



Mendell A, Mahdavi A, Siegel JA. 2022. Particulate matter concentrations in social housing. *Sustainable Cities & Society*, 76, 103503. DOI: [10.1016/j.scs.2021.103503](https://doi.org/10.1016/j.scs.2021.103503)

Abstract

Multifamily buildings generally, and social housing specifically, are an important component of most urban environments. Residents of social housing are often exposed to higher concentrations of indoor pollutants. We measured particulate matter (PM) concentrations in 91 smoking and non-smoking apartments across seven social housing buildings in Toronto, Canada before and after energy retrofits. Particle concentrations varied greatly within and between apartments. Of the four environmental factors examined (smoking, season, building, and retrofit status), only smoking ($p < 0.001$) had a significant effect across all measurements. PM concentrations were two to three times higher in smoking apartments. PM concentrations in non-smoking apartments from this study were two times higher than comparable measurements from 21 single-family homes in Toronto that used the same particle monitor. A source detection algorithm reported elevated PM concentrations during $57\% \pm 12\%$ of each monitoring period, which was higher than in the single-family homes, suggesting that indoor sources are likely responsible for the concentration differences. Overall, we found that PM concentrations are disproportionately higher in social housing buildings which likely contribute to health disparities and highlight the importance of exposure reduction strategies in this important urban building type.

Main findings

1. PM concentrations were two to three times higher in smoking apartments.
2. Non-smoking apartments had concentrations twice that of single-family dwellings.
3. Higher periods of elevated PM concentrations in the social housing apartments suggest that indoor sources are primarily responsible for differences.
4. Exposure reduction strategies should be employed to improve resident health.

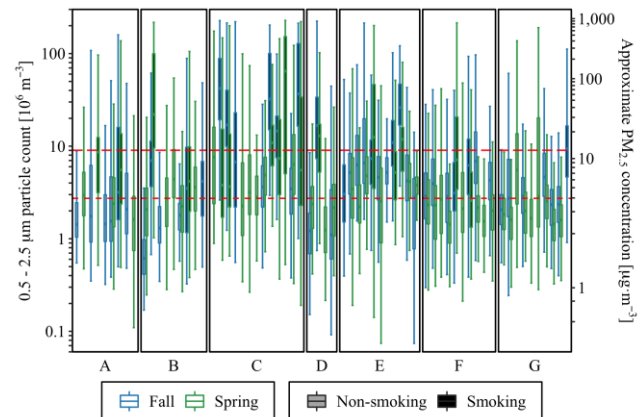


Figure 1. Pre-retrofit indoor PM number concentration of apartments measured by the Dylos DC1700 optical particle counter. Each box represents one period of measurement for one apartment. Apartments measured during both seasons are represented by adjacent boxes.

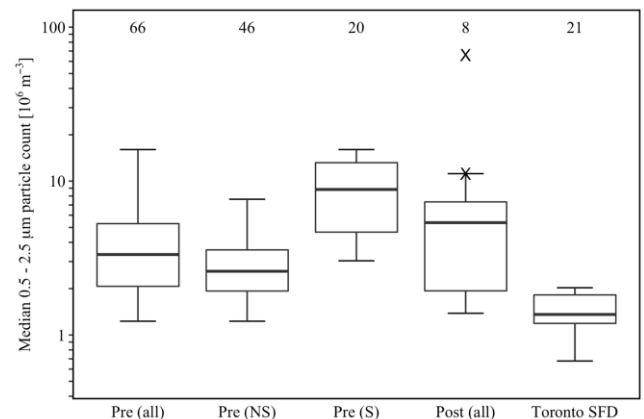


Figure 2. Median indoor 0.5 – 2.5 μm particle count of apartments and single-family dwellings (SFDs) measured by the Dylos DC1700 monitors. The numbers displayed at the top indicate the number of apartments in each group. NS and S refer to non-smoking and smoking respectively. The two smoking apartments measured post-retrofit are represented by X's.

Support provided by:



**NSERC
CRSNG**

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