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## **The Effect of Ordinances Requiring Smoke-Free Restaurants on Restaurant Sales**



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**R E P R I N T**

ABSTRACT

**Objectives.** The effect on restaurant revenues of local ordinances requiring smoke-free restaurants is an important consideration for restaurateurs themselves and the cities that depend on sales tax revenues to provide services.

**Methods.** Data were obtained from the California State Board of Equalization and Colorado State Department of Revenue on taxable restaurant sales from 1986 (1982 for Aspen) through 1993 for all 15 cities where ordinances were in force, as well as for 15 similar control communities without smoke-free ordinances during this period. These data were analyzed using multiple regression, including time and a dummy variable for whether an ordinance was in force. Total restaurant sales were analyzed as a fraction of total retail sales and restaurant sales in smoke-free cities vs the comparison cities similar in population, median income, and other factors.

**Results.** Ordinances had no significant effect on the fraction of total retail sales that went to restaurants or on the ratio of restaurant sales in communities with ordinances compared with those in the matched control communities.

**Conclusions.** Smoke-free restaurant ordinances do not adversely affect restaurant sales. (*Am J Public Health*. 1994;84:1081-1085)

# The Effect of Ordinances Requiring Smoke-Free Restaurants on Restaurant Sales

Stanton A. Glantz, PhD, and Lisa R. A. Smith, BA

## Introduction

As the evidence that environmental tobacco smoke endangers nonsmokers<sup>1-5</sup> has accumulated, more and more communities have restricted or eliminated smoking in public places and workplaces. Several communities have enacted legislation that requires smoke-free restaurants, thereby protecting the public and, particularly, restaurant employees<sup>6</sup> from the toxic chemicals in secondhand tobacco smoke. Such legislation, however, is not in the interests of the tobacco industry because creation of smoke-free restaurants is a highly visible statement that tobacco use is no longer socially acceptable.<sup>7</sup> Thus, tobacco companies have sponsored front organizations like the Beverly Hills Restaurant Association, Restaurants for a Sensible Voluntary Policy on Smoking, Californians for Fair Business Policy, and the California Business and Restaurant Alliance to mobilize restaurants against local smoke-free ordinances.<sup>8,9</sup> This strategy achieved its first success in 1987, when the tobacco industry convinced the Beverly Hills City Council to repeal the first 100% smoke-free restaurant ordinance in California on the basis of undocumented claims that business dropped 30% because of the ordinance.<sup>8,9</sup> Because similar predictions for other cities have been published nationally, voiced repeatedly through public testimony, and regularly printed in news reports, we tested the hypothesis that the passage of a smoke-free restaurant ordinance is accompanied by an immediate significant drop in restaurant sales.<sup>10</sup>

This study analyzes sales tax data for the first 15 US cities to enact smoke-free ordinances affecting restaurants. The California cities of Auburn, Bellflower (which repealed its ordinance in March 1992),

Beverly Hills (which amended its ordinance 4 months after it went into force), El Cerrito, Lodi, Martinez, Palo Alto, Paradise, Roseville, Ross, Sacramento, and San Luis Obispo, and the Colorado cities of Aspen, Snowmass Village, and Telluride have had such 100% smoke-free restaurant ordinances in force long enough to assess their effects. We also examined sales tax data from 15 comparison cities similar to the smoke-free cities in population, income, smoking prevalence, and other factors.<sup>11-13</sup> An analysis of restaurant sales as a fraction of total retail sales, and of restaurant sales in cities with smoke-free restaurant ordinances compared with those in similar cities that do not have smoke-free ordinances, shows no significant effects on business.

## Methods

Data on taxable restaurant sales and total retail sales were obtained from the California State Board of Equalization<sup>14</sup> and Colorado State Department of Revenue<sup>15</sup> from the first quarter of 1986 through the first or second quarter of 1993 (depending on data availability) for the 15 communities that had smoke-free restaurant ordinances in force. Included were cities whose ordinances were in force for at least four quarters during this period, plus Beverly Hills and Bellflower, Calif, whose ordinances were repealed. Data were also obtained for 15 comparison communities where no such smoke-free

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**TABLE 1—Profile of Smoke-Free and Comparison Cities**

