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Tobacco Use among Middle and High School Students: Results from the North Carolina Youth Tobacco Survey, 1999–2007

by

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Abstract

North Carolina first conducted the Youth Tobacco Survey (YTS) in 1999 among middle and high school students, and found current smoking rates higher than the national average. Since that time, the North Carolina YTS has been conducted four times. Every survey to date has been highly representative due to the very high response rates by schools and students. In 2007, both middle and high school tobacco use rates were at their lowest point in state history. Middle school current cigarette smoking was 4.5 percent and high school current cigarette smoking was 19.0 percent. Almost every type of tobacco product use (cigarette, cigar, pipe, and bidi) has decreased since the 1999 YTS. Health officials should expand and improve implementation of proven evidence-based tobacco prevention strategies (e.g., mass media when combined with local interventions and increasing the cigarette excise tax) and develop new strategies to promote continued declines in youth smoking.

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Introduction

Each day in the United States, approximately 6,600 youths ages 12–17 try their first cigarette.¹ An estimated one-third of these young smokers are expected to die from a smoking-related disease if they continue to smoke into adulthood.² Recent data suggest that youth nicotine addiction, with even very limited use, is more rapid than previously thought.³ In order to better understand the scope of the problem, North Carolina has collected extensive tobacco data among middle and high school students since 1999 using the Youth Tobacco Survey (YTS) in coordination with the Centers for Disease Control and Prevention (CDC). The North Carolina YTS, conducted by the Tobacco Prevention and Control Branch of the North Carolina Division of Public Health along with the North Carolina Department of Public Instruction, provides estimates of usage among middle and high school students for various tobacco products (i.e., cigarettes, cigars, smokeless tobacco, pipes and bidis [leaf wrapped, flavored cigarettes from Asia]), as well as information about beliefs and exposure to secondhand smoke. This report summarizes tobacco use prevalence estimates from the 2007 North Carolina YTS and describes changes in prevalence from 1999 to 2007.

Methods

The sampling frame for the YTS sample consisted of all public and charter schools in North Carolina for any given survey year. The YTS is coordinated with the North Carolina Youth Risk Behavior Survey (YRBS) to minimize the burden placed on any given school, so that a school could be selected to participate in either survey but not both in the same year. In 2007, a total of 74 primary sampling units (PSUs) based on Local Education Areas (school districts) were selected in the first stage of sampling in three distinct geographic regions of the state (west, central, and east), and 197 schools were selected from these PSUs in the second stage of sampling. Of these 197 eligible schools, 191 (97%) participated in the 2007 North Carolina YTS. Classes were then randomly selected proportional to overall school enrollment for each school. Participation was voluntary and anonymous, and

district and school parental permission procedures were followed. Students recorded their responses on computer-scannable sheets which were then returned to the state for processing.

Among the students attending the 191 participating schools, 7,431 (3,787 middle school students and 3,644 high school students) completed the survey, resulting in an overall response rate of 80.8 percent. Data were weighted to be representative of students statewide and by region. CDC and RTI International processed the data and generated basic summary data tables. Current use of a specific tobacco product was defined as having used that product one or more times during the 30 days preceding the survey.

Results

Current Prevalence

In 2007, 9.1 percent of middle school students reported current use of any tobacco product (Table 1). Cigarettes (4.5%) were the most commonly used tobacco product, with no statistically significant differences in usage by sex. Cigars (3.9%) were the second most commonly used tobacco product, followed by bidis (2.8%), smokeless tobacco (2.3%), and pipes (2.2%). (Percentages add to more than 9.1 because some students used more than one type of tobacco product.) Blacks (11.7%) were more likely than whites (7.2%) to use any tobacco. No other statistically significant differences were found for any type of tobacco use by race/ethnicity among middle school students.

