Policy Predictors of Participation in Adult Tobacco Cessation Programs

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This article examines the effect of tobacco cessation treatment factors and environmental, structural, and client factors on participation in tobacco cessation programs among adults in a tobacco growing state. A pooled time series cross-sectional research design was used to analyze the primary and secondary data collected at the population level (N = 140 Health Department Service Areas; HDSA). Results indicated that for every cessation program added, there would be an increase in participation of 4 adults per 10,000 smokers, and for every $1.00 per capita spent on counteradvertising, there would be an increase in participation of 26 adults per 10,000 smokers. Local health departments need to initiate or increase counteradvertising, targeting younger adults and HDSAs with higher per capita tobacco production; enhance marketing efforts for cessation; and increase the number of cessation programs offered by HDSAs to as many as are feasible and affordable.

Keywords: *policy predictors; tobacco cessation; tobacco counteradvertising*

Tobacco use is the single most preventable cause of death in the United States and accounts for more than 30% of all deaths from cancer (Centers for Disease Control [CDC], 1997). In 2002, prevalence of cigarette smoking was 25.2% for men and 20.0% for women in the United States, with a combined median of 22.5% (CDC, 2004a). By 1999, the average U.S. smoking attributable mortality (SAM) rate had increased from 315,120 deaths in 1984 (CDC, 1997) to more than 440,000 deaths (CDC, 2002a), accounting for 19.5% of all deaths. From 1995 to 1999, annual smoking-attributable costs for adults and infants, including lost productivity and medical expenditures, amounted to $157 billion dollars (CDC, 2002a).

The statistics for the state of Kentucky, the second largest tobacco producer in the United States, are even more alarming. In 2003, smoking prevalence in Kentucky was the highest among adults in the nation, at 30.8% (CDC, 2004b). The prevalence was 33.8% for men and 28.1% for women (CDC, 2001). Smoking prevalence among adolescents in Kentucky also was among the highest in the nation, with 22% of middle school and 37% of high school students reporting smoking cigarettes within the past 30 days (Kentucky Cabinet for Health Services, 2001). The SAM rate in Kentucky for the years 1995-1999 was 7,791 deaths (CDC, 2002b). Smoking-attributable direct medical costs for 1998 totaled $1.17 billion (CDC, 2002b). Although the CDC recommends that Kentucky

Policy, Politics, & Nursing Practice
Vol. 6 No. 4, November 2005, 296-304
DOI: 10.1177/1527154405283426

spend at least $25,090,000 per year for an effective tobacco control program, current funding is only 15% of the recommended amount (CDC, n.d.). In fact, Kentucky is currently ranked 36 of the 50 states in effective tobacco control funding, spending an average of $1.21 per person per year instead of the CDC recommended minimum of $6.40 per person per year (CDC, n.d.). The Commonwealth of Kentucky is ranked second in the nation in cash receipts from tobacco, accounting for $566.3 million in 2001 (Kentucky Agricultural Statistics Service [KASS], 2002). In fact, tobacco grown in Kentucky accounts for 27% of all tobacco produced in the nation and 34% of cash receipts of all farm commodities in the state (KASS, 2002).

The purpose of this study was to examine whether tobacco cessation treatment factors and environmental, structural, and client factors predict participation in tobacco cessation programs among Kentucky adults. It was hypothesized that a higher participation rate of smokers in cessation programs would be associated with (a) a greater number of cessation treatment factors; (b) greater financial resources for tobacco control and tobacco counteradvertising; (c) a higher percentage of smoke-free food establishments; (d) fewer pounds of tobacco produced; (e) presence of a Health Department Service Area (HDSA) with a single county organizational format; and (f) presence of a full-time tobacco coordinator.

