

Effects of Clean Indoor Air Laws on Bar and Restaurant Revenue in Minnesota Cities

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Background: In recent years, local governments have strengthened laws to prohibit smoking in bars and restaurants to promote patron and employee health. Because of concerns that clean indoor air policies could have negative economic effects on some hospitality businesses, some cities have adopted partial clean indoor air policies (e.g., exempting bars).

Purpose: This paper considers how partial and comprehensive smokefree policies affected bar and restaurant revenue, using quarterly data reported to the Minnesota Department of Revenue.

Methods: Data from ten Minnesota cities from 2003 to 2007 were used to conduct a time-series analysis in 2009, adjusting for the population size of each city.

Results: Bars and restaurants governed by either partial or comprehensive policies had slightly higher revenues than those not regulated by any local clean indoor air policy. Bars and restaurants governed by partial local bans reported 0.009% higher total revenue ($p=0.5$) and 0.052% higher liquor sales revenue ($p=0.003$) than those not covered by a ban. Bars and restaurants governed by comprehensive local bans reported 0.026% higher total revenue ($p=0.05$) and 0.018% higher liquor sales revenue ($p=0.35$).

Conclusions: These findings suggest that smoking bans, whether comprehensive or partial, do not have a negative effect on bar and restaurant total or liquor revenues and may be associated with slightly higher revenue compared to not having a clean indoor air policy.

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Background

In 1975, Minnesota became the first state to adopt clean indoor air legislation affecting private workplaces, restricting smoking in order to protect public health, comfort, and the environment.¹ In recent years, some county and municipal governments in Minnesota enacted more comprehensive policies to protect workers and the public from secondhand smoke, which is known to cause lung cancer, heart disease, respiratory conditions, and other diseases in nonsmokers.² In particular, these local ordinances sought to offer equal health protections to employees in bars and restaurants, workplaces that had only minimal restrictions in the 1975 state statute (and subsequent amendments) on public smoking.

Prohibiting smoking in workplaces is the most effective way to eliminate involuntary worksite exposure to

secondhand smoke.² A review of studies of bar and restaurant employee exposure found that in establishments in which any smoking was allowed, levels of secondhand smoke were 1.6 to 6.1 times higher than those found in other workplaces.³ Other studies have found evidence that the physical health of bar and restaurant employees suffers when they are not protected from secondhand smoke. In one study, non-smoking workers in establishments where smoking was allowed had elevated levels of a tobacco-specific carcinogen in their urine, compared to those in smoke-free establishments.⁴ In another study, bartenders' respiratory health improved from baseline after legislation prohibiting smoking in bars and taverns was enacted.⁵ Clean indoor air ordinances are a way to extend health protections to all workplaces and end the disparity in harmful exposure for hospitality workers.

Between 2000 and 2007, a total of 18 local governments in Minnesota enacted clean indoor air policies that exceeded requirements of the state law and applied to hospitality workplaces, although some of these policies maintained an exemption for bars.⁶ These local policy

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changes in Minnesota mirrored a national trend toward including hospitality employees in secondhand smoke protection. By 2009, over 400 cities in the U.S. had enacted local, comprehensive clean indoor air policies that included both bars and restaurants. Over 2000 cities had enacted partial policies that exempted freestanding bars from workplace smoking restrictions.⁷ The current study examines the effects of comprehensive bans, those enforced in all indoor areas of all bars and restaurants; and partial bans, which apply only to restaurants.

The persistence of exemptions for bars is based on the established connection between alcohol consumption and smoking. People who are regular alcohol drinkers are more likely to be smokers than nondrinkers.⁸ Clean indoor air policies make it more difficult to engage in one of these behaviors—smoking—in bars and restaurants. Because of this, critics of clean indoor air ordinances assert that they may decrease alcohol sales, and maybe even food sales, if people who want to smoke while drinking no longer patronize bars after smoking bans are implemented.

