

Brief report

Economic Impact of Smoke-Free Air Laws in North Dakota on Restaurants and Bars

Paul R. Shafer MA^{1,2}, Brett R. Loomis MS¹

¹Center for Health Policy Science and Tobacco Research, RTI International, Research Triangle Park, NC; ²Department of Health Policy and Management, Gillings School of Global Public Health, University of North Carolina at Chapel Hill, Chapel Hill, NC

Corresponding Author: Paul Shafer, MA, Center for Health Policy Science and Tobacco Research, RTI International, 3040 E. Cornwallis Road, Research Triangle Park, NC 27709, USA. Telephone: 919-260-2711; Fax: 919-485-5555; E-mail: pshafer@rti.org

Abstract

Introduction: In late 2012, North Dakota expanded its statewide smoke-free air law to cover all restaurants and bars in the state. Several North Dakota communities also had local ordinances that prohibited smoking in restaurants and bars prior to the statewide law. Previous work found no effect of the initial statewide law or several local laws on restaurant and bar sales.

Methods: Using quarterly county-level employment data from 1990 to 2014, we examined whether the expanded statewide law or pre-existing local laws were associated with significant changes in employment in restaurants and bars in North Dakota. Separate models were estimated for restaurant and bar employment using two methods of controlling for smoke-free air law coverage.

Results: We found no evidence of a significant association between employment in restaurants and bars in North Dakota and the expanded statewide law or pre-existing local laws. Prior employment levels in restaurants and bars and prevailing economic conditions were the main drivers of restaurant and bar employment, not smoke-free air laws.

Conclusions: This study examines the economic impact of smoke-free air laws in North Dakota on restaurant and bar employment following the expansion of the statewide law in late 2012 to cover all restaurants and bars. We find no significant adverse effect of smoke-free air laws on restaurants and bars, consistent with results from previous studies conducted in North Dakota and throughout the United States.

Implications: This study is the first to analyze the economic impact of smoke-free air laws in North Dakota on restaurant and bar employment following the 2012 expansion of the statewide law to cover all restaurants and bars. We find no evidence of a significant adverse effect of smoke-free air laws on restaurants and bars, consistent with results from previous studies conducted in North Dakota and throughout the United States. Prior employment levels and prevailing economic conditions proved to be the main drivers of restaurant and bar employment, not smoke-free air laws.

Introduction

Smoke-free air laws are an effective tool for protecting employees and the public from the dangers of secondhand smoke exposure.¹ Twenty-four states currently have smoke-free air laws that prohibit smoking in workplaces, restaurants, and bars, covering approximately 49% of the US population.² On August 5, 2005, North Dakota enacted a statewide smoke-free air law that prohibited

smoking within public and private non-hospitality workplaces, including, but not limited to, offices, factories, and retail stores, as well as state-regulated, non-tribal gambling facilities. On December 6, 2012, this law was expanded to all restaurants and bars in North Dakota. Several North Dakota communities also had stronger local ordinances that prohibited smoking in restaurants and bars prior to the statewide law.

Opponents frequently claim that the implementation of smoke-free air laws will have an adverse economic impact on the hospitality industry. A recent systematic review and meta-analysis found no evidence of widespread adverse economic effects of these laws on restaurants and bars.³ Similarly, a study examining the economic impact of smoke-free air laws in nine states across the South and Midwest found no significant adverse effects on employment or sales for restaurants and bars.⁴ Studies examining the effect of smoke-free air laws on restaurant and bar revenue in 10 Minnesota cities⁵ and 11 Missouri cities⁶ found no significant negative effects. However, a few peer-reviewed studies have found negative effects. For example, a 2007 study found that a county having a smoke-free air law was associated with reductions in bar employment, particularly in areas with high smoking prevalence.⁷

To our knowledge, no other studies, peer-reviewed or otherwise, have examined the impact of the expanded statewide law in North Dakota. Earlier work found no effect of the initial statewide law in 2005, which did not cover all restaurants or any stand-alone bars, on taxable sales for restaurants and bars or the fraction of overall taxable sales represented by restaurants and bars in the following year.⁸ A study of the 2008 smoking bans in Fargo and West Fargo found no effect of the laws on taxable sales in full-service restaurants or bars in either city.⁹ The objective of this study is to assess whether the expanded statewide law and pre-existing smoke-free air laws are associated with changes in employment for restaurants and bars in North Dakota.