LITERATURE REVIEW

Research-based tobacco cessation interventions are aimed at both individuals/groups and populations/communities. Individual and group tobacco cessation treatments include the use of a tobacco screening system for all patients at every health care provider visit; the use of multiple types of clinicians in tobacco cessation treatment; programs with higher levels of intensity as far as amount of provider contact or group sessions; multicomponent formats that include multiple forms of counseling (individual, group, telephone) and self-help; the use of pharmacotherapy; and targeting treatments at high-risk populations such as pregnant women (Fiore, Bailey, Cohen, et al., 2000; Lancaster, Stead, Silagy, & Sowden, 2000; Task Force on Community Preventive Services [TFCPS], 2001; U.S. Department of Health and Human Services [USDHHS], 2000). Interventions aimed at populations and communities include health care system reminders for providers; expanding coverage for tobacco cessation treatments through health plans and provider reimbursement; smoke-free laws; raising the unit price of tobacco; and the use of mass media intervention (Fiore et al., 2000; Lancaster et al., 2000; TFCPS, 2001; USDHHS, 2000).

This study adapted the Logic of Governance Model (Lynn, Heinrich, & Hill, 2000) to examine factors that influence policy implementation and outcomes including treatment factors, environmental factors, structural factors, and client factors. Tobacco cessation treatment factors are the financial resources and interventions implemented by local health departments that promote quitting and are measured by funding allocations for tobacco control programs, counteradvertising expenditures, and the number of tobacco cessation programs. The environmental, structural, and client factors are those at the local level that encourage or impede the public to quit or reduce tobacco use. Environmental factors include the percentage of smoke-free food establishments and pounds of tobacco produced. Smoke-free food establishments are a result of voluntary policies and the result of the culture of the environment; an environment that is less dependent on tobacco as an agricultural staple may be more likely to enact such policies. Structural factors refer to the organizational format of the HDSA and include the single- or multi-county format of health departments and tobacco coordinator employment status (full- or part-time). Kentucky is made up of both single-county and multi-county health departments. Of the 55 total health departments, 16 are multi-county sites including a range of 2 to 10 counties. In the multi-county health departments, personnel, budgets, and strategic operations are consolidated at one branch site, which also employs one tobacco coordinator to oversee tobacco control efforts in that HDSA. Client factors include adult population demographics such as age, gender, education, and race, all aggregated at the HDSA level.

Many studies have tested the effectiveness of cessation interventions on individuals, behavior system changes, and population prevalence (Fiore et al., 2000; TFCPS, 2001; USDHHS, 2000).

Furthermore, some studies demonstrate the influence of age, gender, education, and race on smoking prevalence (Escobedo, Anda, Smith, Remington, & Mast, 1990; Escobedo & Peddicord, 1996; Fiore, Novotny, Hatziandreu, Patel, & Davis, 1989; Pierce, Fiore, Novotny, Hatziandreu, & Davis, 1989; Zhu et al., 1996). Studies also document the effect of public policies including excise taxes and smoking bans/restrictions on smoking prevalence (Brownson, Eriksen, Davis, & Warner, 1997; CDC, 1996, 1999b; Chaloupka & Grossman, 1996; Green, Eriksen, Bailey, & Husten, 2000; Grossman & Chaloupka, 1997; Jeffrey et al., 1994; Parry, Platt, & Thomson, 1999; Wasserman, Manning, Newhouse, & Winkler, 1991). The literature is lacking, however, with regard to the effects of public policy factors on participation in tobacco cessation programs.

METHOD

Design

A pooled time series cross-sectional research design was used to analyze the primary and secondary data collected at the population level and obtained from state and local agencies. All data were from the years 1999-2001. The unit of analysis was the local health department service area by year. There are 55 health departments in Kentucky, encompassing all 120 counties.

Measures

State-level data from six sources were used: Local Health Department Tobacco Cessation Survey (LHDTCS), Smoke-Free Food Establishment Survey (SFFES), Kentucky Agricultural Statistics Service (KASS), Kentucky Department for Public Health (KDPH) financial records and phone interviews, and Behavioral Risk Factor Surveillance System (BRFSS) from 1999-2001.

