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# Emerging Trends in Cigarette Sales in Ohio During First Year Implementation of the Smoking Ban

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## Abstract

*Objective:* The Ohio smoking ban was passed by Ohio voters on November 7, 2006 and took effect on December 7, 2006. The reporting of violations to the Ohio smoking ban began on May 3, 2007 with the implementation of the civil penalties for the violations. The purpose of this study is to look at emerging trends in cigarette sales change from 2006 to 2007 for the 88 counties in Ohio following implementation of the smoking ban on December 7, 2006 based on geographical location, violation level, and tobacco production.

*Methods:* Data was obtained from Claritas for the 2006 aggregate expenditure estimate on cigarettes and the 2007 aggregate expenditure estimate on cigarettes (Claritas, 2008). This data was used to calculate cigarette sales change and cigarette percent sales change for the state of Ohio. The independent variables used were county regional distinction, tobacco production, and smoking ban violation level per 1000 population. For each of these variables an analysis of descriptive statistics was used to look at cigarette percent sales change. The descriptive statistics included mean, median, standard deviation, range, minimum, and maximum.

*Results:* Overall for the state of Ohio there was a decrease in the aggregate expenditure estimate on cigarettes from 2006 to 2007. The cigarette percent sales change for Ohio was -1.9%. The cigarette percent sales change for all regional distinctions decreased; Appalachian counties by -2.1%, rural non-Appalachian counties by -1.7%, metropolitan counties by -2.0%, and suburban counties by -1.1%. The cigarette percent sales change decreased for both violation distinctions; high violation counties by -1.9% and low violation counties by -1.7%. The cigarette percent sales change also decreased for all tobacco producing distinctions; -1.6% for high tobacco producing counties, -1.9% for low tobacco producing counties, and -1.7% for non-tobacco producing counties.

*Conclusion:* Although the results can not draw concrete connections between cigarette sales change and the smoking ban this study does provide some insight into what has occurred in Ohio with cigarette sales since the implementation of the smoking ban and enforcement of violations. Cigarette sales in Ohio decreased in 95.45% of Ohio counties (84 of 88) ranging from 1.6% change to -5.2% change. Cigarette sales for the state of Ohio as a whole decreased from 2006 to 2007 by a total of \$83,002,044 which is a -1.9% mean percentage cigarette sales change. This decrease in cigarette sales change provides support for the implementation of the smoking ban in Ohio and the positive impact it has had on the Ohio population in relation to a decrease in cigarette sales and. This study also shows the areas in Ohio which efforts can be focused to increase awareness of the negative effects of smoking and secondhand smoke along with the hope of increasing cessation rates and/or decreasing cigarette consumption in these areas to comparable levels of the other regions in Ohio.

## Introduction

The effects of smoking and environmental tobacco smoke, also known as secondhand smoke, have become an increasing public concern. The 2006 Report of the Surgeon General highlighted the negative health effects of secondhand smoke including cardiovascular problems, coronary heart disease, lung cancer, and premature death (U.S. Department of Health and Human Services, 2006). Due to the increase in public interest of the negative effects of environmental tobacco smoke there has been a legal push to place smoking bans in public places. Ohio joined the legal push to ban smoking on November 7, 2006 when the public passed a law banning smoking in all workplaces, restaurants, and bars. The smoking ban was implemented December 7, 2006 and the enforcement and violations were fully put into effect on May 3, 2007. There is now a need for evaluation of the program to look at county trends related to smoking since the implementation and enforcement of the ban and to determine the effect that the smoking ban has had on the Ohio population.

The purpose of this study is to look at emerging trends in cigarette sales change from 2006 to 2007 for the 88 counties in Ohio following implementation of the smoking ban on December 7, 2006 based on geographical location, violation level, and tobacco production. Cigarette sales data for 2006 and 2007 was collected from the Claritas database with access from the Ohio Department of Health and smoking violation data was collected from the Ohio Department of Health to determine high versus low violations among counties. Regional county distinctions (Appalachian, rural non-Appalachian, metropolitan, or suburban), as classified by the Ohio Family Health Survey (Ohio Job & Family Services, 2005), were used as an independent variable. High

tobacco producing, low tobacco producing, and non-tobacco producing county distinctions were also used as classified by the Southern Ohio Agricultural & Community Development Foundation (2007). This data was used to look at emerging trends in Ohio since implementation of the smoking ban.

The research conducted in this study looked at cigarette sales in conjunction with the independent variables described to determine trends in the counties based on their defining characteristics with the goal of showing differences in cigarette sales among regional distinction, high violation counties versus low violation counties, as well as among level of tobacco production in Ohio counties.

### *Limitations*

This study was limited by not having cigarette sales prior to 2006; therefore general trends in cigarette sales in years prior to the study were not available to establish a base. Therefore, there is no way to tell if the decreases in cigarette sales seen in this study were due to a continued trend or from implementation of the smoking ban.

Another limitation in this study was that violations were only looked at from April 4, 2007 to December 31, 2007 rather than being able to look at the first full year of violation data. The first full year was not looked at because the first violation was reported April 4, 2007 and due to time restrictions, data analysis, and the availability of cigarette sales data the violations analyzed ended December 31, 2007. This could possibly produce skewed results because it is only looking at the initial months of the smoking ban rather than an extended period of time. A final limitation to the study is that counties bordering states that lack smoking legislation were not given special consideration. People could

purchase cigarettes in the bordering states depending on the location of their residence, location of their workplace, and location of establishments frequented. These limitations are factors that could possibly skew the results of the study

### *Purpose Statement*

The purpose of this study is to look at emerging trends in cigarette sales change from 2006 to 2007 for the 88 counties in Ohio following implementation of the smoking ban on December 7, 2006 based on geographical location, violation level, and tobacco production.

### *Research Questions*

1. Have overall cigarette sales decreased from 2006 to 2007 in the state of Ohio since implementation of the smoking ban on December 7, 2006?
2. Was there a difference in cigarette sales change from 2006 to 2007 in the state of Ohio since implementation of the smoking ban on December 7, 2006 by geographical location: Appalachian, rural non-Appalachian, metropolitan, and suburban?
3. Was there a difference in cigarette sales change from 2006 to 2007 in the state of Ohio since implementation of the smoking ban on December 7, 2006 by violation level: high violations and low violations?
4. Was there a difference in cigarette sales change from 2006 to 2007 in the state of Ohio since implementation of the smoking ban on December 7, 2006 by tobacco

production: high tobacco producing areas, low tobacco producing areas, and non-tobacco producing areas?

## Literature Review

### *Current Trends in Tobacco*

#### *Introduction*

“Tobacco, the only consumer product proven to kill more than half of its regular users is responsible for about 5 million deaths worldwide every year” (Mackay et al., 2006, p. 9). Deaths from tobacco are avoidable with intervention, however if the situation is left as it is today the tobacco pandemic will spiral out of control. Tobacco has moved from developed nations to the developing nations and as tobacco use increases the burden placed on these developing nations is more than they can handle. Developing nations do not have the resources necessary to prepare for the financial, social, and political consequences that come with the burden of the current tobacco situation. Without the necessary interventions, tobacco will continue to kill more people each year and will eventually kill 650 million of today’s smokers and half will be during the productive years of their life placing additional burden on their economy, society, and family (Mackay et al., 2006).

#### *Adult Tobacco Use*

Males were the first smokers in the world with the initial portrayal of smoking as a masculine habit. Marketing strategies geared towards males linked smoking to, “health, happiness, fitness, wealth, power, and sexual success” (Mackay et al., 2006, p. 22). When smoking first became the trend, people believed the claims of marketing which sent male smoking rates on a steady incline. Smoking trends for males have hit a peak and are now on the decline across the world, however the trend has been slow moving

and the numbers are still high. The majority of males that have quit smoking are those with higher education; therefore making smoking more prevalent among less educated males (Mackay et al., 2006).

Smoking rates for women across the world are on average lower than that of males, however in some cultures and countries they are equal or have surpassed levels of males. In 2004 the smoking rate of females in the USA was 19% compared to 23% of males (Mackay et al., 2006). Tobacco companies used marketing strategies to lure women towards smoking. These strategies included seductive images, slim body types, independence, and sexuality. Although these strategies have been present since female smoking began, companies have continued to use these with the introduction of female-only cigarettes and feminine packaging (Mackay et al., 2006).

#### *Youth Tobacco Use*

In youth, boys are more likely to smoke than girls; however tobacco use among girls is increasing across the world therefore making the differences less prevalent. One in seven teens aged 13-15 years smoke and a quarter of them try their first cigarette before the age of ten. Every day across the world 100,000 youth become addicted to tobacco. With the large amount of youth smoking, marketing towards youth has increased and access to tobacco has become easier. Peer pressure, thoughts of increased popularity and increased approval from older siblings and parents have also added to the increase in youth smoking rates. Young females also have the increased influence to begin smoking because they believe it will help them maintain a slender figure although tobacco has not been shown to be associated with a lower body mass index in young

women. The negative health effects associated with tobacco addiction lead to a greater risk of developing diseases such as cancer, emphysema and heart disease later in life (Mackay et al., 2006).

### *Environmental Tobacco Smoke*

#### *Background Information*

Environmental tobacco smoke (ETS), also referred to as secondhand smoke, can have negative health effects to those that are exposed. Since the early 1990's ETS has been the focus of studies, with some concluding that it can cause some of the same health problems caused by smoking. A person that is exposed to ETS is classified as a passive smoker due to the smoke that they are inhaling (Mackay et al., 2006). A passive smoker is exposed to two types of smoke; the sidestream smoke that comes off the end of a burning cigarette and the mainstream smoke which is exhaled by the smoker (Mackay et al., 2006). Although both forms of smoke are toxic and dangerous to the passive smoker, the sidestream smoke is more toxic per unit of tobacco than the mainstream smoke (Mackay et al., 2006). ETS contains approximately 4,000 chemicals some of which are toxic and can cause cancer and other health problems when an individual is exposed (Ohio Department of Health-Dangers, 2007). Although secondhand smoke is not being directly inhaled from the cigarette it is very similar to the smoke inhaled by the smoker. Secondhand smoke contains a mixture of many chemicals, some of which are known carcinogens (U.S. Department of Health and Human Services, 2006). ETS can cause immediate health problems to some exposed individuals especially those suffering from

allergies or asthma. ETS can have immediate effects to some exposed but often times the effects are more long-term such as cancer (Ohio Department of Health-Dangers, 2007).

