

Indoor air pollution increases asthma symptoms

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A study by researchers at the Johns Hopkins University found an association between increasing levels of indoor particulate matter pollution and the severity of asthma symptoms among children. The study, which followed a group of asthmatic children in Baltimore, Md., is among the first to examine the effects of indoor particulate matter pollution. The results are published in the February 2009 edition of the journal *Environmental Health Perspectives*.

Particulate matter is an airborne mixture of solid particles and liquid droplets. The solid particles come in numerous shapes and sizes and may be composed of different chemical components. Fine particles measure 2.5 microns or less in size (approximately 1/30th the diameter of a human hair) and can penetrate deep into the body's respiratory system. Coarse particles fall between 2.5 and 10 microns in diameter. These larger particles can also enter the respiratory system and can be produced indoors through activities such as cooking and dusting. The U.S. Environmental Protection Agency (EPA) regulates outdoor levels of fine particle pollution, but does not have a standard for coarse particle pollution. There are no regulations for indoor pollution.

For the study, researchers from the Center for Childhood Asthma in the Urban Environment—a joint center of the Johns Hopkins Bloomberg School of Public Health and the Johns Hopkins School of Medicine—followed 150 asthmatic children, ages 2 to 6, for six months. Environmental monitoring equipment was used to measure the air in the child's bedroom for over three three-day intervals. Air measurements

were taken at the beginning of the study, after 3 months and again after 6 months. Ninety-one percent of the children who participated in the study were African-American, from lower socioeconomic backgrounds, and spent most of their time indoors.

"We found that substantial increases in asthma symptoms were associated both with higher indoor concentrations of fine particles and with higher indoor concentrations of coarse particles," said Meredith C. McCormack, MD, MHS, lead author of the study and an instructor with the Johns Hopkins School of Medicine.

For every 10 micrograms per cubic meter of air ($\mu\text{g}/\text{m}^3$) increase in indoor coarse particle concentration, there was a 6 percent increase in the number of days of cough, wheeze, or chest tightness, after adjusting for a number of factors. For every 10 $\mu\text{g}/\text{m}^3$ increase in fine particles measured indoors, there was a 7 percent increase in days of wheezing severe enough to limit speech and after adjusting for various factors, a 4 percent increase in days on which rescue medication was needed. In many cases, the level of indoor fine particle pollution measured was twice as high as the accepted standard for outdoor pollution established by the EPA.

"Children spend nearly 80 percent of their time indoors, which makes understanding the effects of indoor air very important," said co-author, Gregory B. Diette, MD, an associate professor in the School of Medicine and co-director of the Center for Childhood Asthma in the Urban Environment.

"Improving indoor air quality and lowering indoor PM concentrations may provide additional means of improving asthma health, especially for children living in inner cities," added co-author, Patrick Breyse, PhD, a professor in the Johns Hopkins Bloomberg School of Public Health and co-director of the Center for Childhood Asthma in the Urban

Environment.

Source: Johns Hopkins University Bloomberg School of Public Health

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