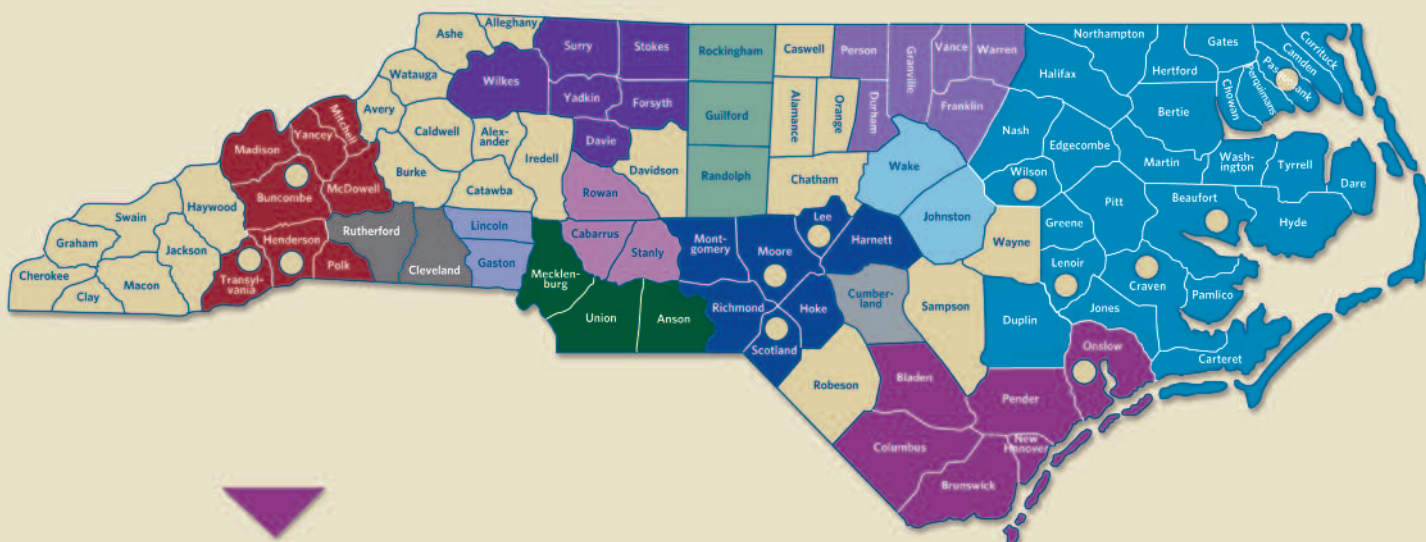


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Community Care of North Carolina: Building Medical Homes

Declining Tobacco Use Among North Carolina Middle and High School Students: 1999-2007

Scott K. Proescholdbell, MPH; Shelley K. Summerlin-Long, MPH, MSW; Adam O. Goldstein, MD, MPH

Abstract

Background: In 1999, North Carolina first conducted the Youth Tobacco Survey (YTS) among middle and high school students and found current smoking rates higher than the national average. In 2003, school and community grants across the state were funded to prevent and reduce youth tobacco use.

Methods: The North Carolina YTS has been conducted every other year since 1999 with high response rates by schools and students. The YTS is a written survey administered during the school day. It is voluntary and anonymous.

Results: In 2007, middle and high school student tobacco use rates reached their lowest point in the last decade. Nineteen percent of high school students reported current cigarette smoking, while 4.5% of middle school students said that they currently smoke. Almost every type of tobacco product use (cigarette, cigar, pipe, and bidi) has decreased since the 1999 YTS, with increasing rates of decline in cigarette use from 2003-2007 compared to 1999-2003.

Limitations: This is a cross-sectional survey conducted every other year where students self-report use, attitudes, and perceptions.

Conclusions: North Carolina's youth tobacco use rates have declined more steeply since 2003 when the tobacco initiatives started by the North Carolina Health and Wellness Trust Fund (HWWTF) began to mobilize communities statewide. Continuing to fund and expand evidence-based tobacco prevention strategies is likely necessary in order to sustain steady declines in youth smoking rates.

Keywords: adolescent; tobacco; cross-sectional study; prevalence.

