



Key points:

- many children in Scotland are exposed to second-hand smoke (SHS) in the home, this exposure is associated with a range of adverse health outcomes
- there is no evidence that banning smoking in public places in Scotland has resulted in increased exposure in the home due to a displacement effect
- effective interventions for reducing exposure in the home are under-researched, with no clear evidence of efficacy for any one particular approach
- as many individuals do not place any restrictions to reduce SHS in the home, the identification of barriers to adopting a smoke-free home should be a focus of future research.

1. The level of second-hand smoke exposure in the home

The introduction of smoke-free legislation for Scotland's public places in 2006 served as an important milestone in reducing the adverse impact tobacco has on health. Research conducted since the introduction of this legislation has emphasised the positive effects of the law, but also highlighted the fact that work must continue to reduce exposure to tobacco smoke, particularly for vulnerable groups (such as children) in areas not covered within the legislation, and particularly in the home¹.

During the passage of the smoke-free legislation concern was expressed that making public places smoke-free would push smoking inside the home and put children's health at risk. This has been shown not to be the case². Despite this, the home remains the environment where second-hand smoke (SHS) exposure is likely to be highest, particularly for children.

In Scotland in 2007, 40% of primary school children reported living with a parent who smokes, 27.4% of Scottish children reported they were exposed to second-hand smoke in their own home, 9.5% reported exposure at someone else's home and a further 6.5% reported exposure in a car. 19% of children were exposed to SHS at levels dangerous to arterial health³.

Infants inhale double the quantity of household dust compared to adults, and so inhale more dust containing SHS particulates (perhaps 40 more times more per body weight than adults)⁴. Infants also have greater hand/object/mouth contact, and so absorb proportionately more SHS through ingestion, as well as through inhalation⁵.

Exposure to SHS is particularly an issue for children in disadvantaged areas where smoking rates are higher than average and quit rates lower. More than half (54%) of babies and young children from poorer backgrounds (social class V) are regularly

exposed to SHS in the home, compared with fewer than two in ten (18%) of UK children from families with a professional background (social class I)⁶. Recent research confirms that marked social inequalities in SHS exposure exist among 11 year old children from different socioeconomic groups in Scotland⁷.

2. The health risks associated with second-hand smoke exposure

There is clear published evidence from a range of study types and countries, including large scale reviews of the scientific literature that show SHS exposure is a cause of lung cancer and ischaemic heart disease⁸. Children and infants face the highest level of SHS exposure in the home as they are often unable to remove themselves from smoky environments. With their smaller airways, faster rates of breathing and immature immune systems children and infants are also most vulnerable to any adverse health effects⁹. Exposure to SHS in childhood is associated with reduced lung function, middle ear disease, an increased risk of a range of respiratory symptoms and a higher incidence of respiratory tract infections. SHS exposure has also been shown to be a cause of Sudden Infant Death Syndrome (SIDS)¹⁰.

Second-hand smoke exposure and impact on child health

- SHS exposure is associated with reduced lung function in children¹¹. Exposure to SHS in childhood is associated with a higher incidence of respiratory tract infections including bronchitis, bronchiolitis, croup and pneumonia, and an increased risk of respiratory symptoms such as breathlessness, phlegm, coughing and wheezing^{8 12}
- it is estimated that each year, more than 17,000 children under five are admitted to UK hospitals because of respiratory illness caused by exposure to SHS¹³
- exposure to SHS in infancy is a cause of Sudden Infant Death Syndrome (SIDS)^{14 15 16}. The UK Confidential Inquiry into Stillbirths and Death in Infancy¹⁷ estimates that in families where only the father smokes, risk of SIDS is increased 2.5 times. Where both parents smoke, the risk of SIDS is increased almost 4 times
- exposure to SHS can cause asthma in children, and may increase the severity of the condition in children who are already affected^{18 19}. SHS is cited by up to 80% of asthmatics as a trigger for further attacks²⁰. A recent report has demonstrated that children with asthma whose parents smoke at home are at least twice as likely to have asthma symptoms all year compared to children of non-smokers²¹
- exposure to SHS can cause middle ear disease, including recurrent ear infections in children^{8 9 22}
- recent research suggests that children who are exposed to SHS are at a higher risk of developing lung cancer as adults. Children exposed to SHS on a daily basis, and for many hours, face over three times the risk of lung cancer than those who grow up in smoke-free environments²³.

