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Data Visualization Project

Exploring the Impact of COVID-19 on Housing Affordability by Analyzing Residential Population size, Median Household Income, and Median Sales Price for Residential Properties Across US States: 2020-2022

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Introduction

Amid the COVID-19 pandemic, the housing market has experienced significant fluctuations, impacting affordability across various regions in the United States. This data visualization project aims to delve into the intricate relationship between the pandemic, overall population size, median household income, and median residential sales price for residential houses from 2020 to 2022. By examining these key factors at the state level, the goal is to uncover patterns and trends to visualize how the pandemic has shaped housing affordability dynamics.

Research Findings: This published paper "https://www.consumerfinance.gov/about-us/blog/office-of-research-blog-housing-inflation-is-hitting-low-income-renters/ " emphasizes on the impact of rising housing prices on low-income individuals in the USA. The article explores how inflation impacts both renters and homeowners, focusing on the significant role housing costs play in this economic phenomenon. With housing being a substantial expense for most individuals, any increase in housing costs due to inflation forces people to reevaluate their spending priorities.

Homeowners who have no immediate plans to sell their homes benefit from inflation as it leads to an increase in their property's value. However, those looking to purchase a home face challenges, as inflated housing prices and higher mortgage interest rates make homeownership more costly.

Similarly, renters also feel the pinch of inflation, as rental rates rise swiftly. This poses a particular hardship for low-income renters, who already dedicate a significant portion of their income to housing expenses.

Based on the findings from the research, following are the research questions to be addressed:

1. What is the relationship between median household income, median residential housing price, and overall residential population across different states?
2. How do changes in median household income and median residential housing price correspond to fluctuations in overall residential population across different states over the course of three years?

Methodology

For the project, 3 Datasets have been used:

1. Total Residential Population in the United States for the period 2020-2022
    - The dataset contains the following attributes: Region, State, Origin, Sex, Race, Age, Total Residential Population 2020, Total Residential Population 2021, Total Residential Population 2022
2. Median Sales Price for Residential Houses in the United States for the period 2020-2022
    - The dataset contains the following attributes: States, Median Household Income 2020, Median Household Income 2021, Median Household Income 2022
3. Median Household Income for the period 2020-2022
    - The dataset contains the following attributes: States, Median Housing Price 2020, Median Housing Price 2021, Median Housing Price 2022

Datasets Sourced From:

1. Population dataset: Census.gov
   https://www.census.gov/data/datasets/time-series/demo/popest/2020s-state-detail.html
2. Median Prices for Residential houses Dataset: Redfin Data Centre (public data source)
   https://www.redfin.com/news/data-center/
3. Median Household Income: Fred (Federal Reserve Bank of Cleveland)
   https://fred.stlouisfed.org/release/tables?rid=249&eid=259515&od=2020-01-01#

Analysis

Prior to analysis, the sourced data tables from all the above-mentioned sources were preprocessed using Tableau Prep Builder by removing unnecessary columns. The project then utilizes the processed data tables to analyze trends in the United States from 2020 to 2022.

