Regional and Socioeconomic Analysis of Cancer Trends

Overview of the Data Discovery Project

To assist Rochester Regional Health (RRH) in identifying strategic opportunities and regions that require medical intervention, our team conducted a comprehensive analysis of cancer incidence and mortality across the United States, with a specific focus on New York State. Using detailed data visualization and statistical analysis, we aimed to make insights accessible to a broad audience, including healthcare professionals and administrators. This project identifies high-risk regions, examines socioeconomic factors influencing cancer outcomes, and offers strategic recommendations to guide RRH's planning and enhance cancer care and community health initiatives. Through this approach, we uncovered key trends and actionable insights to inform RRH's healthcare strategies.

Methodology

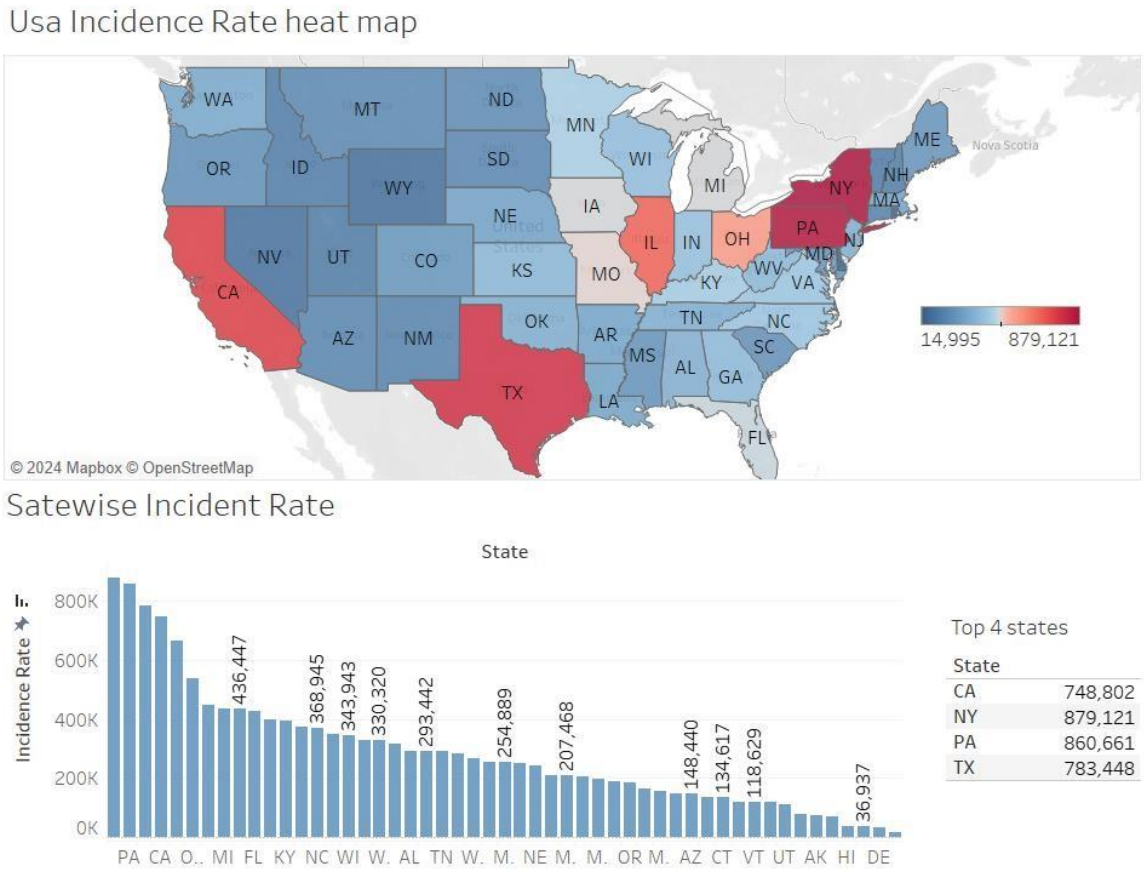
1. **Data Collection**: The dataset includes detailed information on cancer incidence and mortality across various regions in the United States, with attributes such as zipCode, State, PovertyEst (poverty estimates), medIncome (median income), popEst2015 (population estimate), incidenceRate, avgAnnCount (average annual case count), deathRate, and trends over time. The data enables a county-level analysis to explore socioeconomic factors like poverty and median income in relation to cancer outcomes.
2. **Data Processing**: We standardized and cleaned the data to ensure consistency, focusing on key columns like incidence rate, death rate, median income, poverty percentage, and recent trends. This step allowed us to perform meaningful visualizations and statistical analyses in Tableau.
3. **Data Analysis and Visualization**: Using Tableau, we created various visualizations, including bar charts, scatter plots, and geographic maps:
    - **Bar Charts**: Displayed incidence and death rates by county and state.
    - **Scatter Plots**: Examined correlations between factors like median income and poverty with cancer death and incidence rates.
    - **Maps**: Visualized cancer incidence and death rates by county across states for a spatial analysis of high-risk regions.
4. **Interpretation and Recommendations**: Based on these visualizations, we derived insights to inform Rochester Regional Health's strategy, focusing on areas with high incidence and death rates, as well as socioeconomic disparities affecting cancer outcomes.

