



March 2014

The health effects of exposure to secondhand smoke

research report **ash.**
action on smoking and health

Definition

Breathing other people's smoke is known as passive, involuntary or secondhand smoking. It can also be called 'environmental tobacco smoke'. (Note: the term 'secondhand smoke' or 'SHS' has been used throughout this research report.)

Smokers and non-smokers alike inhale SHS. Inhaling tobacco smoke is an unavoidable consequence of being in a smoke-filled environment.¹

SHS is a mixture of air-diluted 'sidestream' smoke from the burning tip of a cigarette, and the exhaled 'mainstream' smoke exhaled by the smoker. While the proportions of sidestream and exhaled mainstream smoke can differ, sidestream smoke is usually the larger constituent of SHS.

Mainstream smoke inhaled by a smoker contains over 4000 chemicals (both particles and gases), including chemical irritants and almost 70 carcinogens (cancer causing substances). Sidestream smoke has a similar composition but the relative quantities of chemicals can differ.

Mainstream and sidestream smoke contain fine particles and thousands of gases made up from the combustion of tobacco, paper and additives in a cigarette. The concentration of these chemicals and particles changes over time and in different environmental conditions. The concentration is dependent on the number of smokers, the rate at which they are smoking and the volume of air into which the smoke is distributed.

General health effects

Exposure to SHS has immediate health effects. It can reduce lung function; exacerbate respiratory problems; trigger asthma attacks; reduce coronary blood flow; irritate eyes; and cause headaches, coughs, sore throats, dizziness and nausea.

As well as the immediate health effects there are also long-term health effects, especially with continued exposure over time. A US Surgeon General report published in June 2006 concluded that there is no risk-free level of exposure to SHS.¹ This report adds to the weight of scientific evidence including a review by the Scientific Committee on Tobacco and Health (SCOTH) in the UK, published in 2004, which concluded that "no infant, child or adult should be exposed to secondhand smoke" and that SHS is a substantial health hazard.²

The International Agency for Research on Cancer (IARC) and the World Health Organization (WHO) have classified SHS as a known (class A) human carcinogen. Other class A carcinogens include asbestos, arsenic, benzene and radon gas.³

Evidence about the health impacts of SHS exposure has built up over decades and includes comprehensive reviews by the US National Research Council, reports by the US Surgeon General, the Californian Environmental Protection Agency, the National Health and Medical Research Council of Australia and the Scientific Committee on Smoking and Health in the UK. The WHO also recognises there is no safe level of exposure to SHS.⁴

Since the introduction of smokefree legislation in the UK, living with a person or people who smoke has become the principle cause of exposure to SHS, especially for children. The exposure of the foetus to SHS either through active smoking by the mother or from the mother's own exposure to SHS is also classed by the US Surgeon General as involuntary exposure.

Mortality

Worldwide, an estimated 603,000 deaths were attributed to SHS in 2004, which was approximately 1.0% of worldwide mortality.⁵ These deaths were from ischaemic heart disease (379,000 deaths), lower respiratory tract infections (165,000 deaths), asthma (36,900 deaths) and lung cancer (214,000 deaths).⁵

In 2003, an estimated 617 people in the UK died from the effects of passive smoking at work, of which 54 were long term employees of the hospitality industry. Another 11,000 deaths were attributable to passive smoking exposure in the home in adults aged 20 to ≥ 65 .⁶ This accounts for around 2% of the current annual toll from all smoking related deaths in the UK.⁷

In 2005, the California Environmental Protection Agency used population estimates in the US to show the number of annual estimated deaths from SHS exposure. For non-smokers the Agency estimated that:

- around 3,400 people die from lung cancer (ranging from 3,423 to 8,866)
- 46,000 die from cardiac-related illness (range of 22,700 to 69,600)
- 430 children die from sudden infant death syndrome (SIDS).⁸

Lung cancer

Since the 1950s it has been established that long-term cigarette smoking is a major cause of lung cancer.⁹ Studies over the past twenty five years have pointed to the causal effect of exposure to SHS and the risk of developing lung cancer.