Among high school students, 26.6 percent reported current use of any tobacco product (Table 2). Cigarettes (19.0%) were the most commonly used tobacco product, with no differences by sex. Cigars (13.0%) were the second most commonly used tobacco product, followed by smokeless or spit tobacco (8.6%), bidis (3.4%), and pipes (3.1%). Males were more likely than females to use cigars, smokeless tobacco, pipes, bidis, and any tobacco. Whites (31.4%) were more likely to use any tobacco product than blacks (17.3%). Moreover, white students were more likely to use cigarettes

Table 1. Percentage of students in middle school (i.e., grades 6–8) who were current users* of any tobacco product, by product type, sex, and race/ethnicity — Youth Tobacco Survey, North Carolina, 1999–2007

Characteristic	Any tobacco ⁺		Cigarettes		Cigars		Smokeless tobacco		Pipes		Bidis	
	%	(95% CI) [§]	%	(95% CI)	%	(95% CI)	%	(95% CI)	%	(95% CI)	%	(95% CI)
Middle school, 2007												
Sex												
Male	10.4	(±1.5)	4.2	(±1.1)	4.4	(±1.1)	3.3	(±0.9)	2.7	(±1.1)	3.1	(±1.0)
Female	7.9	(±1.8)	4.8	(±1.4)	3.3	(±1.1)	1.3	(±0.6)	1.8	(±0.8)	2.5	(±1.2)
Race/Ethnicity												
White	7.2	(±1.8)	3.9	(±1.3)	2.6	(±0.9)	2.7	(±0.8)	1.3	(±0.7)	1.3	(±0.4)
Black	11.7	(±2.7)	4.7	(±2.1)	5.1	(±2.2)	1.5	(±0.7)	3.5	(±2.3)	4.8	(±2.5)
Hispanic	9.3	(±3.5)	4.6	(±3.8)	4.8	(±3.2)	1.4	(±0.9)	3.8	(±1.6)	3.8	(±2.0)
Total	9.1	(±2.3)	4.5	(±1.1)	3.9	(±0.9)	2.3	(±0.6)	2.2	(±0.8)	2.8	(±0.8)
Middle school, 2005												
Sex												
Male	13.6	(±3.5)	7.1	(±2.3)	6.9	(±2.1)	4.1	(±1.9)	2.4	(±1.3)	3.8	(±1.8)
Female	7.3	(±1.9)	4.4	(±1.2)	3.0	(±2.1)	1.3	(±0.4)	1.0	(±0.6)	1.6	(±0.8)
Race/Ethnicity												
White	9.5	(±2.3)	6.0	(±1.9)	3.6	(±1.2)	3.4	(±1.3)	1.6	(±1.1)	1.8	(±0.9)