Methods

Employment data for restaurants and bars were obtained from the US Bureau of Labor Statistics' Quarterly Census of Employment and Wages. These data are based on the North American Industrial Classification System (NAICS) code system. We selected codes 7221 (pre-2012) and 722511 (2012 and later) for restaurants (categorized as full-service restaurants) and code 7224 (categorized as drinking establishments) for bars. The change in restaurant industry code selected was a result of changes to the underlying NAICS code structure.¹⁰ All data are reported quarterly, by county, from the first quarter of 1990 through the third quarter of 2014. Data for some quarters and counties were suppressed by the Bureau of Labor Statistics to protect the confidentiality of employers, allowing for the inclusion of 47 out of 53 counties in the analysis. The natural log of employment values was used to provide a percentage change interpretation to model coefficients.

Using lists published by the American Nonsmokers' Rights Foundation,¹¹ we identified 10 communities with local laws that prohibited smoking in restaurants and bars prior to the 2012 statewide law: Bismarck (restaurants, October 11, 2005; bars, April 27, 2011), Fargo (restaurants and bars, July 1, 2008), West Fargo (restaurants and bars, July 1, 2008), Napoleon (restaurants and bars, August 1, 2010), Devils Lake (restaurants and bars, December 20, 2010), Pembina (restaurants and bars, February 1, 2011), Munich (restaurants and bars, June 1, 2012), Cavalier (restaurants and bars, July 1, 2012), Linton (restaurants and bars, September 1, 2012), and Lisbon (restaurants and bars, September 1, 2012). Three communities (Dickinson, Walhalla, and Williston) enacted local laws covering restaurants and bars after the expansion of the statewide law, to protect against future changes in or repeal of the statewide law. The smoke-free air law variables described below do not explicitly account for these new local laws in these three cities, as the statewide law was already in effect.

The presence of a smoke-free air law in a county is coded in two ways. The first coding is an indicator for the presence of any restaurant or bar smoke-free air law, which is equal to 0 in all time periods preceding a local and/or the statewide law and 1 in the time period in which any law took effect and all subsequent time periods. If any community within a county adopts a smoke-free air law in a given quarter, the indicator for the whole county is set to 1 for that quarter. The indicator variable for all counties that did not already have a pre-existing local law was set equal to 1 beginning with the first quarter of 2013, after the statewide smoke-free air law went into effect in December 2012. The second coding is a continuous variable measuring the percentage of each county's population covered by a restaurant or bar (separately) smoke-free air law (scaled from 0 to 100). If any communities within a county adopt a smoke-free air law, this variable measures the percentage of the population accounted for by the smoke-free communities in that county, regardless of when a law went into effect during the quarter. Thus, when the statewide smoke-free air law went into effect in December 2012, the percentage of the population covered in all counties was set equal to 100, beginning with the fourth quarter of 2012. This is a result of a legacy decision to not implement a cutoff date in generating the continuous representation of smoke-free air law coverage from 1990 to the present.

We utilized a dynamic panel data model, which uses variation in smoke-free air law coverage over time and across counties, to estimate the average effect of the statewide smoke-free air law and any pre-existing smoke-free air laws on county-level restaurant and bar employment. Employment in restaurants and bars exhibit a high degree of correlation between past and present values. To account for the dynamic nature of employment, we included the lagged value from the previous quarter as a control variable. To account for general economic activity that may affect restaurants and bars, independent of the implementation of smoke-free air laws, we included non-sector employment (either non-restaurant or non-bar employment, based on outcome) in each model. Finally, we controlled for any remaining unmeasured differences between counties and seasonality in employment by including a set of county and quarter fixed effects.

