



**TEXAS TOBACCO PREVENTION INITIATIVE**

**MEDIA CAMPAIGN AND COMMUNITY PROGRAM**

**EFFECTS AMONG CHILDREN AND ADULTS**

**Prepared by the Center for Health Promotion and Prevention Research at the University of Texas School of Public Health and the Center for Chronic Disease Prevention Research at the Baylor College of Medicine in collaboration with the Texas Tobacco Prevention Initiative Research Consortium.**

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#### **Summary:**

To give the Texas Legislature information about how the state's tobacco settlement income can be used to improve health by promoting reductions in tobacco use, the Texas Department of Health and collaborating university research institutions conducted a field experiment to evaluate the short-term (spring to autumn 2000) effects of media and community programs on tobacco use among children and adults. This report presents the estimated effects of three levels of media activity (no campaign, low level campaign or high level campaign) and five community program options (no programs, cessation programs, law enforcement programs, school-community programs or all three programs combined). These media activities and community programs were provided either singly or in combination in fourteen areas in Texas at annual per capita media and/or program costs of \$0.50 to \$3.00. In studies of 9,799 6<sup>th</sup> graders in their first year of middle school and 7<sup>th</sup> graders in their first year of junior high school, school-community and multiple programs showed evidence of significant prevention effects which appeared to be enhanced by a high-level media campaign. In studies of 1,069 adult smokers, the highest daily smoking cessation rate was seen in the areas where high level media campaigns were combined with community programs to promote cessation. In random sample surveys of 16,139 adults, a significant relative reduction in the prevalence of daily smoking was found in the area where a high level media campaign was conducted in combination with either school-community or multiple programs. Overall, the results show that significant short-term reductions in tobacco use among children and adults can be achieved with combinations of high level media campaigns and multiple community programs.

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## Introduction

This report presents the results of research requested by the Texas Legislature to provide information about the expected effects of different options for reducing tobacco use through public expenditures. While more than 26,000 Texans die annually from tobacco-related illnesses, the tobacco industry spends approximately \$400 million per year, \$20 for every person in the state, to advertise and promote tobacco in Texas (Texas Department of Health, 2001). Each year thousands of children and young adolescents begin what will likely be a lifetime of harmful and expensive tobacco use. In 1993 the estimated annual direct and indirect health costs attributed to tobacco use were approximately \$4.9 billion (Texas Department of Health, 2001). To receive compensation for those costs, the state of Texas brought and won a lawsuit against the tobacco industry. Approximately \$20 million (\$0.50 per capita per year statewide) from the settlement fund were allocated by the Legislature to the Texas Department of Health for activities to reduce tobacco use during the current two-year budget period. These funds were used to implement and evaluate different types and levels of prevention activity in selected areas in Texas.

Previous studies of community and regional level tobacco control activities have demonstrated positive long-term effects when comprehensive activities were provided. The North Karelia Project in Finland combined cessation and prevention activities involving mass media, public policy, schools, health care providers, community organizations and both formal and informal opinion leaders (McAlister, et al., 1980; 1982). Ten to fifteen year follow-up findings demonstrated conclusive evidence of a long-term reduction in adult and youth tobacco use (Puska, et al., 1985; Vartiainen, et al., 2000). In a four-year community experiment in South Texas, multi-component media and community programs significantly increased rates of maintained smoking cessation among adults (McAlister, et al., 1992). In other research in the U.S.A., the Stanford Five-City Study in California showed that comprehensive programs can have effects on tobacco use among children and adults (Farquhar, et al., 1995). Similar findings were reported from the Minnesota Heart Health Study (Perry, et al., 1992) and from research on combined school and media activities in Vermont (Flynn, et al., 1994). In contrast, tests of single component programs, e.g., programs focusing only on cessation (e.g., COMMIT, 1996) or only on prevention in schools (e.g., Ellickson, et al., 1993; Peterson, et al., 2000), have not demonstrated significant long-term effects on adult or youth tobacco use (DHHS, 2000).

Because limited or single-component approaches do not appear to be effective, federal tobacco control experts now recommend a “comprehensive” or multi-component approach with combined prevention and cessation efforts involving mass media, school-based programs, health care providers and outreach to community organizations (Centers for Disease Control, 1999). This comprehensive approach is expensive, with annual per capita costs of approximately \$5 to \$14 recommended by the U.S. Centers for Disease Control as the appropriate amount for achieving a significant reduction in tobacco use. To guide decisions about funding allocations during the 2001 legislative session, the Texas Senate and House of Representatives asked the Texas Department of Health to use its initial allocation of settlement funds to test a variety of single and multiple activity options with an annual per capita cost range of approximately \$0.50 to \$3.00.

