

## Secondhand smoke

Over the past 40 years, a growing body of scientific evidence has concluded that secondhand smoke can harm the health of non-smokers.<sup>1</sup> The growing acceptance of the health impacts of secondhand smoke has been a driver for smoking bans in enclosed workplaces, pubs and clubs and other public spaces.

### What is secondhand smoke?

The process of smoking produces four different types of tobacco smoke:<sup>1, 2</sup>

1. Mainstream smoke  
This is smoke directly inhaled by the smoker through a burning cigarette.
2. Exhaled mainstream smoke  
This is smoke breathed out by the smoker.
3. Sidestream smoke  
This is smoke which drifts from the burning end of a cigarette.
4. Aged sidestream smoke  
This is smoke that is greater than 30 minutes old.<sup>2</sup>

Secondhand smoke (SHS) is the combination of exhaled mainstream smoke and sidestream smoke. Secondhand smoke is also called environmental tobacco smoke (ETS). Breathing in secondhand smoke is also referred to as passive smoking.<sup>1</sup> There is no safe level of exposure to SHS. Secondhand smoke affects the health of both non-smokers and smokers. There are at least 250 chemicals in secondhand smoke that are known to be toxic, including more than 50 that are known to cause cancer.<sup>1</sup>

Sidestream smoke contains a range of chemicals similar to mainstream smoke.<sup>1, 3</sup> However, when the sidestream smoke and mainstream smoke from one cigarette are compared, they appear to contain differing amounts of these chemicals.<sup>1, 3</sup> For example, compared to mainstream smoke, sidestream smoke contains greater amounts of ammonia, acrolein, carbon monoxide, nicotine and a number of cancer causing chemicals, per cigarette.<sup>3, 4</sup> In some cases their levels are more than ten times higher than in the smoke inhaled by the smoker.<sup>1</sup>

However, sidestream smoke is diluted by being mixed with air before being inhaled.<sup>1</sup> People breathing in secondhand smoke receive lower levels of toxic chemicals than active smokers, who draw the tobacco smoke directly into their lungs. This means active smoking is more dangerous to health than breathing in secondhand smoke.

After smoke is created, the chemicals in it continue to react and change over time. This process is known as 'ageing'. *Aged* sidestream smoke is about three times more toxic per gram than *fresh* sidestream smoke. Fresh sidestream smoke is also three to four times more toxic than *mainstream cigarette smoke*, when the amounts inhaled weigh the same. As a result, it is estimated that the same amount of *aged* sidestream smoke is around 12 times as toxic as *mainstream cigarette smoke*.<sup>2</sup>

## Thirdhand smoke

Thirdhand smoke (THS) refers to exposure to chemicals from secondhand smoke on indoor surfaces and dust. When a cigarette is smoked indoors, chemicals and particles from SHS settle onto and coat walls, furniture, carpet, clothes, toys, dust and other objects. There, they can react with other chemicals to form new ones, and they can be released back into the air hours or months after they were first deposited.<sup>5-7</sup>

Thirdhand smoke builds up over time in smokers' homes and cars, and can persist for months, even years, even if tobacco is no longer smoked.<sup>5, 8</sup> Infants and very young children are likely to be among those most at risk from THS exposure and its potential health effects.<sup>5-7</sup>

## Diseases related to secondhand smoke

Secondhand smoke causes early death and disease in children and in adults who do not smoke.<sup>1</sup> The more secondhand smoke you are exposed to, the higher your risk of disease.<sup>1, 4</sup> There is no level of exposure to secondhand smoke that is free of risk.<sup>1</sup>

Reviews of the research conclude that secondhand smoke **causes** the following diseases and conditions:<sup>1</sup>

### In adults

- Heart disease
- Stroke<sup>9</sup>
- Lung cancer
- Irritation of the eyes and nose<sup>4, 10</sup>

### **In children and infants**

- Sudden infant death syndrome (SIDS or cot death)
- Lower birthweight (where the pregnant mother was exposed to SHS)
- Bronchitis, pneumonia and other lung/airways infections
- Wheeze illnesses in early childhood
- Middle ear disease (otitis media or 'glue ear', middle ear effusion)
- Respiratory symptoms including cough, phlegm, wheeze and breathlessness
- Higher rates and worsening of asthma
- Weaker lungs: lower level of lung function during childhood (i.e. they cannot breathe in as deeply or breathe out as hard as they would otherwise)

Research also **links** exposure to secondhand smoke to other diseases and conditions. They include:<sup>1, 9, 11, 12</sup>