In 2004 the International Agency for Research on Cancer (IARC) concluded that a non-smoker living with a smoker has a significantly increased risk of lung cancer, by approximately 24% for women and 37% for men.³ The IARC

reported that studies of non-smokers exposed to SHS in their workplace show an increased risk of lung cancer of the order of 16% to 19% compared to people not exposed.³

IARC research further found an exposure-response relationship from living with a smoking spouse and the development of lung cancer. The risk of developing lung cancer in the non-smoking spouse increases with the years spent living with the smoker and the number of cigarettes the smoker consumes.³

These findings were confirmed by the UK Government-appointed Scientific Committee on Tobacco and Health (SCOTH). The 2004 SCOTH report found exposure to SHS to increase the risks of lung cancer in non-smokers by 24%.² Similarly, the 2006 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.¹

More recently, a systematic review of 20 papers published in 2011 reported an increased risk of lung cancer of 25% among those exposed to SHS in the workplace.¹⁰

Coronary heart disease

Studies have consistently shown that exposure to SHS increases the risk of coronary heart disease (CHD) in non-smokers. In the 1990's heart disease caused by passive smoking was estimated to have been the third leading cause of preventable death in the United States, ranking just behind active smoking and alcohol use.¹¹

Exposure to SHS increases blood platelet activity, causing the blood to thicken and become more likely to clot. The tobacco smoke also affects cells lining the coronary arteries, contributing towards the narrowing of the arteries. This reduction in blood flow may lead to a heart attack. A small study in 2001 concluded that even half an hour of exposure to SHS can reduce coronary blood flow.¹²

The SCOTH report estimates that non-smokers exposed to SHS have a 25% increased risk of heart disease.² The Institute of Medicine in the United States confirms that exposure to SHS is a cause of heart disease in non-smokers.¹³ Other estimates have found an increased risk of heart disease between 25-35%.¹⁴

A study published in the British Medical Journal suggests that the effects of passive smoking on the risk of heart disease may have been underestimated. Researchers found that non-smokers exposed to SHS had a 50-60% increased risk of heart disease.¹⁵ Furthermore, a review published in 2005 reported that the risks of heart disease caused by passive smoking were 80-90% as large as those caused by active smoking.¹⁶

Research has shown that even a brief exposure to environmental smoke increases the tendency of blood to clot, restricting blood flow to the heart, and can produce a serious and even lethal effect on patients with heart disease. The authors of the study recommend that people who are at risk of heart disease should avoid all places that allow smoking indoors.¹⁷

Chronic respiratory symptoms

The IARC research showed that the strongest causal effect of SHS exposure is chronic respiratory symptoms in adults.³

The US Surgeon General report in 2006 argued 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).¹ Whilst passive smoking clearly places a burden on the lungs, and research has identified plausible mechanisms by which passive smoking may cause chronic respiratory symptoms, further evidence is required to confirm the associated risks.¹

Asthma

Research on the link between SHS exposure and asthma has mainly focused on childhood asthma (see below). The US Surgeon General's report found a suggestive, though not conclusive, link between SHS exposure and exacerbation of acute respiratory symptom in adults with asthma.¹⁸ The IARC argued that many studies have shown that people with allergies and/or asthma experience more nasal symptoms, headaches, cough, wheezing, sore throat, hoarseness, eye irritation and aggravation of asthma symptoms due to exposure to SHS.¹⁹ There is substantial evidence that exposure to SHS is both a trigger for asthma attacks and exacerbates asthma symptoms.^{20 21 22 23}

In the UK, 5.4 million people live with asthma which is one of the highest asthma rates in Europe.²⁴ There are also approximately 1.1 million children receiving treatment for asthma in the UK.²⁵ On average three people die from asthma every day in the UK,²⁶ with up to nine in ten of those deaths being preventable.²⁷ Approximately three quarters of hospital admissions for asthma are also avoidable.²⁸

Stroke

Whilst the SCOTH²⁹ and the US Surgeon General³⁰ reports did not find conclusive evidence for an association between passive smoking and increased risk of stroke, more recent research supports a link.

