Housing Unaffordability: A Closer Look at Rent Trends and Homelessness

David Ng, Jaelon Mendoza, Vridhi Manchanda

Summary:

1. How does the geographic distribution of households with high rent burdens correlate with the geographic distribution of homelessness across different counties in Washington State?
    a. The geographic distribution of households with high rent burdens correlates with the distribution of homelessness across different counties in Washington State, with counties experiencing higher rent burdens also facing higher rates of homelessness.

2. How do economic conditions such as income in conjunction with high rent burdens, influence the trends and dynamics of homelessness in Washington State?
    a. Economic conditions, especially the interplay between income levels and the proportion of that income spent on housing, have a considerable influence on homelessness. Analyzing such data can reveal patterns and pinpoint where the issues are most acute, guiding targeted responses to mitigate the situation.

3. What are the regions or counties within Washington State that are most significantly impacted by high rates of homelessness in their communities?
    a. King County has the most homeless people in Washington State, but Garfield County has the highest proportion. Counties like Pierce, Snohomish, and Spokane have similar trends in adult homelessness. From 2020 to 2022, homelessness increased significantly in Asotin County and others in the south and east, while it decreased in counties like Garfield, Klickitat, and Pend Oreille in the southeast and northeast.

Motivation:

As rents continue to climb, many are forced to make tough choices, often opting for lower-quality or less secure housing to stretch their budgets. This compromise can severely affect their quality of life, leading to health and safety concerns. Moreover, the need to find affordable housing can push individuals to relocate to areas far from their workplaces or communities, disrupting social ties and increasing commuting burdens. The time, energy, and financial resources expended on longer commutes can further erode their quality of life and financial stability.

The specter of housing instability and homelessness is a critical concern, as the fear of losing one's home can have profound psychological impacts. The stress and anxiety associated with housing insecurity can be debilitating, affecting mental health, employment stability, and the overall well-being of individuals and families. For those who do fall into homelessness, the challenges become even more daunting, with significant barriers to accessing stable housing, employment, healthcare, and education.

Homelessness is not just a personal crisis for those affected but a societal issue that reflects broader economic and policy failures. It highlights the need for a comprehensive approach to housing policy that considers affordability, quality, and accessibility. Solutions may include increasing the supply of affordable housing, providing subsidies or assistance to those in need, and implementing policies that prevent unfair evictions and rent hikes.

Data setting:

The data used for this study was gathered from multiple reputable sources. The first dataset is gathered from the U.S. Census Table B25070 (Household Income to Rent). This data provides information on the amount of people per county paying above a certain percentage of their income for rent. The Zillow dataset obtained from zillow.com shows the average rent price per year by county for years 2015 to 2024. The last two datasets are obtained from Washington State Department of Commerce which provides information on Point-In-Time Homeless counts, and also shelter types. The datasets will all be used to create visualizations on homelessness rates and compare with other factors to determine if there is a common factor. Some of the data might not be fully accurate and it might not measure the entire population of that county, but can be a good indicator of an approximate value.

Datasets can be found on these links:

- WA PIT Homelessness (measures by people per county)
    - https://www.commerce.wa.gov/serving-communities/homelessness/annual-point-time-count/
- U.S. Census Table B25070 (measures by people per county)
    - https://data.census.gov/table/ACSDT5Y2021.B25070
- Zillow Rent Data (measured in dollars, and also monthly per year)
    - https://www.zillow.com/research/data/

Methodology:

Data Collection & Preparation

The methodological approach of our study is designed to analyze the interconnections between housing affordability, economic vulnerability, and their impact on homelessness rates throughout Washington State counties. We collected our data by searching for data that provides counts on homelessness measured by county as we will be doing our study in Washington State. To analyze rent trends we would need to find a dataset that contains rent data, and then finally a measure of people paying more than a certain percentage of their income to rent. When we have gathered all

the datasets we will clean the data using Python libraries to automate the task, such as fixing NaN values and manipulating columns we will use for our analysis. This includes changing column names to be easier to read, deleting unnecessary columns, and reformatting the data frame. We will also make sure that all datasets contain the correct amount of counties in WA state as since we are doing an analysis throughout WA state we need to ensure a fair measure of all counties.

Analysis

After our data collection and cleaning we can begin our analysis by leveraging Python libraries to create visualizations, in our analysis we decide to explore a couple of new libraries to meet our challenge goals, we decide to use plotly to create interactive charts displaying homelessness shelter types and their counts. We also used other analytical tools such as matplotlib to create maps and barcharts to compare counties and with a map we can make it easily interpretable to locate the counties with high rates.

Visualization/Reporting

After all the visualizations are completed and a strong amount of evidence we can begin with interpreting the results from our analysis by comparing each graph created and looking at all the visualizations to see if there is a correlation between each dataset and factors which can provide insight if homelessness can potentially be caused by other factors such as income and rent.

Results:

How does the geographic distribution of households with high rent burdens correlate with the geographic distribution of homelessness across different counties in Washington State?
To answer this question we looked at two visualizations in particular- Total Count of Homeless Households and the Percentage of Households Spending More Than 50 Percent of Income on Rent by County (Figure 4 & 5.). There is almost a direct correlation between the two graphs. The counties where a lot of the population is spending more than 50% of their income on rent are the ones that face the highest burden of rent. This greater burden on rent makes it harder for people to cover these charges. This directly correlates to a greater number of homeless households in

those counties. King County has the greatest number of homeless households at about 12,000 and about 25% of King County spends more than 50% of their income on rent.