Smoke-Free and Comparison Cities	Population (1989) <sup>a</sup>	Geographical			Type of Smoking Restriction <sup>b</sup>	Median Household Income (1989) <sup>a</sup>	% of Smokers <sup>c</sup>	Date Ordinance in Effect	No. of Months in Effect <sup>d</sup>
		Inside Urbanized Area	Outside Urbanized Area	Rural Nonfarm					
Aspen, Colo	5 049		X		100%	37 467	23.5	10/85	95
Vail, Colo	3 659		X		Some	41 211			
Auburn, Calif	10 592		X		100%	37 272	24.1	10/91	21
Oroville, Calif	11 960		X		None	16 614	23.6		
Beverly Hills, Calif	31 971	X			100%	54 348	21.8	4/87–8/87	5
Santa Monica, Calif	86 905	X			Some	35 997			
Bellflower, Calif	61 815	X			100%	32 711	21.8	6/91–3/92	10
Lakewood, Calif	73 000	X			None	44 700			
El Cerrito, Calif	22 869	X			100%	39 538	22.9	11/91	20
San Pablo, Calif	25 158	X			Some	25 479			
Lodi, Calif	51 874	X			100%	30 739	24.1	11/90	32
Merced, Calif	56 216	X			Some	24 727	25.1		
Martinez, Calif	32 038	X			100%	45 964	22.0	3/92	16
Pleasant Hill, Calif	31 585	X			Some	46 885			
Palo Alto, Calif	55 544	X			100%	55 333	19.7	11/91	20
Mountain View, Calif	67 460	X			None	42 431			
Paradise, Calif	25 408		X		100%	22 954	23.6	8/91	23
Red Bluff, Calif	12 363		X		None	19 474			
Roseville, Calif	44 685	X			100%	39 975	24.1	9/91	22
Chico, Calif	40 076	X			Some	19 005	23.6		
Ross, Calif	2 180	X			100%	84 414	21.6	1/90	42
Tiburon, Calif	7 532	X			None	75 864			
Sacramento, Calif	369 365	X			100%	28 183	25.2	5/92	14
Fresno, Calif	354 202	X			Some	24 923	25.1		
San Luis Obispo, Calif	41 958	X			100%	25 982	18.9	8/90	35
Santa Maria, Calif	61 284	X			Some	29 492			
Snowmass, Colo	1 426			X	100%	39 107	23.5	5/89	51
Breckenridge, Colo	1 285			X	Some	33 259			
Telluride, Colo	1 292			X	100%	31 968	23.5	4/88	63
Steamboat Springs, Colo	6 695		X		Some	29 363			

<sup>a</sup>1990 US Census of Population and Housing.<sup>11</sup>

<sup>b</sup>"Some" refers to no more than 60% seating areas for nonsmokers.

<sup>c</sup>Tobacco Use in California (reported by county)<sup>12</sup> for California and Behavioral Risk Factor Surveillance Study for Colorado (statewide) 1991.<sup>13</sup>

<sup>d</sup>Number of months for which data were available for this study.

ordinance was in force or where no more than 60% seating availability for nonsmokers occurred as a part of an existing ordinance (Table 1). Sales data for Aspen and its comparison city were collected from the first quarter of 1982 because Aspen's ordinance was passed in 1985. Data were recorded for "Eating and Drinking Places" and "Total Retail Sales." Published data for restaurant sales and total retail sales in the city of Paradise for the second, third, and fourth quarters of 1990 and in the city of San Luis Obispo for the fourth quarter of 1990 and first quarter of 1991 were corrected as instructed by the Board of Equalization to

account for late-reported data (written communications from Robert Rossi, June 15, 1992, and July 20, 1993).

To account for population growth, inflation, and changes in underlying economic conditions, the fraction (*F*) of total retail sales at restaurants was computed as follows:

$$F = \frac{\text{Restaurant Sales}}{\text{Total Retail Sales}}$$

If an ordinance adversely affected restaurants, this fraction would be expected to drop when the ordinance was in force. Restaurant sales in cities with ordinances

were also compared with sales in comparable cities without ordinances as follows:

$$C = \frac{\text{Restaurant Sales in City with Ordinance}}{\text{Restaurant Sales in City without Ordinance}}$$

Again, if an ordinance adversely affected sales, this ratio would be expected to drop.

