Secondhand Smoke Exposure in Bars and Restaurants in St. Louis

STUDY FINDINGS

STUDY PURPOSE

There is no known safe level of secondhand smoke (SHS) exposure.[1] It has been linked to increased risk of heart disease and lung cancer.[2-4] Smokefree workplaces (including bars and restaurants) are the only solution to protect workers from the deadly effects of SHS.

In St. Louis, smokefree workplace policies have been met with contentious debate and resistance. At local city and county council meetings the need for St. Louis specific data documenting exposure to SHS has become apparent as residents and members debate the need for smokefree policies. Also, many restaurant and bar owners claim that having a smoke-specific ventilation system eliminates the potentially harmful effects of SHS.

To date, there have been no studies assessing SHS exposure in bars and restaurants in the St. Louis area. Therefore, the Siteman Cancer Center and the Center for Tobacco Policy Research at Washington University sought to determine the following in bars and restaurants:

- Level of SHS exposure using airborne nicotine concentrations;
- Employees' exposure to SHS using hair nicotine levels;
- Employees' health issues related to SHS exposure; and
- Employees' knowledge and attitudes regarding smokefree policies.

Airborne nicotine is a reliable marker of SHS exposure given that cigarette smoke is the only source of nicotine in the air. For this study, SHS exposure was measured by placing two airborne nicotine monitors in randomly selected bars and restaurants. Hair nicotine levels were obtained from hair samples from the employees working at the venues where the monitors where placed. Hair nicotine levels provided a measure for employees' exposure to SHS.

The Exposure Assessment Laboratory of the Johns Hopkins Bloomberg School of Public Health performed the analysis of the air monitors and hair samples.

SUMMARY OF RESULTS

Venue Characteristics

Monitors were placed in 20 venues (10 bars and 10 restaurants) throughout St. Louis City and County between June and August 2009. Sixteen venues allowed smoking indoors and four were smokefree (Table 1). Those that were smokefree had voluntarily implemented a smokefree policy.

Table 1. Characteristics of Venues

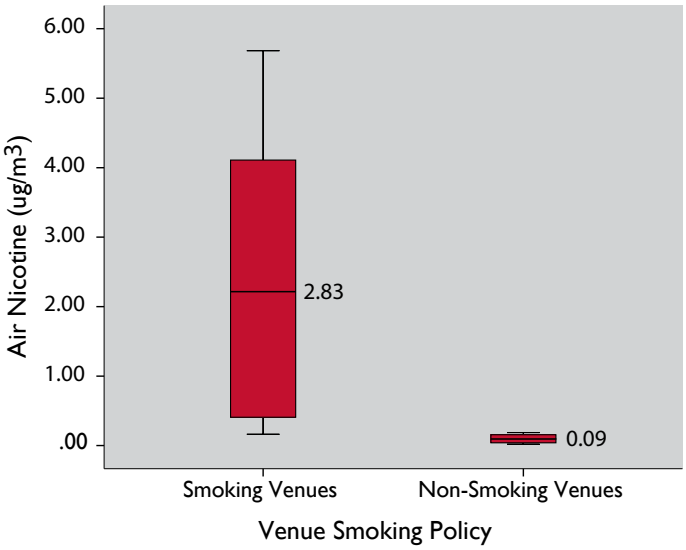
Characteristic	Mean (Standard Deviation)
Years in business	12.4 (14.4)
Maximum occupancy	146 (90)
Indoor area size	1746.9 (1061.3) feet^2
Number of employees	41 (22)
Other Features	**Percentage (%)**
Ventilation system	50
Air conditioning	100
Outdoor area	70
Full menu	100
Smoking Policies	**Percentage (%)**
Smoking allowed	80
Cigarettes sold	30 (10% over the bar counter, 20% vending machines)
Tobacco products advertised	10

Venues that allowed smoking had significantly higher levels of nicotine than smokefree venues

Airborne nicotine levels ranged from 0.015 to 25.14 ug/m^3. The median (interquartile range) airborne nicotine levels in venues that allowed smoking was 2.83 µg/m^3 (0.57-4.56 µg/m^3) compared to 0.09 µg/m^3 (0.03-0.17 µg/m^3) in smokefree venues (Figure 1). *The median airborne nicotine levels were significantly higher in smoking venues compared to smokefree venues.*

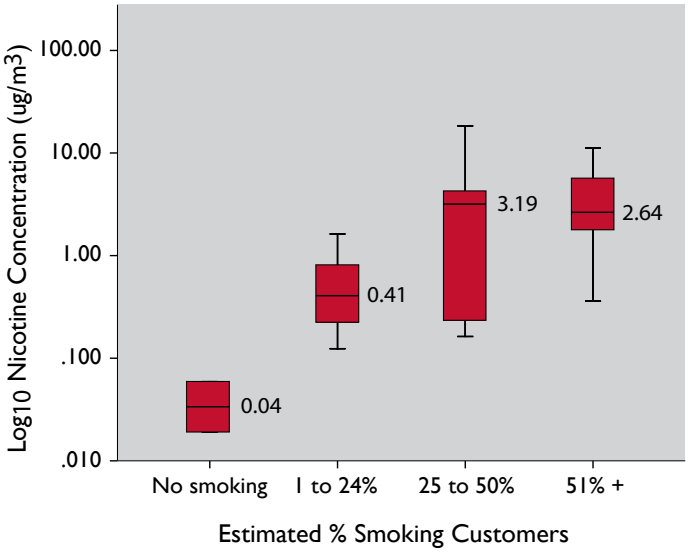
None of the venues were below level of detection. This may be due to employees smoking in the facility after hours or airborne nicotine from outdoor smoking that infiltrated through open doors and windows.

