

# Decreased lung function in 7-year-old children with early-life organophosphate exposure

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# Abstract

**Background** Organophosphate pesticides are heavily used in agriculture, and adverse associations with respiratory health in occupational settings have been reported. However, most of the evidence comes from studies where there were no biomarkers of exposure and no objective outcome measurement. Non-occupational chronic effects among residents living in agricultural communities are less well described.

**Objective** To evaluate associations between early-life organophosphate exposure and lung function of children living in an agricultural community.

**Methods** Participants were 279 children from the Center for the Health Assessment of Mothers and Children of Salinas (CHAMACOS) longitudinal birth cohort. The area under the curve for organophosphate exposure was determined by urinary diethyl and dimethyl dialkylphosphate metabolites of organophosphate pesticides, which were measured five times during childhood (6–60 months). Spirometry was performed at age 7 years. Regression models controlled for maternal smoking during pregnancy, season of birth, particulate matter concentrations with aerodynamic diameter  $\leq 2.5 \mu\text{m}$  ( $\text{PM}_{2.5}$ ), breast feeding duration, mould and pets at home, distance of home from a highway, food insecurity, maternal education, season of spirometry, sex, height and technician.

**Results** Childhood diethyl, dimethyl and total dialkylphosphate concentrations were associated with significant decreases in lung function at age 7. Specifically, we found lower  $\text{FEV}_{1,}$  (L/s) ( $\beta = -0.16$ , 95% CI  $-0.30$  to  $-0.02$ ,  $p = 0.03$ ) and FVC (L) ( $\beta = -0.17$ , 95% CI  $-0.34$  to  $0.01$ ,  $p = 0.06$ ) per 10-fold increase of total dialkylphosphate levels.

**Conclusions** Early-life organophosphate exposure as assessed by dialkylphosphate concentrations was adversely associated with 7-year-old children's lung function.