Data were analyzed with linear regression<sup>16</sup>:

$$y = b_0 + b_t t + b_L L + b_W W,$$

where *y* is the dependent variable (*F* or *C*), *t* is time needed to represent the

underlying secular trend, and  $L$  is a dummy variable that indicates whether a smoke-free restaurant law is in force. The estimate of the coefficient  $b_L$  quantifies the annual rate of increase (or decrease) in the dependent variable,  $y$ , each year. The dummy variable  $L$  quantifies the presence of a smoke-free restaurant ordinance as follows:

$$L = \begin{cases} 0 & \text{If No Ordinance} \\ \frac{1}{3} & \text{If Ordinance in Force for} \\ & \text{1 Month of Quarter} \\ \frac{2}{3} & \text{If Ordinance in Force for} \\ & \text{2 Months of Quarter} \\ 1 & \text{If Ordinance in Force for} \\ & \text{Entire Quarter} \end{cases}$$

The coefficient  $b_L$  quantifies the magnitude of the effect of the ordinance on the dependent variable. Because all of the Colorado cities under study are ski centers, the restaurant business is much stronger during the winter tourist season. To allow for this effect, the dummy variable  $W$  was included for the Colorado cities, set to 1 for the first quarter (the winter tourist season) and 0 otherwise.

Not only were data analyzed for each city separately, but all the data on restaurant sales as a percentage of total retail sales for all 15 cities with ordinances for the entire year period were pooled in a single analysis, including 29 additional dummy variables, to allow for between-city differences in the mean values of the fraction of total retail sales going to restaurants.

The variance inflation factors for each variable were computed to assess multicollinearity, and the Durbin-Watson statistic was computed to test for autocorrelation among the residuals. The variance inflation factors were always well below 2, and the Durbin-Watson statistic never reached statistical significance. A change is considered statistically significant when  $P < .05$ .

## Results

Table 2 summarizes the results for total restaurant sales as a fraction of all retail sales ( $F$ ), and total restaurant sales in cities with ordinances compared with those in the matched comparison cities ( $C$ ). The first column in the table is the mean value observed from 1986 (1982 for Aspen) to the second quarter of 1993 to provide a comparison with the magnitude of the change associated with the ordinance.

