Analyzing the Relationship Between Wildfires & Respiratory Conditions

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Introduction

Wildfires significantly affect communities, with long-lasting impacts to both environment and health. Inspired by the recent Maui wildfires, the focus of this project examines wildfires and their effects on respiratory conditions, to both the immediate and surrounding communities affected.

I analyzed data on two wildfires, the Oakland Hills fire, in Oakland, California in October of 1991 and the South Canyon fire, in Glenwood Springs, Colorado, with affected areas in east Utah in July of 1994.

Methods & Programs

I analyzed the CDC Multiple Mortality data from 1995 - 2004 for respiratory related mortalities. I used underlying cause of death (UCOD) and the top two contributing condition that influenced or were present at the time of death (coded as ICD-9 or ICD-10):

- Malignant neoplasm (cancer) of the Trachea, Bronchus and Lung (ICD-9 code: PREFIX 162 & ICD-10 code: PREFIX C34)
- Asthma (ICD-9 code: PREFIX 493 & ICD-10 code: PREFIX J45)

I further subsetted data to only include the county/state where the wildfires occurred: 1) Alameda county *(where Oakland, CA is located)* (Alameda county code: 06001), 2) Colorado (Colorado State code: 08), and 3) Utah (Utah State code: 49).

Using the LoneStar6 supercomputer at TACC, I analyzed this data using R through RStudio to combine/subset data, calculated death rates and create data visualization.

Hypothesis

H1: There will be an increase in respiratory cancers within ten years post wildfires to the communities affected.
H2: There will be an increase in Asthma within five years post wildfires to the communities affected.

Acknowledgements

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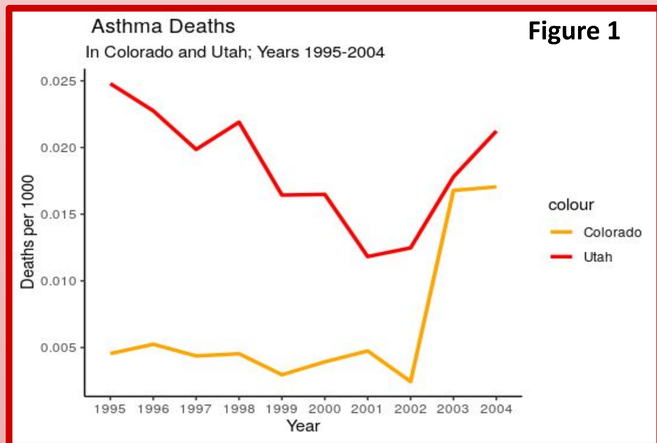
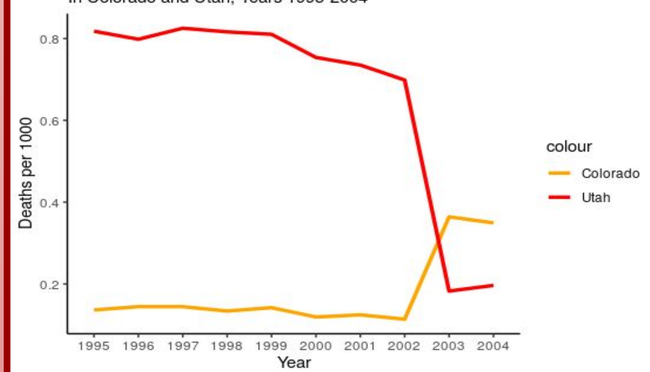
Asthma Deaths — Figure 1

In Colorado and Utah; Years 1995-2004



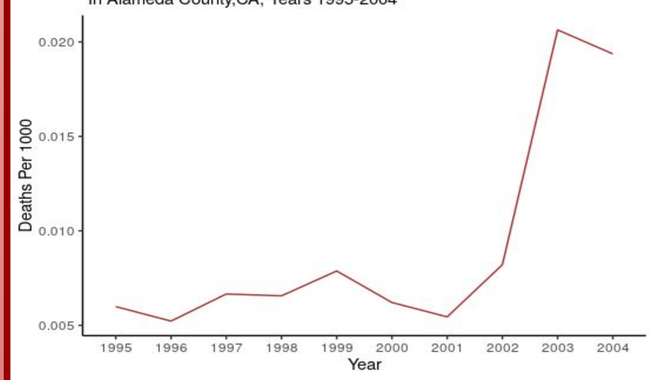
Cancer of Trachea/Bronchus/Lung Deaths — Figure 2

In Colorado and Utah; Years 1995-2004



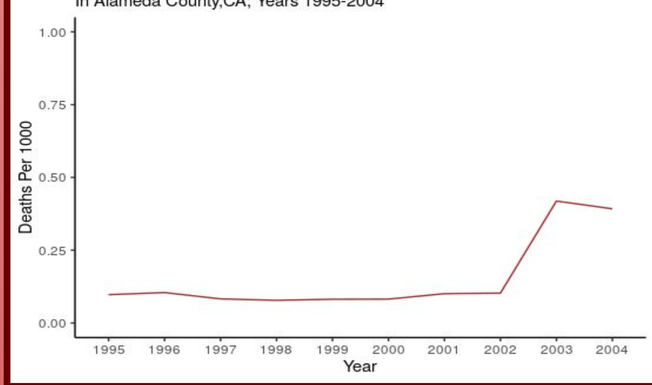
Asthma Deaths — Figure 3

In Alameda County,CA; Years 1995-2004



Cancer of Trachea/Bronchus/Lung Deaths — Figure 4

In Alameda County,CA; Years 1995-2004



Discussion

Shown in Figure 1, analysis indicates a gradual decrease within the first five years of Asthma deaths in Colorado and Utah, with a consistent ten to fifteen percent increase from the years of 2001-2004. For Alameda County, however, there is a slight increase to 1999, with a sharper increase from 2001-2004 (see Figure 3).

In Figures 2 and 4 show Cancer of Trachea/ Bronchus and Lung deaths for Alameda county and Utah, illustrating a slight fluctuation from 1995-2001 with a slight increase in 2002. Colorado had the opposite trend with a slight decline from 1995-2001, with a five percent decline from 2002-2004.

Future Research

I would like to expand this work to do a longitudinal study of Maui County. After the recent fires in 2023. I would like to analyze the respiratory related mortality rates recorded by the CDC using Maui county underlying cause of death (Asthma and Cancer of Lung/Trachea and Bronchus deaths from the years of 2023-2033).

Conclusion

There was an increase in Cancer of the Trachea/Bronchus and Lung deaths ten years post wildfires, confirming my first hypothesis. However, there was a decrease in Asthma deaths within the first five years challenging my second hypothesis.

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