



## Resource Guidelines: Multiunit Housing and Thirdhand Smoke

This packet provide accessible explanations of what thirdhand smoke is, how it behaves, it's consequences, and why it matters for multiunit housing. Each of the following 12 questions and more can be found in English at <https://thirdhandsmoke.org/faq/> or in Spanish at <https://thirdhandsmoke.org/category/pregunta-de-la-semana/>.

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### What tobacco products contribute to thirdhand smoke?

Tobacco products come in many different forms and shapes, including cigarettes, cigars, cigarillos, little cigars, pipes, electronic cigarettes, water pipes called hookah or shisha, dissolvable products, and smokeless tobacco products such as chew, spit and snuff.

All tobacco products are manufactured from the leaves of the tobacco plant. Some of toxic chemicals in tobacco smoke occur naturally in the tobacco plant, others are added or created during the manufacturing process, and others form when tobacco is burned.

All tobacco products can leave behind chemical residue. We know most about the toxic residue from burning tobacco products, such as cigarettes, cigars, and pipes and hookah. Increased levels of thirdhand smoke have also been found in indoor environments where residents used smokeless tobacco, electronic cigarettes, and marijuana.

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# THIRDHAND SMOKE Resource Center

## Are there tests for thirdhand smoke?

When people smoke, the chemicals in tobacco smoke build up over time leaving behind toxic thirdhand smoke residue. Thirdhand smoke accumulates on surfaces in indoor environments, such as homes or offices, and enclosed spaces, such as cars or buses. Scientists have developed sensitive tests that can detect thirdhand smoke chemicals in air, in house dust, and on surfaces of indoor environments. These tests can detect nicotine, a compound that increases the risk of cardiovascular, respiratory, and gastrointestinal disorders, and tobacco specific nitrosamines, powerful carcinogens produced when tobacco burns. These tests are expensive to conduct and are not commercially available at this time.

We are aware of one commercially available test kit for nicotine on surfaces, but this test is only able to detect extremely high levels of nicotine. A report of “no nicotine detected” from this test kit may give a false sense of security, as only the most polluted surfaces would be reported as having detectable levels of nicotine. According to the information on the packaging the test kit, the “reporting limit” is 10  $\mu\text{g}/100\text{ cm}^2$  (or 1,000  $\mu\text{g}/\text{m}^2$ ). Such a level is extraordinarily high even for the home or car of a smoker. In fact, 1,000  $\mu\text{g}/\text{m}^2$  is more than 30 times higher than typically found in homes of active smokers who smoke indoors and similar to levels previously found in a smoker casino.

For a test of thirdhand smoke to be useful to a nonsmoker who wants assurance that a home is free of tobacco smoke pollutants, a test must be significantly more sensitive than what is currently available for sale. We believe that a useful test must be able to determine if the level of thirdhand smoke pollutants in the home exceeds what would be expected in a 100% smokefree home in communities with low smoking rates. Based on research in San Diego, California, an urban environment where about 12% of residents smoke, nonsmokers who keep 100% smokefree homes can sometimes find up to 1  $\mu\text{g}$  of nicotine/ $\text{m}^2$  on surfaces in their homes. Thus, a test for thirdhand smoke should detect at a minimum nicotine levels as low as 1  $\mu\text{g}/\text{m}^2$ .

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# THIRDHAND SMOKE Resource Center

## What surfaces does tobacco smoke stick to?

Tobacco smoke contains thousands of different chemicals in the form of gases and particles, which are tiny, oily, waxy droplets. After tobacco is smoked, research has shown that 70%-90% of nicotine and NNK (a tobacco specific lung carcinogen) chemicals stay behind in indoor environments as residue. Just like a sponge can soak up water, carpets, cushions, or drywall can “soak up” the chemicals from tobacco smoke. Although the smoke in the air seems to disappear after someone smoked, the tobacco smoke residue (also known as thirdhand smoke) remains on surfaces, in dust, and on objects. Over time, this tobacco smoke residue becomes embedded into materials and can adhere to virtually any indoor surface, including carpets, walls, furniture, windows, and doors. It can also adhere to objects we use every day, such as furniture, dishes, silverware, curtains, and pillows, as well as to our skin, hair, and clothing. In an environment where tobacco was smoked regularly, it is reasonable to assume that tobacco smoke residue has contaminated every surface and every object. This residue can build up over time and be detected years after smoking has stopped. Similar to the water dripping and evaporating from a soaked sponge, tobacco smoke residue can be later released back into the air or picked up by touching, leading to exposure long after the cigarette was smoked.