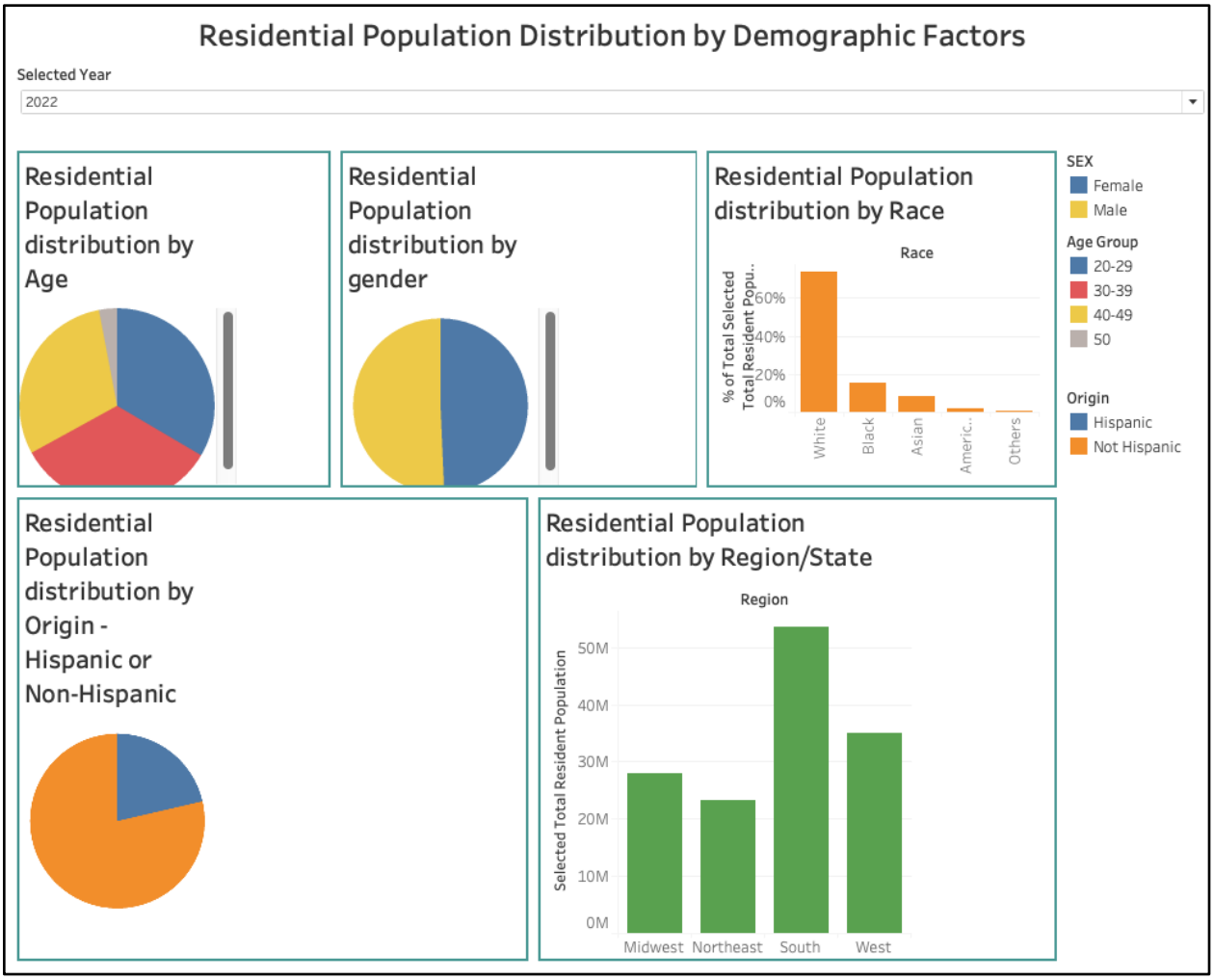
- The first dataset focuses on the Total Residential Population, detailing demographic information such as region, state, origin, sex, race, and age, alongside the total residential population figures for each year within the specified period, i.e., 2020-2022.
- The second dataset provides the Median Sales Price for Residential Houses, presenting insights into states' median household incomes across the same timeframe.

- Lastly, the third dataset provides information on Median Household Income, highlighting the median housing prices for various states over the same period.

The three datasets have one common attribute, which is “State.” This shared attribute will be used to link the data tables within the Tableau workbook. Given that the project involves three datasets, there will be two links between the three tables in the Tableau Workbook.