Although exposure to ETS has declined over the past 15 years, a significant amount of the population is still exposed every year. The Surgeon General Report on Tobacco concluded that 43% of nonsmokers in the U.S. have detectable levels of cotinine (a biomarker of secondhand smoke exposure) and approximately 22 million children ages 3-11 years are exposed to secondhand smoke (U.S. Department of Health and Human Services, 2006).

#### *Effects of Environmental Tobacco Smoke*

Exposure to secondhand smoke does not necessarily cause health problems after one exposure, but continued exposure has the potential to develop health effects. Adults exposed to secondhand smoke are at an increased risk for cardiovascular problems, coronary heart disease, lung cancer, and premature death (U.S. Department of Health and Human Services, 2006). Nonsmokers that are exposed to the harmful chemicals found in secondhand smoke are at an increased risk for lung cancer by 20-30% and an increased risk for heart disease by 25% (Mackay et al., 2006).

“In 2005, it was estimated that exposure to secondhand smoke kills more than 3,000 adult nonsmokers from lung cancer, approximately 46,000 from coronary heart disease, and an estimated 430 newborns from sudden infant death syndrome. In addition, secondhand smoke causes other respiratory problems in nonsmokers such as coughing, phlegm, and

reduced lung function” (U.S. Department of Health and Human Services, 2006, p *i*).

Secondhand smoke also causes negative health effects to pregnant women and the unborn child. ETS has been linked to pre-term delivery as well as low birth-weight or small size for the gestational age (Mackay et al., 2006).

Children with exposure to secondhand smoke are negatively affected. They are at risk for premature death as well as a variety of other conditions such as; sudden infant death syndrome (SIDS), acute respiratory infections (bronchitis and pneumonia), ear infections, and more severe and frequent asthma attacks (U.S. Department of Health and Human Services, 2006). The Surgeon General Report on Tobacco (2006) by the U.S Department of Health and Human Services also states through evidence that there is no risk-free level of secondhand smoke exposure since short term exposure can have negative health effects immediately.

#### *Control of Environmental Tobacco Smoke*

The concentration of secondhand smoke exposure is dependent a number of factors. The concentration of exposure is a combination of the number of cigarettes smoked during the period of exposure, how air moves through the building/environment, and the rated of indoor and outdoor air exchange (U.S. Department of Health and Human Services, 2006). Previous methods to prevent exposure to secondhand smoke in public places such as separating smokers and nonsmokers, cleaning the air, and ventilation systems are not adequate to reduce exposure to secondhand smoke (U.S. Department of Health and Human Services, 2006).

Separating smokers and nonsmokers has not been shown to decrease secondhand smoke to safe levels and without a separate room and separate ventilation system secondhand smoke can travel and will not be kept separate with a wall or partition. The current designs for heating systems, air conditioning, and ventilation systems can actually further distribute secondhand smoke throughout a building (U.S. Department of Health and Human Services, 2006). Air cleaning systems used today are effective to remove large particles from the air; however secondhand smoke contains smaller particles and gases that cannot be removed through air cleaning systems (U.S. Department of Health and Human Services, 2006). The Surgeon General's Report on Tobacco states that the only way to fully prevent nonsmokers' exposure to secondhand smoke is to eliminate smoking in indoor public places such as restaurants, bars, and the workplace (U.S. Department of Health and Human Services, 2006).

Nearly half of all children in the world are exposed to secondhand smoke, with the majority of them being exposed in their own home (Mackay et al., 2006). Between 1999 and 2004 it was calculated that 40-59.9% of the youth in the USA lived in homes where others smoked (Mackay et al., 2006). Public smoking bans do not help protect these children. In order for these children to be safe from environmental tobacco smoke and grow up in an environment free of these toxins, adult smoking cessation rates must increase (Mackay et al., 2006). Public smoking bans are commendable for their effort to control ETS and are essential to the health of our nation; however adult smoking cessation is another essential element to protect the children of the world.

## *Smoking Bans in Public Places*

### *Legislation in the United States*

In January 2006, the American Lung Association created the *Smokefree 2010 Challenge* in which they charged all states to pass comprehensive smoking legislation by 2010 (American Lung Association, 2008). The legislation would ban smoking in all public places and the workplace (American Lung Association, 2008). All states do not currently have legislation in place; however some states have accepted the *Smokefree 2010 Challenge* by implementing comprehensive smoking legislation to protect their citizens. According to the American Nonsmokers' Rights Foundation-Overview List (2008) as of January 2, 2008, 2,671 municipalities have local laws that place restrictions on smoking and out of this 251 of the municipalities have local laws that have 100% smoking restrictions on workplaces, restaurants, and bars. As of January 2, 2008, there are 26 states, Washington D.C., and Puerto Rico that have 100% smokefree laws in place for workplaces, and/or restaurants, and/or bars (American Nonsmokers' Rights Foundation-Overview List, 2008). As of 2007, 17 states, the District of Columbia, and Puerto Rico had comprehensive air legislation in full effect and 4 more states had approved legislation to go into effect in 2008 and 2009 (American Lung Association, 2008). The U.S. Capitol also became smokefree in January of 2007 (American Lung Association, 2008). The amount of smoking bans across the U.S. has increased over the years and has becoming a growing trend since 1993 (American Nonsmokers' Rights Foundation-Local, 2007). Smoking ban legislation appears to be on the rise in the U.S. and continues to be an increased topic of interest among public health officials and politicians.

In addition to smoking ban legislation there has been other tobacco related legislation introduced in recent years. In 2004, the Framework Convention on Tobacco Control (FCTC) was the world's first tobacco control treaty to be signed and as of 2007 it had been ratified by 151 nations; however, the U.S. was not one of these nations. The President has not sent the treaty to the Senate for ratification which is a necessary step in the process to put the treaty into action; therefore, the U.S. is unable to be a part of the discussions which are taking place among the nations which have ratified the treaty regarding current tobacco issues. Other legislation on hold by the U.S. President is a 61 cent increase in the federal cigarette excise tax. This tax increase was passed in 2007 by the U.S. Senate and House of Representatives in 2007; however, as of December 1<sup>st</sup>, 2007 it had not become law because it had been vetoed by the President. Approval of this tax increase would go towards funding for the State Children's Health Insurance Program (SCHIP) to provide medical care to youth as well as help decrease youth smoking due to the increase in price (American Lung Association, 2008).

### *Effects of Smoking Bans*

The purpose of smoking regulations in public places is to reduce exposure to secondhand smoke and encourage smoking cessation (Trotter, Wakefield, & Borland, 2002). Laws requiring the workplace, and/or restaurants, and/or bars to be 100% smokefree are implemented in order to reduce secondhand smoke exposure to nonsmokers, as well as help promote healthy behavior choices for smokers. In order for tobacco control policies to be effective and have a positive impact on the population, smoking behavior must be affected through the encouragement of current smokers to quit

as well as targeting youth so that they never initiate smoking behaviors (Gilpin, Lee, & Pierce, 2004). Social venues and establishments are more often frequented by a younger population; therefore, placing smoking restrictions on these venues may help to disrupt the succession from experimentation to regular use of tobacco and eventually tobacco dependence (Trotter et al., 2002). Tobacco has become part of society in the U.S. and in order for people to begin to quit smoking it has to be viewed as unacceptable behavior. If smoking begins to be viewed as unacceptable behavior then fewer people will smoke (Gilpin et al., 2004).

In 2002, Trotter et al. conducted a study in Victoria, Australia to evaluate smokers' beliefs on how their smoking behavior would change with implementation of smoking bans in bars, nightclubs, and gaming venues. Only those who smoked were interviewed for the research and participants were classified into two categories: "smokers" and "socially cued smokers". A "smoker" was identified as smoking "daily", "weekly", or "less than weekly" and a "socially cued smoker" reported going to bars, nightclubs, or gaming venues monthly and smoked more in these venues (Trotter et al., 2002). The research found that 69.4% of smokers in Victoria attended social venues monthly and out of this group 70.1% smoked more while attending these social venues with 25.4% reporting they would be more likely to quit if a smoking ban was implemented (Trotter et al., 2002). These results indicate that smoking restrictions in social venues could have an impact on the smoking behavior of those that frequent the venues and in turn could increase cessation rates among the affected population. Although smoking restrictions is not a solution for smoking, it is one option to decrease smoking levels.

Workplace smoking bans reduce exposure to secondhand smoke for non-smokers while they are at the workplace. In addition to protection from ETS for the non-smokers, smokers also benefit from workplace smoking bans, because there is an increased rate of cessation among smokers (Longo, Johnson, Kruse, Brownson, & Hewett, 2001). A study was conducted by Longo et al. (2001) in order to compare cessation rates among smoke-free hospitals and non-smoke-free workplaces; the cessation rates among employees of hospitals with total workplace smoking bans after three surveys was 17.7% compared to 11.3% of community employees with non-smoke-free workplaces. A total ban on smoking in the workplace can have positive health effects on employees that are non-smokers as well as smokers. Although workplace smoking bans do not solve the problem of smoking or exposure to secondhand smoke it is another strategy that can be used to decrease smoking rates across the world and help eliminate some of the morbidity and mortality associated with smoking.

After a decade of attempts to combat smoking rates, New York City had seen no decrease in the prevalence of smoking therefore decided to include a smoking ban as part of the implementation of a five-point tobacco-control program (Ellis et al., 2007). The five points included “increased taxation in 2002, establishment of smoke-free workplaces in 2003, public and health-care--provider education, cessation services, and rigorous evaluation, including annual cross-sectional, citywide telephone surveys using the same measures as CDC’s state-based Behavioral Risk Factor Surveillance System (BRFSS)” (Ellis et al., 2007, p. 604). The tobacco-control program in New York City seemed as though it was a successful program with a decrease in smoking prevalence from 21.5% in 2002 to 18.4% in 2004; however, no further decreases were seen until 2006 after the

implementation of television advertisements and these changes were only seen in the male and Hispanic subgroups (Ellis et al., 2007).

