Smoking in Boston Bars Before and After a 100% Smoke-Free Regulation: An Assessment of Early Compliance

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The objective of this study was to assess compliance with Boston's 100% smoke-free bar regulation within the first 3 months of implementation. An observational survey was conducted of a random sample of 102 bars in Boston before and after the smoking ban went into effect. Forty bars were observed both pre- and postban, serving as a true comparison group; 62 additional bars were observed postban only. From preban to postban, highly significant decreases were found in the mean proportion of patrons smoking inside (22.5% to 0.19%, $p < 0.0001$), in the proportion of bars with smoking patrons (100% to 2.5%, $p < 0.0001$), and in the average number of ashtrays present in each bar (24 to 0, $p < 0.0001$). A highly significant increase was found in the average number of "no smoking" signs posted in each bar (0 to 3.3, $p < 0.0001$). Within the 3 months immediately following the 100% smoke-free bar regulation in Boston, bars were highly compliant with the ban, including not allowing patrons and employees to smoke, removing ashtrays, and posting signs indicating that smoking is prohibited. Therefore, with proper time and preparation, public health practitioners can change social norms before a ban goes into effect and can implement smoke-free policies smoothly and with immediate compliance.

KEY WORDS: health policy, public health, tobacco smoke pollution

Secondhand smoke exposure is a documented occupational health hazard, especially for bar and restaurant workers.[1–4] Over the past few decades, states and municipalities have implemented clean indoor air policies in an effort to protect workers from secondhand smoke exposure. The focus of these policies has shifted over time from public places, to office workplaces, then to restaurants, and, only within the past year, to bars.[5] As of October 2003, of 1,641 local smoking regulations in the United States, 80% regulated smoking in workplaces, 60% regulated smoking in restaurants, but only 9% regulated smoking in bars.[6] However, in recent years, several states have passed 100% smoke-free laws that prohibit smoking completely in all restaurants and bars, including: California (1998), Delaware (2002), New York (2003), Maine (2004), and Connecticut (2004). Additionally, within the past year, two major cities, Boston and New York City, have implemented similar laws.

While regulating smoking in bars is a relatively new component of clean indoor air legislation, protecting bar workers from secondhand smoke exposure is becoming more prevalent. As of October, 2003, 118 communities nationally (75 of which are in Massachusetts) have enacted 100% smoke-free bar laws.[7]

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Given the number of communities that are adopting or considering smoke-free bar policies, it is critical to assess the level of compliance with these regulations.

Given the number of communities that are adopting or considering smoke-free bar policies, it is critical to assess the level of compliance with these regulations. Whereas enacting a smoking ban plays an important role in protecting individuals from secondhand smoke, compliance is the key to a successful smoking regulation, as the regulations are only as effective as the establishments that comply with them. If establishment owners continue to allow patrons to smoke once a smoking regulation has been implemented, the purpose of the ban, to protect workers (and patrons) from exposure to secondhand smoke, is compromised. The tobacco industry, along with some restaurant and bar associations, have claimed that smoke-free bar laws will result in chaos and that the smokers and establishments will not comply with the ban.[8–11]

Unfortunately, there is a dearth of studies in the literature with which to evaluate the tobacco industry's claim. The two published studies[12,13] we are aware of that assessed compliance with a smoke-free bar law involve a state-wide ban. Weber et al[12] examined the long-term compliance with the California Smoke-Free Workplace Law in Los Angeles County from 1998 to 2002. Through site inspection surveys and brief interviews, the study measured patron and employee smoking in restaurants and bars, and found significant increases in both patron (45.7% to 75.8%) and employee (86.2% to 94.7%) nonsmoking compliance for free-standing bars. Lee et al[13] utilized unobtrusive observation techniques and interviews to assess standalone bar compliance with the workplace smoking regulation in one city in California 5 years after the regulation prohibiting smoking in bars was implemented. Initial findings from this study indicate a 50.4% compliance rate with the state-wide law in standalone bars in the California city.

