

Do Smoking Bans Reduce Heart Attacks?

Michael L. Marlow, Ph.D.

Introduction

Recent newspaper articles have heralded studies concluding that smoking bans lead to dramatic decreases in the annual incidence of acute myocardial infarction (AMI).¹⁻³ Coupled with studies concluding that bans never harm businesses and that environmental tobacco smoke (ETS) significantly endangers health of nonsmokers, studies claiming AMI reduction have provided governments with additional evidence to support bans in the name of public health.^{4,5}

Some communities have expanded bans from workplaces to include parks, beaches, and other open areas, based on this growing body of evidence. This commentary argues that, as with distorted claims regarding economic harm and ETS,^{6,7} recent studies concluding that bans lower AMI incidence misrepresent public health benefits of bans.

Studies Reporting Dramatic AMI Reductions

Conclusions drawn in the recent Institute of Medicine (IOM) report⁸ commissioned by the Centers for Disease Control and Prevention (CDC) are often used as the rationale for expanding smoking ban coverage. The IOM report examined 11 studies and concluded that heart attack reduction caused by bans ranged from 6% to 47%, based on health outcomes measured by admission records of local hospitals. CDC argues that effects are explained by reduced ETS exposure among nonsmokers and reduced smoking, with the former making the larger contribution.⁹ Studies that link ETS exposure to increased rates of cardiovascular disease, respiratory illness, and lung cancer¹⁰⁻¹² are cited to rationalize claims that bans dramatically improve health outcomes of nonsmokers.

The 11 studies examined effects of bans in the following locations: three in overlapping regions of Italy,¹³⁻¹⁵ two in Pueblo, Colorado (one with 18 months and one with 3 years of follow-up);^{9,16} and one each in Helena, Montana;¹⁷ Monroe County, Indiana;¹⁸ Bowling Green, Ohio;¹⁹ New York State;²⁰ Saskatoon, Canada;²¹ and Scotland.²² Most studies compared health outcomes in a single community with a smoking ban with those in nearby communities without bans. Bans were argued to protect public health when relative annual incidence of AMI fell in communities with bans, compared to nearby communities lacking bans.

Flawed Evidence

The evidence does not demonstrate that smoking bans dramatically reduce AMI incidence. Major flaws include the following five:

Small-Sample Bias

It is inappropriate to form strong conclusions based on a few studies, especially when data are collected and analyzed on a nonrandom basis. The only large-scale comprehensive study to date, which is ignored in the IOM report, examined whether bans affect hospitalization and mortality rates, based on thousands of cases across

the U.S.²³ The study concluded that bans do not significantly affect health outcomes in the elderly, working-age, or pediatric populations. Simulations from all possible small-scale studies using sub-samples from the national data found that large short-term increases in AMI incidence were as common as large short-term decreases following bans. Thus, a random draw from the many locations adopting bans would find that the number showing increases would equal the number showing decreases in AMI incidence.

Common sense suggests that, given numerous bans enacted worldwide, researchers can select jurisdictions that “prove” the hypothesis that bans promote public health. This is clearly an inappropriate research methodology because of the “file drawer” or “publication” biases that arise when researchers selectively choose data or studies to publish, cite, or ignore, based on their personal judgments.⁶ “Cherry-picking” could explain how published studies “find” that bans reduce the incidence of AMI despite zero change in total AMI incidence.

Most Studies Combine Smokers and Nonsmokers

Only two of 11 studies included in the IOM study—Monroe County, Indiana, and Scotland—examine AMI incidence in nonsmokers.^{18,22} This oversight apparently raised few concerns for writers of the IOM study, who also admitted that none of their studies had information on duration or pattern of ETS exposure, and thus also had no information on whether ETS exposure changed as a result of the ban. No information was collected on whether acute coronary events were triggered by acute and sporadic or by chronic exposure to ETS, or even whether bans induced some smokers to quit or reduce smoking. The stridency of the IOM’s conclusions is puzzling in light of the absence of information on previous ETS exposure and the paucity of information on nonsmokers. The IOM study appears to rationalize conclusions by the “precautionary principle”: resolve any doubt in the direction of measures that claim to protect public health.

Studies Contain No Direct Evidence of ETS Risk

IOM admits that, because no direct evidence shows that brief exposure to ETS can initiate heart attacks in nonsmokers, it relied on indirect evidence associated with particulate matter from other pollution sources to validate their assessment on health effects from ETS. Selection bias is again apparent: The IOM report ignores perhaps the most important study of the effects of ETS on nonsmokers, the very large cohort study that followed, over a 40-year period from 1959 to 1998, the health histories of more than 35,000 never-smoking Californians who were married to smokers. This study found no causal link between ETS exposure and tobacco-related mortality, and included spouses who smoked 80 or more cigarettes per day.²⁴ How can bans result in dramatic reductions in AMI incidence in nonsmokers when so far it has not been possible to show a causal link between ETS and poorer health in nonsmokers?

