

Health Effects of Secondhand Smoke on Children

The 2006 U.S. Surgeon General's Report, "*The Health Consequences of Involuntary Exposure to Secondhand Smoke*," has concluded that **there is no safe level of exposure to secondhand smoke and that, on average, children are exposed to more secondhand smoke than adults.** Children are significantly affected by secondhand smoke. Children's bodies are still developing, and exposure to the poisons in secondhand smoke puts them at risk of severe respiratory diseases and can hinder the growth of their lungs. Secondhand smoke is a known cause of low birth weight, Sudden Infant Death Syndrome (SIDS), asthma, bronchitis, pneumonia, middle ear infection, and other diseases.¹

Although levels of secondhand smoke exposure declined between 1988-1994 and 1999-2004 in the general population overall, children were the sub-group with the least rate of decline.²

Low Birth Weight

- Secondhand smoke is a known preventable cause of low birth weight, which contributes to infant mortality and health complications into adulthood. Secondhand smoke exposure reduces the birth weight of infants of nonsmoking mothers and contributes to additional reductions in birth weight among babies of smoking mothers.³
- Nonsmoking pregnant women who are exposed to secondhand smoke tend to give birth to infants who have a reduced mean birth weight of 33g or more. Secondhand smoke exposure also increases the risk of a birth weight below 2,500g by 22 percent.⁴

Sudden Infant Death Syndrome (SIDS)

- Maternal smoking is the strongest risk factor leading to SIDS.⁵
- Infants who die from SIDS tend to have higher concentrations of nicotine in their lungs than do control children, regardless of whether smoking is reported.⁶

Cognitive Impairments

- Secondhand smoke exposure impairs a child's ability to learn. It is neurotoxic even at extremely low levels. More than 21.9 million children are estimated to be at risk of reading deficits because of secondhand smoke. Higher levels of exposure to secondhand smoke are also associated with greater deficits in math and visuospatial reasoning.⁷
- The offspring of mothers who smoke one pack of cigarettes per day during pregnancy have an IQ score that is, on average, 2.87 points lower than children born to nonsmoking mothers.⁸

Behavioral Problems

- Children born to women nonsmokers who are exposed to secondhand smoke during pregnancy and to women who smoked during pregnancy are more likely to suffer from Attention Deficit Hyperactivity Disorder (ADHD) and conduct disorder.^{9, 10}
- Girls are exposed to higher rates of secondhand smoke than boys, but boys have greater problems with hyperactivity, aggression, depression, and other behavioral problems.¹¹

Respiratory Problems

- The U.S. Environmental Protection Agency (EPA) has reported that secondhand smoke exposure increases the risk of lower respiratory tract infections such as bronchitis and pneumonia. The EPA estimates that between 150,000 and 300,000 annual cases of lower respiratory tract infections in infants and young children up to 18 months of age are attributable to secondhand smoke exposure. Of these cases, between 7,500 and 15,000 result in hospitalization.¹²
- Infants whose mothers smoke are 50 percent more likely to be hospitalized with a respiratory infection during their first year when compared to infants with nonsmoking mothers. Infants whose mothers smoke in the same room have a 56 percent higher risk of being hospitalized compared to infants whose mothers smoke in a separate room. There is a 73 percent higher risk if mothers smoke while holding their infants and a 95 percent higher risk if mothers smoke while feeding their infants.¹³
- Early exposure to cigarette smoke is a likely significant independent risk factor for subsequent respiratory disease. It is likely that in utero damage is compounded by increased susceptibility to the effects of continued postnatal secondhand smoke exposure.¹⁴

Asthma

- Asthma attacks are perhaps the most well-known health effect of secondhand smoke exposure among children. Secondhand smoke exposure increases the frequency of episodes and the severity of symptoms in asthmatic children. The EPA estimates that 200,000 to 1,000,000 asthmatic children have their condition worsened by exposure to secondhand smoke.¹⁵
- Secondhand smoke exposure is associated with increased respiratory-related school absenteeism among children, especially those with asthma.¹⁶
- Maternal and grand maternal smoking may increase the risk of childhood asthma. Relative to children of never-smokers, children whose mothers smoked throughout the pregnancy have an elevated risk of asthma in the first five years

of life. Children whose mothers quit smoking prior to the pregnancy show no increased risk.¹⁷

- Secondhand smoke exposure causes children who already have asthma to experience more frequent and severe attacks.¹⁸
- Maternal smoking, in utero and later, is significantly related to lifetime wheezing in offspring.¹⁹

