

Attitudes Toward Smoking Restrictions in Work Sites, Restaurants, and Bars Among North Carolinians

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Abstract

Background Public support for smoking restrictions has increased in recent years, but support varies among groups and according to where restrictions should apply. National studies show that Americans are less likely to favor smoking restrictions in restaurants and bars than at other work sites but that the support varies across segments of the population. A full examination of the changes and status of attitudes toward smoking restrictions by site and across subgroups in North Carolina has not been undertaken.

Methods Data from US Census Bureau Current Population Surveys conducted during 2001-2002 and 2006-2007 were analyzed. Trends in attitudes toward smoke-free policies at indoor work sites, restaurants, and bars are presented overall and by occupation, smoking status, income, race/ethnicity, workplace smoking policy, age, sex, and education. Logistic regression was used to identify key factors predicting support for smoke-free policies at work sites.

Results Support for smoke-free policies increased by at least 7.4 percentage points at each venue between 2001-2002 and 2006-2007. In 2006-2007, the strongest public support for smoking restrictions was reported for work sites (69.6%), followed by restaurants (52.3%) and bars (36.1%). Whether a person smokes is the strongest predictor of their attitude about smoking restrictions in indoor work sites.

Limitations Data are self-reported, from independent samples, and lack county identifiers.

Conclusions There is substantial and increasing public support for smoke-free policies in North Carolina. These findings show extensive support for extending smoking bans to all indoor work sites, with nearly 70% of respondents in 2006-2007 favoring smoke-free work sites.

Secondhand-smoke exposure has numerous negative health effects, and a recent report of the US Surgeon General advises that no level of exposure to secondhand smoke is safe [1]. Increasingly, this risk is recognized by the public, and studies report strong public support for smoking bans in workplaces, restaurants, and bars. In national studies, public support for smoking bans varies according to the venue affected and who is asked [2-5]. Current smokers and men are less likely to support smoking restrictions, and work-site restrictions are more strongly supported than are those applying to bars or restaurants. Recent polls conducted by Elon College in 2006, 2007, and 2009 indicated that 62%-67% of North Carolinians support state laws that would ban smoking in all public places [6-8]. Public support

for smoking bans by venue, important demographic characteristics, and changes over time have not fully been explored in North Carolina.

With increasing public support for smoking bans, legal protection against secondhand smoke is beginning to emerge. The North Carolina General Assembly has gone from prohibiting local units of government from restricting smoking in public places, in 1993, to banning smoking in state government buildings and allowing local governments to do likewise in their buildings, in 2007 [9]. In 2008, state-owned vehicles were included in the smoking ban [10]. Most recently, the 2009 session enacted a state law, which took effect in January 2010, that bans smoking in restaurants and bars in North Carolina [11]. Although this protects custom-

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ers and employees at these sites, the law will not protect those at other workplaces.

This timely study describes attitudes in North Carolina toward smoking restrictions in indoor work sites, bars, and restaurants with respect to the following key independent variables: occupation, smoking status, income, age, sex, race/ethnicity, education, and workplace smoking policy. It also documents changes in attitudes toward smoking restrictions over a 5-year period and identifies the key predictors of attitudes.

On the basis of national trends, it was expected that an increase in support for smoking restrictions in North Carolina would be seen over time [3]. It was hypothesized that blue-collar workers, smokers, and people in younger age groups would report less-positive attitudes toward smoking restrictions, compared with other groups [2-5]. Stronger support was expected among females, people in the highest education and income groups, and Hispanics [2-5]. Lastly, it was anticipated that attitudes toward restrictions in restaurants would be less positive than those toward restrictions in work sites and that the least support would be for restrictions in bars [3].

Methods

Participants. The target population for this study was North Carolinians, represented by 2 independent, random samples of North Carolina residents surveyed as part of the Current Population Survey (CPS) during 2 periods, 5 years apart. Surveys conducted during each period also included questions from the Tobacco Use Supplement (TUS). The 2001-2002 sample included 3,835 self-responding individuals residing in North Carolina. Their responses were compared to responses from a sample of 2,766 in 2006-2007, the most recent period for which TUS data were available. The individual was the unit of analysis. The study was approved by the East Carolina University and Medical Center Institutional Review Board.