Visualizations from the report:

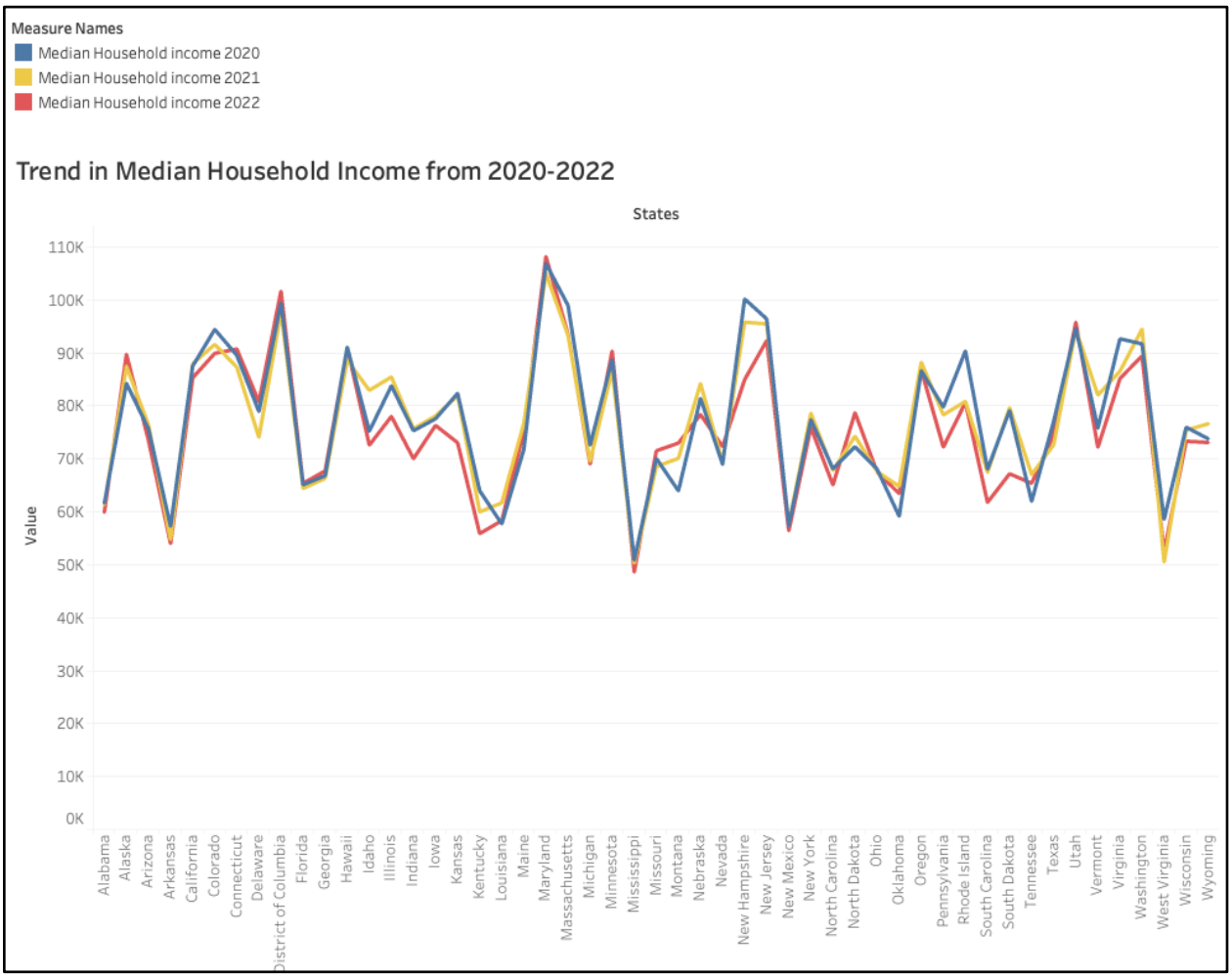
Dashboard 1-



- Distribution by Age: The graph shows a breakdown of the population by age group. It shows that 20–29-year-olds make up the largest portion of the population, followed by 30–39-year-olds.
- Distribution by Sex: The graph divides the population by sex, showing a seemingly balanced population between males and females.
- Distribution by Race: The population is further divided by race, but the specific race categories aren't shown in the image.
- Distribution by Origin: The graph shows a distribution of the population by Hispanic or Non-Hispanic origin where the majority of the population falls under non-Hispanic.
- Distribution by Region: The data shows that the region South has the largest population, followed by the West, Midwest, and Northeast.