We then compared the Percentage of Households Spending More Than 50 Percent of Income on Rent by County Graph to the Proportion of Persons homeless chart to account for the differences in population sizes of different counties. Our results were similar. Counties that had a higher proportion of homeless population also had a higher percentage of people spending a majority of their income on rent. There were some counties that did not correlate higher homelessness with higher burden on rent. For example, Jefferson County had about 20% of the population with a higher burden on rent, which is low compared to other counties, but their homeless population proportion was about 0.05 which is high compared to other counties. This could point to other underlying factors such as limited availability of affordable housing options, lack of supportive services for individuals experiencing homelessness, or specific socio-economic dynamics unique to Jefferson County. Further research and analysis are needed to comprehensively understand the multifaceted factors contributing to homelessness in different counties within Washington State.

How do economic conditions such as income in conjunction with high rent burdens, influence the trends and dynamics of homelessness in Washington State?

The top map shows several counties, like King and Pierce, with a dark red color, indicating a higher percentage of households spending more than 40% of their income on rent (Figure 5). This rent burden could be a precursor to homelessness, as individuals in these households are likely at a higher risk of housing instability.

The line graph of monthly rent trends by county further establishes this correlation (Figure 2). For instance, King County shows a pronounced upward trajectory in rental costs over the years, which may contribute to the significant increase in homelessness depicted in the bar graph of percentage change of homeless persons from 2020 to 2022 (Figure 10).

The bar graph of the maximum yearly percent change in rent by county (Figure 3.) highlights areas like Grant and Adams counties with the highest annual increases. The direct relationship between these spikes in rent and the growth in homelessness can be inferred, as such economic pressure often results in displacement of residents.

The shelter statistics graphs for 2020 and 2022 show increased counts in emergency shelter and transitional housing, (Figure 7 & 8.) particularly in counties where the rent has increased the most. This indicates not only a rise in homelessness but also a growing demand for temporary housing solutions.

In the overall statistics of people spending a portion of their income on rent (Figure 1.) shows that the highest value is in the category of people spending more than 50 percent of their income on rent. The general rule for budgeting is that people should not spend more than 30 percent of their income on rent to have enough for other expenses, but data shows that there is a high volume of people spending more than 50 percent of their income on rent; this can be an indicator of leading to homelessness rates across the state.

In summary, counties with higher rent burdens and sharp increases in rent, such as King, Pierce, Grant, and Adams, are also those with notable rises in homelessness. This suggests that economic conditions in these counties, specifically relating to housing affordability, are directly influencing the dynamics of homelessness.

What are the regions or counties within Washington State that are most significantly impacted by high rates of homelessness in their communities?

In Washington State (Figure 6.), King County stands out for having the highest homeless population, which is expected given its larger overall population. However, when we look at the proportion of homeless individuals, Garfield County has the highest percentage according to our dataset.

Our bar graph (Figure 9.) shows that King County leads in all measures due to its high population. But when we focus on households with no minors and persons from households with no minors, we see similar trends in Pierce, Snohomish, Spokane, and other counties. This suggests that the majority of the homeless population in these areas are adults.

When we compare the change in total homeless persons from 2020 to 2022 using a percentage bar graph (Figure 10), Asotin County shows a significant increase in homeless numbers. Despite being much smaller than King County, Asotin County's homeless population has grown

dramatically. Other counties like Pacific, Grant, Ferry, and Clark have also seen an increase in homeless numbers since 2020, indicating that the growth in homelessness is primarily in the south and east of Washington State.