Bauer, Hyland, Li, Steger, and Cummings (2005) performed a cohort study which followed a group of smokers from the Community Intervention Trail for Smoking Cessation (COMMIT) done previously. This study used participants from the original COMMIT study which were smokers and employed during the 1993 and 2001 surveys in order to determine the effects that workplace smoking policies had on smoking behaviors (Bauer et al., 2005). The follow up study used participants that met the following criteria: they had participated in the COMMIT surveys in 1993 and 2001, were employed in a primarily indoor environment outside of the home, and could provide information on the smoking policy at their place of employment (Bauer et al., 2005). The COMMIT cohort determined that in 1993, 27% of the participants worked in smoke-free workplaces and in 2001, the amount had increased to 76% (Bauer et al., 2005). It was concluded that more restrictions on smoking in the workplace and the more enforcement that was in place was related to increased success in employees quitting smoking or reducing their cigarette consumption per day if they continued to smoke (Bauer et al., 2005).

In 1995 the Finnish government made reforms to the Tobacco Control Act to prohibit smoking in joint and public workplaces (Heloma, Jaakkola, Kahkonen, & Reijula, 2001). Each workplace in Finland was given the option to enforce a total ban on smoking for employees or provide a separate smoking area with a separate ventilation system (Heloma et al., 2001). Following the implementation of the reforms to the Tobacco Control Act Heloma et al. (2001) performed a study to determine the effect that the reforms had on tobacco use of employees. The largest decrease in tobacco use was

found among those employees with less education (Heloma et al., 2001). Placing restrictions on smoking in the workplace not only reduces secondhand smoke exposure to nonsmokers but it also helps promote healthier lifestyles and smoking cessation among those employees that do smoke.

California was the first state in the U.S. to take a step towards tobacco control and helped to set the bar for the rest of the nation. California passed the Smoke-free Workplace Act on January 1, 1995 which banned smoking in all public and private workplaces, including restaurants (Stolzenberg & D'Alessio, 2007). The law in California was highly opposed especially by restaurants, in particular those serving alcohol, because they were afraid that they would lose business from their smoking patrons (Stolzenberg & D'Alessio, 2007). Businesses argue that by placing restrictions on smoking in restaurants that serve alcohol their revenue will greatly decrease causing financial problems for these businesses. Stolzenberg and D'Alessio (2007) compared revenues for both alcohol-serving restaurants and non-alcohol-serving restaurants prior to the smoking ban and again after the smoking ban went into effect.

An initial analysis showed increases in revenue for both alcohol-serving and non-alcohol-serving restaurants, however, many other factors could have been involved in this increase and therefore an intervention analysis was preformed for further detail (Stolzenberg & D'Alessio, 2007). After controlling for total revenue, non-alcohol-serving restaurants were not positively or negatively affected by the enactment of the smoking ban and alcohol-serving restaurants saw an initial 4% decrease in revenue (Stolzenberg & D'Alessio, 2007). This was increased back to normal after one quarter (Stolzenberg & D'Alessio, 2007). There are many factors that affect the revenues of

restaurants and this study does not solely provide answers as to the effects of smoking bans; however, it sheds some light on the debate and can be of some comfort to those restaurant owners that are affected by indoor smoking bans.

Although restaurant owners, as well as many smokers in California opposed the smoking ban, a decline of 22% was seen in per capita cigarette consumption from 1996-2002. Most of the decline in per capita cigarette consumption (>50%) 1990-1996 was found to be from current smokers smoking fewer cigarettes (Gilpin, Messer, White, & Pierce, 2006). Approximately 30% of the decline from 1990-1996 was from a reduced *amount* of ever smokers in the population, and an insignificant amount of the decline was from ever smokers *quitting* (Gilpin et al., 2006). However, between 1996 and 2002 the decline in cigarette consumption was considerably influenced by ever smokers quitting with it accounting for 22% of the decline (Gilpin et al., 2006).

Other evidence that can be used to show the success of the California smoking ban is through the attitudes of the population towards smoking. California adults, as well as adults outside California were surveyed about their attitudes to where smoking should not be allowed. The categories included were restaurants, hospitals, indoor work areas, bars, indoor sports venues, and indoor shopping malls (Gilpin et al., 2004). During the years 1998-1999 residents of California had higher percentages in all categories than the rest of the USA (Gilpin et al., 2004). The largest difference was in people that believed smoking should not be allowed in restaurants with 71.3% for Californians versus 48.3% for the rest of the USA (Gilpin et al., 2004).

*Smoking Bans in Traditional Tobacco-Growing States*

As tobacco control policies have become more prevalent, traditional tobacco-growing states and areas have been behind non tobacco-growing states and areas regarding tobacco legislation. Recently progress is being made towards changing this stereotype. In 2007, Tennessee strengthened its smokefree air laws becoming “the first traditional tobacco-growing state to pass legislation to prohibit smoking in most public places and workplaces, including almost all restaurants” (American Lung Association, 2008, p. 22). Loopholes contained within the legislation prevent Tennessee’s smokefree law from being considered comprehensive; however, it is still a step in the right direction for Tennessee as well as will hopefully serve as a template for other traditional tobacco-growing states (American Lung Association, 2008).

Other tobacco growing states have experienced mixed outcomes with smoking ban legislation. Virginia proposed a law to ban smoking in restaurants; however it was denied in the state House of Delegates (American Lung Association, 2008). Although this effort did not become law, it is still a positive step for traditional tobacco-growing states. North Carolina is another traditional tobacco-growing states in which smoking legislation is moving toward public smoking restrictions. North Carolina passed legislation that took effect in January of 2008 to ban smoking in state government buildings (American Lung Association, 2008).

Kentucky has seen success with smoking legislation with a total of 11 cities and counties that have passed local laws to prohibit smoking. Although 11 cities and counties in Kentucky have passed local laws to prohibit smoking it was not an easy or widely accepted process. The citizens of Kentucky had the highest smoking rates among all the

states in the U.S. at 30.8% of adults and 47% of youth. This leads to 34% of youth in Kentucky having exposure to secondhand smoke which is higher than the exposure of children in any other state. Allen County, KY is a small rural county which has several tobacco farms and has done little to decrease smoking rates among the population. In 2004, a study was conducted by Wilson, Duncan, and Nicholson to determine attitudes of Allen County citizens towards smoking restrictions within the county. It was found that 43.4% of those surveyed supported the banning of smoking in the Allen County Courthouse and a total of 88.1% of those surveyed supported some form of smoking restrictions in the Allen County Courthouse. Some form of smoking restrictions in restaurants were supported by 90.9% of the people surveyed and 86.2% of the people surveyed supported some form of smoking restrictions in the workplace. These results are significant for public health and show that smoking restrictions will gain support even in areas where tobacco has always been the way of life (Wilson et al., 2004).

### *Ohio Smoking Ban*

#### *Ohio Smoking Prevalence and Effects*

According to the Centers for Disease Control and Prevention Behavioral Risk Factor Surveillance System (BRFSS) 22.4%, approximately 1 in 4, of the Ohioans are current smokers and 16.8% of Ohioans smoke everyday (2006). Between 1997 and 2001 the average annual smoking-attributable mortality for Ohio was 18,607 for adults 35 years and older, not including burn or secondhand smoke deaths (Centers for Disease Control and Prevention, 2007).

Smoking is not only detrimental to those that smoke and those exposed to secondhand smoke but it also has economic effects. According to the Smoking-Attributable Mortality, Morbidity, and Economic Costs (SAMMEC) program between the years 1997 and 2001 Ohio had a total average annual smoking-attributable productivity loss of \$4,380,201,000 for adults 35 years and older, not including burn or secondhand smoke deaths (Centers for Disease Control and Prevention, 2007). SAMMEC also reported that the smoking-attributable expenditures for Ohio in 1998 totaled \$3,416,000,000 for adults 18 years and older (Centers for Disease Control and Prevention, 2007). This shows the large impact that smoking has on the state of Ohio and can provide rationale for the smoking ban passed by Ohio citizens on November 7, 2006.

Although the passage of the Ohio smokefree law was a success and gave Ohio a grade of an “A” for smokefree air on the State of the Air Report Card other areas related to tobacco in Ohio are lacking. The areas lacking in Ohio are tobacco prevention and control spending, cigarette tax, and youth access. Ohio funds tobacco prevention and control at less than 75% of the recommended minimum level by the CDC, therefore giving Ohio a grade of a “C” in this category. Ohio also receives a grade of a “C” for cigarette tax with tax at \$1.25 per pack of 20 cigarettes. The area in which Ohio needs the most work is in youth access. Ohio was given a grade of an “F” from the American Lung Association for a lack of laws regarding youth access. Another area in which Ohio is struggling in regards to tobacco is the decisions that have been made regarding the Tobacco Master Settlement Agreement. (American Lung Association, 2008)

Tobacco production and control areas are anticipated to lesson with the decisions on the Tobacco Master Settlement Agreement. “Ohio securitized all of its Master

Settlement Agreement monies in 2007, putting future tobacco control program funding in jeopardy” (American Lung Association, 2008, p. 23). With this action, Ohio sold the next 40 years of Master Settlement Agreement (MSA) payments to investors, and therefore as of 2009, there will be no money earmarked for tobacco prevention (American Lung Association, 2008). The Ohio Tobacco Prevention Foundation (OTPF) was originally to be fully funded from MSA payments, however in the next 8-10 years the OTPF will be forced out of existence (American Lung Association, 2008).

### *Smoking Ban Implementation*

Effective December 7, 2006 section 3794 of the Ohio Revised Code (ORC) was implemented, and banned smoking in all public places and places of employment (Ohio Revised Code, 2006). The smoking prohibitions are broken down into five areas under section 3794.02 of the Ohio Revised Code (2006).

