



Vakalis D, Touchie M, Tzekova E, MacLean HL, Siegel JA. 2019. Indoor environmental quality perceptions of social housing residents. *Building and Environment*, 150, 135-143. DOI: [10.1016/j.buildenv.2018.12.062](https://doi.org/10.1016/j.buildenv.2018.12.062)

Abstract

The need to reduce the carbon footprint of the current stock of multi-unit residential buildings (MURBs) creates an opportunity to improve the indoor environmental quality (IEQ), particularly in buildings occupied by vulnerable populations. This investigation presents IEQ findings from an occupant survey of 180 suites across seven social housing MURBs. The results show many residents are experiencing discomfort in all three categories of outcomes surveyed, thermal comfort, olfactory comfort and health symptoms. Residents in two of the seven buildings have higher thermal discomfort, and initial analysis suggests that higher glazing ratios may be a contributing factor. Windows are generally associated with higher solar gains and drafts, making them a good retrofit target for energy and IEQ gains. Resident interventions, such as use of fans or window air conditioning units, were not effective. Olfactory discomfort is another challenge for residents, 80% of whom reported discomfort on at least a weekly basis. Retrofits that exhaust odors from within the suite and limit inter-suite odor transfer could improve olfactory conditions. The buildings that have higher rates of olfactory and thermal discomfort also have higher frequency of health symptoms, warranting further investigation of interrelationships among the outcomes. Residents who report thermal discomfort more frequently report olfactory discomfort and experience more frequent health symptoms. Overall, these results are useful benchmarks of the current IEQ status of this type of building. Understanding the results is helpful for targeting retrofit strategies across multiple IEQ dimensions.

Main findings

1. Residents of social housing have widespread thermal comfort and olfactory complaints
2. Window coverings, fan use and window air conditioning units appear ineffective against thermal discomfort during summer
3. Fenestration ratio, but not stack effect, appears to play a role in resident thermal comfort
4. Reducing olfactory discomfort from cooking odors and inter-suite tobacco smoke would require extensive retrofits

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5. Reports of health symptoms tend to be from residents who more frequently report both olfactory and thermal discomfort

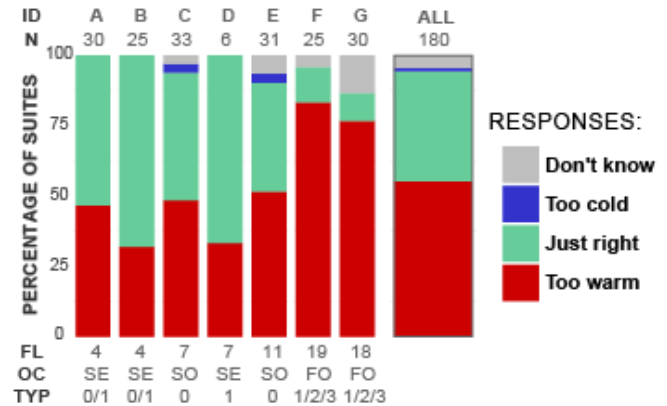


Figure 1. “How comfortable are you in different rooms of your apartment, during the summer months?” Self-reported thermal comfort for each building. ID: building identifier. N: number suites surveyed. FL: number of floors. OC: occupancy (SE Senior, SO Single Occupancy, FO Family Occupancy). TYP: Suite Type (0 studio, 1 bedroom, 2 bedroom, 3 bedroom).

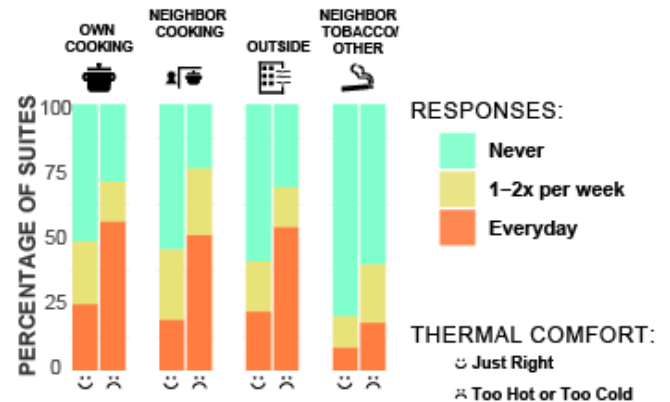


Figure 2. Are you bothered by any of the following odors in your apartment, during the summer months? Olfactory outcomes, split by thermal comfort. Own Cooking: Your own cooking odors spreading in the apartment. Neighbor cooking: Cooking odors from neighbors. Neighbor tobacco/other: Tobacco smoke or other odors from neighbors. Outside: Odors from outside, such as car exhaust fumes, barbecue smoke, industrial exhaust.