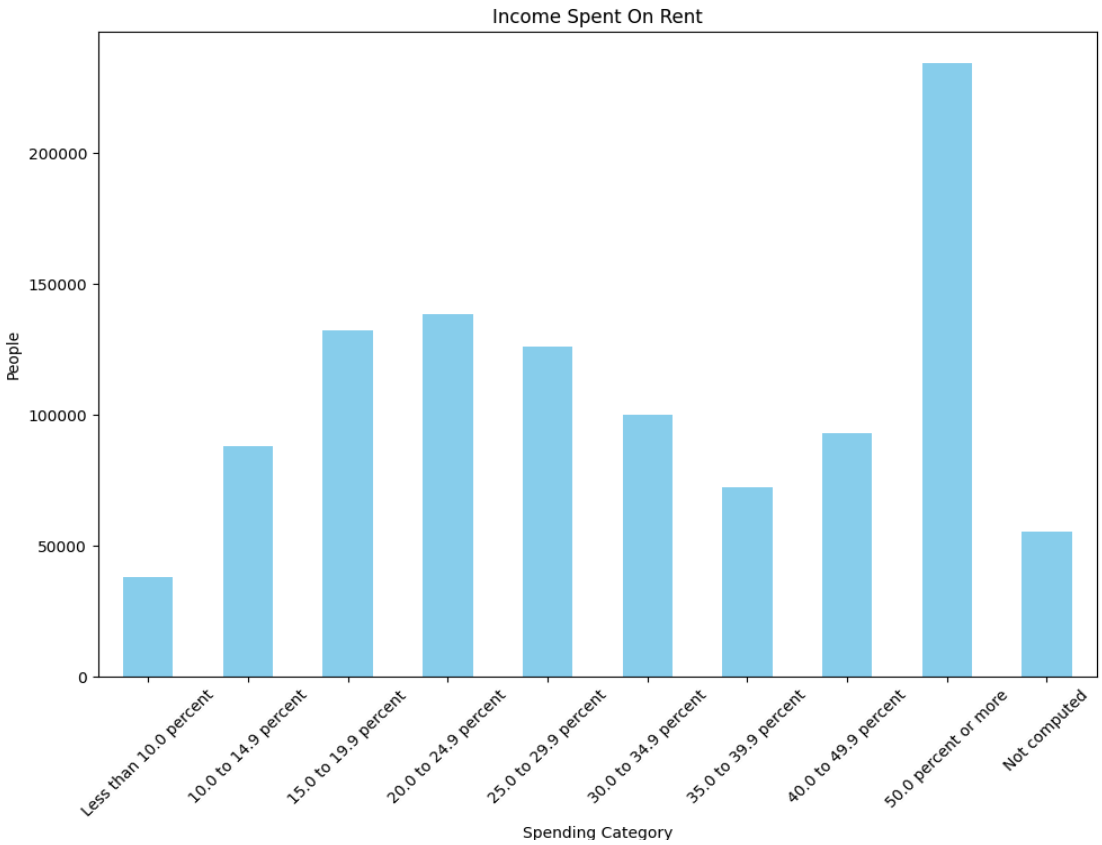
On the other hand, counties like Garfield, Klickitat, and Pend Oreille have seen a decrease in homeless numbers since 2020, as shown by their negative percentages. These counties are located in the far southeast and northeast parts of Washington, suggesting that the decrease in homelessness is more pronounced in these regions.

Which demographics/type of people are considered homeless, and how does that compare to other demographics?

People without minors are much more likely to be homeless than households that do have people who are minors. In general, homelessness affects a wide range of household types. Single adults without children (Persons of Household with no Minor) represent a significant portion of the homeless population. However, families with children (Persons in Households with Minors and Households with Minors) also make up a substantial part of the homeless population.

It's also worth noting that the number of homeless households (Households with no Minors and Households with Minors) is typically smaller than the number of homeless persons because each household can include multiple persons.

The specific distribution of these demographics can vary greatly by region. For example, urban areas might have a higher proportion of single adults experiencing homelessness, while rural areas might have a higher proportion of families experiencing homelessness.



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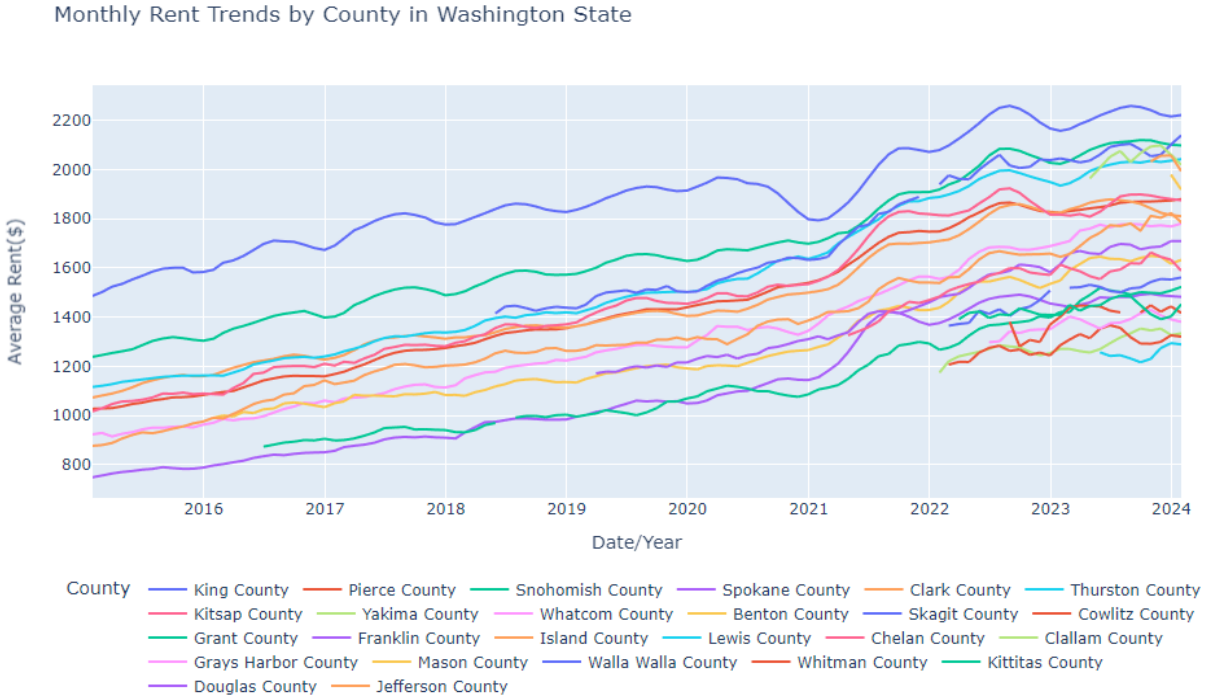

