

In 2011 and 2012 the University of Missouri School of Medicine, in partnership with the Campus-Community Alliance for Smoke-free Environments conducted an indoor air quality monitoring study in Rolla, Missouri. The purpose of this study was to measure the air quality in public places before and after Rolla's smoking ban.

On January 1, 2012 a smoke-free ordinance went into effect in Rolla. In order to document the changes following the smokefree ordinance, the levels of smoke in businesses that allowed smoking were measured before and after the ban. Measuring these levels gave a clearer picture of how secondhand smoke impacted the health of Rolla employees and customers. The study measured indoor particulate matter, which is a mixture of microscopic particles that can be inhaled very deeply into the lungs. Breathing particulate matter can worsen asthma, and cause or worsen heart and lung disease.

Rolla before and after the smoke-free ordinance

Before	After
Before the Rolla smokefree ordinance, the level of particulate matter air pollution was more than 42 times higher in places that allowed smoking than places that didn't.	After the smoking ban, there was a 95% decrease in particulate matter in locations that previously allowed smoking.
In public places that allowed smoking, the density of smoke measured would be rated by the Environmental Protection Agency (EPA) as "unhealthy" and near the "hazardous" level.	After the smoking ordinance, places that had previously allowed smoking qualified as "good" by EPA standards.
Full-time employees in a smoking-allowed Rolla businesses would have inhaled nearly four times the EPA's average yearly limit for particulate matter, while working. Exposure to smoke outside of work would further increase health risks.	After the ban, the study found that workers would inhale an average of only 50% of the EPA's particulate matter limit for the year.
Although there was an average of only 4 cigarettes burning at once, it was still enough to make the air dangerous to breathe.	After the ban, the researchers saw no one smoking inside the businesses, indicating that customers were obeying the law.
During the study, only 6% of customers or workers were actively smoking, whereas the smoking rate for Phelps County is 22%. This is evidence that customers and employees of bars and restaurants do not have a higher smoking rate the rest of the community ¹	

Secondhand smoke is a known cause of cancer. It contains more than 7,000 chemicals, 250 of which are known to be poisonous.² There is no safe level of contact. Overwhelming scientific evidence shows that secondhand smoke causes stroke, emphysema, bronchitis, asthma, respiratory infections, Sudden Infant Death Syndrome and other illnesses.^{3,4} Hours and even minutes of SHS exposure can damage the cardiovascular system.^{5,6}

Smoke-free ordinances are the most effective way to stop exposure to secondhand smoke in public. The Rolla City Council passed a smokefree ordinance by a vote of 8 to 4 on July 5, 2011 covering all workplaces and public places. Unfortunately, the city council later passed an amendment to allow smoking in private clubs during public events if they use unpaid volunteers.

Missouri state law permits smoking sections, which cannot be more than 30% of the total space of the dining area. However, restaurants that seat less than 50 people, bars, billiard parlors, and bowling alleys are exempt. An increase in state and city smoke-free ordinances means that less of the overall U.S. population is exposed to secondhand smoke⁷, but a majority of Missouri cities and towns are not protected by smokefree laws.

Hospitality workers and customers are at greater risk

Ten to fourteen percent of employees work in the hospitality industry (bars, restaurants, bowling alleys, casinos, etc.). While many businesses voluntarily go smokefree, the hospitality industry has been slow to convert. Consequently, workers and customers are exposed to secondhand smoke. Studies of hospitality workers have found that lung health increases rapidly after smoke-free bans.^{8,9,10}

Contact with second-hand smoke can quickly damage health. Just two hours of exposure at the smoke level normally found in casinos can cause irregular heartbeat for those in good health.¹¹ For those with heart disease short-term exposure can cause a heart attack with no warning symptoms. This is especially important because casinos are popular with older adults, who are more likely to have heart and lung disease, or they may be unaware that they have the disease.¹² This supports the Centers for Disease Control & Prevention recommendation that doctors advise patients to avoid places that allow smoking if they have heart disease, or are at high risk.¹³

Ventilation systems in casinos can be ineffective. A study of Pennsylvania casinos shows that even though few people were smoking and the ventilation systems were better than the minimum standard, the indoor air pollution levels were 4 to 6 times higher than outdoor air.¹⁴

Smoking bans reduce heart attacks

There is an average 17% reduction in hospital admissions for heart attacks during the first year after a community's smoking ban.^{15,16,17,18,19,20,21,22,23,24,25} In the first three years after Pueblo Colorado's smoking ban there was a 41% decrease in heart attacks, while the smoking rate in nearby smoking communities changed very little.^{26,17} For non-smokers, the health benefits are even greater. Studies have found that non-smokers suffered 30% to 60% fewer heart attacks a year after a ban.^{28,29}

Details of the Rolla Air Monitoring Study

Researchers sampled indoor air quality for particulate matter in various locations in Rolla on January 22, 2010 before the ban was enacted, February 17, 2012 after the ban was in effect for several weeks. The measurements were taken on Friday nights between 6 p.m. and 10:30 p. m. Researchers spent a minimum of 45 minutes in the location and were discreet so that they did not

disturb other customers. The number of people in the location and the number of burning cigarettes were recorded every 10 minutes.

Researchers needed to know the measurements of the room so they could calculate the thickness of particulate matter. To do this they used an instrument that can discreetly measure the dimensions of a space using sonic waves. The average amount of smokers in the room was calculated by comparing the amount of lit cigarettes to the size of the room. The number of burning cigarettes was divided by the number of people at the location to find the percent of people smoking.

To measure the particulate matter, researchers used a small device, called a TSI Sidepak AM510 Personal Aerosol Monitor. This device draws in air every 60 seconds and calculates the amount of particulate matter based on how much the light is diffused. The monitor was re-calibrated before each use.

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