

# Policies to Restrict Secondhand Smoke Exposure

## American College of Preventive Medicine Position Statement

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**Abstract:** Secondhand smoke (SHS) exposure poses serious health risks for all nonsmokers, especially children and pregnant women. SHS is estimated to contribute to heart attacks in nonsmokers and nearly 53,800 deaths in the U.S. annually. A literature review of English-language articles was performed using PubMed, organizational websites, and pertinent review articles. Over the past 25 years, smokefree policies have protected nearly half the U.S. population from the adverse health effects of SHS. Smokefree policies have been shown to improve health outcomes with no consequences to local businesses. As of April 2013, a total of 24 states and 561 municipalities and territories, including the District of Columbia, New York City, Puerto Rico, and the U.S. Virgin Islands, have established laws that require nonhospitality workplaces, restaurants, and bars to be 100% smokefree. Four other states—Florida, Indiana, Louisiana, and Nevada—have smokefree laws that cover restaurants but provide an exemption for stand-alone bars. At least 14 states have no smokefree laws.

This paper describes the benefits of policies that reduce SHS and concludes with recommendations for future directions. The American College of Preventive Medicine (ACPM) recommends expanded clean indoor air policies for workplaces, stand-alone bars, restaurants, and multi-use family housing such as apartment buildings. ACPM recommends clean air policies for all university campuses, secondary school campuses, primary schools, child care centers, and city landmarks to further shift social norms and protect the health of children, adolescents, and adults. ACPM recommends closing existing gaps in clean indoor air policies.

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### Background and Import

The American College of Preventive Medicine (ACPM) Prevention Practice Committee is responsible for developing policy guidelines and recommendations on preventive healthcare topics for clinicians and public health policymakers. These recommendations often take the form of a position statement that provides guidance relating to topics that already

have been researched and have a set of recommendations from other agencies or professional organizations.

This ACPM position statement provides an evidence-based rationale for regulations that minimize or eliminate secondhand smoke (SHS) exposure. An overview is provided of both the public health and economic benefits of minimizing exposure. These benefits are clear from the data reviewed by ACPM, which show that SHS exposure causes harmful health effects and that smokefree policies do not have negative effects on businesses. Recommendations from leading health organizations also were reviewed and taken into account in the formulation of ACPM's concluding recommendations.

Secondhand smoke is a mixture of the sidestream smoke from the lit end of a cigarette and the exhaled mainstream smoke. Tobacco smoke contains nicotine, carcinogens, and other human and environmental toxicants. Most frequently, SHS exposure is a direct result of being present in a specific environment, such as a restaurant, bar, or building entryway. SHS exposure poses serious health risks for all nonsmokers, especially children and pregnant women. The 2010 Surgeon

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General report titled “How Tobacco Smoke Causes Disease” concludes that there are no safe levels of exposure to tobacco smoke and that even low levels of exposure to SHS lead to pathologic processes implicated in acute cardiovascular events and thrombosis.<sup>1</sup> This conclusion was corroborated in a similar IOM report.<sup>2</sup>

### **Children and Fertility**

Exposure to SHS is especially harmful to young children.<sup>2–4</sup> An estimated >60% of children aged 3–11 years have been exposed.<sup>5</sup> In addition, nearly 40% of U.S. children have detectable levels of cotinine, a metabolite of nicotine in the blood.<sup>6</sup> SHS is estimated to be responsible for approximately 150,000–300,000 lower-respiratory-tract infections, annually, in infants aged <18 months and contributes substantially to asthma exacerbations in children.<sup>3</sup>

The 2010 Surgeon General report<sup>1</sup> concluded that reproductive endpoints affecting fertility, such as menstrual cycle function and semen quality, can be attributed to SHS exposure. The report notes consistent evidence that SHS exposure contributes to complications of pregnancy that include miscarriage, ectopic pregnancy, and preterm delivery. Negative developmental outcomes to which SHS exposure contributes include poor birth weight, congenital anomalies, and sudden infant deaths and sudden unexplained infant deaths.<sup>1</sup>

