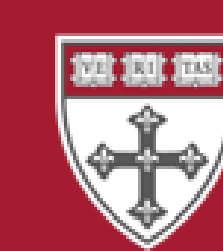


Traffic-related air pollution and ultrasound parameters of fetal growth in Eastern Massachusetts



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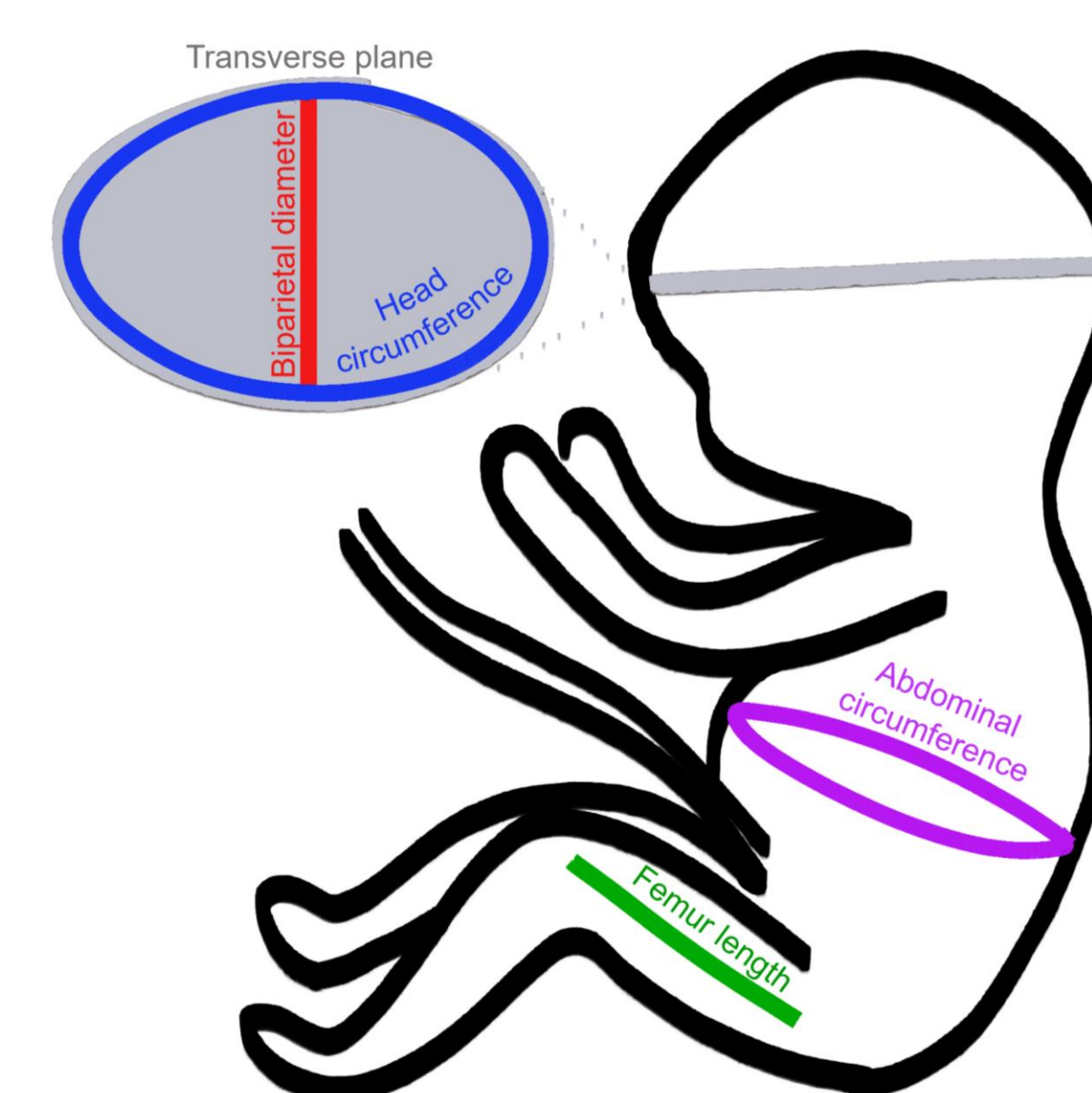
Background

- Previous studies have examined the association between prenatal nitrogen dioxide (NO₂) —a gaseous pollutant derived from traffic combustion — and fetal growth based on ultrasound measures
- Yet, most have used exposure assessment methods with low temporal resolution (e.g., land-use or land-cover regression), which limits the identification of critical exposure windows given that pregnancy occurs over a relatively short period
- Here, we used NO₂ data from a high-resolution spatiotemporal model to fit distributed lag models (DLMs) that estimated the association between weekly-resolved NO₂ and ultrasound parameters of fetal growth

