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Assessing the Health Effects of Burn Ban Policy Implementation: Evidence from Texas Counties

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Abstract

I exploit county-level variation in burn ban policies to estimate the effect of burn bans on respiratory disease mortality rates in Texas counties from 2008 to 2020. Using a fixed effects regression model that controls for year and county fixed effects, as well as drought index, firefighting resources, and aging population, I find that burn bans decrease respiratory disease mortality rates by 7 people per 100,000 in the year when the policy is implemented and reduced mortality rates, due to burn ban implementation, persist over a 3-year period. This result is statistically significant (p-value <.05) and provides a novel contribution to an area largely overlooked in previous literature. While previous studies have mainly focused on the economic and environmental effects of burn bans, this research specifically investigates the health outcomes associated with county-level burn bans. Additionally, this study provides evidence of the persistence of the benefits of county-level burn bans over a 3-year period. This contribution to the literature sheds light on the sustained benefits of implementing and enforcing burn bans, which has not been previously explored in prior research.

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I. Introduction

Every year, wildfires devastate vast areas of land and threaten the lives and health of millions of people worldwide. In addition to the immediate dangers of flames and smoke, these fires can have long-term effects on public health, including increased mortality rates due to respiratory diseases. In response, many governments and local authorities have implemented policies aimed at reducing the frequency and severity of wildfires, including burn bans that restrict outdoor burning activities during times of high fire risk. Although economic literature supports burn ban policies as a preventive measure, no studies have quantified the health effects of county-level burn ban policy implementation on respiratory related mortality.

In this paper, I examine the effectiveness of burn bans in reducing mortality rates from wildfire pollution by quantifying the change in mortality rates associated with a change in burn ban policy implementation per year. Additionally, unlike prior literature on this topic, I analyze the long-term health effects of burn ban policies to better understand the mechanisms by which these policies impact mortality rates. By examining a comprehensive dataset that includes information on burn bans, drought, firefighting resources, aging population, and mortality rates, I hope to provide a more nuanced understanding of the effectiveness of burn bans in reducing the negative health impacts of wildfire pollution. This research has important implications for policymakers who are seeking to mitigate the negative

impacts of wildfires on public health, particularly in regions that are particularly susceptible to wildfires due to their geography or climate. Ultimately, my goal is to contribute to a more evidence-based and effective approach to wildfire management that considers the complex interplay between environmental factors, public health, and policy.

Burn bans are a set of regulations imposed by local governments and fire departments that restrict or prohibit outdoor burning in certain areas during specific periods of time.[1] The aim of burn bans is to reduce the risk of wildfires that can cause significant damage to homes, property, and wildlife. Burn bans typically prohibit burning of yard waste, trash, and other materials, as well as the use of fireworks and other open flames.

The implementation of burn bans is influenced by a range of factors, including weather conditions, the availability of firefighting resources, and the level of risk posed by wildfire in a particular area. Burn bans are most commonly implemented during periods of high fire danger, which are often associated with hot, dry weather and low humidity. In addition, burn bans may be implemented in areas that are particularly vulnerable to wildfire, such as forested or rural areas.

[1] Brooks, D.B. *Guide to Texas Laws for County Officials*; Texas Association of Counties: Austin, TX, USA, 2018.

Burn bans can be implemented in various ways, depending on local regulations and the severity of the wildfire risk. In some cases, burn bans may be implemented at the state or regional level, covering a broad area. Other times, burn bans may be implemented at the county or city level, targeting specific areas with high wildfire risk. The regulations may also differ in terms of the specific types of burning that are prohibited, as well as the penalties for violating the burn ban.

When burn bans are implemented, they are typically communicated through a variety of channels, including local news media, social media, and emergency alert systems. In addition, signs may be posted in public areas to alert residents and visitors to the burn ban regulations. Violating a burn ban can result in fines, penalties, or even criminal charges, depending on the severity of the offense and the local regulations in place.

I exploit county-level variation in burn ban policy implementation in Texas to estimate the policy effects on respiratory related mortality rates. To overcome suppressed county-data and account for variability in the number of times a burn ban is implemented and lifted for a county, I construct a burn ban variable that denotes the proportion of days in a year i where a burn ban was in effect for county j. I use a fixed effects model to estimate the effects of respiratory related mortality, while controlling for year and county fixed effects, firefighting resources, drought, and aging population.

I find that the implementation of burn ban policies is associated with a statistically significant decrease in respiratory mortality rates, with a coefficient of -7.13 ($p < 0.05$) in the same year, -6.50 ($p < 0.05$) when using a 1-year lag, -10.06 ($p < 0.01$) when using a 2-year lag, and -8.65 ($p < 0.05$) when using a 3-year lag. Additional lag-years are not statistically significant. These results imply that a 1 percentage point increase in the burn ban variable, or roughly a 4 day increase in the duration of a burn ban, equates to 7 less deaths per 100,000 in the year when the policy is implemented, 7 less deaths with a 1-year lag, 10 less deaths with a 2-year lag, and 8 less deaths with a 3-year lag. Consistent results between a fixed-effects and random-effects model highlight the robustness of the analysis.

This study makes a significant contribution to the existing literature on burn bans and their effectiveness in reducing air pollution and associated health outcomes. While prior research has already established that burn bans can have a positive impact on public health, the current study takes this a step further by quantifying the actual decrease in mortality rates per 100,000 individuals associated with burn ban policy implementation. This quantitative analysis provides a more precise and nuanced understanding of the potential benefits of burn bans as a preventive measure. Additionally, this study also contributes to the literature on burn bans by providing evidence of the persistence of their benefits over time. Specifically, the study finds that lagged mortality rates are lower for up to three years following the implementation

of burn bans, suggesting that these policies can have sustained positive effects on public health outcomes. This finding is particularly significant as it highlights the potential for burn bans to not only provide short-term benefits but also to promote long-term improvements in public health.

The rest of the paper proceeds as follows: Section II provides a review of the relevant literature on the relationship between burn bans and respiratory-related mortality. Section III details the data sources and variables used in the empirical analysis. Section IV outlines the empirical strategy, including the fixed-effects models utilized to estimate the causal effects of burn bans on respiratory mortality. Section V presents the results of the analysis, including the estimated effects of burn bans on respiratory mortality. Section VI provides a summary of the findings and discusses their implications. Finally, Section VII lists the references used throughout the paper, and Section VIII provides an appendix with Texas county court documents and additional information.

II. Literature

While studies have examined the effects of wildfires and smoke exposure on respiratory health, there is currently no research available that specifically investigates the impact of burn ban policies on respiratory health outcomes in the United States, especially at the county level. Given the prevalence of respiratory diseases such as chronic obstructive pulmonary disease (COPD), asthma, and

pneumonia in the United States, it is crucial to understand the risk factors associated with these conditions. As a leading cause of death, respiratory diseases are frequently linked to air pollution exposure. In this context, outdoor burning has emerged as a key contributor to poor air quality and adverse respiratory health outcomes. Therefore, a deeper understanding of the impact of burn ban policies on respiratory health outcomes could have significant public health implications.

Epidemiology of Respiratory Disease

Respiratory diseases are a leading cause of death worldwide and are often linked to air pollution exposure. In the United States, COPD, asthma, and pneumonia are the three most common respiratory diseases that result in mortality. COPD, a chronic inflammatory lung disease, is the third leading cause of death in the U.S., with an estimated 16 million Americans diagnosed with the disease. Asthma, a chronic respiratory disease that affects the airways, affects over 25 million Americans. Pneumonia, an infection of the lungs, is responsible for over 50,000 deaths annually in the U.S. [2] Understanding the risk factors associated with respiratory diseases, including outdoor burning, is crucial for reducing mortality rates.