The outcome variable, participation in tobacco cessation programs, was assessed using the annual LHDTCS (Hahn, 1999-2001). The LHDTCS monitors the number and type of smoking cessation programs offered by all local health departments in Kentucky. Smoking cessation programs include group and individual methods as well as printed materials, posters, and audiovisual materials. The health department, tobacco coordinators, health educators, and clinic managers participate voluntarily in a 15-minute telephone interview conducted by research assistants at the University of Kentucky Tobacco Policy Research Program.

Tobacco cessation treatment factors including per capita financial expenditures for tobacco control funding and counteradvertising were accessed from financial records from the KDPH and self-report from each local health department. The variable of participation in tobacco cessation programs was derived from the question, "How many clients/patients participated in tobacco cessation programs within the last year?" The numbered response from this question was then divided by the number of adult smokers in each HDSA to calculate the participation in tobacco cessation programs per 10,000 adult smokers. The number of adult smokers in each HDSA was calculated by multiplying the population of each HDSA by the proportion of adults, then multiplying this number by unweighted smoking prevalence rates from 1999-2001.

Per capita funding was obtained by dividing the dollar amount of funding by the population of the HDSA, with ranges expected from 0 to $2.00 per capita. Counteradvertising expenditures were defined as cessation expenditures for print media such as television, radio, and billboard ads; mass printing of tobacco cessation literature such as pamphlets, bookmarks, car hang tags, or contest literature from a local Quit and Win contest; Web sites offered to the public; and external grant money spent on counteradvertising. Data were verified for accuracy by contacting a random sample of tobacco coordinators. Expected ranges were 0 to $1.00 per capita.

Environmental factors were measured by the SFFES and the number of pounds of tobacco produced. The SFFES is included on the existing statewide food service inspection survey form and determines the percentage of food service establishments that are smoke-free. Food service establishments are defined as any facility that prepares food for the public as well as provides a place to eat. Pounds of burley and flue-cured tobacco produced per HDSA were standardized per capita for 1999-2001. Pounds of tobacco produced are compiled annually by the KASS and are available by county (KASS, 2002).

Structural factors including format of health departments and tobacco coordinator employment status were measured using telephone interviews with staff from the Kentucky Tobacco Use Prevention and Cessation Program at the KDPH. Client factors were measured using the BRFSS to assess mean age, race (percentage Black and percentage American Indian or Alaskan Native), gender (percentage male), and education (percentage completing kindergarten or no school, percentage completing grades 1-8, and percentage 4-year college graduates).

Data Analysis

The data were compiled into one database through the use of the SAS System for Windows Version 8 statistical package. All data were linked by HDSA. Quantitative analysis was performed using the SPSS Version 11.5 for Windows statistical package. A fixed-effects regression approach was used and dummy variables were created for the years 2000 and 2001 (Pedhazur, 1997). An adjusted R^2 statistic was used to adjust for the number of parameters and the sample size used in the model. Data were missing from the SFFES in a total of 25 counties over the 3 years of the study. The unit of analysis for this study was the HDSA by year, and the sample included HDSAs over 3 years ($N = 140$). In this study, none of the variables had a VIF that exceeded 4.0 or a tolerance less than .25, indicating that multicollinearity was not a problem.

TABLE 1: Means, Standard Deviations, and Ranges for Continuous Independent Variables

Variable by Year	n	M	SD	*Range*
1999				
Number of programs	55	2.40	3.42	0-16.00
Tobacco control funding[a]	55	.08	.22	0-1.03
Counteradvertising[a]	55	.00	.01	0-.06
% smoke-free food establishments	46	21.44	18.07	0-58.33
Pounds of tobacco produced[a]	55	162.72	165.06	.04-810.85
2000				
Number of programs	55	1.85	2.57	0-12.00
Tobacco control funding[a]	55	.55	.01	.52-.60
Counteradvertising[a]	55	.02	.07	0-.38
% smoke-free food establishments	47	24.02	20.19	0-84.21
Pounds of tobacco produced[a]	55	104.75	104.70	.0-108.60
2001				
Number of programs	55	2.60	3.68	0-20.00
Tobacco control funding[a]	55	.85	.40	.52-2.31
Counteradvertising[a]	55	.13	.24	0-1.26
% smoke-free food establishments	47	26.54	18.31	0-61.40
Pounds of tobacco produced[a]	55	97.76	100.18	.05-423.02

a. Per capita.