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# THIRDHAND SMOKE Resource Center

## My family members smoke, but only outside. Do they bring thirdhand smoke into my house when they come inside?

When outdoor smokers come inside, they bring thirdhand smoke with them. Often you can smell tobacco smoke when they walk in the door. But even when you can't smell it, toxic tobacco residue called thirdhand smoke, is brought in on the clothes, skin, hair, and even the exhaled breath of the person who smoked outside. The tobacco smoke odor is not just a nuisance, it is a sign that a mixture of tobacco smoke pollutants—some we can smell and some we can't—have been brought into the home.

Inside the home, the effect is similar to someone smoking a cigarette inside. The gases and particles in the tobacco residue on the smoker's clothes, skin, and hair can be transferred, stick to, and ultimately become embedded in materials and objects in your home. This includes carpets, walls, furniture, blankets, and toys. The gases and particles can also be released into the air and accumulate in house dust. As a result, nonsmokers may be exposed to toxic thirdhand smoke, even though no cigarettes were smoked inside.

To keep toxic tobacco residue out of your home, tell family members and friends about thirdhand smoke and help them adopt these strategies:

1. Remove clothes worn while smoking before entering the home. Leave them outside on a porch or patio until they can be washed.
2. Wash clothes worn while smoking each day to avoid release of toxic compounds into the air.
3. Whenever possible, shower immediately upon entering the home after smoking to remove tobacco smoke residue from hair and skin. If showering is not possible, thoroughly wash hands and face.

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### How are you exposed to thirdhand smoke?

#### Through touching:

People can be exposed to thirdhand smoke when their skin comes in contact with a surface on which thirdhand smoke has collected. Such surfaces could be the steering wheel of a car, a blanket, a table, a toy, or a chair. From a polluted surface, thirdhand smoke chemicals can adhere to your skin, enter your blood stream, and circulate through your body where it may harm your DNA, immune system, or affect your cardio-vascular system. If you think you've touched surfaces that have thirdhand smoke pollution, wash your hands immediately.

#### Through breathing:

It is possible to breathe in thirdhand smoke chemicals and particles that are in the air. Thirdhand smoke vapors can be released into the air from clothes, furniture, carpets, walls, or pillows. When this happens, we can sometimes smell stale tobacco smoke, but not always. When you smell thirdhand smoke, it is not just a bad odor, it is a mixture of toxic chemicals that can enter your body through your lungs.

#### Through entering the mouth:

People can swallow thirdhand smoke when they put fingers or objects (e.g., toys, cups, utensils) in their mouths that have been polluted with thirdhand smoke. Young children are at highest risk of ingesting thirdhand smoke because they put just about anything into their mouths, particularly when they are teething.

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## Nobody around me smokes. Can I still be exposed to thirdhand smoke?

Yes, even if nobody around you smokes, you can still be exposed to thirdhand smoke. This is because tobacco smoke residue accumulates in an enclosed space, like a home or car, and remains on surfaces, in dust, and in materials for years after smoking has stopped.

We know that thirdhand smoke can be found even in homes with strict no smoking rules. Thirdhand smoke has been found in homes of non-smokers where smokers have previously lived, in non-smoking rooms at hotels that allow smoking on the premises, and inside cars where drivers or passengers have smoked. In an enclosed space, such as a home, car, or hotel room, the behavior of previous owners and residents can expose you to thirdhand smoke, even if no one around you smokes.

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### Who is most likely to be exposed to thirdhand smoke?