Data collection. The CPS has been conducted monthly by the US Census Bureau since 1940 to provide estimates for labor statistics and update demographic information between the decennial censuses. Respondents to the CPS are also given the option of responding to the TUS. The TUS was introduced in 1992 and is typically conducted in 2-year cycles. The TUS is given in conjunction with the regular CPS for 3 months out of each 2-year cycle. It includes questions related to tobacco, including questions on tobacco use, smoking policies at work, and attitudes toward smoking policies. Although the CPS allows proxy respondents, an effort is made to collect data from self-respondents for the TUS, since many of the responses would be unknown to proxies [12, 13]. For this analysis, only self-responses were used.

Measures. The 3 dependent variables in this study are attitude about smoking in indoor workplaces, attitude about smoking in restaurants, and attitude about smoking in bars or cocktail lounges (hereafter collectively referred to as

bars). In the CPS-TUS, each question measuring an attitude toward smoking asked, "In [indoor work areas, restaurants, bars/cocktail lounges], do you think smoking should be allowed in all areas, allowed in some areas, or not allowed at all?" Responses indicating "all areas" and "some areas" were combined to create a dichotomous variable relative to each site, classified as either should be smoke-free or should not be smoke-free. The 3 venues are mutually exclusive.

It was hypothesized that 8 independent variables affect an individual's attitude (ie, preference that a venue be smoke-free). The independent variables are smoking status, occupation, income, age, sex, race/ethnicity, education, and type of workplace smoking policy. Each of these variables was coded into either nominal or ordinal groupings, as shown in the results (Tables 1 and 2).

Values for the independent variable type of workplace smoking policy (ie, smoke-free vs not smoke-free) were computed from questions that asked about the smoking policy for work and common/public areas separately. Respondents could report that smoking was allowed in all, some, or no areas, for both items. If a respondent reported that smoking was not allowed at all in both work and public areas, their workplace smoking policy was classified as smoke-free in the analysis. Questions about smoking policies were asked only of currently employed indoor workers who reported some form of a smoking policy (ie, their workplace had a formal policy, regardless of whether it restricted smoking). Data for respondents who did not know whether their work site had a policy or said their workplace did not have a policy were coded as missing for this item.

Occupation groupings were created using census codes for each respondent's primary job. The categories generally followed those used by the Census Bureau (Table 3). Occupation codes were not collected for respondents not in the workforce (ie, for those who were retired, disabled, or other reason) or for those who were unemployed. Complete information for each census code and all of the questions used in this study can be found in the technical documentation for the CPS [12, 13].

Data analysis. The data were read, managed, and analyzed using SAS, version 9.2 (SAS Institute), by R.L.M., with input from the other authors. A supplemental weight developed by the Census Bureau was used to adjust for nonresponse and use of self-response only. Descriptive statistics (eg, percentages of respondents reporting different attitudes toward smoking policies) were reported by the independent variables and overall for both periods. A weighted, pooled *t* test was used to calculate the 95% confidence interval (CI) for the difference between the 2 periods and to provide *P* values indicating statistically significant (defined as a *P* value of <.05) and insignificant differences between the 2 periods.

Logistic regression was used to identify the most important factors predicting attitudes toward smoking restrictions in indoor workplaces. Respondents with unexplained miss-

Table 1.
Comparison of Preferences for Smoke-Free Venues, by Key Independent Variables, Among Respondents to Census Bureau Current Population Surveys, 2001-2002 and 2006-2007