This study examines compliance with Boston's 100% smoke-free bar regulation within the first 3 months of implementation. The objectives were: (1) to assess the compliance of bars in Boston as specified by the regulation, (2) to determine other effects of the smoking ban on the culture of bars, for example, changes in the streetscape and the number of patrons who frequent the bars, and (3) to examine the preparatory work done by the City of Boston in anticipation of the ban, in relation to the overall compliance rates.

Methods

Background: the regulation

In December, 2002, the Boston Public Health Commission (BPHC) voted to join ranks with the other Massachusetts communities that had banned smoking from all workplaces, including bars. On May 5, 2003, the city-wide Boston "Workplace Smoking Regulation" was implemented. Under this regulation, smoking is prohibited in all workplaces in Boston including bars,[14] and bar owners and managers are responsible for enforcing the regulation. In compliance with the regulation, bar employers are required to conspicuously display signs indicating that the establishment prohibits smoking. Violations of the regulation result in a $100 fine for the first violation, a $500 fine for the second violation within a 24-month period, and a $1,000 fine for the third and each additional violation within a 24-month period.[14]

Data sources

Boston Public Health Commission Databases

Two sources provided by the Boston Public Health Commission (BPHC) were used to create a sample of bars in Boston. The first source was compiled by the BPHC. In 1998, BPHC staff members surveyed all of the food and alcohol service establishments in the city of Boston and coded them as bars, restaurants with bar sections, smoking bars, or dual use establishments. The other source was constructed from establishments that sell tobacco that are required to apply for a permit from the BPHC. On the permit application, the establishments are self-coded as either restaurants with bar sections or as bars/taverns (J Landers, personal communication, March 19, 2003, e-mail: Joann_Landers@bphc.org). To create our list of bars, establishments were included that were coded as "bars" from the first BPHC source and establishments that were coded as "bars/taverns" from the second source. The combined list consisted of 336 bars.

Sample

From the list of bars that were compiled, a random sample of bars was selected for observation. A bar was not valid and was excluded from the sample if it no longer existed, moved, or was determined to be an adult entertainment establishment. Due to time constraints, only 40 bars could be observed preban. The first 40 valid bars on the randomized list were designated to be observed both pre- and postban; the following 62 valid bars on the list were selected for postban observation only. Thus, a total of 102 bars were observed postban. Thirty-six bars

were not usable and were therefore discarded from the sample.

Survey instrument

The observational survey included 40 variables; 27 variables assessed various aspects of a bar that could be affected by a smoking ban, and 13 variables were logistical indicators (readers interested in the survey can contact the corresponding author for a copy). This survey was adapted in part from work done by Lee and Moore[15] and by the San Francisco Tobacco Free Project (M Lau, personal communication, March 12, 2003, facsimile). We used Pendragon Forms 3.2 software[16] to create the survey on a personal digital assistant (PDA). The PDA proved to be a less conspicuous way to collect data than a paper survey with a clipboard. Additionally, it was easier to transfer data and was more accurate than having to copy a transcription into a computer for analysis.

Data collection

Two observers collected the data. Data collection occurred in 2 phases: before the smoking ban went into effect (preban) and after the ban was implemented (postban). For both phases, bars were visited from Wednesday through Sunday, between 8:00 PM and 1:00 AM, for an average of 32.5 minutes. In the first phase, observations were made at 40 bars between April 12 and May 1, 2003. In the second phase, observations were made at 102 bars between May 7 and July 30, 2003. Included in the postban observations were the 40 bars that were visited preban, serving as a comparison group. In order to make the preban and postban comparison group as equivalent as possible, observations at these bars were made by the same observer, on the same day of the week, at the same time of night, and for approximately the same duration postban as preban.

Table 1 delineates the descriptive data about the bars and the observations, including the number of bars visited pre- and postban, observation details (ie, dates, days of the week, times of the day, length of stay, and number of observers), location of the bars, establishment type, and seating capacity.