### **Historical Progression of Health Risk Identification**

In 1972, the U.S. Surgeon General issued the first report of its kind to recognize the health consequences of SHS.<sup>7</sup> Several years later, a second report addressed the potential health consequences of indoor SHS exposure in poorly ventilated areas, such as airplanes and buses.<sup>8</sup> By the early 1980s, epidemiologic evidence began to mount on the adverse consequences of SHS exposure, and new biomarkers, such as cotinine, a major nicotine metabolite, and other indicators, such as nicotine and acrolein, became the focus of investigations bringing the field closer to identifying the health risks of SHS exposure.

In 1992, the U.S. Environmental Protection Agency classified SHS as a Group A carcinogen and concluded that SHS exposure contributed to >3000 lung cancer deaths annually in nonsmokers and ~300,000 respiratory infections in infants aged <18 months.<sup>3</sup> Later, the California Environmental Protection Agency (CalEPA) included sudden infant death syndrome (SIDS) and cardiac-related illnesses as diseases attributable to SHS and estimated that about 50,000 excess annual deaths occur as a result of exposure (Table 1).<sup>9</sup>

### **Cardiovascular Disease**

Exposure to SHS has been shown to have adverse cardiovascular effects, including coronary heart disease, with long-term exposure.<sup>3,8</sup> Several studies<sup>14,15</sup> have examined the impact of smokefree policies on cardiovascular benefits, including reductions in the incidence of acute myocardial infarctions. These studies show a relationship between the immediate effect of the reduction of indoor tobacco smoke in workplaces and public venues with decreased rates of emergency room admissions for this type of heart problem.

Bartecchi and colleagues<sup>15</sup> examined hospital admission rates for acute myocardial infarctions over a 3-year period before and after the implementation of smokefree ordinances in a small community in Pueblo CO.<sup>15</sup> They found a significant reduction in such hospitalizations among residents living in the vicinity covered by the ordinance. In 2008, Glantz conducted a meta-analysis of several studies that evaluated the benefits of smokefree policies on hospital admissions for acute myocardial infarction and found an estimated 19% decrease in areas with smokefree policies.<sup>14</sup> A systematic review of smokefree policies and decreases in such admissions, Meyers and Neuberger<sup>16</sup> reported an average 17% decreased risk for acute myocardial infarction, with the greatest decreases seen in nonsmokers and young adults.<sup>16</sup> They concluded that the effect was greater when the policies had been enforced over several years.

A seminal 2010 report from the IOM<sup>2</sup> established the scientific evidence that smokefree policies prevent heart attacks and save lives. The report grew out of a CDC request for IOM to review 11 major studies on the relationship between SHS exposure and acute coronary events. The main findings include the following: (1) Evidence is consistent with a causal relationship between SHS exposure and acute coronary events; (2) there is an absolute biological plausibility for a relatively brief exposure to SHS to precipitate an acute coronary event; and (3) there is a causal relationship between smokefree policies and decreases in acute coronary events.<sup>2</sup>

### **Cancer**

Smoking is well established as the number one cause of lung cancer. Nearly 90% of all lung cancers occur in people who smoke or have previously smoked.<sup>17</sup> Lung cancer accounts for >28% of annual cancer-related deaths among men, and 26% among women, and kills more people than breast, colon, and prostate cancers.<sup>18</sup> Because tobacco smoking is well established as the