Characteristic	Indoor work sites				Restaurants				Bars			
	2006-2007 (N = 2,671)	2001-2002 (N = 3,722)	Δ^a	P	2006-2007 (N = 2,673)	2001-2002 (N = 3,732)	Δ^a	P	2006-2007 (N = 2,616)	2001-2002 (N = 3,591)	Δ^a	P
Overall	69.6	62.2	7.4	<.001	52.3	44.7	7.6	<.001	36.1	27.6	8.5	<.001
Smoking status												
Nonsmoker	76.4	69.0	7.4	<.001	60.2	52.8	7.4	<.001	42.6	34.5	8.1	<.001
Smoker	44.5	41.8	2.7	.316	22.8	20.1	2.7	.229	12.6	7.4	5.2	.001
Sex												
Male	64.7	58.7	6.0	.001	48.2	43.3	4.9	.011	32.0	25.0	7.0	<.001
Female	74.3	65.3	9.0	<.001	56.1	45.9	10.2	<.001	40.2	30.1	10.1	<.001
Education												
High school or less	58.3	54.5	3.8	.031	44.0	39.8	4.2	.016	31.4	26.7	4.7	.004
At least some college	80.4	71.0	9.4	<.001	60.2	50.3	9.9	<.001	40.6	28.7	11.9	<.001
Race/ethnicity												
White, non-Hispanic	69.8	60.6	9.2	<.001	52.0	42.7	9.3	<.001	35.8	25.9	9.9	<.001
Black, non-Hispanic	68.7	64.9	3.8	.159	51.4	47.6	3.8	.188	34.8	29.6	5.2	.057
Hispanic	72.3	76.9	-4.6	.418	61.1	62.4	-1.3	.841	42.7	49.4	-6.7	.305
Other	68.9	62.2	6.7	.279	50.5	45.7	4.8	.456	40.2	25.5	14.7	.016
Workplace smoking policy ^b												
Smoke-free	84.6	72.7	11.9	<.001	61.7	48.8	12.9	<.001	40.9	28.9	12.0	<.001
Not smoke-free	65.6	59.6	6.0	.179	45.3	35.2	10.1	.023	28.1	18.5	9.6	.015

Note. Unless otherwise indicated, data are percentage of respondents who prefer smoke-free venues. Percentages do not include respondents for whom data on variables were missing.

^aValues denote the difference between 2006-2007 percentages and 2001-2002 percentages.

^bData include indoor workers with any type of smoking policy and exclude those not in the labor force.

ing data were excluded from the logistic model (649 respondents [16.8%] were excluded from the 2001-2002 group, and 451 respondents [16.3%] were excluded from the 2006-2007 group). For occupation and workplace smoking policy, some respondents were included despite missing data, since the missing information could be explained. For the logistic regression, these groups were included in the analysis but coded as missing. Occupation was not recorded for respondents who were retired, disabled, or not in the workforce. Smoking policy at work was not recorded for respondents who worked outdoors or whose work site did not have any type of official smoking policy. It is likely that many of the workers in this category were regularly exposed to smoke at work, since they either worked outside (where smoking policies are rarely in effect) or worked at a site that lacked a formal smoking policy.

Results

The sample was generally representative of the North Carolina population but contained a greater percentage of females (57.8% in the sample vs 51.1% in the population) and white, non-Hispanic respondents (73.4% vs 67.5%) [14]. It is significant to note that 79.6% of respondents in the recent, 2006-2007 sample were nonsmokers, an

increase of 4.6% over the previous period. Nearly 80% of respondents working indoors at a workplace with a smoking policy reported that their workplace was smoke-free in 2006-2007.

As expected, there was a general trend toward increased support for smoke-free policies between 2001-2002 and 2006-2007. Preference for all areas to be smoke-free increased for all 3 venues (Figure 1). Table 1 shows that the proportion of respondents supporting smoke-free policies in work sites, restaurants, and bars increased by 7.4 percentage points (95% CI, 5.1-9.8; $P < .001$), 7.6 percentage points (95% CI, 5.1-10.0; $P < .001$), and 8.5 percentage points (95% CI, 6.2-10.8; $P < .001$), respectively. As hypothesized, support for smoke-free policies in 2006-2007 was the highest for work sites (69.6% [95% CI, 67.7%-71.5%]), the lowest for bars (36.1% [95% CI, 34.2%-38.1%]), and between the other values for restaurants (52.3% [95% CI, 50.2%-54.3%]) (Figure 1 and Table 1).