Tools Used

- **Tableau**: Used for creating visualizations to analyze trends and correlations in cancer data, such as incidence rates and socioeconomic factors.

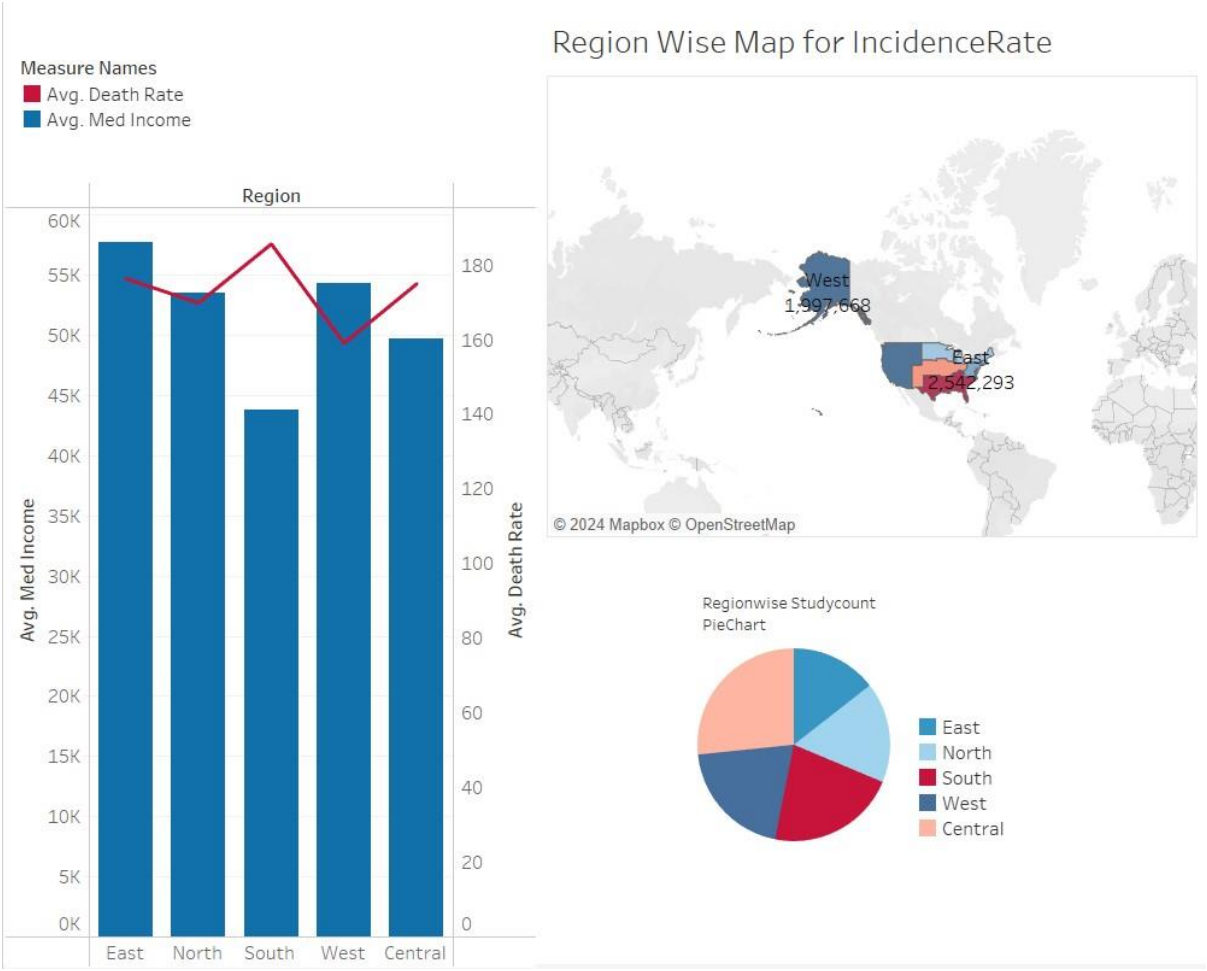
The analysis is structured to answer three main questions:

1. **Which regions of the country are most prone to cancer?**



The **USA Incidence Rate Heat Map** and **State wise Incident Rate Bar Chart** provide a clear picture of cancer incidence across the United States. The heat map uses color gradients to show the severity of incidence rates by state, with darker red indicating higher rates. The map highlights states like New York, Pennsylvania, Texas, and California as having the highest cancer incidence rates in the country, with New York leading at 879,121 cases.

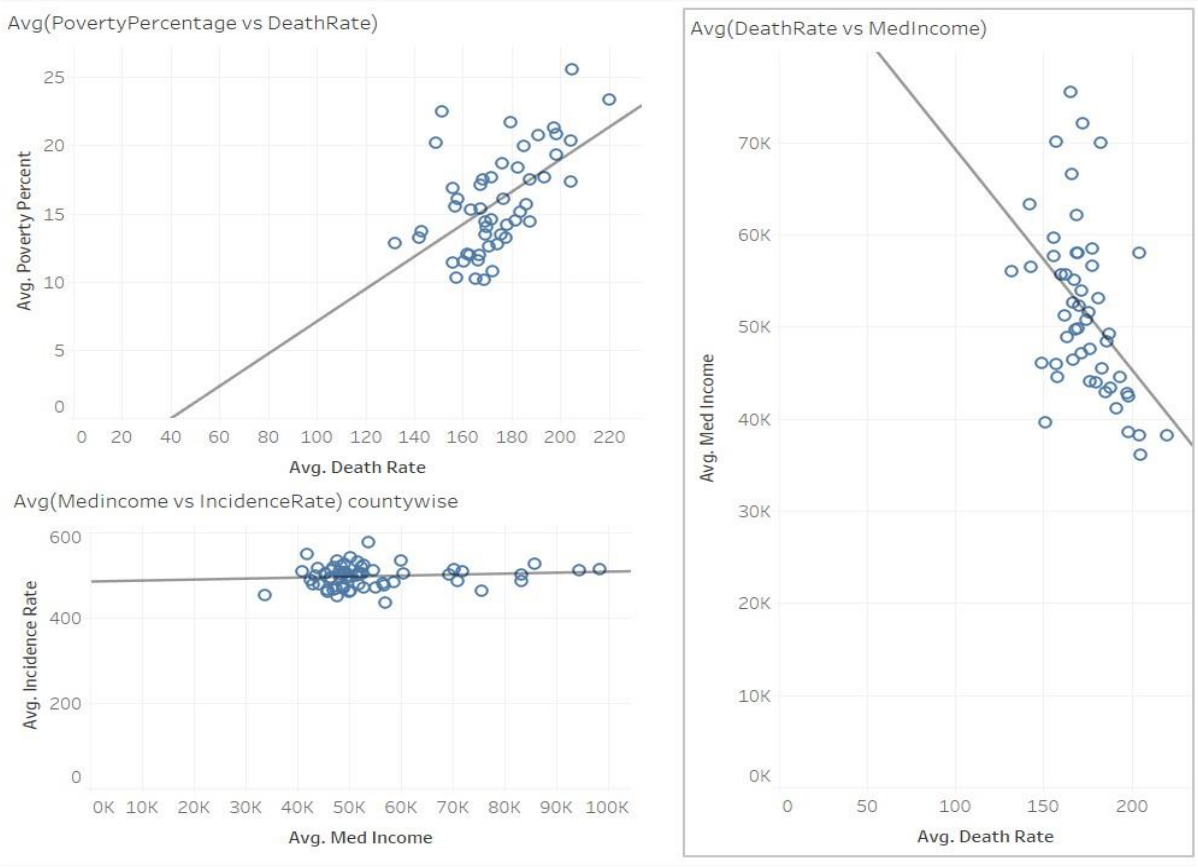
The **Statewise Incident Rate Bar Chart** further details the incidence rates across all states, emphasizing the disparity between high-incidence states (New York, Pennsylvania, California, and Texas) and states with lower rates. This visualization allows healthcare providers to identify and prioritize states with the greatest cancer burden, directing resources and interventions to the areas most in need.



