



ECHO

Environmental influences
on Child Health Outcomes

A program supported by the NIH

PRENATAL EXPOSURE TO “FOREVER CHEMICALS”

ECHO researchers are studying the effects of **exposure to “forever chemicals” in pregnant women and their children.** “Forever chemicals”, like PFAS and phthalates, are found in hundreds of industrial and consumer products, including personal care products, food, and drinking water. Recent ECHO studies have found associations between some of these chemicals and **adverse health outcomes, including preterm birth, neurodevelopmental delays, and obesity.**



Effects on Birth Outcomes

ECHO researchers measured levels of different chemicals in urine samples collected during pregnancy. PFAS were found in almost all participants and women with higher levels of **PFAS exposure had a greater risk to have babies with lower birthweight**.¹

A recent ECHO study featured on national news outlets found that **women with the highest levels of DEHP phthalates had a 50% higher risk of giving birth preterm**.²



Effects on Child Health and Development

ECHO researchers found that prenatal exposure to a specific PFAS chemical, perfluorononanoic acid (PFNA), may be associated with an **increase in autism-related traits in children**³, while a second study found a link between a different class of PFAS and slightly **higher BMIs in children and potential risk of obesity**.⁴ A separate study showed that phthalates in infant’s meconium, or first stool, were associated with **lower scores in a neurodevelopment test in girls when they were 5 years old**.⁵



Effects on Maternal Health

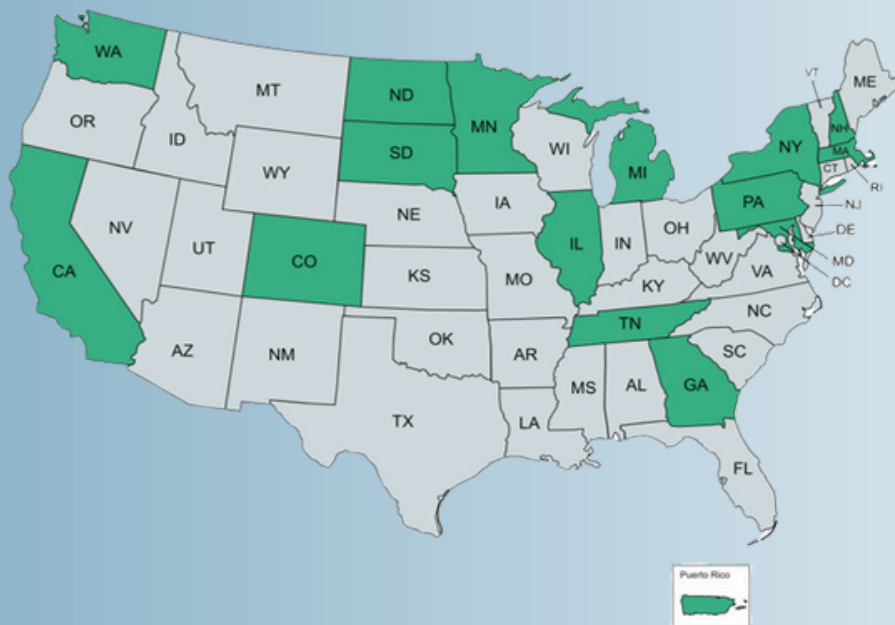
Postpartum depression affects up to 20% of new mothers, making it the most common pregnancy complication to occur after delivery. ECHO investigators are researching how synthetic chemicals can contribute to the risk of postpartum depression. **Prenatal phthalate concentrations were associated with increased risk of higher postpartum depression scores**.⁶ The condition was observed to be more likely in people who reported 1) to be Hispanic, 2) had lower education levels, or 3) had prenatal depression.



ECHO’s Innovative Tools for Studying Chemical Exposure

ECHO investigators used a new method to measure multiple chemicals in a single urine sample to determine if pregnant women were exposed to different chemicals. The **researchers were able to measure 89 biomarkers for more than 100 chemicals** in the urine samples. They discovered that most chemicals were found in at least one of the women in the study and about **a third of the chemicals were found in over half of the participants**.⁷

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



PUBLICATIONS & CITATIONS

1. [Padula, Amy M., et al. "Birth outcomes in relation to prenatal exposure to per-and polyfluoroalkyl substances and stress in the environmental influences on child health outcomes \(ECHO\) program." *Environmental health perspectives* 131.3 \(2023\): 037006.](#)
2. [Trasande, Leonardo et al. "Prenatal phthalate exposure and adverse birth outcomes in the USA: a prospective analysis of births and estimates of attributable burden and costs." *The Lancet. Planetary health* vol. 8,2 \(2024\): e74-e85. doi:10.1016/S2542-5196\(23\)00270-X.](#)
3. [Ames, Jennifer L et al. "Prenatal Exposure to Per- and Polyfluoroalkyl Substances and Childhood Autism-related Outcomes." *Epidemiology \(Cambridge, Mass.\)* vol. 34,3 \(2023\): 450-459. doi:10.1097/EDE.0000000000001587.](#)
4. [Liu, Yun, et al. "Associations of gestational perfluoroalkyl substances exposure with early childhood BMI z-scores and risk of overweight/obesity: results from the ECHO cohorts." *Environmental health perspectives* 131.6 \(2023\): 067001.](#)
5. [Mathew, Leny, et al. "The associations between prenatal phthalate exposure measured in child meconium and cognitive functioning of 12-month-old children in two cohorts at elevated risk for adverse neurodevelopment." *Environmental Research* 214 \(2022\): 113928.](#)
6. [Jacobson MH, Hamra GB, Monk C, et al. Prenatal Exposure to Nonpersistent Environmental Chemicals and Postpartum Depression. *JAMA Psychiatry*. 2024;81\(1\):67-76. doi:10.1001/jamapsychiatry.2023.3542.](#)
7. [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.](#)

For questions on these findings or other ECHO Program activities, please email
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