### **In adults**

- Cancers of the breast, throat, larynx (voice-box), nasal sinus (nose) and cervix
- Diabetes<sup>13</sup>
- Atherosclerosis (disease of the blood vessels)
- Acute (short term) respiratory symptoms including cough, wheeze, chest tightness and difficulty breathing among both healthy persons and persons with asthma
- Chronic (long term) respiratory symptoms
- Acute (short term) decline in lung function in persons with asthma
- Small loss of lung function
- Development of asthma and worsening of asthma control
- Chronic obstructive pulmonary disease (COPD)

## In children and infants

- Development of asthma
- Preterm delivery (where the pregnant mother was exposed to SHS)
- Childhood cancers: liver cancer, leukemias, and lymphomas (where both the pregnant mother and the child after birth were exposed to SHS)
- Tooth decay
- Breathing complications during and after surgery<sup>14</sup>
- Worsening of cystic fibrosis<sup>10</sup>
- Meningococcal disease

## Heart disease and stroke

Secondhand smoke causes heart disease and stroke in non-smokers. It is estimated that long term exposure to secondhand smoke increases the risk of heart attack in a non-smoker by about one-quarter to one-third.<sup>15</sup> The increased risk for stroke is between one-fifth and one-third.<sup>9</sup>

Secondhand smoke interferes with the normal workings of the heart, blood and blood vessels, causing both short and long term damage.<sup>1</sup> Some effects occur within as little as 30 minutes, and appear to be nearly as large as those seen in an active smoker.<sup>1, 16</sup> For example, secondhand smoke affects the lining of your blood vessel walls and interferes with the way they regulate blood flow. It makes your blood thicker, stickier and more likely to clot.<sup>1, 16</sup>

Carbon monoxide from SHS replaces some of the oxygen in your blood, reducing the delivery of oxygen to your heart and muscles. With less oxygen, short-term or permanent damage to your heart and tissues is more likely. Over many years, the damaging effects of secondhand smoke help to build up fatty deposits on blood vessel walls, narrowing and stiffening them, and causing inflammation. Eventually this may lead to heart attack and stroke.<sup>1, 9, 10, 16</sup>

The majority of deaths from secondhand smoke are from heart disease.<sup>15</sup> People with other risk factors for heart disease such as diabetes, high blood pressure, and vascular disease are at even greater risk from SHS exposure.<sup>10</sup>

## Cancer

Secondhand smoke has been confirmed as a cause of cancer in humans.<sup>1, 3, 17, 18</sup> Secondhand smoke is a cause of lung cancer in non-smokers. Non-smokers with long term exposure to tobacco smoke have an estimated 20% to 30% higher risk of developing lung cancer than non-exposed non-smokers.<sup>1</sup>

Exposure to secondhand smoke increases the risk for cancers of the throat, larynx (voice-box), nasal sinus (nose) and cervix.<sup>1, 10-12, 19</sup> It may also be a cause of breast cancer in younger women (before menopause), but more research is needed before these findings can be confirmed.<sup>9, 11</sup> Breast cancer is the most commonly diagnosed cancer in Australian women,<sup>20</sup> and the United States government recommends that women avoid exposure to SHS because of high incidence of breast cancer.<sup>1</sup>

## Effects on the unborn child

When a pregnant woman breathes in secondhand smoke, chemicals from the smoke can pass through her lungs into the bloodstream. Nicotine, carbon monoxide and other chemicals can cross the placenta affecting her unborn child.<sup>1</sup> Women exposed to secondhand smoke are more likely to have a baby with a low birth weight of less than 2,500g.<sup>1</sup> Overall, babies who are born to mothers exposed to SHS have a slightly lower birth weight than they would otherwise. This would not necessarily adversely affect a healthy baby, but could further compromise a baby with other health problems.<sup>1</sup>

The baby of a mother exposed to SHS may also be more likely to have preterm birth, meaning they are carried for less than 37 weeks.<sup>1</sup>

Some evidence suggests that when a pregnant mother and a child is exposed to secondhand smoke before and after birth, her child may have an increased risk of certain childhood cancers, such as liver cancer, leukemias, and lymphomas.<sup>1, 11, 15</sup> However, it's also possible they occur due to damage to the father's sperm from his smoking.<sup>1, 11, 21</sup>

## Health effects on infants and children

Children are especially vulnerable to secondhand smoke. In households where at least one parent smokes, the best way to protect children from secondhand smoke is by parents ensuring a total ban on smoking inside the home and car.<sup>22</sup>