Repercussions on Adult Health

- Not only does in utero and childhood secondhand smoke exposure cause decreased lung function and asthma in children, but such exposure is also responsible for poor lung function and respiratory disease in adults. Men who report postnatal secondhand smoke exposure and women who report prenatal exposure are more likely to have respiratory problems as adults.^{20, 21}
- Secondhand tobacco smoke exposure raises adolescents' risk of metabolic syndrome – a disorder associated with excessive belly fat that increases one's chances of heart disease, stroke, and type II diabetes.²²
- The level of secondhand smoke a child is exposed to is directly proportional to the likelihood of the child becoming a smoker as an adolescent or an adult.²³
- Moderate exposure to tobacco smoke is associated with decreased elasticity of the abdominal aorta in healthy 11-year-old children. Altered aortic elasticity is an early marker of atherosclerosis.²⁴
- SHS exposure in motor vehicles may be associated with nicotine dependence symptoms among young never-smokers.²⁵
- Women exposed to six or more hours of secondhand smoke a day as children and as adults have a 68 percent greater chance of having difficulty conceiving and suffering more miscarriages.²⁶
- There is an increased risk of failed embryo implantation among women reporting current secondhand tobacco smoke exposure.²⁷
- In subjects hospitalized because of early wheezing, prenatal and postnatal secondhand smoke exposure is a risk factor for asthma in early adulthood. The connection between prenatal smoke exposure and asthma appears to be mediated via the development of bronchial hyper-responsiveness. Smoke exposure in infancy is associated with an increased risk of active smoking in early adult age, which in turn, is linked to current asthma.²⁸
- The adverse effects of postnatal smoking on development of airway growth may persist into early adulthood.²⁹

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REFERENCES

- 1 U.S. Department of Health and Human Services. *The Health Consequences of Involuntary Exposure to Tobacco Smoke: A Report of the Surgeon General*. U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health, 2006.
- 2 Schober, S.E.; Zhang, C.; Brody, D.J.; Marano, C., "Disparities in secondhand smoke exposure — United States, 1988-1994 and 1999-2004," *Morbidity and Mortality Weekly Report* 57(27): 744-747, July 11, 2008.
- 3 Dejmek, J.; Solansky, I.; Podrazilova, K.; Sram, R., "The exposure of nonsmoking and smoking mothers to environmental tobacco smoke during different gestational phases and fetal growth," *Environmental Health Perspectives* 110(6): 601-606, June 2002.
- 4 Leonardi-Bee, J.A.; Smyth, A.R.; Britton, J.; Coleman, T., "Environmental tobacco smoke on fetal health: systematic review and meta-analysis," *Archives of Disease in Childhood, Fetal and Neonatal Edition* [Epub ahead of print], January 24, 2008
- 5 Woodward, A. and Laugesen M., "How many deaths are caused by secondhand cigarette smoke?" *Tobacco Control*, 10: 383 - 388, December 2001.
- 6 McMartin, K.I.; Platt, M.S.; Hackman, R.; Klein, J.; Smialek, J.E.; Vigorito, R.; Koren, G., "Lung tissue concentrations of nicotine in sudden infant death syndrome (SIDS)," *Journal of Pediatrics* 140(2): 205-209, February 2002.
- 7 Yolton, K. et al., "Exposure to Environmental Tobacco Smoke and Cognitive Abilities of U.S. Children and Adolescents," *Environmental Health Perspectives*, 113(1): 98-103.
- 8 Batty, G.D.; Der, G.; Deary, I.J., "Effect of maternal smoking during pregnancy on offspring's cognitive ability: empirical evidence for complete confounding in the US National Longitudinal Survey of Youth," *Pediatrics* 118(3): 943-950, September 2006.
- 9 Button, T.M.M.; Thapar, A.; and McGuffin, P., "Relationship between antisocial behavior, attention-deficit hyperactivity disorder and maternal prenatal smoking," *British Journal of Psychiatry* (2005), 187, 155-160.
- 10 Potera, C., "Secondhand behavioral problems," *Environmental Health Perspectives* 115(10): A492, October 2007.
- 11 Yolton, K.; Khoury, J.; Hornung, R.; Dietrich, K.; Succop, P.; Lanphear, B., "Environmental tobacco smoke exposure and child behaviors," *Journal of Developmental & Behavioral Pediatrics* 29(6):450-457, December 2008.
- 12 [n.a.], "Fact Sheet: Respiratory Health Effects of Passive Smoking," *U.S. Environmental Protection Agency*, April 2004.
- 13 Blizzard, L.; Ponsonby, A.; Dwyer, T.; Venn, A.; Cochrane, J.A., "Parental smoking and infant respiratory infection: how important is not smoking in the same room with the baby?" *American Journal of Public Health* 93(3): 482-488, March 2003.
- 14 Prescott, S.L., "Effects of early cigarette smoke exposure on early immune development and respiratory disease," *Paediatric Respiratory Reviews* 9(1): 3-10, March 2008.
- 15 [n.a.], "Fact Sheet: Respiratory Health Effects of Passive Smoking," *Environmental Protection Agency*, April 2004.
- 16 Gilliland, F.D.; Berhane, K.; Islam, T.; Wenten, M.; Rappaport, E.; Avol, E.; Gauderman, W.J.; McConnell, R.; Peters, J.M., "Environmental tobacco smoke and absenteeism related to respiratory illness in schoolchildren," *American Journal of Epidemiology* 157(1): 861-869, May 15, 2003.
- 17 Yu-Fhen, Li. et al., "Maternal and Grandmaternal Smoking Pattern Are Associated With Early Childhood Asthma," *Chest*, 127(4): 1232, 2005.
- 18 U.S. Department of Health and Human Services. *The Health Consequences of Involuntary Exposure to Tobacco Smoke: A Report of the Surgeon General*. Children are Hurt by