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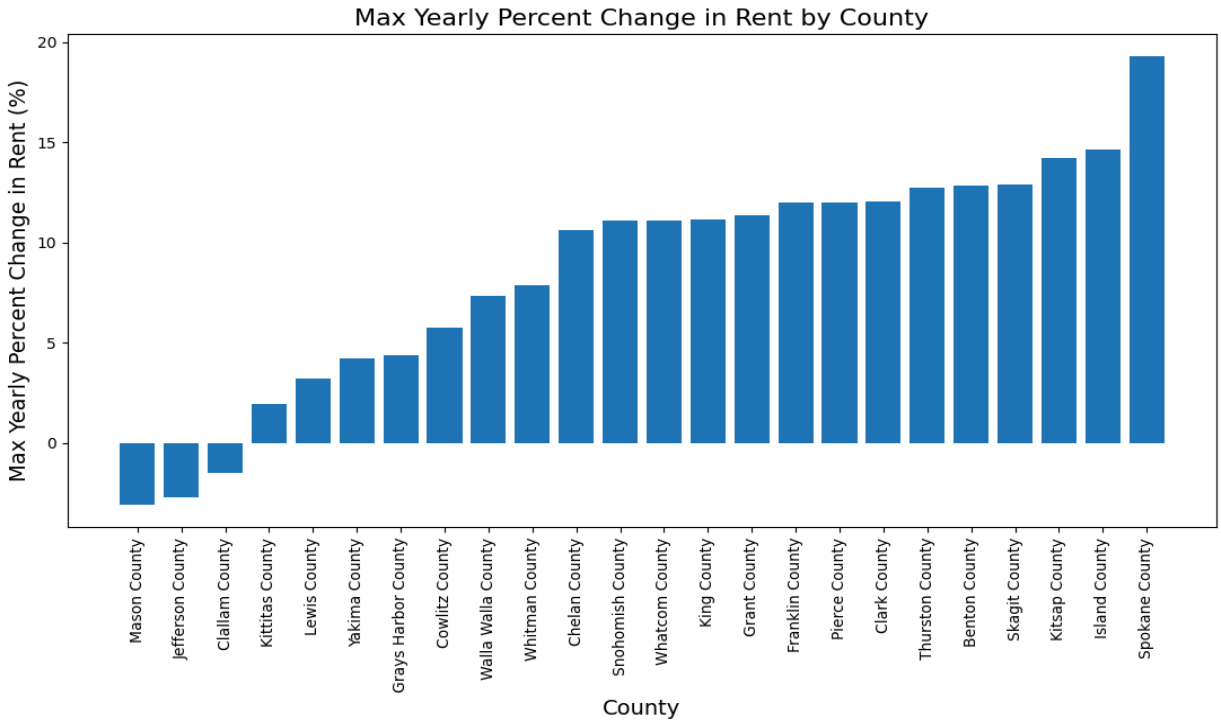

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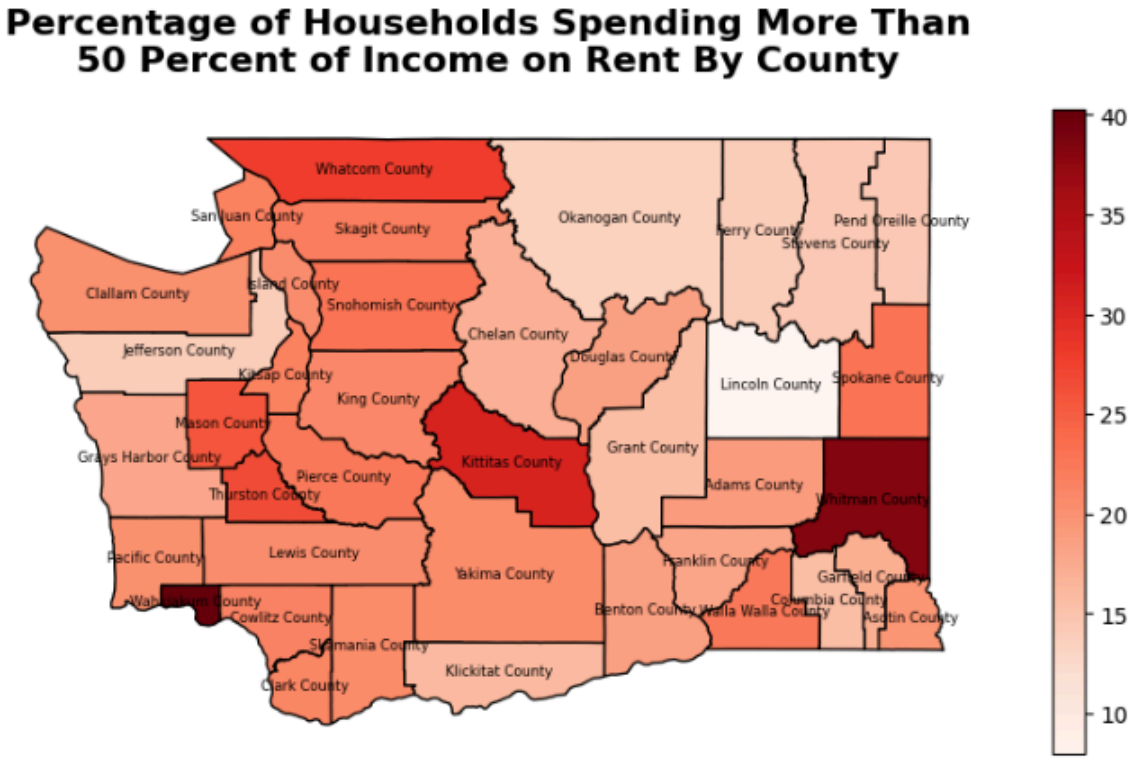