RESULTS

Participation in tobacco cessation programs per 10,000 adult smokers ranged from 0 to 131.81, with a mean of 14.46 in 1999-2001. The means, standard deviations, and ranges for the continuous variables are reported in Table 1. The number of tobacco cessation programs ranged from 0 to 20, with a mean of 2.28 from 1999-2001. Total funding for tobacco control per capita ranged from 0 to $2.31, with a mean of $0.49 cents from 1999-2001. Counteradvertising per capita ranged from 0 to $1.26, with a mean of $0.056 cents from 1999-2001. Over the course of the 3 years included in the analysis, 40 of 55 health departments used funds for counteradvertising. Percentage of smoke-free food establishments ranged from 0% to 84.2%, with a mean of 24.02% from 1999-2001. The amount of burley and flue-cured tobacco produced per capita ranged from .01 to 818.85 pounds, with a mean of 121.74 pounds from 1999-2001.

There were a number of bivariate correlations that were significant at the $p < .05$ level for 1999-2001. Participation in tobacco cessation programs per 10,000 smokers positively correlated with the number of tobacco programs ($r = .64$, $p \leq .001$) and counteradvertising per capita ($r = .21$, $p \leq .05$). Per capita counteradvertising was positively correlated with total tobacco control funding ($r = .20$, $p \leq .01$), indicating that the higher the amount of total funding, the more was spent on counteradvertising for tobacco. The percentage of smoke-free food establishments was positively correlated

TABLE 2: Regression of Participation in Tobacco Cessation Programs Onto Selected Variables, 1999-2001 (*N* = 140)

Variable	*Regression Coefficient*	*SE*	t *Statistic*
Time 2000	3.319	5.077	.654
Time 2001	4.714	6.248	.754
Treatment factors			
Cessation program	5.143	3.917	1.313
Number programs	4.518	.564	8.012***
Counteradvertising[a]	26.283	10.172	2.584**
Total funding[a, b]	–.202	6.153	–.033
Environmental factors			
Smoke-free restaurants[c]	–.107	.093	–1.155
Pounds of tobacco[a]	.006	.013	.440
Structural factors			
Organizational format	–3.176	3.408	–.932
Coordinator position	–2.045	2.699	–.758
Client factors			
Mean age	1.306	.605	2.159*
% Black	–.103	.341	–.303
% Indian/Alaskan	–2.486	2.621	–.949
% males	–.103	.341	–.303
% kindergarten/no school	–1.529	2.828	–.541
% completing grades 1-8	–.430	.273	–1.575
% college graduates	–.140	.251	–.557

Model adjusted R^2 = .461; ($F_{17, 122}$ = 7.993)***

a. Per capita.
b. Total funding for tobacco control.
c. Smoke-free food establishments.
*$p \leq .05$. **$p \leq .01$. ***$p \leq .001$.

with the number of programs provided (r = .33, $p \leq .001$) and negatively correlated with tobacco production per capita (r = –.26, $p \leq .01$), indicating that an environment that supports smoke-free food establishments also is supportive of tobacco cessation programs.

The number of cessation programs, funding per capita for counteradvertising, and mean age of the population were significant predictors of participation in tobacco cessation programs (see Table 2). For every increase of 1.0 in mean age, number of cessation programs, and funding for counteradvertising per capita, the participation rate of smokers in cessation programs increased by 1.306, 4.518, and 26.283, respectively. For example, for every increase in year of mean age of HDSA residents, there would be an increase in participation of 1 adult per 10,000 smokers; for every cessation program added, there would be an increase in participation of 4 adults per 10,000 smokers; and for every $1.00 per capita spent on counteradvertising, there would be an increase in participation of 26 adults per 10,000 smokers. After adjusting for sample size and number of parameters, 46.1% of the variation in the tobacco cessation program participation was explained by the independent variables in the model ($F_{17, 122}$ = 7.993, $p < .0001$).

