

# US Prevalence and Trends in Tobacco Smoke Exposure Among Children and Adolescents With Asthma

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## KEY WORDS

asthma, low income, environmental tobacco smoke, second-hand smoke, smoking

## ABBREVIATIONS

aOR—adjusted odds ratio  
CI—confidence interval  
ETS—environmental tobacco smoke  
MEC—mobile examination center  
PIR—poverty-income ratio  
TSP—tobacco smoke product

Dr Kit contributed to the conception and design of the study, acquisition of data, analysis and interpretation of the data, and drafting the manuscript; Drs Simon and Akinbami contributed to the conception and design of the study, analysis and interpretation of the data, and revising the manuscript; and Ms Brody contributed to the conception and design of the study, acquisition of data, analysis and interpretation of the data, and revising the manuscript.

Findings from this work were presented in part at the April 28–May 1, 2012 Pediatric Academic Societies meeting; Boston, MA.

The findings and conclusions in this report are those of the authors and not necessarily those of the Centers for Disease Control and Prevention.

[www.pediatrics.org/cgi/doi/10.1542/peds.2012-2328](http://www.pediatrics.org/cgi/doi/10.1542/peds.2012-2328)

doi:10.1542/peds.2012-2328

Accepted for publication Nov 12, 2012

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PEDIATRICS (ISSN Numbers: Print, 0031-4005; Online, 1098-4275).

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**FINANCIAL DISCLOSURE:** *The authors have indicated they have no financial relationships relevant to this article to disclose.*

**FUNDING:** No external funding.



**WHAT'S KNOWN ON THIS SUBJECT:** Among youth with asthma, tobacco smoke exposure causes increased asthma morbidity. Little is known about changes over time in tobacco smoke exposure among youth with asthma in a national sample.



**WHAT THIS STUDY ADDS:** Our analysis reveals a decrease in environmental tobacco smoke exposure among children and adolescents with current asthma in the United States from 1988–1994 to 2005–2010, but a majority of youth with asthma remain exposed to environmental tobacco smoke.

## abstract



**OBJECTIVE:** To examine exposure to tobacco smoke products (TSPs), environmental tobacco smoke (ETS), and in-home smoke among youth with asthma in the United States.

**METHODS:** Nationally representative, cross-sectional data from 2250 youth aged 4 to 19 years with current asthma in the 1988–1994, 1999–2004, and 2005–2010 National Health and Nutrition Examination Survey (NHANES) were analyzed. Outcomes were use of TSPs (serum cotinine level >10 ng/mL or self-reported recent use of cigarettes, cigars, or pipes) and, among non-TSP users, ETS exposure (serum cotinine  $\geq$ 0.05 ng/mL) and in-home smoke exposure (reported). Multiple logistic regression analyses assessed the associations between the outcomes and age, gender, race/ethnicity, and family income.

**RESULTS:** Among adolescents (aged 12–19 years) with asthma in 2005–2010, 17.3% reported TSP use. Among youth (aged 4–19 years) with asthma who did not use TSPs, 53.2% were exposed to ETS and 17.6% had in-home smoke exposure. Among low-income youth, 70.1% and 28.1% had exposure to ETS and in-home smoke, respectively. After controlling for sociodemographic factors, higher prevalence of exposure to ETS and in-home smoke persisted among low-income youth. Between 1988–1994 and 2005–2010, there was a decline in ETS and in-home smoke exposure (both  $P < .001$ ).

**CONCLUSIONS:** ETS exposure among youth with asthma declined between 1988–1994 and 2005–2010, but a majority remained exposed in 2005–2010, with higher exposure among low-income youth. More than 1 in 6 youth with asthma in 2005–2010 were exposed to in-home smoke and a similar portion of adolescents used TSPs. *Pediatrics* 2013;131:407–414

Children and adolescents with asthma benefit from reduced exposure to tobacco smoke.<sup>1</sup> Among youth with asthma, exposure to tobacco smoke, either by use of tobacco smoke products (TSPs) or by environmental tobacco smoke (ETS), causes increased asthma morbidity including reduced lung function, exacerbation of asthma symptoms, and higher health care utilization.<sup>2–13</sup> Current asthma treatment guidelines recommend avoiding exposure to tobacco smoke, including both active smoking and ETS.<sup>14</sup>

Children with asthma are more vulnerable to adverse outcomes from tobacco smoke exposure, but the extent to which this population is exposed to tobacco smoke on a national level has not been quantified. In this study in children and adolescents with asthma, we sought to characterize the use of TSPs and, among non-TSP users, exposure to ETS on the basis of a biological biomarker and in-home smoke on the basis of proxy- and self-report. Also, we aimed to describe trends in exposure to ETS and in-home smoke among children and adolescents with asthma in the United States.