A considerable and growing body of peer-reviewed research has examined objective economic effects of smoking bans, including revenue and employment in bars and restaurants.^{9–23} Many of the studies on bar and restaurant revenue did not find any significant effect of smokefree ordinances, and some even detected positive effects of increased revenue.^{9,12,15,21,23} One study of California restaurants found a small, temporary decline in revenue in alcohol-serving restaurants that quickly returned to normal levels.¹⁶ Recent literature has suggested consistency in findings from different cities and regions.^{18–23}

Despite this evidence, potential negative economic effects continue to be an important part of the public debate around smokefree regulations for bars and restaurants. Opponents of comprehensive smoking bans argue that potentially increased expenditures by nonsmokers who may be more willing to go to smokefree bars will not offset the loss of revenue in bars and restaurants resulting from smokers choosing other ways to spend their leisure time. Research from California indicates that the substitution effect of nonsmokers spending more time and money in bars and restaurants after implementation of a clean indoor air policy is greater than the effect of smokers choosing to stay away from bars and restaurants.¹⁷ Nevertheless, when faced with the likelihood of smoking regulation, the tobacco industry and hospitality trade groups have advocated for partial clean indoor air policies, exempting bars to reduce potential loss of revenue.

This paper is designed to respond to those economic concerns, describing and comparing community-level

effects of local clean indoor air ordinances on taxable revenue in bars and restaurants in a sample of Minnesota cities. A pooled time-series analysis was performed to determine whether there were differences in taxable revenues in bars and restaurants among cities in which comprehensive clean indoor air laws, partial laws exempting some establishments, or no laws restricting smoking in bars or restaurants were in place.

This analysis is designed to add to our understanding of the effects of clean indoor air policies in two important ways. First, it distinguishes among effects of different types of clean indoor air laws (comprehensive, partial, and none) on bar and restaurant revenues. Second, this study directly compares clean indoor air policy types using a pooled time-series design, which enables modeling of variation in observations across both time and communities.

Methods

This study examined economic effects of local clean indoor air ordinances, focusing on a time period during which several municipal and county governments in Minnesota adopted or modified their local ordinances regulating smoking in bars and restaurants, but prior to the statewide comprehensive law.

Because of the small number of localities with a local clean indoor air ordinance and the observational nature of the study, a convenience sample of Minnesota cities was used. Initially, all five Minnesota cities with a complete ban on smoking in bars and restaurants for some or all of the study period and with a substantial number of bars and restaurants were selected. All of these cities are located in the seven-county Twin Cities metropolitan area. Cities of comparable size were then selected with an exemption for bars and with no restaurant or bar policy (Figure 1).

The sample included eight cities that had local clean indoor air policies (partial and/or complete bans) during some quarters of the study period and two comparison cities without any local regulation of smoking in bars or restaurants during the study period. No comparison city without a ban of the size of Minneapolis and St. Paul was available. To protect the confidential information of businesses in smaller cities, only Minneapolis and St. Paul are identified.

All partial bans included exemptions for bars, generally defined as establishments that draw more than 50% of their revenue from alcohol sales.

Data on taxable revenues were obtained from the Minnesota Department of Revenue (MN Revenue), which collects this information directly from businesses in their quarterly tax returns. Revenue amounts reported by MN Revenue and included in this analysis are sales receipts, not the amount of tax collected. Revenue amounts for bars and restaurants were aggregated to the city level for each quarter.

Revenue data were obtained for “full-service restaurants” and “drinking places” as defined by the North American Industry Classification System (NAICS) industry codes 7221 and 7224. NAICS codes are self-reported by businesses as they file tax returns with the state. In accordance with their internal policies and in order to protect the confidentiality of individual business owners, MN Rev-

venue does not release information in any category that would contain fewer than ten businesses reporting sales tax data. For some of the cities in this study, fewer than ten businesses in either NAICS code 7221 or code 7224 reported revenue in some quarters. Because some of the cities did not have ten businesses in at least one category during at least one quarter, MN Revenue collapsed the NAICS categories, and revenue numbers for full-service restaurants and bars were reported together as one number. Thus it was not possible to evaluate the effects of clean indoor air ordinances on revenue for bars and restaurants separately. Taxable revenue amounts were reported separately for sales of alcohol (reported as “liquor” revenue) and for general sales, as well as a total combined revenue for all products.

