Tobacco use among middle and high school students — United States, 2011–2015

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Tobacco use is the leading cause of preventable disease and death in the United States; if current smoking rates continue, 5.6 million Americans aged <18 years who are alive today are projected to die prematurely from smoking-related disease (1). Tobacco use and addiction mostly begin during youth and young adulthood (1,2). CDC and the Food and Drug Administration (FDA) analyzed data from the 2011–2015 National Youth Tobacco Surveys (NYTS) to determine the prevalence and trends of current (past 30-day) use of seven tobacco product types (cigarettes, cigars, smokeless tobacco, electronic cigarettes [e-cigarettes], hookahs [water pipes used to smoke tobacco], pipe tobacco, and bidis [small imported cigarettes wrapped in a tended leaf]) among U.S. middle (grades 6–8) and high (grades 9–12) school students. In 2015, e-cigarettes were the most commonly used tobacco product among middle (5.3%) and high (16.0%) school students. During 2011–2015, significant increases in current use of e-cigarettes and hookahs occurred among middle and high school students, whereas current use of conventional tobacco products, such as cigarettes and cigars decreased, resulting in no change in overall tobacco product use. During 2014–2015, current use of e-cigarettes increased among middle school students, whereas current use of hookahs decreased among high school students; in contrast, no change was observed in use of hookahs among middle school students, use of e-cigarettes among high school students, or use of cigarettes, cigars, smokeless tobacco, pipe tobacco, or bidis among middle and high school students. In 2015, an estimated 4.7 million middle and high school students were current tobacco product users, and, therefore, continue to be exposed to harmful tobacco product constituents, including nicotine. Nicotine exposure during adolescence, a critical period for brain development, can cause addiction, might harm brain development, and could lead to sustained tobacco product use among youths (1,3). Comprehensive and sustained strategies are warranted to prevent and reduce the use of all tobacco products among U.S. youths.

The NYTS is a cross-sectional, school-based, self-administered, pencil-and-paper questionnaire administered to U.S. middle school and high school students. Information is collected on tobacco control outcome indicators to monitor the impact of comprehensive tobacco control policies and strategies (4) and to inform the FDA’s regulatory actions (5). A three-stage cluster sampling...
Participants were asked about current (past 30-day) use of cigarettes, cigars, smokeless tobacco, e-cigarettes, hookahs, pipe tobacco, and bidis. Current use for each product was defined as use on ≥1 day during the past 30 days. Current tobacco use was categorized as “any tobacco product use,” defined as use of one or more tobacco products in the past 30 days; and “≥2 tobacco product use,” defined as use of two or more tobacco products in the past 30 days.** Kretek (sometimes referred to as clove cigarettes) are no longer legally sold in the United States, and were excluded from the definition of current any tobacco product use, consistent with other recent reports.†† Data were weighted to account for the complex survey design and adjusted for nonresponse; national prevalence estimates with 95% confidence intervals and population estimates rounded down to the nearest 10,000 were computed. Estimates for current use in 2015 are presented for any tobacco product use, use of ≥2 tobacco products, and use of each tobacco product, by selected...
demographics for each school level (high and middle). Results were assessed for the presence of linear and quadratic trends to determine the overall trend present, adjusting for race/ethnicity, sex, and grade; p-value <0.05 was used to determine statistical significance. T-tests were performed to examine differences between estimates from 2014 and 2015; p-values <0.05 were considered statistically significant.

In 2015, 25.3% of high school students reported current use of any tobacco product, including 13.0% who reported current use of ≥2 tobacco products. Among all high school students, e-cigarettes (16.0%) were the most commonly used tobacco product, followed by cigarettes (9.3%), cigars (8.6%), hookahs (7.2%), smokeless tobacco (6.0%), pipe tobacco (1.0%), and bidis (0.6%) (Table). Males reported higher use of any tobacco, ≥2 tobacco products, e-cigarettes, cigarettes, cigars, smokeless tobacco, and bidis than did females. Among non-Hispanic white and Hispanic high school students, e-cigarettes were the most commonly used tobacco product, whereas among non-Hispanic black high school students, cigars were most commonly used. Cigarette use was higher among non-Hispanic whites than among non-Hispanic blacks; and smokeless tobacco use was higher among non-Hispanic whites than other races.

