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Association between Florida's Smoke-Free Policy and Acute Myocardial Infarction by Race: A Time Series Analysis, 2000–2013

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Abstract

Introduction—Racial disparities in acute myocardial infarctions (AMIs) are increasing over time. Previous studies have shown that the implementation of smoke-free policies is associated with reduced AMI rates. The objective of this study was to determine the association between smoke-free policy and AMI hospitalization rates and smoking by race.

Methods—Healthcare Cost and Utilization Project data from Florida from 2000–2013 were analyzed using interrupted time series analysis to determine the relationship between Florida's smoke-free restaurant and workplace laws and AMI among the total adult population (aged 18 years), by age, race, and gender. Behavioral Risk Factor Surveillance System data from Florida from 2000–2010 were analyzed using logistic regression to determine the association between policy and the adult smoking prevalence.

Results—After implementation of the smoke-free policy, no statistically significant associations between AMI hospitalization rates or smoking prevalence were detected in the total population. In the subgroup analysis, the policy was associated with declines in AMI hospitalization rates among

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CONFLICTS OF INTEREST

The authors declare there is no conflict of interest.

non-Hispanic White adults aged 18–44 years ($\beta=-0.001$ per 10,000, p -value=0.0083). No other relationships with AMI hospitalization rates and smoking prevalence were found in the subgroup analysis.

Conclusions—More comprehensive smoke-free and tobacco control policies are needed to further reduce AMI hospitalization rates, particularly among minority populations. Further research is needed to understand and address how the implementation of smoke-free policies affects secondhand smoke exposure among racial and ethnic minorities.

Keywords

Smoke-Free Policy; Myocardial Infarction; Smoking; Adult; Minority Health; Hospitalization/statistics & numerical data; Behavioral Risk Factor Surveillance System

INTRODUCTION

Heart disease is the leading cause of mortality in the U.S. (Johnson et al., 2014). Coronary heart disease (CHD), the most common type of heart disease, was the cause of approximately one in seven deaths in 2011 and is a significant risk factor for acute myocardial infarction (AMI) (Mozaffarian et al., 2015). The prevalence of AMI is higher among men than women and increases with age (Mozaffarian et al., 2015). There is evidence of widening AMI disparities by race and ethnicity. The incidence rate of first AMI is higher among African American men and women than their non-Hispanic White counterparts (Mozaffarian et al., 2015). Although AMI hospitalization rates have declined over time, the decline is significantly slower among African American men and women than White men and women (Wang et al., 2012).

Cigarette smoking and secondhand smoke exposure are well documented as significant risk factors for CHD and AMI, as well as cancer, respiratory diseases, reproductive effects, stroke, and other conditions (Iversen et al., 2013; Tolstrup et al., 2014; U.S. Department of Health and Human Services, 2010, 2014). Secondhand smoke exposure is associated with a 25–30% increase in CHD risk (U.S. Department of Health and Human Services, 2006). Smoking continues to be the leading preventable cause of morbidity and premature mortality in the U.S. and globally (U.S. Department of Health and Human Services, 2014; World Health Organization, 2012). In the U.S., more than 480,000 premature deaths, 5.2 million years of potential life lost, and \$193 billion in healthcare costs on average each year are attributable to smoking (Centers for Disease Control and Prevention, 2008; U.S. Department of Health and Human Services, 2014). After adjusting for socioeconomic and demographic factors, African Americans have lower odds of current smoking than Whites (Barbeau et al., 2004; LaVeist et al., 2008), but are less likely to quit (Centers for Disease Control and Prevention, 2011a; King et al., 2004). African Americans are nearly three times more likely to be exposed to secondhand smoke than non-Hispanic Whites (Pickett et al., 2006).