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.³¹ SHS exposure was associated with an increased risk of stroke of 25%, however this rose to 56% in those with high levels of exposure of 40 cigarettes per day.³¹ 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.³¹

Glucose intolerance and diabetes

Research has shown an increased risk of glucose intolerance (a precursor to diabetes) from SHS exposure over a 15 year time period. The incidence of glucose intolerance amongst young adults was 17% among non-smokers exposed to SHS compared to 12% not exposed to SHS.³²

A review and meta-analysis observed passive smoking to significantly increase the risk of type-2 diabetes by 28%.³³

Other cancers

As carcinogens have no known safe threshold, it is reasonable to assume that if active smoking is a cause of a specific cancer then passive smoking will impose some degree of increased risk, albeit at a lower level than for active smoking.

SHS exposure has been associated with increased risk of developing cervical tumours (cervical neoplasia).³⁴ In particular women who have lived with smokers have a 40% increased risk of developing cervical cancer compared to women living with non-smokers.³⁵ Another review and meta-analysis reported a 75% increased risk of cervical cancer among women exposed to SHS.³⁶

An expert panel's review of the evidence reported a causal link between passive smoking and breast cancer in non-smoking premenopausal women.³⁷ A recent meta-analysis found that the risk of breast cancer was increased by 67% in those exposed to SHS.³⁸

Other cancers such as leukaemia, nasal and breast may be associated with increased risk from SHS exposure. However, the epidemiological studies of these cancers and SHS exposure are sparse.³⁹

Cognitive impairment and 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,^{40, 41} other research suggests that exposure to SHS may increase the risk of dementia only in those with cardiovascular disease.⁴² A recent review reported that exposure to passive smoking may increase the risk of cognitive impairment in later life by between 30-90%.⁴³

Sensory irritation

The most common effect of SHS exposure is that of sensory irritation of the eyes, nose and throat, including red eyes, sore throat, coughing or wheezing and hoarseness.

The chemical constituents of SHS that are thought to be responsible for this sensory irritation include organic acids (acetic and propionic acid), aldehydes (formaldehyde and acrolein), nicotine, ammonia, pyridine, toluene, sulphur dioxide and nitrogen oxides. Non-smokers also typically find the odour from tobacco smoke annoying.³

Evidence requiring further research

- There is some new evidence to show that exposure to SHS is associated with depressive symptoms in non-smokers.⁴⁴
- Exposure to SHS during childhood and adulthood may be a risk factor for chronic rhinosinusitis (CRS) with sufferers also reporting worse nasal symptoms and a more use of nasal decongestants compared with unexposed cases. This would suggest that SHS exposure is related to exacerbation and more severe symptoms.⁴⁵
- A 2010 study found an independent association between exposure to secondhand smoke and tuberculosis.⁴⁶ In addition to this, non-smokers exposed to secondhand smoke were reported to be significantly more susceptible to infectious diseases in general including community acquired pneumonia and invasive pneumococcal disease.⁴⁷
- A potential association between exposure to secondhand smoke and the development of peripheral arterial occlusive disease (PAOD) has been identified. PAOD is a surrogate marker for coronary artery disease. The same study also demonstrated that non-smokers exposed to secondhand smoke are nearly 60% more likely to have an ischemic stroke than non-smokers who are not exposed to SHS.⁴⁸

Secondhand smoke and children

A child exposed to SHS has an increased risk of cancer; of developing and/or experiencing a worsening of asthma; and reduced respiratory function (cough, wheezes); In addition, a child is at risk of bronchitis; middle ear infection; pneumonia; meningococcal or meningitis infection and sudden infant death syndrome (SIDs).^{49, 50}

Children are believed to be especially vulnerable to SHS as they breathe more rapidly, inhaling more pollutants per pound of body weight (a higher relative ventilation rate) than adults.⁵¹ Children also ingest higher quantities of tobacco smoke pollutants due to more hand-to-mouth behaviours.⁵² Research has found that after exposure to similar levels of tobacco smoke, cotinine levels (a metabolite of nicotine used to measure SHS exposure) in children are about 70% higher than in adults.⁵³

