Air Pollution from Secondhand Smoke in Baton Rouge Bars and Casinos

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Key Points from BR Air Monitoring Study:

- $PM_{2.5}$ means particulate matter less than 2.5 microns in size. It is representative of secondhand tobacco smoke pollution.
- A sample of 27 Baton Rouge bars had an average $PM_{2.5}$ concentration level of 237 µg/m^3, which is 13.9 times higher than nonsmoking restaurants in Louisiana.
- Viewed in another way, the average $PM_{2.5}$ concentration level in nonsmoking restaurants in Louisiana is 93% lower than Baton Rouge Bars.
- On average, Baton Rouge bars had very unhealthy (237 µg/m^3) air quality, according to U.S. Environmental Protection Agency guidelines.
    - The health effects associated with this level of exposure include:
        - Significant aggravation of heart or lung disease and premature mortality in people with cardiopulmonary disease and older adults
        - Significant increase in respiratory effects in general population
- A full 85% of the bars sampled (23 of 27 bars) had unhealthy, very unhealthy, or hazardous air quality levels. None (0 of 27 bars) had good air quality.
- If bars and casinos became smoke-free, $PM_{2.5}$ pollution levels would be significantly reduced.
- The one casino that was sampled had unhealthy (85 µg/m^3) air quality

We assessed the impact of environmental tobacco smoke on indoor air quality by measuring indoor air pollution levels in twenty seven bars and one casino in Baton Rouge, Louisiana. Secondhand tobacco smoke is comprised of an abundance of very small particles, therefore we took real-time measurements of fine particulates less than 2.5 micrometers in size ($PM_{2.5}$) using a direct reading instrument. Air monitoring began on Wednesday, April 14 and continued through Saturday, April 24, 2010.

The average $PM_{2.5}$ concentration measured in bars was 237 µg/m^3, ranging from a low of 16 µg/m^3 to a high of 802 µg/m^3 (Table 1). In addition, one casino was monitored, and the $PM_{2.5}$ concentration level was 85 µg/m^3. Air quality in Louisiana restaurants was measured in a statewide study in 2007 assessing the effectiveness of Act 815, and the average $PM_{2.5}$ concentration in nonsmoking restaurants was 17 µg/m^3. This sample of Baton Rouge bars had an average $PM_{2.5}$ concentration level of 237 µg/m^3, which is **13.9 times higher** than nonsmoking restaurants in Louisiana. Viewed in another way, the average $PM_{2.5}$ concentration level in nonsmoking Louisiana restaurants is **93% lower** than Baton Rouge bars. If bars and casinos were smoke-free, pollution levels would be significantly reduced.

Table 1. $PM_{2.5}$ Concentration Levels in Baton Rouge Bars (n=27)

	$PM_{2.5}$ Concentration (µg/m^3)
Average	237
Standard Deviation	193
Range	16 to 802

The U.S. Environmental Protection Agency (USEPA) has developed ambient air quality standards for criteria pollutants including $PM_{2.5}$. The USEPA has also developed descriptive categories associated with $PM_{2.5}$ concentration levels ranging from good to hazardous. While these categories were developed for

daily average ambient (outdoor) air pollution levels they are useful in contextualizing the results of this study. These descriptive categories along with the proportion of Baton Rouge bars with $PM_{2.5}$ concentration levels in each category are shown in Table 2. Using these categories our results can be described as follows; no bars had good air quality, 7% had moderate air quality, 7% had air quality unhealthy for sensitive groups, 26% had unhealthy air quality, 26% had very unhealthy air quality, and 33% had hazardous air quality levels. **Combined, a full 85% had unhealthy air quality levels or worse.** On average, Baton Rouge bars had very unhealthy (237 µg/m^3) air quality.