Substantial evidence from the U.S., Canada, New Zealand, and several European countries has shown that bans on indoor smoking, including workplaces, restaurants, bars, and/or other public places, are associated with a decreased incidence of AMI, and the reductions increase over time (Lightwood and Glantz, 2009; Lin et al., 2013; Pell et al., 2008). One

mechanism for this association is the reduction to secondhand smoke exposure (Institute of Medicine Committee on Secondhand Smoke Exposure and Acute Coronary Events, 2010; U.S. Department of Health and Human Services, 2014). Smoke-free policies also encourage smokers to cut back or quit, and studies have shown that they are associated with decreased cigarette consumption and smoking prevalence (Dinno and Glantz, 2009; Fichtenberg and Glantz, 2002; Hurt et al., 2012; Lin et al., 2013).

The effect of smoke-free policies on AMI hospitalization by race/ethnicity has received limited attention in the literature. The extent to which these policies have a pro- or anti-equity impact is important to know, given the widening racial gap in AMI. Studies of the impact of smoke-free policy on AMI in the U.S. often do not address this question, or are unable to due to small numbers within racial/ethnic subgroups of the study population (Bartecchi et al., 2006; Bruintjes et al., 2011; Gupta et al., 2011; Hahn et al., 2011; Hurt et al., 2012; Moraros et al., 2010). Of the available literature, Dinno & Glantz (2009) found no interaction between clean indoor air laws and race/ethnicity for either current smoking status or daily cigarette consumption, thus concluding that there was an equal affect across groups. Other studies found no or smaller associations between smoke-free policy and AMI among minority racial/ethnic groups compared to non-Hispanic Whites, suggesting interactive effects by race/ethnicity (Chaloupka and Pacula, 1999; Farrelly et al., 1999; Stein et al., 2009). Additional studies are needed to examine the impact of smoke-free policies on AMI among racial and ethnic minority populations.

To fill this gap, we examined the association between Florida's smoke-free law in restaurants and workplaces, enacted on July 1, 2003, and AMI hospitalization and smoking prevalence overall and by race/ethnicity using interrupted time series analysis.

METHODS

Study site

To select a state for this study, we used three criteria: (1) large population size, (2) a higher proportion of African American and Hispanic populations relative to other states, and (3) enacted a smoke-free policy with at least three years of data before and after the policy implementation. The first two criteria ensured a sufficient number of cases for the analysis and subgroup analysis. The third criterion ensured sufficient data for the time series analysis. We started by looking at the ten most populated U.S. states, and chose Florida based on these criteria. Florida is the third largest state and has among the highest proportions of African American and Hispanic populations across all U.S. states. It has a population of nearly 20 million and a diverse distribution by race: 56% non-Hispanic White, 16% non-Hispanic African American, and 22% Hispanic White (U.S. Census Bureau, 2014, 2015). On July 1, 2003, a statewide smoke-free policy was implemented in restaurants and workplaces; bars were exempted.

Measures

AMI hospitalizations—Quarterly AMI hospitalization discharge data were obtained among adults aged 18 years and older from 2000–2013 from the Healthcare Cost and

Utilization Project (HCUP) State Inpatient Databases (SID). The SID translates inpatient discharge abstracts from 48 states, including community hospitals, into a uniform format. It encompasses nearly 90% of all U.S. hospital discharges. AMI hospitalizations were defined as discharges with ICD-9-CM codes 410.XX in the primary diagnosis field. Discharges included live discharges and deaths in the hospital. The denominator for hospitalization rates was constructed from the U.S. Census Population Estimates Program. The annual population estimate was used for every quarter within that year to construct quarterly hospitalization rates.

Smoking prevalence—Annual current smoking prevalence data were obtained among adults aged 18 years and older from 2000–2010 from the Centers for Disease Control and Prevention Behavioral Risk Factor Surveillance System (BRFSS). BRFSS is a state-based cross-sectional telephone survey using a standardized questionnaire to collect prevalence data among adult U.S. residents about their risk behaviors and preventive health practices. From 2000–2010, a disproportionate stratified sample design was used to randomly sample from landline phones, and data were weighted using post-stratification methods. Beginning in 2011, a new weighting methodology (raking) was implemented and cell phone-only respondents were added to the sampling frame. Therefore, post-2011 BRFSS data were excluded.