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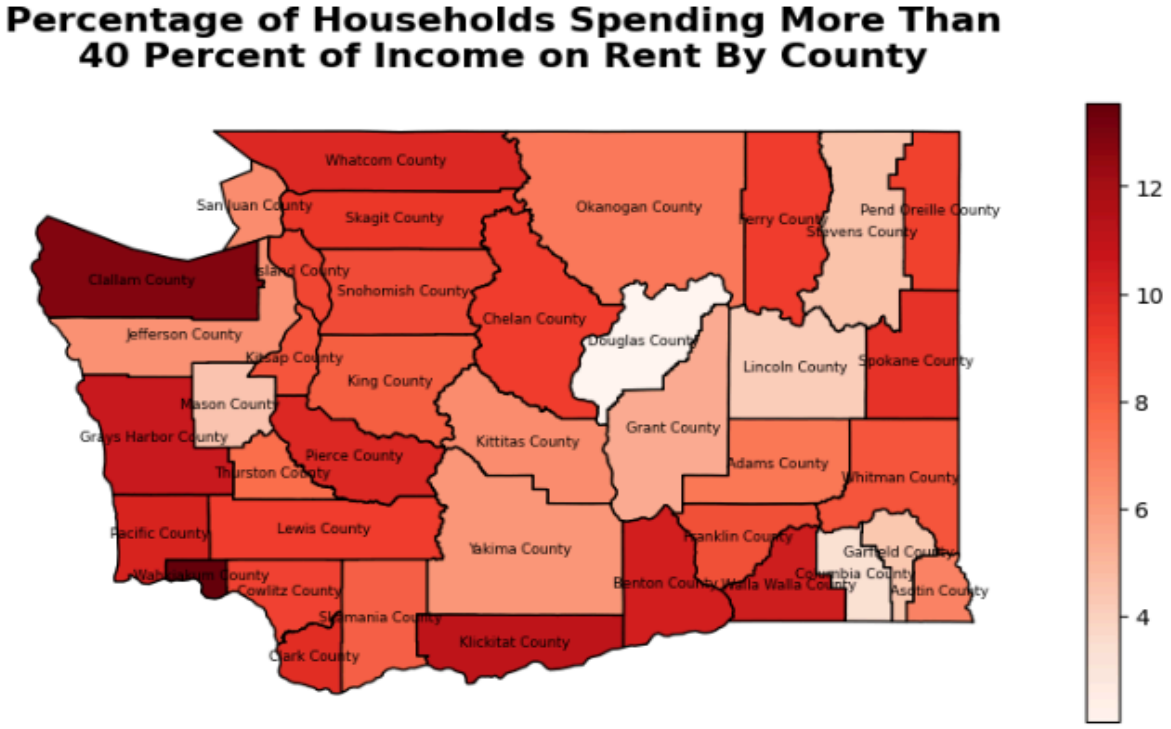

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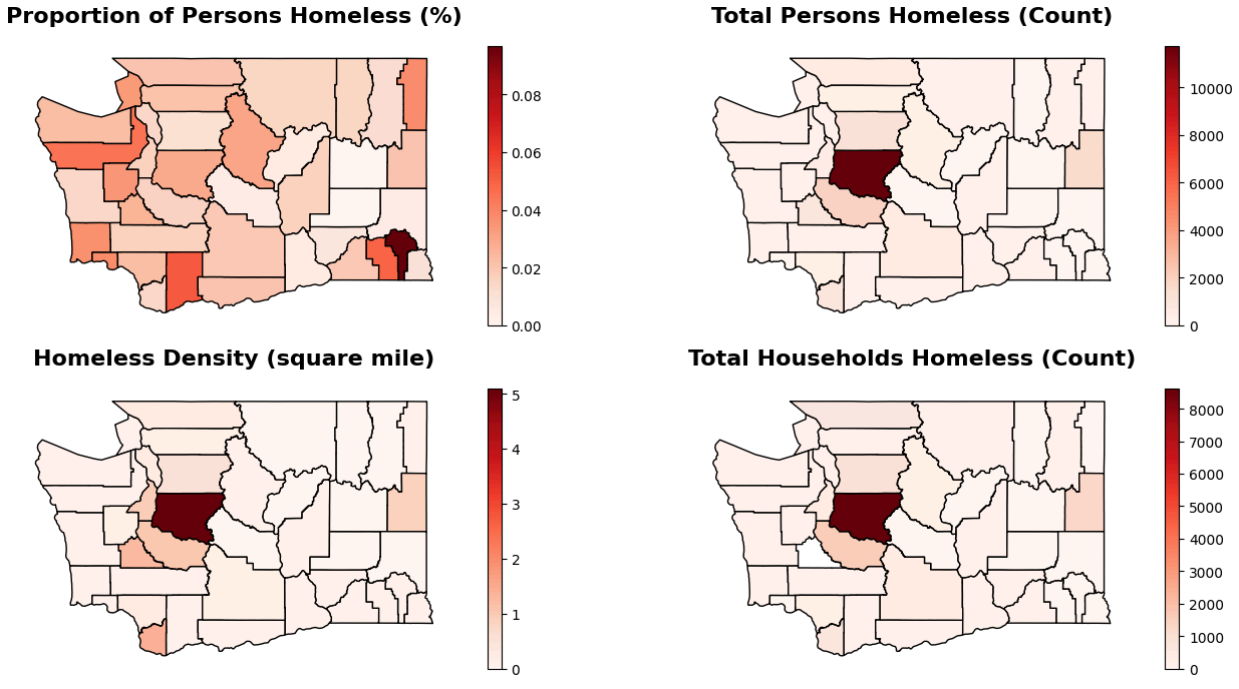