Methods

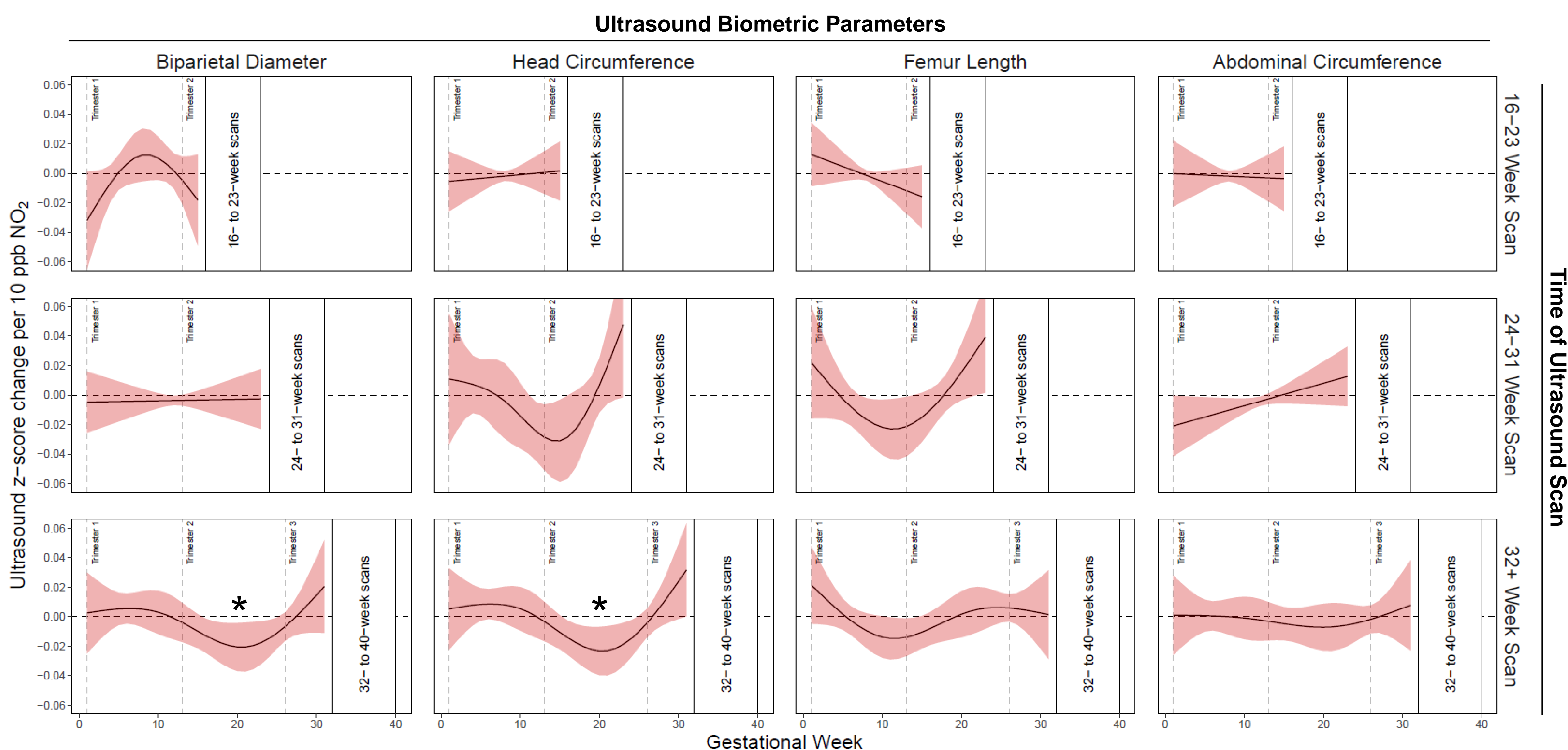
- Study population consisted of 9,446 deliveries from Beth Israel Deaconess Medical Center, Boston, Massachusetts, 2011-2016
- Ultrasound parameters were standardized using the INTERGROWTH-21st standards and include biparietal diameter, head circumference, femur length, and abdominal circumference
- NO₂ data were derived from a well-validated ensemble model that estimates daily NO₂ concentration for each 1-km grid in the US (R²=0.79)
- We fitted DLMs to estimate the time-varying association between ultrasound parameters of fetal growth and NO₂ exposure in each gestational week up until the ultrasound measurement
- To compare our DLMs to more common approaches, we also fitted trimester-average-exposure models
- All models were adjusted for sociodemographic characteristics, time trends, and temperature

Fig 1. Ultrasound parameters of fetal growth



Results

Fig 2. DLM estimates of the time-varying association between weekly NO₂ and ultrasound parameters of fetal growth (negative is smaller measure)



* Critical window identified by trimester-average-exposure models

Conclusion

- DLM analyses identified critical windows that differed depending on the parameter and when the outcome was assessed.
- Trimester-average-exposure models identified critical windows when they aligned with trimester boundaries
- Our findings indicate that reducing traffic emissions is one potential avenue to improving fetal and offspring health

References

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- Simoncic V, Enaux C, Deguen S, Kihal-Talantikite W. Adverse Birth Outcomes Related to NO₂ and PM Exposure: European Systematic Review and Meta-Analysis. *Int J Environ Res Public Health*. 2020;17(21):1-70.

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