Decreased youth tobacco use in Massachusetts 1996 to 1999: evidence of tobacco control effectiveness

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Objective: To evaluate tobacco control in Massachusetts through examining trends in youth tobacco use from 1996 to 1999.
Design: Data are from the 1996 and 1999 Massachusetts Prevalence Study survey of public school students in the state.
Participants: Participants consisted of 6800 (1996) and 6980 (1999) students in Massachusetts public school grades 6–12 (approximate ages 11–18 years).
Main outcome measures: Outcomes are changes in lifetime and current (past month) cigarette, cigar, and smokeless tobacco.
Results: In grades 7–12, there were significant decreases in lifetime (48.3% to 41.9%) and current (30.7% to 23.7%) cigarette use, smokeless tobacco use (lifetime 16.5% to 9.9%; current 4.55 to 2.6%), and current cigar use (12.2% to 8.6%). Decreases occurred for both male and female 7–8th graders. In grades 9–12 decreases were somewhat greater for females than males. Trends for grades 8, 10, and 12 were compared to those seen nationally and in the northeast region in the Monitoring the Future study. For the pooled grades the decreases for cigarettes were greater than those seen nationally or in the northeast region.
Conclusions: Results support the effectiveness of the comprehensive Massachusetts Tobacco Control Program. The increasing tobacco rates in the first half of the 1990s have been dramatically reversed. These results suggest that programme efforts should be supported or even expanded in order to decrease further the state's rates of youth tobacco use. The findings suggest that other states may learn useful lessons from Massachusetts' successes.

In the early 1990s, cigarette use among youth increased, leading to concerns that success in reducing adult smoking rates[1] might be undone as a new generation of smokers emerged into maturity.[2 3] Studies have shown that between 80–90% of those who will ever smoke do so before age 18.[4] Also, in the first half of the 1990s there was an increase in smokeless tobacco use,[3 5] and an apparent increase in cigar smoking among youth.[6] Because of these trends, state and local tobacco control efforts aimed at stopping youth smoking and smokeless tobacco initiation; further efforts encouraging young cigarette smokers and smokeless tobacco users to quit were initiated or expanded by the federal government and several states.[7–9] Given the public health importance of tobacco use and the potential lifelong consequences of youth tobacco initiation, it is essential to determine if these expanded tobacco control efforts have been effective. Only one state to date—Florida—has shown that concerted tobacco control efforts can rapidly lead to dramatic reductions in youth use of cigarettes.[10–12] Therefore, considerably more data are necessary to demonstrate the value and, ultimately, the cost effectiveness of state tobacco control efforts.

This paper presents findings for youth in Massachusetts, which has one of the oldest, best funded, and most comprehensive state tobacco control efforts in the country. Created in 1993 using funds obtained from a 1992 voter referendum raising the cigarette tax 25 cents,[13–15] the Massachusetts Tobacco Control Program (MTCP) goals are protecting people from environmental tobacco smoke, helping adults to quit, and reducing youth initiation and uptake. MTCP supports youth prevention efforts in three broad categories: (1) community activities supporting passage and enforcement of youth access provisions; (2) school programmes to increase youth awareness of the harmful effects of cigarette smoking and smokeless tobacco use and to engage them in positive anti-tobacco efforts; and (3) media strategies, including a major statewide media campaign and efforts to enlist celebrities in anti-tobacco efforts.

The triennial Massachusetts Prevalence Study (MPS), an alcohol, tobacco, and other drug prevalence survey,[16] confirmed that Massachusetts youth exhibited the same dramatic increases from 1990 to 1993 in cigarette and smokeless tobacco prevalence seen nationally.[17 18] Analyses of 1996 MPS results showed that, in its first three years, MTCP exhibited apparent success in reducing lifetime and current cigarette smoking rates limited to boys in middle school (grades 7–8, approximately ages 13–14 years), with reductions in lifetime and current smokeless tobacco use among both male and female middle school students and reductions in current smokeless use among high school students (grades 9–12, approximately ages 15–18).[18] Not only were there significant declines in rates, but the Massachusetts declines were considerably greater than those seen for similar items in the national Monitoring the Future study.[19] However, rates of cigar and bidi use among youth in the state raised the spectre of alternate forms of tobacco partially taking the place of cigarettes among certain groups of youth.[6 20 21]