Table 1. SHS exposure reports

Report	Conclusion
1972 Surgeon General report <sup>7</sup>	First report to recognize adverse health impacts of SHS exposure
1975 Surgeon General report <sup>8</sup>	Identifies airplanes and buses as key sources for SHS and outlines this as particularly hazardous for individuals with existing heart and lung disease Smoking prohibited on all domestic flights, most international flights, and all interstate bus travel
1986 National Research Council <sup>10</sup>	Identifies increased risk of lung cancer in nonsmokers with reported SHS, particularly among nonsmokers married to smokers
1992 Environmental Protection Agency (EPA) <sup>3</sup>	Classifies SHS as a Group A Carcinogen Attributes SHS to 3000 lung cancer deaths annually in nonsmokers Estimates SHS as the contributing factor in 300,000 respiratory infections in infants aged < 18 months
1997 California Environmental Protection Agency <sup>11</sup>	Supports causal association between SHS exposure from spousal smoking and coronary heart disease mortality in nonsmokers Identifies tobacco smoke as carcinogens: links SHS to lung cancer, nasal sinus cancer, and cervical cancer SHS exposure affects fetal growth with increased risk of low birth weight Links SHS exposure to chronic respiratory diseases such as asthma, bronchitis, middle-ear infection
2005 California Environmental Protection Agency <sup>9</sup>	Links SHS exposure to sudden infant death syndrome (SIDS), low birth weight, and preterm delivery Estimates SHS aggravates asthma symptoms in up to 1,000,000 people annually Attributes > 790,000 pediatric visits for middle ear infections to SHS exposure Finds a causal link between SHS and breast cancer in younger, primarily premenopausal women
2006 Surgeon General report <sup>5</sup>	Entire report dedicated to harmful effects of SHS Focus on new biomarkers that identify SHS levels in nonsmokers At-risk populations identified, including children and pregnant women
2010 DHHS <sup>12</sup>	Publishes Healthy People 2020 goals that include reduction in proportion of nonsmokers exposed to SHS
2010 IOM <sup>2</sup>	Publishes report that establishes validity of the relationship between smokefree laws and reductions in acute coronary events
2011 <i>Journal of the American Academy of Pediatrics</i> <sup>13</sup>	Publishes article that addresses relationship between SHS and neurobehavioral disorders in children
CDC	Launches the STATE system as an electronic database containing up-to-date and historical state-level data on tobacco use prevention and control

Note: STATE is a system of the CDC ([apps.nccd.cdc.gov/statesystem/Default/Default.aspx](http://apps.nccd.cdc.gov/statesystem/Default/Default.aspx)).  
SHS, secondhand smoke; STATE, state tobacco activities tracking and evaluation

major cause of lung cancer, the etiology among never-smokers with SHS exposure remains of great public health importance.<sup>19</sup> There are an estimated 250 carcinogenic components of SHS, and more than 50 studies have been published in the past 25 years establishing the relationship between SHS and lung cancer risk in never-smokers, especially in spouses of smokers.<sup>5,19–21</sup>

The WHO's International Agency for Research on Cancer (IARC) conducted a meta-analysis of published studies that showed a significant association between lung cancer risk in spouses of smokers and exposure to SHS with an excess risk as high as 20% for women and 30% for men.<sup>21</sup> A similar meta-analysis examined lung cancer in never-smokers exposed to SHS in the workplace, finding a 12%–19% risk for exposed workers. The IARC concluded that evidence is sufficient to determine

that SHS exposure is a cause of lung cancer in never-smokers.

A 2005 CalEPA report<sup>9</sup> found a causal link between SHS exposure and breast cancer in younger, primarily premenopausal women. A report of the Canadian Expert Panel on Tobacco Smoke and Breast Cancer Risk (2009)<sup>22</sup> also noted that active and SHS exposures increase breast cancer risk. The 2006 Surgeon General report<sup>5</sup> said that the relationship between SHS and breast cancer risk is “suggestive of causality.” The association between SHS exposure and other cancers requires further investigation.

### **Respiratory Diseases**

The 2006 Surgeon General report<sup>5</sup> concluded that evidence is sufficient to infer a causal relationship

between SHS and acute respiratory symptoms, such as cough, wheeze, chest tightness, and breathing difficulty. The report states that the evidence suggests that people with nasal allergies or history of respiratory illness are more likely to develop nasal irritation from SHS exposure. The report also suggests that there is a causal relationship between SHS exposure and adult-onset asthma.