Table 2. $PM_{2.5}$ Concentration Levels in Baton Rouge Bars Grouped by Air Quality Index (AQI) Category

Air Quality Index Category	$PM_{2.5}$ Particulate Matter Concentration (ug/m^3)	Proportion of Baton Rouge Bars
Good	0-15	0%
Moderate	>15-40	7%
Unhealthy for Sensitive Groups	>40-65	7%
Unhealthy	>65-150	26%
Very Unhealthy	>150-250	26%
Hazardous	>250	33%

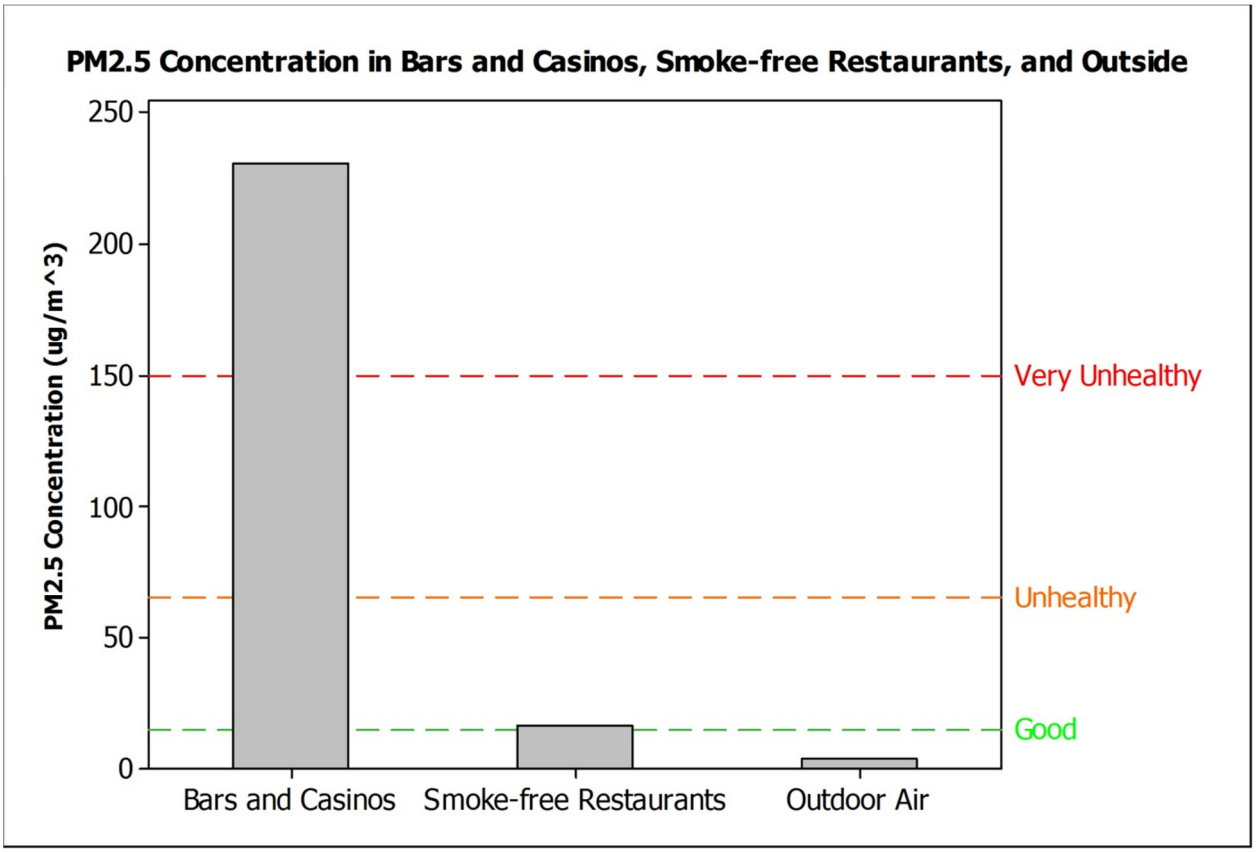

Figure 1. Average $PM_{2.5}$ concentration in Baton Rouge Bars and Casinos, Louisiana Smoke-free Restaurants, and Baton Rouge Outdoor Air (note: Baton Rouge Bars and Casinos were measured in April, 2010, Louisiana Smoke-free Restaurants were measured in 2007, and Baton Rouge Outdoor Air was measured on May 21, 2010).