Recent data suggests that parents in England and Scotland may have little knowledge about the specific health risks associated with SHS exposure to children. In a 2001 survey of 2040 adults in England and Scotland, parents were asked unprompted to give examples of the health impacts of SHS on children. 26% of parents interviewed identified asthma as a likely impact, and 22% mentioned respiratory illness or lung infections as an outcome. Only 3% of parents asked knew that SIDS could result from SHS exposure, and only 1% identified glue ear as an outcome²⁴.

3. The effect of smoking bans in public places on SHS exposure in the home

Opponents of smoke-free legislation often argue that an immediate consequence of introducing smoke-free public places is increased smoking in the home. This argument is used to attempt to justify a voluntary approach to reducing exposure to second-hand smoke^{25 26 27 28}.

There is no published, peer-reviewed evidence to demonstrate that smoke-free workplaces and enclosed public places increase the exposure of children to SHS at home²⁹ with recent Scottish¹ and Welsh³⁰ research finding no indications that smoking in the home has increased post-legislation.

For Scottish adults as a whole, surveys have demonstrated that non-smokers exposure to SHS in the home has decreased markedly from 1998 to 2008: from 18% to 10% for men and women. Exposure in other people's homes has also declined from 21% to 12% for men, and 25% to 13% for women³¹.

Smoke-free legislation is associated with fewer adults remaining smokers and lower levels of smoking more generally^{32 33}. A systematic review of studies on the effects of smoke-free workplaces found that totally smoke-free workplaces are associated with around a 4% reduction in smoking prevalence³⁴. This in turn means fewer parents exposing children to SHS in the home. Research also demonstrates that where smoke-free workplaces and enclosed public places are the norm, parents are more likely to try and prevent smoking in the home^{35 36}.

In Australia, researchers have been monitoring indicators of SHS policies in home since 1989. The proportion of family homes with smoking restrictions more than doubled (25% - 59%) after smoke-free workplaces were introduced. In households where one adult smoked, the proportion with smoking restrictions rose from 17 per cent to 53 per cent; among those where both adults smoked, it increased from 2% to 32%. This research also indicated that individuals who work in smoke-free environments are more likely to discourage visitors from smoking in their homes, than respondents whose workplaces had partial or no smoking restrictions³⁷.

In California, the proportion of children and adolescents living in smoke free homes increased from 38% in 1992, to 82.2% in 1999, one year after all enclosed public places and workplaces became smoke-free state-wide³⁸. After two years of smoke-free public places in New York City, exposure to second-hand smoke in the home had decreased by 35%.³⁹

A study of a national representative sample of smokers in Ireland found that there was a significant increase in the percentage of smokers who banned smoking in their homes after the law was implemented (from 80% to 85%)⁴⁰.

Initial data confirms that in New Zealand, the percentage of people reporting SHS exposure in their home has reduced since smoke-free legislation came into effect (December 2004) by over 5% (from 20% to 14.7%)⁴¹. The New Zealand data also demonstrated that individuals who work in a smoke-free environment are more likely to discourage visitors from smoking in their home, compared to respondents whose workplaces have partial or no smoking restrictions⁴².

One year after the implementation of Scotland's smoke-free legislation the proportion of children reporting a complete ban on smoking in their home, as opposed to a partial or no ban, increased independent of parental smoking status⁴³.

4. Effective interventions for reducing children's SHS exposure in the home

Evidence on the effectiveness of health practitioner interventions to reduce parental smoking in the home is mixed. Research from the US, Norway and the Netherlands suggests that having health professionals discuss the health hazards of parental smoking in the home may be effective in limiting SHS exposure to children in the home^{44 45 46 47}. However, a Cochrane Review of family and carer smoking control programmes for reducing children's exposure to SHS found that in only four out of eighteen studies which met the selection criteria was there a significant effect, concluding that there was little evidence of effectiveness of such programmes⁴⁸.

Some studies have found that parent-reported smoking in front of children significantly underestimates exposure when compared with estimates derived from biochemical validation such as urine cotinine levels^{49 50}. A recent report by the Tobacco Advisory Group of the Royal College of Physicians advises that the success of individual or family-level interventions must be verified by objective measures. Self-report may be compromised when parents have been encouraged to reduce the exposure of their children to tobacco smoke for health reasons⁵¹.