Infants exposed to secondhand smoke have about twice the risk for SIDS (Sudden Infant Death Syndrome or cot death) compared with infants living in a smokefree environment.<sup>1, 15</sup> *Red Nose* recommends avoiding exposing babies to tobacco smoke before birth and after, and to put the baby to sleep in a safe bassinet or cot.<sup>23</sup>

The children of parents who smoke have higher rates of lung or airways infections such as bronchitis, bronchiolitis and pneumonia during their first two years of life compared to children of non-smokers.<sup>15</sup> They are also more likely to develop wheeze illnesses.<sup>1</sup> Children in this age group exposed to secondhand smoke have higher rates of admission to hospital.<sup>24, 25</sup>

Children of smokers have a small lowering in lung function, meaning that on average, they cannot breathe in as deeply or breathe out as hard compared to children of non-smokers.<sup>1</sup> Children of all ages are affected, including adolescents, and some evidence suggests that reduced lung function may even persist into adulthood.<sup>1, 10</sup>

School-aged children of smokers are more likely to have symptoms such as cough, phlegm, wheeze, and breathlessness.<sup>1</sup> Asthma is more common among children of smokers. Children with asthma exposed to secondhand smoke have a greater risk of developing symptoms earlier in life, and having more symptoms and asthma attacks.<sup>1, 10</sup> They are more likely to use asthma medications more often and for a longer period.<sup>10</sup> Respiratory symptoms, such as chronic dry cough and phlegm production, can persist into adulthood. This is true even without ongoing exposure to SHS.<sup>26</sup>

Children of smokers are more likely to contract 'glue ear' (otitis media), which is an infection and swelling of the ear common in young children.<sup>1</sup> Children of smokers are also more likely to have 'glue ear' multiple times and to have long-term middle ear effusion (leaking of fluid).<sup>1</sup> Middle ear disease is a common cause of hearing loss in children, which can delay speech development.<sup>10, 27</sup>

Secondhand smoke appears to impair the immune system in both children and adult non-smokers, which increases their risk of infection.<sup>1</sup> Children exposed to secondhand smoke have double the risk of breathing complications during and after surgery involving a general anaesthetic.<sup>14</sup> Children of smokers have over twice the risk of meningococcal disease, which is serious illness that can sometimes cause death, mental disability, hearing loss, or loss of a limb.<sup>12, 28</sup> Smokers are more likely to be carriers of the bacteria that causes this disease.<sup>29</sup>

Effects of secondhand smoke that can lead to heart disease may begin in childhood and adolescence.<sup>1</sup> Even though some symptoms from SHS become less common with age, it is still important to protect children of all ages from secondhand smoke.<sup>1</sup>

## Public attitudes to secondhand smoke

Since the 1980s The Cancer Council Victoria has conducted several surveys with the Victorian public on their knowledge of the health risks of secondhand smoke, and their attitudes towards introducing smokefree areas. These surveys have consistently shown that a majority of smokers, as well as non-smokers, believe that secondhand smoke is harmful to health.<sup>30</sup>

Research has shown strong community support for smokefree outdoor areas including outdoor dining areas (72%), at uncovered areas of bus stops, tram stops and train stations (67%),<sup>31</sup> between the flags at beaches (71%), and near entrances to buildings (72%).<sup>32</sup>

## Adult smokers' attitude to smoking in the home around children

Adults are more likely to have a smokefree home if they have children, live with non-smoking adults and support public smoking bans.<sup>33</sup> In 2016, among Australian households with children aged under 15 years, 3% reported that someone smokes inside the home. This is down from 31% in 1995.<sup>34</sup>

## Importance of smokefree areas

There is now firm evidence that enacting smokefree laws reduces heart attacks among young and middle-aged people.<sup>9</sup> Other research suggests that it is likely that they also reduce stroke, symptoms of heart disease, preterm births, and hospital admissions for asthma and lung infections in children.<sup>9, 35, 36</sup>

As well as protecting people from secondhand smoke<sup>37</sup>, smokefree areas serve to de-normalise smoking,<sup>37-39</sup> decrease daily cigarette consumption<sup>40-42</sup> and remove smoking cues that may create cravings for former smokers and those attempting to quit.<sup>43</sup> Smokefree public places are also linked to the adoption of smokefree homes, which in turn are associated with increased quit attempts and the success of those attempts.<sup>33</sup>

There have been several achievements in smoking bans in Victoria in the last decade.<sup>44</sup>