Support for smoking restrictions increased across nearly every subgroup, with the majority of differences being statistically significant. Nonsmokers reported the highest degrees of support for smoke-free policies across all 3 venues in 2006-2007, and their support increased significantly and substantially over the 5-year period. A total of 76.4%

of nonsmokers thought indoor work sites should be smoke-free, an increase of 10.7% from 2001-2002 ($P < .001$); 60.2% thought restaurants should be smoke-free, an increase of 14% ($P < .001$); and 42.6% thought bars should be smoke-

free, an increase of 23.4% ($P < .001$). A decline in support for restrictions among Hispanics (for all venues) was suggested by the data; workers at sites that were typically outdoors, such as construction and forestry workers (for indoor

Table 2.
Findings of Logistic Regression to Predict Preferences for Smoke-Free Indoor Work Areas Among Respondents to Census Bureau Current Population Surveys, 2001-2002 and 2006-2007

Characteristic	2001-2002			2006-2007		
	OR (95% CI)	χ^2_{df}	P	OR (95% CI)	χ^2_{df}	P
Smoking status		104.5 ₁	<.001		88.8 ₁	<.001
Smoker	Reference			Reference		
Nonsmoker	2.6 (2.2-3.1)			3.2 (2.5-4.0)		
Occupation		28.2 ₅	<.001		22.6 ₅	<.001
Construction, extraction, installation, maintenance, repair, farming, fishing, forestry	Reference			Reference		
Service	1.7 (1.2-2.5)			1.4 (0.9-2.4)		
Manufacturing, production, transportation	1.5 (1.1-2.2)			1.4 (0.9-2.3)		
Administrative support, sales	2.0 (1.4-2.7)			2.5 (1.6-4.1)		
Management, business, financial, professional specialty	2.3 (1.7-3.3)			2.2 (1.4-3.5)		
Missing ^a	1.8 (1.4-2.4)			2.1 (1.4-3.1)		
Annual income		4.4 ₃	.226		18.2 ₃	<.001
Low (<\$25,000)	Reference			Reference		
Middle (\$25,000 to <\$50,000)	1.0 (0.9-1.3)			1.1 (0.8-1.4)		
Upper middle (\$50,000 to <\$75,000)	1.3 (1.0-1.6)			2.0 (1.4-2.8)		
High ($\geq$ \$75,000)	1.2 (0.9-1.6)			1.3 (0.9-1.8)		
Education		24.5 ₁	<.001		35.0 ₁	<.001
High school graduate or less	Reference			Reference		
At least some college	1.6 (1.3-1.9)			2.0 (1.6-2.6)		
Race/ethnicity		30.9 ₃	<.001		5.3 ₃	.149
White, non-Hispanic	Reference			Reference		
Black, non-Hispanic	1.4 (1.1-1.7)			1.1 (0.9-1.5)		
Hispanic	3.4 (2.1-5.6)			1.7 (1.0-2.9)		
Other	1.1 (0.7-1.8)			1.6 (0.8-2.9)		
Workplace smoking policy		15.9 ₂	<.001		29.9 ₂	<.001
Not smoke free	Reference			Reference		
Smoke free	1.4 (1.0-2.0)			2.1 (1.3-3.3)		
Missing ^b	0.9 (0.7-1.3)			0.9 (0.6-1.4)		