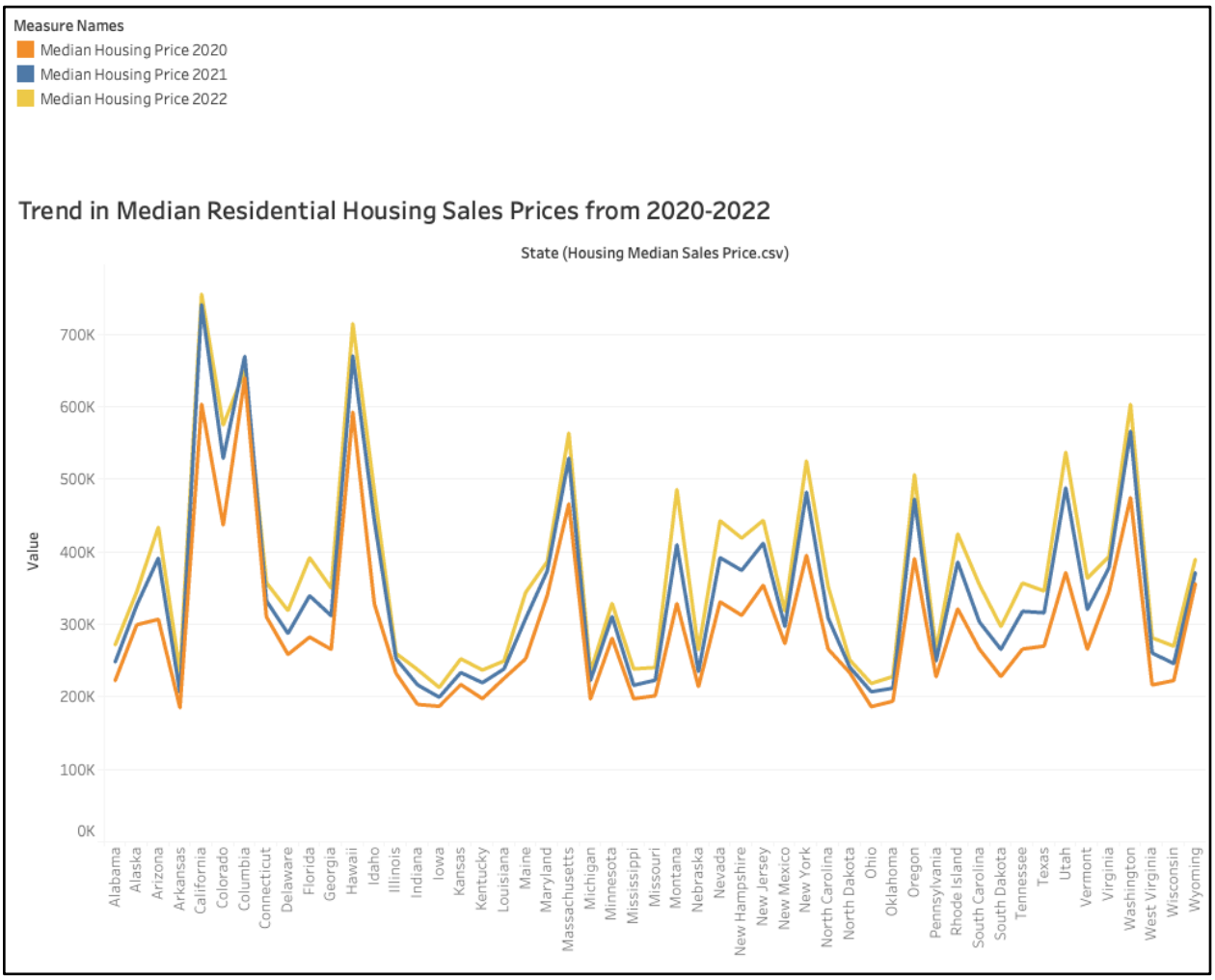
In general, the dashboard provides an overall view of the total residential population by various demographic factors. The applied filters can be used to visualize the data for a particular year. The column charts and pie charts have been used to represent the total values and the proportions, respectively.