Exposure to SHS is a known contributor to indoor air pollution and a source of respiratory irritants and is particularly dangerous for those with existing respiratory illness.<sup>23</sup> Eisner and colleagues<sup>23</sup> examined healthcare utilization data to evaluate the impact of SHS exposure on chronic obstructive pulmonary disease (COPD) exacerbations. They found that SHS exposure was associated with poorer health outcomes and increased risk of emergency department visits.<sup>23</sup> Both low and high levels of SHS exposure were associated with a greater risk of hospital-based care for COPD. The authors noted that higher levels of urine cotinine, another measure of SHS exposure, are associated with greater COPD severity and dyspnea.<sup>24</sup>

Hahn et al.<sup>25</sup> examined the effects of smokefree policies on respiratory symptoms among restaurant and bar workers and concluded that they had significant declines in hair nicotine and respiratory symptoms after policy implementation. Menzies and colleagues<sup>26</sup> found a significant improvement in spirometer measurements and decreases in respiratory symptoms and systemic inflammation in bar workers following implementation of a smokefree policy in confined public places. Several studies have shown decreased lung function in older populations that have had SHS exposure compared to those that have not.<sup>5</sup> SHS exposure has been shown to worsen airway hyper-responsiveness and wheezing, and to reduce pulmonary function in children, with either prenatal or postnatal exposure.<sup>27</sup>

## **Children's Health**

Exposure to SHS is linked with adverse health effects in children, including middle ear disease,<sup>28</sup> colic,<sup>29</sup> sudden infant death syndrome,<sup>30–32</sup> asthma exacerbations,<sup>33,34</sup> and various respiratory difficulties.<sup>35–37</sup> A comprehensive review<sup>38</sup> of 172 research papers published in the past 51 years, covering 174,000 cases of birth defects, demonstrated that the risks of having clubfoot and missing limb malformations in newborns are increased by as much as 50% with mothers who smoke. The findings showed that exposure to SHS increased the risk of a baby having missing or deformed limbs 26%, clubfoot 28%, gastrointestinal defects 27%, skull defects 33%, eye defects 25%, and cleft lip/palate 28%. The greatest increase in risk (50%) was for gastroschisis.

Numerous studies have demonstrated a significant association between prenatal SHS exposure and attention-deficit/hyperactivity disorder (ADHD) and ADHD-related behaviors.<sup>13,39–41</sup> A recent study by Kabir et al.<sup>42</sup> demonstrated that 4.8 million U.S. children aged <12 years are exposed to SHS in their homes. Children exposed to SHS had an increased risk of having two or more childhood neurobehavioral disorders compared with children with no exposure. Such disorders included learning disabilities, ADHD, and behavioral and conduct disorders. The study concluded that at least 274,100 of these disorders could have been prevented by eliminating SHS exposure in the home.<sup>42</sup>

Despite the compelling evidence of the harmful effects of SHS exposure, more than 40% of U.S. children continue to live in homes where they are exposed to SHS.<sup>43</sup> The National Health and Nutrition Examination Survey revealed that 43% of U.S. children aged 2 months to 11 years lived with at least one smoker in their home, and 37% of adults who do not use tobacco lived with at least one smoker or reported being exposed to SHS at work.<sup>43</sup>

Thirdhand smoke (THS) exposure also may be a health risk to young children and infants. Whereas SHS exposure refers to inhaling a mixture of particles from exhaled smoke and other substances released from cigarettes into the atmosphere, THS exposure is to contamination from cigarette smoke on surfaces in environments where there has been SHS. THS can potentially cause the greatest harm to infants and young children because infants crawl on floors, and young children are closer to ground surfaces and often put objects into their mouths without first washing their hands.<sup>44</sup> Recent research has documented that many of the environmental toxicants associated with smoking remain in the surrounding area long after the SHS dissipates.<sup>44</sup>