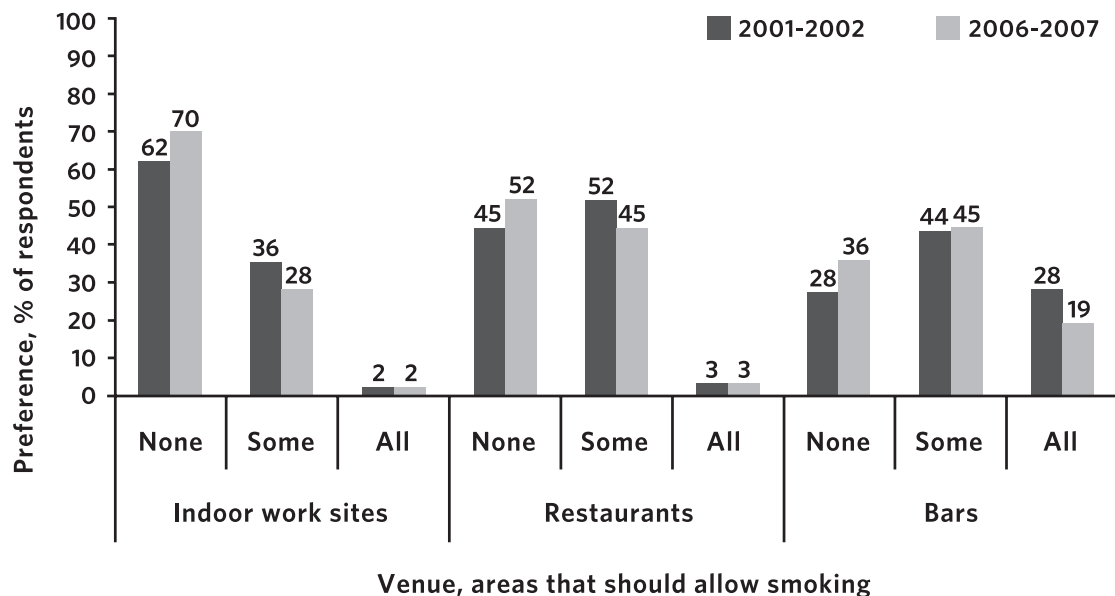
Note. Missing data on occupation and/or workplace smoking policy were determined not to be missing at random, and respondents for whom these data were missing were thus included in the analysis. For 2001-2002, 649 respondents were excluded because of missing data (N = 3,186). For 2006-2007, 451 respondents were excluded because of missing data (N = 2,359). CI, confidence interval; df, degrees of freedom; OR, odds ratio.

^aMost respondents considered to have missing data were not in the labor force (ie, retired, disabled, other, or unemployed).

^bMost respondents considered to have missing data worked outdoors or for a company with no smoking policy in place.

Figure 1.

Smoking Preferences at Indoor Work Sites, Restaurants, and Bars Among Respondents to Census Bureau Current Population Surveys, 2001-2002 and 2006-2007



Note. Sample sizes for 2001-2002 and 2006-2007 surveys were 3,722 and 2,671 responses, respectively, for indoor work sites; 3,732 and 2,673, respectively, for restaurants; and 3,591 and 2,616, respectively, for bars.

work areas and bars); and the youngest age group (for bars). However, none of these differences were significant.

In general, in 2006-2007, the groups with the most support for smoke-free policies at the 3 sites were nonsmokers, females, respondents with at least some college, white-collar or office-type workers, higher-income groups, and respondents with a smoke-free policy at work. Conversely, less support for restrictions was generally seen among workers in traditionally blue-collar fields (eg, construction, manufacturing, and service workers), smokers, the lowest income group, the youngest age group, males, respondents with a high school education or less, and respondents without a smoke-free policy at work.

In the logistic regression, several factors were statistically significant predictors of support for a smoke-free policy at work sites (Table 2). For both 2001-2002 and 2006-2007, smoking status, occupation, education, and workplace smoking policy were significant. In both periods, smoking status was clearly identified as the strongest predictor. In 2006-2007, the odds among nonsmokers of supporting a smoke-free policy were more than 3 times the odds among smokers. The ratio of the odds of support by nonsmokers to the odds of support by smokers increased from 2.6 in 2001-2002 to 3.2 in 2006-2007. The odds of support were also higher for respondents with more education and for respondents with smoke-free policies at work, with the odds among both groups approximately 2 times those of their counterparts. In 2001-2002, the odds of support among Hispanics

were more than 3 times those among white, non-Hispanics; however, race/ethnicity was not a significant characteristic in the 2006-2007 model. Income was not significant in 2001-2002, but in 2006-2007 the odds of support in the upper-middle income group were nearly 2 times the odds in the lowest income group.