## METHODS

### Study Design

Data from the National Health and Nutrition Examination Survey (NHANES) of the National Center for Health Statistics, Centers for Disease Control and Prevention were used. NHANES is a series of cross-sectional health examination surveys consisting of an in-home interview and an examination at a mobile examination center (MEC). Each survey is a nationally representative sample of the US civilian, noninstitutionalized population and uses a complex, stratified, multistage probability cluster sampling design. NHANES 2005–2010 is the primary data source for this analysis. Data from NHANES III (1988–1994) and NHANES 1999–2004 were used for

trend analyses. For all analyses, children and adolescents with current asthma aged 4 to 19 years were included. Informed consent was obtained for persons 18 years and older. For those younger than 18 years, written parental consent was obtained, and child assent was obtained for those aged 7 to 17 years. The surveys were approved by the National Center for Health Statistics Ethics Review Board. Examination response rate ranged from 75% to 80%. Further details on the design, response rates, and implementation of the surveys are described elsewhere.<sup>15,16</sup>

During the in-home interview, participants aged  $\geq 16$  years, or proxy respondents (usually a parent) for younger participants, were asked detailed questions regarding socioeconomic characteristics, health-related behaviors, and health history. To assess reported in-home smoke exposure in NHANES III, participants or their proxy were asked, “Does anyone who lives here smoke cigarettes in the home?” Beginning in 1999, the question was modified as follows: “Does anyone who lives here smoke cigarettes, cigars, or pipes anywhere inside this home?” Current asthma status was defined on the basis of an affirmative response to 2 questions: “Has a doctor or health professional ever told you that you have asthma?” and “Do you still have asthma?”

In the MEC, venipuncture was performed and adolescents aged  $\geq 12$  years were asked (without a proxy) about use of products containing nicotine, including cigarettes, pipes, cigars, chewing tobacco, snuff, nicotine patches, and nicotine gum in the past 5 days. The blood specimen obtained in the MEC was subsequently analyzed by the Centers for Disease Control and Prevention's National Center for Environmental Health to determine serum cotinine values, a metabolite of nicotine with

a half-life of 16 to 19 hours,<sup>17</sup> by using methods described elsewhere.<sup>18</sup> In NHANES III, children aged  $\geq 4$  years had cotinine measured, and in subsequent surveys those aged  $\geq 3$  years had cotinine measured. For comparability, the sample for this analysis was restricted to those between the ages of 4 and 19 years. The use of TSPs among adolescents was defined as self-reported use of cigarettes, pipes, or cigars in the past 5 days or a serum cotinine level  $>10$  ng/mL, a cotinine cutoff used to define smoking in previous studies.<sup>19</sup> Thus, both self-reported and measured data were used to define the use of TSPs but only one of the criteria needed to be met. Approximately 85% of adolescents identified as using TSPs were identified by self-report; the remaining were identified on the basis of serum cotinine values.

Participants with a serum cotinine level  $\geq 0.05$  ng/mL, but  $\leq 10$  ng/mL, and who did not use TSPs were considered to be exposed to ETS.<sup>19,20</sup> In this analysis, as in previous studies, ETS and TSP are mutually exclusive categories. An affirmative response to the question regarding household members who smoke inside the home was used to categorize youth as having in-home smoke exposure. Similar to ETS, adolescents who used TSPs were not included in analyses of in-home smoke exposure. A total of 4 youth with reported in-home smoke exposure did not have laboratory evidence of ETS exposure. Because it is possible for in-home smoking to be episodic and serum cotinine has a half-life of 16 to 19 hours, this discrepancy was considered plausible and data for these youth were retained.

Age was grouped as 4–11 years and 12–19 years. Race/ethnicity was defined on the basis of self-reported responses and categorized as non-Hispanic white, non-Hispanic black, Mexican American, and “other,” including multiracial. The

“other” group was included in overall estimates but was not separately reported. Family income data collected during the in-home interview were used to calculate the poverty-income ratio (PIR), a ratio of family income to the federal poverty threshold adjusted for family size. PIR was dichotomized as  $<1.85$  and  $\geq 1.85$ . A PIR of  $<1.85$ , herein referred to as low income, reflected income eligibility for participation in some federal programs, including reduced-price lunches,<sup>21</sup> during our study period.