- “(A) No proprietor of a public place or place of employment, except as permitted in section 3794.03 of this chapter, shall permit smoking in the public place or place of employment or in the areas directly or indirectly under the control of the proprietor immediately adjacent to locations of ingress or egress to the public place or place of employment.
- (B) A proprietor of a public place or place of employment shall ensure that tobacco smoke does not enter any area in which smoking is prohibited under this chapter through entrances, windows, ventilation systems, or other means.
- (C) No person or employer shall discharge, refuse to hire, or in any manner retaliate against an individual for exercising any right, including reporting a violation, or performing any obligation under this chapter.
- (D) No person shall refuse to immediately discontinue smoking in a public place, place of employment, or establishment, facility or outdoor area declared nonsmoking under section 3794.05 of this chapter when requested to do so by the proprietor or any employee of an employer of the public place, place of employment or establishment, facility or outdoor area.
- (E) Lack of intent to violate a provision of this chapter shall not be a defense to a violation.” (Ohio Revised Code, 2006, p. 2)

The civil penalties for violations of the smoking ban were put into place on May 3, 2007 and can be found in sections 3701-52-08 and 3701-52-09 of the Ohio Administrative Code (2007). Violations to the Ohio smoking ban can be reported by mail, e-mail, or phone to the Ohio Department of Health by citizens. Upon the receipt of a smoking ban violation, the Ohio Department of Health or designee will send a written notice of the violation to the proprietor and an investigation by the Ohio Department of Health or designee will occur (Ohio Administrative Code, 2007). If a proprietor is found to be in violation of the smoking ban, a violation schedule is in place by the Ohio Department of Health and varies depending on which section of the Ohio Revised Code or the Ohio Administrative Code has been violated (Ohio Administrative Code, 2007). The fines range from a written warning to a \$2,500 fine, depending on which section has been violated, and the number of proprietor offenses (Ohio Administrative Code, 2007).

In order to promote the smoking ban, the Ohio Department of Health published facts for employers and business owners. One of the benefits for employers is reduced employee costs due to the fact that without secondhand smoke employers will be healthier (Ohio Department of Health- Q&A, 2007). Healthier employees result in a reduction of employees missing work, less worker's compensation claims, and less cost to insure employees (Ohio Department of Health- Q&A, 2007). The implementation of the smoking ban in Ohio can also reduce operating costs for employers. Businesses that previously allowed smoking will see decreased costs through; no additional ventilation systems, less up-keep such as cleaning and repainting, no burn holes from cigarettes, no purchasing of ashtrays, and less filter changes in the ventilation system (Ohio Department

of Health- Q&A, 2007). A final benefit to Ohio employers is the possibility of decreased or discounted insurance from some companies for being a smoke-free business and workplace (Ohio Department of Health- Q&A, 2007).

### *Conclusion*

Ohio voters passed the Ohio smoking ban and therefore implementation of the Ohio smoking ban occurred with the support of Ohio citizens. The smoking ban has currently been in effect for fifteen months and the civil penalties have been in place for ten months. Now that the Ohio smoking ban as well as civil penalties have been in effect it is time to determine the effects that are being seen by Ohio citizens. Many studies have shown positive implications following implementation of smoking restrictions and this study seeks to identify cigarette sales trends in Ohio since Ohio enforced smoking restrictions in the workplace and all public places. This study uses cigarette sales to determine if a change has been seen among the sales since implementation of the smoking ban. As was seen in research conducted by Bauer et al. (2005), Heloma et al. (2001), and Gilpin et al. (2006) smoking restrictions in the workplace and public places promotes an increase smoking cessation and/or a decrease in daily cigarette consumption. With the use of cigarette sales, the current study will look for a connection between implementation of the smoking ban a change in sales.

Ohio is a diverse state in terms of regional distinction. This study will use a four region classification system including; Appalachian, rural non-Appalachian, metropolitan, and suburban to look at trends among the 88 Ohio counties in relation to their region distinction. Tobacco production is another characteristic that varies among counties

within Ohio. The American Lung Association (2008) reported steps being taken towards smoking restrictions in the traditional tobacco growing states of Tennessee, Virginia, Kentucky, and North Carolina. Although these states have made some strides with smoking restrictions there has been opposition due to the large impact tobacco has on the economy and way of life in these states. The presence of tobacco farms in areas of Ohio will be used in this study to look at differences among the tobacco producing areas and non-tobacco producing areas. The final variable looked at in this study will be violations to the smoking ban to see if there is a connection between the level of smoking ban violations and the change in cigarette sales. This study seeks to look at trends throughout Ohio since implementation of the smoking ban on December 7, 2006.

## Methodology

### *Design*

This study was a descriptive study of emerging trends in cigarette sales change from 2006 to 2007 for the 88 counties in Ohio. The independent variables studied were geographical location, violation level, and tobacco production level.

### *Sample*

This study was able to examine the entire population of all 88 Ohio counties. Cigarette sales for 2006 and 2007 for all 88 counties in Ohio were collected and analyzed for cigarette sales change trends since implementation of the smoking ban. All cigarette sales included in the Claritas report for 2006 and 2007 were included in the analysis.

### *Measurement/Data Collection*

#### *State of Ohio*

Claritas is a marketing information company providing a wide array of data to companies including non-profit organizations.

“Since 1971, Claritas has been the pre-eminent source of accurate, up-to-date demographic data and target marketing research information about the population, consumer behavior, consumer spending, market segments, households and businesses within any specific geographic target market area in the United States” (Claritas, 2008, p. 3).

The Claritas data used in this study was obtained through the Ohio Department of Health for the 2006 aggregate expenditure estimate on cigarettes and the 2007 aggregate expenditure estimate on cigarettes. The 2006 aggregate expenditure estimate was subtracted from the 2007 aggregate expenditure to determine 2006-2007 cigarette sales change for each of the 88 counties in Ohio. The 2006-2007 cigarette sales change was then converted into a 2006-2007 percentage cigarette sales change to standardize the dollar amounts among the counties.

### *Violation Level*

Smoking ban violation data from April 4, 2007 to December 31, 2007 was obtained from Public Health Dayton and Montgomery County through the Ohio Department of Health database in order to evaluate smoking violations for each of the 88 Ohio counties. In order to standardize the results, violations were calculated per 1000 population. This was calculated in Microsoft Excel by taking the total violations for the county divided by the 2006 population estimate and then multiplying by 1000. A total of 21,597 violations of the smoking ban were reported during the nine months. The violations per county ranged from 5 violations per county to 1,835 violations per county. Due to the wide range in the violations per county, a distinction had to be made for high violations versus low violations. There was not a natural break in the violation data so it was decided to use the top 20% of violations per 1000 population for high violations and the bottom 20% of violations per 1000 population for low violations. There are 88 counties in Ohio and 20% of 88 calculated to 17.6 counties. This number was rounded up to 18 for the purposes of using a whole number. Therefore the 18 counties with the

highest amount of violations were considered to have high violations and the 18 counties with the lowest amount of violations were considered to have low violations.

### *Regional Distinction*

The 88 counties that comprise Ohio have varying regional characteristics. Each county can be classified into a regional distinction and this classification varies based on the organization that defines the classification. For this study, the classification system used by the Ohio Job & Family Services was chosen to define the regional distinctions. The 88 counties in Ohio were put into regional classifications by the Ohio Job & Family Services for The Ohio Family Health Survey March 2005. The four regional distinctions include: Appalachian, rural non-Appalachian, metropolitan, and suburban (Ohio Job & Family Services, 2005). Appalachian counties comprise 29 of the 88 counties, rural non-Appalachian account for 30 counties, metropolitan counties comprise 12 of the 88 counties, and the remaining 17 counties are suburban.

### *Tobacco Production*

Tobacco production occurs in 22 of the 88 counties in Ohio. Tobacco production data was obtained from the *Economic and Community Development Grant Application Handbook 2007-2008* provided by the Southern Ohio Agricultural & Community Development Foundation (2007). This document identifies the 22 counties in Ohio which produce tobacco. These counties are also divided into major tobacco producing counties and other tobacco producing counties (Southern Ohio, 2007). The classifications made by the Southern Ohio Agricultural & Community Development

Foundation (2007) identify 9 Ohio counties as major tobacco producing based on the percentage of tobacco farms and 13 tobacco producing counties which are identified as having between 1 and 33 tobacco farms. This study used the classifications from the Southern Ohio Agricultural & Community Development Foundation (2007) and classified the 9 major tobacco producing counties as high tobacco producing, the 13 tobacco producing counties as low tobacco producing, and the remaining 66 counties as non-tobacco producing.

### *Data Analysis*

Cigarette sales change for 2006 to 2007 and percent cigarette sales change for 2006 to 2007 were calculated for the state of Ohio by violation level, regional distinction, and tobacco production. Descriptive statistics were also reported by county for the state of Ohio and the three independent variables using Microsoft Excel to look at trends within the 88 Ohio counties since implementation of the Ohio smoking ban. The sample was the population; thus parameters of mean, median, standard deviation, range, minimum, and maximum were reported. Confidence intervals and other inferential statistics were not reported because there was not a sample.

#### *State of Ohio*

The 2007 cigarette sales for the state of Ohio was subtracted from the 2006 cigarette sales for the state of Ohio to determine the 2006 to 2007 cigarette sales change. This was then converted to a 2006 to 2007 percent cigarette sales change to standardize the data among counties. Descriptive statistics were also calculated using Microsoft

Excel for the state of Ohio. These calculations were used to look at emerging trends for the state of Ohio following implementation of the smoking ban on December 7, 2006.

#### *Violation Level*

A total of 21,597 violations were reported from April 4, 2007 to December 31, 2007. The data was obtained from through Public Health Dayton and Montgomery County from the Ohio Department of Health violation database. The document of violations contained violations beginning April 4, 2007 and ending February 28, 2008. This study only included violations that were reported in 2007 so violations after December 31, 2007 were removed from the total violations. The document also included a violation date and a reporting date for each violation. Inclusion criteria included any violation occurring on or prior to December 31, 2007 even if the violation was not reported until after the ending date established. The violations occurring during the time period but reported after the December 31, 2007 date were included because they occurred in the time frame and the reporting date was not considered to be significant. The violations ranged from 5 per county to 1,835 per county. In order to standardize the results violations were calculated per 1000 population. Therefore the top 20% (18 counties) of county violations were considered to be high violations per 1000 population and the bottom 20% (18 counties) of county violations were considered to be low violations per 1000 population.

The 2007 cigarette sales for high violation counties was subtracted from the 2006 cigarette sales for high violation counties to determine the 2006 to 2007 cigarette sales change for high violation counties. This was then converted to a 2006 to 2007 percent

cigarette sales change for high violation counties to standardize the data among counties. The same process was repeated for low violation counties to determine the 2006 to 2007 cigarette sales change for low violation counties and the 2006 to 2007 percent cigarette sales change for low violation counties. Descriptive statistics were also calculated using Microsoft Excel for high violation counties and low violation counties. These calculations were used to look at emerging trends for the state of Ohio based on violation level following implementation of the smoking ban on December 7, 2006.