The 1999 MPS survey provides an opportunity to evaluate MTCP youth prevention efforts at a more mature stage of the programme and among youth with more sustained exposure. This evaluation is important as MTCP constitutes a model for other tobacco control efforts. Previously released data from the Massachusetts Youth Risk Behavior Survey showed nearly every measure of tobacco use for high school students declining from 1997 to 1999,[22] with significant declines from 1995 to 1999 among recent (past month) smokers.[14] The current study allows a further opportunity to determine if MTCP is associated with significant declines in cigarette, cigar, and smokeless tobacco use in students in the state. Further, similarity of question wording between the MPS and the national

Abbreviations: MPS, Massachusetts Prevalence Study; MTCP, Massachusetts Tobacco Control Program

Table 1 Lifetime and current tobacco use by year with combined grades 7– 8, 9–12, 7–12: 1999 Massachusetts Prevalence Study with comparison to 1996

	Grades 7–8		Grades 9–12		Grades 7–12	
	1996 (n=2046)	1999 (n=2354)	1996 (n=3633)	1999 (n=3472)	1996 (n=5679)	1999 (n=5826)
Lifetime†						
Cigarettes	34.0 (29.0 to 39.4)	24.0** (21.5 to 26.8)	55.4 (52.6 to 58.1)	52.0 (49.5 to 54.5)	48.3 (45.6 to 50.9)	41.9** (40.0 to 43.9)
Smokeless tobacco	8.9 (6.1 to 12.9)	4.3** (3.5 to 5.4)	20.2 (17.7 to 23.0)	13.0** (10.9 to 15.4)	16.5 (14.5 to 18.7)	9.9* (8.9 to 11.4)
Cigars	22.3 (19.2 to 25.9)	17.5** (15.3 to 20.0)	39.2 (35.9 to 42.5)	37.6 (35.0 to 40.1)	33.6 (31.1 to 36.1)	30.4 (28.5 to 32.3)
Current‡						
Cigarettes	21.0 (16.8 to 25.8)	12.6** (10.6 to 14.9)	35.6 (32.8 to 38.4)	29.9** (27.5 to 32.5)	30.7 (28.4 to 33.1)	23.7** (21.9 to 25.6)
Smokeless tobacco	2.4 (1.5 to 3.7)	1.4 (0.9 to 2.1)	5.6 (4.6 to 6.7)	3.3** (2.5 to 4.3)	4.5 (3.8 to 5.3)	2.6* (2.0 to 3.3)
Cigars	7.6 (4.9 to 11.5)	4.2 (3.2 to 5.3)	14.5 (12.6 to 16.6)	11.1** (9.9 to 12.4)	12.2 (10.6 to 14.0)	8.6* (7.9 to 9.5)

Cell entries are percentages of students reporting use. Numbers in parentheses are 95% confidence intervals.
*Significant difference between 1996 and 1999 at $p<0.05$ (design adjusted χ^2).
**Significant difference between 1996 and 1999 at $p<0.01$ (design adjusted χ^2).
†Used at least once in lifetime.
‡Used at least once in 30 days before survey.

Monitoring the Future[3 19] allows comparison of rates of declines in Massachusetts with those seen nationally and in the northeast region (consisting of New York, Pennsylvania, New Jersey, and the five New England states). If MTCP has been effective, youth use declines in Massachusetts should be larger than national or regional declines.

METHODS

Sample

In both 1996 and 1999, the sample was generated using a two stage stratified random sampling design; the first stage sampled schools and the second classrooms within selected schools. The 1996 sample consisted of two subsamples, one a stratified random sample of schools and classrooms throughout the state and the other an oversample of five urban areas with high non- white student populations. This sample was stratified on county and grade. For 1999, the urban oversample was replaced with an additional three level stratification on the percentage of minority students in each school and a higher sampling rate for strata with a greater percentage of minority students, as calculations indicated that this strategy would reduce the standard errors for both overall and minority prevalence rates. The use of probability weights (see below) within each of the 1996 and 1999 data sets removed any bias caused by the changes in sample design. The 1996 sample consisted of 6800 students in grade 6–12 (approximate ages 11–18 years, unweighted percentages: 50% female, 48% white, 23% black, 21% Hispanic, 8% other race/ethnicity). The 1999 sample consisted of 6980 6–12th grade students (unweighted percentages: 50% female, 64% white, 14% black, 14% Hispanic, 7% other).