Studies Ignore Other Health Factors

Only one study, which is ignored in the IOM report, perhaps because it reported no effect from bans, has controlled for confounding factors that may affect health outcomes, such as smoking prevalence and improved prevention and treatment of cardiovascular disease.²³

Implausible Conclusions

Studies attribute AMI reductions of up to 47% to bans, even though CDC itself claims only a 25%-30% increased risk of developing heart disease from prolonged ETS exposure.²⁵ Certainly ETS exposure is unlikely to be beneficial, but CDC estimates are not based on evidence from intermittent exposure associated with public places.

Although authors of the IOM study expressed confidence in the existence of an association between chronic ETS exposure and AMI incidence, they also admitted there is no convincing evidence of the magnitude of the association. It takes quite a leap of inference to believe that smoking bans would offer such immediate and dramatic health benefits of up to 47% fewer AMI admissions if risks are truly associated with prolonged ETS exposure, and there is no knowledge of the potential magnitude of effects on AMI incidence from reduced exposure.

Moreover, most studies examined bans implemented for less than 1 year, with the longest examining 3 years.⁹ Only two out of the 11 studies examined bans lasting 2 years or longer. For example, the Helena, Montana, study,¹⁷ which found a 40% reduction in AMI, based its conclusion on only 6 months of observation, during which AMI admissions decreased by 16 (from 40 to 24)—a very small sample size. During the baseline period, this hospital apparently admitted, on average, fewer than seven patients a month with AMI.

Discussion

Publicly led research on public health effects of smoking bans has overstated benefits by overreaching on conclusions, excluding studies that contradict predetermined conclusions, and relying on studies subject to biases outlined above. This pattern is lamentable for a number of reasons. One is that efforts claiming to improve public health appear to be driven more by social agendas than by science.^{26,27} The IOM released, and various media outlets promulgated overstated claims on the public benefits of smoking bans, apparently without even considering whether they met the simplest tests of believability.

Another problem is that overstating health benefits from bans may induce some individuals to alter behavior in ways that raise risk to themselves and others. For instance, research shows that drunk driving rises following bans in bars presumably because drinkers drive longer distances in search of places where they may drink and smoke.²⁸ Research also shows that, if bans lead smokers to smoke cigarettes more intensely in anticipation of periods where they are subject to bans, their health suffers.²⁹ Moreover, claims that bans significantly lower AMI incidence may lead some individuals to be less likely to make lifestyle changes that could lower their personal risk.

Conclusions

Claims that smoking bans in public places have led to dramatic reductions in AMI incidence are not supported by the evidence. Scientifically invalid claims, though promulgated in the name of protecting public health, have adverse consequences.

Michael L. Marlow, Ph.D., is professor of economics at California Polytechnic State University, San Luis Obispo, Calif. Contact: mmarlow@calpoly.edu.

Potential conflict of interest: I have received no grants or funding of any kind for working on this manuscript or the studies cited herein on the effectiveness of tobacco-control spending. I received past grants from Philip Morris Management Corp. for my work on the effects of smoking bans, which led to refereed publications, all of which acknowledged this support. I recently served as expert witness in a smoking ban case for the Buckeye Institute. I am a nonsmoker.

Acknowledgement: I have benefited from constructive comments of two anonymous referees.

REFERENCES

¹ Winslow R. The case for bans on smoking. Curtailing second-hand smoke cuts heart-attack rates, studies show. *Wall St J*, Sep 22, 2009.