### *Regional Distinction*

The 88 counties in Ohio were classified into regional distinctions: Appalachian, rural non-Appalachian, metropolitan, and suburban. These regional distinctions were determined by the Ohio Job & Family Services (2005). Each of the 88 counties in Ohio was assigned a regional distinction and therefore there were not any inclusion or exclusion criteria. Appalachian counties comprised 29 of the 88 counties, rural non-Appalachian accounted for 30 counties, metropolitan counties comprised 12 of the 88 counties, and the remaining 17 counties were suburban.

The 2007 cigarette sales for Appalachian counties was subtracted from the 2006 cigarette sales for Appalachian counties to determine the 2006 to 2007 cigarette sales change for Appalachian counties. This was then converted to a 2006 to 2007 percent cigarette sales change for Appalachian counties to standardize the data among counties. The same process was repeated for rural non-Appalachian counties, metropolitan counties, and suburban counties to determine the 2006 to 2007 cigarette sales change for each regional distinction and the 2006 to 2007 percent cigarette sales change for each

regional distinction. Descriptive statistics were also calculated using Microsoft Excel for each regional distinction. These calculations were used to look at emerging trends for the state of Ohio based on regional distinction following implementation of the smoking ban on December 7, 2006.

### *Tobacco Production*

The Southern Ohio Agricultural & Community Development Foundation (2007) classifies the tobacco producing counties in Ohio as major tobacco producing counties and tobacco producing counties. In this classification 9 counties are considered major tobacco producing and 13 are classified as tobacco producing. The remaining 66 counties in Ohio do not produce tobacco. This study chose to use this classification of tobacco production and consider the major tobacco producing counties to have high tobacco production, the tobacco producing counties to have low tobacco production, and the remaining to have no tobacco production.

The 2007 cigarette sales for high tobacco producing counties was subtracted from the 2006 cigarette sales for high tobacco producing counties to determine the 2006 to 2007 cigarette sales change for high tobacco producing counties. This was then converted to a 2006 to 2007 percent cigarette sales change for high tobacco producing counties to standardize the data among counties. The same process was repeated for low tobacco producing counties and non-tobacco producing counties to determine the 2006 to 2007 cigarette sales change for each tobacco classification and the 2006 to 2007 percent cigarette sales change for each tobacco classification. Descriptive statistics were also calculated using Microsoft Excel for each regional distinction. These calculations were

used to look at emerging trends for the state of Ohio based on tobacco producing following implementation of the smoking ban on December 7, 2006.

## Results

The 88 counties that comprise Ohio were used in this study to look for emerging trends in cigarette sales since the implementation of the smoking ban. Cigarette sales change for 2006-2007, percent cigarette sales change for 2006-2007, and descriptive statistics: mean, median, standard deviation, range, minimum, and maximum were calculated for the state of Ohio and the three independent variables in this study.

### *State of Ohio*

A total of 84 of the 88 counties (95.45%) in Ohio had a cigarette sales decrease. The remaining 4 Ohio counties (4.55%), Delaware, Pickaway, Union, and Warren had a cigarette sales increase. The 2006 cigarette sales for Ohio was \$4,338,772,122 and the 2007 cigarette sales for Ohio was \$4,255,770,078 for a change of -\$83,002,044 from the 2006 cigarette sales to the 2007 cigarette sales. The sales change in dollars was standardized to a percentage and was calculated to be a -1.9% sales change for the state of Ohio. The mean sales change by county was calculated to be \$943,205. The mean percent sales change by county was -1.8%. The minimum sales change for counties in Ohio was -5.2%, the maximum sales change for counties in Ohio was 1.7%, and the range for sales change in Ohio counties was 6.9%. The median sales change by county was -1.9%. The standard deviation was calculated to be 0.010. The results for the state of Ohio can be seen in Table 1 below.

Table 1: Cigarette sales change statistics for the state of Ohio

2006 Cigarette Sales	\$4,338,772,122
2007 Cigarette Sales	\$4,255,770,078
Cigarette Sales Change	-\$83,002,044
Cigarette Sales Percent Change	-1.9%
Counties with Cigarette Sales Decrease	84
Counties with Cigarette Sales Increase	4
Mean Sales Change per County	\$943,205
Mean Percent Sales Change per County	-1.8%
Median	-1.9%
Standard Deviation	0.010
Range	6.9%
Minimum	-5.2%
Maximum	1.7%

### *Violation Level*

Of the 18 counties classified in the high violation per 1000 population category 17 counties had a decrease in cigarette sales change and Pickaway County was the only county that had an increase in cigarette sales change by 0.5%. The 2006 cigarette sales for high violation counties was \$43,131,810 and the 2007 cigarette sales for high violation counties was \$42,298,077 for a change of -\$833,733 from the 2006 cigarette sales to the 2007 cigarette sales. The sales change in dollars was standardized to a percentage and was calculated to be a -1.9% sales change for high violation counties. The minimum sales change for high violation counties was -2.8%, the maximum sales change for high violation counties was 0.5%, and the range for high violation counties was 3.3%. The median sales change for high violation counties was -2.1%. The standard deviation was calculated to be 0.008. The results for the high violation counties can be seen in Table 2 below.

Table 2: Cigarette sales change statistics for high violation per 1000 population counties

<b>County</b>	<b>2006 Cigarette Sales</b>	<b>2007 Cigarette Sales</b>	<b>Sales Change</b>	<b>%Sales Change</b>
Butler	\$129,979,696	\$129,154,804	-\$824,892	-0.6%
Clark	\$57,759,893	\$56,665,908	-\$1,093,985	-1.9%
Coshocton	\$16,414,941	\$16,031,451	-\$383,490	-2.3%
Crawford	\$20,852,343	\$20,405,418	-\$446,925	-2.1%
Defiance	\$16,124,580	\$15,851,480	-\$273,100	-1.7%
Erie	\$32,183,053	\$31,279,402	-\$903,651	-2.8%
Guernsey	\$18,037,209	\$17,606,378	-\$430,831	-2.4%
Highland	\$18,575,909	\$18,222,893	-\$353,016	-1.9%
Huron	\$25,846,137	\$25,351,001	-\$495,136	-1.9%
Jefferson	\$30,182,919	\$29,345,545	-\$837,374	-2.8%
Logan	\$20,631,450	\$20,171,096	-\$460,354	-2.2%
Marion	\$27,032,969	\$26,341,569	-\$691,400	-2.6%
Mercer	\$16,610,001	\$16,415,078	-\$194,923	-1.2%
Montgomery	\$201,100,728	\$195,881,922	-\$5,218,806	-2.6%
Ottawa	\$17,657,929	\$17,356,661	-\$301,268	-1.7%
Pickaway	\$20,548,646	\$20,655,666	\$107,020	+0.5%
Trumbull	\$89,902,500	\$88,122,206	-\$1,780,294	-2.0%
Williams	\$16,931,682	\$16,506,904	-\$424,778	-2.5%
Average:	\$43,131,810	\$42,298,077	-\$833,733	-1.9%

Of the 18 counties classified in the low violation per 1000 population category 16 counties had a decrease in cigarette sales change. Delaware County had cigarette sales increase of 1.4% and Warren County had a cigarette sales increase of 1.6%. The 2006 cigarette sales for low violation counties was \$21,199,495 and the 2007 cigarette sales for low violation counties was \$21,028,608 for a change of -\$170,887 from the 2006 cigarette sales to the 2007 cigarette sales. The sales change in dollars was standardized to a percentage and was calculated to be a -1.7% sales change for low violation counties. The minimum sales change for low violation counties was -5.2%, the maximum sales change for low violation counties was 1.6%, and the range for low violation counties was 6.9%. The median sales change for high violation counties was -1.6%. The standard deviation was calculated to be 0.017. The results for the low violation counties can be seen in Table 3 below.

Table 3: Cigarette sales change statistics for low violation per 1000 population counties

County	2006 Cigarette Sales	2007 Cigarette Sales	Sales Change	% Sales Change
Adams	\$12,793,145	\$12,566,997	-\$226,148	-1.8%
Athens	\$22,363,789	\$21,663,579	-\$700,210	-3.1%
Brown	\$19,251,258	\$18,911,119	-\$340,139	-1.8%
Carroll	\$13,282,064	\$12,848,516	-\$433,548	-3.3%
Clinton	\$17,899,641	\$17,643,348	-\$256,293	-1.4%
Darke	\$23,172,968	\$22,613,869	-\$559,099	-2.4%
Delaware	\$49,046,903	\$49,724,841	\$677,938	+1.4%
Fulton	\$17,574,134	\$17,214,518	-\$359,616	-2.0%
Geauga	\$31,256,382	\$30,805,379	-\$451,003	-1.4%
Harrison	\$7,123,824	\$7,015,960	-\$107,864	-1.5%
Henry	\$12,267,210	\$12,089,049	-\$178,161	-1.5%
Monroe	\$6,702,560	\$6,350,879	-\$351,681	-5.2%
Morrow	\$15,124,203	\$14,774,361	-\$349,842	-2.3%
Noble	\$5,116,722	\$4,998,745	-\$117,977	-2.3%
Paulding	\$8,573,235	\$8,511,350	-\$61,885	-0.7%
Vinton	\$6,108,878	\$6,022,335	-\$86,543	-1.4%
Warren	\$69,375,908	\$70,520,173	\$1,144,265	+1.6%
Wayne	\$44,558,088	\$44,239,920	-\$318,168	-0.7%
Average:	\$21,199,495	\$21,028,608	-\$170,887	-1.7%

### *Regional Distinction*

The regional distinctions were determined based on the classification by Ohio Job & Family Services (2005). There were 29 counties in the Appalachian region and all 29 counties had a cigarette sales decrease from 2006 to 2007. The 2006 cigarette sales for Appalachian counties was \$21,457,508 and the 2007 cigarette sales for Appalachian counties was \$21,042,282 for a change of -\$415,226 from the 2006 cigarette sales to the 2007 cigarette sales. The sales change in dollars was standardized to a percentage and was calculated to be a -2.1% sales change for Appalachian counties. The minimum sales change for Appalachian counties was -5.2%, the maximum sales change for Appalachian counties was -0.4%, and the range for Appalachian counties was 4.8%. The median sales change for Appalachian counties was -1.9%. The standard deviation was calculated to be 0.010. The results for the Appalachian counties can be seen in Table 4 below.