Smoke-free ordinances generally had no statistically significant effect on the

TABLE 2—Effect of Smoke-Free Restaurant Ordinances on Total Restaurant Sales

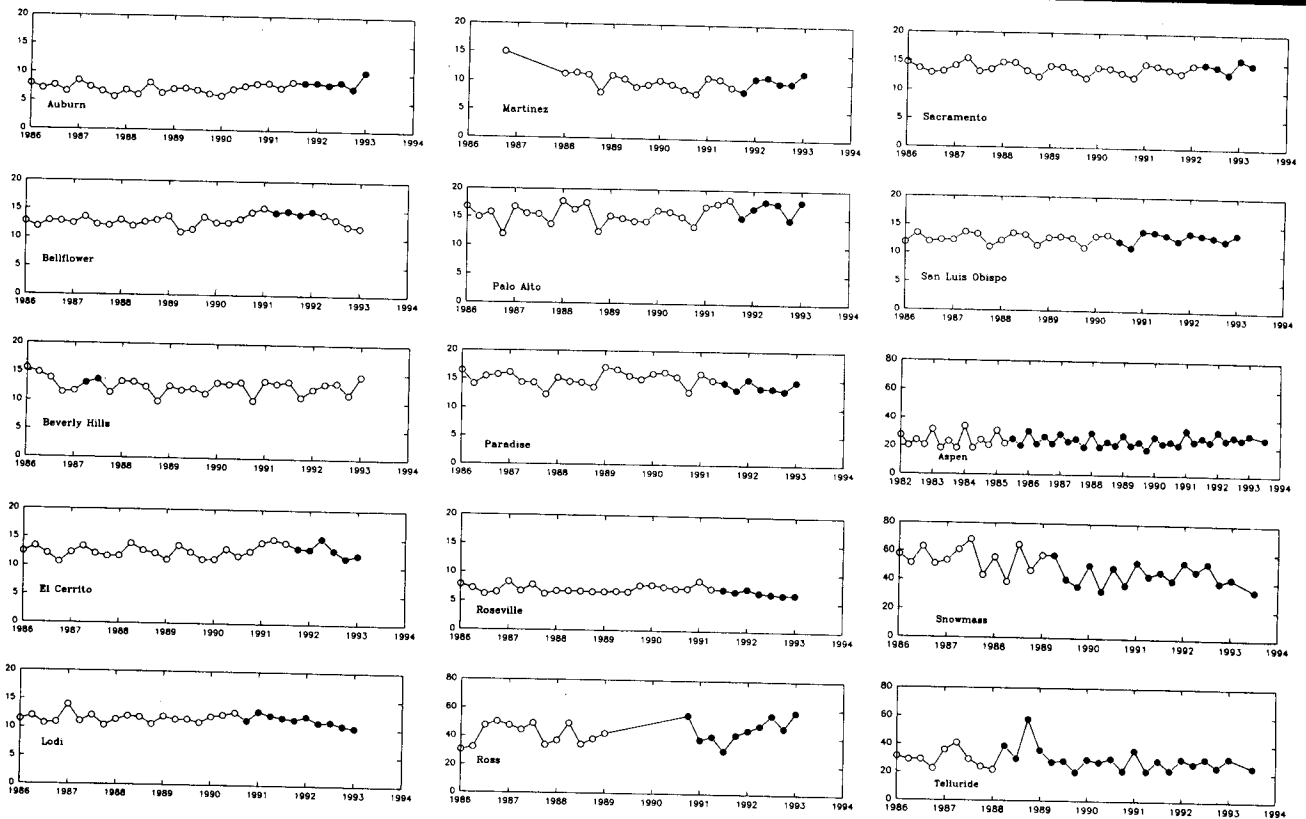
City	Mean	Effect of Ordinance		Model	
		Change, $b_L$	$P$	$R^2$	$P$
<b>Fraction of total retail sales, <math>F</math>, %</b>					
Aspen	24.8	1.1 ± 1.3	.408	.688	.000
Auburn	7.5	1.0 ± 0.5	.092	.319	.007
Bellflower	13.1	1.5 ± 0.6	.025	.313	.008
Beverly Hills	12.8	0.6 ± 1.2	.633	.033	.646
El Cerrito	12.7	-0.4 ± 0.7	.637	.100	.255
Lodi	11.7	0.1 ± 0.6	.902	.005	.939
Martinez	10.3	2.9 ± 1.0	.008	.404	.007
Palo Alto	15.8	0.7 ± 1.1	.520	.115	.204
Paradise	14.9	-1.4 ± 0.8	.078	.181	.075
Roseville	7.1	-0.9 ± 0.4	.039	.156	.111
Ross	43.5	-3.3 ± 9.1	.715	.132	.243
Sacramento	13.9	0.9 ± 0.6	.102	.102	.233
San Luis Obispo	12.7	0.2 ± 0.6	.764	.082	.327
Snowmass	49.2	6.0 ± 5.7	.301	.374	.006
Telluride	29.6	9.4 ± 4.7	.055	.197	.120
All combined	18.4	-1.3 ± 1.0	.210	.611	.000
<b>Ratio of sales with comparison city, <math>C</math></b>					
Aspen	1.12	.21 ± .12	.106	.153	.071
Auburn	.44	.03 ± .02	.186	.082	.327
Bellflower	.50	-.02 ± .02	.347	.036	.621
Beverly Hills	.56	-.06 ± .04	.171	.238	.029
El Cerrito	1.28	-.00 ± .08	.998	.053	.495
Lodi	.90	-.01 ± .03	.742	.270	.017
Martinez	.41	.04 ± .03	.194	.329	.001
Palo Alto	1.69	.23 ± .07	.004	.416	.001
Paradise	.71	-.07 ± .03	.049	.144	.132
Roseville	.68	-.02 ± .03	.562	.089	.300
Ross	.05	.02 ± .01	.196	.302	.028
Sacramento	1.10	-.05 ± .03	.091	.403	.001
San Luis Obispo	1.12	-.08 ± 0.6	.177	.154	.113
Snowmass	.95	-.29 ± .20	.193	.584	.000
Telluride	.42	.08 ± .07	.282	.372	.006
All combined	.82	-.04 ± .03	.166	.828	.000

fraction of retail sales that went to restaurants or on total restaurant sales in cities with ordinances compared with those in cities without smoke-free ordinances (Table 2 and Figure 1). There is marginal evidence that the fraction of total retail sales to restaurants increased in two cities (Bellflower,  $P = .025$ ; Martinez,  $P = .008$ ) and decreased in one city (Roseville,  $P = .039$ ). In a comparison of restaurant sales in one city with an ordinance versus one city without an ordinance, sales increased in one city (Palo Alto,  $P = .004$ ) and decreased in another (Paradise,  $P = .049$ ). The lack of consistent response suggests that these results may simply reflect random variation, given the large number of  $P$  values that were computed. Analysis of all the data in pooled regressions did not detect significant changes in the percentage of retail sales or sales in cities with smoke-free ordinances compared with those in cities without ordinances.