Main outcome measures

Smoking patrons

The main outcome measures to assess compliance with the smoking ban were the number and proportion of patrons smoking inside the bars. Two observations were made in each establishment to assess the number of patrons smoking and the number of patrons present. An observation consisted of an observer counting

TABLE 1 ● Descriptive bar data

Background details		
Number of bars		
Preban	40	
Postban: comparison group*	40	
Postban: total sample†	102	
Observation details		
Dates		
Preban	April 12–May 1, 2003	
Ban implementation	May 5, 2003	
Postban	May 7–July 30, 2003	
Days	Wednesday–Sunday	
Times	8:00 PM–1:00 AM	
Average length of stay	32.5 minutes	
Number of observers	2	
Location: neighborhoods in Boston	**Preban and postban comparison group ($n = 40$)**	**Total postban sample ($n = 102$)**
Allston	3 (7.5%)	7 (6.9%)
Brighton	0 (0.0%)	4 (3.9%)
Beacon Hill	2 (5.0%)	3 (2.9%)
Chinatown	1 (2.5%)	2 (1.9%)
Dorchester	7 (17.5%)	17 (16.7%)
Downtown Boston	12 (30.0%)	22 (21.6%)
East Boston	3 (7.5%)	4 (3.9%)
Fenway/Kenmore	2 (5.0%)	12 (11.8%)
Hyde Park	0 (0.0%)	4 (3.9%)
Jamaica Plain	2 (5.0%)	5 (4.9%)
Mattapan	0 (0.0%)	1 (1.0%)
North End	1 (2.5%)	2 (1.9%)
Roslindale	0 (0.0%)	1 (1.0%)
Roxbury	1 (2.5%)	6 (5.9%)
South Boston	4 (10.0%)	10 (9.8%)
South End	2 (5.0%)	2 (1.9%)
Type of establishment		
Free-standing bar	38 (95.0%)	91 (89.2%)
Restaurant with bar	2 (5.0%)	6 (5.9%)
Nightclub	2 (5.0%)	5 (4.9%)
Seating capacity (range: 12–300 seats)		
Number of seats		
12–24 seats	6 (15.0%)	16 (15.7%)
25–49	13 (32.5%)	30 (29.4%)
50–74	8 (20.0%)	24 (23.6%)
75–99	6 (15.0%)	12 (11.8%)
100–149	5 (12.5%)	15 (14.7%)
150–199	1 (2.5%)	3 (2.9%)
200–300	1 (2.5%)	2 (1.9%)

*The comparison group represents the same 40 bars that were visited preban and postban. The bars in the comparison group were visited by the same observer, on the same day of the week, and at the same time as the preban bars.
†The total sample represents the comparison group bars (40) plus an additional 62 bars that were only visited postban.

the number of patrons in an establishment who were smoking at one particular point in time. The first observation occurred within the first few minutes of an observer entering a bar, and the second took place within the last few minutes before an observer exited a bar, or within half-an-hour, whichever came first. The two observations were done to get an accurate sample of smokers in each establishment, as opposed to counting the total number of cigarettes smoked during the entire observation period. For example, over a 30-minute period, one patron could smoke 5 cigarettes, and if that person were counted each time he or she lit a new cigarette, the number of smokers would not be accurately represented. Two distinct observations within a finite amount of time enabled a more accurate representation to be achieved, especially in large venues.

To determine the number of smoking patrons at each bar, we averaged the number of patrons smoking during the two observation periods. The proportion of patrons smoking at each bar was obtained by averaging the proportion of smokers from the two observation periods.

Number of bars with smoking patrons

A variable was created to establish if any patrons were smoking at all during the time that the observer was present. This variable provided an actual measure of compliance because if, postban, a patron were smoking at any time including the period outside of the formal observation window, it would appear as though the bar was in compliance with the ban, when in fact it was not. This variable was the basis for analyzing the number of bars that had at least one smoking patron, but it only served as a measure of bar compliance as if patrons were smoking outside the formal observation window, they were not included in the "number of patrons smoking" variable.

Smoking paraphernalia

Other measures of compliance included whether ashtrays were present preban and postban (and if ashtrays were present, the number of ashtrays with ashes in them) and the number of "no smoking" signs posted before and after the ban went into effect.

