

Secondhand Smoke

March 2020

Introduction

Breathing in other people's cigarette smoke is called passive, involuntary or secondhand smoking (SHS). Secondhand smoke, also called "environmental tobacco smoke", comprises "sidestream" smoke from the burning tip of the cigarette and "mainstream" smoke which is smoke that has been inhaled and then exhaled by the smoker.

The United States Environmental Protection Agency (EPA) classifies environmental tobacco smoke as a Class A (known human) carcinogen alongside asbestos, arsenic, benzene and radon gas.¹ There is no safe level of exposure to SHS.²

Worldwide, an estimated 33% of male non-smokers, 35% of female non-smokers and 40% of children are exposed to SHS.³

What's in secondhand smoke?

Tobacco smoke contains over 4000 chemicals in the form of particles and gases.¹ Many potentially toxic gases are present in higher concentrations in sidestream smoke (the smoke that comes from the lighted end of the cigarette/pipe/cigar) than in mainstream smoke (smoke that is inhaled by a smoker and then exhaled into the environment) and nearly 85% of the smoke in a room results from sidestream smoke.⁴

The particulates in tobacco smoke include tar (itself composed of many chemicals), nicotine, benzene and benzo(a)pyrene. The gaseous component includes carbon monoxide, ammonia, dimethylnitrosamine, formaldehyde, hydrogen cyanide and acrolein. Some of these have marked irritant properties and there are more than 50 cancer-causing chemicals in secondhand smoke.⁵

For further information on tobacco smoke, please see [ASH Fact Sheet: What's in a Cigarette](#).

Health effects

Short-term effects of exposure to secondhand smoke (SHS) include eye irritation, headaches, coughs, sore throat, dizziness and nausea. Adults with asthma can experience a significant decline in lung function when exposed, while new cases of asthma may be induced in children whose parents smoke. Short term exposure to tobacco smoke also has a measurable effect on the heart in non-smokers.⁶

In the longer-term, passive smokers suffer an increased risk of a range of smoking-related diseases. Exposure

to other people's smoke increases the risk of lung cancer in non-smokers by 20-30% and coronary heart disease by 25-35%.⁷

There is existing evidence of secondhand smoke being associated with a myriad of conditions linked to regular smoking. Studies have found heightened risks of:

- **Heart disease.** It has been estimated that non-smokers exposed to SHS have a 25%-35% increased risk of heart disease.^{7 8} Other studies have estimated this risk to be as high as 50-60%,⁹ with another review reporting the risks of heart disease caused by passive smoking were 80-90% - as large as those caused by active smoking.¹⁰
- **Lung cancer.** The Scientific Committee On Tobacco and Health (SCOTH) report's review of the evidence concluded that exposure to SHS increased the risks of lung cancer in non-smokers by 24%.⁸ Similarly, the US Surgeon General's report and review of the evidence concluded a causal link between SHS exposure and lung cancer, with the risks of developing lung cancer increasing by between 20-30% for non-smokers who live with a smoker.⁵
- **Breast cancer.** An expert panel's review reported a causal link between passive smoking and breast cancer in non-smoking premenopausal women.¹¹ A recent meta-analysis found that the risk of breast cancer was increased by 67% in those exposed to SHS.¹²
- **Other cancers.** There is some evidence of a link between SHS exposure and other types of cancer. For example, passive smoking has been associated with a 40% increased risk of developing cervical tumours (cervical neoplasia).¹³ The 2010 IARC update on the link between exposure to SHS and cancer reports limited evidence showing an association with cancers of the larynx and pharynx.¹⁴
- **Lung function.** The US Surgeon General report found the evidence was suggestive of a link between SHS exposure and acute respiratory symptoms, poor lung function, acute lung function decline, asthma and chronic obstructive pulmonary disease (COPD).⁵
- **Stroke.** A review and meta-analysis of 20 studies published in 2011 found a strong, dose-dependent association between exposure to SHS and risk of stroke.¹⁵ The authors argued that even at very low levels of passive smoking, the risk of stroke was disproportionately high suggesting that there is no safe level of exposure to tobacco smoke.¹⁵
- **Dementia.** Evidence of a link between exposure to SHS and dementia and cognitive impairment is beginning to emerge. Whilst a link between passive smoking and dementia has been reported by some studies,^{16 17} other research suggests that exposure to SHS may increase the risk of dementia only in those with cardiovascular disease.¹⁸ A recent review reported that exposure to passive smoking may increase the risk of cognitive impairment in later life by between 30-90%.¹⁹
- **Other diseases.** Further evidence of a link between exposure to SHS and other diseases have also been found, including diabetes^{20 21} and tuberculosis,²² however further research is required to confirm these findings.