Dashboard 2 -



The chart indicates a positive trend in median household income in the United States over the last two years. This suggests that a growing number of households are experiencing an increase in income. Overall, there has been a steady increase in median household income over the two-year period in the majority of the States over the period. The line chart has been used to depict the trend line over the span of two years.

Dashboard 3 -



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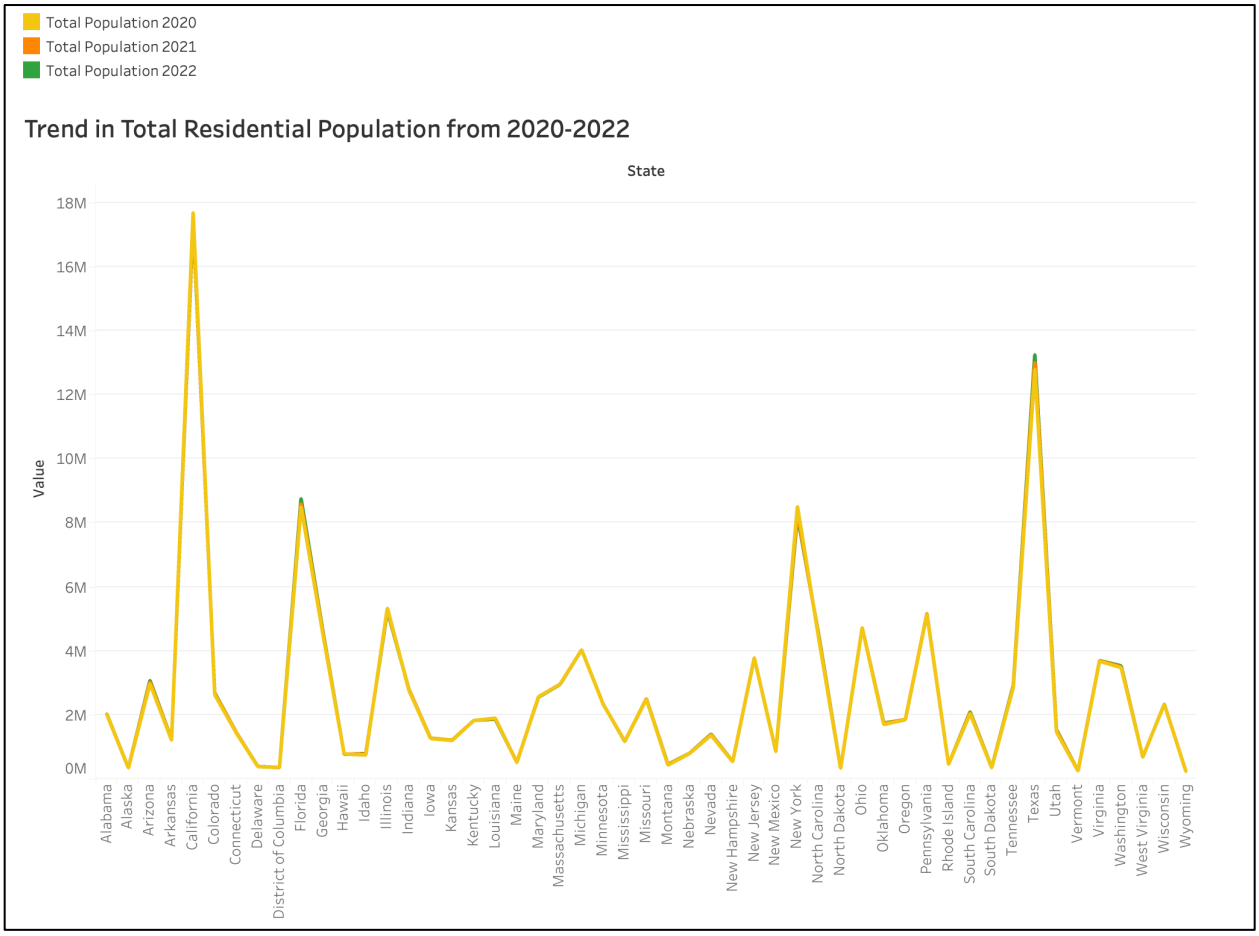
Dashboard 4 -