Smoke-free policy—The main independent variable was the date of implementation of the smoke-free policy, which was obtained from the American Nonsmokers' Rights Foundation's U.S. Tobacco Control Laws Database (American Nonsmokers' Rights Foundation). This database tracks U.S. municipal, county and state tobacco control laws through multiple methods, including systematic scanning of publications, web sites, and email discussion lists; solicitation from tobacco control professionals, and partnerships with health professional organizations. Senior staff members code the laws using standardized guidelines. The policy variable was binary, such that is equaled 0 before the implementation and 1 afterwards.

Other covariates—Additional BRFSS items included age, date of interview, gender, race, ethnicity, marital status, education, and employment.

Statistical analysis

An interrupted time series analysis was conducted to estimate the effect of the smoke-free policy on quarterly AMI hospitalization rates per 10,000 overall and by demographic subgroups from 2000–2013 in Florida. Interrupted time series is useful to examine the impact of an intervention because it maximizes the analytic benefit of a large number of repeated observations and accounts for seasonality and linear time trends (Shadish et al., 2002; Zeger et al., 2006). We used the Box-Jenkins approach (Box, 2008) to build autoregressive integrated moving average (ARIMA) models and estimated the parameters of the ARIMA model by maximum likelihood (e.g., Luz et al., 2008; Ma et al., 2013). A minimum of 50 observations is recommended to estimate the autocorrelation function for ARIMA models (Box, 2008). We used the Akaike Information Criterion (AIC) to select the most appropriate model and graphically checked the model's fitted values with the observed

data for accuracy. The final ARIMA (0,1,1)x(0,1,1)₄ model without a mean term (AIC=10.61462) can be expressed as:

$$\hat{Y}_t = Y_{t-4} + Y_{t-1} - Y_{t-5} - \theta_1 e_{t-1} - \Theta_1 e_{t-4} + \theta_1 \Theta_1 e_{t-5} + \beta_1 * \text{SmokeFreePolicy}$$

where the errors terms e_t 's are defined as $e_t = Y_t - \hat{Y}_t$ and assumed to be independent and normally distributed with mean zero and variance σ^2 for all t . The term θ_1 is the coefficient for the moving average MA(1) and Θ_1 is the seasonal moving average coefficient SMA(1). SmokeFreePolicy is an indicator of implementation of smoke-free policy (0 = prior to July 1, 2003 (quarter 3), 1 = July 1, 2003 and later).

Models were estimated for quarterly AMI hospitalization rates per 10,000 in the total population, by race (non-Hispanic White, non-Hispanic African American, Hispanic White), age group (18–44 years, 45–54 years, 55–64 years, 65–74 years, 75 years and older), and gender (male, female). Trends in AMI hospitalizations with and without the smoke-free policy were estimated using a spline with 2 polynomials of degree 1 with a knot at the date of the smoke-free policy implementation.

To estimate the effect of the smoke-free policy on smoking prevalence from 2000–2010 in Florida, we conducted logistic regression accounting for the sampling scheme and data weights. Data weights were adjusted prior to analysis to account for multiple years of survey using the following formula: “Adjusted weight” = “original weight” x (“number of respondents this year”/“number of respondents in combined years”). We estimated a model of the smoking prevalence for the total adult population adjusting for gender (female vs. male), race (non-Hispanic White, non-Hispanic African American, Hispanic White, and Others), age in years, the smoke-free policy (post- vs. pre-implementation), education (less than high school, high school degree, attended college/technical school, and graduated from college/technical school), employment status (employed vs. unemployed/out of the workforce), year of data collection, and marital status (married vs. other). The model took the following form:

$$\ln \left(\frac{\hat{\pi}}{1-\hat{\pi}} \right) = \beta_0 + \beta_1 \cdot \text{Female} + \beta_{2i} \cdot \text{Race}_i + \beta_3 \cdot \text{Age} + \beta_4 \cdot \text{SmokeFreePolicy} + \beta_{5j} \cdot \text{Education}_j + \beta_{6l} \cdot \text{Employed}_l + \beta_7 \cdot \text{Year} + \beta_8 \cdot \text{Married}$$

where π is the probability that the surveyed person smokes and SmokeFreePolicy is an indicator of the implementation of the smoke-free policy (0 = prior to 2004, 1 = 2004 and later). The year 2004 was chosen as the cut-off, rather than the date July 1, 2003, for two reasons. First, BRFSS sampling and weighting are designed such that a year of data (not six months) is representative of the population for that year. Second, it allowed for a lag of 6 months between policy implementation and behavioral changes. Year of data collection accounted for the secular trend. We did not include a variable to account for the seasonality of smoking (e.g., month or quarter) because BRFSS is not weighted monthly or quarterly. In the subgroup analysis, we estimated models of the effect of the smoke-free policy on smoking prevalence by race (non-Hispanic White, non-Hispanic African American, and

Hispanic White), age group (18–44 years, 45–54 years, 55–64 years, 65–74 years, and 75 years and older), and gender.

All analysis was conducted in SAS 9.4 (SAS Institute Inc, Cary, NC).

RESULTS

Acute myocardial infarction hospitalization

A total of 684,178 acute myocardial infarctions (AMIs) occurred from 2000–2013 in Florida, and the AMI hospitalization rate declined during that time (Table 1). Adjusting for the secular trend and seasonality effects, the smoke-free policy was not associated with a decline in the AMI hospitalization rate in the total population ($\beta=0.005$ per 10,000, $p=0.7898$; Table 1). No effects were seen by race or gender. However, the policy was associated with a small but statistically significant decrease in AMI hospitalization rate among adults aged 18–44 years ($\beta= -0.001$ per 10,000, $p\text{-value}=0.0031$; Table 2 and Figure 1). A post-hoc analysis stratified by race within the youngest age group showed the smoke-free policy was significantly associated with decreased rates of AMI among non-Hispanic White adults aged 18–44 years ($\beta= -0.001$ per 10,000, $p\text{-value}=0.0083$), but was not significantly associated with changes to AMI rates among non-Hispanic African Americans ($\beta=0.0002$ per 10,000, $p\text{-value}=0.7563$) or Hispanic Whites ($\beta= -0.002$, $p\text{-value}=0.2565$; Figure 2).

Smoking prevalence

The Florida BRFSS data included 142,210 observations for a population size of 13,803,480. The adult smoking prevalence declined from 2000–2010, adjusting for gender, race, age, education, household income, marital status, and the smoke-free policy (Table 3). The policy was not associated with a change in smoking prevalence in the total population, by gender, race group, or age group (Tables 3 & 4).

DISCUSSION

Following the implementation of a smoke-free law for workplaces and restaurants in Florida, we detected no statistically significant association with AMI hospitalizations in the total population. A prior study using data from 1990–2006 found that the smoke-free policy was only marginally associated with a decrease in AMI hospitalization rates in Florida (Loomis and Juster, 2012). Our study added to the previous study by extending the analysis through 2013, thus accounting for a slowing in the downward trend in AMI hospitalization rates that occurred in 2007. Our finding of no effect on AMI is inconsistent with meta-analysis studies that have found the risk of AMI decreases after smoke-free legislation, with estimates ranging between 13% (Lin et al., 2013), 15% (Tan and Glantz, 2012), and up to 36% in 3 years (Lightwood and Glantz, 2009). This may be due to the limited coverage provided by the smoke-free legislation in Florida, which does not prohibit smoking in bars that make 10% or less of their sales from food. Florida is one of only 12 states to have a preemption law prohibiting local ordinances from further restricting indoor smoking (Centers for Disease Control and Prevention, 2011b). Comprehensive smoke-free laws that include all venues are associated with lower odds of secondhand smoke (SHS) exposure, coronary

events, and other disease outcomes compared to limited coverage laws like the one in Florida (Pickett et al., 2006; Tan and Glantz, 2012). Our findings support the need to include bars in smoke-free legislation to have a greater impact on AMI hospitalizations.

