Stanford study finds secondhand smoke pervasive in California's Indian casinos (w/ Video)

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Civil and Environmental Engineering doctoral student Viviana Acevedo-Bolton on a research trip to a California casino.

(PhysOrg.com) -- Smoke levels at California Indian casinos can exceed health benchmark levels during peak attendance hours and many non-smoking areas offer incomplete protection, Stanford researchers say.

Secondhand smoke in California's Native American casinos often exceeds concentrations associated with harmful health effects, according to a new study by environmental engineers at Stanford University. The casinos, which are exempt from the state's smoking restrictions, are one of the few public places in California where smoking is still legal.

The study of smoke particle concentrations during busy evenings in 36 casinos across the state found that even many nonsmoking areas within the buildings contained smoke concentrations that were several times that of outdoor air. The paper was published online Feb. 17 in the Journal of Exposure Science and Environmental Epidemiology.

One-quarter of U.S. adults visited a casino in 2008, according to the 2009 American Gaming Association Survey of Casino Entertainment. Of the almost 60 casinos operating in California, 98 percent allow smoking.

"We did this study to warn the public that where they go and what they do in their everyday lives can impact their health," said Lynn Hildemann, an associate professor of civil and environmental engineering and a senior author of the study. "Air pollution affects human health, whether it is secondhand smoke indoors or truck exhaust outdoors. Because many people frequent smoky casinos, and many employees work there, we became interested in finding how high the pollution levels inside the buildings were."

Over more than a year, the team of researchers discreetly made smoke particle measurements in various locations at each casino on weekend and holiday evenings - times when casinos were most likely to be crowded. Sampling each location for 30 to 60 minutes, the engineers used compact monitors that measure smoke particles in the surrounding air every 10 seconds.

Smoke exposure

In areas of casinos where smoking was allowed, average fine particle concentrations were nine times as high as in outdoor air (63 micrograms per cubic meter versus 7 micrograms per cubic meter outdoors). Similarly high averages were reported in bars and restaurants in

California before the state passed laws restricting smoking indoors in 1994. The smokiest casino had an average concentration that was 26 times as high as outdoor air.

The U.S. Environmental Protection Agency's health-based standard for fine particles is an average of 35 micrograms per cubic meter over a 24-hour period. This concentration level was exceeded in 90 percent of the casinos the researchers visited.

Some researchers have linked exposures over relatively brief time periods to significant impacts on cardiovascular health. A 2001 study by C. Arden Pope at Brigham Young University found that exposure to 78 micrograms per cubic meter for just two hours can weaken the heart. The Stanford researchers detected average concentrations exceeding that level in 18 percent of their casino visits.

"The EPA's health standards are not on-and-off switches, such that at 34 you feel fine but at 36 you feel awful," Hildemann notes. "Different segments of the population have different sensitivities. The World Health Organization's fine particle standard is 25 micrograms per cubic meter."

Although patrons may experience elevated concentrations inside casinos for only a few hours, Hildemann said, many employees are exposed to them for eight hours or more.

Seeking refuge

There is evidence that the majority of casino visitors would rather have smoke-free air. In 2008, the commercial research firm JD Power and Associates found that 85 percent of Southern California casino patrons surveyed would prefer casinos that were smoke-free. Ruo-Ting Jiang, a civil and environmental engineering doctoral student and the Stanford

study's lead author, said she sometimes observed people wearing masks in the casinos.

But in some states, including Connecticut, Michigan, Oregon and New York, casino owners have fought smoking bans, arguing that restrictions would drive away smokers.

The Stanford study indicates that nonsmokers often don't have the opportunity to find complete refuge from elevated exposure. Only 10 of the 36 visited casinos where smoking was allowed (one was smoke-free) have constructed nonsmoking gaming areas isolated enough to minimize secondhand smoke intrusion, Jiang said. Meanwhile, 12 casinos had no nonsmoking gaming areas at all.

In nonsmoking areas with no walls separating them from smoking areas, concentrations remained six times as great as outdoor air on average (and above the EPA standard of 35 micrograms per cubic meter). Non-smoking areas without closed doors had average concentrations almost three times that of outdoor air. Nonsmoking areas with full walls and closed doors had average concentrations similar to outdoor air. Jiang said that no casino visited in the study provided a nonsmoking area that offered all the same gaming amenities as in the smoking areas, so patrons would frequently venture back into smoking areas to play.

Casino restaurants, where smoking is prohibited and children are allowed, had average concentrations four times that of outdoor air.

In addition to Jiang and Hildemann, other study authors were civil and environmental engineering doctoral students Kai-Chung Cheng and Viviana Acevedo-Bolton, Stanford consulting Professors Neil Klepeis and Wayne Ott, and Tufts University consulting Professor James Repace. Klepeis, Ott and Repace are also private consultants on smoking-related research, and Repace on smoking litigation. The study was

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More information: www.nature.com/jes/journal/vao … full/jes200975a.html