Effect of Wildfires on Respiratory Health

Wildfires have been identified as having significant impacts on respiratory health and mortality. The smoke generated by wildfires is a

[2] Center for Disease Control (CDC)

complex mixture of particles and gases, and exposure to this smoke can lead to serious negative effects on the respiratory system. Multiple research studies have highlighted the association between exposure to wildfire smoke and an increased risk of respiratory diseases, hospitalizations, and mortality.

For instance, Reid et al. (2016) have noted that the smoke from wildfires may contain fine particulate matter PM 2.5 and other pollutants, which can penetrate deep into the lungs and cause respiratory symptoms. Additionally, exposure to this smoke can exacerbate asthma and increase the risk of hospital admissions. Liu et al. (2017) have similarly found that exposure to wildfire-specific PM 2.5 is associated with an increased risk of hospital admissions for respiratory diseases, such as asthma, COPD, and pneumonia. This association was observed in both urban and rural areas, indicating that the impact of wildfire smoke on respiratory health is not limited to certain regions.

In addition to the significant impact on respiratory health, exposure to wildfire smoke has broader negative effects on public health. Haikerwal et al. (2015) found that elevated levels of PM 2.5 during wildfires were associated with higher rates of cardiovascular hospitalizations and mortality, including respiratory mortality. Moreover, the adverse respiratory health effects of wildfires have been further supported by studies such as Finlay et al. (2012) and Hutchinson et al. (2018), which reported associations between wildfire smoke exposure and respiratory symptoms, hospitalizations, and mortality.

Furthermore, Kondo et al. (2019) identified certain populations that were more susceptible to respiratory outcomes from wildfire smoke, highlighting the need for targeted interventions to mitigate the impact of wildfires on public health.

Effect of Burn Bans

Although there is limited literature on the health effects associated with burn bans and no papers specifically exploring the effects of county-level burn ban policies in the U.S. on health outcomes, there have been some examples of successful burn bans implemented in other countries and at the local level in the U.S. For instance, Yang's (2020) research found that enforcing a biomass burning ban in China in 2018 resulted in significant reductions in PM2.5 concentrations. Specifically, the ban caused PM2.5 concentrations to decrease by 67.10%, 53.23%, and 10.06% in the Heilongjiang, Jilin, and Liaoning provinces, respectively. The ban also effectively lowered region-wide PM2.5 concentrations by 48.1% during the post-harvest season by reducing fire emissions. Similarly, Van Kley (2003) conducted a cost-benefit analysis of banning leaf burning in Cedar Falls, Iowa. His analysis factored in the costs associated with asthma, property damage, and business disruptions, and concluded that a burn ban would be beneficial.

Literature Contribution

This study examines the effectiveness of burn bans in reducing air pollution and associated health risks, specifically respiratory-related health outcomes, at the county level. To the best of my knowledge, no prior studies have investigated the impact of burn bans on county-level mortality rates. My results provide novel evidence on the effectiveness of implementing and enforcing burn bans as a preventive measure against the health risks associated with wildfire smoke exposure. My findings add to the literature on the positive impact of burn bans on respiratory-related health outcomes by demonstrating their effectiveness at the county level. Specifically, I find that burn ban implementation results in a reduction of 7 deaths from respiratory-related causes in the same year, highlighting the potential benefits of burn bans as a public health intervention.

Moreover, my study also contributes novel evidence on the long-term effects of burn bans. Using a lagged analysis, I found that burn bans continue to be significant in preventing mortality for up to three years. This contribution to the literature sheds light on the sustained benefits of implementing and enforcing burn bans, which has not been previously explored in prior research. My results emphasize the importance of maintaining burn bans as a preventive measure against the adverse health effects of wildfire smoke exposure, not only in the short term but also in the long term.

III. Data

Data Access

In order to conduct the empirical analysis, data was gathered from various sources. In addition to the mortality rates per 100,000 data obtained from the Center of Disease Control (CDC) Wonder, I also requested information on burn ban dates through the Texas A&M Forest Service Open Records portal. This data provided detailed information on the dates of burn ban implementation in Texas counties, as well as the duration of each ban's effect. The dataset covers the period from 2008 to 2020, allowing me to study the long-term impact of burn ban policies on respiratory mortality rates.

To further understand the environmental factors that may affect respiratory mortality rates, drought index data was also acquired from Texas A&M Forest Service's Keetch-Byram Drought Index (KBDI), which was calculated using data from West Gulf River Forecast Center, National Weather Service, and PRISM climate group. This data is available for each Texas county and covers the same time period as the other datasets.

In addition to environmental factors, this paper also includes data on fire station locations and the percentage of county residents aged 65 and older. The former was aggregated from the Texas Department of Insurance's Fire Department FDID list for each Texas county from 2008-2020. This data helps us understand the accessibility of fire prevention and emergency response

services in each county. The latter data was collected from the U.S. Census Bureau and is important because older adults are at a higher risk for respiratory illnesses.

By utilizing these multiple datasets, the model is able to control for a range of factors that may affect respiratory mortality rates and isolate the impact of burn ban policies. The empirical analysis, detailed in Section IV, presents a fixed effects model to analyze this impact and provide insight into the effectiveness of burn bans as a preventive measure.

Data Construction

Since the CDC adheres to guidelines to protect the privacy of individuals in small geographic areas, accessing mortality data at the county-level by month can be problematic as mortality rates less than 10 are suppressed. Therefore, a more granular interpretation of the data is not feasible. To circumvent this suppression issue, mortality data is aggregated by year. I aggregate the number of days in which there is a burn ban policy in place by county and construct a ban proportion that is the number of burn days where the policy is in effect over 365.

Furthermore, it's essential to note that the mortality data obtained from the CDC isn't standardized or adjusted for population differences across different counties. As such, to account for these population differences, the number of deaths in a year is divided by the county's population and then

multiplied by 100,000 to calculate the population-adjusted mortality rate. By doing so, this paper can make fairer comparisons across different counties with different population sizes.