### Statistical Methods

Statistical analyses were performed by using SAS software, version 9.2 (SAS Institute Inc, Cary, NC), and SUDAAN software, version 10.0 (RTI, Research Triangle Park, NC), was used to account for the complex design of the survey. Sample weights, which account for differential probabilities of selection, nonresponse, and noncoverage were used to obtain estimates representative of the civilian noninstitutionalized US population. Statistical significance was determined at a  $P$  value of  $<.05$ .

Prevalence estimates and SEs were calculated to assess the use of TSPs and, among non-TSP users, exposure to ETS and in-home smoke overall and by gender, race/ethnicity, age, and family income. Multivariate logistic regression models were conducted to examine the associations of the dependent variables (exposure to ETS, in-home smoke exposure, and use of TSPs) with the independent variables of age, gender, race/ethnicity, and family income. The independent variables were selected for inclusion because they have been previously described correlates of smoking or smoke exposure. All covariates were analyzed as categorical variables. To test for linear trends in ETS exposure and in-home smoke exposure over the 3 survey periods (1988–1994, 1999–2004, and 2005–2010),

the null hypothesis of no linear trend was examined by using orthogonal contrast matrices.<sup>22</sup> In addition, linear trends were considered in all age, gender, race/ethnicity, and family income subgroups. The overall linear trend in use of TSPs among adolescents was examined.

### Analytic Sample

Children and adolescents aged 4–19 years in NHANES 2005–2010 with both interview and examination data were assessed for current asthma status ( $n = 9546$ ). Of these, 32 were missing data on current asthma status. There were 1048 children and adolescents with current asthma in 2005–2010 who were eligible for inclusion into this study. A total of 186 children and adolescents with current asthma were excluded because of missing serum cotinine levels; 5 adolescents who used non-TSP nicotine products (eg, chewing tobacco and snuff) were also excluded. Fewer older, compared with younger, and Mexican American, compared with non-Hispanic white, children were excluded because of missing laboratory data, but there were few other differences between those with and without missing data. Although publicly available NHANES sample weights are adjusted for unit nonresponse, they are not adjusted for item nonresponse. To assess for possible nonresponse bias to the laboratory component of NHANES, we examined the potential impact of nonresponse by adjusting the original examination weights according to methods published by Lohr.<sup>23</sup> The use of these adjusted weights led to only small differences in point and variance estimates; therefore, we present in this article all estimates with the use of the publicly available sample weights.

### RESULTS

The characteristics of the analytic sample are shown in Table 1. Overall,

17.3% (standard error [SE]: 2.5%) of adolescents with asthma used a TSP (Table 2); and among low-income adolescents with asthma, 23.3% (SE: 3.4%) used a TSP in 2005–2010. After adjustment for gender and race/ethnicity, the odds of a low-income adolescent using a TSP was 2.2 (95% confidence interval [CI]: 1.0, 5.1) compared with adolescents in the higher income category ( $P = .055$ ).

Data presented in Tables 3, 4, and Fig 1 examine exposure to ETS and in-home smoke among youth who did not use TSPs. Among children and adolescents with asthma, 53.2% (SE: 3.7%) were exposed to ETS in 2005–2010 (Table 3). Among low-income children and adolescents with asthma, 70.1% (SE: 2.9%) were exposed to ETS. In multivariate logistic regression analysis controlled for age, gender, and race/ethnicity, the adjusted odds of ETS exposure were higher among low-income youth with asthma (adjusted odds ratio [aOR]; 4.1; 95% CI: 2.7, 6.3) compared with youth with asthma in the higher income category. The adjusted odds of ETS exposure were lower among Mexican American (aOR: 0.3; 95% CI: 0.2, 0.6) than among non-Hispanic youth but did not otherwise differ statistically by race/ethnicity or by age and gender.

More than 1 in 6 youth with asthma had in-home smoke exposure in 2005–2010 (17.6%; SE: 2.4%) (Table 4). Among low-income youth with asthma, 28.1% (SE: 3.1%) had in-home smoke exposure. In multivariate logistic regression analysis, the aOR of in-home smoke exposure was higher among low-income youth with asthma (aOR: 4.2; 95% CI: 2.1, 8.3) compared with youth in the higher income category. The aOR of in-home smoke exposure was lower among Mexican American (aOR: 0.2; 95% CI: 0.1, 0.5) than among non-Hispanic white youth but did not otherwise differ statistically by race/ethnicity or by age and gender.