The following variables did not predict participation in cessation programs: financial resources devoted to tobacco control; proportion of smoke-free food establishments; pounds of tobacco produced; and the presence of a HDSA with a single-county organizational format and full-time tobacco coordinator.

DISCUSSION

The major findings of this study were that the treatment factors of number of programs and counteradvertising and the client factor of mean age of the population contributed the most toward participation in tobacco cessation programs. In other words, the greater the number of cessation programs provided, the greater the financial resources for counteradvertising, and the higher the mean age in the population, the higher the participation in tobacco cessation programs.

The results indicated that none of the environmental and structural factors helped to explain participation in tobacco cessation programs. Possible reasons for these nonsignificant findings include the fact that current tobacco control funding is far below the CDC-recommended levels and thus may have minimal effect. In 2002, Kentucky spent $1.21 per capita on actual tobacco control funding, which is far below the CDC-recommended amounts of $6.40 (low estimate) to $17.90 (high estimate) for effective funding (CDC, 1999a). Another factor is that the agricultural dependence on tobacco is on the decline; tobacco production decreased by an estimated 137,100,000 pounds from 1999 to 2000 (KASS, 2002). There are many efforts under way in the state to reduce the

agricultural dependence on tobacco through diversification (Governor's Office of Agricultural Policy, 2002). Although percentage of smoke-free food establishments and tobacco coordinator employment status did show variation in ranges over 3 years, collection of more years of data would facilitate an analysis of changes over time, which may reveal significant findings.

Counter-advertising has been shown to promote tobacco cessation, decrease the likelihood of tobacco initiation, increase public support for tobacco control, and support a climate for community and school prevention efforts (CDC, 1999a). Counter-advertising has also been shown to decrease smoking prevalence in adults in a computer simulation (Levy & Friend, 2001) and is known to be effective in decreasing smoking prevalence among adolescents (Sowden & Arblaster, 2001). Current CDC recommendations call for Kentucky to spend between $1.00 and $3.00 per capita for counter-marketing (CDC, 1999a). In this study, the mean countermarketing expenditure was $0.056 cents per capita between 1999 and 2001, far below the CDC-recommended amount. Because counteradvertising is a relatively new treatment factor in Kentucky, these findings show promise. Increasing counter-advertising expenditures could further increase participation in tobacco cessation programs, which remains fairly low (18 per 10,000 smokers in 2001). In addition, a higher participation rate in tobacco cessation programs might eventually translate to an increase in quit attempts and, ultimately, a decrease in smoking prevalence.

Given the strong predictive ability of funding for counter-advertising on participation in tobacco cessation programs, it is recommended that local health departments or other organizations continue to allocate funding for counter-advertising in their tobacco control programs. Local health organizations that did not allocate funding for counter-advertising might consider re-budgeting to fund counter-advertising. All Kentucky health departments are strongly urged to increase their present level of funding for counter-advertising to at least $1.00 per capita, the minimum recommended by the CDC. In addition, health departments in other states are urged to increase their levels of funding for counter-advertising to the minimum amount recommended by the CDC.

The only significant demographic variable was mean age, indicating that HDSAs with a higher proportion of older smokers were more likely to have higher participation rates in tobacco cessation programs. Adults aged 45 to 64 and older than 65 are far more likely to successfully quit smoking than younger adults (CDC, 2004a). Nationally, smoking prevalence is the highest among 18- to 24-year-olds and 25- to 44-year-olds (CDC, 2004a). Since the mid-1990s, youth smokers were the only age category that has increased in smoking prevalence, which has contributed to the rise in young adult smokers (CDC, 2000). Targeting younger adult smokers through counter-advertising and promotional campaigns might increase participation in tobacco cessation programs. The finding that HDSAs with a higher proportion of older adults have higher participation in tobacco cessation programs suggests that efforts targeting older adults to actively participate in cessation may be working. Another explanation may be that consumer demand naturally increases as smokers age and experience illness symptoms.