Children's exposure to SHS can be affected by:

- the number of smokers at home
- the number of cigarettes being smoked
- the level of parents' education
- where parents or others smoke in the house.⁵⁴

Forty percent of children globally are reported to be exposed to SHS.⁵⁵ Before the introduction of smokefree legislation in the UK, around 2 million children were estimated to be regularly exposed to SHS in the home,⁵⁶ with approximately 40% of all children reported to be living in a household where at least one person smokes.⁵⁷ Following the introduction of legislation, there was an increase in proportion of children reporting that they live in a smokefree home.⁵⁸ However, the 2012 Smoking, Drinking and Drug Use Survey of 11-15 year olds in England revealed that 67% of children continue to be exposed to SHS.⁵⁹

In the UK, surveys in the 1980s and 1990s found that about half of all children in lived in a house where at least one person smoked.⁶⁰ By early 2007 this figure had dropped to 40%.⁵⁷ Since the introduction of the smokefree legislation in 2007, research conducted across the UK has observed that the overall level of SHS exposure among children has fallen substantially.^{50, 61, 62} There is further evidence that the smoking ban has led to an increasing proportion of parents making their homes smoke free. In England the proportion of smoking parents adopting smoke free home policies has risen from 16% in 1998 to 48% in 2008.⁶³ Despite these reductions, passive smoking remains a major hazard to the health of millions of children both worldwide and in the UK.

Children from socio-economically disadvantaged backgrounds are generally more heavily exposed to SHS.⁵⁰

Health effects of SHS on children

Children are especially vulnerable to SHS as they breathe more rapidly and inhale more pollutants per pound of body weight (a higher relative ventilation rate) than adults.⁶⁴

In 2010 The Royal College of Physicians (RCP) published a landmark report entitled “Passive Smoking and Children”. The report acknowledges the importance of smoke free legislation in reducing exposure to SHS in the workplace but points out that the principle source of exposure for non-smokers is in the home and that children are especially at risk.⁵⁰

The authors state that *“passive smoking in the home is a major hazard to the health of the millions of children in the UK who live with smokers, and the extent of this health problem has not, to date, been accurately quantified.”*(preface IX) They conclude that *“passive smoking is a significant cause of morbidity and mortality in babies and children.”*(p197)⁵⁰

The RCP report concurs with the findings of a review published by the World Health Organization in 1999,⁶⁵ with both reports identifying that SHS is linked to increased risks of a wide range of poor health outcomes for children.

The poor health outcomes are discussed below.

Lower respiratory tract infections

Lower respiratory tract infections affect the airways and lungs, and include flu, bronchitis and pneumonia. A review of 60 research studies found that SHS exposure in the home increased young infants’ risks of developing lower respiratory tract infections by around 50%.⁶⁶

Asthma and wheezing

Asthma is the most common chronic disease of childhood.⁶⁷ SHS exposure has been found to trigger the development of asthma and exacerbate symptoms.⁶⁸

A review of 79 studies reported that exposure to pre or post-natal SHS was associated with between 30-70% increased risk of incidents of wheeze, and 21-85% increase risk in asthma in children.⁶⁹ The review concluded that the effects of SHS exposure on incident wheeze and asthma are substantially higher than previous estimates, and the authors argued that SHS exposure is an important risk factor for both conditions throughout childhood.⁶⁹

A further review of 20 studies found that exposure to SHS was associated with a 30% increased risk of physician-diagnosed asthma in childhood.⁷⁰ Research suggests that an effective means of preventing asthma is to reduce exposure to SHS.^{68, 71}

The Royal College of Physicians estimates that exposure to secondhand smoke is responsible for over 100,000 GP consultations for asthma in the UK each year among 3-16 year olds, costing over £3 million. Additionally, it is estimated that there are over 1,400 hospital admissions of children aged 0-14 in England attributable to passive smoke exposure, at a cost of over £1.5m.⁷²