Black	11.6	(±3.5)	5.3	(±2.1)	6.6	(±1.9)	1.6	(±1.1)	1.8	(±1.0)	4.3	(±2.3)
Hispanic	12.8	(±5.1)	5.7	(±2.8)	8.6	(±5.1)	2.9	(±2.8)	2.1	(±1.6)	2.6	(±2.3)
Total	10.5	(±2.3)	5.8	(±1.4)	5.0	(±1.3)	2.7	(±1.0)	1.7	(±0.8)	2.7	(±1.0)
Middle school, 2003												
Sex												
Male	17.4	(±3.1)	9.8	(±1.8)	7.9	(±1.8)	7.2	(±1.7)	3.6	(±1.3)	4.4	(±1.6)
Female	11.0	(±2.2)	8.9	(±2.1)	2.8	(±1.1)	1.5	(±0.7)	0.8	(±0.5)	1.6	(±0.9)
Race/Ethnicity												
White	14.1	(±2.7)	9.1	(±2.2)	5.2	(±1.3)	5.9	(±1.3)	2.2	(±0.7)	2.2	(±1.1)
Black	13.7	(±3.7)	8.8	(±2.4)	5.5	(±2.5)	1.7	(±1.2)	2.1	(±1.2)	3.7	(±2.1)
Hispanic	17.7	(±9.9)	13.5	(±9.7)	6.7	(±6.3)	5.7	(±5.9)	2.9	(±4.0)	5.0	(±5.3)
Total	14.3	(±2.4)	9.3	(±1.6)	5.4	(±1.2)	4.5	(±1.0)	2.2	(±0.7)	3.0	(±1.1)
Middle school, 2001												
Sex												
Male	18.3	(±2.7)	10.5	(±1.8)	8.3	(±1.7)	5.7	(±1.4)	4.6	(±1.8)	5.1	(±1.2)
Female	15.9	(±2.7)	11.8	(±2.4)	5.4	(±1.5)	2.3	(±0.9)	2.4	(±0.9)	3.3	(±1.0)
Race/Ethnicity												
White	15.6	(±3.3)	10.4	(±2.5)	5.7	(±1.9)	4.3	(±1.4)	3.1	(±1.0)	2.9	(±1.0)
Black	18.0	(±2.7)	10.7	(±2.2)	8.0	(±2.1)	3.5	(±1.2)	3.2	(±1.4)	5.4	(±1.3)
Hispanic	15.6	(±5.8)	9.5	(±5.5)	7.3	(±4.6)	3.7	(±2.7)	5.3	(±3.6)	5.0	(±3.7)
Total	17.4	(±2.6)	11.3	(±1.9)	7.1	(±1.5)	4.1	(±1.0)	3.7	(±1.1)	4.5	(±0.9)
Middle school, 1999												
Sex												
Male	21.0	(±3.1)	16.0	(±2.8)	10.6	(±1.9)	6.3	(±1.6)	5.2	(±1.3)	NA	
Female	15.7	(±2.1)	14.0	(±2.1)	5.1	(±1.1)	1.4	(±0.5)	1.5	(±0.5)	NA	
Race/Ethnicity												
White	16.8	(±2.4)	14.1	(±2.2)	6.3	(±1.2)	4.0	(±1.1)	2.4	(±0.7)	NA	
Black	19.8	(±3.5)	15.7	(±3.5)	9.7	(±1.8)	2.6	(±1.1)	3.9	(±1.3)	NA	
Hispanic	20.5	(±4.6)	16.0	(±4.7)	9.1	(±3.3)	4.7	(±2.7)	6.1	(±2.7)	NA	
Total	18.4	(±2.3)	15.0	(±2.2)	7.9	(±1.3)	3.9	(±0.9)	3.4	(±0.7)	NA	