Table 4: Cigarette sales change statistics for Appalachian counties

County	2006 Cigarette Sales	2007 Cigarette Sales	Sales Change	% Sales Change
Adams	\$12,793,145	\$12,566,997	-\$226,148	-1.8%
Athens	\$22,363,789	\$21,663,579	-\$700,210	-3.1%
Belmont	\$29,439,678	\$28,720,687	-\$718,991	-2.4%
Brown	\$19,251,258	\$18,911,119	-\$340,139	-1.8%
Carroll	\$13,282,064	\$12,848,516	-\$433,548	-3.3%
Clermont	\$76,945,757	\$76,398,469	-\$547,288	-0.7%
Columbiana	\$47,379,799	\$46,157,285	-\$1,222,514	-2.6%
Coshocton	\$16,414,941	\$16,031,451	-\$383,490	-2.3%
Gallia	\$13,398,514	\$13,197,295	-\$201,219	-1.5%
Guernsey	\$18,037,209	\$17,606,378	-\$430,831	-2.4%
Harrison	\$7,123,824	\$7,015,960	-\$107,864	-1.5%
Highland	\$18,575,909	\$18,222,893	-\$353,016	-1.9%
Hocking	\$12,851,778	\$12,634,041	-\$217,737	-1.7%
Holmes	\$13,955,657	\$13,751,142	-\$204,515	-1.5%
Jackson	\$14,621,028	\$14,376,562	-\$244,466	-1.7%
Jefferson	\$30,182,919	\$29,345,545	-\$837,374	-2.8%
Lawrence	\$27,797,902	\$27,601,066	-\$196,836	-0.7%
Meigs	\$10,618,351	\$10,418,741	-\$199,610	-1.9%
Monroe	\$6,702,560	\$6,350,879	-\$351,681	-5.2%
Morgan	\$6,598,511	\$6,482,915	-\$115,596	-1.8%
Muskingum	\$35,758,803	\$34,995,372	-\$763,431	-2.1%
Noble	\$5,116,722	\$4,998,745	-\$117,977	-2.3%
Perry	\$15,204,205	\$14,997,337	-\$206,868	-1.4%
Pike	\$12,042,351	\$11,657,057	-\$385,294	-3.2%
Ross	\$30,727,713	\$30,601,397	-\$126,316	-0.4%
Scioto	\$32,258,253	\$31,747,211	-\$511,042	-1.6%
Tuscarawas	\$40,115,299	\$39,140,802	-\$974,497	-2.4%
Vinton	\$6,108,878	\$6,022,335	-\$86,543	-1.4%
Washington	\$26,600,902	\$25,764,396	-\$836,506	-3.1%
Average:	\$21,457,508	\$21,042,282	-\$415,226	-2.1%

A total of 30 counties in Ohio were classified as the rural non-Appalachian regional distinction. Of these 30 counties, 29 had a decrease in cigarette sales change and Warren County was the only county with an increase in cigarette sales change of 1.6%. The 2006 cigarette sales for rural non-Appalachian counties was \$22,383,147 and the 2007 cigarette sales for rural non-Appalachian counties was \$22,058,333 for a change of -\$324,814 from the 2006 cigarette sales to the 2007 cigarette sales. The sales change in dollars was standardized to a percentage and was calculated to be a -1.7% sales change for rural non-Appalachian counties. The minimum sales change for rural non-

Appalachian counties was -3.3%, the maximum sales change for rural non-Appalachian counties was 1.6%, and the range for rural non-Appalachian counties was 4.9%. The median sales change for rural non-Appalachian counties was -1.9%. The standard deviation was calculated to be 0.009. The results for the rural non-Appalachian counties can be seen in Table 5 below.

Table 5: Cigarette sales change statistics for rural non-Appalachian counties

<b>County</b>	<b>2006 Cigarette Sales</b>	<b>2007 Cigarette Sales</b>	<b>Sales Change</b>	<b>% Sales Change</b>
Ashland	\$22,085,621	\$21,631,640	-\$453,981	-2.1%
Ashtabula	\$43,367,003	\$43,002,326	-\$364,677	-0.8%
Champaign	\$17,346,376	\$17,030,542	-\$315,834	-1.8%
Clinton	\$17,899,641	\$17,643,348	-\$256,293	-1.4%
Crawford	\$20,852,343	\$20,405,418	-\$446,925	-2.1%
Darke	\$23,172,968	\$22,613,869	-\$559,099	-2.4%
Defiance	\$16,124,580	\$15,851,480	-\$273,100	-1.7%
Erie	\$32,183,053	\$31,279,402	-\$903,651	-2.8%
Fayette	\$12,293,840	\$12,174,539	-\$119,301	-1.0%
Hancock	\$29,793,142	\$29,104,075	-\$689,067	-2.3%
Hardin	\$13,499,525	\$13,054,182	-\$445,343	-3.3%
Henry	\$12,267,210	\$12,089,049	-\$178,161	-1.5%
Huron	\$25,846,137	\$25,351,001	-\$495,136	-1.9%
Knox	\$23,208,628	\$22,969,363	-\$239,265	-1.0%
Logan	\$20,631,450	\$20,171,096	-\$460,354	-2.2%
Marion	\$27,032,969	\$26,341,569	-\$691,400	-2.6%
Mercer	\$16,610,001	\$16,415,078	-\$194,923	-1.2%
Morrow	\$15,124,203	\$14,774,361	-\$349,842	-2.3%
Ottawa	\$17,657,929	\$17,356,661	-\$301,268	-1.7%
Paulding	\$8,573,235	\$8,511,350	-\$61,885	-0.7%
Preble	\$18,689,843	\$18,372,376	-\$317,467	-1.7%
Putnam	\$13,349,950	\$13,258,090	-\$91,860	-0.7%
Sandusky	\$25,697,367	\$25,114,335	-\$583,032	-2.3%
Seneca	\$24,136,221	\$23,513,105	-\$623,116	-2.6%
Shelby	\$20,266,242	\$20,065,190	-\$201,052	-1.0%
Van Wert	\$12,777,697	\$12,480,276	-\$297,421	-2.3%
Warren	\$69,375,908	\$70,520,173	\$1,144,265	+1.6%
Wayne	\$44,558,088	\$44,239,920	-\$318,168	-0.7%
Williams	\$16,931,682	\$16,506,904	-\$424,778	-2.5%
Wyandot	\$10,141,570	\$9,909,277	-\$232,293	-2.3%
Average:	\$22,383,147	\$22,058,333	-\$324,814	-1.7%

The third regional distinction for the state of Ohio was metropolitan which was comprised of 12 counties. There were no metropolitan counties in Ohio with a cigarette

sales increase; all 12 of these counties had a decrease in cigarette sales change. The 2006 cigarette sales for metropolitan counties was \$187,288,909 and the 2007 cigarette sales for metropolitan counties was \$183,082,114 for a change of -\$4,206,795 from the 2006 cigarette sales to the 2007 cigarette sales. The sales change in dollars was standardized to a percentage and was calculated to be a -2.0% sales change for metropolitan counties. The minimum sales change for metropolitan counties was -2.8%, the maximum sales change for metropolitan counties was -0.63%, and the range for metropolitan counties was 2.1%. The median sales change for metropolitan counties was -2.2%. The standard deviation was calculated to be 0.007. The results for the rural non-Appalachian counties can be seen in Table 6 below.

Table 6: Cigarette sales change statistics for metropolitan counties

<b>County</b>	<b>2006 Cigarette Sales</b>	<b>2007 Cigarette Sales</b>	<b>Sales Change</b>	<b>% Sales Change</b>
Allen	\$41,318,000	\$40,487,218	-\$830,782	-2.0%
Butler	\$129,979,696	\$129,154,804	-\$824,892	-0.6%
Cuyahoga	\$445,797,652	\$433,440,050	-\$12,357,602	-2.8%
Franklin	\$381,714,012	\$372,915,702	-\$8,798,310	-2.3%
Hamilton	\$273,012,078	\$265,432,107	-\$7,579,971	-2.8%
Lorain	\$111,824,632	\$110,724,742	-\$1,099,890	-1.0%
Lucas	\$163,790,137	\$159,600,030	-\$4,190,107	-2.6%
Mahoning	\$92,898,680	\$91,621,794	-\$1,276,886	-1.4%
Montgomery	\$201,100,728	\$195,881,922	-\$5,218,806	-2.6%
Richland	\$51,551,849	\$50,923,828	-\$628,021	-1.2%
Stark	\$152,188,851	\$148,957,257	-\$3,231,594	-2.1%
Summit	\$202,290,592	\$197,845,919	-\$4,444,673	-2.2%
Average:	187,288,909	183,082,114	-\$4,206,795	-2.0%

The final regional distinction in Ohio was suburban which is comprised of 17 counties. Of these 17 suburban counties, 14 had a decrease in cigarette sales change. The remaining 3 counties had an increase in cigarette sales change. Delaware County had an increase of 1.4%, Pickaway County had an increase of 0.5%, and Union County

had an increase of 1.0%. The 2006 cigarette sales for suburban counties was \$46,914,298 and the 2007 cigarette sales for suburban counties was \$46,282,855 for a change of -\$631,443 from the 2006 cigarette sales to the 2007 cigarette sales. The sales change in dollars was standardized to a percentage and was calculated to be a -1.1% sales change for suburban counties. The minimum sales change for suburban counties was -2.2%, the maximum sales change for suburban counties was 1.4%, and the range for suburban counties was 3.5%. The median sales change for suburban counties was -1.4%. The standard deviation was calculated to be 0.011. The results for the suburban counties can be seen in Table 7 below.