The present study is designed to answer these questions: What are the activities or combinations of activities that are most effective in reducing tobacco use? Are reductions in tobacco use related to spending levels for prevention and cessation activities? Can lower cost options produce satisfactory effects or is the maximum feasible funding level needed to achieve a substantial impact? When these questions are answered, the Texas Legislature can make informed decisions about the proportion of the tobacco settlement proceeds that should be used to lessen the human and financial impact of tobacco use.

## Research Methods

Fourteen East Texas counties, combinations of counties and sections within Harris and Jefferson counties were assigned to fourteen combinations of three media campaign levels and five community program options. The media levels were (1) no media campaigns, (2) low level media campaigns equivalent to approximately \$0.50 in annual per capita implementation costs or (3) high level media campaigns equivalent to approximately \$1.00 in annual per capita implementation costs. The program options were (1) no community programs, (2) law enforcement programs only, (3) cessation programs only, (4) school-community prevention programs only or (5) all preceding programs combined comprehensively (multiple programs). One of the fifteen possible combinations, multiple programs with no media campaign, was not included in the design. The law enforcement and cessation programs were each established at a level equal to approximately \$0.50 in annual per capita implementation costs. The school-community programs were established at a level equal to approximately \$1.00 in annual per capita implementation costs. This design enables testing of a variety of cost options ranging from \$0.50 to \$3.00 in annual per capita implementation costs.

The youth media campaign “Tobacco is Foul” was designed to prevent tobacco use among youth, with a primary audience in the 11-12 year age group. An adult media campaign promoted quitting assistance programs, especially the American Cancer Society telephone counseling service, and offered messages to help adults quit using tobacco products. The law enforcement programs provided funds to increase enforcement of Texas’ existing laws regarding tobacco use, particularly those related to sales to minors and minors’ possession of tobacco. Cessation activities educated health care providers about current clinical practice guidelines for treating tobacco use and encouraged them to identify and assist their patients in ceasing tobacco use. Community and school programs encouraged the development of tobacco-centered coalitions and the use of the Project T.N.T. (Towards No Tobacco Use) curriculum in middle schools and T.A.T.U. (Teens Against Tobacco Use) in high schools. These activities are thoroughly documented in a separate report (Texas Department of Health, 2001).

Student tobacco use was measured through self-administered questionnaires distributed to all students at selected study schools. To provide prompt estimates of media and program effects on tobacco use among young adolescents, the largest and most diverse school in each study area was selected as a “sentinel” site. Implementation of school and community activities was organized to assure that these schools received programs during the autumn of 2000 and the selected schools were surveyed in their entirety to obtain sample sizes large enough for accurate estimates of change in the different experimental groups. The main focus of the youth prevention activity was on 6<sup>th</sup> grade students in their first year of middle school and 7<sup>th</sup> grade students in their first year of junior high school. A total of 4,070 6<sup>th</sup> graders in middle schools and 628 7<sup>th</sup> graders in junior high schools who were enrolled during the 1999-2000 school year responded to surveys in the spring of 2000 and, after media and community programs were delivered in the summer and autumn, 4,366 new 6<sup>th</sup> graders and 735 new 7<sup>th</sup> graders (junior high school students) in the next year’s class responded to a second wave of surveys in late November and early December. In addition, 32,560 7<sup>th</sup>-12<sup>th</sup> graders (excluding 7<sup>th</sup> graders in junior high schools) participated in the first sentinel schools’ survey and 35,781 participated in the second survey of those schools.

To determine program effects on cessation among adults, a panel of 1,069 daily cigarette smokers was recruited from a random sample of 8,376 persons across the experimental study areas and from the entire state of Texas not including those areas. These smokers were followed from April-May 2000 to November-December 2000 and interviews were conducted by telephone to determine cessation rates in different experimental groups. To assess changes in the prevalence of smoking, a second random sample telephone survey of 7,763 persons from the study areas and from the rest of the state was conducted in November-December 2000.