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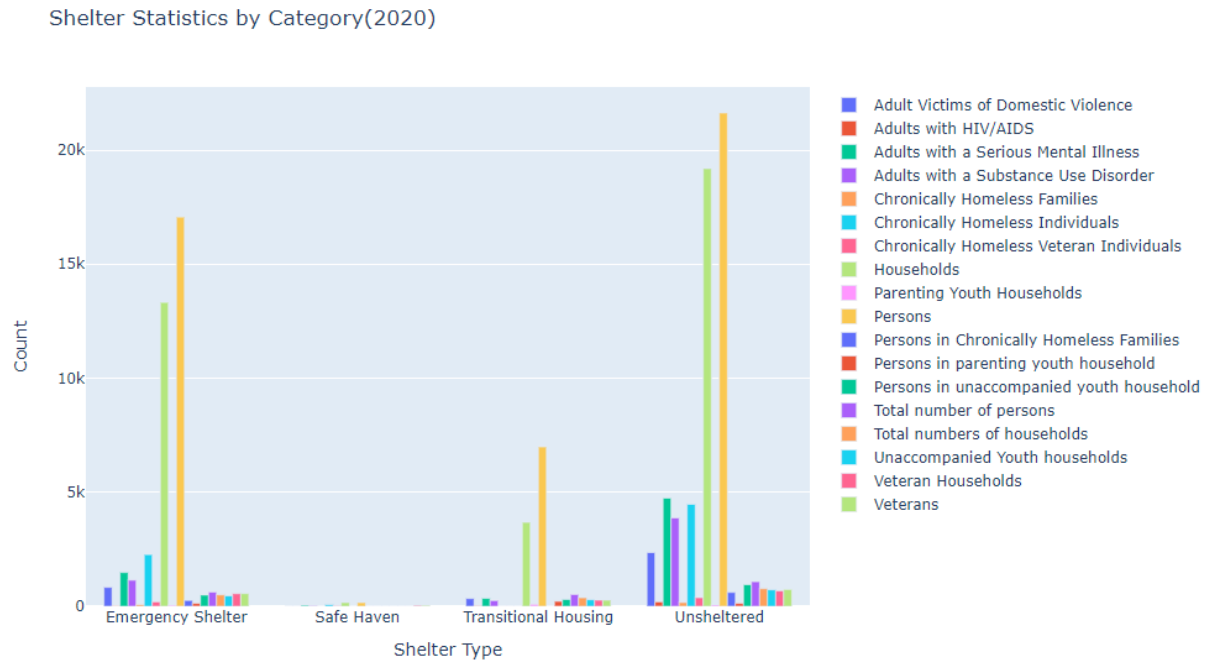

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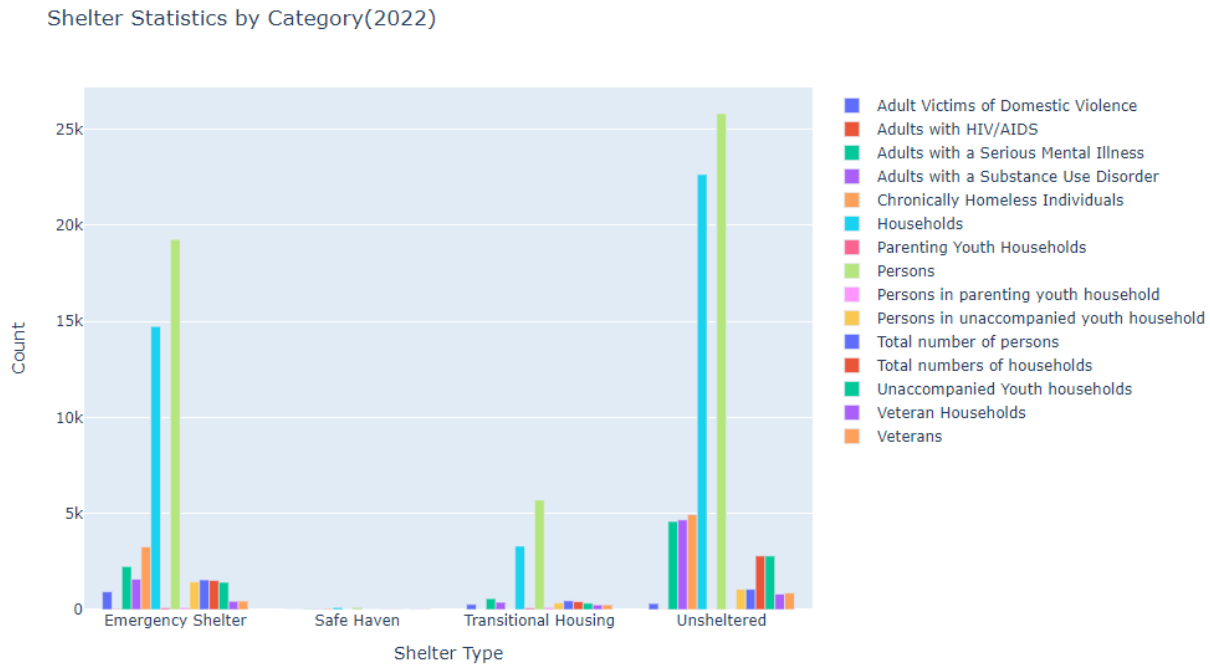