Among middle school students, current use of any tobacco product and ≥2 tobacco products was 7.4% and 3.3%, respectively (Table). E-cigarettes (5.3%) were the most commonly used tobacco product by middle school students, followed by cigarettes (2.3%), hookahs (2.0%), smokeless tobacco (1.8%), cigars (1.6%), pipe tobacco (0.4%), and bidis (0.2%). As was the case among high school students, male middle school students reported higher use of any tobacco product than did females. Hispanic middle school students reported higher use of any tobacco product, use of ≥2 tobacco products, and use of e-cigarettes compared with that of other races/ethnicities. During 2014–2015, current use of hookahs declined among high school students. Use of all other tobacco products, including e-cigarettes, cigarettes, cigars, and smokeless tobacco remained unchanged during this time period among high school students. Among middle school students, e-cigarettes use increased from 3.9% in 2014 to 5.3% in 2015. Use of other tobacco products, including cigarettes, cigars, hookahs, and smokeless tobacco remained unchanged.

During 2011–2015, among all high school students, significant nonlinear increases were observed for current use of e-cigarettes (1.5% to 16.0%) and hookahs (4.1% to 7.2%) (Figure 1). Significant linear decreases were observed for current use of cigarettes (15.8% to 9.3%) and smokeless tobacco (7.9% to 6.0%), and significant nonlinear decreases were observed for current use of cigars (11.6% to 8.6%), pipe tobacco (4.0% to 1.0%), and bidis (2.0% to 0.6%). Current use of any tobacco product (24.2% to 25.3%) did not change significantly during 2011–2015. Among middle school students, significant linear increases were observed for current use of e-cigarettes (0.6% to 5.3%) and hookahs (1.0% to 2.0%) (Figure 2). Significant linear decreases were observed for current use of cigarettes (4.3% to 2.3%), cigars (3.5% to 1.6%), and smokeless tobacco (2.7% to 1.8%), and significant nonlinear decreases were observed for current use of pipe tobacco (2.2% to 0.4%) and bidis (1.7% to 0.2%). There was also a significant nonlinear change in the percentage of middle school students reporting current use of ≥2 tobacco products.

In 2015, an estimated 4.7 million middle and high school students were current users of any tobacco product, over 2.3 million of whom were current users of ≥2 tobacco products. Among middle and high school current tobacco users,
During 2011–2015, there was no change in current use of any tobacco product among middle and high school students, and in 2015, an estimated 4.7 million U.S. middle and high school students currently used any tobacco product. As in 2014, e-cigarettes were the most used tobacco product among U.S. middle and high school students in 2015. During 2011–2015, substantial increases in current e-cigarette use among middle and high school students were reported, resulting in an estimated total of 3.0 million middle school and high school

e-cigarette users in 2015. Although the use of cigarettes and cigars declined during 2011–2015, there was no change in use of these products during 2014–2015, making cigarettes (1.6 million) and cigars (1.4 million) the second and third most commonly used tobacco products among youths in 2015.