Procedure

Principals of selected schools were contacted by research personnel. If agreement to participate was obtained, the survey was administered during a regular class period by research staff. In 1996, 94% of schools agreed to participate (171 schools from 90 communities) and 83% of students enrolled in sampled classes agreed to participate, for an overall response rate of 78%. In 1999, the school participation rate was 87% (169 schools from 106 communities) and the student participation rate within selected classes was 87%, for an overall response rate of 76%. If schools declined to participate they were replaced with randomly selected schools from the same stratum. Field procedures remained substantially unchanged from 1996 to 1999. The study was designed and analysed by Health and Addictions Research, Inc. The data were collected by John Snow Research and Training Institute, Inc.

Questionnaire

The core MPS survey instrument consists of items administered every three years since 1984, supplemented with additional questions at each triennial administration. The 1996 and 1999 surveys contained 98 and 91 items, respectively, on alcohol, tobacco, and other drug use. Prevalence items were similar to those used in the national Monitoring the Future study for comparison purposes. From the survey we use demographic variables, lifetime cigarette smoking (of a whole cigarette), current cigarette smoking (past 30 day use), and lifetime and current cigar and smokeless tobacco use.

Weighting and data analysis

Each observation was weighted to reflect the sample design in that the weights were the inverse of the probability of selecting a given class. As is common when using repeated cross sectional surveys for trend analyses, post-sampling adjustments were made to the 1999 and 1996 weights. Firstly, in order to adjust for minor variations in sampling frequency across grades and make the sample more accurately represent the population from which the sample was drawn, the weights were adjusted to make the proportions of each grade of the weighted sample equal to the proportion of that grade in the state public school student population. Secondly, an adjustment was made to the 1996 weights that made the weighted proportions for each grade equal the 1999 population proportions. This adjustment was only used when determining the statistical significance of changes from 1996 to 1999; it was *not* used in calculating the 1996 prevalence rates, so those rates reflect the actual distribution of students across grades in 1996. This adjustment was made so that significant changes from 1996 to 1999 would reflect true changes in prevalence and not simply differences in the proportion of students in the various grades.

In order to test whether the Massachusetts tobacco rates declined faster than the national or northeast rates, we conducted a series of tests comparing changes in Massachusetts to changes in the national and the northeast rates from Monitoring the Future. In each comparison, we derived a weighted average effect for grades 8, 10, and 12 from the Monitoring the Future data, by weighting the difference between the Monitoring the Future proportion of 1999 and

Table 2 Lifetime and current tobacco use by sex with combined grades: 1999 Massachusetts Prevalence Study with comparison to 1996

	Grades 7–8, female		Grades 7–8, male		Grades 9–12, female		Grades 9–12, male	
	1996 (n=995)	1999 (n=1146)	1996 (n=1051)	1999 (n=1122)	1996 (n=1895)	1999 (n=1759)	1996 (n=1738)	1999 (n=1564)
Lifetime†								
Cigarettes	33.6 (27.6 to 40.1)	21.9** (18.9 to 25.2)	34.4 (29.1 to 40.2)	25.5** (22.3 to 29.0)	57.4 (53.5 to 61.1)	50.7* (47.3 to 54.1)	53.2 (49.5 to 57.0)	53.2 (50.2 to 56.2)
Smokeless tobacco	2.9 (1.4 to 5.9)	2.2 (1.5 to 3.2)	14.5 (9.9 to 20.6)	6.7** (5.2 to 8.5)	7.3 (5.3 to 10.0)	3.7** (2.7 to 5.2)	34.0 (30.1 to 38.1)	23.1** (19.8 to 26.8)
Cigars	17.9 (15.3 to 20.8)	12.1** (10.1 to 14.6)	26.4 (21.8 to 31.6)	22.1 (18.9 to 25.8)	26.8 (23.1 to 30.9)	24.8 (22.5 to 27.1)	52.4 (49.0 to 55.8)	51.7 (48.3 to 55.1)
Current‡								
Cigarettes	23.1 (15.3 to 20.8)	13.9** (10.1 to 14.6)	19.0 (14.6 to 24.5)	11.1** (8.5 to 14.4)	36.5 (33.1 to 40.1)	29.2** (26.1 to 32.5)	34.5 (30.8 to 38.4)	30.4 (27.2 to 33.7)
Smokeless tobacco	0.5 (0.2 to 1.3)	0.7 (0.4 to 1.5)	4.1 (2.5 to 6.4)	1. 9* (1.2 to 3.2)	0.9 (0.4 to 2.0)	0.5 (0.3 to 1.1)	10.5 (8.8 to 12.6)	6.2** (4.6 to 8.3)
Cigars	6.4 (4.1 to 9.8)	2.4** (1.7 to 3.5)	8.6 (5.3 to 13.8)	5.8 (4.3 to 7.7)	6.2 (4.6 to 8.2)	4.2* (3.3 to 5.4)	23.4 (20.1 to 27.1)	18.5* (16.4 to 20.8)

