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**Association between Local Traffic-Generated Air Pollution and Preeclampsia and Preterm
Delivery in the South Coast Air Basin of California**

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ABBREVIATIONS:

CI: 95% confidence interval

CO: Carbon monoxide

IOR: inter-quartile odds ratio

IQR: inter-quartile range

LUR: land-use regression

MPTD: moderate preterm delivery with gestational age <35 weeks

NO_x: Nitrogen oxides

NO₂: Nitrogen dioxide

PAH: polycyclic aromatic hydrocarbons

PM_{2.5}: Particulate matter less than 2.5µm

PTD: preterm delivery with gestational age <37 weeks

SD: standard deviation

UFP: ultrafine particles less than 0.1 µm in diameter

VPTD: very preterm delivery with gestational age <30 weeks

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Abstract

Background: Preeclampsia is a major pregnancy complication leading to substantial maternal and perinatal morbidity, mortality, and preterm birth. Increasing evidence suggests air pollution adversely affects pregnancy outcomes. Yet, few studies have examined how local traffic-generated emissions affect preeclampsia in addition to preterm birth.

Objectives: Examine effects of residential exposure to local traffic-generated air pollution on preeclampsia and preterm delivery.

Methods: We identified 81,186 singleton birth records from four hospitals (1997-2006) in Los Angeles and Orange Counties, California. We used a line-source dispersion model (CALINE4) to estimate individual exposure to local traffic-generated NO_x and $\text{PM}_{2.5}$ across the entire pregnancy. We used logistic regression to estimate effects of air pollution exposures on preeclampsia, preterm delivery (PTD, gestational age <37 weeks), moderate preterm delivery (MPTD, gestational age <35 weeks), and very preterm delivery (VPTD, gestational age <30 weeks).

Results: We observed elevated risks for preeclampsia and preterm birth from maternal exposure to local traffic-generated NO_x and $\text{PM}_{2.5}$. The risk of preeclampsia increased 33% (odds ratio (OR) =1.33, 95% confidence interval (CI): 1.18–1.49) and 42% (OR=1.42, 95% CI: 1.26–1.59) for the highest NO_x and $\text{PM}_{2.5}$ exposure quartiles, respectively. The risk of VPTD increased 128% (OR=2.28, 95% CI: 2.15–2.42) and 81% (OR=1.81, 95% CI: 1.71–1.92) for women in the highest NO_x and $\text{PM}_{2.5}$ exposure quartiles, respectively.

Conclusion: Exposure to local traffic-generated air pollution during pregnancy increases the risk of preeclampsia and preterm birth in Southern Californian women. These results provide further evidence that air pollution is associated with adverse reproductive outcomes.