THIRDHAND SMOKE Resource Center

Who is most likely to be exposed to thirdhand smoke?

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 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 these environments are polluted with thirdhand smoke, infants are at a higher risk of exposure.

2. **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– picking up 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. It can enter their bodies not just through their skin, but also through their lungs and mouths.

   Children and infants put many objects into their mouths: their own hands, toys, blankets, their parents' fingers, or a car seat strap. 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 the TV remote. The surfaces of objects can be contaminated with toxic thirdhand smoke in the air or dust, and when children put them in their mouths, thirdhand smoke chemicals enter their bodies.

3. Growth and Development

The respiratory systems of infants and young children are developing, and they breathe more times each minute than an adult. This increased respiratory rate means that in relation to their size, they can breathe in more thirdhand smoke than adults. Additionally, their organ systems are immature and growing—this includes their skin. The skin of an infant or child is thinner than the skin of adults, making them more susceptible to exposure from thirdhand smoke by dermal absorption. Their immune systems are also developing, making them more vulnerable to the effects of tobacco pollutants than adults.

Updated: October 2022

Sources

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

He, L., Zhou, Y.-X., Zhang, Y., Hang, B., Chang, H., Schick, S.F., Celniker, S.E., Xia, Y., Snijders, A.M. and Mao, J.-H. (2021), Thirdhand cigarette smoke leads to age-dependent and persistent alterations in the cecal microbiome of mice. MicrobiologyOpen, 10: e1198. https://doi.org/10.1002/mbo3.1198.

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. https://doi.org/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, Environmental Research, Volume 202, 2021, 111722, ISSN 0013-9351, https://doi.org/10.1016/j.envres.2021.111722.