Cell entries are percentages of students reporting use. Numbers in parentheses are 95% confidence intervals.
*Significant difference between 1996 and 1999 at p<0.05 (design adjusted χ^2).
**Significant difference between 1996 and 1999 at p<0.01 (design adjusted χ^2).
†Used at least once in lifetime.
‡Used at least once in 30 days before survey.

1996 users in each grade by the relative proportion in the Massachusetts public student population for that grade. We then conducted an adjusted Wald test to determine if the average change in Massachusetts was greater than that seen in the national or northeast samples.

All analyses were conducted using design based survey analysis techniques as implemented in STATA version 6.0. These techniques take into account the stratified sampling design and the design effects caused by the non-independence of students in the same school. The Wald test for the design based Pearson χ^2 statistic was used to determine the significance of changes from 1996 to 1999.

RESULTS

In the 7–12th grades current use of all three forms of tobacco declined significantly from 1996 to 1999 (table 1). For cigarettes the decline was from 30.7% to 23.7%, for smokeless tobacco, from 4.5% to 2.6%, and for cigars, from 12.2% to 8.6%. Lifetime use of cigarettes (from 48.3% to 41.9%) and smokeless tobacco (from 16.5% to 9.9%) also declined significantly. Lifetime cigar use did not change significantly (from 33.6% to 30.4%).

Middle and high school trends

When broken out for middle (grades 7 and 8) and high school (grades 9–12) separately (table 1), significant declines are seen for lifetime and current cigarette use, lifetime smokeless tobacco use, and lifetime and current cigar use in middle school. High school students reported significant declines in current use of all three forms of tobacco, but only in lifetime use for smokeless tobacco was the decline significant.

Sex trends

When differences are examined by sex (table 2), middle school girls exhibited significant declines in both lifetime and current cigarette and cigar use while boys declined significantly in lifetime and current cigarette and smokeless tobacco use. High school females reported significant declines in lifetime and current cigarette use and in lifetime smokeless tobacco and current cigar use. High school males reported declines in lifetime smokeless tobacco use and in current smokeless tobacco and cigar use; their lifetime cigarette use stayed stable at 53.2%.

Trends by race/ethnicity

Table 3 reports trends by race/ethnicity. In middle school, whites declined consistently across lifetime and current use of all three forms of tobacco. Blacks in middle school significantly declined in both lifetime and current cigarette use, while Hispanics did not report significant declines for any form of tobacco use.

In high school, whites showed significant declines in lifetime smokeless tobacco use and in current use of all forms of tobacco. Blacks in high school declined in lifetime use of all three forms of tobacco and in current use of cigars. As was the case for middle school students, Hispanics did not report any significant declines in rates of use.

Sixth grade trends

In Massachusetts, most, though not all, 6th grade students (approximately age 11) are in elementary schools, not middle schools with 7th and 8th graders. Thus we analysed trends in this grade separately (table 4). Because of the small sample size, data on 6th grade subgroups are not presented. With the exception of current cigar use, these students reported significant declines in rates of lifetime and current use of all three forms of tobacco. Further, the percentage declines in this grade were quite substantial, ranging from a low of 44.4% relative decline for lifetime cigar use to a high of 76.9% relative decline for current smokeless tobacco use.