Smokefree legislation has helped to reduce the risk of asthma attacks amongst children. Research in the UK showed that smokefree legislation significantly reduced hospital admissions for childhood asthma in England.⁷³ A study of the impact of Arizona's 2007 statewide smoking ban revealed a significant reduction in hospital admissions for asthma.⁷⁴

Middle ear infections

There is evidence that exposure to SHS increases the risks of middle ear disease in children. A review of 61 studies found that exposure to maternal smoking increased a child's risk of middle ear infection by over 60%, and when exposed to both parents smoking children were over 80% more at risk of needing surgery for middle ear infections.⁷⁵ The review concluded that 7.5% of episodes of middle ear infections in children could be attributed to exposure to SHS in the home.⁷⁵

Sudden unexpected death in infancy

Sudden unexpected death in infancy, also known as cot death, is the sudden and unexpected death of an apparently well baby, and affects at least 300 babies in the UK each year.⁷⁶ A review of the research presented in the Passive Smoking and Children report using data from 75 studies concluded that maternal smoking after birth was associated with a three-fold increased risk of sudden unexpected death in infancy.⁵⁰ The report also found that having one or more smokers living in the household more than doubled the risk of sudden unexpected death in infancy.⁵⁰

Invasive meningococcal disease

Invasive Meningococcal disease is a serious cause of disability and death in children, with just under 5% of cases being fatal and around 16% of those having the disease being left with serious physical or mental disability.⁷⁷ A review of 18 studies found that exposure to SHS in the home more than doubled a child's risk of invasive meningococcal disease, with the greatest risks found for children under five years of age and those whose mothers smoked in the postnatal period.⁷⁸

Other ill health

Exposure to SHS has also been found to be linked to increased risks of a range of other health conditions, including some types of childhood cancer,⁷⁹ some types of cancer in adulthood,⁵⁷ emphysema in adulthood,⁸⁰ impaired

olfactory (sense of smell) function,⁸¹ and may exacerbate chronic conditions such as sickle cell disease.⁸²

Economic cost of ill health effects in children

These disorders generate over 300,000 UK GP consultations and about 9,500 hospital admissions every year, costing the NHS about £23.3 million.⁵⁰

Social/mental development, school absenteeism

Exposure to SHS in childhood may also affect children's mental development. One study found that children exposed to SHS at home were at an increased risk of neurobehavioural health problems, including learning disabilities and attention deficit hyperactivity disorder.⁸³ A United States (US) study found deficits in reading and reasoning skills among children even when exposed to very low levels of SHS.⁸⁴

There is also some evidence to suggest a link with poor mental health, with some research from the US⁸⁵ and UK⁸⁶ suggesting that children and adolescents exposed to SHS in the home are more likely to have symptoms of depression and anxiety.

Children who live with a smoker have also been found to have increased school absenteeism.^{87, 88, 89}

Increased likelihood of smoking uptake

A review of the research has found that children exposed to smoking are significantly more likely to take up smoking themselves.⁹⁰ Children whose parents both smoked were at a three-fold increased risk of smoking uptake. Children were further found to be over 70% more likely to start smoking if just one parent smoked, and over twice as likely if that parent was the mother. The authors estimated around 23,000 adolescents in the UK were smoking as a result of exposure to household smoking.

Health effects of prenatal exposure to SHS

Maternal smoking in pregnancy is frequently reported to be associated with a wide range of adverse health outcomes, causing substantial harm to infants through increased risks of miscarriage, stillbirth, prematurity, low birth weight, perinatal morbidity and mortality, neo-natal or sudden infant death.^{91, 50}

A report by the Public Health Research Consortium estimated costs to the National Health Services [NHS] related to infant health outcomes associated with smoking in pregnancy to be around £23.5 million per year.⁹²

Health effects of exposure of pregnant women to SHS

Research has highlighted significant risks associated with SHS exposure in pregnant women. A review of 58 studies published in 2008 found that infants of women exposed to SHS during pregnancy were on average between 33g–

40g lighter than infants whose mothers were not exposed.⁹³ Babies born to mothers exposed to SHS during pregnancy were further found to be at between 20-30% increased risk of being born at low birth weight (less than 2500g), and some evidence was found for a further link with babies being small for their gestational age.⁹³

