

Supplementary Information

Temporal Variation in Air Pollution Concentrations and Preterm Birth—A Population Based Epidemiological Study

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Abstract: There is growing evidence of adverse birth outcomes due to exposure to air pollution during gestation. However, recent negative studies are also reported. The aim of this study was to assess the effect of ozone and vehicle exhaust exposure (NO₂) on the length of the gestational period and risk of preterm delivery. We used data from the Swedish Medical Birth Registry on all vaginally delivered singleton births in the Greater Stockholm area who were conceived during 1987–1995, n = 115,588. Daily average levels of NO₂ (from three measuring stations) and ozone (two stations) were used to estimate trimester and last week of gestation average exposures. Linear regression models were used to assess the association between the two air pollutants and three exposure windows, while logistic regression models were used when analyzing associations with preterm delivery (<37 weeks gestation). Five percent were born preterm. The median gestational period was 40 weeks. Higher levels of ozone during the first trimester were associated with shorter gestation as well as with an elevated risk of preterm delivery, the odds ratio from the most complex model was 1.06 (95% CI 1.00–1.13) per 10 µg/m³ increase in the mean daily 8-h maximum concentration. Higher levels of ozone during the second trimester were associated with shorter gestation but the elevated risk of preterm delivery was not statistically significant. Higher levels of ozone and NO₂ during the last week of gestation were associated with a shorter duration of gestation and NO₂ also with preterm delivery. There were no significant associations between first and second trimester NO₂ exposure estimates and studied outcomes. The effect of first trimester ozone exposure, known to

cause oxidative stress, was smallest among women who conceived during autumn when vitamin D status, important for fetal health, in Scandinavian women is the highest.

Keywords: pregnancy; preterm birth; vehicle emissions; ozone; nitrogen dioxide

Table S1. Crude and adjusted ORs for preterm delivery per 10 $\mu\text{g}/\text{m}^3$ increase in pollutant concentration for primiparous women.

Time frame	Pollutant	Crude OR (95% CI)	ORs and (95% CI) from multiple pollutant model ^a . Exposure windows studied individually	ORs and (95% CI) from multiple pollutant model ^a . Exposure windows studied simultaneously
First trimester	O ₃	1.04 (1.01, 1.07)	1.09 (1.02, 1.15)	1.06 (0.98, 1.15)
Second trimester	O ₃	1.00 (0.98, 1.03)	1.00 (0.94, 1.06)	1.06 (0.96, 1.16)
Last week	O ₃	0.99 (0.96, 1.01)	1.01 (0.98, 1.04)	1.01 (0.97, 1.06)
First trimester	NO ₂	1.01 (0.95, 1.08)	1.01 (0.91, 1.13)	1.01 (0.90, 1.13)
Second trimester	NO ₂	0.99 (0.92, 1.06)	0.94 (0.84, 1.05)	0.91 (0.81, 1.02)
Last week	NO ₂	1.07 (1.03, 1.12)	1.04 (0.99, 1.09)	1.06 (1.00, 1.12)

^a Adjusted for maternal smoking, parity, sex of the child, temperature, relative humidity, seasonal variation and long term trend.

Table S2. Crude and adjusted slope estimates for duration of gestation (in weeks) per 10 $\mu\text{g}/\text{m}^3$ increase in pollutant concentration for primiparous women.

Time frame	Pollutant	Crude slope estimate (95% CI)	Slope estimates and (95% CI) from multiple pollutant model ^a . Exposure windows studied individually	Slope estimates and (95% CI) from multiple pollutant model ^a . Exposure windows studied simultaneously
First trimester	O ₃	-0.02 (-0.03, -0.01)	-0.06 (-0.09, -0.03)	-0.03 (-0.07, 0.01)
Second trimester	O ₃	-0.01 (-0.02, 0.00)	-0.04 (-0.07, -0.01)	-0.08 (-0.12, -0.03)
Last week	O ₃	0.01 (0.00, 0.02)	-0.02 (-0.04, 0.00)	-0.02 (-0.04, 0.00)
First trimester	NO ₂	0.02 (-0.01, 0.04)	0.03 (-0.02, 0.08)	0.02 (-0.04, 0.07)
Second trimester	NO ₂	0.02 (0.00, 0.05)	0.02 (-0.03, 0.07)	0.05 (-0.01, 0.10)
Last week	NO ₂	-0.03, (-0.05, -0.01)	-0.02 (-0.05, 0.00)	-0.03 (-0.05, 0.00)

^a Adjusted for maternal smoking, parity, sex of the child, temperature, relative humidity, seasonal variation and long term trend.