**TABLE 1** Sample Sizes and Characteristics of Youth Aged 4 to 19 Years With Current Asthma

	1988–1994		1999–2004		2005–2010	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Total sample size	444	100.0	949	100.0	857	100.0
Age						
4–11 y	248	46.9	336	45.4	392	42.2
12–19 y	196	53.1	613	54.6	465	57.8
Gender						
Boys	239	51.0	505	54.2	480	54.3
Girls	205	49.0	444	45.8	377	45.7
Race/ethnicity						
Non-Hispanic white	118	67.1	228	57.1	246	56.9
Non-Hispanic black	190	16.7	399	20.8	294	19.8
Mexican American	108	6.4	227	8.8	173	9.7
Other	28	9.8	95	13.3	144	13.6
Family income (PIR) <sup>a</sup>						
<1.85	256	46.5	526	49.0	477	46.3
≥1.85	161	53.5	358	51.0	345	53.7

Sample sizes are unweighted; percentages are weighted. Source: NHANES. PIR, poverty income ratio.

<sup>a</sup> Sample sizes for family income do not sum to the total because of missing income data.

**TABLE 2** Prevalence and ORs of TSP Use Among Adolescents Aged 12 to 19 Years With Current Asthma, 2005–2010

	% (SE)	Unadjusted OR (95% CI)	aOR <sup>a</sup> (95% CI)
Total	17.3 (2.5)		
Gender			
Boys	19.1 (4.1)	Reference	Reference
Girls	15.3 (2.7)	0.8 (0.4, 1.5)	0.8 (0.4, 1.5)
Race/ethnicity			
Non-Hispanic white	19.3 (3.6)	Reference	Reference
Non-Hispanic black	13.9 (3.2)	0.7 (0.3, 1.3)	0.6 (0.3, 1.2)
Mexican American	9.6 (3.7) <sup>b</sup>	0.4 (0.2, 1.2)	0.4 (0.2, 1.0)
Family income (PIR)			
<1.85	23.3 (3.4)	2.0 (0.9, 4.5)	2.2 (1.0, 5.1)
≥1.85	13.1 (3.6)	Reference	Reference

TSP use was defined as the use of a cigarette, pipe, or cigar in the past 5 days or a serum cotinine level >10 ng/mL. OR, odds ratio; TSP, tobacco smoke product; PIR, poverty income ratio. Source: NHANES.

<sup>a</sup> Adjusted for the other variables in the table.

<sup>b</sup> Does not meet standard of statistical reliability and precision (relative SE >30% but <40%).

**TABLE 3** Prevalence and ORs of ETS Exposure Among Non-TSP-Using Youth With Current Asthma, 2005–2010

	% (SE)	Unadjusted OR (95% CI)	aOR <sup>a</sup> (95% CI)
Total	53.2 (3.7)		
Age			
4–11 y	58.3 (4.5)	1.5 (1, 2.3)	1.4 (0.8, 2.4)
12–19 y	48.7 (4.4)	Reference	Reference
Gender			
Boys	51.6 (4.2)	Reference	Reference
Girls	54.9 (4.7)	1.1 (0.8, 1.7)	1.2 (0.8, 1.8)
Race/ethnicity			
Non-Hispanic white	54.0 (5.9)	Reference	Reference
Non-Hispanic black	66.5 (3.8)	1.7 (0.9, 3.1)	1.0 (0.6, 1.9)
Mexican American	38.6 (4.5)	0.5 (0.3, 0.9)	0.3 (0.2, 0.6)
Family income (PIR)			
<1.85	70.1 (2.9)	3.5 (2.4, 5.4)	4.1 (2.7, 6.3)
≥1.85	39.8 (4.7)	Reference	Reference

ETS exposure was defined as a serum cotinine level ≥0.05 ng/mL among non-TSP users (use of a tobacco product including cigarettes, pipes, or cigars in the past 5 days or a serum cotinine level >10 ng/mL). ETS, environmental tobacco smoke; OR, odds ratio; PIR, poverty income ratio; TSP, tobacco smoke product. Source: NHANES.

<sup>a</sup> Adjusted for the other variables in the table.