Similarly, a review of 76 studies published in 2010 found that the infants of SHS exposed women were at increased risks of low birth weight, increased risks of congenital anomalies and smaller head circumferences.⁹⁴

A further review of 19 studies that examined SHS exposure during pregnancy specifically among non-smoking women found significantly increased risks of stillbirth and congenital malformation.⁹⁵

More information

Further information on effects on children of SHS can be found in ASH's Research Report: [Secondhand smoke: Impact on children](#). See also [Passive smoking and children](#). A report by the Tobacco Advisory Group of the Royal College of Physicians. London, RCP, 2010.

Awareness of health risk

The 2008/2009 Smoking Behaviour and Attitudes Survey found a high degree of overall awareness about the health risks of SHS amongst UK adults with around 80% believing that a non-smoker's risk of lung cancer, bronchitis and asthma is increased by SHS exposure.⁹⁶ Slightly fewer (76%) believed that SHS increases the risk of heart disease.⁹⁶

Younger people (i.e. aged under 35) and those who have never smoked are more likely to know about the health effects of passive smoking on adults and children.⁹⁶

Around 62% of non-smokers dislike people smoking around them. Women who did not smoke were more likely to mind others smoking near them than men who did not smoke (64% compared with 59%). Those who have never smoked regularly were more likely to mind people smoking near them than ex-regular smokers (67% and 53% respectively).⁹⁶

People do not like the smell of cigarettes (65%); or the smell of smoke on clothes (53%). 51% also reported adverse health reactions due to SHS including that: it affects their breathing; makes them cough; gets in their eyes and makes them feel sick.⁹⁶

There is a high level of awareness about the impact of secondhand smoke on children: 92% of adults are aware that exposure to SHS increases a child's risk of chest infections and 86% are aware of an increased risk of asthma. People are less likely to be aware of the risks associated with cot deaths

(58% thought there was an increased risk), and only 35% believed there was an increased risk of ear infections in children living with a smoker.⁹⁶

The Health Act 2006: Smokefree Legislation

Since the implementation of the smokefree provisions of the Health Act in 2007, smoking in enclosed public places and workplaces is prohibited across the United Kingdom.

Health Impact of Smokefree Legislation

A department of health report, *The Impact of Smokefree Legislation in England: Evidence Review* concludes that the legislation has had a significant, positive impact on SHS exposure and has been positively received.⁹⁷ There is consistent evidence to show that in countries where comprehensive smokefree legislation has been implemented,⁹⁸ with reductions in secondhand smoke exposure of between 80% and 90% recorded.⁹⁹

A study in Ireland found that hospitality workers experienced significant reductions in both air nicotine levels (80% drop) and saliva cotinine concentrations (70% decrease) during the first six weeks of the Irish smoking ban. Cotinine is a biomarker for nicotine and can be used to show recent passive smoking exposure. Before the law came into effect, 68% of workers reported having over 21 hours of SHS exposure per week. After the introduction of the ban this changed to 70% of workers reporting no exposure to SHS per week.¹⁰⁰

In England, significant reductions in SHS exposure among non-smoking adults were observed following the introduction of the smokefree legislation. Even after adjustment for the overall trend in reduction of SHS exposure among non-smoking adults between 1998 and 2008, the smokefree legislation reduced overall SHS exposure by around 27%, and significantly increased the proportion of adults who experienced no exposure.¹⁰¹

New York State implemented the *Clean Indoor Air Act* in 2003. After the ban there was a marked reduction in reported exposure by hospitality employees to SHS. Study subjects reported an 89% decrease in exposure to SHS at work; this was confirmed by urinary cotinine tests of the workers.¹⁰²

The smokefree legislation also appears to have had an impact on smoking behaviours in the home. The 2008-09 smoking related behaviour and attitudes survey found that 69% of people surveyed in England do not allow smoking inside their home, compared to 61% in 2006. A further 20% only allow smoking in certain rooms or at certain times. Only 10% allow smoking to take place anywhere in their homes.¹⁰³