## Results and Discussion

### Media and Program Effects Among 6<sup>th</sup> Grade Students

The first year of middle school (6<sup>th</sup> grade) is a critical time for the initiation of tobacco use. Taking that into account, the youth-oriented media campaign was specifically designed to appeal to 6<sup>th</sup> graders and the school-based activity focused on the implementation of a new 6<sup>th</sup> grade curriculum (T.N.T.) for prevention. To evaluate the effects of the T.D.H. Texas Tobacco Prevention Initiative's different media and program activities designed to prevent the onset of tobacco use, changes in the proportion of sentinel school 6<sup>th</sup> graders using any tobacco product during the past month were compared in the different study groups. In the low and high media enforcement areas, where 7<sup>th</sup> graders were in their first year of junior high school, changes were compared among these students. All schools with response rates above 50% were included in the analyses. The mean response rate among these schools was approximately 80%. There were no systematic group differences in response rates.

Among 6<sup>th</sup> graders in middle schools and 7<sup>th</sup> graders in junior high schools who were surveyed in the first half of 2000, near the end of their school year and before the experiment began, the proportion reporting any tobacco (cigarettes, pipes, cigars or spit tobacco) use in the past month ranged from approximately 0.05 to 0.28 in sentinel schools in the different study areas. There were no significant or systematic differences related to the media or program conditions to which the areas were assigned. The new 6<sup>th</sup> graders or 7<sup>th</sup> graders (junior high schools) in each school were surveyed after the new campaigns and programs were delivered, during the middle of the 2000-2001 school year. The proportion reporting any tobacco use in the past month was lower (0.03 to 0.24) in the second survey in all groups. Some of this apparent reduction may be expected, due to the fact that students in the second survey were surveyed earlier in the school year, i.e., at a point when they were only halfway through the increase in tobacco use that is usually seen during the first year of middle school or junior high school.

To adjust for pre-existing differences between areas, we calculated the proportional percentage reduction in each group (absolute percent difference between baseline and follow-up proportions divided by baseline proportion) and then calculated the mean reduction across the different combinations of experimental groups. When areas are grouped by program type (combining areas with the same programs but with different levels of media campaign), the average proportional reduction was approximately 36% in the no program group and 34% in the cessation group, where no community programs were delivered to prevent tobacco use among 6<sup>th</sup> graders (or 7<sup>th</sup> graders in junior high schools). Where single prevention-related programs were delivered, the average reduction was 25% in the enforcement group and 51% in the school/community group. In the multiple program group the average reduction was 50%. These findings show that school-community programs and multiple programs (including school-community programs) may reduce tobacco use in this age group, but that single-focus cessation or enforcement programs do not have detectable effects.

Further analyses compared changes in levels of tobacco use among the 6<sup>th</sup> and 7<sup>th</sup> (junior high schools) grade students according to the level of media campaign that was delivered, combining areas with the same level of media campaign but different types of community programs. When areas are grouped in this way, not taking program type into account, the average proportional reduction was 37% in the areas with no media campaign, 40% in the areas with a low level campaign and 39% in the areas with a high level campaign. More detailed analyses were conducted to determine whether the effects of media campaigns were different in areas with different kinds of programs in the community.

The first figure (1) shows the proportional reductions in each of the fourteen study areas. There are wide variations between the reductions in the different areas (14% to 62%). Many of the differences are not systematically related to the experimental design. These differences may be attributed to normal random variation between tobacco use rates in different age cohorts and to randomly distributed measurement errors. Some variation may also be attributed to systematic (nonrandom) differences between trends in communities that are not related to the experimental design, e.g., tobacco use prevention activities not supported by this research project. Taken together, these factors explain most of the variation in the reductions in the fourteen study areas.