Figure 1. Airborne nicotine levels by venue smoking policy



Airborne nicotine levels by the estimated percentage of customers who smoke (Figure 2) was also analyzed (owners/managers estimated the % of their customers who are smokers). As expected, venues with a higher estimated percentage of customers who smoke had higher airborne nicotine levels than those with a lower percentage of smokers. Airborne nicotine levels in bars where less than 25% of customers smoked ranged from 0.12-3.05 $\mu g/m^3$ compared to 0.02-25.14 $\mu g/m^3$ and 0.11-12.67 $\mu g/m^3$ in bars where 25-50% and >51% of all customers smoked, respectively.

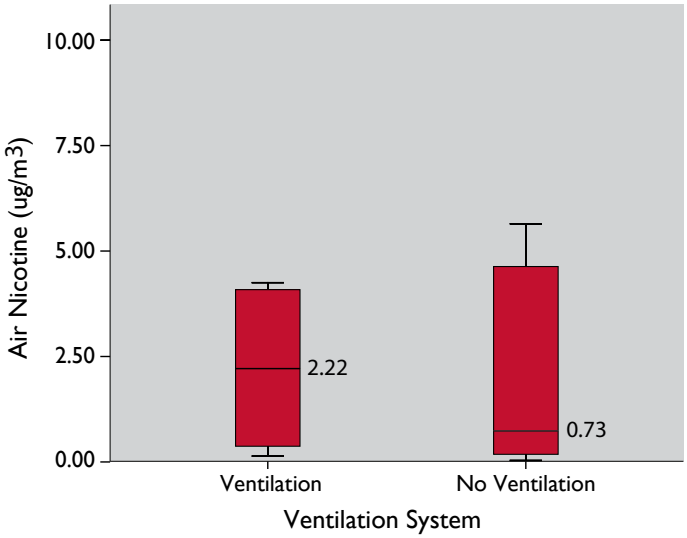
Figure 2. Levels of nicotine in air by estimated % of customers who smoke



Ventilation systems do not make a difference

In St. Louis, the ventilation issue has been a topic of much debate. In the venues with ventilation systems, median airborne nicotine levels were 2.22 µg/m3 (0.33-4.15 µg/m3) compared to those without a ventilation system 0.73 µg/m3 (0.14-4.92 µg/m3). Venues with ventilation systems had higher air nicotine concentrations compared to those without a ventilation system. Given that there was no significant difference in the density of smokers between venues with or without a ventilation system, this finding most likely reflects ventilation systems actually recycling the air back into the same space.[5] Thus the SHS is constantly recirculated through the same space. *Ventilation systems were not effective in eliminating exposure to SHS.*

Figure 3. Levels of nicotine in the air in venues with and without ventilation systems



Most employees preferred smokefree workplaces

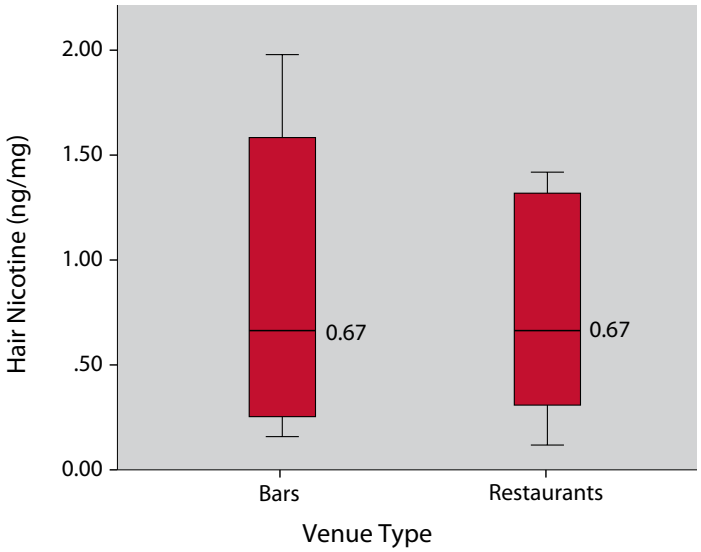
Seventy-eight bar and restaurant employees were surveyed (36 male and 42 female). Respondent's average age was 30.6 years old (SD 9.1). Most (n=43, 55%) were current smokers. Employees reported the following:

- A large majority (62%) of employees preferred to work in a smokefree environment.
- Fifty-six percent of non-smokers and 30% smokers, believed that restaurants/bars/nightclubs should be smokefree.
- Over half (51%) of current smokers believed smokefree legislation would help them to quit.
- Seventy percent of former smokers believed that smokefree legislation would help them remain nonsmokers.