We used lagged values of non-sector employment as instruments for non-sector employment in the current quarter to better account for unobserved confounders that may simultaneously affect restaurant or bar employment and general economic activity.¹² Failure to account for this endogeneity would lead to bias when using ordinary least squares regression estimates. All models were estimated using the *ivreg2*¹³ command in Stata 13,¹⁴ which estimates a single equation instrumental variables model, with standard errors that are robust to heteroscedasticity and serial correlation (Newey-West kernel adjustment). All models satisfy the weak instrument test (Kleibergen and Paap's rank statistic¹⁵ via the first-stage *F* statistic).

Results

Statewide restaurant employment in North Dakota has trended steadily upward from approximately 7300 employees in the first quarter of 1990 to nearly 13 000 employees by the third quarter of 2014 (Figure 1). Bar employment has grown more slowly, from approximately 2500 employees in the first quarter of 1990 to just under 4000 employees by the third quarter of 2014. Seasonal variation is evident in employment patterns for restaurants but less so for bars.

We found no evidence that employment in restaurants or bars in North Dakota was associated with the expanded 2012 statewide law or the pre-existing local laws (Table 1). Prior quarter restaurant employment was a significant predictor of current quarter restaurant employment, as more than 85% of restaurant employment in a given quarter was explained by the prior level (Model 1: $b = 0.88, P < .01$; Model 2: $b = 0.87, P < .01$). Improvements in general economic conditions, controlled for by non-restaurant employment, were positively associated with restaurant employment in the smoke-free air law indicator model (Model 1: $b = 0.05, P < .05$). Similarly, for bars, prior quarter employment was highly predictive of current employment, at levels just below that of restaurant employment (Model 3: $b = 0.84, P < .01$; Model 4: $b = 0.83, P < .01$). Improvements in general economic conditions, controlled for by non-bar employment, were positively associated with increases in bar employment (Model 3: $b = 0.12, P < .01$; Model 4: $b = 0.12, P < .01$).

With the recent shale oil boom and the accompanying influx of oil and gas workers in North Dakota,¹⁶ we estimated an alternate set of models (not shown) controlling specifically for non-sector employment excluding oil and gas employment while including a separate control for oil and gas employment (NAICS code 211: oil and gas extraction). Our results did not qualitatively change, and oil and gas employment was not significantly associated with restaurant or bar employment.

We also conducted alternate analysis (not shown) including year fixed effects and nominal employment counts (rather than logged values), but our results did not qualitatively change. As a sensitivity analysis for the timing of the inclusion of the statewide law in the smoke-free air law indicator, we reestimated Models 1 and 3 (not shown) with the smoke-free law indicator equal to 1 for all counties beginning in the fourth quarter of 2012 instead of the first quarter of 2013, with no qualitative change in our results.

We were also able to obtain 3 years of quarterly taxable sales data for restaurants and bars in 34 of the 53 counties in North Dakota, covering 2 years pre-expansion and 1 year post-expansion (2011 to 2013). A trend analysis of these data (not shown) found no changes in sales activity following the expansion of the statewide law in December 2012.

Discussion

Our results indicate that North Dakota's expanded statewide smoke-free air law and pre-existing local laws were not associated with any adverse economic impacts on restaurant and bar employment. Our analysis used both a broad county-level indicator and a more granular percentage coverage variable to account for smoke-free air laws in