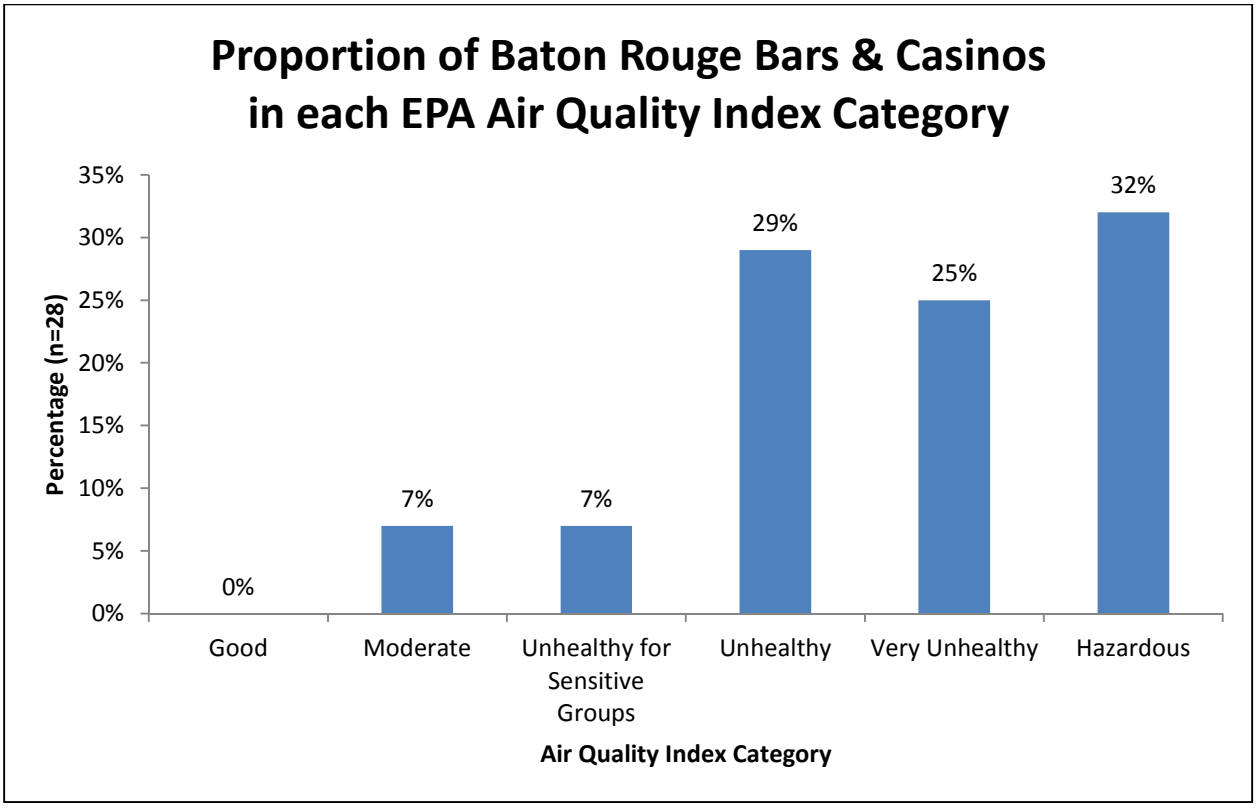

Figure 2. Percentage of Baton Rouge Bars and Casinos Grouped by EPA Air Quality Index Category