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 occurs more rapidly than previously thought, even with very limited use.³

In order to better understand the scope of the problem and to help evaluate youth tobacco control programs, North Carolina has collected extensive data among middle and high school students since 1999⁴ using the Youth Tobacco Survey (YTS) in coordination with the Centers for Disease Control and Prevention (CDC). The North Carolina YTS, conducted by the North Carolina Tobacco Prevention and Control Branch and 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 or spit tobacco, pipes, and bidis—leaf wrapped, flavored cigarettes from Asia) as well as information about tobacco-related beliefs, attitudes, media awareness, and exposure to secondhand smoke. This article 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 consists of all North Carolina public and charter schools that include at least one grade between 6th and 12th for the survey year. The YTS is

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coordinated with the North Carolina Youth Risk Behavior Survey (YRBS) in order to minimize the burden placed on any given school, so that a school could be selected to participate in either survey but not both.

Since 1999, survey statisticians have used sampling methods to capture a representative sample of middle and high school students across the state. Every other year, in the first stage of the survey, Local Education Areas (school districts) are selected within three

geographic regions of the state (west, central, and east). A school's probability for selection is proportional to its enrollment size. In the second stage, researchers choose second-period classes in each school based on a systematic equal probability sampling scheme. An average of two second-period classes are sampled from each school per YTS cycle. All students in the sampled classes are eligible to participate in the survey except those who are routinely exempt from written tests because of language or learning barriers. Nonparticipation was primarily due to absenteeism.

In 1999, statisticians selected a total of 87 primary sampling units (PSUs) in the first stage of sampling based on Local Education Areas in the three distinct geographic regions and then selected 272 schools from these PSUs in the second stage of sampling. Of these 272 eligible schools, 266 (97.8%) participated in the 1999 YTS. Classes were then randomly selected proportional to overall school enrollment for each school. Participation was voluntary and anonymous, and researchers followed district and school parental permission procedures. Students recorded their responses on computer-scannable sheets which were then returned to the state for processing. A similar process occurred for each year the survey was administered.

In 1999, among the students attending the 266 participating schools, 12,576 students (6,016 middle and 6,560 high school) completed the survey, resulting in an overall response rate of 87.1%. Analysts at RTI International and the CDC processed survey data and calculated summary statistics at 95% confidence intervals using SAS-callable SUDAAN to adjust for the sampling design. Analysts weighted the data to be representative of students statewide and by region. In each corresponding year a similar pattern emerged (see Table 1).

Results

Current Prevalence

In 2007, 9.1% of middle school students reported current use of any tobacco product (see Table 2). Current use of a

Table 1.
YTS Schools Sampled and Response Rates by Year:
YTS 1999, 2001, 2003, 2005, and 2007

	1999	2001	2003	2005	2007
Number of schools sampled (MS & HS)	272	208	216	180	197
Number of schools participating	266	177	200	178	191
School response rate	97.8%	85.1%	92.6	98.9%	97.0%
Number of students sampled	14,112	13,000	7,589	7,930	8,922
Number of students participating	12,576	10,950	6,334	6,405	7,431
Student response rate	89.1%	84.2%	83.5%	80.8%	83.3%
Overall response rate	87.1%	71.7%	77.3%	79.9%	80.8%

specific tobacco product was defined as having used that product one or more times during the 30 days preceding the survey. Cigarettes (4.5%) were the most commonly used tobacco product, with no statistically significant difference in usage by sex. Cigars (3.9%) were the second most commonly used tobacco product, followed by smokeless tobacco (2.3%), bidis^a (2.8%), and pipes (2.2%). African American middle school students (11.7%) were slightly 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% reported current use of any tobacco product (see Table 3). 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 tobacco (8.6%), bidis (3.4%), and pipes (3.1%). Males were more likely than females to use cigars, smokeless tobacco, bidis, pipes, or any tobacco at all. Whites (31.4%) were much more likely to use any tobacco product than African Americans (17.3%). Moreover, white students were much more likely to use cigarettes than African American students (23.2% vs. 11.0%), and white students were almost four times more likely to use smokeless tobacco than African American and Latino 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' tobacco use in several categories (see Table 2 and Figure 1). The overall "any tobacco" use declined from 18.4% in 1999 to 9.1% in 2007. Significant decreases occurred among males (from 21.0% to 10.4%), females (from 15.7% to 7.9%), whites (from 16.8% to 7.2%), African Americans (from 19.8% to 11.7%), and Latinos (from 20.5% to 9.3%).

Significant declines also occurred in overall middle school student current cigarette use (from 15.0% in 1999 to 4.5% in 2007). Males, females, whites, African Americans, and

a Bidis are Indian-style cigarettes that deliver more nicotine, CO₂, and tar than other tobacco products.