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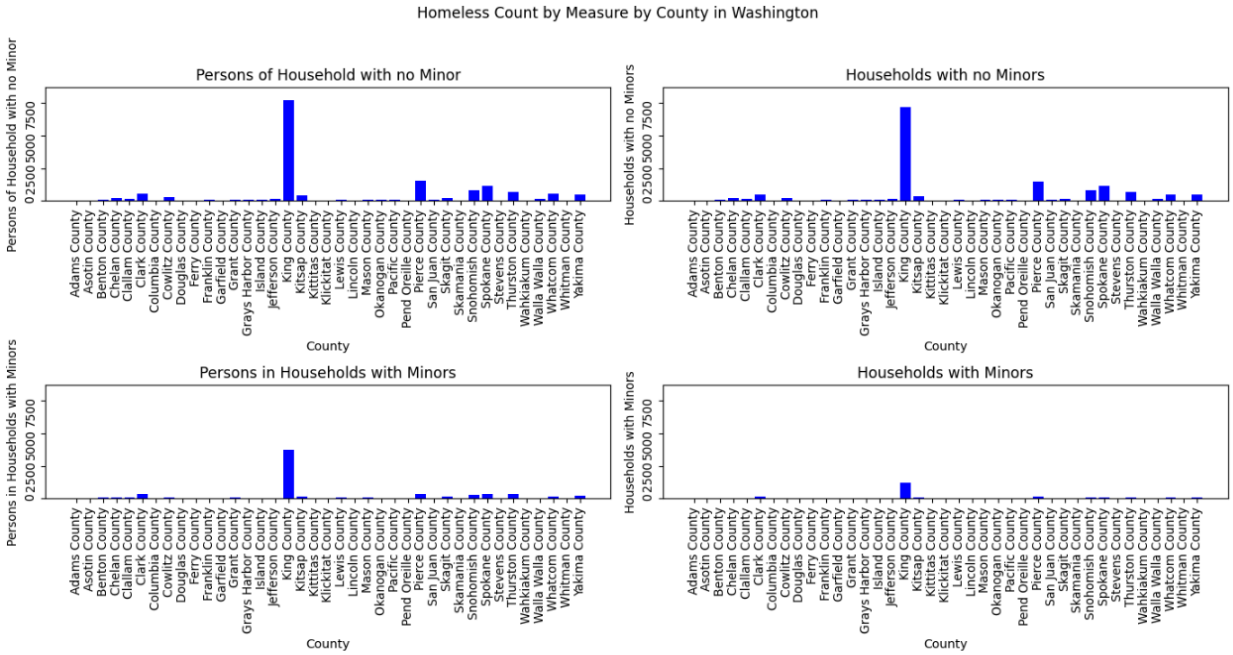

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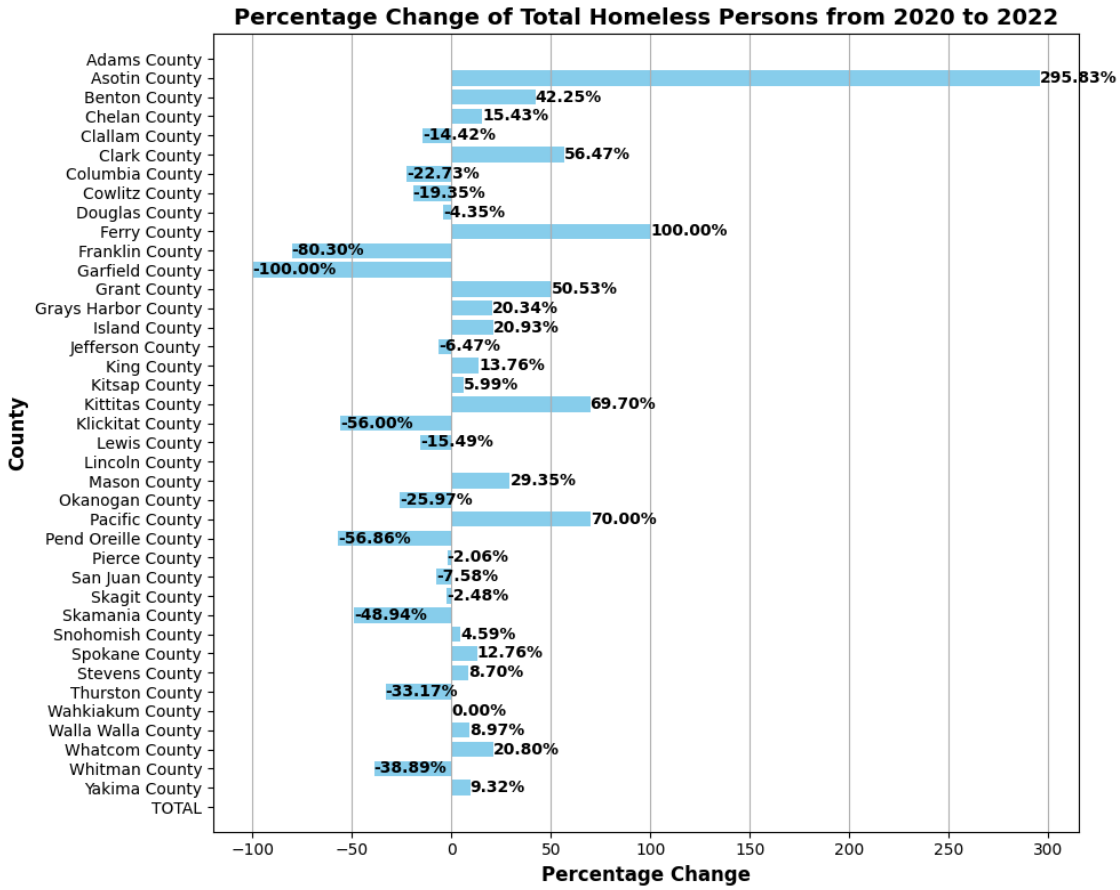

