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**To cite this article:** Martin J Dockrell, Amanda Sandford & Sarah Ward (2007) Smoke-free public places and their impact on public health, Expert Review of Pharmacoeconomics & Outcomes Research, 7:4, 309-313, DOI: [10.1586/14737167.7.4.309](https://doi.org/10.1586/14737167.7.4.309)

**To link to this article:** <https://doi.org/10.1586/14737167.7.4.309>



Published online: 09 Jan 2014.



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# Smoke-free public places and their impact on public health

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*Expert Rev. Pharmacoeconomics Outcomes Res.* 7(4), 309–313 (2007)

On July 1<sup>st</sup> England joined the rest of the UK by going 'smoke-free', that is to say, prohibiting by law smoking in virtually all enclosed public places. This has been described as the biggest step forward in public health for 50 years. The first expected benefits will come from fewer people breathing secondhand smoke (SHS), but evidence from other jurisdictions suggests that many smokers will quit entirely and many of those who do not will smoke less. In New York, for example, in the year following comprehensive legislation 7 million fewer cigarettes were sold.

The tobacco industry and their affiliates have sought to undermine public confidence in a growing body of scientific evidence. However, some emerging evidence does suggest that the expected drop in smoking prevalence may not be sustained if governments do not maintain a multifaceted tobacco-control program. Even if they do, smoking cessation may continue to benefit higher social groups disproportionately and so aggravate health inequalities.

## General health effects

Smokers and nonsmokers alike inhale SHS, a mixture of diluted 'sidestream' smoke from the burning tip of a cigarette and the exhaled 'mainstream' smoke exhaled by the smoker. Mainstream smoke inhaled by a smoker contains over 4000 chemicals (both particles and gases), including chemical irritants and almost 70 carcinogens. Sidestream smoke has a similar composition, but the relative quantities of chemicals can differ.

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. The US Surgeon General in June 2006 concluded that there is no risk-free level of exposure to SHS [1]. This conclusion 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 stated 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 WHO have classified SHS as a known (class A) human carcinogen [3].

Evidence regarding 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 recognizes there is no safe level of exposure to SHS [4].

Whilst living with a person or people who smoke is a major contributory factor in SHS exposure, people also receive exposure through workplaces and public places (particularly pubs and restaurants) [5].

### Mortality

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

Population estimates in the USA show the number of annual estimated deaths from SHS exposure as significant. For non-smokers:

- More than 3400 people die from lung cancer (ranging from 3423 to 8866)
- 46,000 die from cardiac-related illness (range of 22,700 to 69,600)
- 430 children die from sudden infant death syndrome (SIDS)

### Lung cancer

In 2004, IARC concluded that a smoker or a nonsmoker living with a smoker has a significantly increased risk of lung cancer, by approximately 24% for women and 37% for men [2].

Studies of nonsmokers exposed to SHS in their workplace show an increased risk of lung cancer of the order of 16–19% compared with people who are not exposed [3].

The IARC states that the evidence is clear: adult nonsmokers exposed to SHS have a higher risk of lung cancer than those not exposed. There is also strong evidence of a dose–response relationship between lung cancer risk and the duration of exposure to SHS. The three main sources of SHS exposure are the home, the workplace and the social environment [8].

The IARC research has 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, the number of cigarettes the smoker smokes and the number of years the person smokes [3].

### Coronary heart disease

Studies have consistently shown that exposure to SHS increases the risk of coronary heart disease (CHD) in nonsmokers. In the 1990s, heart disease caused by passive smoking was estimated to have been the third leading cause of preventable death in the USA, ranking just behind active smoking and alcohol use [9].

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 [10]. It is estimated that SHS exposure increases the risk of an acute CHD event by 25–35% [3].

A study in Helena (Montana, USA) reported in 2004 found that in the 6 months following the introduction of a public smoking ban there was a reduction in hospital admissions due to heart attacks [11]. During the 6 months in which the law was enforced the number of heart attack admissions fell from 40 admissions during the year prior to the law to 24 admissions after the law was enacted. The ordinance was subsequently overturned and the number of acute heart attack admissions returned to previous levels, approximately 40 per year. The Helena study was small in size, however, it demonstrates the significant health improvements as a result of the smoking ban.

### Asthma

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 [3]. Exposure to SHS can also be a trigger for an asthma attack.

In the UK, 5.2 million people live with asthma, of these 2.1 million suffer from severe asthma. A survey conducted in 2003 of people with severe asthma found that 44% said their social life was restricted because they could not go to pubs or restaurants owing to the smoky atmosphere. One in five of those interviewed said their asthma was life threatening [12].

The Health Survey for England 2001 found that being exposed to other people's tobacco smoke for 6 h or more a week had significantly increased the risk of wheezing in the previous 12 months [13].

### Stroke

Few epidemiological studies have examined the effects of SHS on stroke and aortic aneurysms. The SCOTH report found insufficient evidence of an association between SHS exposure and stroke [2].

Previous research in New Zealand in 1999 found SHS exposure increased the risk of stroke in nonsmokers by 82% [14]. Recent research in China has found that nonsmoking women living with partners who smoke have an elevated prevalence of stroke. The prevalence increased with intensity of smoking (number of cigarettes smoked) and duration of the partners' smoking [15]. The US Surgeon General has concluded that the risk of stroke and SHS exposure warrants further study [1].

### 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.

SHS exposure has been associated with increased risk of developing cervical tumors (cervical neoplasia). In particular, women who have lived with smokers have a 40% increased risk of developing cervical cancer compared with women living

with nonsmokers [16]. Other cancers such as leukemia, nasal and breast may be associated with increased risk from SHS exposure. However, the epidemiological studies of these cancers and SHS exposure are sparse [17].