Inconsistency between parental reports and level of exposure can also occur when parents adapt their behaviour and smoke in a different room, but are still close enough for the child to inhale SHS⁵².

US-based research suggests that overall, health care professionals are unlikely to actively engage in intensive efforts to reduce children's exposure to SHS^{53 54}. US research has also demonstrated possible reasons why there is a low rate of intervention from healthcare practitioners to reduce children's exposure to SHS. These include a lack of appropriate skills and training, a belief that such activity is not the clinicians' responsibility, and uncertainty about one's ability to assist smoking parents^{55 56}. Lack of parent interest in giving up smoking, and concern that any advice given would be ignored, have also been identified as additional barriers to delivery⁵⁷.

Whilst these findings suggest that advice on its own may not be sufficient to achieve adequate protection, other evidence indicates that healthcare practitioners *can* intervene to help reduce SHS exposure to children. In the absence of fully developed and tested models for intervention, it has been suggested that practitioners intervene with screening for SHS exposure, and research is currently underway to develop and refine such tools in the practice setting⁵⁸. It has also been suggested that practitioners can give effective brief advice that targets three behavioural outcomes; outdoor smoking, smoking away from the child, and not smoking in the car⁵⁹.

Pregnancy provides a window of opportunity to assist women to give up smoking because of their concerns about foetal wellbeing. Research suggests that establishing a policy against smoking in the home in the first 3-6 months postpartum may be especially important in controlling infants' SHS exposure in the home⁶⁰. Interventions to assist pregnant women to stop smoking should be extended to include measures to prevent smoking relapse after the birth of the child is born⁶¹. It has also been suggested that having a policy forbidding smoking in the home at 6 months postpartum is a significant predictor of continuous abstinence post-partum for mothers who quit during pregnancy⁶⁰.

Many children often do not have the personal power to complain or to remove themselves from exposure to SHS^{62 63} despite the accepted evidence linking the effects of SHS to the cause and exacerbation of a number of childhood illnesses⁶⁴.

5. Establishing and maintaining a smoke-free home: influencing factors

UK research has demonstrated that some people, including a significant minority of non-smokers do not take measures to limit SHS exposure in their own home^{65 66}. Identifying the barriers to adopting a smoke-free home is essential in order to develop practical intervention strategies.

i. Parental smoking status

Research from the UK, the US, Australia and New Zealand suggests that former and never smokers are more likely to endorse and comply with rules that ban smoking throughout the home^{66 67 68 69 70}.

Preliminary research conducted in England suggests that households are more likely to contain a smoking father than mother. In a cross sectional survey, over two-thirds of the 314 smoking households studied included a smoking father. In households where both parents smoke, father's tobacco consumption was found to be significantly higher than in households where only the father smokes⁷¹.

There is additional published research to suggest that mothers are often the recipients of intervention whilst fathers are the most frequent source of SHS exposure in the home³³.

These are preliminary research findings, and so must be interpreted with caution. However, paternal smoking currently receives far less research or health promotion attention than maternal smoking. Protecting infants from fathers' as well as mothers' smoking is key to reducing SHS exposure in infants and children.

Whilst further research in this area is required before substantive recommendations can be made, these preliminary findings suggest an increased need to tackle both the interaction between parents smoking behaviour where both parents smoke, and the father's smoking behaviour, in tailored intervention strategies.

ii. Income and education level

Some studies have shown that income is associated with home smoking rules; those families with a higher income are less likely to endorse rules that only restrict smoking, but are more likely to have a totally smoke-free home^{4 42 2 66 72 73}. Education level shows a similar trend, with those parents who have a higher level of education more likely to have a smoke-free home than those parents who are less well educated^{4 70}.

Research suggests that disadvantaged groups are least likely to change their behaviour in response to traditional health education campaigns, partly because such campaigns often fail to adequately address existing beliefs and constraints on people's behaviour. The task of SHS control around children may be particularly difficult for single smoking parents who have limited opportunities for going 'off duty'^{67 74}.

6. Current research and policy recommendations

A conference hosted by Health Scotland in March 2008 identified a range of challenges and solutions for local agencies supporting families to protect children from second-hand smoke. A report of the event was produced with a range of recommendations based on the presentation and discussion that took place during the day⁷⁵.

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