To combat these types of exposures, some businesses have attempted to restrict THS exposure. For example, in October 2011, Christus St. Frances Cabrini Hospital in Alexandria LA stated that workers whose clothes smelled like smoke would not be allowed to begin their shifts at work.<sup>45</sup> However, more studies are required to measure the risks associated with THS exposure.<sup>46</sup>

## **Economic Impact of Indoor Smokefree Policies**

Financial effects on the hospitality industry have been at the center of concerns about the economic impact of policies that regulate smoking. The earliest review of evidence reports that restaurant and bar smokefree policies have either no impact or a substantial positive

impact on sales and/or employment.<sup>47</sup> The 2006 Surgeon General report<sup>5</sup> also shows that smokefree policies and regulations do not have an adverse economic impact on the hospitality industry.

Glantz and Smith<sup>47</sup> provided one of the first comprehensive studies on the economic effects of legislation requiring smokefree restaurants. In another study,<sup>48</sup> they included 15 cities with and without smokefree restaurants and concluded that smokefree policies had no impact on general revenues. Additional studies have replicated these findings, confirming the negligible effect of smokefree policies on restaurant sales. Researchers at the Claremont Institute for Economic Policy Studies examined more than 20 cities with and without smokefree policies and concluded that restaurant smokefree ordinances had no impact on restaurant revenues.<sup>49</sup>

Several studies also have examined the effect of smokefree policies on tourist revenues.<sup>50</sup> Initial arguments against widespread city smokefree policies, such as in parks and public recreation facilities, focused on the potential decrease in tourist revenues in big cities. Large studies conducted in New York City and Boston, however, showed no decrease in sales or city revenues following ordinances that limited indoor smoking.<sup>50</sup> Similar studies that examined several cities in California found that restaurants, bars, hotels, and tourism revenues were all unaffected by the implementation of the state's smokefree workplace and restaurant policies.<sup>49</sup> A study conducted by the Task Force for a Smoke-free San Diego,<sup>51</sup> examining several California cities that have 100% smokefree restaurant policies, revealed that revenues and tourism rates actually increased after ordinance passage.

As of April 2013, a total of 24 states and 561 municipalities and territories, including the District of Columbia, New York City, Puerto Rico, and the U.S. Virgin Islands, have established laws that require non-hospitality workplaces, restaurants, and bars to be 100% smokefree. Four other states—Florida, Indiana, Louisiana, and Nevada—have smokefree laws that cover restaurants but provide exemptions for stand-alone bars.<sup>52</sup>

## **Rationale for the Statement**

Exposure to SHS in the U.S. population has decreased significantly over the past 20 years, largely because of the implementation of smokefree policies and legislation in the workplace and other public venues.<sup>12</sup> Even though smoking restrictions have increased and smoking prevalence has decreased, at least 126 million nonsmokers in the U.S. are exposed to SHS at least once per week.<sup>5</sup> Recently updated, *Healthy People 2020* included several goals relating to SHS exposure. One of these was to increase the number of smokefree indoor air policies that

prohibit smoking in public workplaces, restaurants, and bars in all 50 states, territories, and the District of Columbia.<sup>10</sup> Indoor clean air policies serve to decrease the harmful effects of SHS and have been linked with health benefits that include reductions in cardiovascular diseases, respiratory illnesses, and certain cancers, as well as increased smoking-cessation rates.<sup>3,5,8,53,54</sup> The evidence is clear: There is no safe level of SHS exposure.

## **Recommendations from Other Groups**

Recommendations on indoor smokefree policies from major professional and healthcare organizations are summarized in Table 2. The U.S. Preventive Services Task Force (USPSTF) strongly recommends that physicians help all smoking adults quit.<sup>57</sup> The American Academy of Family Physicians endorses the USPSTF position and further advises that smoking parents be counseled about the health effects of SHS exposure on their children.<sup>58</sup> The American Academy of Pediatrics recommends that pediatric clinicians urge parents to stop smoking to prevent serious health complications for their children.<sup>59</sup> The CDC states that the “only way to fully protect nonsmokers is to restrict smoking in indoor places.”<sup>60</sup> The CDC also recommends that physicians educate patients and parents about SHS dangers and the toxic chemicals in smoke.