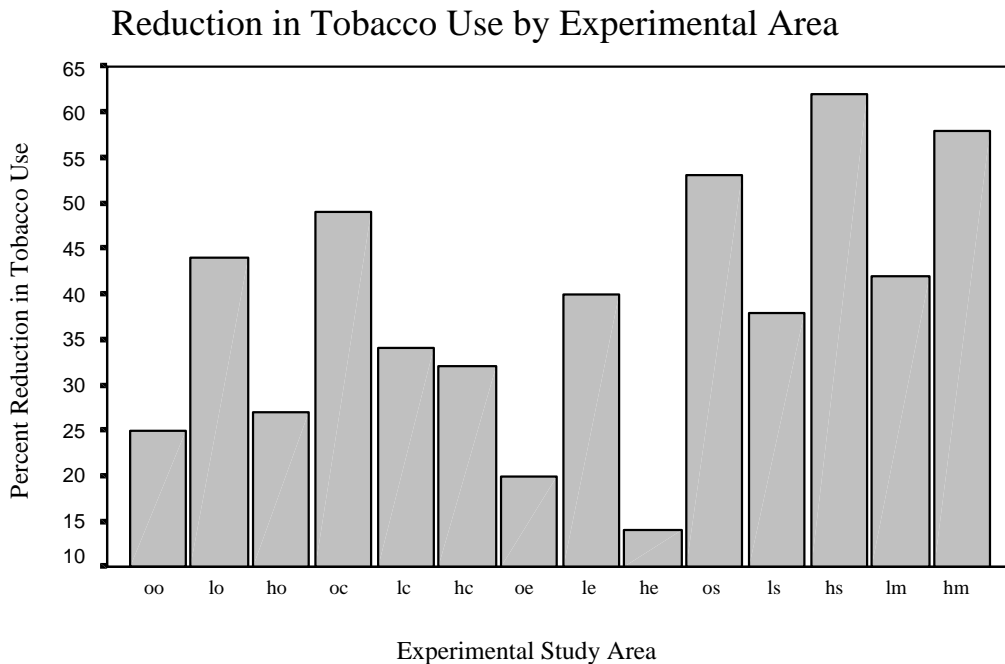
However, the figure shows that some variation is related to the research design. There appears to be a difference between the five areas receiving school-community or multiple programs and the nine areas receiving no programs or single programs for cessation or enforcement. The average reduction in the group with school-community or multiple programs was 51% and the average reduction in the other groups was 32%. This difference is statistically significant in a t-test analysis in which variations between areas within groups is taken into account ( $p < 0.02$ ,  $t = 3.2$ ,  $df = 9.2$ , two-tailed test, equal variances not assumed). The school-community programs that were provided in this experiment had a significant impact on tobacco use among students in their first year of middle or junior high school.

The figure also shows that the greatest reductions in tobacco use were in the areas with high level media campaigns and school-community or multiple programs. Sample sizes vary considerably and these two areas also had the largest reductions in sample size. But changes in sample size were not correlated with changes in tobacco use, as relatively large reductions were also seen in the areas with the largest increases in sample size. To determine whether high level media campaigns significantly enhance the effects of school-community and multiple programs, the fourteen study areas were divided into four distinct media-program groups: (1) six areas with no media or low level media and no programs or single cessation or enforcement programs, (2) three areas with high level media and no programs or single cessation or enforcement programs, (3) three areas with no media or low level media and school-community or multiple programs, (4) two areas with high level media and school-community or multiple programs. The average proportional changes in these four groups of areas were 35%, 24%, 44% and 60%. This pattern represents a statistically significant interaction between program type and media level in an analysis of variance in which the variations between areas within groups is used as the error term ( $F = 5.7$ ,  $df = 1/10$ ,  $p < 0.05$ ). The high level media campaign appears to have significantly enhanced prevention effect in the areas where school-community and multiple programs were provided. The highest level of activity yields the greatest prevention effect.

#### Media and Program Effects Among 7<sup>th</sup> – 12<sup>th</sup> Grade Students

In the T.D.H. Texas Tobacco Prevention Initiative, media and community prevention programs for young people were focused on 11 to 12 year old students in the 6<sup>th</sup> grade. Examination of the data from other grades did not show any systematic evidence of greater reductions in the prevalence of tobacco use across the three media groups and five community program delivery areas. While enforcement activities sought to limit tobacco use among minors in all age groups, the other single program conditions did not involve any school-based activities for older students. The media campaign reached all age groups, but its themes and messages were specifically designed to appeal to younger students. Given these considerations, it is not surprising that the prevention activities have not yet had a measurable impact on the prevalence of tobacco use among older students. Future activities will be designed to reach older youth.