Data analysis

Descriptive statistics were used to summarize all endpoints pre- and postban. Ninety-five percent confidence intervals were also calculated for the means of continuous outcomes and exact 95% confidence intervals were obtained for proportions from binary outcomes. A Wald test,[17] adjusting for the correlation of measurements taken from the same bar and incorporating information from bars with only a postban measurement, was used to compare outcomes before and after implementation of the smoking ban.

Results

Of the 40 bars visited preban, a mean proportion of 22.5% of all patrons were observed to be smoking, as compared to a mean proportion of 0.19% in the postban comparison group ($p < 0.0001$), and a mean proportion of 0.28% in the total postban sample ($p < 0.0001$). Additionally, 100% of the bars observed preban were recorded as having smoking patrons, while 2.5% of the postban comparison group ($p < 0.0001$), and 2.9% of the total postban sample ($p < 0.0001$) were recorded as having smoking patrons (Table 2).

Compared to an average of 24 ashtrays in each bar in the preban group, no ashtrays were present at any of the 102 bars observed postban ($p < 0.0001$). Additionally, once the ban went into effect, the number of "no smoking" signs displayed went from 0 preban to a mean of 3.3 in the postban comparison group ($p < 0.0001$), and a mean of 3.5 in the total postban sample ($p < 0.0001$) (Table 2).

Other relevant analyses indicated that the number of patrons present in the bars did not differ significantly, from a mean of 35.1 patrons preban to a mean of 31.3 patrons in the postban comparison group ($p = 0.58$), and a mean of 32.8 patrons in the total postban sample ($p = 0.58$). Additionally, the average number of patrons smoking outside increased from 0.08 preban to 2.2 in the postban comparison group ($p < 0.0001$), and 1.9 in the total postban sample ($p < 0.0001$) (Table 2).

Discussion

We found strikingly high levels of compliance immediately following the Boston 100% smoke-free bar regulation, demonstrated most prominently by drastic decreases in the number of bars with smoking patrons (from 100% to 2.5%) and in the mean proportion of patrons smoking inside (from 22.5% to 0.19%). We determined with 95% confidence that, at minimum, 91% of the Boston bars were compliant with the smoking ban. These findings are consistent with those of a recent survey done by the Boston Public Health Commission, which found a 98% compliance rate with the smoking ban.[18] These data are remarkable, given that after 4 years of a smoking ban, the California long-term compliance study[12] found that patrons in free-standing bars in Los Angeles County were 75.8% compliant with the ban, and Lee et al[13] found that standalone bars in one California city were 50.4% compliant.

TABLE 2 ● Comparison of smoking ban compliance variables from preban to postban

		Postban			
	Preban ($n = 40$)	Postban comparison group ($n = 40$)	*P*	Total postban sample ($n = 102$)	*P*
Patrons smoking inside					
Mean number of smokers (SD)	5.3 (4.2)	0.03 (0.36)	<.0001	0.03 (0.22)	<.0001
Mean proportion, %† (CI‡)	22.5 (18.2–26.8)	0.19 (0.0–0.58)	<.0001	0.28 (0.0–0.6)	<.0001
Bars with any smoking patrons					
N (%)	40 (100)	1 (2.5)	<.0001	3 (2.9)	<.0001
CI	91.2–100.0	0.063–13.2	—	0.61–8.4	—
Comparison of ashtrays present					
Mean ± SD	24.4 ± 15.4	0	<.0001	0	<.0001
"No smoking" signs present					
Mean ± SD	0	3.3 ± 2.5	<.0001	3.5 ± 2.7	<.0001
Bars with posted signs, %	0.0	100.0	—	98.0	—
Comparison of patrons present					
Mean (SD)	35.1 (43.1)	31.3 (30.7)	0.58	32.8 (38.4)	0.58
Patrons smoking outside					
Mean ± SD	0.08 ± 0.35	2.2 ± 3.0	<.0001	1.9 ± 2.5	<.0001
Mean proportion, %§ (CI)	0.04 (0.0–0.12)	7.8 (5.4–10.3)	<.0001	8.3 (6.2–10.5)	<.0001

*The comparison group represents the 40 bars that were measured preban as well as postban.
†The mean proportion of the total number of smokers inside in relation to the number of patrons present.
‡All confidence intervals are based on 95% confidence.
§The mean proportion of the total number of patrons smoking outside in relation to the total people present inside and outside.
SD = standard deviation; CI = confidence interval.