Comparison with northeast and national trends

In order to evaluate the decreases seen in tobacco use in Massachusetts, we compared the Massachusetts trends to northeast regional (consisting of New York, Pennsylvania, New Jersey, and the five New England states) and national trends seen in the Monitoring the Future study.[19] The Monitoring the Future study annually surveys students in grades 8, 10, and 12 about cigarette and smokeless tobacco use, among other substances. In every case, the percentage decline seen in Massachusetts was greater than the declines seen nationally (table 4). In many instances, the Massachusetts percentage declines were more than twice those seen nationally. Northeast regional data comparing 1996 to 1999 is only available for current smoking. For current cigarette use, the decreases in Massachusetts were greater than those seen for the northeast region. However, the smokeless tobacco

Table 3 Lifetime and current use of tobacco by year, grades 7–8 and 9–12, and race/ethnicity: Massachusetts Prevalence Study

	Grades 7–8				Grades 9–12			
	Lifetime†		Current‡		Lifetime†		Current‡	
	1996	1999	1996	1999	1996	1999	1996	1999
Black	n=403	n=307	n=403	n=307	n=849	n=504	n=849	n=504
Cigarettes	41.0 (33.1 to 49.4)	27.6** (22.4 to 33.4)	15.9 (11.8 to 21.1)	10.0* (7.2 to 13.6)	48.8 (42.1 to 55.6)	36.1** (31.3 to 41.2)	18.8 (14.0 to 24.7)	15.3 (11.6 to 20.0)
Smokeless tobacco	7.0 (3.3 to 14.0)	4.3 (2.7 to 6.9)	0.8 (0.3 to 2.0)	1.7 (0.8 to 3.6)	10.8 (6.1 to 18.3)	5.4* (3.5 to 8.3)	1.1 (0.3 to 4.8)	1.3 (0.5 to 3.4)
Cigars	23.0 (17.4 to 29.7)	16.0 (12.0 to 21.1)	6.5 (2.9 to 13.9)	1.9 (0.5 to 6.3)	27.0 (21.3 to 33.6)	17.6* (13.6 to 22.5)	9.2 (6.1 to 13.7)	4.9* (3.5 to 7.0)
Hispanic	n=536	n=368	n=536	n=368	n=728	n=443	n=728	n=443
Cigarettes	34.1 (28.1 to 40.6)	27.6 (22.8 to 33.0)	18.1 (13.0 to 24.7)	13.8 (9.8 to 19.2)	52.4 (45.8 to 58.9)	45.1 (38.5 to 52.0)	30.6 (23.6 to 38.6)	22.6 (17.3 to 28.9)
Smokeless tobacco	6.6 (3.5 to 12.1)	4.9 (2.8 to 8.3)	3.1 (1.0 to 9.1)	2.2 (0.9 to 5.1)	11.1 (7.0 to 17.3)	6.5 (3.9 to 10.7)	1.3 (0.3 to 5.1)	3.0 (1.3 to 6.7)
Cigars	17.2 (12.3 to 23.5)	18.5 (14.2 to 23.8)	5.4 (2.6 to 10.7)	5.0 (2.7 to 8.8)	28.2 (22.3 to 35.0)	25.9 (20.3 to 32.4)	9.6 (5.3 to 16.8)	8.1 (5.3 to 12.4)
White	n=966	n=1470	n=966	n=1470	n=1747	n=2251	n=1747	n=2251
Cigarettes	33.5 (27.7 to 40.0)	23.5** (20.6 to 26.6)	22.0 (17.1 to 27.8)	12.8** (10.5 to 15.5)	57.1 (53.8 to 60.3)	55.5 (52.9 to 58.2)	38.0 (34.9 to 41.3)	33.0* (30.2 to 36.0)
Smokeless tobacco	9.5 (5.9 to 14.8)	4.4** (3.4 to 5.6)	2.6 (1.7 to 3.9)	1.2* (0.6 to 2.1)	22.6 (19.7 to 25.9)	15.0** (12.6 to 17.7)	6.6 (5.4 to 8.0)	3.6** (2.7 to 4.7)
Cigars	23.4 (19.6 to 27.7)	17.9* (15.2 to 20.9)	8.3 (5.0 to 13.3)	4.3* (3.3 to 5.5)	42.1 (38.4 to 45.8)	41.6 (38.9 to 44.3)	15.9 (13.6 to 18.4)	12.5* (11.0 to 14.1)

Cell entries are percentages of students reporting use. Numbers in parentheses are 95% confidence intervals.
*Significant difference between 1996 and 1999 at p<0.05 (design adjusted χ^2).
**Significant difference 1996 versus 1999 at p<0.01 (design adjusted χ^2).
†Used at least once in lifetime.
‡Used at least once in 30 days before survey.

decreases in Massachusetts were only greater than those for the northeast region for 10th grade, while the regional decrease for 12th graders was greater, both absolutely and proportionally, to that in Massachusetts.