Descriptive Statistics

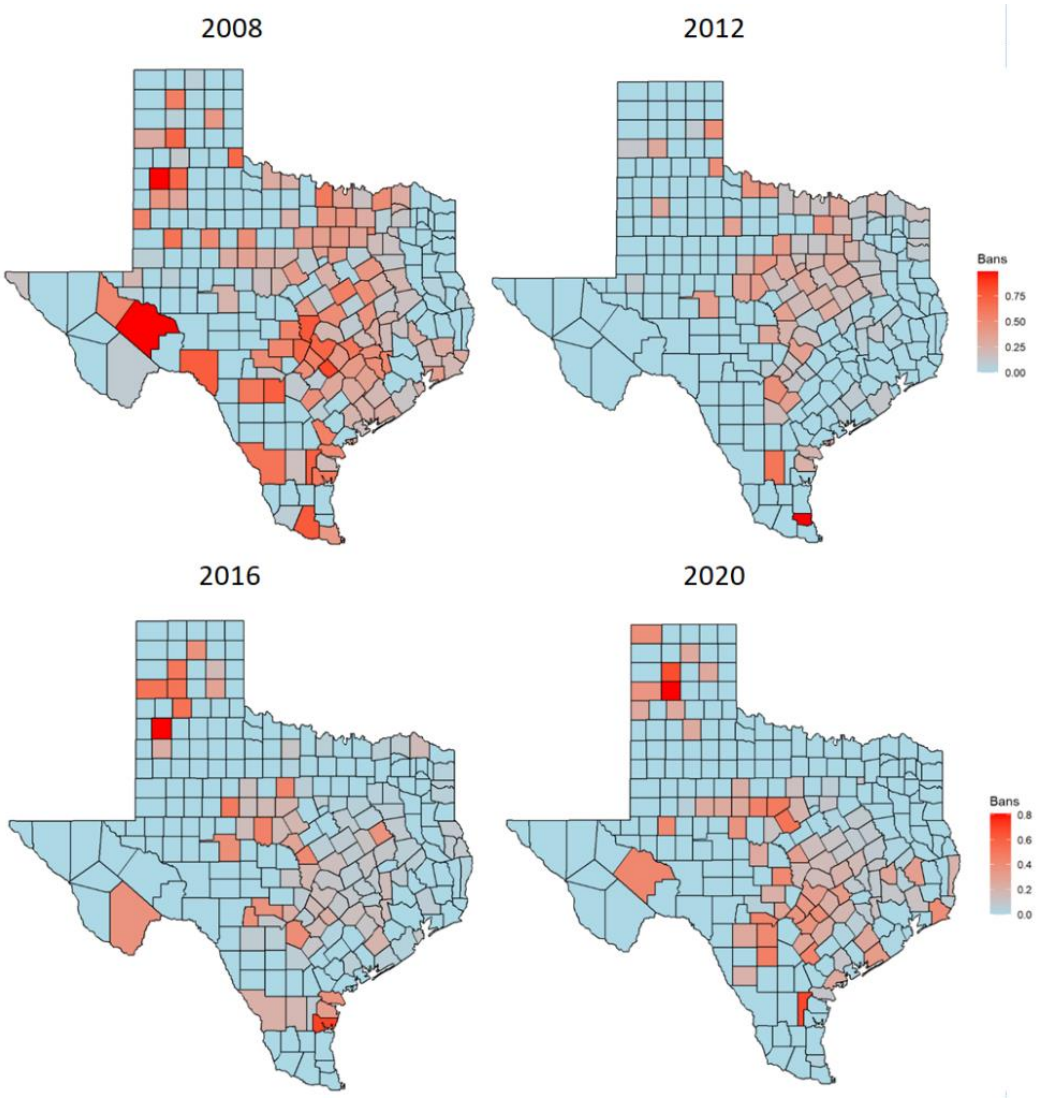
Table 1: Data Summary Statistics

Data	Description	Min	Median	Mean	Max
Mortality Rates	Mortality Rates per 100,000 by respiratory disease	40.22	94.49	94.80	151.12
Bans	Proportion of Bans in a year: (Number of days burn ban policy is in effect/365)	0.0	0.09	0.18	1.0
Drought Index	Drought index ranges from 0 – 800 indicating the level of moisture depletion in the soil.	0.0	265.0	276.3	722.0
Fire stations	Number of fire stations	1.0	9.0	9.2	33.0
Age 65	Percent age 65 and older	0.09	0.17	0.21	0.37

The heat map in Figure 1 depicts the proportion of days with burn bans implemented across Texas for four different years: 2008, 2012, 2016, and 2020. The heat map shows that burn bans were implemented most frequently in the central and southeastern regions of Texas, with some areas having burn bans in place for the entire year. The western regions of Texas had fewer burn bans implemented, with some areas having no burn bans in place at all. These patterns suggest that there may be geographic variation in the implementation and effectiveness of burn ban policies across Texas. To further

investigate this variation, a sample of Texas counties in varying locations were selected in the empirical analysis section. The goal of the sampling is to determine if there are any discernible patterns in the reasons why counties choose to implement burn bans and to take these factors into account when constructing the empirical model.

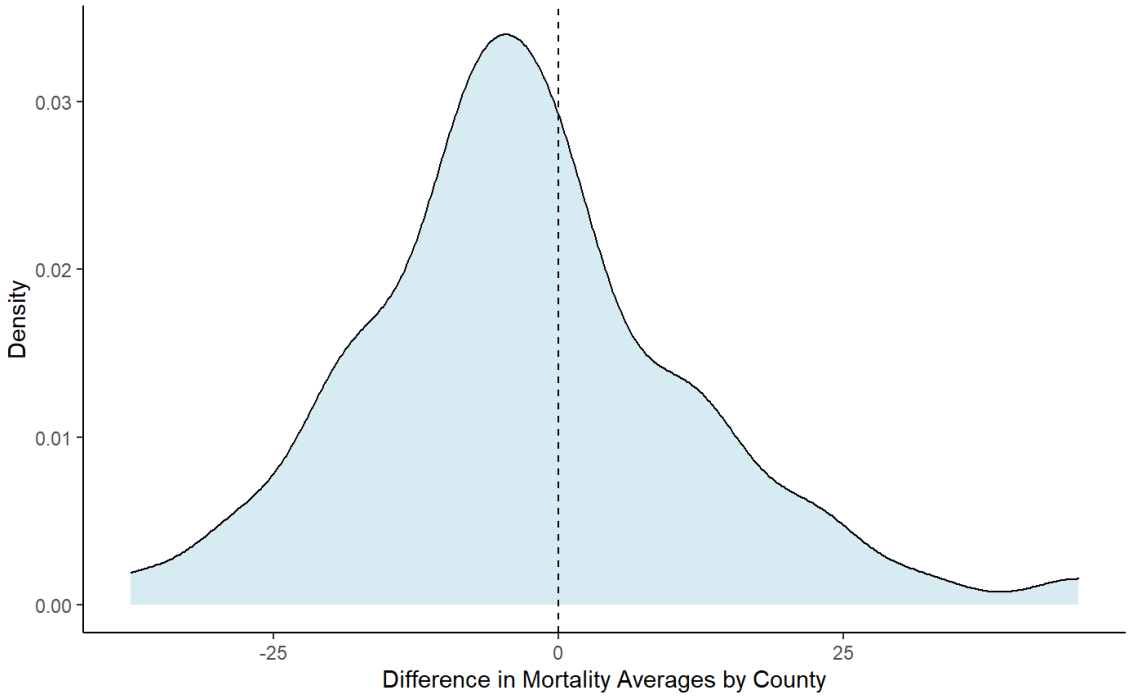
Figure 1: Burn Ban Policy as Proportion of Year by Texas Counties in 2008, 2012, 2016, 2020



To investigate the relationship between burn bans and respiratory mortality rates in Texas, the difference in average crude mortality rates[3] was calculated for each county when a burn ban was in place compared to when it was not. In this case, if a burn ban was implemented for more than half of the days in a year, then that county would be treated as having a burning ban in effect for that year. The results were plotted in a density plot, which showed a clear skew towards negative values, indicating that on average, respiratory mortality rates were lower in counties when a burn ban was implemented. Specifically, the peak of the density plot was located at approximately -4.52, which means that the average crude mortality rate was about 4.52 per 100,000 people lower when a burn ban was in effect. Furthermore, the plot also revealed that the distribution of differences was relatively wide, with some counties showing much larger differences than others. These larger differences may indicate the presence of spatial heterogeneity. For instance, counties grouped in certain regions throughout Texas may respond to Burn Ban implementation differently; therefore, the presence of regional heterogeneity is also analyzed in the empirical analysis section.

[3] Crude mortality is calculated as the number of deaths per 100,000 people.

