

PRETERM BIRTH: RISK AND IMPACT



More than 400,000 babies are born prematurely, before 37 weeks of pregnancy, each year in the United States, representing 10.4% of live births. Infants born preterm are at greater risk than infants born at term for mortality and a variety of health and developmental problems. ECHO researchers are studying the potential chemical and biological associations that can increase risk for preterm birth and the impacts on children's health.



Prenatal Environmental and Chemical Exposures Can Increase Preterm Birth Risk

Environmental and chemical exposures during pregnancy can have long-term consequences for children related to adverse growth patterns and increased risk of diseases in adulthood. ECHO researchers found that during pregnancy, people who had higher levels of harmful biomarkers that cause cell damage (or **oxidative stress**) were more likely to deliver preterm babies. This association was stronger in participants who experienced preterm birth that was sudden and unexpected or occurred prior to 34 weeks.¹

In another study, ECHO researchers also found that pregnant people exposed to specific classes of **flame-retardant chemicals** may have an increased risk of preterm birth, especially for baby girls, and babies with higher birth weights.²



Effect of Preterm Birth on Children's Development and Risk for Chronic Conditions

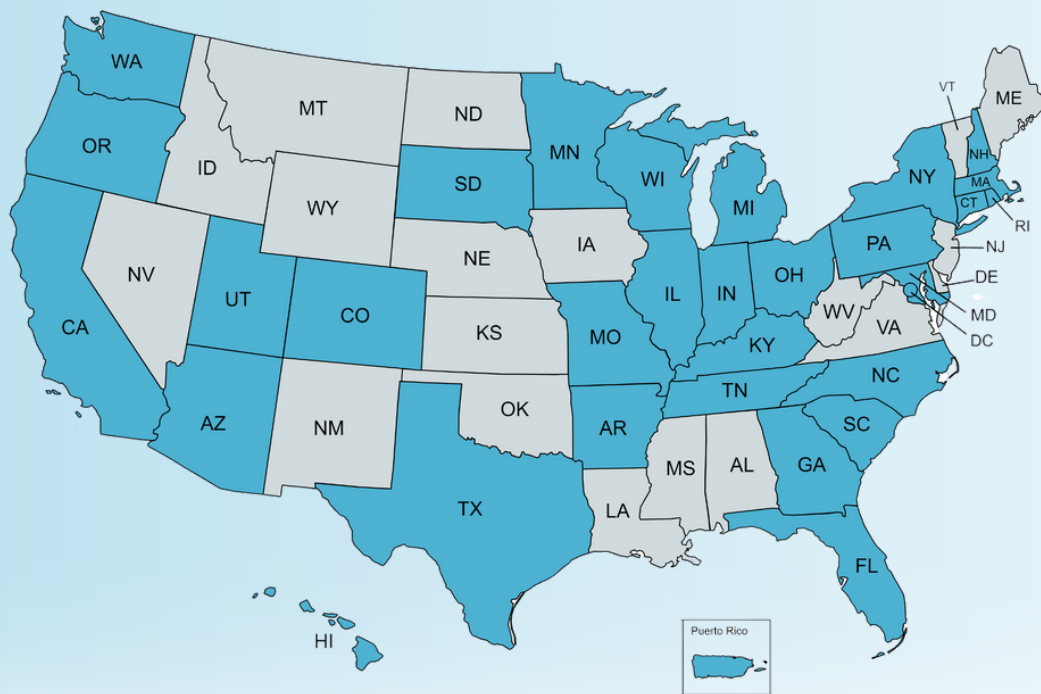
Birth outcomes for infants born preterm have steadily improved over the past several decades. More children born at earlier gestational ages are surviving into childhood, however, it is unclear how being born preterm may influence **neurodevelopmental, behavioral, and health problems**. One ECHO study found that children born preterm, males, and those exposed to more family hardships had more behavioral difficulties that persisted over time, including **anxiety/depression, attention deficits, and aggression**.³ Often, preterm babies need additional medical intervention, ECHO researchers found that babies born preterm were **more likely to use healthcare services** related to COVID-19 symptoms; those born extremely preterm (28 or fewer weeks) were even more likely to do so.⁴



ECHO's Innovative Tools for Measuring Prenatal Exposures

ECHO researchers are developing new methods to measure multiple prenatal exposures at the same time, improving our understanding of the combined effects these exposures have on child health. Investigators developed a combined exposure index that captures national data on several **neighborhood-level environmental hazards and social stressors simultaneously**, such as air pollution, socioeconomic status, and unemployment.⁵ Other researchers have used new methods to test for the presence of more than 100 different chemicals, such as those found in plastics and pesticides, in a single urine sample from pregnant participants.⁶ These studies showed that participants from **minority groups** and those with **lower educational attainment** had **higher levels of chemical exposure** and were also more likely to have greater combined exposures to environmental hazards and social stressors during pregnancy.

PARTICIPANTS FOR THESE STUDIES WERE RECRUITED FROM A LARGE NUMBER OF STATES AND TERRITORIES ACROSS THE U.S.



PUBLICATIONS & CITATIONS

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2. [Fick, S. et al. A pooled analysis of four birth cohorts examining urinary oxidative stress biomarkers and preterm birth. American Journal of Obstetrics and Gynecology. DOI:10.1016/j.ajog.2022.11.1282.](#)
3. [Julie A. Hofheimer, PhD; Monica McGrath, ScD; Rasheda Musci, PhD; et al. "Psychosocial and Neonatal Risk Factors Associated with Behavioral Dysregulation Trajectories Among Young Children from 18 through 72 Months of Age," JAMA Network Open. 2023;6\(4\):e2310059. doi:10.1001/jamanetworkopen.2023.10059](#)
4. [Elisabeth C. McGowan, Monica McGrath, Andrew Law, Barry Lester, et al. "Healthcare Utilization During the COVID-19 Pandemic Among Individuals Born Preterm," JAMA Netw Open. 2023;6\(4\):e2310696. doi:10.1001/jamanetworkopen.2023.10696](#)
5. [Sheena Martenies, et al. "Developing a National-Scale Exposure Index for Combined Environmental Hazards and Social Stressors and Applications to the Environmental Influences on Child Health Outcomes \(ECHO\) Cohort," International Journal of Environmental Research and Public Health. 20.14 \(2023\); 6339](#)
6. [Buckley, Jessie P., et al. "Exposure to Contemporary and emerging chemicals in commerce among pregnant women in the United States: The Environmental influences on Child Health Outcome \(ECHO\) Program." Environmental science & technology. 56.10 \(2022\):6560-6573](#)



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