In addition to comprehensive smoke-free policy, “best practice” state tobacco control policies include strong taxation policy, sufficient funding for programs, and provision of cessation services to have a substantial impact on tobacco use (Centers for Disease Control and Prevention, 2014). Florida does not meet several of these criteria (American Lung Association, 2016). Currently, cigarettes are taxed at a rate of \$1.339 per 20-pack in Florida, compared to the average of \$1.61 per pack across all states (Campaign for Tobacco-Free Kids, 2016). Moreover, it only spends 35.8% of the amount recommended by the CDC for tobacco control programs and has substantially reduced the amount over time (American Lung Association, 2016; Farrelly et al., 2008). Florida has not yet chosen to participate in Medicaid expansion provided by the Affordable Care Act, which has left nearly a million people in the coverage gap. This has significant implications for the accessibility of tobacco cessation aids like nicotine replacement therapies and counseling services. Tobacco cessation coverage under Medicaid varies by carrier, and comprehensive coverage is not mandated by the state. To further reduce AMI and other smoking-attributable disease, greater advocacy efforts are needed to improve tobacco control policies in Florida.

In our study, the AMI hospitalization rate declined a small but statistically significant amount among non-Hispanic Whites aged 18–44 years after passage of the law. Other studies have also found that smoke-free policies have a greater effect on heart disease among younger compared to older patients (Barone-Adesi et al., 2011; Barone-Adesi et al., 2006; Tan and Glantz, 2012). Passive smoking (i.e., secondhand smoke exposure) in healthy young adults is associated with signs of early arterial damage (Celermajer et al., 1996). We found no statistically significant effect among other racial and ethnic groups, which is concerning given evidence of growing racial and ethnic disparities in AMIs (Wang et al., 2012). Chaloupka and Pacula (1999) also found that smoke-free legislation was associated with a decrease in smoking prevalence among young non-Hispanic White men, but not any other racial or ethnic group. Despite smoke-free policies, non-Hispanic African Americans are still more likely to be exposed to secondhand smoke than non-Hispanic Whites (Homa et al., 2015; Pickett et al., 2006). One reason might be issues of enforcement. Smoke-free policies might be enforced differentially by the racial and ethnic composition of neighborhoods where restaurants are located or by the composition of workplaces. Greater information is needed about the enforcement activities for smoke-free laws in Florida. Another explanation might be differences in the source of secondhand smoke exposure by race and ethnicity. Other significant sources of secondhand smoke exposure include homes and vehicles, which are not covered by the smoke-free law in Florida. Non-Hispanic African Americans are less likely to have a smoke-free home or vehicle rule and more likely to report secondhand smoke exposure in the home or vehicle than non-Hispanic Whites (King et al., 2013). Educational campaigns can target homes and vehicles as significant sources of secondhand smoke exposure and promote smoke-free policies in these venues.

In our study, the association between the smoke-free policy and AMI hospitalizations among young Hispanic Whites was double that seen among young non-Hispanic Whites (−0.002 vs.

–0.001 per 10,000, respectively). However, we could not statistically reject the possibility that the association among Hispanic Whites was zero. This null finding might be due to a lack of precision in this subpopulation. Future research of the policy effect among Hispanic Whites could combine multiple states with a high proportion of this population to increase the sample size.