Table 2.

Percentage of Students in Middle School^a Who Were Current Users^b of any Tobacco Product, by Product Type, Sex, and Race/Ethnicity—Youth Tobacco Survey, North Carolina, 1999-2007

	Any tobacco ^c	Cigarettes	Cigars	Smokeless tobacco	Pipes	Bidis
Characteristic	% (95% CI) ^d	% (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)
African American	11.7 (+/-2.7)	4.7 (+/-2.1)	5.1 (+/-2.2)	1.5 (+/-0.7)	3.5 (+/-2.3)	4.8 (+/-2.5)
Latino	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 (+/-1.2)	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)
African American	11.6 (+/-3.5)	5.3 (+/-2.1)	6.6 (+/-1.9)	1.6 (+/-1.1)	1.8 (+/-1.0)	4.3 (+/-2.3)
Latino	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)
African American	13.7 (+/-3.7)	8.8 (+/-2.4)	5.5 (+/-2.5)	1.7 (+/-1.2)	2.1 (+/-1.2)	3.7 (+/-2.1)
Latino	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)
African American	18.0 (+/-2.7)	10.7 (+/-2.2)	8.0 (+/-2.1)	3.5 (+/-1.2)	3.2 (+/-1.4)	5.4 (+/-1.3)
Latino	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
African American	19.8 (+/-3.5)	15.7 (+/-3.5)	9.7 (+/-1.8)	2.6 (+/-1.1)	3.9 (+/-1.3)	NA
Latino	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

a Grades 6-8.

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

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

d Confidence interval.

Table 3.
Percentage of Students in High School^a Who Were Current Users^b of any Tobacco Product, by Product Type, Sex, and Race/Ethnicity—Youth Tobacco Survey, North Carolina, 1999-2007

	Any tobacco ^c	Cigarettes	Cigars	Smokeless tobacco	Pipes	Bidis
Characteristic	% (95% CI) ^d	% (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)
African American	17.3 (+/-4.1)	11.0 (+/-3.0)	11.2 (+/-2.7)	3.3 (+/-1.0)	2.8 (+/-1.2)	3.2 (+/-1.6)
Latino	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)
African American	20.0 (+/-4.0)	12.8 (+/-3.1)	8.1 (+/-2.9)	3.4 (+/-3.0)	3.2 (+/-1.7)	3.3 (+/-1.7)
Latino	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)
African American	25.5 (+/-5.1)	20.1 (+/-3.6)	10.3 (+/-3.4)	3.0 (+/-2.2)	2.9 (+/-1.5)	2.7 (+/-1.4)
Latino	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)
African American	28.2 (+/-4.3)	18.1 (+/-4.2)	14.8 (+/-2.5)	3.6 (+/-1.7)	5.8 (+/-2.5)	9.7 (+/-4.1)
Latino	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
African American	28.7 (+/-3.5)	20.2 (+/-3.1)	17.9 (+/-2.5)	2.6 (+/-1.1)	3.7 (+/-1.3)	NA
Latino	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

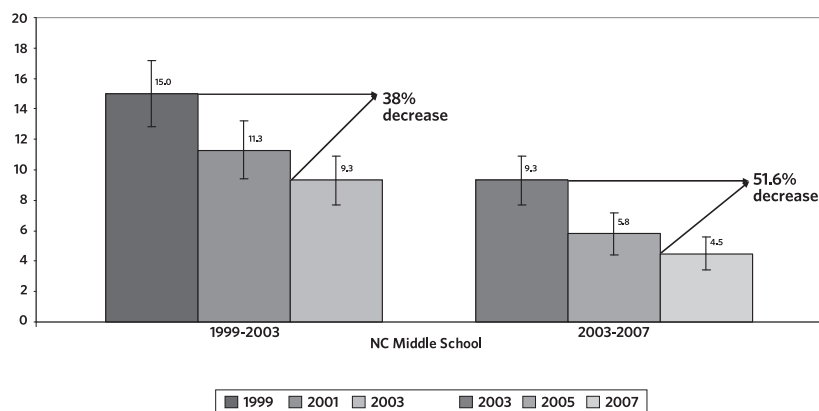
a Grades 9-12.

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

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

d Confidence interval.

Figure 1.
Rate of Decline of Current Middle School Student Smokers by Group Years, YTS 1999-2007



The 2003-2007 rate of decline is significantly higher than the 1999-2003 rate of decline ($p < 0.001$).

