

번호 III-17

제 목	국문	서울지역에서 대기오염은 저체중아의 위험요소인가?			
	영문	Is Air Pollution a Risk Factor for Low Birth Weight in Seoul?			
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**1. Purpose for the study**

We examined the effects of air pollution exposures during pregnancy on birth weight among all full-term births (gestational age 37-44 weeks) registered by the Korean National Birth Register for a 2-year period (January 1996 to December 1997) in Seoul.

Our purpose for this study was to determine whether air pollution is associated with low birth weight, a significant determinant of post-neonatal infant mortality and morbidity.<sup>18</sup> To investigate this relationship, we examined maternal exposure to air pollution in each trimester as a predictor of low birth weight.

**2. MATERIALS AND METHODS**

**Birth data**

Birth certificates in the Seoul area between 1st January, 1996 and 31st December, 1997 were provided by the Korean National Birth Register. They were used to determine the first and third trimester periods and to ascertain birth weight and most of the covariates included in this study. Birth weight, infant gender, gestational age, birth order, marital status, parental age, and parental education were extracted for each birth record.

**Exposure assessment**

Air pollution data were obtained from the Department of the Environment (Seoul, Korea). Exposure measurements during the study period taken from thirty four monitoring sites, which represented for all administrative areas. Measurements of carbon monoxide, nitrogen dioxide, sulfur dioxide, total suspended particles and ozone were done hourly.

Twenty-four hour averages of pollutant concentrations were constructed between measurement sites. In the case of ozone, a daytime 8-hr average was used instead of a 24-hr average.

Based on the gestational age and birth date of each newborn, we estimated the first and third trimester exposure by averaging daily ambient air pollution concentrations during the corresponding days.

### Statistical Analysis

The associations between ambient air pollution and low birth weight were evaluated with a generalized additive logistic regression adjusting for gestational age, maternal age, parental educational level, parity, and infant gender. The exposure variables were evaluated singly and in combination as predictors of low birth weight. Birth weight was also analyzed as a continuous variable to estimate the reduction of birth weight by interquartile changes of each pollutant. Smoothing plots using generalized additive models(GAM) were used to analyze the exposure-response relationship for each air pollutant.

## 3. RESULTS

The adjusted relative risk of low birth weight was 1.08(95% CI:1.04,1.12) for each interquartile increase for CO concentrations during the first trimester of pregnancy. The relative risks were 1.07(95% CI:1.03,1.11) for NO<sub>2</sub>, 1.06(95% CI: 1.02, 1.10) for SO<sub>2</sub>, and 1.04 (95% CI: 1.00, 1.08) for TSP also for interquartile increase in exposure. CO, NO<sub>2</sub>, SO<sub>2</sub>, and TSP concentrations in the first trimester of pregnancy period are significant risk factors for low birth weight.

When concentrations of each pollutant during the first and third trimester of pregnancy were included in combination in the model, the relative risk of low birth weight for each air pollutant of the first trimester of pregnancy remained constant. However, in the third trimester, there was no longer a significant risk for any pollutant.

Each interquartile increase of CO concentration during the first trimester reduced 11.55 gm of birth weight. NO<sub>2</sub>, SO<sub>2</sub>, and TSP also decreased birth weight 8.41 gm, 8.06 gm, and 6.06 gm, respectively.

There was clearly a negative relationship between birth weight and concentrations of CO, NO<sub>2</sub>, SO<sub>2</sub>, and TSP during the first trimester. The relationships are relatively linear, with a steeper slope at higher exposures.

## 4. DISCUSSION

Our results support a relationship between air pollution and low birth weight. In particular, CO, NO<sub>2</sub>, SO<sub>2</sub>, and TSP concentrations in the first trimester of pregnancy were significant risk factors for low birth weight. These associations were observed after taking into consideration time trends, gestational age, neonatal gender, and parental factors. We suggest that chronic toxic injury from air pollutants, even in the lower range of exposure, cause disturbance of fetal growth, a marker of fetal damage.