# Figure 1: More Activity Yields Greater Prevention Effect 6<sup>th</sup> Grade - Any Tobacco Product Use in Past 30 Days



<u>Areas-Activities</u> (May-November 2000)	<u>Sample sizes</u>		<u>Tobacco use rates</u>		<u>Change(%)**</u>
	<u>Pre</u>	<u>Post</u>	<u>Pre</u>	<u>Post</u>	
oo = no media or community programs	303	327	0.14	0.11	-25
lo = low media, no community program	440	544	0.22	0.12	-44
ho = high media, no program	246	259	0.05	0.04	-27
oc = no media, cessation program	129	200	0.26	0.13	-49
lc = low media, cessation	570	501	0.15	0.10	-34
hc = high media, cessation	205	331	0.19	0.13	-32
oe = no media, enforcement program*	315	351	0.20	0.16	-20
le = low media, enforcement	269	276	0.14	0.09	-40
he = high media, enforcement*	313	384	0.28	0.24	-14
os = no media, school-community	254	289	0.18	0.08	-53***
ls = low media, school-community	374	356	0.21	0.13	-38***
hs = high media, school-community	180	125	0.08	0.03	-62****
lm = low media, multiple programs	834	936	0.10	0.06	-42***
hm = high media, multiple programs	266	216	0.28	0.12	-58****

\* Includes areas with 7<sup>th</sup> graders in first year of junior high (no comparable 6<sup>th</sup> grade group).

\*\* Some reductions can be expected because of the time of year when surveys were conducted.

\*\*\* Average of reductions in school-community and multiple program areas is significantly greater than average of reductions in other areas (51% vs. 32%,  $t=3.2$ ,  $df=9.2$ ,  $p<0.02$ ).

\*\*\*\* High media enhances reductions in areas with school-community and multiple programs but not in other areas (44% to 60% vs. 35% to 24%, ANOVA,  $F=5.7$ ,  $df=1/10$ ,  $p<0.04$ ).

The only group in which older students received programs at schools was in the multiple program area receiving a high level media campaign. In this area the media expenditures included support for a special newsletter about smoking cessation that was designed for high school students. The staff conducting school-based activities provided access to high schools and the health care professionals who were involved in the cessation activities visited the schools to distribute the newsletter and promote smoking cessation. These activities illustrate the practical ways in which the effects of single programs can be magnified by combining resources for reaching young people at school with media materials to promote cessation provided by trained health care providers.

Among the high school follow-up survey participants, there were 1,066 students in the school receiving the combined program activity and 14,370 students in the schools that did not receive this activity. The proportion who reported a history of daily smoking and who were current smokers six months before the survey was approximately 16% in both of these groups. Among those students, where the combined program activity was implemented, the proportion reporting a quit attempt during the past 6 months was 66%. Among those students where the combined activity was not carried out, the corresponding proportion was 59%. Among those smokers, the proportion reporting that they succeeded in quitting was 33% among students in schools where combined activity was carried out, with a corresponding rate of 26% among students in the other schools. Thus the total quit rate among all of these one-time daily smokers was 22% in the school with combined activity to promote cessation and 15% in the schools without that activity. This difference in cessation rates is statistically significant (chi square=4.0, df=1,  $p<0.05$ ), indicating that the activity for high school students in the high media combined program area was effective in promoting change within that group.

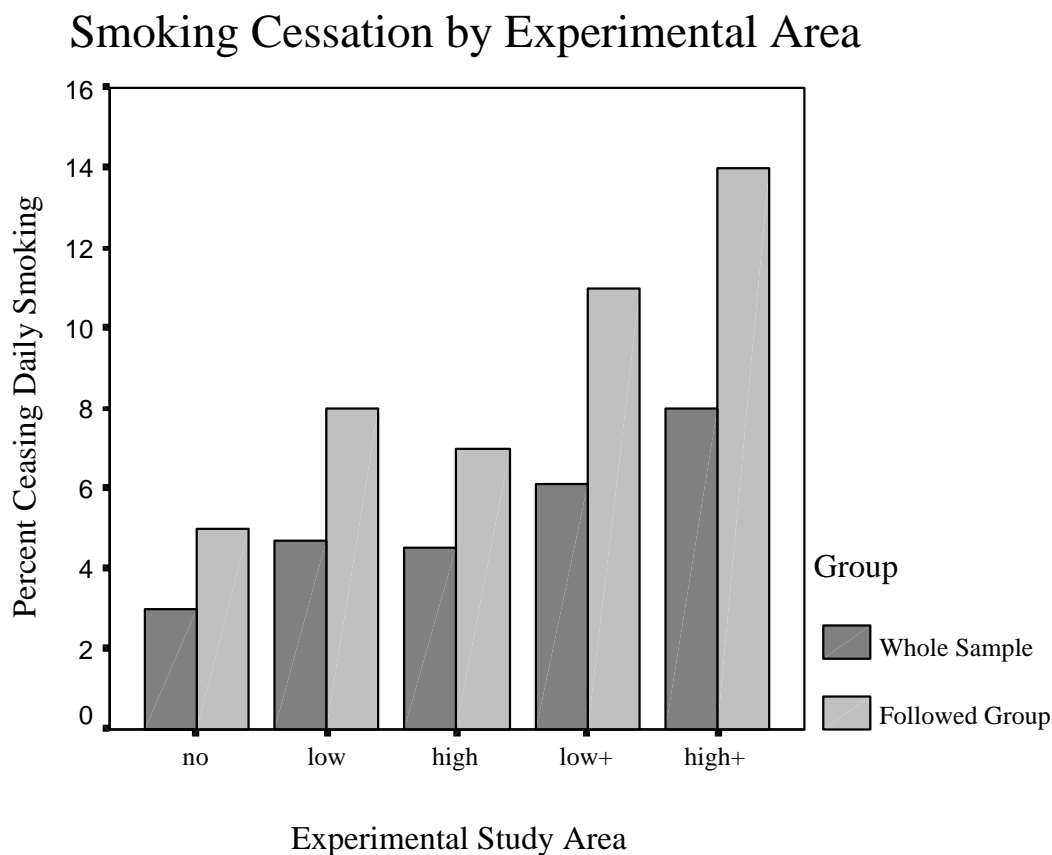
#### Media and Program Effects on Cessation Among Adults

