ECHO
Environmental influences on Child Health Outcomes
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Study Summary

Exposure to $PM_{2.5}$ Air Pollution During Pregnancy Associated with Lower Birthweight, ECHO Study Finds

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Who sponsored this study?

The Environmental influences on Child Health Outcomes (ECHO) Program, Office of the Director, National Institutes of Health supported this research.

Why was this study needed?

Exposure to fine particulate matter ($PM_{2.5}$)—very small inhalable particles found in air pollution—is widespread and linked to various health risks. Previous research has examined the effects of $PM_{2.5}$ exposure during pregnancy on birth outcomes, but gaps remain. More research is needed to understand whether there are critical windows during pregnancy when $PM_{2.5}$ exposure is most impactful. This study aimed to address these gaps by investigating how the timing of $PM_{2.5}$ exposure affects birth outcomes, such as birthweight and length of pregnancy, using data from the ECHO Cohort's large, multi-site study structure. It also explored whether associations differ by infant sex and maternal race and ethnicity.

What were the study results?

Exposure to higher levels of $PM_{2.5}$ during the first weeks of pregnancy was linked to babies being slightly smaller at birth and having a higher chance of being born small for their gestational age (smaller than average for the length of the pregnancy). There was no significant association between $PM_{2.5}$ exposure and shorter pregnancies or preterm birth. For baby girls, higher $PM_{2.5}$ exposure in early pregnancy seemed to affect their birth size more than for baby boys, suggesting that the baby's sex can make a difference in how air pollution affects growth. The effects of $PM_{2.5}$ on birth outcomes like being born prematurely, birth size, or being small for gestational age varied depending on the mother's race and ethnicity.

What was the study's impact?

This study on $PM_{2.5}$ exposure during early pregnancy and birth outcomes can inform ongoing discussions on strategies for reducing $PM_{2.5}$ air pollution.

Who was involved?

The study included 19,108 mother-infant pairs from 51 ECHO Cohort Study Sites across the United States.

What happened during the study?

Researchers estimated $PM_{2.5}$ exposure for each pregnant participant based on residential address, accounting for moves during pregnancy. The researchers then assessed exposure for the whole pregnancy, each trimester, and specific windows in the first trimester. The researchers collected information on birth outcomes, including length of pregnancy and birthweight.

Footnote: Results reported here are for a single study. Other or future studies may provide new information or different results. You should not make changes to your health without first consulting your healthcare professional.

What happens next?

Further research could help investigators better understand the mechanisms underlying differences in air pollution vulnerability by infant sex, and by maternal race and ethnicity. Additional studies could also help researchers understand how other factors, such as diet and lifestyle, influence the relationship between $PM_{2.5}$ exposure and birth outcomes.

Where can I learn more?

Access the full journal article, titled “Gestational fine particulate matter exposure and perinatal outcomes in the ECHO cohort: Associations across pregnancy windows,” in *Environmental Research*.

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