Discussion

As was expected, the percentage of North Carolinians supporting smoke-free policies in workplaces, restaurants, and bars was much higher for 2001-2002 and 2006-2007 than for 1995-1996, according to the CPS-TUS. In 1995-1996, only 48.1% of North Carolinians supported smoke-free policies for workplaces, compared with 62.2% (95% CI, 60.5%-63.8%) in 2001-2002 and 69.6% (95% CI, 67.7%-71.5%) in 2006-2007. For restaurants, support among North Carolinians for smoke-free policies was 33.5% in 1995-1996, compared with 44.7% (95% CI, 43.0%-46.4%) in 2001-2002 and 52.3% (95% CI, 50.2%-54.3%) in 2006-2007. For bars, support among North Carolinians was 21.5% in 1995-1996, compared with 27.6% (95% CI, 26.1%-29.2%) in 2001-2002 and 36.1% (95% CI, 34.2%-38.1%) in 2006-2007 [3]. In each case, the general trend in the current and previous research has been for public support of smoke-free policies to increase.

Differences by smoking status found in this study were in line with those found in previous surveys. Smoking status has always been associated with the level of support

Table 3.
Census Bureau Occupation Codes and Definitions, 2001-2002 and 2006-2007

Period, occupation code(s)	Occupation(s)
2001-2002	
000-235	Management, business, financial, professional
403-469	Service
243-389	Administrative support, sales
473-617, 864-889	Construction, extraction, installation, maintenance, repair, farming, fishing, forestry
628-859	Manufacturing, production, transportation
2006-2007	
0010-3650	Management, business, financial, professional
3700-4650	Service
4700-5930	Administrative support, sales
6000-7620	Construction, extraction, installation, maintenance, repair, farming, fishing, forestry
7700-9750	Manufacturing, production, transportation

for smoking restrictions. Nonsmokers have reliably had the most support for restrictions, whereas smokers have unfailingly had much less support for restrictions [2, 3].

Variation in attitudes toward smoking restrictions by occupation had not been fully explored before this study. Previous studies have shown that blue-collar workers in North Carolina are less frequently covered by smoke-free policies, but their attitudes toward smoking policies were not examined [15]. Feigelman and Lee [2] found food-service workers nationally were less likely to support smoking restrictions than were all other occupations. The current study expanded upon these findings by looking at North Carolina and using more occupation categories. As was expected, blue-collar and service workers displayed less support for smoke-free policies than did white-collar and office workers.

Many of the variables describing North Carolinians were given little research attention in previous reports from the CPS-TUS, but they line up well with results from the North Carolina Behavioral Risk Factor Surveillance System (BRFSS). As found in the BRFSS, females, people with the most education, and Hispanics had the highest support for restrictions. Also similar was the finding that the youngest age group had the lowest support for restrictions. Differences by income were somewhat different from what has been reported in the BRFSS, in that the upper-middle income group had support that tied or even surpassed that of the highest income group [4, 5].

The current research addresses several questions that have previously not been explored. Foremost, it provides a more up-to-date examination of attitudes toward smoking restrictions in North Carolina. It also investigates attitudes by various characteristics, including occupation, sex, race/ethnicity, age, education, income, and smoking policy at

work. Each of these items has previously been only partially examined, if at all, in formal research. This study confirms the importance of smoking status in predicting and explaining attitudes toward smoking restrictions and describes the additional influence of occupation, income, education, and smoking policy at work. Perhaps most importantly, it shows a substantial trend in support for smoking restrictions across all 3 venues.

One of the strengths of this study is the source of the data, which were collected by the US Census Bureau as part of a survey that is the primary source for official government estimates of labor statistics [12]. In addition, weights are included, to weight the sample to the population characteristics and account for nonrespondents and the use of self-response only. The data were regularly collected by a respected agency, using techniques to make the sample as representative as possible. In addition, the sample was larger than one that could easily be collected otherwise.