Table 7: Cigarette sales change statistics for suburban counties

<b>County</b>	<b>2006 cigarette sales</b>	<b>2007 cigarette sales</b>	<b>Sales Change</b>	<b>% Sales Change</b>
Auglaize	\$19,455,400	\$19,269,519	-\$185,881	-1.0%
Clark	\$57,759,893	\$56,665,908	-\$1,093,985	-1.9%
Delaware	\$49,046,903	\$49,724,841	\$677,938	+1.4%
Fairfield	\$53,616,428	\$53,159,227	-\$457,201	-0.9%
Fulton	\$17,574,134	\$17,214,518	-\$359,616	-2.0%
Geauga	\$31,256,382	\$30,805,379	-\$451,003	-1.4%
Greene	\$53,728,559	\$52,605,911	-\$1,122,648	-2.1%
Lake	\$94,130,808	\$92,394,601	-\$1,736,207	-1.8%
Licking	\$63,417,289	\$62,522,676	-\$894,613	-1.4%
Madison	\$15,731,764	\$15,539,730	-\$192,034	-1.2%
Medina	\$63,720,727	\$62,344,270	-\$1,376,457	-2.2%
Miami	\$42,493,313	\$42,142,298	-\$351,015	-0.8%
Pickaway	\$20,548,646	\$20,655,666	\$107,020	+0.5%
Portage	\$61,233,423	\$59,949,941	-\$1,283,482	-2.1%
Trumbull	\$89,902,500	\$88,122,206	-\$1,780,294	-2.0%
Union	\$17,683,071	\$17,851,343	\$168,272	+1.0%
Wood	\$46,243,834	\$45,840,504	-\$403,330	-0.9%
Average:	\$46,914,298	\$46,282,885	-\$631,443	-1.1%

### *Tobacco Production*

Ohio counties are classified as major tobacco producing counties and tobacco producing counties by The Southern Ohio Agricultural & Community Development

Foundation (2007). In this classification, 9 counties are considered major tobacco producing and are labeled high tobacco production in this study and 13 are classified as tobacco producing and are labeled low tobacco production in this study. The remaining 66 counties in Ohio are considered non-tobacco producing.

All 9 of the high tobacco producing areas had a decrease in cigarette sales change. The 2006 cigarette sales for high tobacco producing counties was \$25,298,235 and the 2007 cigarette sales for high tobacco producing counties was \$24,964,297 for a change of -\$333,938 from the 2006 cigarette sales to the 2007 cigarette sales. The sales change in dollars was standardized to a percentage and was calculated to be a -1.6% sales change for high tobacco producing counties. The minimum sales change for high tobacco producing counties was -3.2%, the maximum sales change for high tobacco producing counties was -0.7%, and the range for high tobacco producing counties was 2.5%. The median sales change for high tobacco producing counties was -1.7%. The standard deviation was calculated to be 0.007. The results for the high tobacco producing counties can be seen in Table 8 below.

Table 8: Cigarette sales change statistics for high tobacco producing counties

<b>County</b>	<b>2006 cigarette sales</b>	<b>2007 cigarette sales</b>	<b>Sales Change</b>	<b>% Sales Change</b>
Adams	\$12,793,145	\$12,566,997	-\$226,148	-1.8%
Brown	\$19,251,258	\$18,911,119	-\$340,139	-1.8%
Clermont	\$76,945,757	\$76,398,469	-\$547,288	-0.7%
Gallia	\$13,398,514	\$13,197,295	-\$201,219	-1.5%
Highland	\$18,575,909	\$18,222,893	-\$353,016	-1.9%
Jackson	\$14,621,028	\$14,376,562	-\$244,466	-1.7%
Lawrence	\$27,797,902	\$27,601,066	-\$196,836	-0.7%
Pike	\$12,042,351	\$11,657,057	-\$385,294	-3.2%
Scioto	\$32,258,253	\$31,747,211	-\$511,042	-1.6%
Average:	\$25,298,235	\$24,964,297	-\$333,938	-1.6%

The low tobacco producing distinction was comprised of 13 counties. A total of 12 of the 13 low tobacco producing counties had a decrease in cigarette sales change. Warren County had an increase in cigarette sales change of 1.6%. The 2006 cigarette sales for low tobacco producing counties was \$36,095,085 and the 2007 cigarette sales for low tobacco producing counties was \$35,471,452 for a change of -\$623,633 from the 2006 cigarette sales to the 2007 cigarette sales. The sales change in dollars was standardized to a percentage and was calculated to be a -1.9% sales change for low tobacco producing counties. The minimum sales change for low tobacco producing counties was -5.2%, the maximum sales change for low tobacco producing counties was 1.6%, and the range for low tobacco producing counties was 6.9%. The median sales change for low tobacco producing counties was -1.9%. The standard deviation was calculated to be 0.016. The results for the low tobacco producing counties can be seen in Table 9 below.

Table 9: Cigarette sales change statistics for low tobacco producing counties

<b>County</b>	<b>2006 cigarette sales</b>	<b>2007 cigarette sales</b>	<b>Sales Change</b>	<b>% Sales Change</b>
Athens	\$22,363,789	\$21,663,579	-\$700,210	-3.1%
Clinton	\$17,899,641	\$17,643,348	-\$256,293	-1.4%
Fayette	\$12,293,840	\$12,174,539	-\$119,301	-1.0%
Greene	\$53,728,559	\$52,605,911	-\$1,122,648	-2.1%
Meigs	\$10,618,351	\$10,418,741	-\$199,610	-1.9%
Monroe	\$6,702,560	\$6,350,879	-\$351,681	-5.2%
Montgomery	\$201,100,728	\$195,881,922	-\$5,218,806	-2.6%
Morgan	\$6,598,511	\$6,482,915	-\$115,596	-1.8%
Noble	\$5,116,722	\$4,998,745	-\$117,977	-2.3%
Ross	\$30,727,713	\$30,601,397	-\$126,316	-0.4%
Vinton	\$6,108,878	\$6,022,335	-\$86,543	-1.4%
Warren	\$69,375,908	\$70,520,173	\$1,144,265	+1.6%
Washington	\$26,600,902	\$25,764,396	-\$836,506	-3.1%
Average:	\$36,095,085	\$35,471,452	-\$623,633	-1.9%

The remaining 66 counties in Ohio were classified as non-tobacco producing. A total of 63 of the non-tobacco producing counties had a decrease in cigarette sales change. The remaining 3 non-tobacco producing counties had an increase in cigarette sales change. Delaware County had an increase of 1.4%, Pickaway County had an increase of 0.5%, and Union County had an increase of 1.0%. The 2006 cigarette sales for non-tobacco producing counties was \$55,179,574 and the 2007 cigarette sales for non-tobacco producing counties was \$54,090,341 for a change of -\$1,089,233 from the 2006 cigarette sales to the 2007 cigarette sales. The sales change in dollars was standardized to a percentage and was calculated to be a -1.7% sales change for non-tobacco producing counties. The minimum sales change for non-tobacco producing counties was -3.3%, the maximum sales change for non-tobacco producing counties was 1.4%, and the range for non-tobacco producing counties was 4.7%. The median sales change for non-tobacco producing counties was -1.9%. The standard deviation was calculated to be 0.009.

## Discussion

### *State of Ohio*

The Ohio smoking ban took effect on December 7, 2006 and the reporting and implementation of violations began on May 3, 2007. This study sought to examine at the emerging trends in cigarette sales since implementation of the Ohio smoking ban. A total of 84 of the 88 counties in Ohio had a decrease in cigarette sales change. The four counties found to have an increase in cigarette sales change were Delaware County, Pickaway County, Union County, and Warren County. The findings from this study reveal that overall the state of Ohio had a 1.9% decrease in cigarette sales from 2006 to 2007. The range for percent cigarette sales change was 6.89% with a minimum percent sales change of -5.2% and maximum percent sales change of 1.7%. Although these results can not prove that the decrease is due to the implementation of the smoking ban, they do raise speculation towards a possible connection between the implementation of the smoking ban and cigarette sales in Ohio. The decrease in cigarette sales seen from 2006 to 2007 for Ohio could have a connection to the implementation of the smoking ban.

### *Violation Level*

From April 4, 2007 to December 31, 2007 there were a total of 21,597 violations to the smoking ban reported for the state of Ohio. The top 20% of the 88 Ohio counties were classified as high smoking violation level per 1000 population and the bottom 20% of the 88 Ohio counties were classified as low smoking violation level per 1000 population. The top 20% and bottom 20% was used because there was not a natural break in the data. Violations were reported per 1000 population in order to standardize

the data and account for variations in population per county. The mean percent sales change for high smoking violation level per 1000 population counties was -1.9% compared to -1.7% mean percent sales change for low smoking violation level per 1000 population counties. These findings show that there is no practical difference in the results; however it is still a positive finding to have decreases in mean percent sales change for both violation levels. The results show that violations reported within a county may not have a strong connection to smoking rates among residents.

### *Regional Distinction*

This study also sought to look at trends among the 88 counties in Ohio with regard to cigarette sales change from 2006 to 2007. The four geographical locations identified for Ohio were Appalachian, rural non-Appalachian, suburban, and metropolitan. All four regional distinctions were found to have a decrease in mean percentage sales change. The Appalachian region had a mean percentage sales change of -2.1%, which was the largest change among the four regional distinctions. The Appalachian region was closely followed by the metropolitan region which had a mean percentage sales change of -2.0%; therefore no practical difference was seen between these two regions. The rural non-Appalachian region had a mean percentage sales change of -1.7% and the suburban region had the least mean percentage sales change of -1.1%. The results differed from what was hypothesized because it was expected that the Appalachian and rural non-Appalachian regions would have the least amount of mean percentage sales change due to the thought that tobacco and tobacco production are more prominent in these areas. It was surprising that the Appalachian region had the largest amount of mean percentage

sales change since 17 of the 22 tobacco producing counties in Ohio are classified as Appalachian regions. It is possible that since the Appalachian region contains the majority of tobacco producing counties that when the smoking ban was implemented the Appalachian region was affected more due to a larger amount of smokers in the region. The suburban region had the least amount of mean percentage sales change which could possibly be due to the fact that it contained 3 of the 4 counties in Ohio that had an increase in cigarette sales change. Although the suburban region still had a decrease in mean percentage sales change the 3 counties with an increase in cigarette sales from 2006 to 2007 could have led to it being the region with the least amount of mean percentage sales decrease.