* Used tobacco on one or more occasions during the 30 days preceding the survey

+ Cigarettes, cigars, smokeless tobacco, pipes, or bidis (leaf-wrapped, flavored cigarettes from India)

§ CI = Confidence Interval

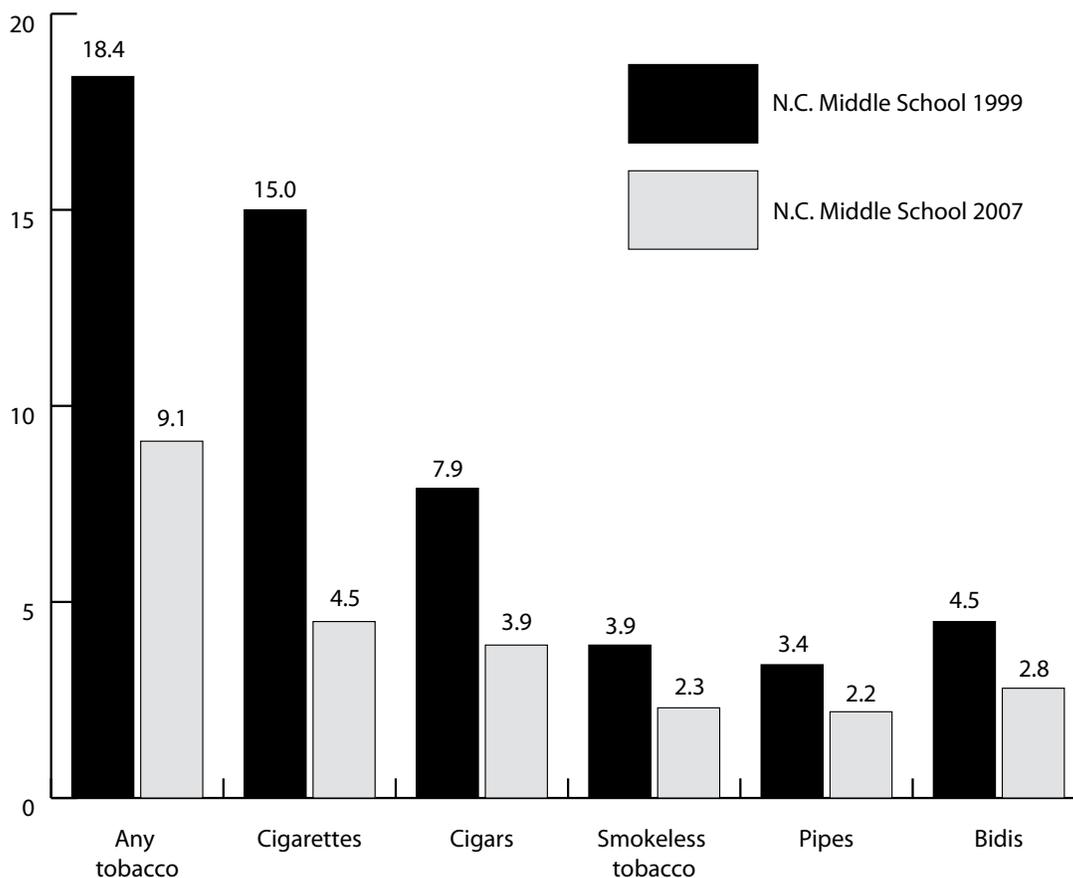
than were black students (23.2% vs. 11.0%), and white students were more likely to use smokeless tobacco than were black or Hispanic students (12.0% vs. 3.3% and 3.1%).

Trends from 1999 to 2007

From 1999 to 2007, statistically significant changes were found among middle school students in several categories (Table 1 and Figure 1). The overall “any tobacco” use declined from 18.4 percent in 1999 to 9.1 percent in 2007. There were significant decreases among males, from 21.0 percent to 10.4 percent; females from 15.7 percent to 7.9 percent; whites from 16.8 percent to 7.2 percent; blacks from 19.8 percent to 11.7 percent;

and Hispanics from 20.5 percent to 9.3 percent. Significant decreases also occurred in overall current cigarette use, from 15.0 percent in 1999 to 4.5 percent in 2007. Males, females, whites, blacks, and Hispanics all had significant decreases in cigarette use. Cigar smoking decreased overall and specifically among males, whites, and blacks. Smokeless or spit tobacco use decreased from 3.9 percent in 1999 to 2.3 percent in 2007, with a significant decline only among males (6.3% in 1999 to 3.3% in 2007). Pipe use had a significant decline only among males. The bidi question was not included in 1999. However, an overall significant decline was noted from 4.5 percent in 2001 to 2.8 percent in 2007. No other significant differences were noted.

Figure 1
Percentage of middle school students reporting current tobacco use, by tobacco product: North Carolina Youth Tobacco Survey 1999 and 2007



Used tobacco on one or more occasions during the 30 days preceding the survey.
 Bidi use is for 2001 and 2007.

**Table 2. Percentage of students in high school (i.e., grades 9–12) who were current users* of any tobacco product, by product type, sex, and race/ethnicity—
Youth Tobacco Survey, North Carolina, 1999–2007**