Revenue data for bars and restaurants in the ten cities were gathered for January 2003 through September 2007, equaling 19 quarterly time points per community. This time interval was chosen because on October 1, 2007, a comprehensive statewide clean indoor air policy was implemented, superceding most local governance of smoking in bars and restaurants.

The primary outcome measures of this study were total taxable sales (or total revenues) and liquor taxable sales (or liquor revenues), and the primary explanatory variable was clean indoor air ordinance type, defined with three levels: comprehensive, partial, and none. To account for revenue change differences due to population, the community population size, based on Census 2000, was included as a covariate.²⁴

The primary research question was whether the level of clean indoor air ordinance is associated with bar and restaurant revenue (either total or alcohol-specific). First, a visual inspection of the serial data was conducted by plotting the dependent variables over time. Plots for each of the dependent variables (total taxable sales and liquor taxable sales) were represented with various policy types. The plots give an initial impression of the data, such as presence or absence of change, cyclical patterns, and trends.

The second analytic step was regression of each dependent variable on policy. Because data for each community are longitudinal and revenues at adjacent quarters are likely correlated, regression models must account for this non-independence to produce unbiased estimates of the SEs associated with the clean indoor air policy predictors. Box–Jenkins autoregressive integrated moving average (ARIMA) models, often used to analyze this type of data, would require separate models for each of the ten cities and would be underpowered given only 19 time points.

Alternatively, pooled time-series analysis allows combined analysis of cross-sectional units (in this case, ten Minnesota cities) with

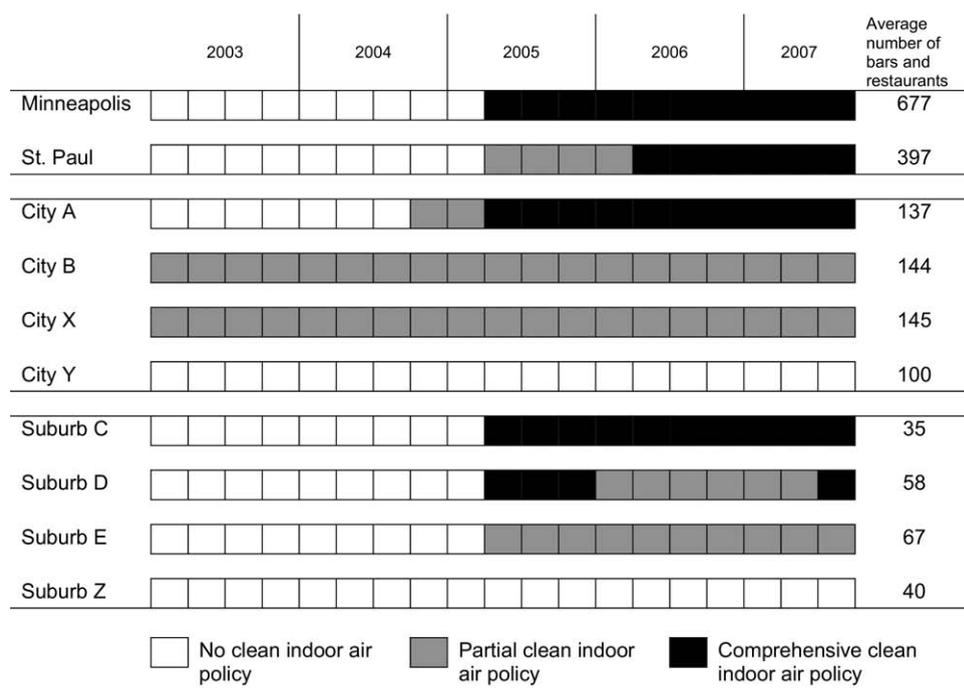


Figure 1. Clean indoor air ordinance status by quarter by city, 2003–2007
 Source: Minnesota Department of Revenue