In order to assess whether the Massachusetts decreases were statistically greater than those seen in the national or northeast data, we conducted a series of six tests, two comparing lifetime cigarette and smokeless tobacco use to the

Table 4 Lifetime and current use of tobacco by year, grades 6, 8, 10, and 12 and comparison of Massachusetts data with national data for grades 8, 10, and 12, 1996–1999

	Grade 6		Grade 8		Grade 10		Grade 12	
	1996 (n=1121)	1999 (n=1154)	1996 (n=1007)	1999 (n=1183)	1996 (n=907)	1999 (n=970)	1996 (n=889)	1999 (n=712)
Lifetime†								
Cigarettes								
Massachusetts§	16.5	7.0**	41.0	30.3**	56.9	44.4**	61.0	60.5
USA	–	–	49.2	44.1	61.2	57.6	63.5	64.6
Smokeless tobacco								
Massachusetts	3.8	1.2**	12.8	4.8**	20.6	10.5**	26.0	18.5*
USA	–	–	20.4	14.4	27.4	20.4	29.8	23.4
Cigar								
Massachusetts	9.9	5.5**	26.7	21.3	42.6	33.1*	42.4	43.2
Current								
Cigarettes								
Massachusetts§¶	8.1	2.4**	26.0	15.6**	33.6	24.6*	40.7	34.9
USA	–	–	21.0	17.5	30.4	25.7	34.0	34.6
Northeast	–	–	22.1	15.7	31.7	28.0	38.5	34.2
Smokeless tobacco								
Massachusetts	1.3	0.3*	3.4	1.7	6.3	3.5*	6.7	4.5
USA	–	–	7.1	4.5	8.6	6.5	9.8	8.4
Northeast	–	–	4.9	2.5	6.8	5.2	8.4	4.3
Cigar								
Massachusetts	2.0	0.8	10.9	5.4*	16.0	12.2	13.4	12.3

Cell entries are percentages of survey respondents. National and northeast data from Johnson *et al*.[3] Northeast regions includes New York, Pennsylvania, New Jersey, and the five New England states. National 6th grade and cigar data not available.
*Significant difference between 1996 versus 1999 at p<0.05 (design adjusted χ^2).
**Significant difference 1996 versus 1999 at p<0.01 (design adjusted χ^2).
†Used at least once in lifetime.
‡Used at least once in 30 days before survey.
§Weighted average effect across grades 8, 10, and 12 significantly different from national change at p<0.01 (design adjusted Wald F test).
¶Weighted average effect across grades 8, 10, and 12 significantly different from northeast change at p<0.05 (design adjusted Wald F test).

national rates from Monitoring the Future, and four comparing the current Massachusetts cigarette and smokeless tobacco rates to the current national and northeast rates. For all three comparisons involving cigarettes, the Massachusetts declines were significantly steeper than changes seen nationally or regionally, whereas in none of the comparisons involving smokeless tobacco use were the Massachusetts rates significantly different from those seen nationally or regionally.

DISCUSSION

These 1999 survey results indicate that youth use of tobacco products decreased in Massachusetts over the three year period between surveys. These decreases, which were in many cases quite substantial, reversed the increases seen at the beginning of the decade. For example, the rate of current use of cigarettes among middle school students in 1999 (12.6%) exactly matches that previously reported for middle school students in 1990, before the larger 1990–1993 increases.[18]

The decreases in cigarette use reported here were broad based, occurring in both middle and high school students, in both boys and girls, and in both blacks and whites. In particular, the large decreases seen among girls in this study indicate that the dramatic increases in female youth smoking rates in Massachusetts seen earlier in the decade have been reversed.[18] Hispanic middle school students, however, failed to exhibit significant reductions, perhaps because of the small sample size. The reductions in cigarette smoking rates among these students were, however, fairly substantial in magnitude.