Beverly Hills is a particularly important case because it has been used by the tobacco industry to support the claim that smoke-free restaurant ordinances are associated with a 30% drop in business (Figure 2). However, data reveal that no such drop in sales occurred upon enactment, and that no increase in sales followed repeal 4 months later. Likewise, despite the fact that the Bellflower ordinance was repealed because of claims that business dropped, the ordinance was actually associated with a marginally significant ( $P = .025$ ) increase in business.

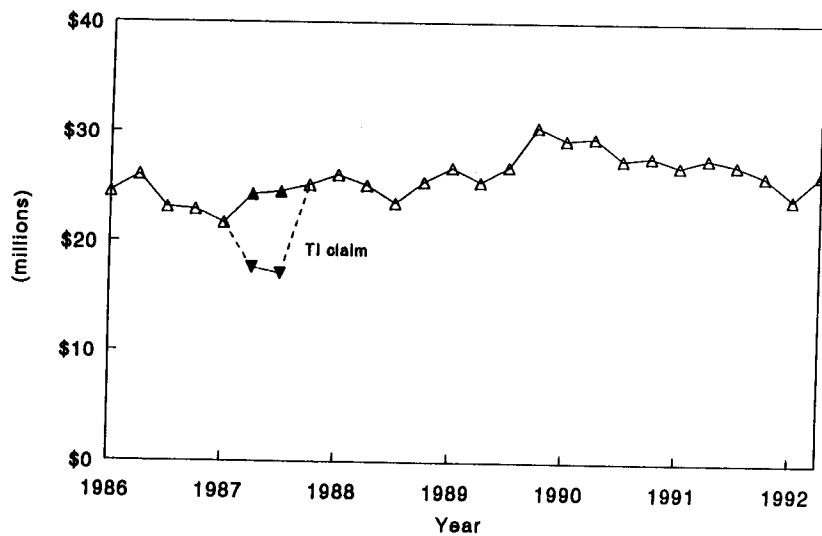
## Discussion

This is the first comprehensive study that examines taxable sales data to determine the economic impact of smoke-free restaurant ordinances on restaurant sales. Using data from the California State Board of Equalization and the Colorado State Department of Revenue for pur-



Note. The quarters in which 100% smoke-free ordinances were in effect are represented by solid circles.

FIGURE 1—Restaurant sales as a percentage of total retail sales for the 15 communities included in the study.



Note. Period of smoke-free ordinance is indicated by the solid triangles.

FIGURE 2—The 100% smoke-free restaurant ordinance in force in Beverly Hills did not reduce sales by 30% (dashed line with "TI [tobacco industry] claim"), as the tobacco industry had suggested; rather, it had no significant effect on sales.

poses of paying sales taxes has several advantages. First, the numbers reflect *all* restaurant sales in a community, not just those of a small sample of restaurants. Second, the numbers are objective; they were collected through consistent methods by agencies with no interest in the effects of smoking restrictions on restaurant sales. Third, sales tax data can be expected to be reasonably accurate since it is a crime to lie in reporting the figures.

The communities studied in the report are different from each other and represent a cross-section of communities that might enact legislation controlling smoking in restaurants: Auburn is a small Sierra foothills community; Beverly Hills is a well-to-do urban city; Bellflower is a middle-class bedroom community; El Cerrito and Martinez lie within highly industrial areas; Lodi is a rural agricultural center; Palo Alto is a large suburban university community; Paradise is a small, semiagricultural community; Sacramento is a large city and the state capital; San Luis Obispo is a college town; Roseville represents a semirural bedroom commu-

nity; Ross is a small affluent San Francisco Bay community; and the three Colorado cities are mountainous, tourist resort areas. The fact that there were no adverse effects on business in these communities supports the conclusion that the results generalize broadly. Further, these 15 cities represent every city that has passed smoke-free ordinances that have been in effect long enough to study.