temporal units (in this case, 19 quarters) by policy condition. The total sample size is determined by multiplying the number of cities by the number of time points, for a total of 190 observations. All of the revenue data from city-quarters during which a comprehensive clean indoor air policy was in place are combined into one pool of data, as are all of the city-quarters where there was a partial smoking ban, and all of the city-quarters where there was no smoking ban in bars or restaurants. Units in each pool are drawn from cities and quarters across the study pool and period based on the policy in effect at that time and place. Pooled time-series cross-sectional regression models allow for comparisons both across time and among cities, while accounting for correlation in the errors and providing unbiased SEs.

Models were estimated using PROC TSCSREG (SAS, version 9.1.3). After a comparison of the available error structures, the Parks method was chosen based on appropriateness for generalized least-squares regression and generating the largest model R-square. Models provided estimates of the percentage change in revenue (with *p*-value) associated with different levels of clean indoor air ordinance after adjusting for community population size.

Results

Total revenues (total taxable sales) for bars and full-service restaurants in each of the ten cities are shown in Figure 2. Each line in this figure represents a community’s unadjusted quarterly revenue amount, with the line style reflecting the types of clean indoor air laws in place over time. Quarterly liquor revenues are similarly represented in Figure 3.

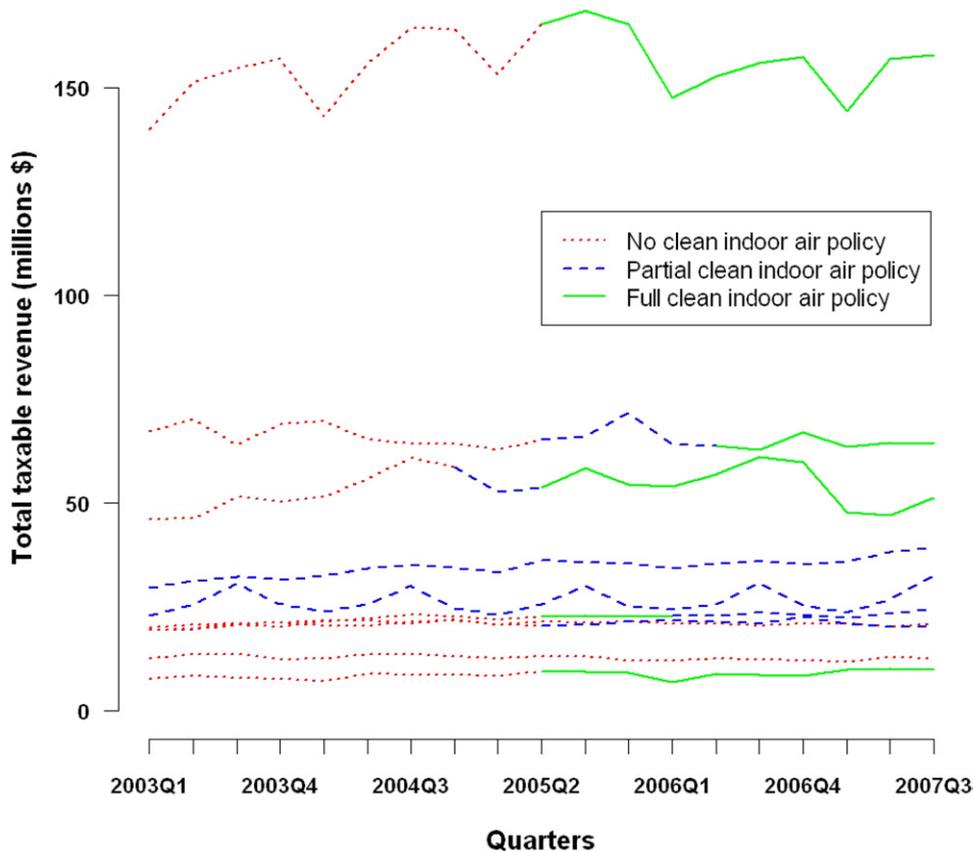


Figure 2. Total taxable revenue in bars and restaurants for ten Minnesota cities, 2003–2007