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

1. Infants and young children spend more time indoors than adults and they explore their environment with their hands and bodies. Before they can walk, they move about by scooting along the floor—basically acting like a dust mop. Because of their size, they fit into small spaces where dust and particles might collect. Through these activities, their hands, mouth, hair, clothes, and toys can collect thirdhand smoke that can enter their bodies not just through their skin, but also through their lungs and mouths.
2. Infants and young children put everything into their mouths: their own hands, toys, blankets; their parents' fingers, their car seat strap, the sock they find under the desk—just about anything they can find goes into their mouths. “Anything they can find” can also include everyday objects parents may use to distract a child, such as a cell phone, car keys, or the TV remote. The surfaces of these objects can be contaminated with thirdhand smoke acquired from the air or dust, and when children put them in their mouths, thirdhand smoke chemicals enter their bodies.
3. The respiratory systems of infants and young children are developing, and they breathe more times each minute than an adult, even when they are at rest. Compared to adults, they breathe in more air relative to their body size. This means that, in relation to their size, they can breathe in more thirdhand smoke than adults. Their immune systems are also developing, making them are more vulnerable to the effects of tobacco pollutants than adults.

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## How can I minimize my child's exposure to thirdhand smoke?

Babies and young children are at greatest risk of exposure to thirdhand smoke. Here are some simple steps you can take to minimize exposure:

### **Make sure all of your child's indoor environments are 100% smokefree.**

- That means no smoking tobacco cigarettes, pipes, cigars, electronic cigarettes, or marijuana at any time inside your home or anywhere else your child spends time. "Anywhere else" includes homes of friends and family, hotels, restaurants and entertainment venues, and playgrounds.
- Remember that smoke can drift into your home, so don't allow anyone to smoke outside near doors, windows, or ventilation systems.
- When you are renting an apartment or buying a new home, ask questions about tobacco, e-cigarette, and marijuana use by previous residents. Include what you learn in your overall decision process.

### **Make sure your child travels in 100% smokefree cars.**

- Don't allow any smoking in your own car at any time, and don't let your child ride with anyone who does allow smoking in their car.
- If you are buying a used car, be sure to ask about smoking by previous owners. Thirdhand smoke is nearly impossible to remove from automobiles.

### **Make sure adults who spend time with your child are 100% smokefree, especially childcare workers.**

- Ask anyone who smokes to wash their hands, shower, change, and/or wash their clothes before coming in contact with your child.

### **Don't bring thirdhand smoke into your home.**

- Before buying something used such as furniture or clothing, ask about tobacco, e-cigarette, and marijuana use by previous owners. If you can't find out, factor that into your decision to purchase.
- If you have items that came from a smoker's home, especially clothes, toys, rugs, or blankets, thoroughly wash or consider discarding them.
- People who smoke can carry tobacco residue into your home on their skin, hair, and clothes, even if they always smoke outside. Encourage them to shower and change into clean clothes when coming inside after smoking.
- You may be able to reduce thirdhand smoke in your home by (1) opening windows to air out rooms each week, (2) regularly wiping surfaces with a diluted white vinegar solution, (3) frequent dusting, and (4) weekly vacuuming with a HEPA filter.

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## How can I remove thirdhand smoke from my home?

Unfortunately, it is very difficult to remove thirdhand smoke from walls and the many other surfaces and materials it can affect. Thirdhand smoke does not just sit on top of a painted surface where it could potentially be wiped off, but it also penetrates into the materials that are underneath the paint. In fact, thirdhand smoke can become embedded in the sheetrock, gypsum board, and drywall.

Research is being done to determine the best ways to remove thirdhand smoke. Evidence is limited but growing. What we know at this point is:

- Vigorous household cleaning techniques may reduce accumulated thirdhand smoke on surfaces and in dust. The long-term effectiveness of these cleaning methods are currently not well understood and depend on the depth of thirdhand pollutants.
- Some types of paint may trap thirdhand smoke pollutants on a wall, but painting cannot and does not remove them. The short-term and long-term effectiveness of this approach is not well understood.
- Painting may reduce the odor of stale tobacco smoke, and some paints may do this more effectively than others.
- Reports of thirdhand smoke residue bleeding through new coats of paint suggest that painting is unlikely to be a permanent solution to thirdhand smoke.
- Reducing the odor of thirdhand smoke does not protect from exposure to it. Our sense of smell is a warning: odor can be how we sense chemical compounds in our environment. However, some very dangerous chemicals are odorless, or even have a pleasant smell, while other chemicals, that are not harmful, have very unpleasant odors.
- Some approaches to “killing odors” involves tricking our senses by covering up an unpleasant smell with a pleasant fragrance. Of course, this strategy does not remove any thirdhand smoke pollutants and may make an environment even more irritating because new compounds are added to the air.
- Other approaches to “killing odors” involve creating chemical reactions that change an odorant into an odorless compound, as can be done with an ozone machine for example. Tragically, some of the odorless secondary compounds from thirdhand smoke can be more toxic than the original compounds.
- In heavily polluted indoor environments, the only effective way to remove thirdhand smoke is to remove and replace the contaminated materials, including carpets, furniture, sheetrock/drywall, and ceiling tiles.



