

# ED visits for AMI, Stroke, ACS & COPD after the Statewide Smoking Ban in Cook Co., IL

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## Objective

To utilize ED chief complaint data obtained from syndromic surveillance to quantify the effect of the Illinois smoking ban on acute myocardial infarction (AMI), acute coronary syndrome (ACS), stroke, and chronic obstructive pulmonary disease (COPD) related ED visits in adults in Cook County, IL.

## Introduction

Tobacco use is the leading global cause of preventable death, killing more than five million people per year [1]. In addition, exposure to secondhand smoke is estimated to kill an additional 600,000 people globally each year [1]. In 1986, the US Surgeon General's Report declared secondhand smoke to be a cause of lung cancer in healthy nonsmokers [2].

The first law restricting smoking in public places was enacted in 1973 in Arizona that followed the 1972 Surgeon General's Report providing awareness of the negative health effects associated with the exposure to air pollution from tobacco smoke [3]. Smoke-free laws were slowly enacted after this time point with most occurring after the year 2000 [4].

In July 2007, the Smoke Free Illinois Act (SB0500, Public Act 095-0017) was passed in IL [5]. The ban went into effect on Jan 1, 2008 and Illinois joined 22 other states in prohibiting smoking in virtually all public places and workplaces including offices, theaters, museums, libraries, schools, commercial establishments, retail stores, bars, private clubs, and gaming facilities [5-6].

While many studies have examined the effect of smoking bans on hospitalizations, this study would be the first to examine the effect of the comprehensive smoking ban in IL on ED visits by utilizing chronic disease categories created with ED chief complaint data captured by syndromic surveillance [7]. The author hypothesizes that the comprehensive smoking ban in IL significantly reduced the ED visits associated with AMI, ACS, stroke, and COPD in adults in Cook County, IL.

## Methods

ED visits with chief complaints consistent with categories for AMI, ACS, stroke and COPD captured by the Cook Co. Dept. of Public Health local instance of ESSENCE from Jan 1, 2006 – Dec 31, 2013 were included in the analysis. Proc Genmod with a log link and negative binomial distribution was utilized for the analysis. All data was aggregated at the monthly level. The total number of ED visits of the health effect of interest was the dependent variable. The total ED visits during the same period of time, was used as the offset variable, sub-grouped by age and gender where appropriate. A binary variable was utilized to capture the effect of the time period after the implementation of the statewide smoking ban; 0 for before the ban and 1 for after the ban. When examining the effect of the statewide ban, Cook Co. as an entirety was examined as well as ED visits stratified by zip codes that already had a smoking ban in place at that time point and those that did not, and stratifying by urban (Chicago) vs. suburban Cook Co. Seasonality was addressed by including month, month squared and month cubed in the model. Influenza was addressed by including a binary variable to indicate when influenza was occurring in the area based on percent influenza-like-illness ED

visits that were occurring above the threshold for the area during that time period. Age and gender were also evaluated as confounders and effect modifiers. SAS 9.4 was utilized to perform the analyses.

## Results

Results are presented in Table 1. Reductions of ED visits after the smoking ban implementation were seen in AMI and ACS disease categories for the overall adjusted model, at 3% and 3.5% respectively. Stroke associated ED visits were not affected by the smoking ban. COPD associated ED visits were not reduced immediately by the smoking ban, but did have a significant reduction 6 months after implementation of the ban at 3.6%. Stronger effects were seen in individuals 70 years and older, females, the urban population, and zip codes without a prior ban for AMI, ACS, and COPD.

## Conclusions

An immediate, significant reduction in ED visits associated with AMI and ACS was associated with the IL statewide smoking ban in Cook Co., IL. COPD associated ED visits were significantly reduced 6 months after the ban implementation. The effect was greater in individuals 70 years and older, females, the urban population, and zip codes without a prior ban.

Table 1. Results for the adjusted models and stratified analysis for AMI, ACS, Stroke, and COPD for ED visits from 1/1/2006 - 12/31/2013 in adults in Cook County, IL.