Figure 2: Density of Differences in County-Level Mortality Averages with and without Burn Bans in Place



IV. Empirical Analysis

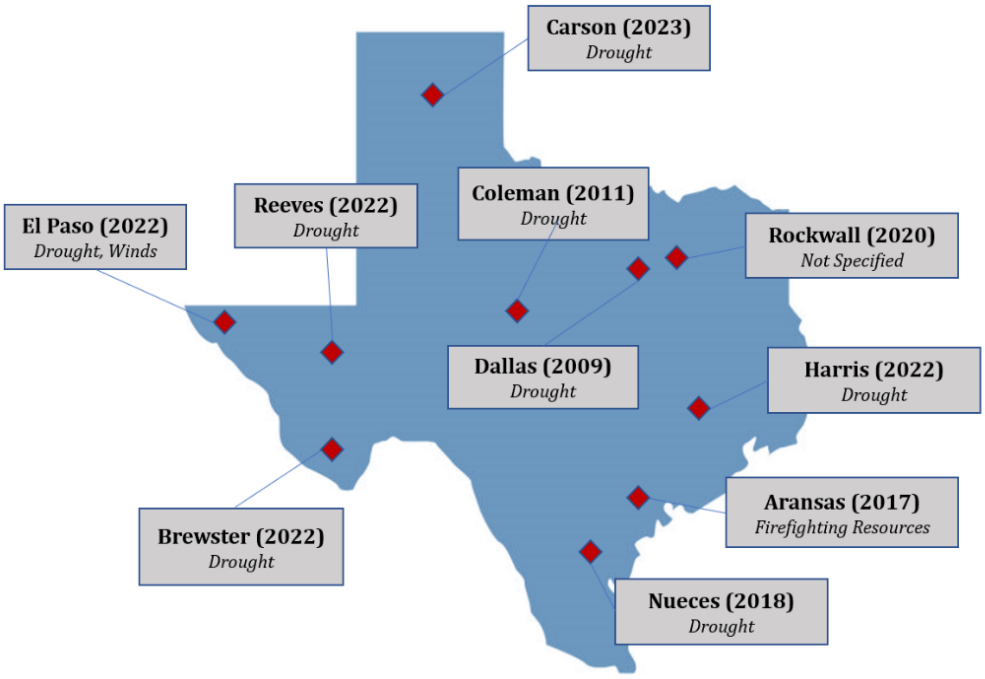
Burn Ban Policy Implementation Methodology

Burn ban implementation is not random. A commissioner's court meets to decide if current weather conditions warrant the implementation of a burn ban in a county. The decision is typically based on weather condition data, as well as input from fire departments, forest resource officials, and other stakeholders. A sample of court documents[4] for different counties (with

[4] Commissioner Court documents provided in Appendix.

differing issue years, population size, geographic location, etc.) are analyzed to understand the factors that drive burn ban policy implementation.

Figure 3: *Texas Counties Sampled for Commissioner Court Orders Regarding Burn Ban Policy Implementation: Aransas, Brewster, Carson, Coleman, Dallas, Harris, Nueces, Reeves, Rockwall*



Source: TX County Court Orders

Commissioner Court documents for the sampled counties in Texas shown in Figure 3 highlight three important observations.

1. The drought level is a factor in a county's decision to implement a burn ban as dry conditions increase the risk of wildfires. Therefore, it's important to control the drought index in the analysis to make sure that

any observed effects of the burn ban on mortality rates are not confounded by drought conditions.

2. A county may implement a burn ban as a precautionary measure if their current resources are maxed out and risks of fire would further deplete their manpower. Therefore, it is important to control firefighting resources in the analysis to make sure that any observed effects of the burn ban on mortality rates are not confounded by firefighting resources.

Through these controls, we can better isolate the impact of burn bans on respiratory disease mortality rates.

3. Burns bans can be implemented even when there is not the risk of drought or unkind environmental conditions, in other words, burn bans can be implemented year-round, which begs the question: what are the reasons why burn ban policies are not implemented as a default policy?

Burn Bans Costs

There could be several reasons why burn bans are not implemented as a default policy. One major reason is the cost associated with implementing and enforcing burn bans. This can be especially challenging for smaller municipalities or counties with limited resources. A cost-benefit analysis should be carefully considered before implementing a burn ban to ensure that

the benefits of the ban outweigh the costs. In some cases, alternative measures may be more cost-effective and feasible.

Another factor that may prevent the implementation of burn bans is political resistance. Burn bans can be a contentious issue, particularly if they affect stakeholders who rely on burning for their livelihood or cultural practices. This can result in political pressure to avoid implementing burn bans, even if they would improve air quality and public health. In some cases, public education and outreach efforts may help to address concerns and build support for burn bans.

Environmental factors may also limit the effectiveness of burn bans in certain situations. For example, if air quality is already poor due to other environmental factors such as wildfires or pollution from other sources, implementing a burn ban may not significantly improve air quality. In these cases, alternative measures such as reducing emissions from other sources may be more effective at improving air quality.

Finally, enforcement issues can also pose a challenge to the implementation of burn bans. Even if a burn ban is implemented, enforcing it can be difficult. Violators may be difficult to identify and penalize, and there may not be enough resources available to enforce the ban effectively. This can lead to a lack of compliance with burn bans, which undermines their effectiveness in improving air quality and public health. Therefore, it is

important to consider enforcement strategies and available resources before implementing a burn ban.

Some industries or communities that may oppose burn bans include those that rely heavily on outdoor burning or use of fire for their operations, such as farmers or ranchers who use burning for land management, or industries that rely on logging or wood processing. Additionally, some communities may oppose burn bans due to concerns about economic impacts, particularly in areas where outdoor recreation is a major source of tourism or where fire-dependent ecosystems are important. Finally, there may be political opposition to burn bans from individuals or groups who view them as an infringement on personal freedoms or property rights.

In this paper, I will not provide a cost-benefit analysis for Texas counties implementing burn bans, rather I will attempt to quantify the health benefits (and thus avoidance of societal costs) of burn ban policies by measuring the decrease, both short and long term, in deaths per 100,000 due to respiratory disease for individuals residing in Texas counties.

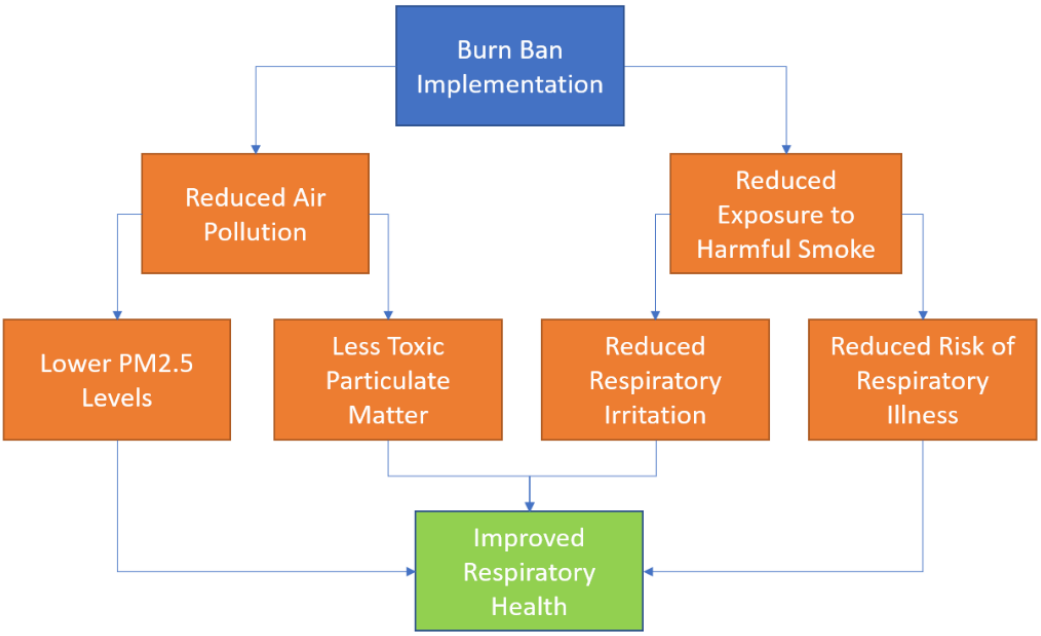
Hypothesis & Theory

The flowchart in Figure 4 illustrates the hypothesis that the implementation of a burn ban policy can lead to reduced respiratory-related mortality rates. The hypothesis is based on the understanding that burn bans are implemented to restrict open burning, which is a significant source of air

pollutants, including fine particulate matter PM2.5. PM2.5 is a harmful air pollutant that is known to increase the risk of respiratory and cardiovascular diseases. Therefore, the restriction of open burning through the implementation of a burn ban policy can lead to a reduction in PM2.5 concentrations in the air.

