Pesticides & Human Health in California: What CHAMACOS Has Shown

The CHAMACOS study has followed 601 Salinas Valley farmworker families since 1999 — from pregnancy into adulthood — with 400,000+ biological samples. It is one of the longest-running studies of pesticides and children's health in the U.S.

What California-based research shows

- Exposure is universal and prenatal. Organophosphate (OP) metabolites were detected in every pregnant woman tested — above U.S. averages — and in 97% of breast-milk samples and nearly all house dust. Children are exposed before birth, at home, and through food.
- An organic diet lowers exposure. Switching to an organic diet reduced children's urinary OP metabolites by roughly 40%, confirming food as a major exposure route.

Hazards identified (reproductive, developmental, neurobehavioral, respiratory, metabolic)

- Prenatal OP exposure is associated with shorter gestation and abnormal newborn reflexes; attention problems (~age 5); poorer working memory and executive function (~age 12); more autism-related traits; and, on brain imaging in adolescents, reduced activation in regions used for executive function.
- Postnatal OP exposure is associated with poorer lung function (FEV1) in childhood.
- Glyphosate/AMPA exposure is associated with markers of liver inflammation and metabolic syndrome as participants reach adulthood.

Why organophosphates (and mixtures) are of special concern

- OPs target the nervous system. Children detoxify them less efficiently — the PON1 enzyme is lower in early childhood — so equivalent doses pose greater risk to the developing brain.
- Chlorpyrifos, an OP, was canceled in California (most uses ended by the end of 2020); glyphosate use has risen. Chemicals should be evaluated as classes and mixtures, not one at a time.
- Effects are amplified by social adversity: prenatal OP exposure was linked to a ~2.5-point IQ decrement in lower-adversity homes vs. ~8 points in higher-adversity homes — a "double burden" on frontline communities.

Policy recommendations to better track and understand health impacts

- **Acknowledging progress:** the chlorpyrifos cancellation, SprayDays California (2025, the first statewide notification system), and the Sustainable Pest Management Roadmap (2023) are meaningful steps.
- **Build statewide biomonitoring** in agricultural communities — measure exposure in people, not only in application records.
- **Link data to health outcomes** — connect Pesticide Use Reporting to birth, developmental, and school data to detect harm early.
- **Regulate cumulative impacts and mixtures,** and strengthen protective buffers around homes, schools, and childcare — prioritizing pregnancy and early childhood.
- **Sustain independent, community-based research** that produces this evidence.

Selected peer-reviewed sources (CHAMACOS unless noted)

Full DOIs available on request.

Bradman A, et al. Organophosphate urinary metabolite levels in pregnant women in an agricultural community. Environmental Health Perspectives (EHP), 2006.

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Eskenazi B, et al. Cardiometabolic outcomes in CHAMACOS young adults (18-year visit). EHP, 2023.

Mills PJ, Caussy C, Loomba R. Glyphosate excretion associated with steatohepatitis and advanced liver fibrosis. Clinical Gastroenterology and Hepatology, 2020. [non-CHAMACOS, cited for context]

Harley KG, et al. COSECHA: youth peer-to-peer research on pesticide exposure. Science of the Total Environment, 2019.

Policy sources

CA Dept. of Pesticide Regulation — chlorpyrifos cancellation (most agricultural uses ended December 31, 2020).

CA DPR — SprayDays California statewide pesticide notification system, launched March 24, 2025 (24-hour notice for restricted materials; 48-hour for soil fumigants).

CalEPA / CA DPR — Accelerating Sustainable Pest Management: A Roadmap for California, 2023 (goal to eliminate high-risk pesticides by 2050).