Trends in prevalence of ETS exposure and in-home smoke exposure are presented in Fig 1. The prevalence of ETS exposure among youth with asthma declined between 1988–1994 and 2005–2010 (1988–1994, 89.1%; 1999–2004, 57.1%; and 2005–2010, 53.2%;  $P < .001$  for trend). The prevalence of in-home smoke exposure among youth with asthma declined linearly between 1988–1994 and 2005–2010 (1988–1994, 36.3%; 1999–2004, 18.4%; and 2005–2010, 17.6%;  $P < .001$  for trend). Although there were decreasing and significant linear trends for ETS and in-home smoke exposure over the entire 22-year study duration, the change between 1999–2004 and 2005–2010 was not significant. Similar to the overall trends, in each age (4–11 and 12–19 years), gender, race/ethnicity (non-Hispanic white, non-Hispanic black, and Mexican American), and income (PIR: <1.85 and ≥1.85) group, there was a decreasing trend in ETS exposure and in-home smoke exposure over the 22-year study period (details available in Supplemental Tables 5 and 6), although the trend for in-home smoke exposure among low-income participants was not significant. Among adolescents with asthma, 22.5% (SE: 4.2%), 18.8% (SE: 2.2%), and 17.3% (SE: 2.5%) used TSPs in 1988–1994, 1999–2004, and 2005–2010, respectively, which is a nonsignificant change. Sample sizes of adolescents with asthma in 1988–1994 ( $n = 196$ ) limit the power to detect statistical significance and limit the ability to conduct subgroup analysis.

Because adolescents may be exposed to tobacco smoke either by personal use of TSPs or by ETS, separate analyses were conducted to assess overall exposure to tobacco smoke among this age group. In these analyses, 57.5% (SE: 4.2%) of adolescents with asthma in 2005–2010 were exposed to either ETS or TSP. In addition, adolescents who

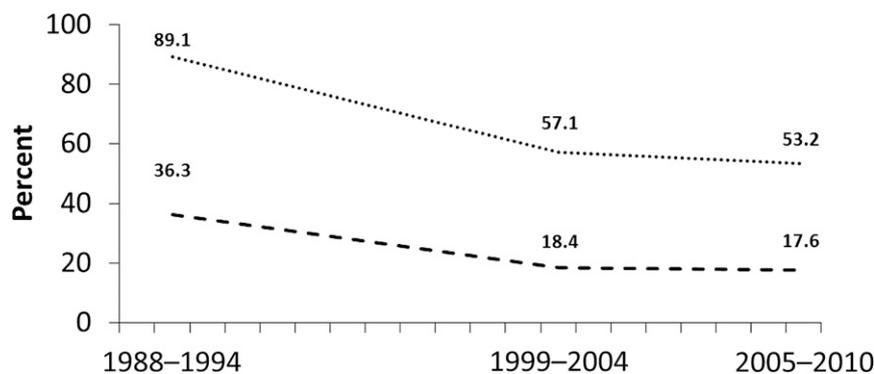
**TABLE 4** Prevalence and ORs of In-Home Household Smoke Exposure Among Non-TSP-Using Youth With Current Asthma, 2005–2010

	% (SE)	Unadjusted OR (95% CI)	aOR <sup>a</sup> (95% CI)
Total	17.6 (2.4)		
Age			
4–11 y	19.8 (3.3)	1.3 (0.8, 2.2)	1.3 (0.7, 2.3)
12–19 y	15.6 (2.6)	Reference	Reference
Gender			
Boys	16.8 (2.8)	Reference	Reference
Girls	18.4 (3.2)	1.1 (0.7, 1.9)	1.1 (0.6, 1.8)
Race/ethnicity			
Non-Hispanic white	17.7 (3.4)	Reference	Reference
Non-Hispanic black	26.0 (3.9)	1.6 (0.9, 2.9)	1.0 (0.6, 1.7)
Mexican American	7.5 (2.3) <sup>b</sup>	0.4 (0.2, 0.8)	0.2 (0.1, 0.5)
Family income (PIR)			
<1.85	28.1 (3.1)	3.8 (1.9, 7.4)	4.2 (2.1, 8.3)
≥1.85	9.3 (2.7)	Reference	Reference

Household smoke exposure was defined as a positive response to the following question: “Does anyone who lives here smoke cigarettes, cigars, or pipes anywhere inside this home” among non-TSP users (use of a tobacco product including cigarettes, pipes, or cigars in the past 5 days or a serum cotinine level >10 ng/mL). OR, odds ratio; PIR, poverty income ratio; TSP, tobacco smoke product. Source: NHANES.

