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Data 512

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Final report

**Exploring the impact of wildfire smoke on the health care industry of Leavenworth, Kansas**

**Introduction:**

In this work, the author was tasked with conducting a human-centered data analysis project concerned with measuring a specific impact that wildfire smoke has on a particular city, and from there creating a policy recommendation for said city. Specifically, the author was assigned to consider the city of Leavenworth, Kansas and chose to measure the impacts on the healthcare industry. As expected, the main motivation behind this work is to save Leavenworth money and resources through education. To answer the question of why this analysis is important, research [INSERT REF] shows that wildfire smoke is dangerous to inhale over both the short and long term. This means that if the city of Leavenworth is not aware of current smoke exposure trends, they will likely be unable to mitigate incurring extra avoidable health and economic repercussions due to wildfire smoke. Tangentially, this work may be considered interesting from a technical standpoint because it served as an exercise that demonstrates the difficulty in solving real world problems due to reasons such as: Suboptimal datasets, operating on multiple assumptions, and combining datasets for analysis. The rest of this report will go into details about related work, methods used, findings, limitations, and finally the proposed policy recommendation.

**Background/Related work:**

This work utilized many different research sources.

**Methodology:**

Asd

**Findings:**

Asd

**Discussion/Implications:**

Asd

**Limitations/assumptions:**

Asd

**Conclusion:**

Asd

**References:**

<http://virtual.vtt.fi/virtual/innofirewood/stateoftheart/database/burning/burning.html> – smoke produced by wood

<https://www.cdc.gov/asthma/most_recent_national_asthma_data.htm> - 7.7% people have asthma in 2021

<https://professional.heart.org/-/media/PHD-Files-2/Science-News/2/2022-Heart-and-Stroke-Stat-Update/2022-Stat-Update-factsheet-GIobal-Burden-of-Disease.pdf> - 7534.1 per 10000 have CVD

[https://www.cdc.gov/copd/basics-about.html](https://www.cdc.gov/copd/basics-about.html#:~:text=Chronic%20lower%20respiratory%20disease%2C%20primarily,the%20United%20States%20in%202018.&text=Almost%2015.7%20million%20Americans%20) – 6.4% people have COPD 2018

<https://www.cdc.gov/heartdisease/facts.htm> - 805k Americans experience heart attack per year

[https://www.census.gov/library/stories/2022/12/happy-new-year-2023.html](https://www.census.gov/library/stories/2022/12/happy-new-year-2023.html#:~:text=Related%20Statistics&text=The%20U.S.%20Census%20Bureau%20projects%20the%20U.S.%20population%20will%20be,1%2C%202022) – American population of 2023, used with above to estimate heart attack % per year

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8862306/> - Asthma is 1.3% of ED visits

<https://www.cdc.gov/mmwr/volumes/67/wr/mm6713a1.htm> 9.9% of people with asthma visited ED

<https://www.cdc.gov/nchs/data/nhsr/nhsr174.pdf> 11.4% ED visits from heart disease (CVD)

[https://journal.copdfoundation.org/jcopdf/id/1103/Characteristics-of-COPD-Patients-Using-United-States-Emergency-Care-or-Hospitalization](https://journal.copdfoundation.org/jcopdf/id/1103/Characteristics-of-COPD-Patients-Using-United-States-Emergency-Care-or-Hospitalization#:~:text=Results%3A%20Among%20diagnosed%20COPD%20patients,hospitalization%20in%20the%20previous%20year) COPD patients 16.3% ED visit

<https://hcup-us.ahrq.gov/reports/statbriefs/sb47.pdf> 0.6% of ED visits are for Heart attack, 0.6% are for stroke [https://www.cdc.gov/nchs/products/databriefs/db452.htm](https://www.cdc.gov/nchs/products/databriefs/db452.htm#:~:text=An%20estimated%20131%20million%20ED,with%20all%20other%20age%20groups) 40/100 people visit ED each year

<https://usafacts.org/articles/how-many-wildfires-occur-in-the-us/> 119 acres for avg fire  
[https://www.healio.com/news/pulmonology/20231107/wildfire-pollution-linked-to-cardiopulmonary-ed-visits-among-vulnerable-populations](https://www.healio.com/news/pulmonology/20231107/wildfire-pollution-linked-to-cardiopulmonary-ed-visits-among-vulnerable-populations#:~:text=Researchers%20found%20that%20with%20every,risk%20for%20cardiovascular%2Drelated%20ED) general more volumetric based metric for increase  
[https://www.pnas.org/doi/10.1073/pnas.2302409120](https://www.pnas.org/doi/10.1073/pnas.2302409120#:~:text=In%20contrast%2C%20health%20outcomes%20with,increase%20by%2030%20to%20110%25) - 30-110% increase in asthma and COPD visits  
<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6015400/> - CVD  
Stroke - also <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6015400/>  
Heart attacks <https://newsroom.heart.org/news/wildfires-may-fuel-heart-health-hazards-smoke-exposure-increases-cardiovascular-risks> up to 42% increase in ER visits

<https://hcup-us.ahrq.gov/reports/statbriefs/sb268-ED-Costs-2017.jsp> - 530 per ED visit

**Data sources:**

This work utilized three different sources of data. First, we used a dataset titled “Combined wildland fire datasets for the United States and certain territories, 1800s-Present”. This dataset was published [here](https://www.sciencebase.gov/catalog/item/61aa537dd34eb622f699df81) on 12/08/2021. In short, the dataset is a combination of many smaller or incomplete United States fire datasets and stores various metadata for historical fires such as: Area, location, date, polygon coordinate geometry, etc. The second source of data utilized the [Air Quality System (AQS) API](https://aqs.epa.gov/aqsweb/documents/data_api.html), which contained “ambient air sample data collected by state, local, tribal and federal air pollution control agencies”. The contents of data called by the API include recorded station data such as: Particulate type, particulate amount measured, date of collection, location of the station, etc. Third, this work utilized United States census data, which can be found [here](https://data.census.gov/). United States census data is quite vast and can include many different schemas which cannot be fully described here. For this work specifically, population estimates, age estimates, healthcare coverage estimates, and employment by industry estimates were used.