Although the use of secondary data provides strength to this research, the survey did not request data on some important factors, such as place of residence and support for a law banning smoking in each location. We would like to know how support for specific regulations varies across urban versus rural regions, as well as across counties dependent or not on tobacco growing, tobacco industry employment, and tourism. Also, despite the large overall sample size, some subgroups were smaller than necessary to obtain stable percentages. Finally, although the data represent the most recent release of the TUS and the current research provides a more up-to-date examination of the issue at hand than does previously discussed research, the data are still slightly dated, owing to delays in the release of data by the Census Bureau.

The current research has brought to light several issues

that would be good to explore in future studies. Contrary to expectations, the data suggested a decline of support among Hispanics between 2001-2001 and 2006-2007; however, the declines were not significant. Data on Hispanics are unclear, probably because of the low sample size in this subgroup, which did not allow sufficient power to detect differences. It may be useful to explore this issue further, to capture a larger sample of this population, and to determine whether there are differences in support by other characteristics. If future research confirms a decline in support for smoking restrictions among Hispanics, then factors such as increased acculturation should be explored as a potential cause.

It would also be informative to examine support by geographic area in North Carolina. Do certain parts of the state have significantly higher or lower support for restrictions? If so, education and policy efforts could be more finely focused.

Although the models generated in the current research are a large step forward in understanding attitudes toward smoking restrictions, they are not strong enough to be used for predicting attitudes toward smoking restrictions for many groups of interest. Perhaps the addition of acculturation and geographic areas within North Carolina would strengthen the models proposed in the current research. If these variables can be adequately measured, the model will provide a more precise prediction of attitudes and will allow the crafting of policy most likely to be preferred by affected citizens and employees, as well as by patrons of workplaces.

The last potential area of future research is simply to reexamine this issue in a few years. On the basis of previous trends, it is expected that support will continue to increase for the next few years. In addition, there might be dramatic increases in support after the law banning smoking in restaurants and bars goes into effect, as has been seen in other areas where smoking bans have been implemented [2, 16].

The current study provides confirmation of growing pub-

lic support for smoking restrictions similar to those imposed by the law recently passed in the North Carolina legislature, which bans smoking in all restaurants and bars. Support for restrictions has consistently grown over the past 5 years and will likely continue to increase. In 2006-2007, just over half of respondents supported a smoke-free policy in restaurants. Among nonsmokers, more than 60% would like to see all restaurants smoke-free. Although the overall support for smoke-free policies at bars is lower (36.1% of respondents), support among nonsmokers, a substantial segment of potential patrons, is approaching 50% (42.6%). In addition, overall support has increased dramatically, by 8.5 percentage points (relative increase, 30.8%), in just 5 years.

The current research shows very strong support for banning smoking in all indoor workplaces, which goes beyond the legislation that has already been passed. Nearly 70% of respondents in 2006-2007 supported smoke-free work sites, up from 62.2% in 2001-2002. In several subgroups, support nears or surpasses 80%. Even among smokers, who consistently show the lowest support for any restrictions, 44.5% favor smoke-free policies for indoor work sites. Clearly, the public is supportive of making all indoor workplaces smoke-free. As a result, both the state and the local legislative bodies would have strong reason for further extending smoking restrictions to all indoor workplaces.

Health professionals can be reassured by the information that the public is getting the message about the effects of secondhand smoke. They can know from this that people want to avoid exposure in the place where they spend the most time—the workplace. Although the policy on smoking in bars and restaurants is health promoting, advocacy for smoke-free workplaces may have a greater effect. NCMJ

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every section to be a smokefree section.

The American Lung Association is fighting for a day when we can all breathe easier. That's why we champion smokefree public spaces and workplaces, and everyone's right to breathe healthier air. Until that day, we are fighting for air. Join the fight at FightingForAir.org.

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