Latinos all had statistically significant declines in cigarette use. Cigar smoking decreased overall and specifically among males, whites, and African Americans. Smokeless tobacco decreased (from 3.9% in 1999 to 2.3% in 2007), with a significant decline only among males (from 6.3% in 1999 to 3.3% in 2007). Pipe use had a statistically significant decline only among males. While the question on bidi use was not included in 1999, an overall significant decline was noted from 4.5% in 2001 to 2.8% in 2007. No other statistically significant differences were noted.

From 1999 to 2007, statistically significant changes were found among high school students in several categories (see Table 3 and Figure 2). The overall "any tobacco" use declined (from 38.3% in 1999 to 26.6% in 2007). There were significant decreases among males (from 44.0% to 32.4%), females (from 32.4% to 20.5%), whites (from 42.5% to 31.4%), and African Americans (from 28.7% to 17.3%). No significant changes were found among Latinos for this category.

Statistically significant decreases also occurred in high school student overall cigarette use (from 31.6% in 1999 to 19.0% in 2007). Males, females, whites, and African Americans all had significant decreases in cigarette use. Cigar smoking significantly decreased overall and specifically among males, females, whites, and African Americans. Smokeless tobacco had no statistically significant changes among any subgroup. Pipe use had statistically significant declines among males and Latinos. Bidi use from

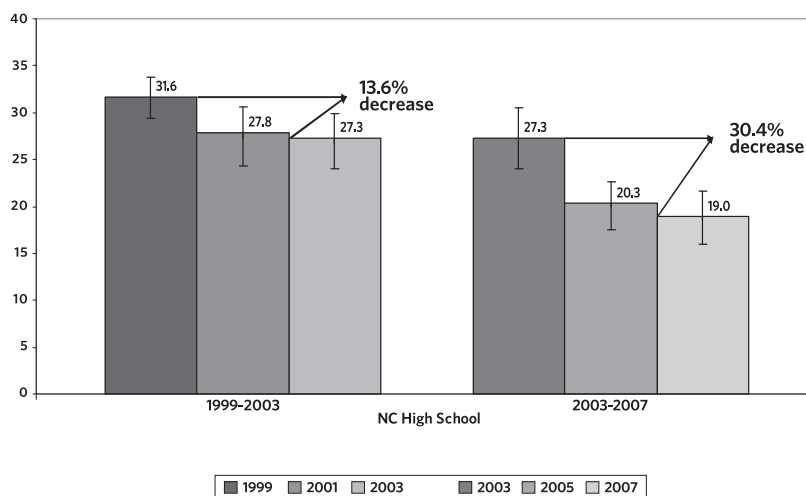
2001 had an overall significant decline (from 7.4% in 2001 to 3.4% in 2007). Bidi use also had statistically significant declines among males, females, African Americans, and Latinos.

Declines in tobacco use appear to have accelerated over time. Analysts divided the North Carolina YTS results into two cohorts: 1999-2003 and 2003-2007. From 1999-2003 the rate of decline among current smokers in middle school was 38%, whereas from 2003-2007 the decline was 51.6% (see Figure 1). Similarly, the rate of decline among high school students was 13.6% from 1999-2003 compared to 30.4% from 2003-2007 (see Figure 2). In both cases, the 2003-2007 decline was significantly higher ($p < 0.001$) than the decline from 1999-2003.

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 and provide a baseline of tobacco use prevalence. The results were higher than expected which, in part, led to the first dedicated state funding for a teen tobacco initiative. The North Carolina legislature voted in 1999 to divide the state's tobacco settlement money between three entities, with 25% of the money going to a trust fund established to focus on health. In 2000, the General Assembly voted to create the North Carolina Health and Wellness Trust Fund

Figure 2.
Rate of Decline of Current High School Student Smokers by Group Years, YTS 1999-2007



The 2003-2007 rate of decline is significantly higher than the 1999-2003 rate of decline ($p < 0.001$).

(HWTF), and members were appointed in 2001. Most school and community grants received funding and began working in 2003; thus the 2003 YTS is considered the baseline for the HWTF teen tobacco program. North Carolina's statewide tobacco prevention media campaign also launched in 2003 with the first television ads airing in 2004.