It has been estimated that domestic exposure to SHS in the UK causes around 2,700 deaths in people aged 20-63 and a further 8,000 deaths a year among people aged 65 years and older.²³ People particularly at risk from the effects of secondhand smoke include pregnant women and people with pre-existing heart or respiratory illnesses.

Risks to children and babies

In the UK, around 2 million children are estimated to be regularly exposed to SHS in the home and many more are exposed outside the home.²⁴ In the UK, surveys in the 1980s and 1990s found that about half of all children lived in a house where at least one person smoked.²⁵ By 2009 this figure had dropped to 20%.²⁶ Despite these improvements, passive smoking remains a major hazard to the health of millions of children both worldwide and in the UK.

Children are particularly vulnerable to the effects of secondhand smoke and exposure increases the risk of cot death, glue ear, asthma and other respiratory disorders, including emphysema later in life.^{24 27 28} Research has highlighted significant risks to babies associated with SHS exposure in pregnant women. These include low birth weight,²⁹ congenital anomalies, smaller head circumferences, and increased risk of still birth.^{30 31}

Reviews of the research around poor health outcomes for children exposed to SHS have found:

- SHS exposure in the home increases young infants' risks of lower respiratory tract infections (including flu, bronchitis and pneumonia) by around 50%.³²
- Exposure to pre or post-natal SHS is associated with between 30-70% increased risk of wheeze, and 21-85% increased risk in asthma in children.³³ A further review reported exposure to SHS was associated with a 30% increased risk of physician-diagnosed asthma in childhood.³⁴
- Exposure to maternal smoking increases a child's risk of middle ear infection by over 60%, and when exposed to both parents smoking children are significantly more at risk of needing surgery for middle ear infections.³⁵
- Maternal smoking after birth is associated with a three-fold increased risk of sudden unexpected death in infancy. Having one or more smokers living in the household more than doubles the risk of sudden unexpected death in infancy.²⁴
- Exposure to SHS in the home more than doubles a child's risk of invasive meningococcal disease, with the greatest risks found for children under five and those whose mothers smoked in the postnatal period.³⁶
- Further studies have suggested exposure to SHS may be linked to increased risks of some types of childhood cancer,³⁷ some types of cancer in adulthood,² emphysema in adulthood,²⁷ impaired sense of smell,³⁸ and may exacerbate chronic conditions such as sickle cell disease.³⁹

The Royal College of Physicians has estimated that every year in the UK children's exposure to secondhand smoke results in:

- Over 20,000 cases of lower respiratory tract infection
- 120,000 cases of middle ear disease
- At least 22,000 new cases of wheeze and asthma
- 200 cases of bacterial meningitis
- 40 sudden infant deaths – one in five of all SIDs²⁴

Each year, these cases generate over 300,000 UK GP consultations, about 9,500 hospital admissions and cost the NHS about £23.3 million.⁵

Why opening a window doesn't help

Opening a window or restricting smoking to a specific room offers little protection against exposure to secondhand smoke.^{40 41} Researchers have found that smoke from one cigarette can linger in a room for up to two and a half hours even with a window open.⁴² Measures such as smoking out of a window or smoking next to an extractor fan are equally ineffective at keeping smoke out of the home.

Emerging research has found that pollution from secondhand smoke (also called thirdhand smoke) can linger on carpets, furnishings and walls long after it has dissipated from the air. These materials absorb the toxins found in tobacco smoke and gradually release them back into the air, posing an additional risk of exposure.^{43 44 45 46 47}

The law

Smoking in all enclosed public places and workplaces was prohibited across the United Kingdom under the Health Act in 2007.

In 2014, the Children and Families Act made it an offence to smoke in a private vehicle carrying children under the age of 18 in England and Wales. A similar law in Scotland was implemented on 5 December 2016.⁴⁸ The Northern Ireland Assembly also voted in favour of a ban on smoking in cars when children are present in 2016.⁴⁹

For more information please see [ASH Fact Sheet: Smokefree Legislation](#).

