



Results From the 1999 North Carolina Youth Tobacco Survey

A Call To Action

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Statewide data on tobacco use by youth are essential to designing and evaluating youth tobacco control programs at the state level. In the fall of 1999, the NC Department of Health and Human Services, in collaboration with the NC Department of Education and the Centers for Disease Control, asked 12,576 randomly chosen North Carolina students in grades 6-12 about tobacco use. This report summarizes the major findings from that survey. When possible, data are compared to published results from the National Youth Tobacco Survey,¹ which used the same questionnaire, sampling period and sampling methodology as the North Carolina Survey.

Methods

The North Carolina Youth Tobacco Survey used a two-stage cluster sample design to produce a representative sample of middle school (grades 6-8) and high school (grades 9-12) students within each of North Carolina's three regions (Coastal, Piedmont, and Mountain). The piedmont com-

prised Surry, Wilkes, Caldwell, Burke, McDowell, Rutherford, and Polk counties on the west; Warren, Franklin, Wake, Lee, Moore, and Richmond counties on the east; and all counties in between. The coastal and mountain counties were those to the east and west of the piedmont, respectively.

In the first of the two sampling stages, all public schools (including charter schools) that included at least one grade between 6 and 12 were eligible, and the probability that schools would actually be selected was proportional to school enrollment size. In the second stage, second-period classes in each school were chosen based on systematic equal probability sampling. An average of three second-period classes was sampled at each school. All students in the sampled classes were eligible to participate in the survey, except those who are routinely exempt from written tests because of language or learning barriers. Across the state, 98% of selected middle schools (134 of 137) and selected high schools (132 of 135) participated in the survey (Table 1); 90% of middle school students and 88% of high school students enrolled in the sampled classes completed the survey. Nonparticipation was primarily due to absenteeism. The overall response rate was

Table 1. Survey response rates by school level and region

	Middle schools				High schools			
	Coastal	Piedmont	Mountain	Total	Coastal	Piedmont	Mountain	Total
No. of schools sampled	49	49	39	137	48	50	37	135
No. of schools participating	48	48	38	134	47	48	37	132
School response rate	98%	98%	97%	98%	98%	96%	100%	98%
No. of students sampled	2,232	2,405	2,047	6,684	2,821	2,405	2,202	7,428
No. of students participating	2,010	2,175	1,831	6,016	2,481	2,178	1,901	6,560
Student response rate	90%	90%	90%	90%	88%	91%	86%	88%
Overall response rate	88%	89%	87%	88%	86%	87%	86%	86%

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88% for middle school and 86% for the high schools. Response rates at the school and student levels were nearly identical for all regions. The final sample consisted of 6,016 middle school students and 6,560 high school students. All questionnaires were completed between September and November of 1999.

The self-administered, 72-item questionnaire asked questions on tobacco use, exposure to environmental tobacco smoke, access to tobacco, enforcement of legal restrictions, and desire to quit tobacco use. A weighting factor was applied to each response to reflect the likelihood of sampling each student and to compensate for differing patterns of non-response. Software for the Statistical Analysis of Correlated Data² (SUDAAN) was used to compute variance estimates and 95% confidence intervals; differences between subgroups were considered statistically significant if their confidence intervals did not overlap (that is, $p < 0.05$). Ethnicity was based on respondents' self-report and was categorized as black (non-Hispanic), white (non-Hispanic) and Hispanic. There were too few respondents from other ethnic groups to support analyzing their response separately. Students were categorized as urban if their school was located in a county with a population density greater than 7,190 per square mile. Current tobacco use was defined by self-report of use within the past 30 days. Tobacco products included cigarettes, smokeless, cigars, and pipes.

Results

Nearly one-fifth (18%) of middle school students reported that they had used a tobacco product in the previous 30 days (Table 2). This percentage was significantly higher for boys (21%) than girls (16%). Current tobacco use almost tripled between 6th and 8th grades, rising from 11% to 27%. The slight differences in percentages of tobacco use observed—for blacks and Hispanics compared to whites, for rural students compared to urban, and for coastal compared to piedmont and mountain regions—were not statistically significant.

Among high school students, 38% reported current tobacco use (Table 2). As with middle school students, current tobacco use was significantly higher for boys (44%) than girls (32%) and increased with grade, from 35% among 9th graders to 45% among 12th graders. In contrast to the data for middle school students, current tobacco use by white students (43%) was significantly higher than for black students (29%). Current tobacco use among Hispanics (34%) was considerably lower than for whites; however, because of the small number of Hispanic students (374), the difference did not reach statistical significance. Differences noted between urban and rural communities and region of the state were not statistically significant.