Characteristic	Any tobacco ⁺		Cigarettes		Cigars		Smokeless tobacco		Pipes		Bidis	
	%	(95% CI) [§]	%	(95% CI)	%	(95% CI)	%	(95% CI)	%	(95% CI)	%	(95% CI)
High school, 2007												
Sex												
Male	32.4	(±4.5)	20.9	(±3.4)	17.4	(±3.3)	14.5	(±3.3)	4.5	(±1.2)	4.8	(±1.6)
Female	20.5	(±3.8)	16.8	(±3.7)	8.3	(±2.0)	2.4	(±0.7)	1.5	(±0.6)	1.8	(±0.6)
Race/Ethnicity												
White	31.4	(±4.7)	23.2	(±3.8)	14.1	(±2.8)	12.0	(±3.3)	3.5	(±0.9)	3.2	(±1.1)
Black	17.3	(±4.1)	11.0	(±3.0)	11.2	(±2.7)	3.3	(±1.0)	2.8	(±1.2)	3.2	(±1.6)
Hispanic	25.6	(±7.2)	18.7	(±7.5)	14.7	(±5.0)	3.1	(±2.2)	1.3	(±1.3)	2.2	(±2.0)
Total	26.6	(±3.5)	19.0	(±3.0)	13.0	(±2.1)	8.6	(±2.0)	3.1	(±0.6)	3.4	(±0.9)
High school, 2005												
Sex												
Male	33.9	(±4.4)	20.7	(±3.8)	16.6	(±2.4)	15.9	(±3.7)	4.7	(±1.2)	5.1	(±1.6)
Female	22.8	(±3.6)	19.8	(±3.6)	9.8	(±2.5)	2.3	(±1.8)	3.4	(±2.0)	3.8	(±2.1)
Race/Ethnicity												
White	32.1	(±4.6)	23.8	(±3.6)	15.5	(±2.6)	12.1	(±3.4)	4.1	(±1.4)	4.5	(±1.2)
Black	20.0	(±4.0)	12.8	(±3.1)	8.1	(±2.9)	3.4	(±3.0)	3.2	(±1.7)	3.3	(±1.7)
Hispanic	31.3	(±6.6)	19.9	(±8.7)	14.9	(±6.4)	8.5	(±7.1)	7.7	(±4.3)	8.6	(±6.0)
Total	28.5	(±3.4)	20.3	(±2.8)	13.3	(±1.9)	9.2	(±2.6)	4.1	(±1.0)	4.6	(±1.1)
High school, 2003												
Sex												
Male	39.2	(±4.0)	28.7	(±3.8)	18.5	(±2.9)	17.3	(±4.2)	6.6	(±1.6)	4.8	(±1.2)
Female	27.9	(±3.9)	25.7	(±3.9)	8.2	(±1.9)	1.8	(±0.7)	1.5	(±0.9)	2.4	(±1.1)
Race/Ethnicity												
White	37.9	(±4.5)	30.8	(±4.3)	14.5	(±2.8)	13.1	(±2.9)	4.4	(±1.4)	3.9	(±1.1)
Black	25.5	(±5.1)	20.1	(±3.6)	10.3	(±3.4)	3.0	(±2.2)	2.9	(±1.5)	2.7	(±1.4)
Hispanic	22.6	(±7.5)	18.0	(±6.6)	12.9	(±5.2)	3.9	(±3.2)	6.1	(±4.8)	3.0	(±2.9)
Total	33.7	(±3.6)	27.3	(±3.3)	13.4	(±2.1)	9.5	(±2.3)	4.1	(±1.1)	3.6	(±0.8)
High school, 2001												
Sex												
Male	42.3	(±4.7)	29.8	(±4.6)	22.5	(±3.8)	15.2	(±2.6)	8.2	(±2.0)	9.9	(±2.3)
Female	29.0	(±2.3)	25.7	(±2.6)	10.1	(±1.3)	2.5	(±0.5)	3.5	(±1.4)	4.6	(±1.5)
Race/Ethnicity												
White	37.4	(±4.1)	30.5	(±3.8)	15.3	(±2.7)	10.7	(±1.9)	4.3	(±0.9)	5.0	(±1.4)
Black	28.2	(±4.3)	18.1	(±4.2)	14.8	(±2.5)	3.6	(±1.7)	5.8	(±2.5)	9.7	(±4.1)
Hispanic	38.3	(±5.9)	30.2	(±5.1)	19.3	(±6.1)	11.5	(±3.4)	10.6	(±4.2)	13.0	(±4.9)
Total	35.8	(±3.3)	27.8	(±3.5)	16.4	(±2.1)	8.9	(±1.4)	5.9	(±1.3)	7.4	(±1.8)
High school, 1999												
Sex												
Male	44.0	(±2.6)	33.4	(±2.6)	26.8	(±2.0)	14.0	(±2.6)	8.7	(±1.8)	NA	
Female	32.4	(±2.6)	29.7	(±2.6)	12.5	(±1.6)	1.8	(±0.5)	1.7	(±0.7)	NA	
Race/Ethnicity												
White	42.5	(±2.7)	36.5	(±2.8)	19.8	(±2.2)	9.7	(±1.7)	4.6	(±1.1)	NA	
Black	28.7	(±3.5)	20.2	(±3.1)	17.9	(±2.5)	2.6	(±1.1)	3.7	(±1.3)	NA	
Hispanic	33.9	(±6.6)	26.3	(±6.0)	18.2	(±4.8)	8.7	(±4.2)	11.1	(±4.6)	NA	
Total	38.3	(±2.2)	31.6	(±2.2)	19.7	(±1.5)	7.9	(±1.5)	5.3	(±1.1)	NA	