This study covers a significant period of time. It is important to take into account long-term (secular) trends as well as the quarter-by-quarter random variation and short-term economic changes. We avoided short-term analyses because it is generally possible to reach any conclusion desired by selectively picking the "correct" two quarters for analysis.<sup>17</sup> To avoid such biases and increase the power of the statistical analysis to detect an effect of the ordinances, we used data for a 7-year period (12 years for Aspen and Vail). This length of time allowed us to obtain good estimates of secular trends before evaluating any effects of the ordinances.

A common concern is raised about the possibility that patrons will dine in adjacent communities without such restrictions. Our data address this concern because the cities examined in this study are not isolated communities. Auburn, Lodi, Martinez, Paradise, Roseville, and San Luis Obispo, while not in large urban centers, are all surrounded by unincorporated areas that contain restaurants. Beverly Hills and Bellflower and their comparison cities, Santa Monica and Lakewood, are all located in Los Angeles County, a major metropolitan area in which all communities directly abut other communities. El Cerrito, Palo Alto, Ross, and their comparison cities all lie within the San Francisco Bay region. Sacramento and its comparison city, Fresno, both large urban centers, face competition from several neighboring communities. Although the skiing communities of Aspen, Telluride, and Snowmass Village are relatively secluded, other resort towns nearby that allow smoking would represent viable tourist alternatives to these smoke-free cities. If people were leaving

these cities to dine in neighboring cities, our analysis would have detected it.

Another area of concern is the effect on bars since smoking and drinking are thought to go together. Revenues from bars and "full-service" restaurants are included in the sales tax data we used. The ordinances examined in this study contain different provisions governing bars independently and bars in relation to restaurants. Had there been a significant effect on sales in such restaurants, our analysis would have detected it. Furthermore, an analysis of individual classes of restaurants (based on whether they sell different types of alcohol) for four cities in California previously showed no effect when full-service restaurants were analyzed separately.<sup>18</sup>

Finally, the fact that the ordinances in Beverly Hills and Bellflower were repealed adds to the strength of our conclusions. Had the ordinances affected sales negatively, we would have expected to see an increase in sales following repeal. However, there was no increase in Beverly Hills, and sales dropped in Bellflower after the ordinance was repealed. Thus, legislators and government officials can enact such health and safety requirements to protect patrons and employees in restaurants from the toxins in second-hand tobacco smoke without the fear of adverse economic consequences. □

### Acknowledgments

This research was supported by funds provided by the Cigarette and Tobacco Surtax Fund of the State of California through the Tobacco-Related Disease Research Program of the University of California (award 1RT 520).

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## Erratum

In: Glantz SA, Smith LRA. The effect of ordinances requiring smoke-free restaurants on restaurant sales. *Am J Public Health*. 1994;84:1081-1085.

**Authors' note.** Critics have also identified a few cities in our original study for which there were errors in the effective dates of the ordinances (Evans MK. A review of "The effect of ordinances requiring smoke-free restaurants on restaurant sales" by Stanton A. Glantz and Lisa R. A. Smith. March 1997. Unpublished.). We have corrected the effective dates where appropriate and rerun the statistical analysis; doing so led to only minor changes in the numerical results. Revised copies of the tables from our paper appear below and on the following page.

**TABLE 1—Profile of Smoke-Free and Comparison Cities**

Smoke-Free and Comparison Cities	Population (1989) <sup>a</sup>	Geographical			Type of Smoking Restriction <sup>b</sup>	Median Household Income (1989) <sup>a</sup>	% of Smokers <sup>c</sup>	Date Ordinance in Effect	No. of Months in Effect <sup>d</sup>
		Inside Urbanized Area	Outside Urbanized Area	Rural Nonfarm					
Aspen, Colo	5 049		X		100%	37 467	23.5	8/85	131
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Auburn, Calif	10 592		X		100%	37 272	24.1	4/91	27
Oroville, Calif	11 960		X		Some	16 614	23.6		
Beverly Hills, Calif	31 971	X			100%	54 348	21.8	4/87-7/87	4
Santa Monica, Calif	86 905	X			Some	35 997			
Bellflower, Calif	61 815	X			100%	32 711	21.8	3/91-6/92	16
Lakewood, Calif	73 000	X			Some	44 700			
El Cerrito, Calif	22 869	X			100%	39 538	22.9	11/91	20
San Pablo, Calif	25 158	X			Some	25 479			
Lodi, Calif	51 874	X			100%	30 739	24.1	12/90	31
Merced, Calif	56 216	X			Some	24 727	25.1		
Martinez, Calif	32 038	X			100%	45 964	22.0	3/92	16
Pleasant Hill, Calif	31 585	X			Some	46 885			
Palo Alto, Calif	55 544	X			100%	55 333	19.7	9/92	7
Mountain View, Calif	67 460	X			Some	42 431			
Paradise, Calif	25 408		X		100%	22 954	23.6	8/91	23
Red Bluff, Calif	12 363		X		None	19 474			
Roseville, Calif	44 685	X			100%	39 975	24.1	10/91	21
Chico, Calif	40 076	X			Some	19 005	23.6		
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Tiburon, Calif	7 532	X			Some	75 864			
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Santa Maria, Calif	61 284	X			Some	29 492			
Snowmass, Colo	1 426			X	100%	39 107	23.5	5/89	51
Breckenridge, Colo	1 285			X	None	33 259			
Telluride, Colo	1 292			X	100%	31 968	23.5	4/88	63
Steamboat Springs, Colo	6 695		X		None	29 363			

