

Wan Y, Diamond ML, Siegel JA. 2020. Elevated concentrations of semivolatile organic compounds in social housing multiunit residential building apartments. *ES&T Letters*, 7(3), 191-197.

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Abstract

Flame retardants and phthalates are commonly used in consumer products and building materials, and as such, are prevalent in indoor air. Polycyclic aromatic hydrocarbons (PAHs) can have both indoor and outdoor sources and can also be found in indoor air. Flame retardants, phthalates and PAHs were measured in indoor air in 71 units in low-income social housing multi-unit residential buildings (MURBs) using silicone rubber (polydimethylsiloxane or PDMS) passive air samplers deployed for 1 week in Toronto, Canada, in late spring and winter of 2017. Tris(1,3-dichloro-2-propyl) phosphate (TDCiPP), diethyl phthalate (DEP) and phenanthrene were the dominant flame retardant, phthalate and PAH, with median concentrations of 1640 pg/m^3 , 1840 and 79.0 ng/m^3 , respectively. Flame retardant and phthalate concentrations were 2 to 18 times higher than those in predominantly detached and semi-detached houses in Toronto measured using the same passive samplers. These results indicate higher exposures among residents of low-income social housing (63% with income < \$23,400) than those of higher socio-economic status single-family dwellings (67% with income > \$100,000).

Main findings

- We found significantly higher concentrations of all flame retardants and phthalates analyzed in low-SES vs higher-SES residences.
- Concentrations were higher in late spring than in winter; however, the difference was only significant for tris(1,3-dichloro-2-propyl) phosphate (TDCiPP).
- Differences in SVOC profiles were not attributable to the building, such as location, apartment type, or number of stories.
- Cigarette smoking contributed to higher concentrations of some PAHs and additional sources (such as barbecuing on balconies) may have been important in some units.
- Naphthalene can originate from cooking and cigarette smoking, as well as off-gassing from products such as deodorizers, repellents, and fumigants.
- We were unable to find strong evidence for factors that could explain this difference, for example, use of household products such as self-reported use of scented

projects and housing characteristics including temperature, occupant density, and building materials.

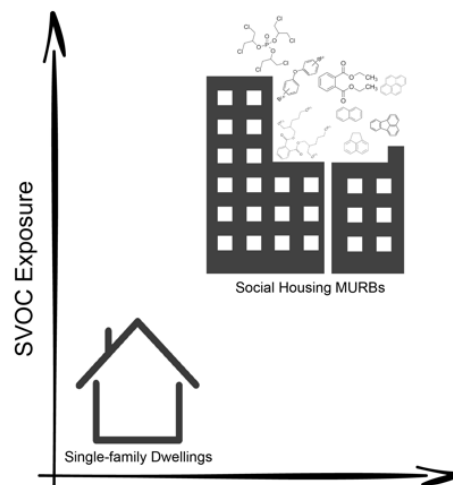


Figure 1. Graphic abstract

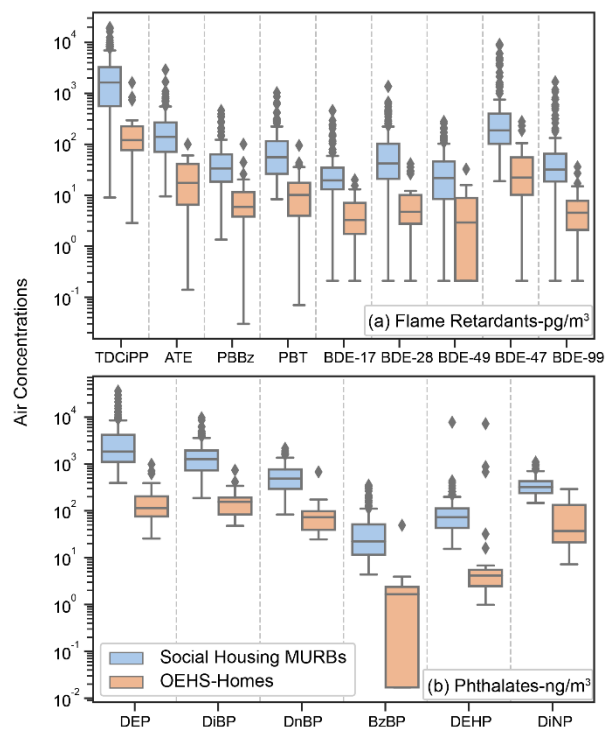


Figure 2 Comparison of flame retardant (pg/m^3) and phthalate (ng/m^3) concentrations from most-used rooms between social housing MURB apartments in Toronto, Canada (this investigation), and OEHS-Homes (Ontario Environmental Health Study-Homes).

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