Secondhand Smoke. U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health, 2006.

19 Raheison, C.; Penard-Morand, C.; Moreau, D.; Caillaud, D.; Charpin, D.; Kopfersmitt, C.; Lavaud, F.; Taytard, A.; Annesi-maesano, I., "In utero and childhood exposure to parental tobacco smoke, and allergies in schoolchildren," *Respiratory Medicine [epub ahead of print]*, May 28, 2006.

20 Svanes, C.; Omenaas, E.; Jarvis, D.; Chinn, S.; Gulsvik, A.; Burney, P., "Parental smoking in childhood and adult obstructive lung disease: results from the European Community Respiratory Health Survey," *Thorax* 59(4): 295-302, April 1, 2004.

21 Skorge, T.D., et. al., "The Adult Incidence of Asthma and Respiratory Symptoms by Passive Smoking In Utero or in Childhood," *American Journal of Respiratory and Critical Care Medicine*, Vol. 172, pp. 61-66, April 2005.

22 Weitzman, M., et. al, "Tobacco Smoke Exposure Is Associated With the Metabolic Syndrome in Adolescents," *Circulation* 2005, doi:10.1161/CIRCULATIONAHA.104.520650.

23 Becklake, M.R.; Ghezzo, H.; Ernst, P., "Childhood predictors of smoking in adolescence: a follow-up study of Montreal schoolchildren," *CMAJ* 173(4): 377-379, August 16, 2005.

24 Kallio, K.; Jokinen, E.; Hamalainen, M.; Saarinen, M.; Volanen, I.; Kaitosaari, T.; Viikari, J.; Ronnema, T.; Simell, O.; Raitakari, O.T., "Decreased aortic elasticity in healthy 11-year-old children exposed to tobacco smoke," *Pediatrics* 123(2): e267-e273, February 2009

25 Belanger, M.; O'Loughlin, J.; Okoli, C.T.C.; McGrath, J.J.; Setia, M.; Guyon, L.; Gervais, A., "Nicotine dependence symptoms among young never-smokers exposed to secondhand tobacco smoke," *Addictive Behaviors [Epub ahead of print]*, July 23, 2008.

26 Secondhand smoke raises odds of fertility problems in women," *Science Daily*, December 5, 2008.

27 Meeker, J.D.; Missmer, S.A.; Vitonis, A.F.; Cramer, D.W.; Hauser, R., "Risk of spontaneous abortion in women with childhood exposure to parental cigarette smoke," *American Journal of Epidemiology* 166(5): 571-575, September 1, 2007.

28 Goksor, E.; Amark, M.; Alm, B.; Gustafsson, P.M.; Wennergren, G., "The impact of pre- and post-natal smoke exposure on future asthma and bronchial hyperresponsiveness," *Acta Paediatrica [Epub ahead of print]*, May 10, 2007

29 Hayatbakhsh, M.R.; Sadasivam, S.; Mamun, A.A.; Najman, J.M.; O'Callaghan, M.J., "Maternal smoking during and after pregnancy and lung function in early adulthood: a prospective study," *Thorax [Epub ahead of print]*, June 11, 2009.

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