The **Region Wise Map for Incidence Rate**, **Avg. Death Rate vs. Avg. Median Income by Region Bar Chart**, and **Region wise Studycount Pie Chart** provide insights into regional variations in cancer incidence and the socioeconomic factors influencing cancer outcomes across different U.S. regions.

- The **Region Wise Map for Incidence Rate** shows that the South and Central regions have the highest incidence rates, with significant disparities compared to other regions. This highlights these regions as particularly vulnerable to cancer, indicating a need for focused healthcare efforts.
- The **Avg. Death Rate vs. Avg. Median Income by Region Bar Chart** illustrates the correlation between income and death rates across regions. The South has lower median income levels and higher average death rates, while the East and West, with higher median incomes, experience lower death rates. This suggests that lower-income regions may lack adequate healthcare access, impacting cancer survival rates.
- The **Region wise Studycount Pie Chart** displays the distribution of studies across regions, showing that research efforts are fairly distributed but slightly more concentrated in the South and East, potentially reflecting the higher incidence and mortality in these areas.

2. How do the factors affecting cancer vary by region?

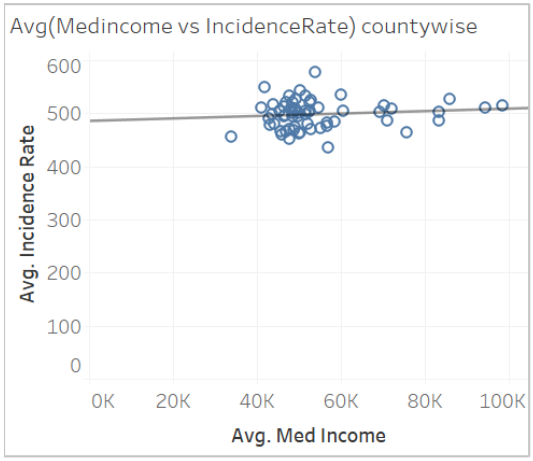


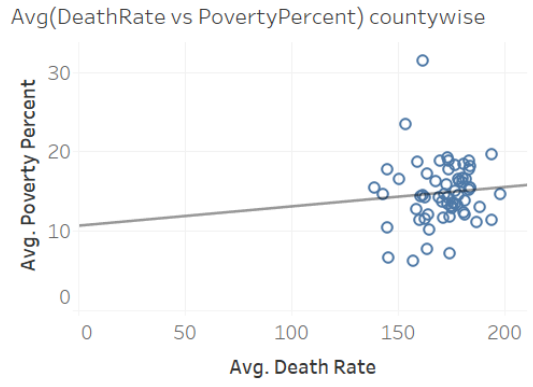
The scatter plots provide insights into how socioeconomic factors, specifically poverty and median income, correlate with cancer incidence and mortality rates across different counties in the United States.