#### Health effects of SHS on children

Children's exposure to tobacco smoke generally takes place in their home, with the main source of exposure being from their parents and, in particular, maternal smoking. Smoking has a significant impact on the health of the child, both in childhood and in later life.

A child exposed to SHS has an increased risk of cancer, increased risk of developing and/or exacerbating asthma, reduced respiratory function (cough, wheezes), increased risk of bronchitis, middle ear infection, pneumonia, meningococcal or meningitis infection and SIDS [17].

In 1997, the Canadian Institute of Child Health found that children are especially vulnerable to SHS as they breathe more rapidly and they inhale more pollutants per pound of body weight (a higher relative ventilation rate) than adults [18].

In the UK, approximately 5 million children are exposed regularly to SHS and close to half of all children still live in households with at least one smoker [19].

A child'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 the parents or others smoke in the house [20].

Children are more likely to start smoking if they grow up in households where those around them smoke and are more likely to smoke if one or both of their parents do [21].

A study in Sweden released in 2006 has shown that parents who smoke are greatly increasing their child's risk of developing several types of cancer. Similar risks for exposure by mothers and fathers smoking were found for lung cancer (71%) and upper aerodigestive cancer (45%). There was an eightfold increased risk of developing nasal cancer (nasal adenoid cystic carcinoma) by exposure to SHS from either parent during childhood [22].

Children who are exposed to SHS on a daily basis grow up with more than triple the risk of lung cancer later in life compared with those who grow up in smoke-free environments [23].

Asthma is the most common chronic disease of childhood. In particular, SHS exposure can trigger the development of asthma and exacerbate symptoms. Children who suffer from asthma and whose parents smoke are at least twice as likely to suffer asthma symptoms all year round compared with the children of nonsmokers. Wheeze and physician-diagnosed asthma was more common in children who lived with a smoker and the prevalence of asthma increases with the number of smokers living in the home. An effective means of preventing asthma is to reduce the person's exposure to SHS [24].

#### Smoke-free legislation & smoking cessation

Evidence from jurisdictions where smoke-free legislation has been in place for some time suggests that many smokers seize the opportunity to attempt to quit smoking. In Scotland, over 46,000 smokers made a quit attempt in the first year of smoke-free legislation, one smoker in 20 [23]. In Ireland, smoking prevalence fell from 27% 1 month before the ban to 22% 1 year later [25].

When the full range of policy measures is implemented and sustained over time, the result is especially powerful. In New York City (NY, USA), smoking prevalence among adults tumbled by 11% from 2002 to 2003 following a comprehensive smoke-free law, a cigarette excise tax increase, a media campaign and a cessation initiative involving the distribution of free nicotine replacement therapy [26].

According to the Office for National Statistics, approximately 70% of smokers in England want to quit [27]. A survey conducted by UK Action on Smoking and Health (ASH) and the British

Thoracic Society found that 39% of smokers expressed an intention to quit: 31% within 1 year of England's smoke-free legislation coming into force and a further 8% at an unspecified time after that [28]. The distinction between 'wanting' to quit and 'intending' to quit is the

difference between the 'contemplation stage' and 'preparation stage' in Prochaska and Diclemente's Stages of Change model [29].

This pattern was most in evidence among younger smokers, with one in four 18–24-year-olds planning to quit before July 1st 2007 and 58% planning to quit in total. The proportion intending to quit declines with age, with those aged over 55 years least intent on quitting. It remains to be seen how many of these are able to make the leap to the third of the Stages of Change 'Action' by making a quit attempt.

Not all of these will quit successfully at their first attempt. Since smoking is highly addictive, many will fall at Prochaska and Diclemente's fifth hurdle, the Maintenance stage. A report by the Royal College of Physicians ranked substances according to a range of addictive qualities including difficulty in achieving abstinence and physical withdrawal symptoms [30]. Nicotine was ranked top with alcohol, heroin and cocaine according to the former, and higher than cocaine but lower than heroin according to the latter. Many recovering drug addicts and alcoholics report that quitting smoking was tougher for them than giving up drugs and alcohol. Ask almost any smoker who has tried to quit and they will tell you that among the most challenging times is going to a pub with friends who continue to smoke. Smoke-free pubs and restaurants should make that less of a problem.

#### Don't quit on the quitters

Given the continued high prevalence of smoking and the high proportion of smokers who would like to quit, approximately one British adult in five remains a smoker who wants to quit. Successes in smoking cessation over the last 50 years have been most pronounced in the higher socioeconomic groups. In this group, smoking prevalence has fallen to 15% but remains highest,

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at 35%, among those in a routine occupation [31]. Indeed it has been calculated that smoking accounts for 50% of the inequality in life expectancy between the richest and poorest in the UK [32].

Recent evidence from the Republic of Ireland showed the early fall in smoking prevalence was only partially sustained and the decision of the Irish government not to continue increase in tobacco taxation may have been an important factor [25].

England's first smoke-free summer began on Sunday July 1, just a few days after Gordon Brown became Prime Minister. Both events have been a long time coming, but if the new

Brown government is not to squander these hard won health gains, it will be essential to maintain smoking cessation services and mass media campaigns while clamping down on tobacco marketing and smuggling so that accelerated taxation can help to deliver a healthier – and fairer – Britain.

#### Financial disclosure

The authors have no relevant financial interests, including employment, consultancies, honoraria, stock ownership or options, expert testimony, grants or patents received or pending, or royalties related to this manuscript.

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