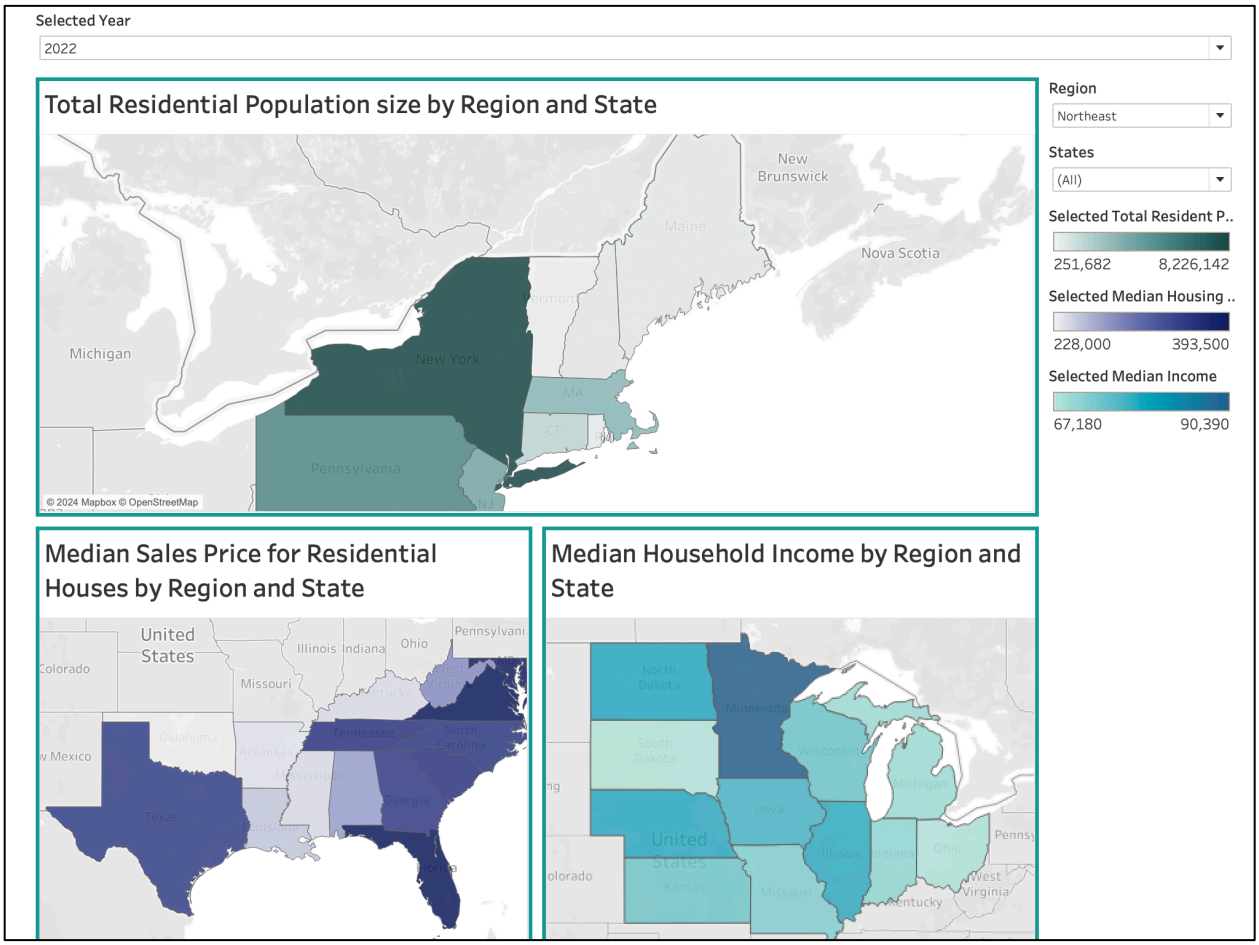


From the chart, it can be concluded that the total residential population size in the United States has been relatively stable from 2020 to 2022. There might be slight fluctuations, but the overall trend suggests minimal change in the total number of people during these years. The line chart has been used to depict the trend line over the span of two years.

Dashboard 5 -