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# THIRDHAND SMOKE Resource Center

## What do we know about the health risks of thirdhand smoke?



When people smoke in their homes, the chemicals in tobacco smoke build up over time leaving a toxic thirdhand smoke residue on carpets, furniture, walls, doors, and ceilings. This toxic residue lingers long after the smoke clears, even after smokers move out. Thirdhand smoke is a mixture of particles and gasses that become embedded in surfaces and then, under certain conditions, can be released back into the air. Thirdhand smoke contains several different classes of toxic compounds, many known to harm human health.



People (and pets) contact thirdhand smoke when their skin touches a surface where thirdhand smoke has collected, when they breathe in thirdhand smoke particles and gasses that are in the air, and when they swallow particles that are on objects, such as toys, that they put in their mouths.

Five major lines of research are relevant to evaluating the impact of thirdhand smoke exposure on human health.

### 1) Research on the effects of chemicals found in thirdhand smoke:



Thirdhand smoke contains some of the same toxic chemicals as first- and secondhand smoke, including tobacco specific nitrosamines, polycyclic aromatic hydrocarbons, heavy metals, nicotine, and ultrafine particles with a median diameter  $<0.10 \mu\text{m}$ . There is overwhelming evidence that exposure to this mixture of toxic chemicals and to ultrafine particulate matter is harmful to human health.

### 2) Research on the effect of thirdhand smoke exposure on human cells under controlled laboratory conditions:



Studies of human cells show that exposure to thirdhand smoke can directly damage DNA (the genetic material found in nearly every cell in the human body that contains the instructions our cells need to develop, function, grow, and reproduce), induce oxidative stress, and change the function of reproductive cells. Exposure to toxic chemicals that interfere with the basic functioning and repair mechanism of human cells is harmful to human health.

### 3) Research on the presence of thirdhand smoke and human exposure to thirdhand smoke in real-world field settings:



The presence and persistence of thirdhand smoke has been demonstrated in a variety of real-world nonsmoking field settings worldwide, including: single-family homes, low-income multi-unit housing, and high-end condominiums; homes of nonsmokers with smoking bans, homes of smokers after they have quit, and homes after smokers moved out; nonsmoking rooms in hotels; public places; and public transportation. Exposure to toxic constituents of thirdhand smoke in these environments has been demonstrated repeatedly, based on the presence of specific metabolites of thirdhand smoke chemicals measures as biomarkers in infants, children, and adult nonsmokers.

#### 4) Research on the effects of thirdhand smoke exposure conducted on animal under controlled laboratory conditions:

One of the earliest animal studies on thirdhand smoke, conducted in 1953, showed that mice developed skin cancer when thirdhand smoke residue was applied to their skin. A more recent study showed that mice exposed to thirdhand smoke through their bedding material have:

- slow wound healing
- inflammation in their lungs
- elevated levels of fat in their livers
- elevated LDL (“bad”) cholesterol and low HDL (“good”) cholesterol
- high blood sugar levels
- increased clotting
- hyperactive behavior/poor weight gain after birth

#### 5) Research conducted on humans under laboratory and field conditions:

One researcher has studied the effects of thirdhand smoke exposure using human volunteers in a laboratory setting. In these healthy volunteers, just three hours of exposure to thirdhand smoke exposure damaged cells in their respiratory system.

The evidence from human cells, animals, laboratory experiments, field studies, and healthy volunteers show that thirdhand smoke contains chemicals toxic to humans, that it persists in the environment, and that exposure has the potential to cause harm to multiple organ systems in the human body. In combination, the existing evidence from laboratory experiments and field studies strongly suggest that exposure to thirdhand smoke is harmful to human health through a variety of mechanisms and with a variety of health outcomes.