To evaluate media and program effects on smoking cessation rates among adults, a panel of 1,069 daily cigarette smokers was selected from the baseline survey in late spring of 2000 and surveyed again in the late autumn. Only 611 (57%) responded to the follow-up survey, with most attrition coming from disconnected or changed numbers or from individuals who could not be reached after up to five attempts. Only approximately 10% refused to participate when contacted. There were no significant differences between the study groups in the response rate for the second survey. Only approximately 2-3% of the original study group reported complete cessation of smoking and the sample sizes at this rate were too small to be reliably analyzed. However, a large proportion (3-8%) reported that they were no longer smoking every day, and this group provided a sufficient number for statistical comparisons. The proportion ceasing daily smoking was calculated both as a proportion of survey respondents and as a proportion of the entire original study group. The latter method is the most conservative way to estimate cessation rates, as it assumes that all non-respondents have continued to smoke. According to either criterion, a higher rate of cessation was seen in the high media areas than in the low or no media areas. There was also a relatively higher cessation rate in the cessation program delivery area than the other areas. However, these differences in cessation rates are not statistically significant.

To determine whether media campaign level and program delivery type might have a significant interactive effect, we separated the different media and program groups as shown in the second figure (2). The percent reduction is calculated both as a proportion of the smokers who participated in the follow-up interview and as a proportion of all smokers who were enrolled in the study. Among follow-up participants there is a strongly significant trend toward higher cessation rates in the more intensive treatment groups (linear association, chi square=6.58, df=1,  $p<0.01$ ). The highest rate of cessation, close to 14%, was in the area with high level media campaigns and cessation service delivery. There is less change (11%) with cessation services and



**Figure 2: Adults - Media and Community Programs Combine to Increase Reductions in Tobacco Use\***



Areas, sample sizes and follow-up response rates (May – November 2000)

No = No media or community activities for cessation (232 - 137, 0.59)

Low = Low level media, no community activities for cessation (274 - 158, 0.58)

High = High level media, no community activities for cessation (133 - 87, 0.65)

Low + = Low level media with community activities for cessation (229 - 142, 0.62)\*\*

High + = High level media with community activities for cessation (173 - 98, 0.57)

\*Trend toward higher cessation rates in higher activity areas is statistically significant for whole samples and followed groups (Chi square tests of linear association, values = 5.5 – 6.5, df = 1,  $p < 0.02 - 0.01$ ).

\*\*This group includes cases from the area with community activities for cessation but no Texas Department of Health media campaign, where the sample size (47) was too small for separate analysis. Local media activities to promote cessation were carried out in this area.

a low level media campaign. Media campaigns without cessation services yield cessation rates of only approximately 8%, while a cessation rate of 5% is found among those with no campaigns or services. The same pattern is found when reductions are calculated as a proportion of the original study groups (chi square=5.55, df=1,  $p<0.02$ ), with cessation rates ranging from 3% to 8% when calculated in this way.