The first level of the flowchart in Figure 4 shows the implementation of a burn ban policy. Once a burn ban policy is implemented, it restricts open burning in a specific area, such as a county or state. The restriction of open burning leads to a decrease in the amount of smoke and other air pollutants released into the air, which results in a decrease in PM2.5 concentrations. The second level shows how the reduction in PM2.5 concentrations can lead to a decrease in respiratory-related mortality rates. The decrease in PM2.5 concentrations can result in improved air quality, which can reduce the risk of respiratory and cardiovascular diseases. In particular, the flowchart suggests that the reduction in PM2.5 concentrations can lead to a decrease in respiratory-related mortality rates because respiratory conditions, such as asthma and chronic obstructive pulmonary disease are strongly associated with exposure to PM2.5.

Figure 4: Potential Impact of Burn Bans on Health



Empirical Model

This paper utilizes a fixed effects model to account for county-level heterogeneity that is constant over time. By controlling for county-level fixed effects, I am able to capture the underlying differences between counties that may affect mortality rates, such as differences in socioeconomic status, demographic characteristics, and environmental factors. This allows the analysis to focus on the effect of the burn ban policy itself, while controlling for the underlying differences that may affect both the policy and the outcome.

Fixed Effects Regression

I estimate the effect of burn bans on respiratory mortality using a fixed effects model with the following estimating equation:

$$y_{it} = \alpha_i + \gamma_t + \beta_1 bans_{i,t-n} + \beta_2 drought_{i,t-n} + \beta_3 firestations_{i,t-n} + \beta_4 age_{it} + \epsilon_{it}$$

where y_{it} is the number of deaths per 100,000 due to respiratory conditions. α_i is the county fixed effects, controlling for time-invariant factors. γ_t is the year fixed effects, controlling for time trends across all counties. $bans_{i,t-n}$ is the proportion of days in a year t that had a burn ban policy in effect for county i with a lag of n years. $drought_{i,t-n}$ is the drought index in county i and year t with a lag of n years. $firestations_{i,t-n}$ is the number of fire stations in county i and year t with a lag of n years. age_{it} is the percentage of population over 65 years old in county i and year t. ϵ_{it} is the error term. The number of fire stations serves as a proxy for the availability of firefighting resources within a county, while age serves as a proxy for individuals who are at a higher risk of mortality from respiratory disease.

V. Results

Table 2: Fixed Effects Model Regression Results[5]

Variable	No-Lag	1-Year Lag	2-Year Lag	3-Year Lag
Bans	-7.13 *	-6.50 *	-10.06 **	-8.65 *
	(2.996)	(3.117)	(3.628)	(3.953)
Drought	-0.02 ***	-0.02 ***	-0.01 *	-0.01 **
	(0.004)	(0.004)	(0.005)	(0.005)
Age 65 Plus	269.93 ***	254.53 ***	250.69 ***	251.96 ***
	(13.629)	(14.181)	(15.361)	(16.532)
Firestation	-0.50 ****	-0.47 ***	-0.45 ***	-0.37 **
	(0.115)	(0.117)	(0.126)	(0.133)
Significance Codes: *** (p<0.001), ** (p<0.01), * (p<0.05)				

The results of my fixed-effects model, which are presented in Table 2 suggest that the implementation of burn ban policies is associated with a statistically significant decrease in respiratory mortality rates, with a coefficient of -7.13 ($p < 0.05$), -6.50 ($p < 0.05$) when using a 1-year lag, -10.06 ($p < 0.01$) when using a 2-year lag, and -8.65 ($p < 0.05$) when using a 3-year lag. Additional lag-years are not statistically significant.

[5] Standard errors are presented in parentheses in Table 2.

Table 3: Random Effects Model Regression Results[6]

Variable	No-Lag	1-Year Lag	2-Year Lag	3-Year Lag
Bans	-6.16 *	-5.00 *	-8.54 **	-6.43
	(2.642)	(3.336)	(3.257)	(3.676)
Drought	-0.02 ***	-0.01 ***	-0.01 **	-0.01
	(0.003)	(0.004)	(0.003)	(0.004)
Age 65 Plus	267.58 ***	253.64 ***	249.11 ***	251.65 ***
	(13.647)	(14.173)	(15.365)	(16.580)
Firestation	-0.47 ****	-0.45 ***	-0.43 ***	-0.32 *
	(0.114)	(0.117)	(0.124)	(0.132)
Significance Codes: *** (p<0.001), ** (p<0.01), * (p<0.05)				

I provide results using a random-effects model in Table 3 to ensure robustness. The results of the random effects model suggests that the implementation of burn ban policies is associated with a statistically significant decrease in respiratory mortality rates, with a coefficient of -6.15 ($p < 0.05$), -5.00 ($p < 0.05$) when using a 1-year lag, -8.53 ($p < 0.01$) when using a 2-year lag. The random effects model does not find a 3-year lag or additional lag-years statistically significant.

The results from the fixed effects model imply that a 1% increase in the burn ban variable equates to 7 less deaths per 100,000 in the year when the policy is implemented, 7 less deaths per 100,000 with a 1-year lag, 10 less deaths per 100,000 with a 2-year lag, and 8 less deaths per 100,000 with a 3-

[6] Standard errors are presented in parentheses in Table 3.

year lag. Fairly consistent results between the fixed-effects and random-effects model highlights the robustness of the overall analysis, yet also signifies that the effects of the 3-year lag may not be as robust due to differing statistical significance between the fixed effects and random effects models.

Spatial Heterogeneity

To test regional heterogeneity, counties are grouped into four regions: West, Southeast, North, and Central. These regions were defined based on the natural geography of Texas and their location relative to major urban centers. The West region includes counties located in the western and northwestern parts of Texas, while the Southeast region includes counties located along the Gulf Coast and Coastal Plains regions. The North region includes counties located in the northern part of Texas, while the Central region includes counties closer to the central part of Texas. By grouping countries into these regions, I can test how burn ban policy effects may differ with different socio-economic and environmental characteristics found in different parts of Texas.

I account for differences in regions by including a region-burn interaction term in my fixed effects model and present the results in Table 3. After including a region-ban interaction term in my fixed effects model, I did not observe any significant interactions. However, the coefficient for bans became more negative in this model, implying that when accounting for regional variations, the impact of burn bans on mortality rates may be more pronounced.

Table 4: Fixed Effects Model with Regional Interaction Results[7]

Variable	No-Lag	1-Year Lag	2-Year Lag
Bans	-12.82 **	-10.06 *	-11.96 *
	(4.538)	(4.689)	(5.364)
Drought	0.00	0.00	0.01
	(0.005)	(0.005)	(0.005)
Age 65 Plus	312.15 ***	304.57 ***	306.66 ***
	(14.388)	(14.979)	(16.307)
Firestation	-0.49 ***	-0.44 ***	-0.39 **
	(0.125)	(0.127)	(0.135)
Bans: Southeast	1.11	-6.29	0.55
	(7.019)	(7.165)	(9.073)
Bans: North	14.49	12.97	17.75
	(7.847)	(8.027)	(10.032)
Bans: Central	7.93	4.58	-0.70
	(7.121)	(7.642)	(8.957)
Bans: West	10.98	5.43	-3.56
	(8.962)	(9.051)	(10.296)
Significance Codes: *** (p<0.001), ** (p<0.01), * (p<0.05)			

Discussion

The finding that the implementation of burn ban policies is associated with a statistically significant decrease in respiratory mortality rates is noteworthy and provides evidence for the effectiveness of these policies in

[7] Standard errors are presented in parentheses in Table 4.

reducing health risks associated with poor air quality. The coefficients obtained using different lag periods suggest that the effect of burn bans on mortality rates may persist for up to 3 years after implementation, which highlights the importance of sustained implementation and enforcement of these policies.