The health impacts of these reductions in SHS exposure are widely reported:

- There is a growing body of evidence to show that incidences of myocardial infarction (heart attack) have fallen following the introduction of smokefree legislation, both in the UK and internationally.^{104, 105, 106, 107, 108}
- One review of studies found an overall decrease in acute myocardial infarction of 17%.¹⁰⁹
- 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 legislation.¹¹⁰
- Research has further shown reductions in hospital admissions for childhood asthma following the introduction of the smokefree legislation.^{111 112}
- A recent study in the Republic of Ireland reported an immediate 13% decrease in all-cause mortality following the smoking ban.¹¹³ Reductions in mortality from ischaemic heart disease (26%), Stroke (32%), COPD (38%) were found, with an estimated 3,726 deaths prevented as a result of the smoking ban. These deaths were argued to be due to reductions in passive smoking.

Public support for smokefree legislation:

- The Department of Health carried out a survey in 2008 which found that 76% of respondents supported smokefree legislation in England.¹¹⁴
- The 2008/9 edition of the “Smoking-related behaviour and attitudes” survey found that 85% of respondents supported restrictions on smoking at work, 93% in restaurants, 91% for indoor shopping centres, 94% for indoor sport and leisure centres. 75% of those interviewed supported the ban on smoking in pubs.¹¹⁵
- Monthly surveys conducted on behalf of the Government post-ban revealed that 98% of businesses are compliant with the law and 81% believe the legislation is a “good idea”.¹¹⁶
- A MRUK survey carried out on behalf of the Scottish government in 2006 found that 91% of non-smokers supported smokefree legislation.¹¹⁷
- Surveys suggest there is strong support for the introduction of a law banning smoking in cars with children (see below).

More information

[ASH Factsheet on Smokefree Legislation](#)

[Smokefree England](#)

[Clearing the Air Scotland](#)

[Smoking Ban Wales](#)

[Space to Breathe for Northern Ireland](#)

[Smokefree England Regulations](#)

[The Smoke-free \(Premises and Enforcement\) Regulations 2006](#)

Smoking in cars

Smoking in vehicles and cars is an important source of SHS exposure. Levels of SHS in cars can be extremely high because of the restricted area in which the smoke is circulated,¹¹⁸ which allow high levels of tobacco smoke to accumulate.

In 2005, the State of California's Air Resources Board (CARB) conducted a comprehensive review of studies which measured secondhand smoke particle concentrations in a variety of environments. The review found that in-car concentrations were up to 60 times greater than in a smoke-free home, and up to 27 times greater than in a smoker's home.¹¹⁹

Other research consistently finds that smoking in vehicles can cause SHS concentrations to build up to dangerously high levels.^{120 121 122} Several studies measuring tobacco smoke pollutants in vehicles have found high levels even in ventilated conditions.^{122 123 124}

A study carried out in Scotland examined secondhand smoke in cars in a realistic setting.¹²⁵ Fine air particulate matter (a commonly used measure of secondhand smoke exposure), was examined in 104 journeys, during which participants were asked to carry out their normal driving and smoking behaviours. Fine particulate matter concentrations in cars where smoking took place were found to be high, and exceeded the World Health Organisation's indoor air quality guidance values. Even when ventilation methods were used, such as opening windows or using electronic ventilation, these indoor air quality guidelines were still exceeded.

Prevalence of smoking in cars

Internationally, in 2007 it was reported that smoking in the presence of non-smokers in cars ranged from 29% in the UK and Australia, 34% in Canada and 44% in the US.¹²⁶

There is some information about the prevalence of children's exposure to SHS in vehicles.

- In England, a 2009 survey carried out on behalf of the Department of Health found that 35% of children aged 8-13 whose parents smoked reported being exposed to SHS while travelling in a vehicle with them.¹²⁷
- 2012 data from a survey carried out in England by the Health and Social Care Information Centre found 30% of 11-15 year olds report being exposed to SHS in someone else's car, and 26% report being exposed in their own family's car.¹²⁸
- In Scotland, 6.5% of 11-12 year olds reported exposure to smoking in cars in 2007.¹²⁹
- In Wales, 20% of 11-16 year olds reported being exposed to SHS the last time they travelled in a car.¹³⁰

- In Ireland, 14% of 13-14 year olds were reported to be exposed to SHS in vehicles.¹³¹

These figures are concerning as they indicate that a significant proportion of children in the UK are exposed to SHS in cars and vehicles.