<sup>a</sup>1990 US Census of Population and Housing.<sup>11</sup>

<sup>b</sup>"Some" refers to no more than 60% seating areas for nonsmokers.

<sup>c</sup>Tobacco Use in California (reported by county)<sup>12</sup> for California and Behavioral Risk Factor Surveillance Study for Colorado (statewide) 1991.<sup>13</sup>

<sup>d</sup>Number of months for which data were available for this study.

**Erratum (continued)**

In: Glantz SA, Smith LRA. The effect of ordinances requiring smoke-free restaurants on restaurant sales. *Am J Public Health*. 1994;84:1081-1085.

**TABLE 2—Effect of Smoke-Free Restaurant Ordinances on Total Restaurant Sales**

City	Mean	Effect of Ordinance		Model	
		Change, $b_L$	<i>P</i>	$R^2$	<i>P</i>
<b>Fraction of total retail sales, <i>F</i>, %</b>					
Aspen	24.8	-2.0 ± 1.1	.820	.650	.000
Auburn	7.5	1.0 ± 0.5	.071	.329	.006
Bellflower	13.1	1.7 ± 0.5	.002	.433	.001
Beverly Hills	12.8	0.5 ± 1.4	.734	.029	.684
El Cerrito	12.7	-0.4 ± 0.7	.637	.100	.255
Lodi	11.7	0.0 ± 0.6	.955	.004	.945
Martinez	10.3	2.9 ± 1.0	.008	.404	.007
Palo Alto	15.8	0.3 ± 0.9	.760	.178	.022
Paradise	14.9	-1.4 ± 0.8	.078	.181	.075
Roseville	7.1	-0.8 ± 0.4	.043	.150	.121
Ross	43.5	-3.3 ± 9.1	.715	.132	.243
Sacramento	13.9	0.9 ± 0.6	.102	.102	.233
San Luis Obispo	12.7	0.2 ± 0.6	.764	.082	.327
Snowmass	49.2	6.0 ± 5.7	.301	.374	.006
Telluride	29.6	9.4 ± 4.7	.055	.197	.120
All combined	18.4	0.1 ± 0.6	.874	.911	.000
<b>Ratio of sales with comparison city, <i>C</i></b>					
Aspen	1.12	.09 ± .12	.459	.223	.003
Auburn	.44	.04 ± .02	.094	.119	.192
Bellflower	.50	.00 ± .02	.968	.002	.975
Beverly Hills	.56	-.06 ± .05	.179	.236	.030
El Cerrito	1.28	-.00 ± .08	.998	.053	.495
Lodi	.90	-.02 ± .03	.652	.272	.016
Martinez	.41	.04 ± .03	.194	.329	.001
Palo Alto	1.69	.25 ± .13	.066	.296	.010
Paradise	.71	-.07 ± .03	.049	.144	.132
Roseville	.68	-.02 ± .03	.476	.095	.274
Ross	.05	.02 ± .01	.196	.302	.028
Sacramento	1.10	-.05 ± .03	.091	.403	.001
San Luis Obispo	1.12	-.08 ± 0.6	.177	.154	.113
Snowmass	.95	-.29 ± .20	.193	.584	.000
Telluride	.42	.08 ± .07	.282	.372	.006
All combined	.82	-.02 ± .02	.487	.881	.000