DATA 512 Project Part 2

Motivation/Problem Statement

The driving force behind this initiative is the compelling need to confront the escalating environmental and public health dilemma in Yakima, Washington, exacerbated by the increasing occurrence and intensity of wildfires. In the past few years, Yakima has been increasingly besieged by these environmental upheavals, raising serious concerns about their implications for the health of its residents. Particularly at risk are adolescents, especially those in the tenth grade, who face significant health hazards due to the deteriorating air quality that often accompanies wildfire incidents.

This project aims to investigate a critical issue: the relationship between the rising instances of wildfires and the incidence of asthma among tenth graders in Yakima. Asthma is a widespread respiratory ailment among this age group and is notably aggravated by poor air quality, an unfortunate byproduct of wildfire smoke. Despite the recognition of this risk, there exists a substantial gap in detailed research focused on the specific effects of air pollution caused by wildfires on young individuals in areas like Yakima.

Consequently, the project is propelled by two primary objectives. The first is to fill the existing knowledge void by comprehensively understanding the distinct health impacts of wildfire smoke on adolescents. This understanding is essential for the formulation of specialized public health measures and preventive strategies tailored to this demographic. The second objective is to equip key stakeholders, including public health authorities, educators, parents, and the wider Yakima community, with valuable, data-driven insights. These insights are indispensable for bolstering Yakima's ability to effectively prepare for and respond to the growing wildfire threat, with a particular focus on safeguarding the health and welfare of its adolescent population.

In essence, the project seeks not only to contribute to the academic discourse on environmental health but also to serve as a practical tool for community resilience. By shedding light on how wildfire smoke impacts the health of young residents, the study aims to guide public health strategies, inform educational programming, and shape community responses to environmental challenges. This endeavor is thus a vital step toward ensuring the well-being of Yakima's youth in the face of increasingly frequent and severe environmental challenges.

Impact Focus

The primary focus of this project is to conduct a thorough examination of the impacts of wildfire smoke on asthma prevalence among tenth graders in Yakima. This focus is critical given the increasing instances of wildfires and their subsequent effect on air quality and public health. By concentrating on this specific age group, the study aims to uncover vital insights into how environmental hazards like wildfire smoke influence the health of adolescents, a demographic that is particularly susceptible to respiratory conditions like asthma.

The project seeks to extend beyond just identifying the direct health impacts. It aims to explore the broader implications of increased asthma rates among adolescents. These include but are not limited to impacts on academic performance, participation in physical activities, emotional well-being, and overall quality of life. Understanding these wider effects is essential for informing public health policies, guiding school health programs, and shaping community responses to environmental challenges.

Moreover, the study will contribute to a more comprehensive understanding of how environmental factors like wildfires can have far-reaching consequences on community health. By providing a holistic view of the impact of environmental change on public health, the project aims to foster a more integrated approach to dealing with such challenges, emphasizing the need for collaborative efforts between health authorities, environmental agencies, educational institutions, and community groups.

In essence, the impact of this project is to not only elucidate the direct correlation between wildfire smoke and asthma in adolescents but also to highlight the cascading effects on various aspects of community life. Through this multifaceted approach, the project will offer actionable insights that are crucial for building a resilient community, capable of adapting and responding to the evolving challenges posed by environmental changes and their impact on public health.

Data or Model to be Used

- **Asthma Prevalence Data**: The primary dataset for this study will be obtained from the Children's Alliance Provider. It provides detailed statistics on the prevalence of asthma among tenth graders in Yakima over several years. This longitudinal data is crucial for observing trends and patterns in asthma prevalence, offering insights into how these rates have evolved with environmental changes, particularly the increase in wildfire incidents.
    - Data Link

LocationType	Location	TimeFrame	DataFormat	Data
State	Washington	2008	Percent	0.208
State	Washington	2006	Percent	0.19
State	Washington	2010	Percent	0.192
State	Washington	2012	Percent	0.222
State	Washington	2014	Percent	0.215
State	Washington	2016	Percent	0.211
State	Washington	2018	Percent	0.213
County	Adams	2008	Percent	0.148
County	Adams	2006	Percent	0.083
County	Adams	2010	Percent	0.22
County	Adams	2012	Percent	S
County	Adams	2014	Percent	S
County	Adams	2016	Percent	0.194
County	Adams	2018	Percent	0.226
County	Asotin	2008	Percent	0.112
County	Asotin	2006	Percent	0.187
County	Asotin	2010	Percent	*23.1%
County	Asotin	2012	Percent	*22.2%
County	Asotin	2014	Percent	*22.7%
County	Asotin	2016	Percent	0.207
County	Asotin	2018	Percent	0.214