We investigated a reduction in the adult smoking prevalence as a potential mechanism for the effect of smoke-free policy on AMI among young non-Hispanic Whites, but found no association between the policy and smoking. Other studies have shown that the impact of smoking bans is largely attributable to a decrease in secondhand smoke exposure, rather than a decrease in active smoking (Barone-Adesi et al., 2006; Pell et al., 2008; Seo and Torabi, 2007). To investigate decreased secondhand smoke exposure vs. decreased active smoking as the mechanism for the policy effect on AMI, future studies should include self-reported and biologically measured secondhand smoke exposure as an outcome or utilize hospitalization data sources that include smoking status to compare AMI rates among nonsmokers compared to smokers.

The interrupted time series design strengthens our ability to determine the association between the smoke-free policy and AMI because it does not suffer from many of the threats to the validity of quasi-experimental or other observational designs. Potential confounders are limited to factors that are associated with the outcome of interest and changed at the time of the intervention (or policy change), including simultaneously occurring interventions, seasonal changes in the outcome at the time of the intervention, and changes in the composition of the population (Wagner et al., 2002).

This study has several limitations. Our ability to separate intervention effects from the effects that occur at the same time period is limited by our lack of a control group. In addition, the sample was limited to one state with a moderately strong (but not comprehensive) smoke-free policy. Therefore, our ability to detect an effect of smoke-free policy on AMI hospitalization rates and smoking prevalence is limited. Although we picked one of the most populated and diverse U.S. states, the subgroup analysis might have suffered from limited precision due to a small sample size among Hispanic Whites. Therefore, future research is needed with larger numbers of this and other minority populations. This was an exploratory ecological study looking at state-level changes in AMI and smoking in response to a policy change. We attempted to address these issues by exploring four significant cardiovascular risk factors that could serve as plausible alternative causes for the change in AMI hospitalizations. In addition, the interrupted time series method analyzes the trend and level before and after the policy change while controlling for other unknown factors. Secondhand smoke exposure was a likely mechanism for the effect of the smoke-free policy on AMI, but we were unable to assess it in this analysis due to limitations in the datasets.

CONCLUSIONS

The results of this study, which was carried out on a large population over a long period of observation, suggest the association between smoke-free policy and AMI hospitalizations differs by race and age. This finding has several significant implications for tobacco control

policy. First, comprehensive coverage of venues (including stand-alone bars) is important to have a more substantial impact on AMI hospitalizations. Second, a more complete tobacco control policy that includes strong taxation and funding needs to be adopted to reduce the burden of smoking and related health conditions. Third, further policy and program work is required to address the growing racial gap in smoking and AMI hospitalizations, including comprehensive cessation benefits with no cost sharing in all healthcare plans. Research is needed to understand enforcement of smoke-free policies and how implementation of smoke-free policies affects secondhand smoke exposure in racial and ethnic minorities.

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Abbreviations

AMI	acute myocardial infarctions
NH	non-Hispanic
BRFSS	Behavioral Risk Factor Surveillance System
HCUP	Healthcare Cost and Utilization Project
SID	State Inpatient Databases

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HIGHLIGHTS

- Time series analyzed smoke-free (SF) policy and AMI by race in Florida.
- No association between SF policy and AMI or smoking among adults was detected.
- SF policy was associated with decreased AMI among young non-Hispanic Whites only.
- More comprehensive tobacco control policies are needed in Florida.
- Additional research needs to examine policy implementation among minority groups.

Figure 1.
The effect of smoke-free policy on quarterly acute myocardial infarction hospitalization rates (per 10,000) by age group in Florida, 2000–2013

Figure 2. Acute myocardial infarction hospitalization rate per quarter among individuals aged 18–44 years by race in Florida, 2000–2013: (A) non-Hispanic White, (B) non-Hispanic African American, and (C) Hispanic White

Vertical line=July 1, 2003, when the smoke-free policy was implemented.