This study had several limitations. The cross-sectional study design obscures the temporality between the dependent and independent variables, owing to the limitation of time. Temporality of association means that a cause must precede an effect, which in a cross-sectional design cannot be established (Streiner & Norman, 1998). Also, the use of secondary data implies threats to the reliability and validity of those data. The data used in this study were reported in the same year or years, but data collection did not occur concurrently. A circumstance such as death by lung cancer of a prominent community member might affect responses to measures obtained at different time points (Streiner & Norman, 1998).

Another limitation of this study was that the data were only analyzed over a 3-year period of time. Continuing to collect these data for a longer span, for example over 10 years, would facilitate detecting change over time. This study also was limited by the lack of data available for analysis. There were many variables that might have been examined if data were available such as the

budgetary allocation specific to cessation. Further studies could include cessation treatments located outside of health department settings including population-based approaches such as Quit and Win contests and quit lines. An environmental factor that also would be useful to examine is the percentage of smoke-free worksites. A structural factor that could be examined would be the smoking status of health department staff and whether the local health department is smoke-free. There are many client factors that might have also been examined such as the salience of cessation programs and attitudes toward quitting among adult tobacco users. The difficulty in including all of these variables is that the data do not currently exist, and new measures would need to be created and implemented at the population level.

POLICY RECOMMENDATIONS

Findings from this study have implications for specifically targeting young adults with counter-advertising for cessation including the use of television, radio, and billboard ads; pamphlets, bookmarks, car hang tags, or literature from a Quit and Win contest or quit lines; and Web sites. Although this study did not examine the nature of the counter-advertising, perhaps younger adults were not exposed to media advertising for cessation programs. Most of the advertising for cessation programs is currently conducted through newspaper and radio ads that may not target younger adults. Marketing cessation programs to younger adults is congruent with eliminating health disparities, one of five CDC strategies for lowering smoking prevalence (CDC, 1999a).

There is support that evidence-based counter-advertising measures such as the American Legacy Foundation's TRUTH campaign provide a dose-response relationship in lowering youth smoking prevalence (Farrelly, Davis, Haviland, Messeri, & Healton, 2005), but there is little literature concerning evaluation of smoking prevention and cessation interventions for young adults (Lantz, 2003). Research needs to be conducted that examines the factors that influence smoking prevalence in young adults, both those who attend college and those who do not (Lantz, 2003). A need also exists to measure the nature of these counteradvertising measures to determine if they are congruent with evidence-based research. Public health professionals and tobacco use prevention and cessation staff must work closely not only to budget for counteradvertising but also to target young adults with evidence-based messages that would most influence this age, such as social acceptability marketing (CDC, 1999a; Lantz, 2003).

Health departments must be encouraged to conduct as many cessation programs as are feasible and affordable on a consistent basis. The number of programs provided by health departments was positively associated with participation in tobacco cessation programs. The greater the number of programs provided, the greater the participation in such programs. This may seem like an obvious relationship, but it offers evidence that cessation programs that are marketed increase consumer demand. For tobacco control programs that are just beginning, as many are in Kentucky, this finding supports a strong policy recommendation for the implementation of year-round cessation programs. For those organizations that already provide year-round programs, this finding is evidence that they should continue to provide and market programs to increase consumer demand.

Factors that influence the number of cessation programs are primarily fiscal in nature. However, the environmental factor of percentage of smoke-free restaurants was found to be positively correlated with the number of programs provided. To the extent that local politics plays into the establishment of smoke-free restaurants, there is a suspected political influence as well.

Research-based tobacco cessation interventions have been shown to be effective for individuals, groups, and populations. This study, however, was the first to examine the effects of tobacco cessation treatment factors and environmental, structural, and client factors on participation in tobacco cessation programs at the local level. By continuing to provide cessation programs that are well-advertised, local health organizations will be more likely to affect the participation in cessation programs. With increased funding for counter-advertising in combination with other policies such as increased tobacco excise taxes and smoke-

free laws, the expectation is that smoking prevalence may eventually decline in Kentucky.

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