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Original Research

Prevalence and location of tobacco smoke exposure outside the home in adults and children in the United States

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ABSTRACT

Objectives: Tobacco smoke exposure (TSE) is associated with many adverse health outcomes. The goal of this study was to provide insight into the prevalence and location of self-reported TSE outside the home for US adults and children.
Study design: Cross-sectional survey.
Methods: Data from a nationally representative sample of US adults from 2014 were included. Participants who responded that they smelled smoke during the past seven days in various settings were considered to have been exposed to TSE. Parents were asked about TSE exposure of their children.
Results: Sixty-nine percent of all adults reported TSE outside their home in the past seven days. The most common exposure location among adults was on a public sidewalk and outside the doorway of a building (both 33%). Thirty-three percent of parents reported outside the home TSE for their children in the past seven days. Most commonly, the reported exposure was 'In some other place(s)' (16%), followed by at a relative's house (10%).
Conclusions: This study reports on TSE outside the home in a wide variety of settings and a broad range of ages in a nationally representative US sample. A high proportion of US adults and children are exposed to TSE outside the home in indoor, outdoor, public, and private settings. Smoke-free laws, clinical interventions, education, and a change in social norms are required to stop TSE.

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Introduction

Tobacco smoke exposure (TSE) is associated with many adverse health outcomes, ranging from heart disease and stroke, to respiratory illness, asthma, Sudden Infant Death Syndrome, and cancer.[1–4] Although exposures have decreased since 2000, the public health burden of TSE is still high.[5,6] Thousands of deaths each year are attributed to TSE and the accompanying economic toll is substantial. Since the Surgeon General's original report on the health effects of smoking in 1964, almost 2.5 million non-smokers are thought to have died from heart disease or lung cancer.[4] Parental smoking has caused 100,000 infant deaths in this same time frame-due to Sudden Infant Death Syndrome, prematurity, low birth weight, and other conditions.[4] Likewise, lost productivity due to premature death from TSE is estimated at $5.6 billion per year.[4] Long-term TSE is associated with a multitude of adverse health events,[7] and there is a growing body of evidence that even brief periods and low levels of TSE, such as those that occur outside the home, can be harmful, as they have been linked to physiologic changes that indicate and lead to serious TSE-related health problems.[8–14] Furthermore, exposure to short periods of real-world levels of tobacco smoke can lead to sustained vascular injury and cardiac function; and, for those with asthma or other respiratory symptoms, brief exposure to TSE can trigger potentially life-threatening bronchopulmonary reactions.[7,14–16]

Studies documenting the trends in US TSE often focus on in-home exposure.[5,17–19] There has also been limited research on exposure outside the home, highlighting its relevance.[20,21] For example, during 2009–2010 approximately 9% of non-smoking US adults and over 20% of US middle and high school students reported being exposed to smoke in the car in the past seven days.[18,22] Authors of a 2013 study of young adults reported more than 70% were exposed in a bar; these results were similar to a 2009 study of college students in which 65% reported bar exposure in the past week.[23,24] US workplace exposure to secondhand smoke among non-smokers was 10% in 2015.[25] Although there has been some research on TSE occurring outside the home, little is known over all age ranges and in a wide variety of settings in the US. The aim of this study was to provide insight into the prevalence and the location of self-reported TSE outside the home in adults and children of adult participants from a nationally representative sample. We also compare parent and child TSE outside the home, evaluate demographic determinants of TSE outside the home, and compare TSE outside the home between smokers and non-smokers.

Methods

Data source

We collected our data from the 2014 Social Climate Survey of Tobacco Control, an annual nationally representative, cross-sectional survey developed by tobacco-control researchers to study the behaviors and trends related to tobacco use and exposure in the United States that has been administered from 2000 to the present. The survey used a random digit dial (RDD) frame from 2000 to 2009 and added a probability-based Internet frame in 2010 to address the issues of coverage bias due to wireless substitution.[26–28] The RDD sample frame included households with listed and unlisted landline telephones; the probability-based Internet panel sample frame included an online survey administered to a randomly selected sample of a nationally representative research panel which provides sample coverage for 99% of US households.[26,29] We weighted data based on the US census to be representative of the US population. We also adjusted for age, race, sex, region, and frame overlap for those who were eligible for both the RDD and internet frames. Details about the survey methodology have been previously described.[26] The Institutional Review Board at Mississippi State University approved this study, and informed verbal consent was obtained from participants. Participants were asked about demographics, smoking behavior, smoking attitudes, and beliefs and TSE.

Measures

Demographic variables in the survey included: the year the parent was born, which was categorized into four age groups (18–24 years, 25–44 years, 45–64 years, and 65+ years); gender, race, and ethnicity, which was categorized into four groups (white, non-Hispanic; black, non-Hispanic; Hispanic, other; and non-Hispanic); highest educational level attained, which was categorized into four groups (Less than high school, High school, some college, Bachelor's degree or higher); annual household income, which was combined into four categories (<$19,999, $20,000 to $49,999, $50,000 to $99,999, ≥$100,000): and geographic region (Northeast, Midwest, South, and West).

To assess TSE outside the home, we asked 'During the past seven days, in which of the following places have you smelled secondhand smoke?'. The choices were 'In your car', 'In someone else's car', 'At work', 'On a public sidewalk', 'Outside the doorway of a building', 'In an indoor public place, such as a restaurant or salon', 'On other public transport', or 'In some other indoor place, such as a friend's home'. Participants who answered 'Yes' to any of these were considered to have been exposed to TSE outside the home.[30]

Participants who lived in multiunit housing (MUH) were defined as those who responded to the question 'Which of the following best describes where you live?' in one of the following two ways: 'A one-family house attached to one or more houses' or 'An apartment or condominium building'. Exposure outside of the MUH unit but on the MUH property was assessed for MUH dwellers. The choices were prefaced with: 'The next series of questions are about where you live. In the past 30 days, have you smelled cigarette smoke?'. Choices included 'In outdoor areas', 'On your balcony', 'In indoor staircases', 'In elevators', and 'In some other place'. If MUH participants answered 'Yes' to any of these questions, they were categorized as having TSE on MUH property but outside their MUH unit.