### *Tobacco Production*

The final variable examined in this study was tobacco production level. The three distinctions for tobacco production were high tobacco producing, low tobacco producing, and non-tobacco producing. The low tobacco producing counties had the largest mean percent sales change of -1.9%. The low tobacco producing counties were closely followed by the non-tobacco producing counties with a -1.7% mean sales change of and high tobacco producing counties with a mean percent sales change of -1.6%. The results of this variable were different than expected with the low tobacco producing counties having the largest mean percent sales change. It would be expected that the non-tobacco producing counties would have the highest amount of mean percent sales change because tobacco is not a driving force of the economy in these counties and it would be thought that there would be less smokers in these counties. High tobacco producing counties had

the least amount of mean percent sales which was expected since tobacco is the way of life in these counties and a driving force of the economy for these Ohio counties, therefore possibly having more smokers in these counties. Although these results were not what was expected all three of the tobacco production distinctions have similar mean percentage sales change therefore showing that tobacco production did not have much bearing of cigarette sales change.

### *Suggestions for Future Research*

This study provides the first step in research and evaluation of the smoking ban in Ohio. Future research is needed to evaluate the effectiveness of the Ohio smoking ban. Another study would be necessary once the smoking ban and penalties for violations have been in effect for a longer amount of time. Another study could possibly show the success or failure of the smoking ban once a longer amount of time has passed and more data is available on cigarette sales. Another study could look for a connection between the smoking ban and smoking behavior. In order to study smoking behavior, cessation rates for adults in Ohio in the years prior to and the years following implementation of the smoking ban could be examined. Smoking cessation rates could provide insight to the effectiveness of the smoking ban on the population of smokers in Ohio. The evaluation of restaurant and bar sales could also be looked at to see the effect that the smoking ban and the restriction of smoking in restaurants has had on revenue. It is often times thought that restricting smoking in restaurants and bars has a negative effect on revenue and many establishment owners are advocates against the implementation of a smoking ban. A study that examines the revenue of restaurants and bars would settle the

debate as to whether the implementation of a smoking ban has a negative, positive, or no effect of revenue. A survey study could also be conducted in order to determine the view and support of the smoking ban by the Ohio population. A survey study could provide insight into the effectiveness of the smoking ban and the attitudes of the Ohio population since its implementation. The suggestions for further research would provide more conclusions and insight on the effect that the smoking ban has had on Ohio businesses as well as the citizens of Ohio.

### *Connections to Previous Research*

Previous research has shown that when a smoking ban is enforced there are increased rates of cessation and/or people decrease their cigarette consumption (Longo et al., 2001; Bauer et al., 2005). The results of the current study support the research by Longo et al. (2001) and Bauer et al. (2005) because the current study showed a mean percentage cigarette sales change of -1.9% for the state of Ohio. This mean percentage cigarette sales change would support the idea that after a smoking ban is enforced cessation rates increase and/or cigarette consumption by individuals is decreased.

Traditional tobacco-growing states have been lagging behind other states when it comes to the passage of smoking ban legislation. Previous studies have shown that traditional tobacco-growing areas are beginning to discuss and pass legislation on smoking restrictions (American Lung Association, 2008; Wilson et al., 2004). There is not much research on the success of smoking legislation in traditional tobacco-growing states and the current study provides some insight into the effects that smoking legislation could have on traditional tobacco-growing states. Although Ohio is not a traditional

tobacco-growing state 22 out of 88 counties in Ohio produce tobacco. This study found that the mean percentage cigarette sales change for high tobacco producing counties, low tobacco producing counties, and non-tobacco producing counties were similar and the low tobacco producing counties had the largest decrease in mean percentage cigarette sales change with a value of -1.9%. The current research conducted has similar findings to previous research related to smoking restrictions and provides support for the implementation of smoking legislation across the nation.

### *Conclusions*

This study sought to provide descriptive statistics for the state of Ohio in relation to the first year implementation of the Ohio smoking ban. Although the results can not draw concrete connections between cigarette sales change and the smoking ban this study does provide some insight into what has occurred in Ohio with cigarette sales since the implementation of the smoking ban and enforcement of violations. Cigarette sales in Ohio decreased in 95.45% of Ohio counties (84 of 88). Delaware, Pickaway, Union, and Warren counties had increases in mean cigarette sales change from 2006 to 2007. The four counties with increase mean cigarette sales change do not all fall into any of the same independent variable categories. Three of the counties are in the suburban distinction, two are in the low violation category, and three are in the non-tobacco producing category. Cigarette sales for the state of Ohio as a whole decreased from 2006 to 2007 by a total of \$83,002,044 which is a -1.9% mean percentage cigarette sales change. This decrease in cigarette sales change provides support for the implementation of the smoking ban in Ohio in relation to a decrease in cigarette sales.

The violation levels studied in the current research did not show much variation in mean cigarette sales change between low violation counties and high violation counties, however low violation counties had a lower amount of mean cigarette sales change and could therefore be the focus of higher rates of smoking cessation education and intervention. The tobacco production levels studied did not show much variation in mean cigarette sales change between high tobacco production counties, low tobacco production counties, and non-tobacco producing counties, however high tobacco producing areas and non-tobacco producing areas had lower amounts of mean cigarette sales change. Therefore high tobacco producing areas and non-tobacco producing areas could be the focus of higher rates of smoking cessation education and intervention. Differences were seen in mean cigarette sales change for the different regional distinctions. The Appalachian region had a -2.1% mean cigarette sales change and the metropolitan region had a -2.0% mean cigarette sales change. These two regions had similar amounts of mean cigarette sales change however the rural non-Appalachian region and suburban region had lower amounts of mean cigarette sales change. The rural non-Appalachian region had a mean percentage cigarette sales change of -1.7% and the suburban region had a mean percentage cigarette sales change of -1.1% and could therefore be the focus of higher rates of smoking cessation education and intervention to bring the mean percentage cigarette sales change values closer to those of the other regional distinctions in Ohio. This study provides support for the Ohio smoking ban and the positive impact it has had on the Ohio population. This study also shows the areas in Ohio which efforts can be focused to increase awareness of the negative effects of smoking and secondhand

smoke along with the hope of increasing cessation rates and/or decreasing cigarette consumption in these areas to comparable levels of the other regions in Ohio.

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## Appendix A: IRB Approval Letter



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Dayton, OH 45435-0001  
(937) 775-2425  
(937) 775-3781 (FAX)  
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**DATE:** March 21, 2008

**TO:** Megan Luse, PI, Grad. Student  
Community Health  
Marietta A Langlois, Ph.D., Faculty Advisor  
Community Health

**FROM:** B. Laurel Elder, Ph.D., Chair  
WSU Institutional Review Board 

**SUBJECT:** SC# 3624  
*'Trends in Ohio During First Year Implementation of the Smoking Ban'*

At the recommendation of the Screening Committee, your study referenced above has been recommended for exemption. Please note that any change in the protocol must be approved by the IRB; otherwise approval is terminated.

This action will be referred to the Full Institutional Review Board for ratification at their next scheduled meeting.

**NOTE:** This approval will automatically terminate one (1) year after the above date unless you submit a "continuing review" request (see [http://www.wright.edu/rsp/IRB/CR\\_sc.doc](http://www.wright.edu/rsp/IRB/CR_sc.doc)) to RSP.

If you have any questions or require additional information, please call me at 775-2425.

Thank you!

Enclosure

RESEARCH INVOLVING HUMAN SUBJECTS

SC# 3624

ACTION OF THE WRIGHT STATE UNIVERSITY  
SCREENING COMMITTEE  
Assurance Number: FWA00002427

Title: 'Trends in Ohio During First Year Implementation of the Smoking Ban'

Principal Investigator: Megan Luse, PI, Grad. Student  
Community Health  
Marietta A Langlois, Ph.D., Faculty Advisor  
Community Health

The Institutional Review Board Screening Committee Coordinator has approved an exemption with regard to the use of human subjects on this proposed project.

REMINDER: Federal regulations require prompt reporting to the IRB of any changes in research activity [changes in approved research during the approval period may not be initiated without IRB review (submission of an amendment), except where necessary to eliminate apparent immediate hazards to subjects] and prompt reporting of any serious or on-going problems, including unanticipated adverse reactions to biologicals, drugs, radioisotope labeled drugs or medical devices.

NOTE: This approval has been assigned an "SC" number in our system, which means the WSU Screening Committee concurs that this protocol is exempt under federal regulations.

B Laurel Elden Ph.D.

Signed \_\_\_\_\_ Chair, WSU-IRB  
Approval Date: March 21, 2008  
IRB Mtg. Date: April 21, 2008

## Appendix B: Public Health Competencies

### Domain #1 Analytic Assessment Skills

- Defines a problem
- Determines appropriate uses and limitations of both quantitative and qualitative data
- Selects and defines variables relevant to defined public health problems
- Identifies relevant and appropriate data and information sources
- Evaluates the integrity and comparability of data and identifies gaps in data sources
- Applies ethical principles to the collection, maintenance, use, and dissemination of data and information
- Makes relevant inferences from quantitative and qualitative data
- Applies data collection processes, information technology applications, and computer systems storage/retrieval strategies
- Recognizes how the data illuminates ethical, political, scientific, economic, and overall public health issues

### Domain #2: Policy Development/Program Planning Skills

- Collects, summarizes, and interprets information relevant to an issue
- Identifies, interprets, and implements public health laws, regulations, and policies related to specific programs

Domain #3: Communication Skills

- Communicates effectively both in writing and orally, or in other ways
- Solicits input from individuals and organizations
- Advocates for public health programs and resources
- Effectively presents accurate demographic, statistical, programmatic, and scientific information for professional and lay audiences

Domain #5: Community Dimensions of Practice Skills

- Establishes and maintains linkages with key stakeholders

Domain #6: Basic Public Health Sciences Skills

- Defines, assesses, and understands the health status of populations, determinants of health and illness, factors contributing to health promotion and disease prevention, and factors influencing the use of health services
- Identifies and applies basic research methods used in public health
- Applies the basic public health sciences including behavioral and social sciences, biostatistics, epidemiology, environmental public health, and prevention of chronic and infectious diseases and injuries
- Identifies and retrieves current and relevant scientific evidence
- Identifies the limitations of research and the importance of observations and interrelationships