The American Public Health Association recognizes that pregnant women and children need healthy environments, and this includes protection for SHS exposure and support for policy measures that would eliminate exposure.<sup>61</sup> The WHO's six policy recommendations, MPOWER, include warning the public about the dangers of SHS and focus on a multidimensional approach to smoking cessation, including the importance of “smoke-free environments”<sup>4</sup> (Table 2).

## **American College of Preventive Medicine Recommendations**

The American College of Preventive Medicine supports expansion of clean air policies throughout the U.S., which will further limit SHS exposure to the majority of the U.S. population. The ACPM recommends expanded clean indoor air policies for workplaces, including hospitals and college campuses, stand-alone bars, apartment buildings and other multi-use family housing facilities, and restaurants. The ACPM also recommends clean air policies for all university campuses, primary and secondary school campuses, child care centers, and city landmarks in order to further shift social norms and protect the health of children, adolescents, and adults. Finally, the ACPM recommends closing existing gaps on clean indoor air policies.

**Table 2.** Recommendations on restricting SHS exposure

Agency	Recommendations
U.S. Preventive Services Task Force <sup>54</sup>	Strongly recommends the adoption of smokefree laws and related smoking restrictions to limit smoking and exposure to cigarette smoking to designated areas Observed a “significant reduction in daily consumption of cigarettes by workers subject to a smoking ban or restriction” In addition, the Task Force noted that several studies have found that smoking restrictions have resulted in “increases in tobacco use cessation and/or reductions in tobacco use prevalence.”
American Academy of Pediatrics <sup>55</sup>	Defined the role of pediatricians in tobacco control. Recommended that pediatricians urge parents to stop smoking to prevent serious health implications for their children <sup>56</sup> Encourages parents to patronize tobacco-free and smokefree venues Supports comprehensive tobacco control and prevention, education, and cessation programs in communities, and connect to resources and organizations related to tobacco control Advocates for tobacco-free homes, cars, schools, and child care programs Suggests government officials mandate smokefree environments in public places and promote programs to prevent and decrease tobacco use Recommends all public and private health insurance plans provide coverage for comprehensive tobacco-cessation treatment
American College of Preventive Medicine <sup>56</sup>	Recommends expanding clean indoor air policies to protect more workplaces, public venues, schools, universities (and other “public commons”), thereby protecting the health of more children, adolescents, and adults Recommends expanding clean air and tobacco smoke-free policies to outdoor campuses and other venues to further shift smoking and nonsmoking norms, and societal health behaviors
Veterans Administration (www.publichealth.va.gov/smoking)	Recommends counseling parents about serious health implications of SHS exposure for their children
DHHS <sup>12</sup>	Recommends developing state and/or local laws that make workplaces, restaurants, and bars completely smokefree Importance of educating patients and parents regarding the dangers of SHS exposure
WHO <sup>4</sup>	<b>MPOWER</b> <b>M</b> onitor tobacco use/prevention policies <b>P</b> rotect people from tobacco smoke <b>O</b> ffer help to quit <b>W</b> arn about the dangers of tobacco use <b>E</b> nforce restrictions on tobacco advertising <b>R</b> aise taxes on tobacco

SHS, secondhand smoke

## Conclusion

There is no safe limit for tobacco smoke exposure. Eliminating the health consequences of SHS exposure involves the implementation of 100% smokefree indoor air policies in public spaces in all 50 states, territories, and the District of Columbia. The ACPM adds its voice to a growing list of medical specialty and public health organizations that support these measures and closing existing gaps on clean indoor air for the majority of the U.S. population that remains at risk. The ACPM supports expanded clean indoor air policies to protect more workplaces, schools, universities, and other public commons, thereby protecting the health of more children, adolescents, and adults.

The following members of the ACPM Prevention Practice Committee participated in the development of this position

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