Smoking in cars: public opinion

Public support for a smoking ban in vehicles, particularly in the presence of children, is growing. In 2011 the British Medical Association called for legislation to ban smoking in all vehicles.¹³² In February 2014, Parliament voted in favour of an amendment to the Children and Families Bill to enable the government to bring forward regulations banning smoking in cars when children are present.¹³³

Proposals for restrictions are generally well supported.

- An international review of surveys from North America, the UK and Australasia found a majority (76%) of the public supported the introduction of smoke free car laws. In four of the jurisdictions examined (Victoria, California, New Zealand, and South Australia) levels of public support were in excess of 90%.¹³⁴
- Data from the 2007 wave of the International Tobacco Control Four Country Survey found high levels of support for banning smoking in cars and vehicles carrying children. In the UK, 75% of smokers were found to support such a ban; support was also high among respondents from Australia (83%), Canada (74%) and the USA (60%).¹³⁵
- A YouGov poll in 2012 found 60% of adults in the UK supported a smoking ban in cars carrying passengers, but there was only 37% support for a ban on smoking in all private vehicles.¹³⁶
- A 2010 poll commissioned by Cancer Research UK found 75% support for legislation banning smoking in cars with children.¹³⁷
- A poll conducted for ASH Scotland found that over 80% of adults in Scotland would support this legislation.¹³⁸
- A poll by the Royal College of Physicians found that 77% of adults in England would support a total ban on smoking in motor vehicles carrying children under the age of 18 years.¹³⁹
- A YouGov poll published by the Faculty of Public Health in August 2010 found 74% support for a ban on smoking in cars with children.¹⁴⁰
- Polls publicised by Road Safety GB around the time that that smokefree laws were implemented in 2007 showed that 70% of respondents supported a complete ban on smoking in cars in the UK.¹⁴¹

Laws banning smoking in cars carrying children have been introduced in a number of jurisdictions in Canada, the United States and Australia. Other countries that have moved to ban smoking in cars carrying children include South Africa, Bahrain, Cyprus and the United Arab Emirates.

A 2013 Evidence Review published by ASH Scotland, concluded that smoking in vehicles is a source of high levels of smoke exposure and that, although there is increasing public awareness of the hazards of SHS, a strong moral case can be made for legislative interventions when children are present. This opinion is echoed in an American study published in 2010 where it is argued that there is an ethical justification for banning smoking in cars carrying children, firstly because of the extreme risk to the health of the child, and secondly because children are not fully autonomous and therefore unable to act to protect their own interests.¹⁴²

In Mauritius smoking is prohibited in any vehicle carrying passengers. There are also a growing number of countries which ban smoking in vehicles used for work purposes, while in Kuwait it is against the law to smoke while driving in any vehicle.¹³⁶

In England and Wales there is currently only a law prohibiting smoking in vehicles used for work purposes by more than one person (until the new legislation banning smoking in cars with children present is implemented). In Scotland it is illegal to smoke in any vehicle used for work purposes, but this ban does not apply to cars.

For more information see also: ASH fact sheet on Smoking in cars. [ASH fact sheet on Smoking in cars](#)

Conclusion

The health risks from SHS exposure are now well documented and there is no risk-free level of exposure to SHS. Significant reductions in SHS exposure in the UK have been seen since the introduction of the smokefree legislation in 2007, and social norms and knowledge about SHS are changing. However millions of adults and children continue to be exposed to SHS in homes and vehicles, meaning that passive smoking remains a substantial cause of mortality and ill health. Government campaigns and policies now need to focus on reducing SHS exposure in these settings, with particular emphasis on reduction of SHS exposure for vulnerable groups.

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