Since 2003, the HWTF has developed and expanded a statewide program that focuses on the four CDC recommended goal areas as they pertain to youth and tobacco: (1) preventing initiation of tobacco use among youth and young adults; (2) promoting quitting among youth, adults whose tobacco use influences youth, and young adults; (3) eliminating exposure to secondhand smoke; and (4) identifying and eliminating tobacco-related disparities among population groups. While the focus has been on cigarette smoking among youth, some efforts have been directed toward other tobacco products, particularly smokeless or spit tobacco, and recent efforts have included young adults in college as well as quitline assistance for adults who live with or take care of youth and who want to quit smoking.

State efforts have included funding for programs falling under all of the overarching components described as part of the CDC's best practices for tobacco control programs.⁵ State and local interventions include school and community programs focused on youth tobacco use prevention, passage of tobacco-free policies in public areas such as schools, programs to reduce youth access to tobacco, and increases in the excise tax on cigarettes. Health communication interventions include a statewide media campaign, Tobacco. Reality.Unfiltered. or TRU. TRU television ads feature North Carolinians who have suffered serious health consequences from tobacco use and direct viewers to a website to find out about interventions aimed at preventing teen tobacco use at the local level. A 2007 evaluation of the TRU campaign using a telephone survey with North Carolina youth ages 11-17 found 71% reporting awareness (confirmed through open-ended ad description) of the TRU campaign and over 95% reporting that the ads were convincing, attention-grabbing, and gave good reasons not to use tobacco.⁶ Cessation interventions include support for the North Carolina Tobacco Use Quitline to cover tobacco cessation calls and proactive cessation services for tobacco users who want to quit and are either under 25, employees of a K-12 school system or child care center, or a primary caregiver of a child under 18 years of age living at home. Over the past two years, because of successful paid marketing campaigns, callers eligible for HWTF funds have comprised about one-half of all calls. Local cessation includes the Not on Tobacco (N-O-T) program in schools.

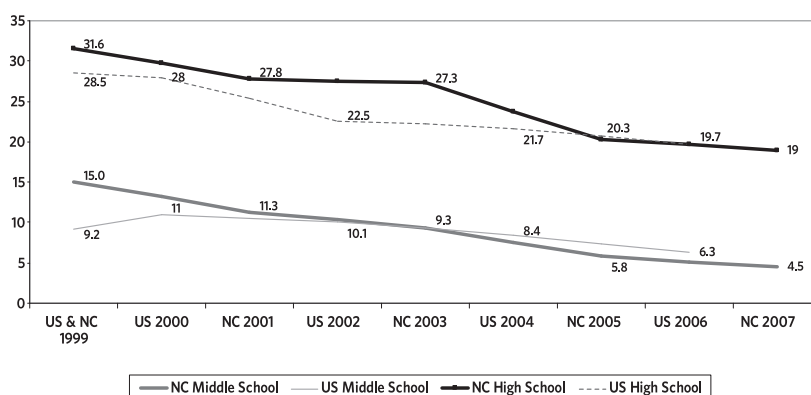
The YTS is part of the state's surveillance effort, along with tobacco-

related questions on the Behavioral Risk Factor Surveillance System (BRFSS), which uses telephone surveys to measure tobacco use prevalence among adults. Another statewide survey is the Child Health Assessment and Monitoring Program (CHAMP), which is done with a subset of the BRFSS sample who have children under 18 living in their homes. The state also funds outcomes evaluation and provides funds for administration and management, which includes program oversight, technical assistance, and training.

Concurrent with funding of these programs, North Carolina seems to be experiencing a steeper decline in youth smoking from 2003 to the present than from 1999 to 2003. In comparison, national declines in current smoking among high school youth were most evident from 1999 to 2002, with only marginal changes from 2004 to 2006. High school current smoking in the United States dropped from 22.5% in 2002 to 19.7% in 2006 (12.4% decrease), compared with North Carolina high school rates declining from 27.3% in 2003 to 19.0% in 2007 (30.4% decrease). Similarly, US middle school rates went from 10.1% in 2002 to 6.3% in 2006 (37.6% decrease), whereas North Carolina middle school rates dropped from 9.3% in 2003 to 4.5% in 2007 (51.6% decrease) (see Figure 3).⁷