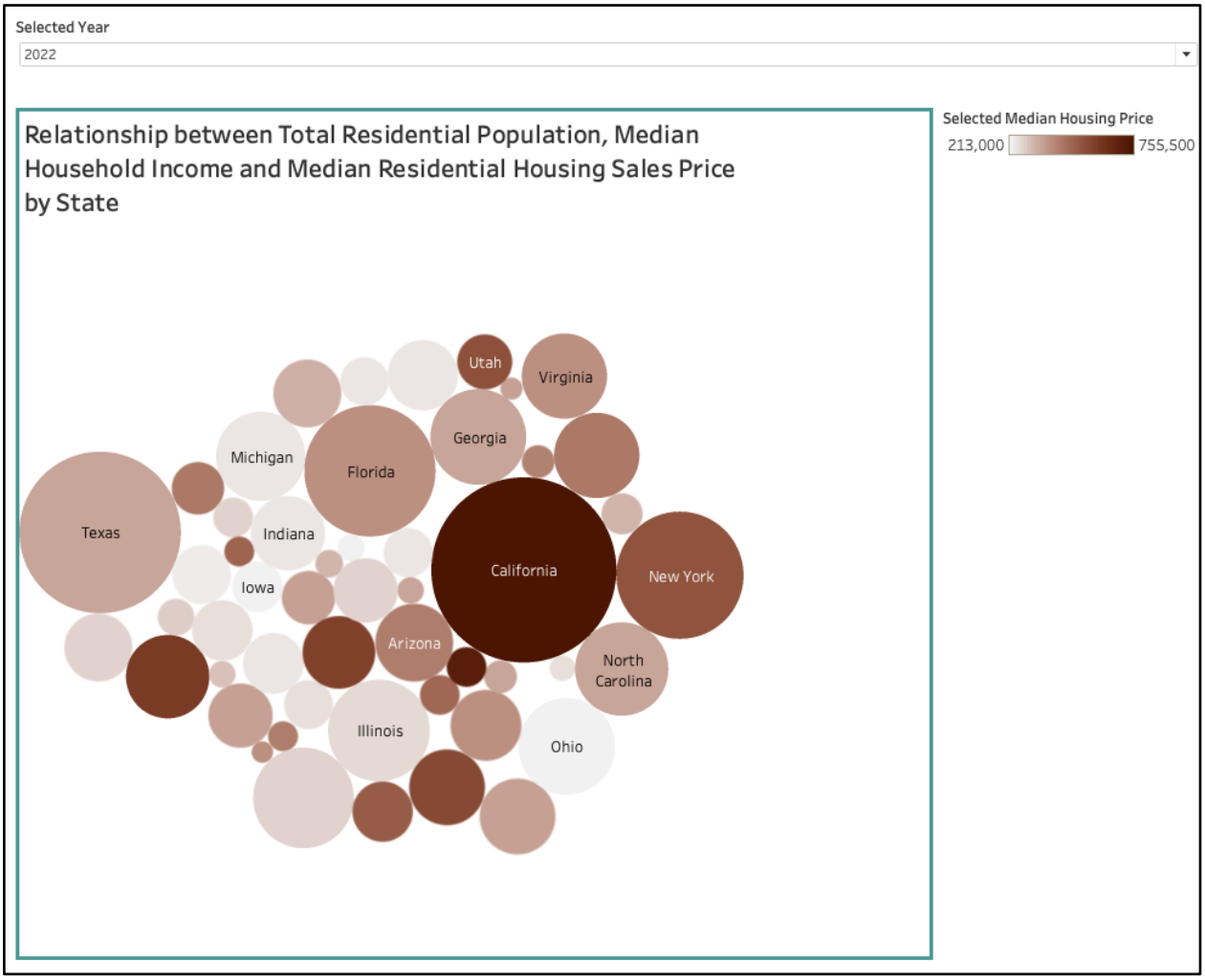
From the chart, it can be concluded that among the top 20 states, California has the highest residential population, followed by Texas and Florida. It can also be seen that California also has the highest median residential sales price for houses from 2022-2023. The column charts have been used to represent the total residential population size of the top 20 countries.

