



University of Wisconsin
Comprehensive Cancer Center

**Air Quality in Madison, Wisconsin Taverns and Bar-
Restaurants, June 2005**

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On July 1, 2005 bars and taverns in Madison became smoke-free. While there is a general understanding that smoking cigarettes results in indoor air pollution, the actual level of air pollutants in Madison establishments resulting from smoking is unknown. The purpose of this study is to document the extent of indoor air pollution as a result of cigarette smoking in Madison's bars and taverns, prior to July 1, 2005. A follow-up study will be conducted in August, 2005.

Methods:

A list of the establishments with tavern and bar licenses in Madison was obtained from the City Clerk and divided into two groups: bars that serve food and those whose food service is incidental to their bar business. Twelve establishments were randomly selected from each list. Establishments that were no longer in business were eliminated from the list.

Between June 3, 2005 and June 18, 2005 indoor air quality was assessed in 19 bars and taverns in the City of Madison (10 bars and nine bar-restaurants). Most air samples were taken on Friday and Saturday nights between 8:30 PM and 12 AM. In addition to the samples obtained in the taverns and bar-restaurants, an air sample was taken outdoors at 5 PM at John Nolen Drive and Blair St., a heavily trafficked area.

The average time spent in each establishment was approximately 35 minutes. The number of people inside the venue and the number of cigarettes burning were recorded every 15 minutes during sampling.

A TSI SidePak AM510 Personal Aerosol Monitor was used to sample and record the level of respiratory particles that are larger than 2.5 micrograms per cubic meter (PM_{2.5}). Particles of this size are released from burning cigarettes and are trapped in the lungs. The SidePak was zero-calibrated prior to each use by attaching a HEPA filter.

While other air pollutants in the atmosphere and particles from cooking may contribute to air pollution, smoking is the basis of most indoor air pollution.¹ The air monitoring device used is particularly sensitive to small particles, known as polycyclic aromatic hydrocarbons (PAH) that are associated with known carcinogens in cigarette smoke.

The equipment makes a record of particulate levels at one minute intervals. The monitor was located in the central area of the main room of each establishment. All of the "single-minute" data points were averaged to provide an average PM_{2.5} concentration within each establishment.

Results:

The air-quality varied between the 19 taverns and bar-restaurants sampled in this study. Bars and taverns (establishments with no or incidental food service) had an average concentration of 168 micrograms per cubic meter (m^3). This ranged from a low of 30 micrograms per m^3 to a high of 300 micrograms. (Figure 1)

Bar-restaurants had an average concentration of 58 micrograms per cubic meter. (Figure 2) The highest concentration observed in this group of establishments was 350 micrograms per cubic meter. This contrasts with another establishment, also randomly selected, that was smoke free and had an air concentration of 1 microgram per cubic meter. This low reading is similar to the measurement of 3 micrograms per cubic meter in outdoor air measured in Madison at the heavily-trafficked intersection of John Nolen Dr. and Blair St at 5 PM.

Discussion:

The National Ambient Air Quality Standards of the Environmental Protection Agency are the appropriate standards for analysis.ⁱⁱ The pollutants measured as part of these standards are considered harmful to public health and the environment.ⁱⁱⁱ The standard for small particulate matter (PM_{2.5}) is called a primary standard. Primary standards set limits to protect public health, including the health of sensitive populations such as asthmatics, children and the elderly. Secondary standards set limits to protect public welfare, including protection against decreased visibility, damage to animals, crops, vegetation and buildings. The primary and secondary standards for small particulate matter are the same. The standard for annual exposure, that is the average of the different rates of exposure over one year, is 15 micrograms per cubic meter. The standard for daily exposure, the greatest exposure allowable in a single 24-hour period, is 65 micrograms per cubic meter

Our air quality sampling data indicates that seven out of nine bar-restaurants were at or exceeded the EPA standard for annual exposure at 15 micrograms per cubic meter. One bar-restaurant recorded pollution concentration more than five times the much higher daily exposure limit of 65 micrograms per cubic meter, with a reading of 350. As a result, an employee working in this establishment for one year would be exposed to 23 times the allowable limit.

Data for the taverns and bars indicate much higher levels of small particle pollutants than for bar-restaurants. With two exceptions, the bars and taverns had concentrations of small particle pollutants two to four times the maximum allowable standard for exposure in a single day.

Study Limitations:

All of the samples were taken in June 2005 during warm weather. Testers documented that nearly all of the establishments were using air-conditioning. In the few instances where air conditioning was not on, doors were open, and in some instances, fans directly exhausted smoke. In cold weather conditions, higher levels of small particulates may be present. Additionally, surveyors found relatively low numbers of patrons, particularly in the downtown bars surveyed. This would further reduce the level of smoking related particulates, compared to other times of the year when patronage is higher.

Conclusion:

It is well documented that secondhand smoke causes cancer, heart disease and other diseases. Even short-term exposure to secondhand smoke can trigger respiratory infections, asthma and death from heart attack.^{iv}

The data presented in this report indicate that patrons and employees of taverns and bar-restaurants in Madison are typically exposed to levels of secondhand smoke that are at, or many times greater than, the nationally recognized safe levels of exposure. This exposure presents immediate and long-term health risks for patrons and employees. Compliance with the new ordinance can eliminate these disease-causing toxins and their related health effects.

References:

ⁱ Repace JF. An air quality survey of respirable particles and particulate carcinogens in Delaware hospitality venues before and after a smoking ban. In Repace Associates, 2003

ⁱⁱ Hyland A, Travers M, Repace JF, 8 City Air Monitoring Study, March- April 2004. Roswell Park Cancer Institute, 2004.

ⁱⁱⁱ US Department of Health and Human Services. Second national report on human exposure to environmental chemicals. Atlanta, GA: US Department of Health and Human Services, Centers of Disease Control and Prevention, National Center for Environmental Health, 2003

^{iv} Centers of Disease Control. Annual smoking-attributable mortality, years of potential life lost, and economic costs- United States, 1995-1999; MMWR 2002;51(14): 300-320

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