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Wan Y, North ML, Navaranjan G, Ellis AK, Siegel JA, Diamond ML. 2021. Indoor exposure to phthalates and polycyclic aromatic hydrocarbons (PAHs) to Canadian children: The Kingston allergy birth cohort. *Journal of Exposure Science and Environmental Epidemiology*. DOI: 10.1038/s41370-021-00310-y

Background: Canadian children are widely exposed to phthalates and polycyclic aromatic hydrocarbons (PAHs) from indoor sources. Both sets of compounds have been implicated in allergic symptoms in children.

Objective: We characterize concentrations of eight phthalates and 12 PAHs in floor dust from the bedrooms of 79 children enrolled in the Kingston Allergy Birth Cohort (KABC).

Method: Floor dust was collected from the bedrooms of 79 children who underwent skin prick testing for common allergens after their first birthday. Data were collected on activities, household, and building characteristics via questionnaire.

Results: Diisononyl phthalate (DiNP) and phenanthrene were the dominant phthalate and PAH with median concentrations of 561 µg/g and 341 ng/g, respectively. Benzyl butyl phthalate (BzBP) and chrysene had the highest variations among all tested homes, ranging from 1–95% to 1–99%, respectively.

Significance: Some phthalates were significantly associated with product and material use such as diethyl phthalate (DEP) with fragranced products and DiNP and DiDP with vinyl materials. Some PAHs were significantly associated with household characteristics, such as benzo[a]pyrene with smoking, and phenanthrene and fluoranthene with the presence of an attached garage. Socioeconomic status (SES) had positive and negative relationships with some concentrations and some explanatory factors. No significant increases in risk of atopy (positive skin prick test) was found as a function of phthalate or PAH dust concentrations.

Main findings

- DiNP, and not DEHP, was the dominant phthalate in household dust from 79 children's rooms in KABC, contributing 2–91% of the total phthalates, whereas phenanthrene was the most abundant PAH contributing 1–93% of the total PAHs.
- DEP and DiBP were significantly positively associated with questionnaire-reported use of **fragranced products** which in turn, was negatively related to SES, whereas DiNP and DiDP had significant positive associations with PVC wallpaper in the home which was positively related to SES.
- No significant increase in risk of allergic sensitization associated with phthalate &/ PAH dust concentrations, except for DiNP, but this relationship was not significant after correcting for SES, gender, mold, breastfeeding, gestational age, or prenatal smoking.

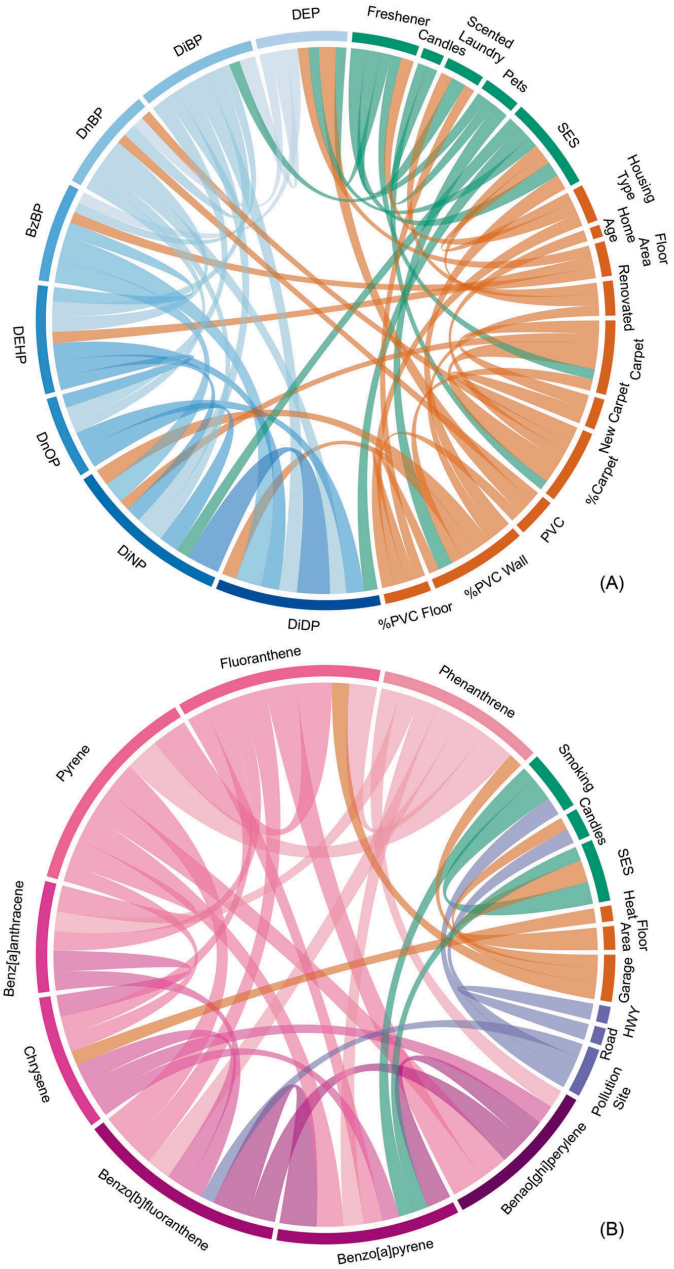

Figure 1. Exposome globes demonstrating the associations between levels of phthalates (A) on the top, PAHs (B) on the bottom and household and building characteristics. Highly detected chemicals (>50% detection frequency) are located on the left-hand side, whereas the characteristics that could potentially explain the chemical concentrations on the right-hand side.

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