To evaluate whether implementation of clean indoor air ordinances changes the relative levels of liquor and food sales, an examination was also made of the proportion of liquor sales within total bar and restaurant sales in each of the ten cities. The proportion of alcohol sales within total bar and restaurant sales ranged from 10% to 30%, with a slight secular trend toward a greater proportion of alcohol sales over the study period regardless of policy type, and with seasonal trends suggested in many cities.

Results of the pooled time-series analysis indicated that after adjusting for population, bars and restaurants in city-quarters with either type of clean indoor air ordinance had slightly higher revenues than those with no clean indoor air law beyond state law (Table 1). Bars and restaurants in city-quarters with partial local bans reported 0.009% higher total revenue ($p=0.5$) and 0.052% higher liquor sales revenue ($p=0.003$) than those in city-quarters with no ban. Bars and restaurants in city-quarters with comprehensive local bans reported 0.026% higher total revenue ($p=0.05$) and 0.018% higher liquor sales revenue ($p=0.35$) compared to those with partial or no ban.

Discussion

Findings from this study suggest that local clean indoor air ordinances, whether comprehensive or partial, had no adverse effects on bar and restaurant revenue in cities in Minnesota. Cities with either type of clean indoor air law (comprehensive or partial) showed higher revenue from both liquor and total sales compared to cities with no clean indoor air ordinance. Previous studies from Massachusetts and New York City found that smoking restrictions had positive, but nonsignificant, effects on bar and restaurant revenue.^{15,21} An analysis of bar and restaurant revenue in California showed significant associations between a state-level ban on smoking in restaurants and a minor increase in restaurant revenue, and a state-level comprehensive smoking ban and an increase in bar revenue.¹⁷

A recent evaluation of the smoking ban in Pueblo CO, showed a slight decrease in tax revenue for taverns more than offset by a significant increase for restaurants.²³ In the present study, findings suggest not only that clean indoor air policies have positive effects on revenue, but also that these effects were sometimes significant.

While positive, the magnitude of the effects in revenue was small. Anecdotal evidence offered during public testimony for and against the local smoking bans in Minnesota often indicated that bars and restaurants operate on slim margins, so even a small difference in revenues may mean the difference between an establishment maintaining operations or going out of business. Contrary to concerns that such ordinances will decrease revenue, enactment of a clean indoor air ordinance appears to improve the profit margin of bars and restaurants overall rather than detract from it.

This study is one of the first to examine the economic effects of different levels of clean indoor air ordinances simultaneously, through the use of pooled time-series analysis. Our findings are consistent with a previous

study using this design to analyze employment data in Minnesota.¹⁸

A strength of this study was the use of objective data gathered by a state government agency for multiple purposes, primarily tax collection, and also other types of research rather than informal, self-reported data.

Another strength of the study was the use of pooled time-series cross-sectional analysis, which enabled comparison of policy conditions across 5 years by quarter and among ten cities. While pooled time-series analysis provides several benefits in this study, it does require assumptions about the similarities among cities in general economic conditions, policy effects, and compliance with the clean indoor air policies.

A potential limitation of this study is that while data obtained for this analysis were consistently collected by and reported by MN Revenue, there may be inaccuracies in industry classification. NAICS codes are defined by the federal government, and the Census Bureau offers an interactive online guide to determining NAICS code. However, there is no officially assigned code for any particular business. Businesses reporting revenue to the state of Minnesota assign themselves to a NAICS code, and there is limited oversight or review to ensure that establishments are accurately classified.

