Aldred J, Darling E, Morrison GC, Siegel JA, Corsi RL. 2016. Benefit-cost analysis of commercially available activated carbon filters for indoor ozone removal in single-family homes. *Indoor Air*, **26(3)**, 501-512. DOI: 10.1111/ina.12220

Abstract

This study involved the development of a model for evaluating the potential costs and benefits of ozone control by activated carbon filtration in single-family homes. The modeling effort included the prediction of indoor ozone with and without activated carbon filtration in the HVAC system. As one application, the model was used to predict benefit-to-cost ratios for single-family homes in 12 American cities in five different climate zones. Health benefits were evaluated using disability-adjusted life-years and included city-specific age demographics for each simulation. Costs of commercially available activated carbon filters included capital cost differences when compared to conventional HVAC filters of similar particle removal efficiency, energy penalties due to additional pressure drop, and regional utility rates. The average indoor ozone removal effectiveness ranged from 4 to 20% across the 12 target cities and was largely limited by HVAC system operation time. For the parameters selected in this study, the mean predicted benefit-to-cost ratios for 1-inch filters were >1.0 in 10 of the 12 cities. The benefits of residential activated carbon filters were greatest in cities with high seasonal ozone and HVAC usage, suggesting the importance of targeting such conditions for activated carbon filter applications.

Practical Implications

Ozone and **ozone reaction products** have been linked to increased incidences of **mortality** and **morbidity**. Indoor exposure is an important contributor to overall population exposures to ozone. As such, **effective ozone control** via carbon filtration can provide health benefits, especially in cities with **high ambient ozone** and **high air-conditioning usage** during the summer.

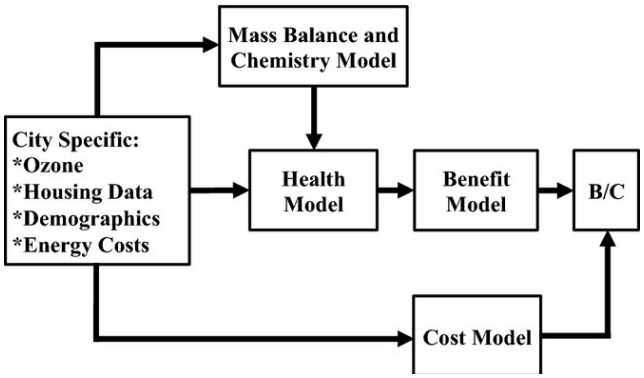

Figure 1. Conceptual model illustrating interconnected submodels of the integrated systems model.

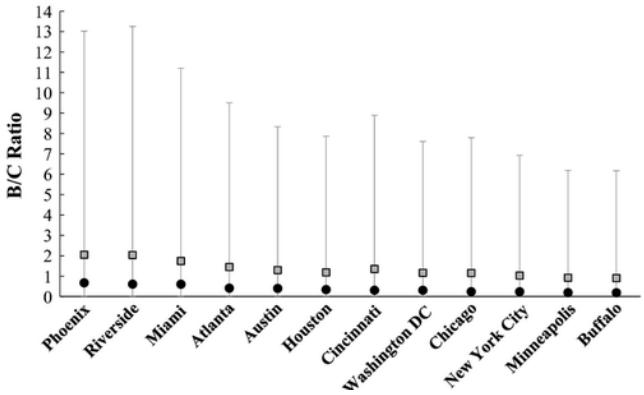

Figure 6. Benefit-to-cost ratios from using activated carbon filters in homes. The filled circle represents the median, the filled box represents the mean, and the whiskers represent the 95% confidence intervals of the distribution determined by the Monte Carlo simulation.

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