Tobacco prevention and control strategies, including increasing tobacco product prices, adopting comprehensive smoke-free laws, and implementation of national public education media campaigns, likely have contributed to the reduction in use of certain tobacco products, including cigarettes, among youths in recent years (2). However, the lack of decline in use of cigarettes and cigars from 2014 to 2015 is concerning, as approximately 80% of adult smokers first try smoking by age 18 years (2). Furthermore, because of increases in the use of

### TABLE. Estimated percentage of tobacco use in the past 30 days, by product, school level, sex, and race/ethnicity—National Youth Tobacco Survey, United States, 2015

<table>
<thead>
<tr>
<th>Tobacco product</th>
<th>Sex</th>
<th>Race/Ethnicity</th>
<th>Total</th>
<th>Estimated number of users†</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Female % (95% CI)</td>
<td>Male % (95% CI)</td>
<td>Female % (95% CI)</td>
<td>Male % (95% CI)</td>
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<td>Electronic cigarettes</td>
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<td>Cigarettes</td>
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<td>Cigars</td>
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<td>Any tobacco product use</td>
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<td>≥2 tobacco product use</td>
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</table>

**Abbreviation:** CI = confidence interval.

* Past 30-day use of cigarettes was determined by asking, “During the past 30 days, on how many days did you smoke cigarettes?” Past 30-day use of e-cigarettes was determined by asking, “During the past 30 days, on how many days did you use electronic cigarettes or e–cigarettes?”

† Estimated total number of users is rounded down to the nearest 10,000.

§ Data are statistically unreliable because sample size <50 or relative standard error >0.3.

‡ Any tobacco product use is past 30-day use of cigarettes, cigars, smokeless tobacco, electronic cigarettes, hookahs, and/or bidis on ≥1 day in the past 30 days.

** ≥2 tobacco product use is past 30-day use of two or more of cigarettes, cigars, smokeless tobacco, electronic cigarettes, hookahs, and/or bidis on ≥1 day in the past 30 days.

3.0 million used e-cigarettes, 1.6 million used cigarettes, 1.4 million used cigars, 1.2 million used hookahs, and 1.1 million used smokeless tobacco.

**Discussion**

During 2011–2015, there was no change in current use of any tobacco product among middle and high school students, and in 2015, an estimated 4.7 million U.S. middle and high school students currently used any tobacco product. As in 2014, e-cigarettes were the most used tobacco product among U.S. middle and high school students in 2015. During 2011–2015, substantial increases in current e-cigarette use among middle and high school students were reported, resulting in an estimated total of 3.0 million middle school and high school
emerging tobacco products, including e-cigarettes, no decline occurred in tobacco use overall during 2011–2015.

The findings in this report are subject to at least four limitations. First, NYTS only recruited middle and high school students from public and private schools in the United States; therefore, the findings might not be generalizable to youths who are being home-schooled, have dropped out of school, or are in detention centers. Second, data were self-reported; thus, the findings are subject to recall and response bias. Third, current tobacco use was estimated among students reporting their use status for at least one of the seven tobacco products included in the survey, whereas students with missing responses were considered nonusers of that product, which would result in conservative estimates. Finally, changes in the wording and placement of survey questions about the use of certain products (e.g., e-cigarettes, hookahs, and pipe tobacco) within the 2011–2015 period might have had an impact on reported use of these products; however, this possibility is difficult to assess because usage patterns were changing during this time period. Despite these limitations, overall trends are generally similar to other nationally representative surveys of tobacco use among youths (6,7).

Sustained efforts to implement proven tobacco control policies and strategies are necessary to prevent youth use of all tobacco products. In April 2014, FDA issued a proposed rule, which when finalized, would give FDA jurisdiction over products made or derived from tobacco, including e-cigarettes, some or all cigars, pipe tobacco, and hookah tobacco (8). Regulation of the manufacturing, distribution, and marketing of tobacco products by FDA, coupled with full implementation of comprehensive tobacco control and prevention strategies at CDC-recommended funding levels (9) could reduce youth tobacco
initiation and use (1,2,9). Given that the use of e-cigarettes is on the rise among middle and high school students and nicotine exposure from any source is dangerous for youths (2), it is critical that comprehensive tobacco control and prevention strategies for youths address all tobacco products and not just cigarettes. In addition, rapid changes in use of conventional and emerging tobacco products among youths, and varying prevalence of certain tobacco products by population groups underscore the importance of enhanced surveillance of all forms of tobacco product use among U.S. youths.

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References