- ² Belluck P. Smoking bans reduce heart attacks and disease. *NY Times*, Oct 16, 2009.
- ³ Maugh TH. Anti-smoking laws reduce heart attacks, report finds. *LA Times*, Oct 16, 2009.
- ⁴ Scollo M, Lal A, Hyland A, et al. Review of the quality of studies on the economic effects of smoke-free policies on the hospitality industry. *Tob Control* 2003;12:13-20.
- ⁵ Eriksen M, Chaloupka F. The economic impact of clean indoor air laws. *CA Cancer J Clin* 2007;57:367-378.
- ⁶ Marlow ML. Honestly, who else would fund such research? Reflections of a non-smoking scholar. *Econ Journal Watch* 2008;5:240-268.
- ⁷ Marlow ML. Epidemiologic and economic research, and the question of smoking bans. *J Am Phys Surg* 2009;14:58-60.
- ⁸ Institute of Medicine. *Secondhand Smoke Exposure and Cardiovascular Effects: Making Sense of the Evidence*. Washington, D.C.: National Academies Press; October 2009.
- ⁹ Centers for Disease Control and Prevention. Reduced hospitalizations for acute myocardial infarction after implementation of a smoke-free ordinance—City of Pueblo, Colorado, 2002-2006. *MMWR* 2009;57:1373-1377.
- ¹⁰ Glantz SA, Parmley WW. Passive smoking and heart disease: epidemiology, physiology, and biochemistry. *Circulation* 1991;83:1-12.
- ¹¹ He J, Vupputuri S, Allen K, et al. Passive smoking and the risk of coronary heart disease—a meta-analysis of epidemiologic studies. *N Engl J Med* 1999;340:920-926.
- ¹² Barnoya J, Glantz SA. Cardiovascular effects of secondhand smoke: nearly as large as smoking. *Circulation* 2005;111:2684-2698.
- ¹³ Barone-Adesi F, Vizzini L, Merletti F, et al. Short-term effects of Italian smoking regulation on rates of hospital admission for acute myocardial infarction. *Eur Heart J* 2006;27:2468-2472.
- ¹⁴ Vasselli S, Papini P, Gaelone D, et al. Reduction incidence of myocardial infarction associated with a national legislative ban on smoking. *Minerva Cardioangiol* 2008;56:197-203.
- ¹⁵ Cesaroni G, Forastiere F, Agabiti N, et al. Effect of the Italian smoking ban on population rates of acute coronary events. *Circulation* 2008;117:1183-1188.
- ¹⁶ Bartecchi C, Alsever RN, Nevin-Woods C, et al. Reduction in the incidence of acute myocardial infarction associated with a citywide smoking ordinance. *Circulation* 2006;114:1490-1496.
- ¹⁷ Sargent RP, Shepard RM, Glantz SA. Reduced incidence of admissions for myocardial infarction associated with public smoking ban: before and after study. *BMJ* 2004;328:977-980.
- ¹⁸ Seo DC, Torabi MR. Reduced admissions for acute myocardial infarction associated with a public smoking ban: matched controlled study. *J Drug Educ* 2007;37:217-226.
- ¹⁹ Khuder SA, Milz S, Jordan T, et al. The impact of a smoking ban on hospital admissions for coronary heart disease. *Prev Med* 2007;45:3-8.
- ²⁰ Juster HR, Loomis BR, Hinman TM, et al. Declines in hospital admissions for acute myocardial infarction in New York State after implementation of a comprehensive smoking ban. *Am J Public Health* 2007;97:2035-2039.
- ²¹ Lemstra M, Neudorf C, Opondo J. Implications of a public smoking ban. *Can J Public Health* 2008;99:62-65.
- ²² Pell JP, Haw S, Cobbe S, et al. Smoke-free legislation and hospitalizations for acute coronary syndrome. *N Engl J Med* 2008;359:482-491.
- ²³ Shetty KD, DeLeire T, White C, et al. Changes in U.S. hospitalization and mortality rates following smoking bans. NBER Working Paper Series, Vol w14790; March 2009. Available at: <http://ssrn.com/abstract=1359506>. Accessed Feb 11, 2010.
- ²⁴ Enstrom JE, Kabat GC. Environmental tobacco smoke and tobacco-related mortality in a prospective study of Californians, 1960-98. *BMJ* 2003;326:1057-1069.
- ²⁵ Centers for Disease Control and Prevention. *The Health Consequences of Involuntary Exposure to Tobacco Smoke: A Report of the Surgeon General*. U.S. Department of Health and Human Services, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health; 2006.
- ²⁶ Siegel M. Is the tobacco control movement misrepresenting the acute cardiovascular health effects of secondhand smoke exposure? *Epidemiol Perspect Innov* 2007;4:1-13.
- ²⁷ Phillips CV. Warning: anti-tobacco activism may be hazardous to epidemiologic science. *Epidemiol Perspect Innov* 2007;4:1-6.
- ²⁸ Adams S, Cotti C. Drunk driving after the passage of smoking bans in bars. *J Public Economics* 2008;92:1288-1305.
- ²⁹ Thun MJ, Lally CA, Flannery JT, et al. Cigarette smoking and changes in the histopathology of lung cancer. *J Natl Cancer Inst* 1997;89:1580-1586.