Interrupted time series analysis of the association between smoke-free policy and quarterly acute myocardial infarction hospitalization rates (per 10,000) overall, by gender and by race/ethnicity in Florida, 2000–2013

Table 1

	All Adults		Male		Female		NH Whites		NH African Americans		Hispanic Whites	
	β (SE)	p-value	β (SE)	p-value	β (SE)	p-value	β (SE)	p-value	β (SE)	p-value	β (SE)	p-value
Non-seasonal MA ^a (1)	0.40 (0.14)	0.0034	0.67 (0.12)	<0.0001	−0.06 (0.14)	0.6501	0.44 (0.13)	0.0006	0.27 (0.13)	0.0363	0.33 (0.13)	0.0117
Seasonal MA ^a (1)	0.27 (0.14)	0.0656	0.22 (0.14)	0.1276	0.41 (0.14)	0.0029	0.65 (0.13)	<0.0001	1.00 (72.34)	0.9890	0.93 (0.28)	0.0008
Smoke-free policy	0.005 (0.02)	0.7898	0.01 (0.01)	0.5137	0.005 (0.02)	0.8314	0.01 (0.02)	0.5107	0.01 (0.01)	0.1712	0.003 (0.008)	0.6635

^aFollowing the Box-Jenkins approach, the signs for MA are inverted in the equation. Therefore, a positive coefficient should be interpreted as a negative trend, and vice versa.

MA = moving average; SE=standard error; NH = Non-Hispanic

Table 2

Interrupted time series analysis of the association between smoke-free policy and quarterly acute myocardial infarction hospitalization rates (per 10,000) by age group in Florida, 2000–2013

	18–44 years		45–54 years		55–64 years		65–74 years		75 years	
	β (SE)	p-value	β (SE)	p-value	β (SE)	p-value	β (SE)	p-value	β (SE)	p-value
Non-seasonal MA ^a (1)	1.00 (32.95)	0.9758	1.00 (113.85)	0.9930	0.67 (0.12)	<0.0001	0.81 (0.10)	<0.0001	0.64 (0.12)	<0.0001
Seasonal MA ^a (1)	0.93 (0.27)	0.0005	0.93 (0.27)	0.0006	0.49 (0.14)	0.0004	0.47 (0.14)	0.0009	0.64 (0.14)	<0.0001
Smoke-free policy	−0.001 (0.0002)	0.0031	0.002 (0.001)	0.0559	0.02 (0.02)	0.2173	0.01 (0.02)	0.5443	0.01 (0.06)	0.8158

^aFollowing the Box-Jenkins approach, the signs for MA are inverted in the equation. Therefore, a positive coefficient should be interpreted as a negative trend, and vice versa.

MA = moving average; SE=standard error

Logistic regression of the association between smoke-free policy and smoking prevalence overall, by gender and by race/ethnicity in Florida, 2000–2010