The health impact of smokefree laws

There is consistent evidence to show that in countries where comprehensive smokefree legislation has been implemented, reductions in secondhand smoke exposure of between 80% and 90% have been recorded.⁵⁰

There is a growing body of evidence to show that incidences of heart attacks have fallen following the introduction of smokefree legislation, both in the UK and internationally.^{51 52 53 54 55} In England, there was a 2.4% reduction, equivalent to an estimated 1200 fewer emergency admissions to hospital for heart attack in the 12 months following implementation of the smokefree law.⁵¹ One review of studies found an overall decrease in acute heart attack of 17%.⁵⁶ A further meta-analysis of 17 studies across six countries found a reduction of 10% in the incidence of acute coronary events following the implementation of smokefree laws.⁵⁷ Research has also shown reductions in hospital admissions for childhood asthma following the introduction of the smokefree laws.^{58 59}

Smokefree legislation not only significantly reduces non-smokers' exposure to tobacco smoke but also encouraged more smokers to quit. According to the Smoking Toolkit study, 43% of England's smokers tried to quit in 2007, with 8% reporting that their decision was a direct result of the smokefree legislation.⁶⁰ The NHS stop smoking services reported a 20% increase in demand in the 12 months following the smokefree law.⁶¹ A systematic review of studies on the effects of smokefree legislation found that implementation was associated with a drop in smoking prevalence of around 4%.⁶²

Children and secondhand smoke

There are no laws to protect children from exposure to secondhand smoke in the home. Studies measuring secondhand smoke exposure in the home show that the most reliable way of reducing exposure is to stop smoking completely indoors.⁶³ Partial measures such as restricting smoking to particular rooms or not smoking in the presence of children are insufficient to protect the health of non-smokers.⁶⁴ Thus, if parents are unable or unwilling to stop smoking, the next best step is to at least make the indoor environment smokefree.

Although several interventions, including parental education and counselling programmes, have been used to try to reduce children's tobacco smoke exposure, their effectiveness is unclear. A Cochrane review of 57 studies was unable to determine if any particular interventions reduced parental smoking and child smoke exposure more effectively than others, although seven studies were identified that reported intensive counselling or motivational interviewing provided in clinical settings was effective.⁶⁵ This suggests that population-level initiatives such as media health education campaigns, are needed to achieve changes in attitude and behaviour.⁶⁶

In ASH's Youth Smokefree 2019 survey, 90% of young people aged 11-18 said that people are never allowed to smoke inside their house, 7% lived in houses where people can smoke, and 3% said that they didn't know.⁶⁷

Smoking in cars

As part of the Health Act 2006 smoking in vehicles used for work purposes was prohibited. The regulations require that a vehicle must be smokefree if it is used "in the course of paid or voluntary work by more than one person" (even if those persons use the vehicle at different times, or only intermittently).⁶⁸ Furthermore, vehicles used for work purposes must display a "No Smoking" sign at all times.⁶⁹ In addition, the Highway Code 2007 advises against smoking and driving because it can cause a distraction.⁷⁰

Levels of secondhand smoke (SHS) in cars can be extremely high due to the restricted space in which the smoke is circulated. It can reach levels far higher than those experienced in buildings.⁷¹ Furthermore, children who are regularly exposed to smoke in cars are up to six times more likely to smoke themselves.⁷²

The Health Act 2006 was amended by the Children and Families Act 2014 granting the Government power to introduce regulations to make private vehicles smokefree when carrying children under the age of 18. The regulations took effect on 1 October 2015.⁷³ The law applies to England and Wales. A similar law in Scotland was implemented on 5 December 2016.⁴⁸ The Northern Ireland Assembly also voted in favour of a ban on smoking in cars when children are present in 2016.⁴⁹

A 2019 YouGov poll conducted for ASH found that 89% of adults in Great Britain support smoking being banned in cars carrying passengers under the age of 18. 64% of adults supported banning smoking in all cars regardless of the age of the passengers.⁶⁷

As of 2019, 87% of young people aged 11-18 say that they never travel in a car where someone is smoking.⁶⁷

For further information about smoking in cars, including the change in legislation, please see [ASH Factsheet: Smokefree Legislation](#).

Passive vaping

E-cigarette liquid is typically composed of nicotine, propylene glycol and/or glycerine, and flavourings. There is no side-stream vapour emitted by an e-cigarette into the atmosphere (like there would be from the end of a lit cigarette), only the vapour exhaled by the e-cigarette user. PHE's 2018 evidence review has found no identified health risks of passive vaping to the health of bystanders.⁷⁴

For more information about e-cigarettes, please see [ASH Briefing: Electronic Cigarettes](#).

Risks to animals

Pets are also at risk when exposed to secondhand smoke.^{75 76} A study in the United States found that even limited exposure to tobacco smoke more than doubled a cat's risk of feline lymphoma.⁷⁷ Other studies have found an association between exposure to secondhand smoke and cancer in dogs.^{78 79} Rabbits are also likely to be at risk.^{80 81}

Animals don't just suffer the ill-effects of inhaling cigarette smoke. Particulate matter within the smoke settles on their hair and is ingested during grooming. Pets also sometimes swallow cigarettes and other tobacco products causing nicotine poisoning which can be fatal.

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