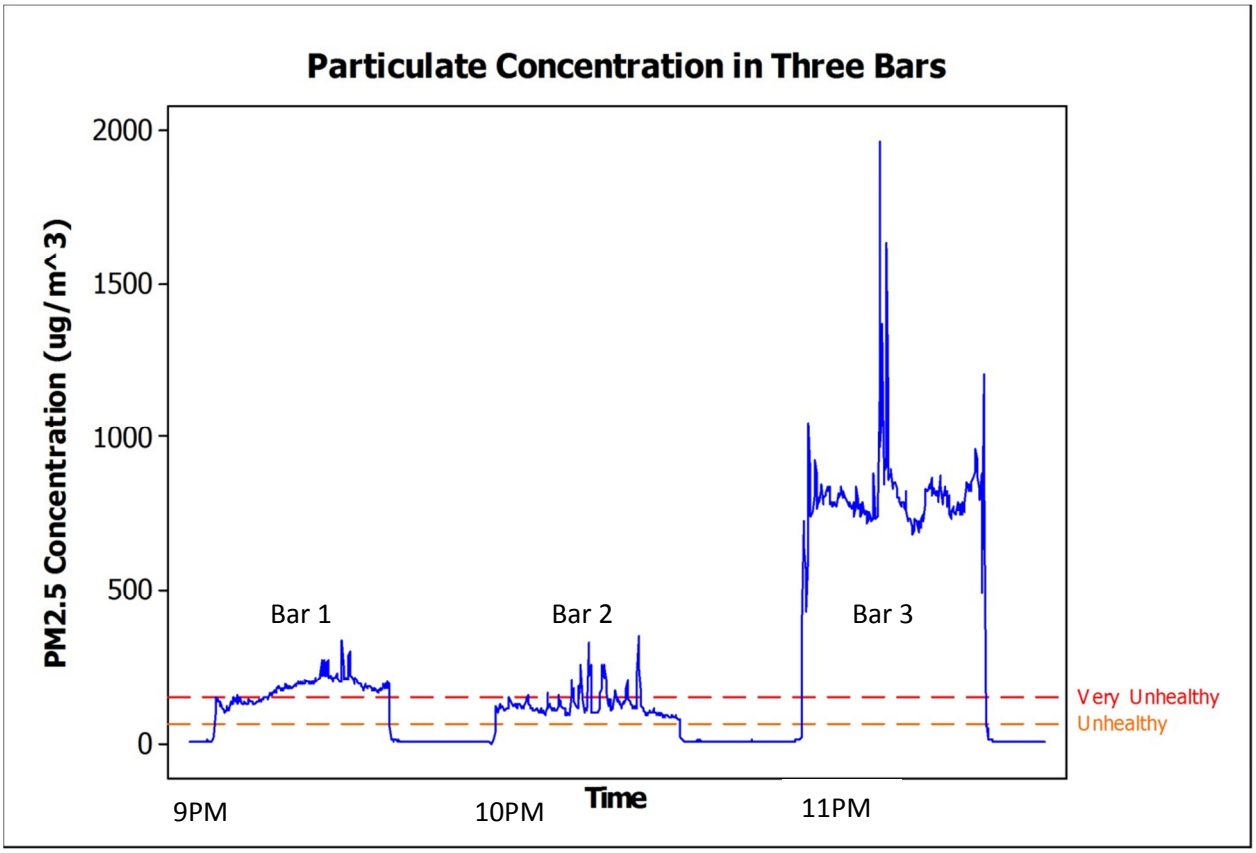

Figure 3. Real-time $PM_{2.5}$ concentrations in three Baton Rouge Bars, April 23, 2010

Tables 3 and 4 match air quality index categories with associated health effect statements and cautionary statements developed by the USEPA.

Table 3. Air Quality Index Categories and Associated Health Effect Statements[1]

Air Quality Index Category	Health Effect Statement
Good	None
Moderate	Respiratory symptoms possible in unusually sensitive individuals, possible aggravation of heart or lung disease in people with cardiopulmonary disease and older adults.
Unhealthy for Sensitive Groups	Increasing likelihood of respiratory symptoms in sensitive individuals, aggravation of heart or lung disease and premature mortality in people with cardiopulmonary disease and older adults.
Unhealthy	Increased aggravation of heart or lung disease and premature mortality in people with cardiopulmonary disease and older adults; increased respiratory effects in general population.
Very Unhealthy	Significant aggravation of heart or lung disease and premature mortality in people with cardiopulmonary disease and older adults; significant increase in respiratory effects in general population.
Hazardous	Serious aggravation of heart or lung disease and premature mortality in people with cardiopulmonary disease and older adults; serious risk of respiratory effects in general population.

Table 4. Air Quality Index Categories and Associated Health Cautionary Statements[1]

AQI Index Category	Cautionary Statement
Good	None
Moderate	Unusually sensitive people should consider reducing prolonged or heavy exertion.
Unhealthy for Sensitive Groups	People with heart or lung disease, older adults, and children should reduce prolonged or heavy exertion.
Unhealthy	People with heart or lung disease, older adults, and children should avoid prolonged or heavy exertion; everyone else should reduce prolonged or heavy exertion.
Very Unhealthy	People with heart or lung disease, older adults, and children should avoid all physical activity outdoors. Everyone else should avoid prolonged or heavy exertion.
Hazardous	Everyone should avoid all physical activity outdoors; people with heart or lung disease, older adults, and children should remain indoors and keep activity levels low.

1. U.S. Environmental Protection Agency, 2006. Guidelines for the Reporting of Daily Air Quality – the Air Quality Index (AQI). Office of Air Quality Planning and Standards, EPA-454/B-06-001.