Thirdhand Smoke Resource Center

Who is most likely to be exposed to thirdhand smoke?

The Short Answer

Thirdhand smoke is the chemicals left behind when someone smokes tobacco. Thirdhand smoke is unhealthy for people and pets. It can stick around for a long time in homes and cars. It gets into your body if you inhale, swallow, or touch the chemicals. Getting rid of it is really hard and can cost a lot of money.

Infants and young children are more likely to breathe in, swallow, or touch thirdhand smoke chemicals for three reasons:

1. They spend most of their time indoors, especially on the floor. This means they are nearer to carpets and dust contaminated with thirdhand smoke chemicals.
2. They explore by putting things into their mouths. This means they can put toys, blankets, and other objects contaminated with thirdhand smoke chemicals into their mouths.
3. Their bodies are developing. Young children breathe more frequently. This means that they have more chances to breathe in thirdhand smoke chemicals. Also, their skin is thinner than adults, so it does not create a barrier to keep the chemicals out.

The Long Answer

Thirdhand smoke is the chemical residue from tobacco smoke. It is also called “tobacco smoke residue” or “stale tobacco smoke.” The chemicals in thirdhand smoke are toxic to humans, especially children. It can linger for years in dust and on household surfaces. It can also become embedded in carpets, furniture, clothes, and building materials. It is difficult and expensive to remove.

Infants and young children are the most likely to be exposed to thirdhand smoke for these three reasons:

1. **Time Spent Indoors**

Infants and young children spend more time on average indoors than adults. Human activity surveys have shown that infants spend 90% of their time indoors at home. If their home environments are polluted with thirdhand smoke, infants are at a higher risk of exposure.

2. **Child Behavior**

Infants and young children explore their environment with their hands and bodies. Before they can walk, they move around by crawling along the floor, where they can touch polluted objects and pick up polluted dust and particles along the way. Their small size lets them fit into tight spaces where dust and particles might collect. Through crawling and exploring their environment, their hands, mouths, hair, clothes, and toys can collect thirdhand smoke.

As part of exploring their environment, children and infants put many objects into their mouths: their own hands, toys, blankets, their parents' fingers, a car seat strap, and more. Just about anything they discover goes into their mouths, including everyday objects parents may use to distract a child, such as a cell phone, car keys, or TV remote.

If their environment contains surfaces, objects, or dust contaminated with toxic thirdhand smoke, the chemicals can enter their bodies through touching, inhaling, or swallowing them.

3. **Growth and Development**

The respiratory systems of infants and young children are developing, and they breathe more times each minute than adults do. This increased respiratory rate means that in relation to their size, they can breathe in more thirdhand smoke than adults can. Their other organ systems are immature and growing too—this includes their skin. The skin of an infant or child is thinner than the skin of adults, meaning that their skin creates less of a barrier to keep thirdhand smoke chemicals from being absorbed into their bodies. Their immune systems are also developing, making them more vulnerable to the effects of tobacco pollutants than adults. A weakened immune system makes it more difficult to fend off infections.

Do you have more questions about the toxic legacy of tobacco smoke, how it affects human health, and what we can do about it? Learn more here.

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Sources:

Breunis, L. J., Versteylen, M., Radó, M. K., Dereci, N., Boderie, N. W., de Kroon, M. L. A., Been, J. V. Pediatric patients' views regarding smoke-free hospital grounds compared to those of adults: A survey study. Tobacco Prevention & Cessation. 2022 Feb;8:7. doi: 10.18332/tpc/145311.

Jenssen BP, Walley SC, Boykan R, Little Caldwell A, Camenga D, Section on Nicotine and Tobacco Prevention and Treatment, Committee on Substance Use and Prevention, Gonzalez L, Agarwal R, Quigley J, Zoucha K, Walker-Harding L, Kurien C, Ba'Gah R,

Jarrett R. Protecting Children and Adolescents From Tobacco and Nicotine. Pediatrics. 2023 May 1;151(5):e2023061806. doi:10.1542/peds.2023-061806.

Kelley ST, Liu W, Quintana PJE, Hoh E, Dodder NG, Mahabee-Gittens EM, Padilla S, Ogden S, Frenzel S, Sisk-Hackworth L, Matt GE. Altered microbiomes in thirdhand smoke-exposed children and their home environments. Pediatr Res. 2021 Dec;90(6):1153-1160. doi: 10.1038/s41390-021-01400-1.

Mahabee-Gittens EM, Merianos AL, Jandarov RA, Quintana PJE, Hoh E, Matt GE, Differential associations of hand nicotine and urinary cotinine with children's exposure to tobacco smoke and clinical outcomes, Enviro Res. 2021;202:111722. doi: 10.1016/j.envres.2021.111722.

Mahabee-Gittens EM, Merianos AL, Matt GE. Preliminary evidence that high levels of nicotine on children's hands may contribute to overall tobacco smoke exposure. Tob Control. 2018;27(2):217-219. doi: 10.1136/tobaccocontrol-2016-053602.

Mahabee-Gittens EM, Merianos AL, Quintana PJE, Hoh E, Matt GE. Nicotine on children's hands: Limited protection of smoking bans and initial clinical findings. Tob Use Insights. 2019;12:1-6. doi:10.1177/1179173X18823493.

Mahabee-Gittens EM, Merianos AL, Stone L, Wullenweber CA, Quintana PJE, Hoh E, Dodder NG, Lopez-Galvez N, Matt GE, Hand nicotine as an independent marker of thirdhand smoke pollution in children's environments, Science of The Total Environment. 2022;849;157914. doi: 10.1016/j.scitotenv.2022.157914.

Matt GE, Quintana PJE, Hovell MF, Bernert JT, Song S, Novianti N, Juarez T, Floro J, Gehrman C, Garcia M, Larson S. Households contaminated by environmental tobacco smoke: sources of infant exposures. Tobacco Control. 2004;13:29–37. doi: 10.1136/tc.2003.003889.

Merianos AL, Jandarov RA, Gordon JS, Lyons MS, Mahabee-Gittens EM. Healthcare resources attributable to child tobacco smoke exposure. PLOS ONE. 2021;16(2): e0247179. doi: 10.1371/journal.pone.0247179.

Merianos AL, Mahabee-Gittens EM, Choi K. Tobacco smoke exposure and inadequate sleep among U.S. school-aged children. Sleep Medicine. 2021;86:99-105. doi: 10.1016/j.sleep.2021.08.012.

Northrup TF, Khan AM, Jacob P, Benowitz NL, Hoh E, Hovell MF, Matt GE, Stotts AL. Thirdhand smoke contamination in hospital settings: Assessing exposure risk for vulnerable pediatric patients. Tob Control. 2016;25: 619-623. doi: 10.1136/tobaccocontrol-2015-052506.

Parks J, McLean KE, McCandless L, de Souza RJ, Brook JR, Scott J, Turvey SE, Mandhane PJ, Becker AB, Azad MB, Moraes TJ, Lefebvre DL, Sears MR, Subbarao P,

Takaro TK. Assessing secondhand and thirdhand tobacco smoke exposure in Canadian infants using questionnaires, biomarkers, and machine learning. J Expo Sci Environ Epidemiol. 2022;32:112–123. doi: 10.1038/s41370-021-00350-4.