As health advocates, the public, businesses, and policy makers become more aware of this research, it will be critical to review existing policies in light of these new studies to close loopholes in the protection of nonsmokers from the harmful effects of thirdhand smoke. At a minimum, we urge adoption of the precautionary principle: When human activities (i.e., exposure to thirdhand smoke) may lead to morally unacceptable harm that is scientifically plausible but uncertain, actions should be taken to avoid or diminish that harm.

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# THIRDHAND SMOKE Resource Center

## Does tobacco smoke residue decrease my home's value?

When people smoke in their homes, the chemicals in tobacco smoke build up over time leaving a toxic thirdhand smoke residue on carpets, furniture, walls, doors, and ceilings. This toxic residue lingers long after the smoke clears, and even after smokers moved out. According to one survey of real estate agents, evidence of thirdhand smoke in a home, such as stale tobacco smell or stains on walls or fabrics, reduces the selling price of a home by as much as 30%. That means if you live in a neighborhood where most homes sell for about \$500,000, the home that smells like stale tobacco smoke will sell for around \$350,000.

There are three major reasons for this. First, almost everybody hates the smell of stale tobacco smoke. Second, many people immediately experience physical symptoms, such as shortness of breath, headaches, sore throat, or earaches when they smell it. Third, it is very difficult and expensive to remove the underlying toxic thirdhand smoke that causes the smell and physical symptoms that many people experience.

The lower selling price is partly a consequence of fewer people being willing to consider buying a home that smells like stale tobacco smoke. With a smaller pool of buyers willing to buy a home in which someone has smoked, there is no competition to drive the price up. Because real estate agents recognize that they will have to work harder to sell a home with evidence of thirdhand smoke, it may also be more difficult for the seller to find a real estate agent.

While in California the Seller Property Questionnaire (Section M, Question 2, Revised 12/16, 6/18) asks buyers to disclose if any occupant has smoked tobacco on or in the property, this is not the case in many other states. Even without such a disclosure, educated buyers and real estate agents are well aware of the signs of indoor smoking and the challenges of ridding a home of thirdhand smoke. It is not unusual for a potential buyer to ask the seller's agent about the smoking history of a home, even if there is no odor of stale tobacco smoke. A reputable professional will not lie. An educated buyer will also ask the home inspector if there is evidence of tobacco use. Lastly, an educated buyer knows that the strong smell of air fresheners, scented candles, or the unexpected use of fans may be an attempt to hide stale tobacco smell.

If someone in your household smokes and you are concerned about your home's value, the first thing to do is get them to stop smoking indoors. That will stop the build-up of thirdhand smoke. The next step is to clean thoroughly all walls; ceilings; carpeting and fabric, such as window treatments; and the heating and air conditioning duct system to try to remove thirdhand smoke from surfaces. Depending on how much thirdhand smoke has accumulated, cleaning may be insufficient and remediation may be required. Remediation could include drastic (and expensive) measures, such as removal and replacement of sheet rock, flooring, and the heating and air conditioning system.

Bottom line: Tobacco smoke residue can significantly decrease your home's value. To avoid bad news when you sell your home, don't allow tobacco use or vaping on or in your property. If thirdhand smoke has already accumulated, consult a remediation expert to make necessary repairs and improvements, and disclose the information to your real estate agenda and buyer.

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# THIRDHAND SMOKE Resource Center

## What are the advantages of making my rental properties smokefree?

More and more people know that secondhand smoke is bad for you and want to live in 100% smokefree housing. Smokefree rental properties are in high demand. Surveys show that most renters prefer smokefree properties.

Smokefree rental properties save money and protect your property from fire and tobacco smoke-related damages:

- Reduced risk of tobacco-related fires in your apartments
- Lower fire and liability insurance premiums for the property
- No expensive smoking-related repairs when tenants move out
- Less litter from tobacco waste like cigarette butts
- Fewer administrative costs to address complaints about unpleasant odors and unhealthy air because of smoke intrusion

Smokefree rental properties save lives and protect your tenants from second- and thirdhand smoke:

- Secondhand smoke drifts into apartments from other apartments or outside
- Secondhand smoke causes diseases like asthma, ear infections, and colds in children and lung disease, heart disease, and cancer in adults
- Thirdhand smoke embeds in walls and other surfaces, emitting toxic compounds long after secondhand smoke has disappeared
- After a smoker moves out, the toxic residue of thirdhand smoke remains, creating a health hazard for the new tenants

## Save money, save lives. Make your property smokefree.

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