<sup>a</sup> Adjusted for the other variables in the table.

<sup>b</sup> Does not meet standard of statistical reliability and precision (relative SE >30% but <40%).

**FIGURE 1**

Trends over time in exposure to ETS and in-home smoke among non-TSP-using youth with current asthma. ETS exposure was defined as serum cotinine levels  $\geq 0.05$  ng/mL among non-TSP users (use of a tobacco product including cigarettes, pipes, or cigars in the past 5 days or a serum cotinine level >10 ng/mL). Household smoke exposure in 1999–2004 and 2005–2010 was defined as a positive response to the following question: “Does anyone who lives here smoke cigarettes, cigars, or pipes anywhere inside this home?” In 1988–1994 household smoke exposure was defined as a positive response to the following question: “Does anyone who lives here smoke cigarettes in the home?” Note: There were significant linear decreasing trends ( $P < .05$ ) between 1988–1994 and 2005–2010 for both ETS and in-home household smoke exposure. Dotted line, ETS; dashed line, in-home household smoke. (Source: NHANES.)

used TSPs were not included in analyses of in-home smoke exposure. In separate analyses of all adolescents with asthma, including those who used TSPs, 18.4% (SE: 2.7%) had been exposed to in-home household smoke.

## DISCUSSION

Despite a decline in ETS exposure among youth with asthma in the United States since the late 1980s, a majority of youth with asthma remain exposed to

ETS, with higher exposure rates among low-income youth. There was also a decline in reported in-home smoke exposure among children and adolescents with asthma. However, >1 in 6 children with asthma were reported to live with a household smoker. Furthermore, despite an overall decrease in exposure to ETS and in-home smoke over the 22-year study duration, there was not a significant change between 1999–2004 and 2005–2010. Among

adolescents, the use of TSPs represents an additional exposure to tobacco smoke.

To our knowledge, no other studies have examined tobacco smoke exposure among children and adolescents with asthma with the use of a national sample. However, other researchers have described high ETS exposure among youth with asthma in different populations.<sup>24,25</sup> For example, in 1 inner-city community approximately half of youth with asthma were exposed to ETS.<sup>24</sup> The prevalence of smoking and other forms of tobacco use among adolescents with asthma is not as well described in the literature.

Our analysis examined in-home smoke exposure. However, there are other potential sources of smoke exposure not examined in our study. Previous studies have reported that sources of ETS exposure among children and adolescents include exposure from neighbors living in multiunit housing,<sup>26</sup> exposure in cars,<sup>27,28</sup> and exposure in other caretakers' homes, including grandparents.<sup>29</sup> In 1 study in low-income minority children with asthma in Los Angeles, approximately half of the smoking activity by household members occurred outside the home.<sup>30</sup> By bringing clothing contaminated with tobacco smoke into the home, household members who engage in smoking outside the home may serve as an additional source of exposure to ETS.<sup>31</sup>

Approximately 20% of US adults report smoking, and this proportion is even higher among low-income adults.<sup>32</sup> In our analysis, we report that low-income youth have greater exposure to ETS and, among low-income adolescents, almost one-quarter used TSPs. Children in low-income families also have a high risk of adverse asthma outcomes.<sup>33</sup> Insofar as tobacco smoke contributes to adverse asthma outcomes, this population may particularly

benefit from reducing exposure to tobacco smoke.

In the clinical setting, the American Academy of Pediatrics encourages pediatricians to discuss smoke exposure with all patients.<sup>34</sup> Furthermore, the US Public Health Service recommends that clinicians advise all patients who use tobacco to quit and offer interventions; in the pediatric setting, this includes advising and offering interventions to smoking patients as well as their parents who smoke.<sup>35</sup> Despite these recommendations, there are gaps in the delivery of anticipatory guidance to reduce tobacco smoke exposure.<sup>36–38</sup> Moreover, even when screening and counseling occurs, most smoking parents are not provided resources for tobacco cessation.<sup>39</sup> On the basis of a survey of providers of pediatric care, Kaplan et al<sup>40</sup> concluded that improvements are needed to optimize delivery of smoking cessation guidance to adolescents.

