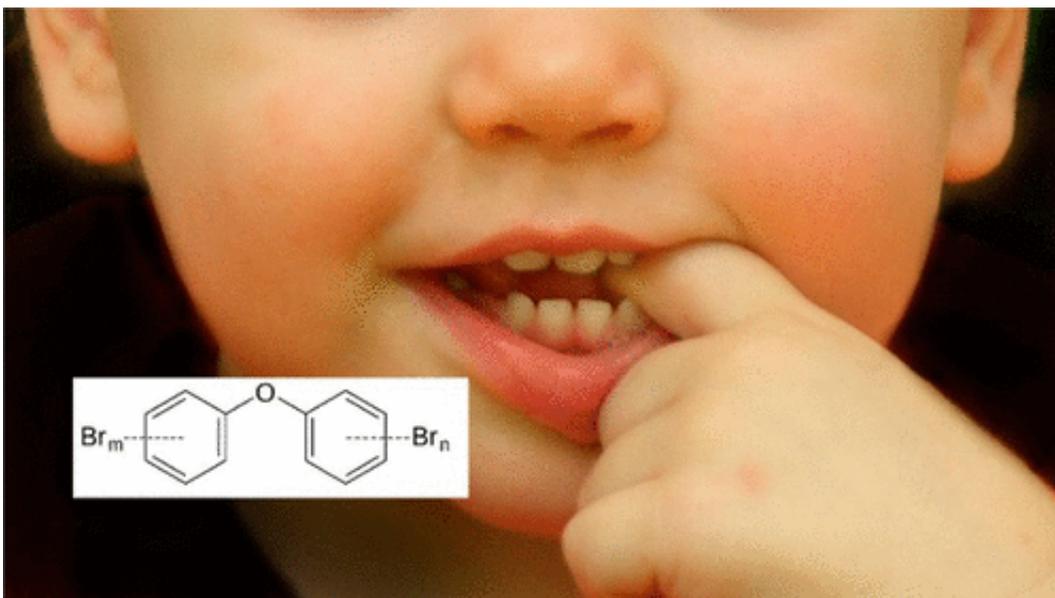


Flame retardant exposure linked to income, BMI and household smoking

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Credit: American Chemical Society

A class of flame retardants known as polybrominated diphenyl ethers (PBDEs) have been phased out of production in the U.S. out of concern for their potential neurotoxic effects, particularly in young children. But the compounds persist in older furniture, plastics and textiles, and in dust. Now a new report in the ACS journal *Environmental Science & Technology* examines the factors that help predict which children could be at a higher risk for exposure to these compounds.

Studies in animals and humans suggest that PBDEs, which are structurally similar to thyroid hormones, could have [neurotoxic effects](#). As a result, various formulations of the flame retardants were phased out in the U.S. as far back as 2004. But the compounds had been added to products such as sofas that people keep for years. And PBDEs can continue to migrate into household dust from these items. Other studies have found that [young children](#), who often put their hands and toys—and any dust that has settled on these items—in their mouths, tend to have the highest concentrations of PBDEs in their blood. Lyndsey Darrow and colleagues wanted to take a closer look to see whether particular groups of children might be affected more than others.

The researchers tested the blood levels of various PBDEs in 80 [children](#) between the ages of 1 and 5, all of whom were born after the U.S. phase-out in 2004 of two types of PBDE commercial formulations. Results showed that lower median income within a neighborhood, lower BMI and smoking in the household corresponded to higher PBDE levels. The researchers note that the socioeconomic disparity in PBDE exposure will likely increase over time as the more economically well-off continue to replace their older products with ones that don't contain these [flame retardants](#). The team speculates that lower BMI could lead to higher PBDE blood concentrations because the [compounds](#) accumulate in fat, which leaner kids have less of. However, it is unclear why smoking affects PBDE exposure.

More information: Predictors of Serum Polybrominated Diphenyl Ether (PBDE) Concentrations among Children Aged 1–5 Years, *Environ. Sci. Technol.*, Article ASAP, pubs.acs.org/doi/abs/10.1021/acs.est.6b04696

Abstract

Serum concentrations of PBDEs were measured using gas chromatography-tandem mass spectrometry in 80 children aged 15–71

months. Demographic and behavioral data were collected on parental questionnaires; a research nurse recorded anthropometric measures and insurance status. For a subset of children ($n = 17$), PBDEs were measured in house dust and child handwipes sampled during a home visit. In linear and Tobit regression, log-transformed PBDE congeners were modeled as a function of child characteristics, including neighborhood-level socioeconomic indicators. BDE congeners 47, 99, and 100 were highly correlated and summed for analysis; BDE-153 was examined individually. PBDE serum concentrations were associated with socioeconomic factors; for example, a \$20,000 increase in median household income in a child's ZIP code was associated with a 34% decrease (95%CI = 14–49%) in BDE-153 and a 26% decrease (95%CI = 6–42%) in \sum BDE-47,-99,-100. Lower body-mass index (BMI) z-score and household smoking were strong predictors of higher BDE-153 levels. Among children who participated in a home visit, serum PBDE was positively correlated with handwipe PBDE (Spearman r \sum BDE-47,-99,-100 = 0.48, $p = 0.09$), but not dust PBDE. Results indicate socioeconomic factors and BMI are strong predictors of serum PBDE levels among young children. PBDEs measured on handwipes are more predictive of serum PBDE levels than vacuum-collected dust.

Provided by American Chemical Society

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