

Thirdhand Smoke:

An Emerging Issue

What is thirdhand smoke?

Although the term “thirdhand smoke” (THS) is relatively new, its existence is not. THS refers to residual secondhand smoke (SHS) contamination that persists in the indoor environment after smoking has stopped. Thirdhand smoke can be defined by 3 Rs:ⁱ

Thirdhand smoke refers to chemicals that remain on surfaces and in dust after tobacco has been smoked, are re-emitted (off-gassed) back into the air, or react with other compounds in the environment to create new pollutants.

You don't need to be a scientist to understand THS—anyone who has seen that yellowish-brown residue on ceilings and walls, or who has smelled that characteristic stale odour knows that SHS doesn't just disappear into thin air. It remains in houses, apartments and even hotel rooms long after smokers move out, and is not removed under normal ventilation conditionsⁱⁱ or even after being thoroughly cleaned.ⁱⁱⁱ Real estate agents and brokers agree that THS decreases property value by up to 29%, and that it is more difficult to sell a home in which smoking has occurred.^{iv}

But is THS dangerous?

It's still too early to conclude that THS is dangerous to health, but the evidence is growing. One study found that nicotine residue, which readily sticks to indoor surfaces, can react to form new extremely potent cancer-causing compounds. For example, a recent study reported the presence of a tobacco-specific lung carcinogen on the surfaces (wooden shelving and tops of refrigerators) of almost all smokers' homes tested, compared with only occasional detection in non-smokers' homes.^v Moreover, these toxins appear able to remain present for weeks, months or even longer.^{vi} What is not yet known is what degree of risk they pose, and how: through skin exposure, dust inhalation or in the case of infants, eating it. However, results of a recent study using mice to simulate realistic human exposure showed THS significantly damaged liver and lung tissue, interfered with wound healing and was linked to hyperactivity.^{vii}

As more becomes known about the health risks of exposure to THS, the issue will have interesting implications for social policy. For example, will people who smoke be permitted to work with vulnerable populations like the very sick or the very young? Regardless of health effects, THS is already changing attitudes and behaviour, which can only help to reduce the death and disease caused by tobacco and exposure to second-hand smoke.

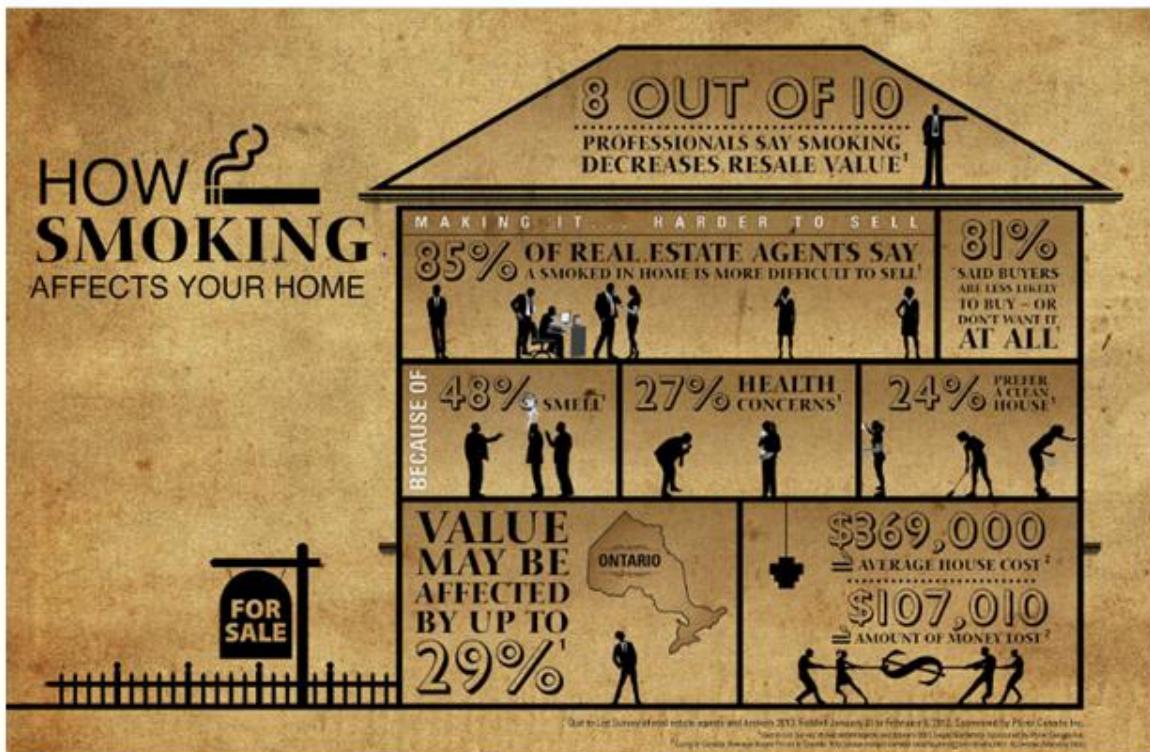


Image courtesy of Pfizer Canada Inc.

ⁱ Burton A. Does the smoke ever really clear? Thirdhand smoke exposure raises new concerns. *Environmental Health Perspectives* 2011; 119:A70-A74.

ⁱⁱ Schick SF, Farraro KF, Perrino C et al. Thirdhand cigarette smoke in an experimental chamber: Evidence of surface deposition of nicotine, nitrosamines and polycyclic hydrocarbons and de novo formation of NNK. *Tobacco Control* 2013; 0:1-8.

ⁱⁱⁱ Matt GE, Quintana PJE, Zakarian JM et al. When smokers move out and non-smokers move in: Residential thirdhand smoke pollution and exposure. *Tobacco Control* 2011; 20:e1.doc10.1136/tc.2010.037382.

^{iv} Pfizer Canada Inc. News release. Up in smoke: Smoking in the home can lower resale value by tens of thousands. 16 April 2013. <http://www.newswire.ca/en/story/1146741/up-in-smoke-smoking-in-the-home-can-lower-resale-value-by-tens-of-thousands>

^v Thomas JL, Hecht SS, Luo X et al. Thirdhand tobacco smoke: A tobacco-specific lung carcinogen on surfaces in smokers' homes. *Nicotine & Tobacco Research* 2013. doi:10.1093/ntr/ntt110.

^{vi} Sleiman M, Gundel LA, Pankow JF et al. Formation of carcinogens indoors by surface-mediated reactions of nicotine with nitrous acid, leading to potential thirdhand smoke hazards. *Proceedings of the National Academy of Sciences of the United States of America* 2010; doi:10.1073/pnas.0912820107.

^{vii} Martins-Green M, Adhami N, Frankos M et al. Cigarette smoke toxins deposited on surfaces: Implications for human health. *PLoS ONE* 2014; 9(1): e86391. doi:10.1371/journal.pone.0086391.