The decreases in cigarette use reported here for grades 8, 10, and 12 were in every case greater than those seen nationally in the Monitoring the Future study, and the current cigarette decreases were greater than those reported for the northeast region. The pooled declines across the three grades in Massachusetts for cigarettes was significantly greater than the declines seen either nationally or regionally. The grade 12 declines were in some cases slight.

In contrast to the decline in use of cigarettes, the pooled declines in either lifetime or current use of smokeless tobacco were not significantly different from the declines seen nationally. To some degree, the lack of a difference in rates of decline in use of this substance was because the 12th graders in Massachusetts reduced their use of smokeless tobacco less than did 12th graders in the northeast region. Another relevant factor is that the declines in smokeless use in Massachusetts from 1996 to 1999 followed strong declines during the 1993 to 1996 inter-survey period.[18] Nonetheless, use of lifetime smokeless tobacco did decline significantly among both middle and high school students from 1996 to 1999, and use of current smokeless tobacco declined significantly among high school students, thus continuing the previous declines.

The magnitude of the decreases in cigarette use reported by most groups of students, along with the fact that these decreases were considerably and significantly greater than those seen nationally, strongly suggests that the comprehensive Massachusetts tobacco control efforts have been successful in decreasing youth cigarette use. Even though survey data cannot definitively establish causality, no state without an intensive tobacco control programme has reported declines in youth tobacco use that were substantially greater than national trends, thus strengthening the inference that the declines are caused by tobacco control and not some unknown secular trend. Furthermore, Massachusetts has also documented declines in adult smoking.[23] While the industry substantially increased the price of cigarettes during this time period, the increases occurred uniformly across the nation and demand elasticity predicts a greater decline in states with proportionately lower tobacco prices (which includes taxes) at the time of the increase. Thus, if MTCP were not effective, Massachusetts, with its higher cigarette taxes, would be expected to exhibit a smaller decline in smoking than that seen in other states, rather than the larger declines observed.

What this paper adds

In recent years, considerable resources have gone into state and federal tobacco control efforts aimed at youth. There is a growing body of data indicating that these programmes are effective, but the extant evidence is still sparse. An early evaluation in 1996 of the model programme in Massachusetts had suggested that the programme was primarily positively impacting middle school boys.

The current study uses data from a statewide school prevalence survey to evaluate the impact of the Massachusetts programme three years later. It indicates that the programme is successfully reducing smoking among youth in most subgroups and that the decreases seen in Massachusetts are greater than those seen nationally. The study supports the effectiveness of state wide tobacco control efforts. Its findings are especially relevant in the current environment of fiscal austerity as tobacco control programmes are being cut back in many states. The study suggests that resources on these programmes are well spent.

In the first three years of MTCP, the declines in use were seen largely among middle school boys.[18] The current results suggest that, in its second three years, MTCP had a positive impact on most groups of students in the state. These encouraging results suggest that Massachusetts joins Florida[10–12] in demonstrating that well funded tobacco control efforts can significantly affect youth tobacco use. Despite the dramatic reductions in use, policy makers and youth workers need to enhance efforts to address the still unacceptable proportion of youth, 24% of 7–12th graders, who have smoked cigarettes in the last month. Because research indicates that between 33–50% of youth who initiate smoking will go on to become regular smokers, potentially facing a lifetime of addiction,[2 24–26] the job of tobacco control programmes in the state is far from over.

The findings of this study suggest that Massachusetts and other states should continue to spend substantial funds from taxes, general revenues, and the Master Settlement Agreement between the states and cigarette companies on specific tobacco control efforts aimed at reducing youth initiation of use in order to curb youth from tobacco products successfully. The results presented here suggest that within a comprehensive tobacco control programme, funds spent on reducing youth tobacco use are likely to be well spent. Although the results of this study are encouraging by suggesting that concentrated efforts can lead to reductions in youth use, policy makers and youth workers need to sustain the reductions and further reduce use. The public and policy makers must remain vigilant and insist on sustained multi-level community based youth prevention strategies in order to meet the nation's Healthy People 2010 objectives for tobacco use.

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