Another potential limitation is that temporal events beyond the change in clean indoor air ordinances may be responsible for the findings, although such other temporal events would have to have different impacts on cities that did or did not adopt clean indoor air ordinances.

The level of analysis possible with community-level revenue data also limits this study. Because

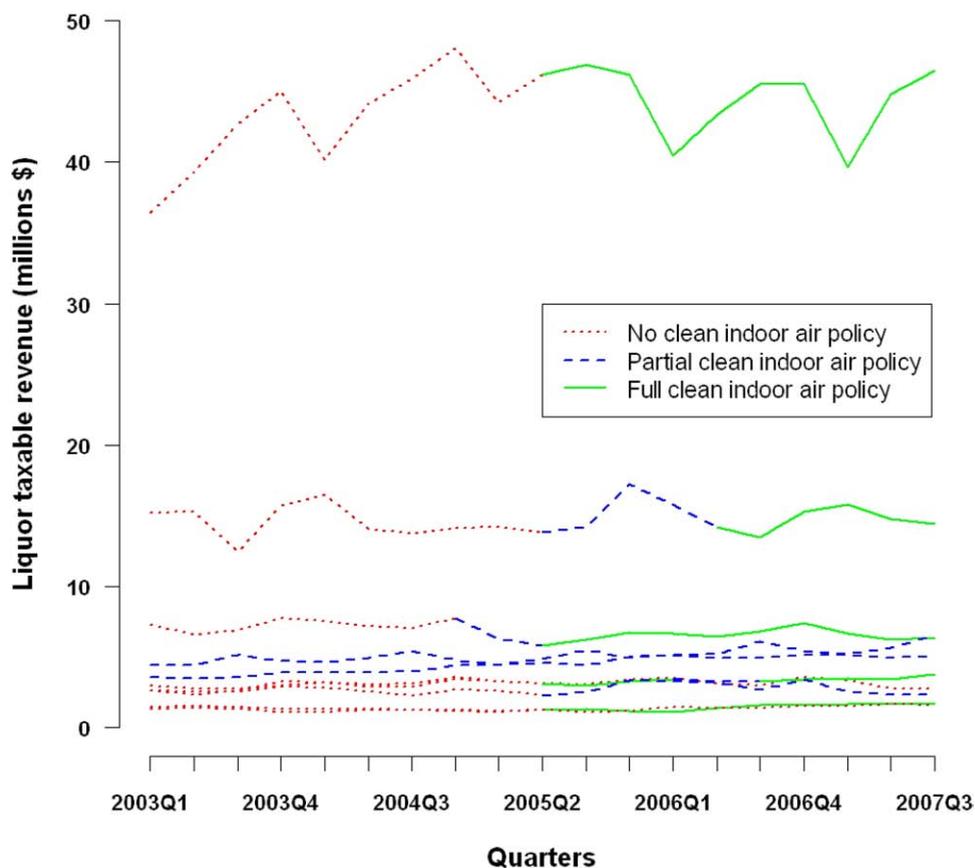


Figure 3. Liquor taxable revenue in bars and restaurants for ten Minnesota cities, 2003–2007

of the need to protect individual business information, it was not possible to examine effects of clean indoor air ordinances on individual establishments, on bars versus restaurants, or at smaller geographic levels. The observed pooled effects should not be taken to describe the experience of any particular business.

Conclusion

The results of this study suggest that neither comprehensive nor partial smoking bans adversely affect the economic success of bars and restaurants as an industry and may be associated with slight increases in revenue. That comprehensive smoking bans appear to offer no negative effect to the economic success of bars and restaurants, and in

Table 1. Percentage difference in total and liquor revenue in bars and restaurants by clean indoor air policy type

Type of clean indoor air ordinance	Total revenue vs no ordinance (%)	p-value	Liquor revenue vs no ordinance (%)	p-value
Comprehensive	+0.026	0.05	+0.018	0.35
Partial	+0.009	0.50	+0.052	0.003

fact, may slightly increase revenues, only adds to their appeal.

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