Since the smoking ban's effective date, the Boston Public Health Commission has issued only 6 violations to free-standing bars (J Landers, personal communication, January 13, 2004, e-mail: Joann_Landers@bphc.org), two of which were included in our sample. Each violation was issued for smoking in the workplace, with a $100 fine for each establishment; one of the bars was also fined $500 for failure to post the required "no smoking" signage (J Landers, personal communication, January 13, 2004, e-mail: Joann_Landers@bphc.org). The small number of violations issued in the 8 months since the regulation went into effect provides further evidence of high compliance with the Boston smoking ban.

The significant increase in the number of "no smoking" signs posted in each bar and the significant decrease in the number of ashtrays present were also indicators of compliance with the smoking ban. It is a requirement of the regulation that employers post signs in a clear and conspicuous manner indicating that smoking is prohibited.[14] Employers and owners that do not post signs in this manner are not only in violation of the regulation, but they increase the likelihood of patrons smoking (or trying to smoke) in their establishments. We found only two establishments from the total post-ban sample that did not have signs clearly posted, indicating a 98% compliance rate. Additionally, once a smoking ban goes into effect, establishments should not provide ashtrays inside, and we found that 100% of the bars were compliant with removing their ashtrays.

Prior to the smoking ban's effective date, there was a sentiment from bar owners and employees that the number of patrons visiting the bars would drastically decrease and that chaos would ensue outside once people were no longer allowed to smoke inside, radically changing the streetscape. This feeling was aptly expressed by a bar owner in Boston's South End who, a year prior to the ban's implementation, was reported as saying: "People will be out on the streets, 50 or 60 of them, if they come to the bar at all."[19] Our findings reveal that within the first 3 months, these predictions did not come to fruition. We found that in addition to the high compliance rate, the number of patrons present in the bars pre- and postban did not decrease significantly. The slight decrease in patronage, however, may be attributable to the seasonal nature of the bar business, especially during the summer months. Additionally, the initial 40 bars were still in business after the ban went into effect (and continue to remain open as of January 15, 2004), which suggests that the law did not put the bars out of business.

While the number of patrons smoking outside did increase significantly, the increase was not dramatic (ie, 0 to 2, on average). Additionally, while the average number of patrons smoking outside did increase, we found

that the mean proportion of smokers overall decreased from 22.5% preban (inside) to 7.8% in the postban comparison group (outside), and 8.3% in the total postban sample (outside). The fact that the overall percentage of smokers greatly decreased from before the ban to after may indicate the changing culture of smoking at bars and may have implications for cigarette consumption and smoking cessation in the future.

Several factors support the validity of our findings: (1) the study was purely observational, so bar employees were unaware that observers were present and, therefore, probably did not change their behaviors (ie, ask patrons not to smoke). This differs from announced inspections from board of health employees or unannounced inspections by recognizable health commission staff where bar employees would likely change their behavior in order to avoid a violation, (2) the observations were done on a variety of days and times, including weekends and late at night in order to increase generalizability, (3) the comparison sample bars were visited at the same day of the week, at the same time of night, and by the same observer in order to minimize possible confounding effects, (4) there were only two observers, limiting bias in the observation (additionally, to minimize variation and to maintain consistency in the observations, the observers were trained in bar settings, resulting in strong inter-rater reliability), and (5) the results indicated high initial compliance with the smoke-free regulation. As past studies have shown that compliance is lower initially following a smoking ban and ultimately goes up,[12,22] this indicates that the high compliance is likely to be maintained over time.