* Used tobacco on one or more occasions during the 30 days preceding the survey

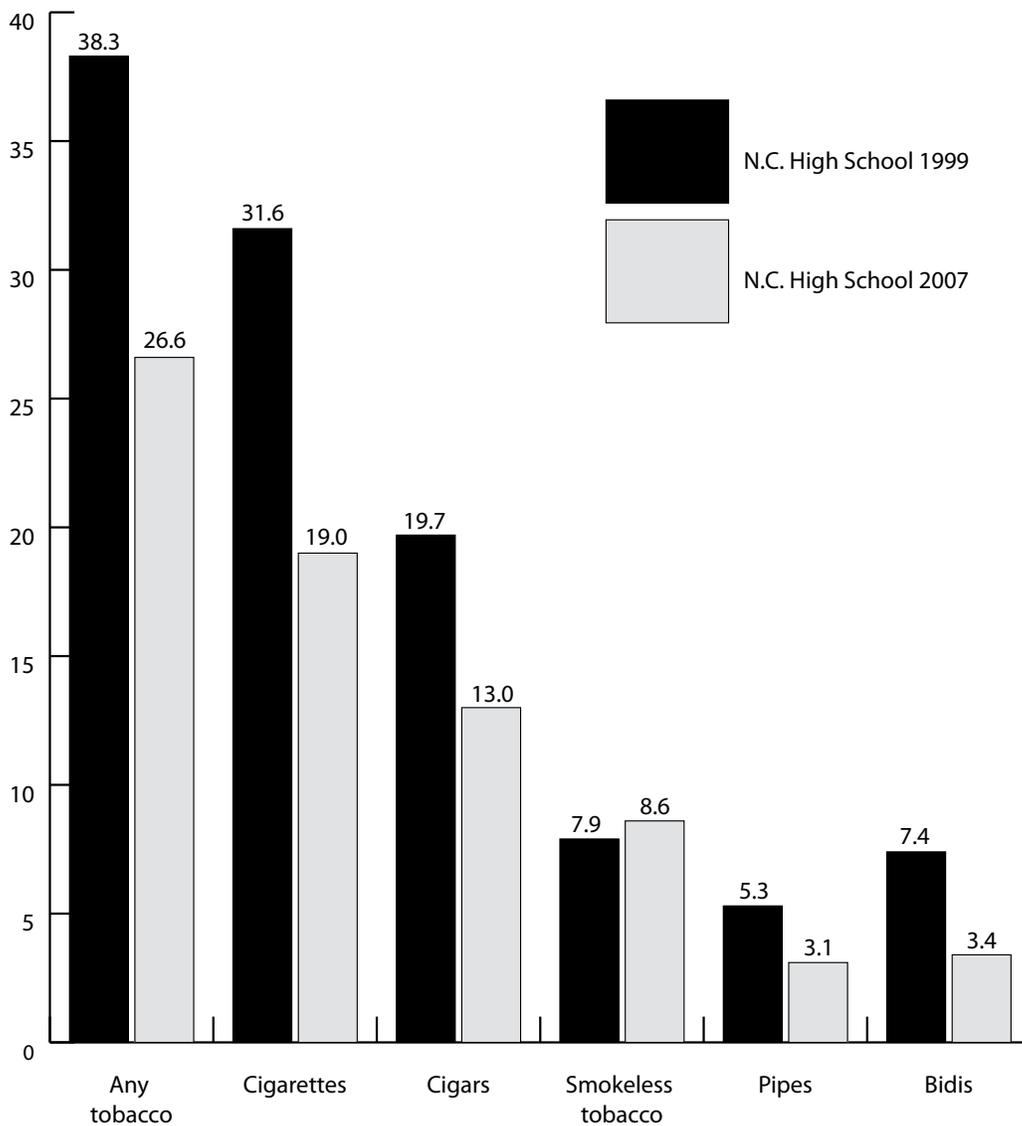
+ Cigarettes, cigars, smokeless tobacco, pipes, or bidis (leaf-wrapped, flavored cigarettes from India)

