflexes score ( $\beta = -0.089$ , 95%CI= -0.123 ~ -0.055) and total NNE score ( $\beta = -0.132$ , 95%CI= -0.198 ~ -0.066).

**Conclusions:** Our study provides the first epidemiological data supporting the adverse effect of gestational PM<sub>10</sub> exposure on neonatal neurobehavioral development.