NC data on current use of specific tobacco products are

Table 2. Percentages of North Carolina students reporting current tobacco use

	Middle school	High school
Total	18.4%±2.3	38.3%±2.2
Boys	21.0%±3.1*	44.0%±2.6*
Girls	15.7%±2.1	32.4%±2.6
Black	19.8%±3.5	28.7%±3.5
Hispanic	20.5%±4.6	33.9%±6.6
White	16.8%±2.4	42.5%±2.7*
6 th Grade	10.6%±1.8	
7 th Grade	17.3%±2.8	
8 th Grade	27.3%±4.3*	
9 th Grade		34.5%±3.0
10 th Grade		35.5%±3.2
11 th Grade		41.8%±4.5
12 th Grade		45.2%±3.7
Urban	15.8%±3.2	35.2%±3.3
Rural	20.2%±3.4	41.2%±3.2
Mountain	17.4%±3.3	42.0%±4.1
Piedmont	17.5%±3.2	37.0%±3.2
Coastal	20.2%±3.5	40.0%±3.1

* $p < 0.05$ compared to others in group

Table 3. Current tobacco use in North Carolina compared to the nation

	North Carolina	United States
Any tobacco		
Middle school	18.4%±2.3*	12.8%±2.0%
High school	38.3%±2.2%	34.8%±2.7
Cigarettes		
Middle school	15.0%±2.2*	9.2%±1.6
High school	31.6%±2.2	28.4%±2.2
Smokeless tobacco		
Middle school	3.9%±0.9	2.7%±0.7
High school	7.9%±1.5	6.6%±1.6

* $p < 0.05$ North Carolina vs US data

compared to published data from the national Youth Tobacco Survey¹ in Table 3. Middle school students in North Carolina were 1.44 times more likely to report current tobacco use than their national peers; they were 1.63 times more likely to report smoking a cigarette and 1.44 times more likely to report using smokeless tobacco in the past 30 days. Table 3 also shows that current use of these products among

high school students also was higher in North Carolina, but the differences were not as dramatic (ratios of 1.10-1.20).

The analysis of responses to questions about stated desire to quit smoking was restricted to the subsample of students in North Carolina and in the nation who were current smokers (Table 4). In general, differences between middle school and high school, and between the North Carolina and the national samples of students, tended to be minor. Approximately half in each subgroup of current smokers reported that they wanted to quit smoking completely, and approximately half reported that they had seriously tried to stop smoking within the past year. Nevertheless, well over 80% of the current smokers in each subgroup believed that they could quit if they *really* wanted to. The only notable difference between the North Carolina data and national data is that North Carolina high school students were significantly less likely than their national peers to report serious quit attempts within the past year (47% versus 56%, respectively).

Discussion

Our data provide the most comprehensive look to date at tobacco use among North Carolina youth. A major strength of the present survey was the representativeness of the sample. In addition to the large number of subjects, nearly 98% of the 275 randomly chosen schools agreed to participate. The overall response rate was 88%, the highest published response rate of any state that has conducted the Youth Tobacco Survey.¹ Thus, biases introduced by failure of response have been minimized in this survey.

The major limitations of this and all school-based tobacco surveys are that students who attend private schools and youth who have dropped out of school are not included, and that all data are based on self-report. Thus, the inferences drawn from the data are only applicable to youth who attend public schools and are only as valid as the self-reported responses. Whether students differentially underestimate or overestimate tobacco use is not clear, and might vary by grade and other demographic factors.

The most alarming finding of the survey is the high rate of current tobacco use, particularly cigarette smoking, among

middle school students in North Carolina compared to the nation. In a 1999 telephone survey of adults, current cigarette smoking in North Carolina (25%) was found to be 1.1 times that of the US (23%).³ We found that North Carolina high school students were 1.1 times more likely to report current use of cigarettes than their national peers, but middle school students were more than 1.6 times more likely to report such use. It is possible that these ratios reflect long-standing patterns of age-specific cigarette use in North Carolina versus the nation—that is, North Carolinians start smoking at earlier ages than their national peers, but they are only slightly more likely to smoke as adults. This argument is not entirely convincing; it is possible that the high relative use of tobacco by NC middle school students signifies a new and worrisome trend in smoking in North Carolina relative to the nation. If the elevated rates observed in this middle school cohort persist into high school and into adulthood, then North

Carolina might soon be leading the nation in smoking among adults.

The finding that 18% of middle school students and 38% of high school students currently use tobacco requires immediate attention. Almost 80% of adult smokers begin smoking as teens, and the age at which they begin is inversely associated with the likelihood of their smoking as adults.⁴ In our sample, over half of

current smokers report that they would like to quit, and half have seriously tried in the past year but have failed. Despite this track record of failure, more than 80% persist in believing that they *could* quit if they really wanted to. Our data underscore the need for teen-based tobacco prevention, control, and cessation programs such as that in Florida, which has been associated with a 41% decline in cigarette use among middle school students.⁵ The data also highlight the need for continued monitoring of youth tobacco use through the comprehensive, representative, and standardized Youth Tobacco Survey.

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Table 4. Attitudes of current smokers about smoking cessation

	North Carolina	United States
Want to completely quit		
Middle school	53.4%±5.1	50.9%±7.0%
High school	51.2%±3.5	54.4%±3.1
Seriously tried to quit in past year		
Middle school	56.0%±5.5	57.9%±3.6
High school	46.8%±2.9*	55.6%±2.3
Believe they could quit if really wanted to		
Middle school	82.3%±3.5	81.7%±4.3
High school	81.9%±2.6	83.7%±2.4
*p<0.05 North Carolina vs US data		

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