Table 3

	All Adults		Male		Female		NH Whites		NH African Americans		Hispanic Whites	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Smoke-free policy	1.00	0.89, 1.11	1.09	0.91, 1.29	0.91	0.79, 1.03	1.10	0.97, 1.24	0.89	0.62, 1.29	1.30	0.81, 2.11
Year	0.97	0.96, 0.99	0.96	0.93, 0.98	0.99	0.97, 1.01	0.97	0.95, 0.98	0.99	0.94, 1.05	0.91	0.85, 0.98
Education												
Some high school	Ref		Ref		Ref		Ref		Ref		Ref	
High school/ GED completed	0.72	0.65, 0.79	0.73	0.63, 0.84	0.70	0.62, 0.79	0.56	0.50, 0.63	0.71	0.53, 0.95	1.52	1.06, 2.18
Some college	0.54	0.49, 0.69	0.56	0.47, 0.65	0.52	0.46, 0.58	0.39	0.35, 0.44	0.57	0.42, 0.78	1.09	0.74, 1.61
College graduate or higher	0.27	0.24, 0.30	0.27	0.23, 0.32	0.26	0.23, 0.30	0.18	0.16, 0.21	0.28	0.20, 0.41	0.68	0.47, 1.01
Race/ Ethnicity												
NH Whites	Ref		Ref		Ref		--		--		--	
NH Blacks	0.48	0.43, 0.54	0.65	0.55, 0.78	0.35	0.31, 0.41	--		--		--	
Hispanic Whites	0.55	0.47, 0.63	0.70	0.56, 0.87	0.41	0.34, 0.49	--		--		--	
Others	0.51	0.46, 0.58	0.64	0.55, 0.76	0.38	0.33, 0.45	--		--		--	
Age in years	0.98	0.98, 0.98	0.99	0.98, 0.99	0.98	0.98, 0.98	0.98	0.97, 0.98	1.00	1.00, 1.01	0.99	0.99, 1.00
Female (vs. male)	0.82	0.77, 0.87	--		--		0.97	0.91, 1.03	0.51	0.42, 0.63	0.60	0.46, 0.77
Married (vs. not married)	0.61	0.57, 0.64	0.56	0.51, 0.62	0.63	0.59, 0.68	0.58	0.55, 0.62	0.63	0.51, 0.79	0.57	0.43, 0.76
Employed (vs. not employed)	0.86	0.80, 0.92	0.82	0.73, 0.92	0.88	0.82, 0.96	0.86	0.80, 0.93	1.12	0.90, 1.41	0.73	0.54, 0.98

OR = Odds Ratio; CI = Confidence Interval; NH = Non-Hispanic; GED=general education development

Table 4

Logistic regression of the association between smoke-free policy and smoking prevalence by age group in Florida, 2000–2010

	18–44 years		45–54 years		55–64 years		65–74 years		75 years	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Smoke-free policy	1.04	0.87, 1.24	1.18	0.94, 1.47	0.97	0.77, 1.21	1.10	0.84, 1.44	0.92	0.61, 1.39
Year	0.95	0.93, 0.98	0.94	0.91, 0.97	0.98	0.95, 1.01	1.00	0.97, 1.04	0.99	0.94, 1.05
Education										
Some high school	Ref		Ref		Ref		Ref		Ref	
High school/ GED completed	0.71	0.61, 0.83	0.62	0.51, 0.76	0.84	0.69, 1.03	0.70	0.55, 0.89	1.05	0.74, 1.49
Some college	0.47	0.40, 0.56	0.45	0.36, 0.56	0.71	0.57, 0.88	0.66	0.52, 0.84	0.79	0.57, 1.10
College graduate or higher	0.21	0.18, 0.25	0.21	0.17, 0.26	0.35	0.28, 0.44	0.45	0.35, 0.59	0.54	0.38, 0.76
Race/ Ethnicity										
NH Whites	Ref		Ref		Ref		Ref		Ref	
NH Blacks	0.35	0.29, 0.41	0.48	0.39, 0.58	0.62	0.50, 0.77	0.99	0.74, 1.34	1.29	0.63, 2.63
Hispanic Whites	0.49	0.39, 0.61	0.50	0.36, 0.68	0.57	0.42, 0.77	0.69	0.44, 1.07	1.11	0.56, 2.22
Others	0.42	0.36, 0.49	0.52	0.42, 0.65	0.78	0.59, 1.03	0.82	0.58, 1.15	0.95	0.61, 1.47
Female (vs. male)	0.83	0.75, 0.91	0.84	0.75, 0.95	0.67	0.60, 0.76	0.87	0.75, 1.01	0.87	0.67, 1.14
Married (vs. not married)	0.60	0.55, 0.67	0.52	0.46, 0.58	0.51	0.45, 0.57	0.44	0.38, 0.51	0.44	0.35, 0.55
Employed (vs. not employed)	1.01	0.90, 1.14	1.50	1.33, 1.70	1.05	0.94, 1.18	0.84	0.70, 1.02	0.73	0.48, 1.11

OR = Odds Ratio; CI = Confidence Interval; NH = Non-Hispanic; GED=general education development