#### Changes in Tobacco Use Prevalence and Reported Cigarette Use Among Adults

There were 8,376 adults surveyed in late spring and early summer of 2000 and 7,763 were surveyed in late November and early December 2000. The response rates at these two survey points were approximately 60%. Adjusting for differences in age, gender, and education level (all significantly related to tobacco use), the daily cigarette smoking rate was 15.7% in the first survey and 17.5% in the second survey. The increase was small, but statistically significant because of the large numbers that are involved.

While the prevalence of daily cigarette smoking increased in all other areas, the proportion decreased from 0.18 (N=998) to 0.17 (N=701) in the area where a high level media campaign was combined with multiple programs and school-community programs. Given the findings in the preceding section, it is not surprising that evidence of a reduction in prevalence of tobacco use was limited to this area. In addition to the combination of single components, the high level media campaign in this area included high-profile cessation and prevention activities in which youth promoted adult cessation with involvement from health care providers, schools, community agencies and law enforcement officials. The reduction in that area is not statistically significant when analyzed separately. But it is significantly different (general linear model, analysis of time by group interaction,  $F=5.0$ ,  $df=1$ , 5265,  $p<0.03$ ) from the relative increase, from 0.13 (N=1798) to 0.17 (N=1761), in the prevalence of daily smoking that was observed among adults in the statewide sample combined with the areas where no media campaigns or community programs were provided.

Changes in adult tobacco use can also be studied with measures of self-reported daily cigarette consumption, e.g., the average number of cigarettes consumed per day by smokers and nonsmokers as reported in the telephone surveys. In the statewide group combined with the areas where no campaigns or programs were provided, the self-reported average daily cigarette consumption increased from 2.6 per day to 3.2 per day or by 23%. In the area where a high level media campaign was carried out in concert with school-community and multiple community programs, the self-reported average daily cigarette consumption decreased from 3.9 per day to 3.5 per day or by 10%. This relative difference in the changes in reported consumption is statistically significant (ANCOVA analysis of interaction between time and group, controlling for gender, age, education and ethnic group,  $F=4.2$ ,  $df=1$ , 5263,  $p<0.05$ ). Media campaigns alone or in combination with single community programs do not appear to influence the average daily rate of self-reported cigarette consumption, but high level media with multiple community programs were associated with relatively favorable change.

## Conclusions

The results of these studies support the conclusion that significant reductions in tobacco use among children and adults can be achieved by combining high level media campaigns with multiple community programs for health care providers, law enforcement, schools and community agencies. The best results were found with the highest levels of activity, as media campaigns appeared to magnify the effects of community programs. This is consistent with the findings of other studies, as reviewed in the introductory section.

Quasi-experimental community studies such as this are the only reasonable options for studying the effects of tobacco control alternatives in whole populations. But there are unavoidable methodological limitations to the inferences that can be drawn from this form of research. While the various study groups were roughly comparable, random differences and unmeasured variations among communities can introduce error into estimations of media and program effects. Difficulties with survey completion and response rates may also dilute the precision of experimental comparisons. The activities were organized over a relatively short period of time, with less than a year for preparation, funding and implementation for media campaigns and community programs that began near the end of the 1999-2000 school year. Greater effects may be seen as implementation continues. In the areas where effects were seen, the group differences cannot be expected to persist unless activities are maintained. This study only provides evidence for the short-term effects of tobacco control activities. Further research will be needed to fully assess the long-term and cumulative effects of continued efforts to reduce tobacco use.

Despite these caveats, the present findings can be used to estimate the effects of different types and levels of state spending for tobacco control. While the federally recommended spending level of \$5.00 or more per capita may produce better results (Centers for Disease Control, 1999), activities involving annual expenditures of \$3.00 per capita, supporting high level media campaigns and combined community programs for prevention and cessation, were associated with a significant reduction in tobacco use. Lower levels of spending, supporting less intensive media campaigns and the implementation of single-focus community programs, did not have measurable effects on tobacco use among children and adults.

Based on this research it is reasonable to conclude that the high level media campaign combined with multiple community programs that was used in the Texas Tobacco Prevention Initiative can produce at least a five to ten percent net reduction in tobacco use during a few years. A cumulative reduction of at least twenty to thirty percent can be obtained in fifteen to twenty years. Statewide implementation of high level and combined activities is expensive. But great benefits would come from the reduction in disease and death rates that will ensue, with tens of thousands of early deaths eventually prevented and a gain in hundreds of thousands of healthy years of living.

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