The observed lag in the effects of burn bans on respiratory mortality rates could potentially be explained by the long-lasting effects of exposure to wildfire smoke. Orr et al. (2020) found that lung function decreased significantly one year after a wildfire event and remained decreased two years post-exposure. These findings suggest that the effects of smoke exposure can persist for several years, potentially contributing to the observed lag in our results. Given that burn bans are implemented in response to elevated air pollution levels, it is possible that the benefits of these policies take time to manifest in respiratory health outcomes.

It is also important to note that the statistical significance of the coefficients decreases with longer lag periods, which may indicate that the impact of burn bans on mortality rates is attenuated over time. Nevertheless, the fact that the coefficients remain negative and significant for up to 3 years after implementation suggests that burn bans are a promising tool for improving public health outcomes.

Furthermore, the analysis of region-specific effects on the relationship between burn bans and respiratory mortality rates using a fixed-effects model

with a region-ban interaction term produced a more negative coefficient for bans, suggesting that the effect of burn bans on mortality rates may be greater when controlling for regional differences. Although no region-ban interactions were found to be significant, the inclusion of this interaction term provides a more nuanced understanding of the impact of burn bans on respiratory mortality rates and highlights the importance of considering regional differences in the implementation of burn bans.

Overall, the findings of this study provide compelling evidence for the effectiveness of burn ban policies in reducing respiratory mortality rates and quantify one aspect of its health benefits. Further research could examine the cost-effectiveness of these policies relative to other interventions aimed at reducing wildfire pollution.

VI. Conclusion

This study highlights the importance of burn bans in mitigating the adverse health effects of wildfires. The findings indicate that burn bans can reduce respiratory mortality and its effects persist over a period (3 years). It is crucial to note that climate change has led to an increase in wildfires, making the implementation of precautionary measures such as burn bans even more vital. As wildfires continue to pose a significant threat to public health, policymakers should prioritize the adoption of proactive strategies to prevent and control wildfires, including the promotion of burn bans as part of a

wildfire management program. Failure to act decisively in this regard may lead to an increase in respiratory mortality rates.

While this study provides valuable insights into the impact of burn bans on respiratory mortality rates, there are several limitations that should be considered. One of the primary limitations of this study is related to the way in which the mortality data was aggregated. The CDC suppresses mortality data for small populations or low counts (<10 deaths) to protect individual privacy, which can result in incomplete data. To overcome this issue, data was aggregated by county and year, which inevitably led to a loss of temporal granularity at a more detailed level, such as monthly data. As a result, this limitation may have affected the precision of the analysis and the ability to capture temporal patterns and changes over shorter time periods.

Another limitation of this analysis is that it only considers the impact of burn bans on respiratory-related mortality rates. While this is an important outcome, it does not provide a comprehensive picture of the health effects of burn bans. Future research could explore the impact of burn bans on other health outcomes. In addition, while the fixed effects model used in this study helps control for confounding variables at the county level, there may still be unmeasured factors that could impact the relationship between burn bans and respiratory mortality rates. Therefore, the results of this study should be interpreted as a complement to additional literature on this topic.

Finally, although this study focuses on burn bans in Texas, which may limit the generalizability of the findings to other regions or states with geographic differences, the use of county-level variation is a significant attribute of this study. By using this approach, this paper provides more precise comparisons than may be the case when comparing across states that are more different.,

VII. References

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VIII. Appendix

County of Nueces

COMMISSIONERS COURT ORDER
(Outdoor Burn Prohibition in Unincorporated Areas – May 10, 2018)

WHEREAS, the Texas Local Government Code authorizes the Commissioners Court to adopt an order restricting outdoor burning during drought conditions; and,

WHEREAS, the Texas A&M Forest Service (formerly Texas Forest Service) has determined that drought conditions exist in Nueces County; and,

WHEREAS, the Commissioners Court has determined that circumstances present in the unincorporated portions of the County create a public safety hazard that would be exacerbated by outdoor burning; and,

WHEREAS, Section 352.081 of the Texas Local Government Code provides that such an order lasts for a maximum period of up to 90 days or until a determination by the Texas A&M Forest Service that drought conditions no longer exist.

NOW, THEREFORE, BE IT ORDERED, by the Commissioners Court of Nueces County, that all outdoor burning is banned in the unincorporated area of the county for 90 days from the date of the adoption of this Order, unless the restrictions are terminated earlier based on a determination made by the Texas A&M Forest Service or this Court. This Order is adopted pursuant to Section 352.081 of the Texas Local Government Code, and other applicable statutes. This Order does not prohibit burning activities related to public health and safety that are authorized by the Texas Commission on Environmental Quality (formerly Texas Natural Resource Conservation Commission) for (1) firefighter training; (2) public utility, natural gas pipeline or mining operations; or, (3) planting or harvesting of agricultural crops, or, burns that are conducted by a prescribed burn manager, in accordance with the Natural Resources Code, or burns that are conducted by the members of a prescribed burn organization under conditions and standards set out in the Natural Resources Code. In accordance with Section 352.081(h), a violation of this Order is a Class C Misdemeanor.

DULY ADOPTED BY VOTE OF THE COMMISSIONERS COURT OF NUECES COUNTY, TEXAS, ON THIS THE 10th DAY OF MAY, 2018.

SAMUEL L. NEAL, JR.
Nueces County Judge

CAROLYN VAUGHN
Commissioner, Precinct 1

JOE A. GONZALEZ
Commissioner, Precinct 2

THE STATE OF TEXAS §
§
COUNTY OF ARANSAS §

COMMISSIONERS' COURT

SUPPLEMENTAL PROCLAMATION ORDER #PO-21-2018-A

AN ORDER OF ARANSAS COUNTY, TEXAS, SUPPLEMENTING ARANSAS COUNTY'S PROCLAMATION DISASTER DECLARATION RENEWAL ORDER #PO-21-2018 AND PROHIBITING OUTDOOR BURNING AND THE SALE AND POSSESSION OF ANY AND ALL FIREWORKS IN ARANSAS COUNTY

WHEREAS, on the 23rd day of August 2017, Aransas County suffered widespread and severe damage and loss of property resulting from Hurricane Harvey, and, pursuant to *Section 418.108 of the Texas Government Code*, a local, county, and federal declaration of disaster was enacted for Aransas County; and

WHEREAS, said local declaration of disaster has been continually renewed for Aransas County, and a current **Proclamation Disaster Declaration Renewal Order** (#PO-21-2018) dated May 23, 2018 has been filed with the County Clerk; and

WHEREAS, as Aransas County has been and remains under a local Disaster Declaration, the Aransas County Judge has determined that a **Supplemental Declaration Order** is necessary to protect the citizens and property in Aransas County from the risk of fire due to greatly enhanced circumstances present in the unincorporated areas of the County that would be exacerbated by the use of outdoor burning and fireworks when local resources continue to be overwhelmed.

NOW, THEREFORE, IT IS HEREBY ORDERED by the County Judge of Aransas County, that all outdoor burning is prohibited in the unincorporated areas of the County for **90 days from the date of adoption of this Order**, unless the restrictions are terminated earlier based on a determination made by the Commissioners' Court through its County Judge or the Declaration of Disaster is lifted and that the high hazard fire conditions no longer exist. This **Order** is adopted pursuant to *Texas Government Code §418.108* and *Local Government Code §352.081*, and other applicable statutes. This **Order** does not prohibit outdoor burning activities related to public health and safety that are authorized by the Texas Natural Resources Commission for: (1) firefighter training; (2) public utility, natural gas pipeline or mining operations; (3) planting or harvesting of agricultural crops; or (4) burns that are conducted by a prescribed burn manager, in accordance with the *Natural Resources Code*. In accordance with *Local Government Code §352.081(h)*, a violation of this **Order** is a Class C Misdemeanor.