	Acute Myocardial Infarction		Acute Coronary Syndrome		Stroke		COPD	
	1/1/2008 RR (95% CI)	6/1/2008 RR (95% CI)						
Adjusted	0.9697 (0.9492 - 0.9907)	0.9647 (0.9443 - 0.9850)	0.9659 (0.9455 - 0.9864)	0.9629 (0.9422 - 0.9834)	1.0126 (0.9796 - 1.0474)	1.0403 (1.0063 - 1.0754)	0.9853 (0.9626 - 1.0092)	0.9641 (0.9413 - 0.9874)
40-59 years	0.9844 (0.9566 - 1.0130)	0.9704 (0.9430 - 0.9985)	0.9620 (0.9341 - 0.9904)	0.9609 (0.9316 - 0.9899)	0.9352 (0.9216 - 0.9491)	0.9978 (0.9743 - 1.0216)	0.9962 (0.9743 - 1.0181)	0.9876 (0.9641 - 1.0110)
60-69 years	0.9667 (0.9408 - 0.9930)	0.9604 (0.9346 - 0.9868)	0.9620 (0.9362 - 0.9874)	0.9577 (0.9318 - 0.9843)	0.9638 (0.9289 - 1.0019)	0.9946 (0.9797 - 1.0127)	1.0025 (0.9550 - 1.0524)	0.9709 (0.9247 - 1.0195)
70+ years	0.9541 (0.9186 - 0.9911)	0.9602 (0.9243 - 0.9973)	0.9497 (0.9143 - 0.9866)	0.9577 (0.9218 - 0.9950)	1.0092 (1.0489 - 1.1555)	1.0092 (1.0568 - 1.1644)	0.9816 (0.9542 - 1.0097)	0.9645 (0.9388 - 0.9930)
Females only	0.9630 (0.9366 - 0.9901)	0.9627 (0.9363 - 0.9899)	0.9622 (0.9358 - 0.9875)	0.9612 (0.9347 - 0.9886)	1.0218 (0.9782 - 1.0671)	1.0499 (1.0072 - 1.0944)	0.9679 (0.9388 - 0.9986)	0.9501 (0.9209 - 0.9803)
Males only	0.9775 (0.9473 - 1.0085)	0.9661 (0.9364 - 0.9968)	0.9733 (0.9433 - 1.0039)	0.9637 (0.9341 - 0.9942)	0.9622 (0.9252 - 1.0010)	1.0392 (0.9980 - 1.0810)	0.9807 (0.9724 - 1.0117)	0.9607 (0.9476 - 1.0149)
Suburban only	0.9912 (0.9671 - 1.0164)	0.9834 (0.9590 - 1.0084)	1.0090 (0.9756 - 1.0250)	0.9955 (0.9690 - 1.0185)	1.0479 (1.0082 - 1.0893)	1.0613 (1.0056 - 1.0865)	1.0085 (0.9805 - 1.0373)	0.9977 (0.9697 - 1.0264)
Urban only	0.9784 (0.9599 - 1.0125)	0.9457 (0.9211 - 0.9703)	0.9486 (0.9249 - 0.9731)	0.9459 (0.9229 - 0.9698)	0.9910 (0.9696 - 1.0124)	0.9910 (0.9700 - 1.0120)	0.9520 (0.9313 - 0.9728)	0.9350 (0.8867 - 0.9830)
No ban	0.9416 (0.9094 - 0.9749)	0.9433 (0.9108 - 0.9769)	0.9491 (0.9171 - 0.9821)	0.9469 (0.9148 - 0.9800)	1.0397 (0.9960 - 1.0824)	1.0397 (0.9815 - 1.1020)	0.9189 (0.8813 - 0.9562)	0.9250 (0.8867 - 0.9630)
Prior ban	0.9599 (0.9260)	0.9511 (0.9183)	0.9526 (0.9201)	0.9544 (0.9228)	0.9869 (0.9484)	1.0850 (1.0031)	0.9587 (0.9188)	0.9177 (0.8723)

## Keywords

chronic disease; smoking ban; syndromic surveillance

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