Hair nicotine was present among all nonsmoking employees in smoking venues

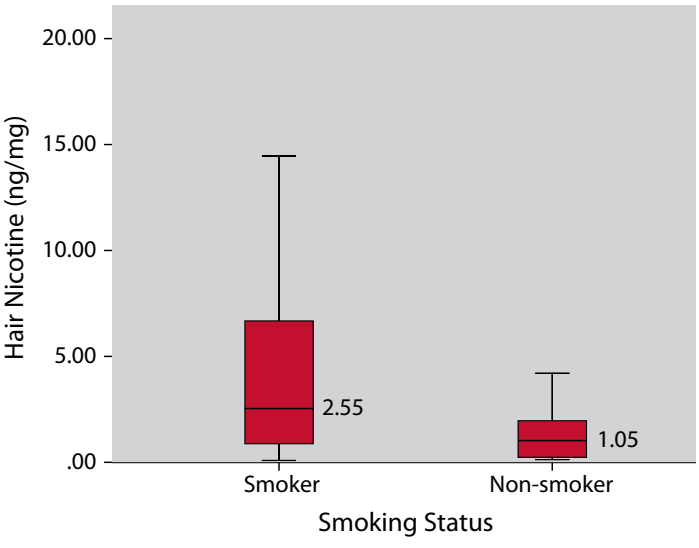
Nonsmoking bar employees median hair nicotine level was 0.67 ng/mg (0.25-1.64 ng/mg). Restaurant employees median hair nicotine level was 0.67 ng/mg (0.28-1.37 ng/mg) (Figure 4).

Figure 4. Hair nicotine levels among nonsmoking employees working in smoking venues



Also, in smoking venues, even though hair nicotine levels in nonsmokers were lower than in smokers, there was hair nicotine present in all employee hair samples (Figure 5). *This finding demonstrates that all employees, regardless of smoking status were exposed to SHS and retained amounts of nicotine in their hair.*

Figure 5. Hair nicotine levels among smoking and non-smoking employees who work in smoking venues



Employees reported experiencing health problems associated with SHS exposure

The most frequent health problems reported by employees were excess phlegm, red or irritated eyes, runny nose, and irritability (Tables 2-3).

Table 2. Reported respiratory health concerns

Health Issue	% of Smoking Employees	% of Non Smoking Employees
Wheezing/whistling in chest	16.4	7.7
Shortness of breath	27.3	15.4
Coughing	56.3	61.6
Excess phlegm	34.5	30.8
Asthma	61.5	38.5

Table 3. Reported sensory health concerns

Health Issue	% of Smoking Employees	% of Non Smoking Employees
Red or irritated eyes	32.7	30.8
Runny nose or sneezing	50.9	46.2
Scratchy throat	34.5	38.5

To determine that smoking status was not related to the high percentage of reported health issues, additional analyses were performed. *The results showed that all employees exhibited some smoking related symptoms, despite smoking status.*

The level of nicotine in the hair samples was also significantly associated with health concerns reported by the employees. These health concerns included having excess phlegm, a depressed mood, restlessness, and increased appetite or weight gain. *This finding confirms that SHS exposure causes negative health effects.*

STUDY CONCLUSIONS

1. Secondhand smoke exposure was higher in St. Louis bars and restaurants where smoking was allowed compared to smokefree restaurants and bars.
2. Smoking venues had 31.4 times the median airborne nicotine levels of smokefree venues.
3. Ventilation systems did not significantly lower levels of airborne nicotine concentrations in bars and restaurants.
4. Employees reported respiratory, sensory, and mental health symptoms more often in smoking venues.
5. Both smokers and nonsmokers preferred to work in a smokefree environment.
6. A "voluntary" smokefree policy does not adequately protect all employees and customers from secondhand smoke exposure.
7. Advocates must support 100% comprehensive smokefree laws, that include bars and restaurants, to ensure that all employees (and patrons) are protected from the harmful effects of secondhand smoke.

For more information, please contact

Sarah Moreland-Russell, MPH
Research Manager
Center for Tobacco Policy Research
Washington University in St. Louis
700 Rosedale Avenue
St. Louis, MO 63122
srussell@gwbmail.wustl.edu
http://ctpr.wustl.edu

References

1. U.S. Department of Health and Human Services. The health consequences of involuntary exposure to tobacco smoke: a report of the Surgeon General. Atlanta (GA); 2006.

2. Barnoya J, Glantz S. Association of the California tobacco control program with declines in lung cancer incidence. Cancer Causes Control 2004;15:689 – 95.

3. IOM (Institute of Medicine). Secondhand Smoke Exposure and Cardiovascular Effects: Making Sense of the Evidence. Washington, DC: The National Academies Press; 2010.

4. California Environmental Protection Agency. Proposed identification of environmental tobacco smoke as a toxic air contaminant. Part A: Exposure assessment. Office of Environmental Health Hazard Assessment, 2005 June 24.

5. Repace, J. L., & Lowrey, A. H. Indoor air pollution, tobacco smoke, and public health. Science 1980; 208(4443): 464-472.