## Timeline of legislative changes in Victoria<sup>45, 46</sup>

- From **1 March 2006**, most indoor Victorian workplaces became smokefree. Smoking was also banned at underage music/dance events.
- On **1 July 2007**, smoking was banned in enclosed indoor premises with liquor licenses including pubs, bars and nightclubs.
- On **1 July 2009**, Government school grounds became entirely smokefree.
- On **1 January 2010**, smoking was banned in cars carrying children under 18 years old.
- From **1 December 2012**, patrolled beaches between the red and yellow flags were smokefree, as well as within a 50m radius of the flags.
- On **1 March 2014**, smoking was prohibited on train platforms, at tram stops and shelters, and at bus shelters.
- On **1 April 2014** smoking was banned at or within 10 metres of children's playgrounds. Smoking was also banned in outdoor areas of public swimming pool complexes, and at sporting venues during organised underage sporting events.
- On **13 April 2015**, smoking was banned at or within four metres of an entrance to a school premises, education or care service premises, children's service premises, children's indoor play centre or Victorian public premises. 'Victorian public premises' includes the Victorian parliament, Victorian Courts, hospitals and any building occupied by a public service body.
- On **1 July 2015**, prisons became entirely smokefree.
- On **1 August 2017**, smoking was banned in outdoor dining areas where food (apart from snacks) is provided on a commercial basis. Smoking was also banned at food fairs and certain organised outdoor events. In addition, the use of e-cigarettes and waterpipe tobacco (shisha) was banned in all smoke-free areas.

Despite these new smokefree laws, smoking continues to be permitted in areas that are frequented by the public, including non-smokers and children, on a daily basis. There remains more to be done, including the implementation of smokefree outdoor drinking areas, and restrictions on smoking in apartments and multi-dwelling units, all workplaces and grounds of health care services.

## Next steps:

### 1. Outdoor drinking areas

Smoking is still allowed in outdoor drinking areas in Victoria. These areas are often substantially enclosed, with the legislation allowing smoking in spaces with a roof and up to 75% of the wall space enclosed.<sup>47</sup>

Outdoor secondhand smoke levels can be comparable to indoor concentrations under certain conditions, while smoking is taking place.<sup>15</sup> Research findings indicate that secondhand smoke levels can exceed prescribed quality standards in outdoor drinking areas particularly as the level of enclosure increases (i.e. roofs and walls), when the number of lit cigarettes increases, when the measurement is taken near a smoker or smoking area, and when there is little wind.<sup>15, 48-50</sup>

SHS tends to drift into adjacent indoor areas, as well as into indoor areas well away from exits to outdoor smoking areas.<sup>48, 51, 52</sup> The results of these studies discredit the notion that indoor smokefree areas are free from secondhand smoke.

### 2. Smoke drift in apartment and multi-unit dwellings

Secondhand smoke, or smoke drift, in apartments and multi-unit dwellings presents SHS related harm and discomfort to many non-smokers.

Smoke-free policies and regulations relating to indoor workplaces and public areas are widespread in Australia, however there are few restrictions on smoking in apartment buildings and other multi-unit dwellings. As a result, there has been a growing concern among apartment residents about the impact of secondhand smoke drifting into their homes.<sup>53</sup>

There is a growing body of research showing that secondhand smoke from nearby apartments or units infiltrates into the homes of non-smokers.<sup>53</sup> One study found that children of non-smoking households living in apartments still showed evidence of tobacco-smoke exposure, and it was greater than that of children living in detached houses.<sup>54</sup>

### 3. Workplaces

Although most workplaces are smokefree there is further work to do. For example the “high-roller” rooms at Crown Casino remain the last places in Victoria where indoor workers in licensed premises are exposed to SHS.

#### 4. Health services

Health services provide health care, and as such, have a special responsibility to set an example for other organisations and the communities they serve.

Smokefree health services are increasingly becoming an important area of smokefree discussion and advocacy. At the moment, smoking is prohibited at or within 4 metres of the entrance to Victorian hospitals, public health services or community health centres, but is otherwise permitted in outdoor areas on hospital grounds (unless specifically prohibited by hospital policy). Victorian research has found that 84% of adults, including the majority of smokers, disapprove of smoking in hospitals grounds.<sup>32</sup>

Western Australia Health (including hospitals and other department owned or leased premises) have gone completely smokefree. The policy applies to all staff, patient, visitors, contractor and other persons who enter a Department of Health site.

In Victoria, the Victorian Network of Smokefree Healthcare Services works to build the capacity for Victorian healthcare services to adopt smokefree policies in addition to continuing to advocate for smokefree hospitals grounds.

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