Public release date: 5-Oct-2006

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Secondhand smoke in cars may lead to dangerous levels of contaminants for children

Study found concentrations rated 'hazardous' by EPA

Boston, MA -- Secondhand tobacco smoke (SHS) can have harmful effects on children. Some of the adverse health outcomes include a greater likelihood of ear infections, lower respiratory infections, sudden infant death syndrome and severity of asthma symptoms. It is estimated that 35% to 45% of children are regularly exposed to SHS from adults using tobacco in homes and cars. To date, there has been little research on SHS in cars.

In the first study to measure SHS in cars in real driving conditions, Harvard School of Public Health (HSPH) researchers have shown that smoking in cars can produce unsafe levels of SHS. Even with the driver's window slightly open, mean respirable suspended particles (RSP) concentrations hit levels rated "hazardous" by the U.S. Environmental Protection Agency (EPA). In the study, concentrations of 272 μg/m3 were measured, with a peak level of 505 μg/m3. In comparison, the EPA's air quality index rates concentrations of more than 40 μg/m3 as "unhealthy for sensitive groups," such as children and the elderly, and more than 250 μg/m3 as "hazardous" for the general population. The results showed that smoking a single cigarette for just five minutes could produce potentially harmful RSP levels. Given the levels the researchers observed, SHS in cars poses a potentially serious threat to children's health.

The authors hope that their findings will encourage renewed efforts to promote smoke-free environments for children both in cars and homes. The study will be published in the November 2006 issue of the American Journal of Preventive Medicine and is available online now at http://www.ajpm-online.net/webfiles/images/journals/amepre/1751.pdf.

SHS is associated with adverse effects in adults as well, including cancers, cardiovascular disease and reproductive and respiratory problems. However, SHS may have more harmful effects on children because their immune systems are less mature

and, due to smaller airways and greater demand for oxygen, they may be more vulnerable to respiratory diseases.

The researchers, Vaughan Rees, research associate, and Gregory Connolly, professor of the practice of public health, both in HSPH's Division of Public Health Practice, recruited volunteers to smoke while driving vehicles in Boston city traffic. In 45 driving trials, which averaged about an hour, SHS measurements were taken using devices that could detect and measure respirable suspended particles (RSPs) of less than 2.5 microns in diameter and carbon monoxide (CO), a poisonous gas. RSPs, which are found in tobacco smoke, are small enough to be inhaled and can transport carcinogens and other toxic substances deep into the lungs. Respiratory illnesses like bronchitis, emphysema, and asthma are linked to exposure to RSPs. The measurement devices were positioned in an empty child restrainer seat at simulated head level. Measurements were obtained under two different ventilation conditions: all car windows rolled down, then with just the driver's side window cracked about two inches.

"The smoke particle levels we measured are alarming and are above the threshold for what's considered unhealthy for sensitive groups -- people like children and the elderly," said lead study author Rees. "Adults who smoke while driving their children may be harming them more than they realize."

Driving under closed-windows conditions generated the highest RSP and CO levels. But the levels of contaminants during open-windows conditions, though significantly less than when the windows were closed, were still unsafe. "There is an argument that even exposure for very short periods of time, perhaps even 10 seconds, can precipitate asthmatic episodes in children," Rees said. He added that ventilation won't likely overcome secondhand smoke pollution that sticks to surfaces.

"Toxic particles from secondhand smoke can settle on furniture or on floors, and we are assuming that will also occur in cars on child-restraint seats. Children tend to touch things with their hands, and put their hands in their mouths. So children can also be exposed to contaminants in that way," Rees said.

Arkansas and Louisiana have recently banned smoking in cars with young children as passengers. Similar legislation has also been introduced, but not passed, in California, Georgia, Michigan, New Jersey, New York, Pennsylvania and Vermont. Although concerns have been raised about government intrusion on personal privacy, supporters

of smoking bans note that SHS is dangerous to children's health and that the use of safety devices such as seat belts and infant car seats are already widely legislated.

"We know from previous research that smoking indoors can produce dangerous levels of toxic contaminants," said Reese. "This research has shown that smoking in cars, even with the windows open, can produce smoke pollution that compares with smoky bars or restaurants. Unlike adults, children cannot advocate for smoke-free spaces and are sometimes physically restrained in very smoky cars. We think that policymakers and health advocates should pay close attention to these findings in order to promote smoke-free domestic environments for children."

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The authors acknowledge the support of the Flight Attendant Medical Research Institute, which provided funding under a Distinguished Professorship awarded to Gregory Connolly.

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