Dashboard 6 -



The map chart has been provided to compare the total residential population, median household income, and median residential house sales price by various states and regions. The filters on the dashboard can be used to filter out the data for all the states from different regions.

Dashboard 7 -



From the bubble chart, it can be observed that there is a positive correlation between total population size and median housing price, with states having higher populations tending to exhibit higher median housing prices. For instance, California, with the highest population among the states listed, also demonstrates the highest median housing price and income level. Additionally, California leads with the highest median income, followed by Texas and then Florida. This suggests that states with a high

concentration of high-paying industries (e.g., tech in California) might have higher median incomes, regardless of population size. Moreover, States with higher median incomes may also have a higher cost of living, potentially offsetting the income advantage.

Exceptions to this trend can be seen in Florida, which despite having a lower population than Texas, exhibits higher median housing prices. This suggests other influencing factors such as:

- Cost of Living: The overall cost of living, including factors beyond housing, may be lower in Texas compared to Florida.
- Land Availability: Texas may benefit from a larger area of developable land compared to more densely populated coastal states like Florida, influencing housing prices.

The bubble chart has been used to see the correlation between the three variables.

Conclusion

1. The overall analysis presents a positive correlation between median household income, median residential housing price, and overall residential population across different states. States with higher populations tend to exhibit higher median household incomes and median housing prices. This suggests that areas with larger populations often attract higher-paying industries and experience increased demand for housing, leading to elevated housing prices and incomes.

2. Over the span of three years, there is a general upward trend in median household income and median residential housing prices across different states, coinciding with changes in overall residential population. As the population grows in various states,

there is a corresponding increase in median household income and median residential housing prices. This dynamic relationship indicates that states experiencing population growth typically witness rises in income and housing prices over time, reflecting the interplay between population dynamics, economic growth, and housing market trends.

Justification:

- Areas with higher populations often attract industries that offer higher-paying jobs, resulting in higher median household incomes. The increased demand for housing in these areas further drives up median housing prices.
- States experiencing population growth tend to have increased demand for housing, leading to rising housing prices. As the population grows, there is also a corresponding increase in the number of households, contributing to higher median household incomes.
- The increase in population leads to higher demand for housing, while the supply of housing may not always keep pace with this demand, resulting in higher housing prices. This imbalance between supply and demand contributes to the upward trend in median housing prices.
- The observed trend in median household income and median residential housing prices over three years reflects the interplay between population dynamics, economic growth, and housing market trends. States experiencing even slight population growth typically witness rises in the housing prices over time, reflecting the complex relationship between these variables.

Additional research questions: The project analysis offers a valuable starting point for understanding the complex interplay between residential population, household income, and residential housing prices. While a possible connection between population and housing price emerges, other factors also play a significant role.

For a more comprehensive picture, we should consider incorporating data on cost of living, industry distribution, and other regional economic trends and the questions could be:

- How does the cost of living vary across different regions in the United States, and how does this impact housing affordability?
- What industries are dominant in high cost versus low-cost housing areas, and how does this affect job availability and income levels?
- Are there any specific laws or tax policies that have a notable impact on housing prices or income levels in certain regions?