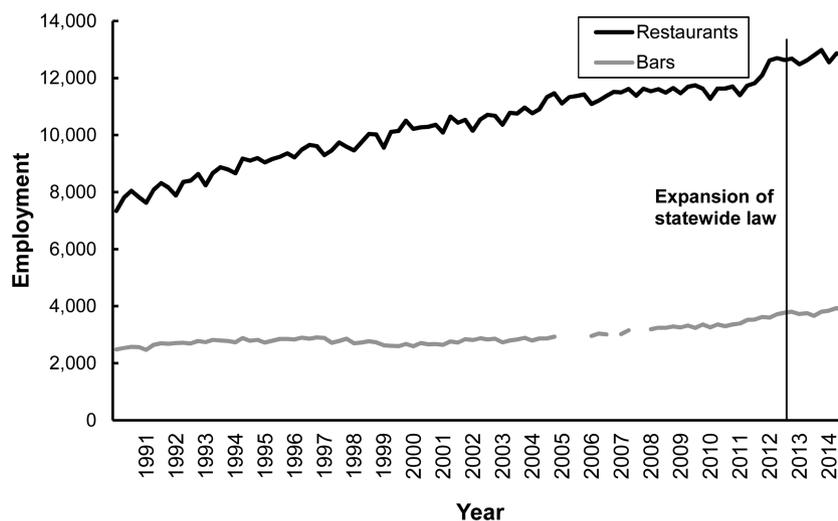


Figure 1. Restaurant and bar employment in North Dakota, Quarterly Census of Employment and Wages, 1990–2014. Note: State bar employment totals were unavailable for 2005, the fourth quarter of 2006, and the third and fourth quarters of 2007 in the Quarterly Census of Employment and Wages.

Table 1. Regression Results for North Dakota Restaurant and Bar Employment on Smoke-Free Air Laws, Quarterly Census of Employment and Wages, 1990–2014

| Independent variable | Restaurant employment | | Bar employment | |
|---------------------------------------|--|--|--|---|
| | Any smoke-free air law in county indicator (0/1) (Model 1) | % of county population covered by restaurant smoke-free air law (continuous) (Model 2) | Any smoke-free air law in county indicator (0/1) (Model 3) | % of county population covered by bar smoke-free air law (continuous) (Model 4) |
| Smoke-free air law variable | 0.0003 (0.0098) | -0.0001 (0.0001) | 0.02 (0.01) | 0.0001 (0.0001) |
| Prior quarter sector employment | 0.88** (0.01) | 0.87** (0.01) | 0.84** (0.02) | 0.83** (0.02) |
| Non-sector employment | 0.05* (0.02) | 0.04 (0.03) | 0.12** (0.03) | 0.12** (0.02) |
| Number of county-quarter observations | 2884 | 2823 | 1483 | 1424 |
| Number of counties included | 47 | 47 | 47 | 47 |

Quarterly and county fixed effects not shown. Prior quarter sector employment and non-sector employment were logged to provide a percentage change interpretation for coefficients. Bold values represent variable of interest.

* $P < .05$; ** $P < .01$.

a dynamic model that accounts for prevailing economic conditions, autocorrelation, seasonality, and time-invariant effects specific to a particular county. Our results persist when controlling for the large spike in population and resulting expansion of economic activity caused by the oil boom in North Dakota. We found that prior employment levels and prevailing economic conditions were the main drivers of restaurant and bar employment, not smoke-free air laws. Additionally, we found no evidence of a negative impact of smoke-free air laws on restaurant and bar sales, which is consistent with earlier findings statewide⁸ and in the Fargo area⁹ prior to the statewide expansion.

Limitations of our study include employment data that covered a relatively short time period after the expansion of the statewide law (seven quarters) and data for some counties and/or quarters were not available. Similarly, we were unable to conduct a more detailed sales analysis because only 3 years of data were available. However, similar studies have been conducted using as little as 1 year of post-law data for either employment or sales and used only descriptive analysis. With the extensive time period of employment data, we are confident in the validity of our approach and robustness of our findings. We also recognize the limitation in the timing difference of the inclusion of the statewide law expansion in each smoke-free air law variable; however, given that our results are qualitatively identical under both coding schemes, we do not believe that it weakens our conclusions.

This study is the first to examine the economic impact of smoke-free air laws in North Dakota on restaurant and bar employment following expansion of the statewide law in late 2012 to cover all restaurants and bars. We find no significant adverse effect of smoke-free air laws on restaurants and bars, consistent with results from previous studies conducted in North Dakota and throughout the United States. The ability to protect workers and the public from secondhand smoke exposure without causing undue harm to businesses is a notable achievement for North Dakota.

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Declaration of Interests

None declared.

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