- The columns in the Dataset are Location, TimeFrame(Year), DataFormat(Percent), Data(Prevalence percentage of Asthma in 10th graders).
- **Wildfire Incident Data:** Complementary to the health data, environmental data recording wildfire incidents in and around Yakima will be utilized. This data will include information on the frequency, severity, duration, and geographical spread of wildfires, offering a comprehensive view of the environmental conditions in Yakima.
- **Existing Smoke Prediction Model:** Developed in Course Project - Part 1, this model will be adapted to include health impact estimations, specifically focusing on asthma prevalence among tenth graders.

Licensing and Usage Terms

The dataset, made available by the Children's Alliance and obtained from an open-access platform, is free from restrictive usage conditions. It permits unrestricted access and analytical use, adhering to the principles of open data sharing and promoting research transparency, particularly in the realm of public health metrics.

Challenges and Dependencies

- Accessibility and Reliability of Data:
    - Challenges: There are potential concerns about the uniformity and thoroughness of the asthma diagnosis data among tenth graders, given the survey's biennial

nature. The dependability of self-reported diagnoses and their accuracy are critical factors that could impact the analytical depth.
    - Dependencies: Essential to this study is the ability to obtain detailed and reliable data on asthma prevalence, with consistent historical records across the surveyed years, relying chiefly on the HYS for information.
- Influences on Health Trends:
    - Challenges: Identifying a direct link between the incidence of asthma and external environmental factors, such as wildfire smoke, is complex. The intricate cause-and-effect relationship between changing environmental conditions and shifts in asthma rates is multifaceted.
    - Dependencies: Collaborating with experts in public health, epidemiology, and environmental science is crucial to unravel the potential links and separate the effects of different environmental factors on asthma rates.
- Variability Over Time and Region:
    - Challenges: The analysis might be impacted by the differences in asthma rates over time and across various regions within Washington State. Understanding the specific local effects and trends related to environmental factors, including wildfires, is crucial.
    - Dependencies: The analysis hinges on the use of spatial-temporal analytical tools and the collaboration with regional health data analysts to provide an in-depth understanding of the data.
- Impact of Other Environmental Factors:
    - Challenges: Additional environmental variables, beyond wildfire incidents, may play a role in influencing the trends of asthma in young populations in Yakima. Isolating the specific effects of wildfires from other environmental factors presents a significant challenge.
    - Dependencies: An interdisciplinary approach involving environmental health specialists, climatology experts, and statisticians is essential for accurately attributing changes in asthma prevalence to specific environmental events.

Timeline to Completion

- Data Collection and Processing (November 17 - November 20): Acquiring and preparing the asthma and wildfire data for analysis. This phase involves ensuring the data's accuracy, relevance, and compatibility for integration.

- Model Adaptation (November 21 - November 25): Modifying the existing smoke prediction model to incorporate health data, specifically focusing on asthma prevalence. This phase will involve technical adjustments to the model, ensuring it accurately reflects the relationship between wildfire smoke and health outcomes.

- In-depth Data Analysis (November 26 - November 29): Conducting a thorough analysis of the integrated data sets. This will involve statistical analysis to explore potential correlations between wildfire incidents and asthma prevalence. Various analytical

techniques, including regression analysis, correlation studies, and predictive modeling, will be employed.

- Visualization, Preliminary Reporting, Presentation Refinement in PechaKucha Style (November 29 - November 30): Creating visual representations of the findings and drafting a preliminary report. This step is crucial for effectively communicating complex data in an accessible format.

- Documentation and Final Reporting (December 1- December 5): Documenting the methodology and compiling a comprehensive report with findings and recommendations. This report will be designed to inform policy-making by decision-makers in Yakima.

Conclusion

This extension project is a vital step towards understanding and mitigating the impacts of environmental challenges on public health in Yakima. By focusing on the health impacts of wildfire smoke on adolescents, particularly asthma prevalence, this study not only contributes to the academic field but also provides practical insights for public health strategy and policy formulation. The findings from this study will be instrumental in guiding the community's response to environmental challenges, focusing on protecting and enhancing the health and well-being of its adolescent population.