Although the rate of sales to minors in North Carolina decreased from 25% in 1999 to 11.5% in 2007, YTS data indicate that from 2003 to 2007 North Carolina youth reported no significant change in source of cigarettes (direct purchase vs. social sources) or in being refused by a merchant because of their age. Similarly, while youth exposure to tobacco advertising may have decreased after the Master Settlement Agreement in 1998, nearly 20% of high school youth and 13% of middle school youth surveyed in the 2007 YTS reported having received or bought something with a tobacco company name or picture on it in the previous year. Middle school youth in North Carolina also reported a significant decrease in practicing ways to say "no" to tobacco from 2003 to 2007, possibly indicating decreased classroom curriculum in North Carolina schools. Neither middle school nor high school youth reported any significant changes in how often their parents

Figure 3.
Percentage of Middle and High School Students Reporting Current Tobacco Use in North Carolina vs. National Rates: 1999-2007



had discussed the dangers of tobacco use with them during the previous year.

While it is difficult to pinpoint the exact cause for the large declines in tobacco use and their acceleration since 2003, data on potential contributing factors such as youth access to tobacco, youth exposure to industry advertising, parental involvement, and school curricula suggest that these factors did not have a large impact on reductions in youth tobacco use in North Carolina. Decreases have likely occurred for other reasons. Most national efforts that would explain the decreases occurred prior to 2003. For instance, the price of tobacco products increased as a result of the Master Settlement Agreement in the late 1990s and an increase in the federal excise tax on tobacco in 2000 and 2002. The national truth® campaign of the American Legacy Foundation launched in 2000, but the major national roll-out of the truth® campaign ended in 2003.

State efforts in North Carolina started in earnest around 2003. The tobacco initiatives started by the HWTF began to mobilize communities statewide. Statewide policies creating comprehensive tobacco-free areas (schools, hospitals, state buildings, prisons, etc.) occurred along with greatly expanded youth empowerment programs and the statewide TRU media campaign, all of which are evidence-based tobacco control initiatives. The increases in North Carolina's tobacco excise tax in 2005 and 2006 (from \$0.05 to \$0.35) likely also contributed to these declines above and beyond local program interventions.

The dramatic declines from 1999 to 2007 in all types of youth tobacco use are particularly exciting given North Carolina's long history with tobacco production. North Carolina has moved from current youth cigarette smoking rates higher than the national average in 1999 to being at the national average in 2007 (see Figure 3). However, in order for North Carolina to reach the 2010 Healthy People objective goal of a high school current smoking rate of 16%, much more needs to be done.

There are some limitations to this study. Data are self-report, and the study is not longitudinal and does not necessarily include the same schools or students from year to year. However, written surveys are a reliable and cost-effective method for gathering prevalence estimates from large populations. While declines in youth tobacco use are occurring concurrently with state-funded efforts to decrease use, a definitive causal link cannot be made between declines in use and state funding.

The CDC recommends that North Carolina spend \$106.8 million per year on tobacco control programs annually.⁵ The HWTF budgeted approximately \$17 million annually (for FYs 2007-2008 and 2008-2009) for programs targeting youth tobacco prevention and cessation with a total of \$75.1 million

allocated through 2007.⁸ In January 2002, prior to HWTF funding, North Carolina ranked 51st^b in the country in state funding for tobacco prevention;⁹ North Carolina currently ranks 28th.¹⁰

Continuation of North Carolina's historic results in youth tobacco use reduction could be jeopardized if funding were decreased. Maintaining and increasing tobacco prevention funding is critically important. An economic analysis examining state-level tobacco control expenditures and youth smoking prevalence estimated that states spending at least the minimum amount recommended by the CDC would have seen youth smoking prevalence rates 3.3% to 13.5% lower than their current rates.¹¹ Funding is threatened in North Carolina because the North Carolina General Assembly passed legislation in 2004 mandating that up to 65% of the annual monies distributed to the HWTF beginning in 2007 would pay the debt service on construction of several major health-related facilities in North Carolina. This decision dramatically reduces the amount of potential funding for HWTF's preventive health programs. The HWTF is currently scheduled to pay \$350 million in debt service over the next 25 years.

Increased funding should go toward additional evidence-based strategies such as advocating for smoke-free policies in all public, indoor places; advocating for further increases in the North Carolina excise tax (currently the 7th lowest in the US¹²); expanding the statewide tobacco prevention media campaign; and increasing adult-focused programs since adult smoking influences youth smoking behavior.¹³ Continuation and expansion of state efforts to decrease youth smoking will ensure that tobacco remains more a part of North Carolina's history than its future. **NCMJ**

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b Washington DC is included, along with the 50 states, for a total of 51.

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