Although we found striking compliance rates, we cannot infer that these results are generalizable to any smoking ban. The most significant factor correlating to the high compliance rate was probably the work done by the Boston Public Health Commission (BPHC) prior to the ban going into effect. In the two months leading up to the smoking regulation prohibiting smoking in bars in Boston, the BPHC launched both an education campaign and a media campaign to ease Boston's businesses and smokers into the new law.

For the education campaign, a team comprised of 2 full-time BPHC employees and 8 outside trained workers visited over 800 hospitality establishments in Boston in order to educate establishment owners about the new law. The BPHC staff spoke to the person in charge at the time of the visit and spent about 10 to 15 minutes giving the employer a summary of the regulation guidelines, explaining what was expected (ie, signage requirements, ashtray removal, etc.), and discussing violation protocol. They provided the owners with the regulation, the employer policy, a model smoking policy that they were required to post, signs to post about the impending law, and BPHC-approved "no smoking" signs for when the ban was implemented. Additionally, prior to the ban, the BPHC conducted community information sessions throughout Boston that were open to the general public, including Boston business owners and residents (O. Deffenbaugh, Senior Health Educator, Tobacco Control Program, personal communication, September 26, 2003). These sessions served as opportunities for people to learn more about the ban and for employers to get the information needed for them to comply with and stay in compliance with the new regulation.

An Implementation Advisory Committee, which included representatives from the hospitality industry, proposed a media campaign in order to bring the regulation into focus for both establishment workers and patrons. The committee guided the development of the promotional materials that were distributed to the bars, including fliers, posters, coasters, and table-tents that promoted the "Smoke-Free $BOSTO_2N$, Breathe it in." campaign[20](O Deffenbaugh, personal communication, September 26, 2003). The campaign was also advertised on subways and buses, in Boston newspapers (including major papers and neighborhood papers), and in movie theaters.[21] Because of these efforts, Boston business owners, patrons and residents were aware of the regulation well before it went into effect, ultimately enabling a smooth transition into the smoking ban.

There are some important limitations to this study. First, bars were only observed within the first 3 months of the regulation's effective date, so there is a possibility of recidivism in compliance with the smoking ban. However, past studies that have examined compliance with smoke-free bar laws have shown that overall compliance increases over time,[12,22] and since our findings demonstrated such high compliance immediately following the ban, even if recidivism did occur, it is likely that compliance will return to, if not surpass, the initial rates. Our recommendation is that further compliance studies need to be conducted in order to determine expected recidivism and ultimate compliance rates with smoke-free bar regulations.

A second limitation is that we did not make observations until the bars closed at 2:00 AM, so we cannot confirm that individuals were not smoking at that hour. However, since we did randomly go to bars until approximately 1:00 AM, if smoking had not occurred up until that point, it is unlikely that smoking commenced afterward. Similarly, observations only lasted, on average, 30 minutes, so we cannot confirm that smoking did not occur at other points while observers were not present. But, since with the comparison group we observed the same bars on the same day of the week and at the same time of day, we had equal footing. For example, before the ban went into effect,

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100% of the bars observed had smoking patrons and, with all other things being equal except for the presence of the smoking ban, only 1 bar in the postban comparison group was observed to have a smoking patron.

Finally, the observations were done in spring and summer months, so it is possible that people were more likely to go outside to smoke in the warmer weather than in the winter months. However, having implemented the ban in the warmer weather has transitioned smokers into going outside to smoke, setting a precedent for when the colder weather approaches.

Despite these limitations, our study demonstrates that the bars in Boston were highly compliant with the smoke-free bar regulation. However, it cannot be assumed that any smoke-free bar law will be implemented with as little difficulty and with as high a compliance rate as was found in Boston. The time and effort put into preparing the city for this law was a fundamental part of the effectiveness of the regulation. The education and media campaigns initiated by the Boston Public Health Commission laid the groundwork for the smooth transition into smoke-free bars. Therefore, with proper time and preparation, public health practitioners can both effectively change social norms before a smoking ban goes into effect and implement smoke-free policies smoothly and with immediate compliance.

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