AN INTERVENTION STUDY USING FREE-STANDING HEPA AIR FILTERS AND AIR CONDITIONERS PLACED IN BEDROOMS OF INNER CITY CHILDREN WITH ASTHMA

Stuart Batterman, *University of Michigan, USA*
Liuliu Du, *University of Michigan, USA*
Edith Parker, *University of Iowa, USA*
Christopher Godwin, *University of Michigan, USA*
Ashley O'Toole, *University of Michigan, USA*
Thomas Robins, *University of Michigan, USA*
Jie Zhou, , *University of Michigan, USA*
Bhramar Muhkerjee, *University of Michigan, USA*
Toby Lewis, *University of Michigan, USA*
Community Action Against Asthma Steering Committee, *Detroit, USA*

Background and aims: Airborne particulate matter (PM) is an asthma trigger and can aggravate respiratory and other health conditions. Environmental tobacco smoke (ETS), to which many children are exposed, is associated with increased frequency and severity of asthma attacks, prolonged duration of symptoms, and decreased lung function. Children in urban areas are especially exposed to indoor pollutants, which often dominate exposures. Air filters can substantially reduce PM exposures and, as suggested in several studies, asthma symptoms. Room filters are inexpensive and easily installed, but performance is affected by clean air delivery rates, air exchange rates (AERs), and other factors. This study evaluates the utility of filters and air conditioners (ACs), intended to reduce AERs and improve filter performance, on exposures and health of asthmatic children in Detroit, Michigan.

Methods: 126 households containing an asthmatic child were randomized into a control group, a group receiving a HEPA filter placed in the child's bedroom, or a group receiving a filter and an AC. Each participant received educational community health worker home visits. Information regarding home characteristics and occupant activities were collected using surveys and inspections. Parameters monitored each season over a year included PM, CO2, ETS, and filter use. Child health measures included pulmonary function, medication use and symptom frequency.

Results: When used, filters substantially reduced PM concentrations, producing 70% reductions as measured immediately after filter installation. However, participants decreased their use of the filters over time. When corrected for ETS and other co-factors, ACs provided a modest drop in PM concentrations, but concentrations sometimes increased. The ongoing analysis of health symptoms suggests diminished symptoms when filters were used.

Conclusions: Measures that capture actual exposures are needed, including continuous monitoring of filter use and pollutant levels, in order to avoid biases that dilute effects seen in air filter and other intervention studies.