NOW, THEREFORE, ALSO BE IT ORDERED BY THE COUNTY JUDGE OF ARANSAS COUNTY, TEXAS, pursuant to *Texas Government Code §418.108* and local ***Proclamation Disaster Declaration Renewal Order*** of Aransas County, that no person may sell, purchase, detonate, ignite or in any way use fireworks of any kind whatsoever, including "permissible fireworks" as classified in *Occupations Code, Section 2154.003(a)* in any portion of the unincorporated areas of Aransas County. This Order does not prohibit a "licensed pyrotechnic operator or professional public display permit holder". **This restriction shall expire 60 hours from the date of the adoption of this Order, unless extended by the Governor of the State of Texas.**

DULY ORDERED AND ADOPTED ON THIS THE 23RD DAY OF MAY, 2018.

C.H. "BURT" MILLS, JR., County Judge

FILED
AT 4:42 P. M.
MAY 23 2018
VALERIE K. AMASON
COUNTY CLERK, ARANSAS CO., TEXAS

COURT ORDER

23

ORDER NO. 2009 0647

DATE: April 7, 2009

STATE OF TEXAS §

COUNTY OF DALLAS §

BE IT REMEMBERED, at a regular meeting of the Commissioners Court of Dallas County, Texas, held on the 7th day of April, 2009, on motion made by Kenneth A. Mayfield, Commissioner of District No. 4, and seconded by John Wiley Price, Commissioner of District No. 3 the following order was adopted:

WHEREAS, On March 03, 2009, the Dallas County Commissioners Court was briefed and approved Court Order 2009-0433, which placed into affect a 90 day outdoor burn ban as allowed by State Law; and

WHEREAS, a review of the Texas Forest Service Fire Risk Levels and Keetch-Bryam Drought Index has shown that drought conditions have greatly decreased in Dallas County to a non-critical level; and

WHEREAS, Chapter 352 of the Texas Local Government Code allows for a county commissioners court to issue an order banning open outdoor burning for a period not to extend beyond the ninetieth (90^{th}) day after the date the order is adopted; and

WHEREAS, Chapter 352 further states that the order expires upon the completion of the 90^{th} day after the order is adopted, or a determination is made that drought conditions no longer exist; and

WHEREAS, on this date, April 07, 2009, the Dallas County Fire Marshal has indicated that drought conditions no longer exist, and recommends that the outdoor burn ban be lifted, and further recommends that the Dallas County Commissioners Court resend Court Order 2009-0433; and

WHEREAS, this order is consistent with the Dallas County Strategic Plan, Vision 3: Dallas County is safe, secure, and prepaired.

IT IS THEREFORE ORDERED, ADJUDGED AND DECREED by the Dallas County Commissioners Court that Court Order 2009-0433 be rescinded and the outdoor burn ban be lifted for all unincorporated areas of Dallas County, Texas,.

DONE IN OPEN COURT this the 7 th day of April, 2009

Jim Foster, County Judge

Maurine Dickey, Comm. Dist. #1

John Wiley Price, Comm. Dist. #3

Mike Cantrell, Comm. Dist. #2

Kenneth A. Mayfield, Comm. Dist. #4

Recommended By:

Bob Grant – Dallas County Fire Marshal

COMM. COURT ITEM NO

APR 12 2022

STATE OF TEXAS § § COUNTY OF Reeves - § REEVES COUNTY

ORDER [PROHIBITING OR RESTRICTING] OUTDOOR BURNING

[WHEREAS, the Texas Forest Service has determined that drought conditions exist within the county;] OR

[WHEREAS, the Commissioners Court finds that circumstances present in all or part of the unincorporated area of the county create a public safety hazard that would be exacerbated by outdoor burning;]

IT IS HEREBY ORDERED by the Commissioners Court of Reeves County that [outdoor burning of is [Restricted] or [Prohibited] in [the unincorporated area of the county for 90 days from the date of adoption of this Order, unless the restrictions are terminated earlier based on a determination made by: (1) the Texas Forest Service that drought conditions no longer exist; or (2) the Commissioners Court [or the Emergency Management Coordinator or County Fire Marshal] based on a determination that the circumstances that required the Order no longer exist.

This Order is adopted pursuant to Local Government Code §352.081, and other applicable statutes. This Order does not prohibit outdoor burning activities related to public health and safety that are authorized by the Texas Commission on Environmental Quality for: (1) firefighter training: (2) public utility, natural gas pipeline or mining operations; (3) planting or harvesting of agricultural crops; or, (4) burns that are conducted by a prescribed burn manager certified under Natural Resources Code §153.048 and meet the standards of Natural Resources Code §153.047.

In accordance with Local Government Code §352.081(h), a violation of this Order is a Class C misdemeanor, punishable by a fine not to exceed $500.00.

ADOPTED this 12th day of April, 2022 by a vote of 4 ayes and ~~0~~ nays.

Attest: Dianne D Flores by Elisa Valdez

Leo Hung COUNTY JUDGE

PROHIBITION OF OUTDOOR BURNING
IN THE UNINCORPORATED AREAS OF EL PASO COUNTY

WHEREAS, El Paso County is under threat of damage, injury, or loss of life or property resulting from the threat of wildfires due to recurring dry grass conditions and gusty winds; and,

WHEREAS, the El Paso County Commissioners Court finds that the conditions persist in all of the unincorporated areas of El Paso County, Texas and these conditions create a public safety hazard that would be exacerbated by outdoor burning; and,

WHEREAS, the El Paso County Commissioners Court is acting under the authority codified at Section 352.081 of the Texas Local Government Code in adopting the following Commissioners Court Order.

BE IT THEREFORE ORDERED that all outdoor burning is prohibited in the unincorporated areas of El Paso County, Texas, excepting activities specifically authorized by and for which a permit has been obtained from the Texas Commission on Environmental Quality for firefighter training, public utility, natural gas pipeline, or mining operations, planting or harvesting of agriculture crops, and prescribed burn management pursuant to Section 352.081(f) of the Texas Local Government Code, and excepting agricultural burning authorized by and for which a permit has been obtained from the appropriate agency as required by law; and,

IT IS FURTHER ORDERED that a violation of this Order are defined and punishable as described in Section 352.081(h) of the Texas Local Government Code as a Class C Misdemeanor; and,

IT IS LASTLY ORDERED that this order shall be effective on the 25th day of May, 2022 and shall continue for a period of 90 days until repealed or expired in accordance with state law.

ADOPTED AND ORDERED on the 16th day of May, 2022 by the El Paso County Commissioners Court.

ATTEST:

County Clerk Delia Briones

THE COUNTY OF EL PASO, TEXAS

County Judge Ricardo A. Samaniego

COUNTY OF ROCKWALL §
§
STATE OF TEXAS §

ORDER RESTRICTING OUTDOOR BURNING

WHEREAS, Section 352.081 of the Texas Local Government Code provides that the commissioners court of a county, by order, may prohibit or restrict outdoor burning in the unincorporated area of the county if the commissioners court makes a finding that circumstances present in the unincorporated area create a public safety hazard that would be exacerbated by outdoor burning; and,

WHEREAS, the Rockwall County Commissioners Court does hereby find that the circumstances present in the unincorporated areas of Rockwall County create a public safety hazard that would be exacerbated by outdoor burning; and

NOW BE IT THEREFORE ORDERED that the following regulations are hereby established for the unincorporated areas of Rockwall County, Texas:

1. Except as herein provided, all outdoor burning is banned in the unincorporated area of the County for 90 days from the date the original order was adopted.