Communities within the United States have addressed the health risks associated with tobacco smoke exposure by implementing smoke-free laws. Persons living in communities with smoke-free laws have a lower prevalence of ETS exposure than those who do not live in a smoke-free community.<sup>41,42</sup> However, even in smoke-free communities, exposure still occurs from household smokers. In our analysis, >1 in 6 children with asthma were reported to live with an in-home smoker. This proportion is similar to the general pediatric population,<sup>20,43</sup> despite the focused recommendations from national

asthma guidelines for persons with asthma to avoid ETS.<sup>14</sup>

There was a large decrease in ETS exposure among youth with asthma between 1988–1994 and 2005–2010. Our study was not designed to assess the determinants of this trend. However, several ecologic associations suggest possible etiologies of the observed trend. Efforts to educate the public after the 1986 Surgeon General's Report on second-hand smoke exposure may have resulted in changes in smoking behaviors.<sup>44</sup> Clinical practice guidelines recommend eliminating tobacco smoke exposure as a management strategy for reducing asthma symptoms.<sup>14,45</sup> Clinician adoption of clinical practice guidelines may have contributed to this trend. In addition, increases in the adoption of smoking bans in communities may have affected our findings.

Our study has several strengths. First, the reported estimates are nationally representative of the US civilian, non-institutionalized population. Second, we used serum cotinine, rather than self-report, to define ETS exposure, and the definition of TSP use was augmented by using serum cotinine concentrations. However, our study is not without limitations. Whereas we minimized social desirability bias in defining ETS exposure and TSP use, this bias still exists for self- and proxy-reported responses to household smoking behaviors. Thus, these reported data may underestimate the amount of in-home smoke exposure. In-home smoke exposure during NHANES III may have been further underestimated

because individuals were not queried about household cigar or pipe use. In the surveys since 1999, it was possible to compare the prevalence of in-home cigarette use with the prevalence of household cigarette, cigar, or pipe use. These estimates differed by ~1%; thus, the underestimation of in-home smoke exposure during NHANES III may be small. Finally, a relatively large proportion of the youth were missing serum cotinine values, particularly among the younger age group. However, there were few other differences between those with missing and complete data. Furthermore, an adjustment of sample weights did not significantly change our results, suggesting that nonresponse bias is unlikely to have significantly affected our findings.

## CONCLUSIONS

Despite reductions over time in objectively measured ETS exposure and reported in-home smoke exposure, a majority of children and adolescents with asthma in the United States remain exposed to tobacco smoke and >1 in 6 live with a household smoker. Low-income youth with asthma experience particularly high exposure to tobacco smoke. There are consistent recommendations for youth, particularly those with asthma, to abstain from smoking, yet >1 in 6 adolescents used TSPs. Future research may include continued identification of effective interventions designed to reduce tobacco smoke exposure, particularly for low-income communities.

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**CRAZY IN LOVE:** *A recently divorced friend of mine is, as she puts it, “crazy in love” and happier now than she has ever been. While I am thrilled for her, I wonder what is different about her new relationship that makes it seem so much better than the one she had for so many years with her husband – and importantly, will she always be so happy? As discussed in The New York Times (Opinion: December 1, 2012), it turns out that most newly-in-love couples enjoy about two years of passionate love. While not a new finding, the most recent study to confirm the transitory nature of passionate love followed 1,761 people who got married and stayed married for 15 years. Newlyweds experienced a boost in happiness that lasted on average two years. At the end of the two years, the individuals had returned to their baseline level of happiness. Innumerable studies have shown passionate love – defined as a state of intense longing, desire, and attraction – to be quite transitory in humans. In couples who stay together, passionate love evolves into companionate love, characterized by affection and connection. Why passionate love fades is multifactorial, but one reason is that humans experience hedonic adaptation – meaning that they become habituated to life changes, particularly those that are pleasurable. While the excitement and happiness associated with a new partner may last longer than the happiness associated with a new car, house, or job, in time the new experiences or emotions are taken for granted. It seems that in both men and women, sexual passion and arousal are particularly predisposed to hedonic adaptation. Evidently familiarity all too quickly can lead to indifference. While we may mourn the loss of passionate love, there may be biologic underpinnings for hedonic adaption. After all, if we are crazy in love with someone, we may not be able to think about anything else and would have difficulty getting much work done. There is, however, good news for couples that stay together for 20 years or more. Reveling in the freedom of the empty nest, couples often report a bump in happiness as they rediscover each other. While I am not sure how long my friend’s current emotional state will last, I am excited for her and hope that it lasts a long time.*

*Noted by WVR, MD*

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