(Figure 10.)

Impact and Limitations:

The analysis of the data visualizations suggest a strong relationship between high rent burdens and the increasing homelessness rates in Washington State. These findings can be beneficial to policymakers, social service organizations, and housing advocates who seek to understand how the continued rise of living impacts the homeless and the communities, which can give them a data-backed perspective on what actions to take next. Groups that may be affected or harmed by this study are most likely property owners and landlords as this can impact their income earning potential if new policies are introduced that limits the property owners from listing their property above a certain cost.

Although this study is on homelessness, it doesn't account for ALL the homelessness factors as there can be other factors that individuals face that are not related to rent burden. We could've measured other factors known to cause homelessness such as mental health issues, cases of violence, and substance abuse.

The limitations of this analysis are that correlation doesn't always imply causation because the relationship between rent burden and homelessness is complex and multi- faceted. The data isn't fully complete also because we are only measuring rent trends with homelessness when there are many other factors that can go into this research for a more in-depth analysis.

The conclusions drawn should be used as starting points for a more in-depth analysis rather than definitive solutions to housing and homelessness. Caution should be exercised to not use these findings to stigmatize areas or individuals struggling with housing and results should not be used to enact policies without further consultation with affected communities and more consideration of different factors.

Challenge goals:

The first challenge we met was the multiple datasets goal. We wanted to do a comparative analysis with factors known to contribute to homelessness such as high amount of income spent

on rent, measuring the rent trends throughout years to see how much rent has increased, and also a count on homelessness during 2020 and 2022 to analyze the trends of homelessness. Based on our research questions, multiple datasets would be a necessity to do this study as homelessness can have many factors other than the ones in the study as it will be too much for this project.

The second challenge we met was learning a new library, to achieve this challenge we decided to use the plotly library, the plotly library is great for interactive data visualization graphs, and in the context of our study would be a very useful tool to visualize the homelessness shelter types as we needed to melt the dataframe of our shelter type data to get the information of the amount of counts for each specific type of shelter within a certain group and category. This transformed data makes it easier to analyze and visualize the data based on shelter types across different categories and groups.

Plan evaluation:

Our team worked on a research project and each of us put in more than 10 hours. We started by finding datasets that matched our research question. We then cleaned this data, which was a big but important job. We used Python to make a model based on the methods we planned to use for analyzing the data. We built this model together on Google Colab, which let us work together in real-time and combine our work easily. Everyone on our team did a bit of everything. We all helped gather data, write methods to clean the data, code to show our data visually, and write the report. This way, everyone understood the whole project, and the work was shared evenly. The final report explained what we found from our research, how we did it, and told a story about our data. This made our research more interesting and easy to understand. Looking back, our work plan estimates were pretty accurate. This was because we all worked together, shared the work evenly, and each put in over 10 hours. Our estimates were close to reality because we kept talking to each other about our progress and changed our plans when we needed to. This flexibility, along with our hard work, made our plan work well. The data cleaning took the longest time as we had to ensure all the data matches correctly and check if data is correctly calculated before we start writing code for the plots. The plot visualizations took about 3 - 4 hours to complete, we had to use the internet and other resources to learn the other libraries that haven’t been taught.

Testing:

We tested our data cleaning process for some datasets by writing some assertions, specifically for when we were trying to calculate the density of homelessness per county, we needed to find the area square mile for each county. But our problem was we only had the geometry data column from our shapefile, so to do this we needed to calculate and convert geometry to a new column that indicates square mile. We tested this by looking on Google for a couple of counties actual square miles, and then wrote an assert to match our produced column to the expected values to check if it passes.

Collaboration:

Stackoverflow on some pandas functions, and how to use other libraries such as Plotly. Some information was obtained from Google search.