§ CI = Confidence Interval

From 1999 to 2007, statistically significant changes were found among high school students in several categories (Table 2 and Figure 2). The overall “any tobacco” use declined from 38.3 percent in 1999 to 26.6 percent in 2007. There were significant decreases among males, from 44.0 percent to 32.4 percent; females from 32.4 percent to 20.5 percent; whites from 42.5 percent to 31.4 percent; and blacks from 28.7 percent to 17.3 percent. No significant changes were found among Hispanics

for “any tobacco” use. Significant decreases also occurred in overall cigarette use, from 31.6 percent in 1999 to 19.0 percent in 2007. Males, females, whites, and blacks all had significant decreases in cigarette use. Cigar smoking decreased overall and specifically among males, females, whites and blacks. Smokeless or spit tobacco had no significant changes among any sub-group and increased slightly overall. Pipe use had significant declines among males and Hispanics. Bidi use

Figure 2
Percentage of high school students reporting current tobacco use,
by tobacco product: North Carolina Youth Tobacco Survey 1999 and 2007



Used tobacco on one or more occasions during the 30 days preceding the survey.
 Bidi use is for 2001 and 2007.

had an overall significant decline from 7.4 percent in 2001 to 3.4 percent in 2007. Bidi use also had significant declines among males, females, and blacks.

Discussion

In 1999, North Carolina first conducted the YTS to assess the scope of the tobacco problem among middle and high school students across the state. The results were startling and led to the first dedicated state funding for a teen tobacco initiative through the North Carolina Health and Wellness Trust Fund (overseers of the health portion of the North Carolina Master Settlement Agreement with tobacco companies). Since that time community and school efforts, including making all North Carolina schools 100 percent tobacco free and a statewide media campaign, have been implemented in order to reduce tobacco use among youth. While the focus has been on cigarette smoking, some efforts have been directed toward other tobacco products, particularly smokeless or spit tobacco. Through tax increases, the price of smokeless tobacco products was increased from 3 percent to 10 percent of the wholesale price. The North Carolina cigarette tax was increased in 2005 and 2006 from 5 cents (lowest in the nation) to 35 cents (North Carolina now ranks 46th in the nation). Increasing the price of tobacco products by more than 10 percent is an evidence-based tobacco use prevention intervention.⁴

While these data are self-reported by students on the YTS and therefore subject to caution, the

dramatic declines from 1999 to 2007 in nearly all types of youth tobacco use suggest that smoking reduction strategies in North Carolina are working. Statewide policies creating 100 percent tobacco free schools and an increase in the tobacco excise tax may have contributed to these declines above and beyond local program interventions. In order to reach the 2010 Healthy People objective goal of a high school current smoking rate of 16 percent, much more needs to be done. Effective, evidence-based strategies need to be fully implemented to continue these gains, along with development of new strategies to promote continued declines in youth smoking.

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