2. Enforcement:
   (a) Under notification of suspected outdoor burning, the fire department assigned to the location of the fire shall respond to the scene and take immediate measures to contain and extinguish the fire.
   (b) If requested by a fire official, a commissioned peace officer shall be sent to the scene to investigate the nature of the fire.
   (c) In accordance with Section 352.081 of the Local Government Code, a person who knowingly or intentionally violates this order commits a Class C misdemeanor, punishable by a fine up to $500 and a peace officer may issue a citation for such violation named: VIOLATION OF BURN BAN ORDER.

3. This Order does not prohibit outdoor burning activities related to public health and safety that are authorized by the Texas Commission on Environmental Quality for (a) firefighter training; (b) public utility, natural gas pipeline or mining operations; or (c) planting or harvesting of agricultural crops.

4. This order does not prohibit prescribed burns conducted by a prescribed burn manager certified under Section 153.048 of the Texas Natural Resources Code, and meets the standards set forth in Section 153.047 of the Texas Natural Resources Code.

5. All or part of this order may be rescinded at any time by the County Judge.

This Order prohibiting outdoor burning shall remain in effect for a period of 90 days and shall expire at the end of the said period or upon the date the Rockwall County Commissioners Court or County Judge determines that the circumstances present in the unincorporated areas of Rockwall County no longer create a public safety hazard that would be exacerbated by outdoor burning, whichever occurs earlier.

STATE OF TEXAS
COUNTY OF **CARSON**

ORDER RESTRICTING OUTDOOR BURNING

WHEREAS, the Texas Forest Service has determined that drought conditions exist within the county;
AND
WHEREAS, the Commissioners Court has determined that circumstance present in all or part of the unincorporated area of the county create a public safety hazard the would be exacerbated by outdoor burning;

IT IS HEREBY ORDERED by the Commissioners Court of Carson County that all outdoor burning in the unincorporated area of the county for 90 days from the date of adoption of this Order, unless the restrictions are terminated earlier based on a determination made by the Texas Forest Service or this Court. This order is adopted pursuant to Local Government Code §352.081, or other applicable statues. This Order does not prohibit outdoor burning activities related to public health and safety that are authorized by the Texas Commission on Environmental Quality for (1) fire training; (2) public utility, natural gas pipeline or mining operations; (3) planting or harvesting of agriculture crops; (4) burns that are conducted by a prescribed burn manager certified under Section 153.048, Natural Resources Code, and meet the standards of Section 153.047, Natural Resources Code or (5) have been granted exemptions since Jan. 3rd,2006 by action of Commissioners Court. Any person is entitled to injunctive relief to prevent the violation of a prohibition or restriction established by an order adopted under this section (g) of the Local Government Code §352.081.

This burn ban does not prohibit the use of outdoor grills or welding activities but will be restricted based on guidelines adopted by the Commissioners Court in accordance with this burn ban order.

In accordance with Local Government Code §352.081(h), a violation of this Order is a Class C misdemeanor, punishable by a fine not to exceed $500.00.

ADOPTED this the 23rd day of January 2023 by a vote of 5 ayes and 0 nays.

COUNTY JUDGE
Dan Looten

ATTEST:
COUNTY CLERK
Celeste Bichsel

COMMISSIONERS COURT
CARSON COUNTY, TEXAS

COLEMAN COUNTY, TEXAS
ORDER PROHIBITING OUTDOOR BURNING

WHEREAS in accordance with Section 352.081 of the Texas Local Government Code, the Coleman County Commissioners' Court has found that dry conditions along with heavy fuel accumulations in the unincorporated areas of Coleman County create a public safety hazard that would be exacerbated by outdoor burning; and, whereas such a finding authorizes the issuance of an order which prohibits or restricts outdoor burning.

NOW THEREFORE BE IT ORDERED that the following regulations are hereby established for all unincorporated areas of Coleman County, Texas:

(1) Action prohibited:

a. A person violates this order if he or she knowingly or intentionally burns any combustible material outside of an enclosure which serves to contain all flames and/or sparks, or orders such burning by others.

b. A person violates this order if he or she knowingly or intentionally engages in any activity outdoors which could allow flames or sparks that could result in a fire, or orders such activities by others.

(2) Enforcement:

a. A violation of this order is a Class C Misdemeanor.

b. This order may be enforced by any duly commissioned peace officer in Coleman County.

(3) This order is effective and enforceable for 90 days after the date signed below.

(4) This order does not apply to outdoor burning activities related to public health and safety that are authorized by the Texas Commission on Environmental Quality for firefighter training; public utility, natural gas pipeline, or mining operations; or planting or harvesting of agriculture crops.

(5) This order does not apply to outdoor burning activities that are conducted by a prescribed burn manager certified under ◆153.048, Texas Natural Resources Code and meet the standards of ◆153.047, Texas Natural Resources Code.

(6) This order does not apply to welding professionals, provided that the work area has been cleared of all debris or accumulated fuels and that another individual with a spray rig is present at the worksite. They should notify the Fire Department of the location and submit notification form and refrain from welding in winds over 16mph.

(7) Any person or persons who violate this order may be held liable for any and all damages incurred as a result of their actions.

IT IS FURTHER ORDERED that this burn ban be in effect for 90 days from the date of adoption of this Order or until sufficient rainfall allows the Judge to lift the burn ban.

THEREFORE, the Commissioners' Court of Coleman County at its regular meeting on November 28, 2011 is hereby ENACTING a County-wide burn ban and executed on the same date in special session of Commissioners' Court.

Joe D. Watson, County Judge

Mark Williams, Commissioner, Pct. 1

Rick Beal, Commissioner, Pct.2

Mike Stephenson, Commissioner, Pct. 3

Alan Davis, Commissioner, Pct. 4

Attest:

Stacey Mendoza, County Clerk

COUNTY OF BREWSTER

STATE OF TEXAS

ORDER PROHIBITING
OUTDOOR BURNING

WHEREAS, Section 352.081 of the Local Government Code provides that the commissioners court of a county, by order, may prohibit outdoor burning in the unincorporated area of the county if the commissioners court makes a finding that circumstances present in the unincorporated area create a public safety hazard that would be exacerbated by outdoor burning; and,

WHEREAS, the Brewster County Commissioners Court does hereby find that circumstances present in the unincorporated areas of Brewster County create a public safety hazard that would be exacerbated by certain outdoor burning; and,

WHEREAS, Section 352.081 of the Local Government Code provides for exemptions from county burn bans for certified prescribed burn managers meeting the requirements of Natural Resources Code Ch. 153, and the County Commissioners Court believes that additional exceptions are warranted to reduce the likelihood of dangerous and uncontrolled wildfire.

BE IT THEREFORE ORDERED that the following emergency regulations are hereby established for portions of the unincorporated areas of Brewster County, Texas not subject to public ownership or stewardship for the duration of the above mentioned declaration:

(1) Actions Prohibited:

Except as described hereinafter, a person violates this order if he/she ignites, or causes ignition of any combustible or vegetative material outside of an enclosure which serves to contain all flames and/or sparks, or orders such burning or ignition by others.

(2) Enforcement:

(a) Under notification of suspected outdoor burning, the fire department assigned to the location of the fire shall respond to the scene and take immediate measures to contain and to extinguish the fire.

(b) If requested by a fire official, a duly-commissioned peace officer, when available, shall be sent to the scene to investigate the nature of the fire.

(c) In accordance with Section 352.081 of the Local Government Code, a person who knowingly or intentionally violates this order commits a Class C Misdemeanor, punishable by a fine up to $500.

(d) If the responding peace officer finds that the person responsible for the fire is in violation of (1) above, a citation shall be issued for: Violation of Burn Ban Order.