- **Avg. Poverty Percentage vs. Avg. Death Rate**: This scatter plot reveals a strong positive correlation between poverty rates and cancer death rates, indicating that counties with higher poverty percentages tend to have higher mortality from cancer. This suggests that poverty is a critical factor affecting cancer outcomes, potentially due to limited access to healthcare and preventive services in low-income areas.
- **Avg. Death Rate vs. Avg. Median Income**: This plot shows a negative correlation between median income and cancer death rates, where counties with lower median incomes generally have higher death rates. This trend underscores the impact of economic resources on healthcare access and cancer survival, with wealthier counties likely benefiting from better healthcare facilities and early detection efforts.
- **Avg. Median Income vs. Avg. Incidence Rate (Statewise)**: The updated scatter plot now shows a weak positive correlation between median income and cancer incidence rates across states, suggesting that states with higher median incomes may report slightly higher incidence rates. This trend could be due to better access to healthcare and diagnostic facilities in wealthier states, leading to more cases being identified and documented. This finding aligns with the idea that wealthier areas may have more resources for health screenings and early detection.

3.Focusing on New York State, which factors are important? What should health professionals focus on to combat them? How should RRH proceed from a business perspective?

1. Socioeconomic Factors and Their Impact on Cancer Outcomes



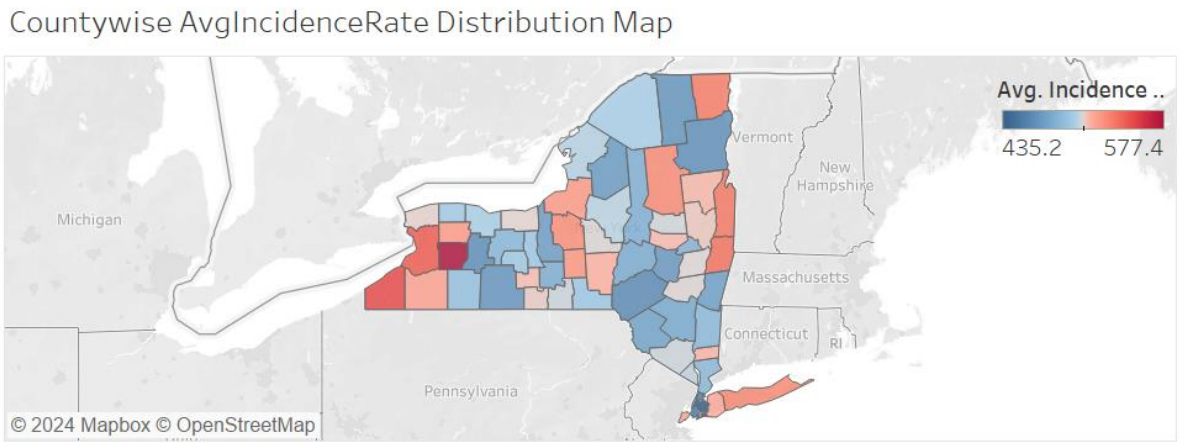


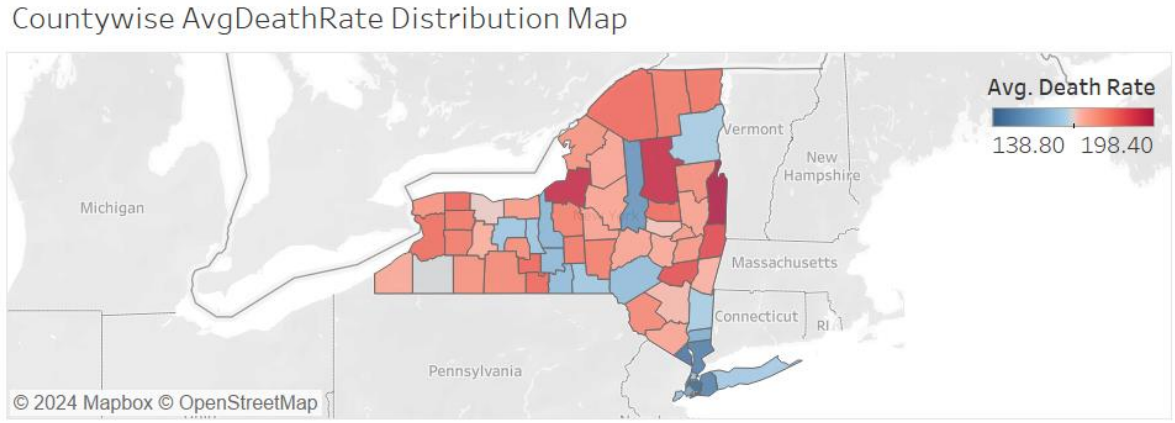
The analysis reveals key relationships between cancer incidence, mortality rates, and socioeconomic factors at the county level in New York:

- **Median Income vs. Incidence Rate**: There is a weak positive correlation, indicating that counties with higher median incomes might report slightly higher cancer incidence rates. This could reflect better healthcare access in wealthier areas, allowing for earlier detection and more reported cases.
- **Death Rate vs. Median Income**: A strong negative correlation is observed, showing that counties with lower median incomes have higher cancer death rates. This implies that income disparity may hinder access to quality cancer care, impacting survival rates.
- **Death Rate vs. Poverty Percentage**: There is a slight positive correlation, suggesting that counties with higher poverty levels face higher cancer mortality rates. This could be due to limited healthcare access, lack of preventive services, and lower health literacy in poorer communities.

Recommendation: Health professionals should prioritize low-income and high-poverty areas for preventive measures, early detection programs, and affordable treatment options. Targeted interventions in these communities could help reduce mortality rates by addressing healthcare access barriers.

2. Geographic Distribution of Cancer Incidence and Mortality Across New York



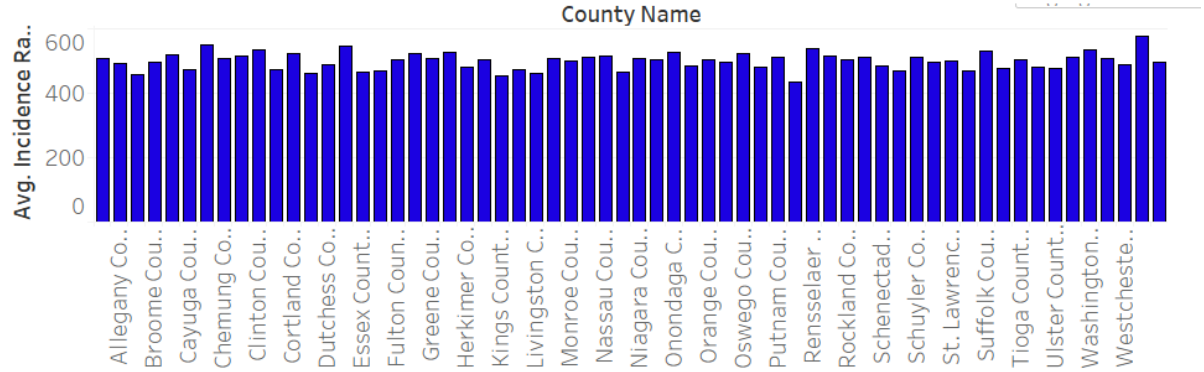


The geographic distribution of cancer incidence and mortality across New York shows:

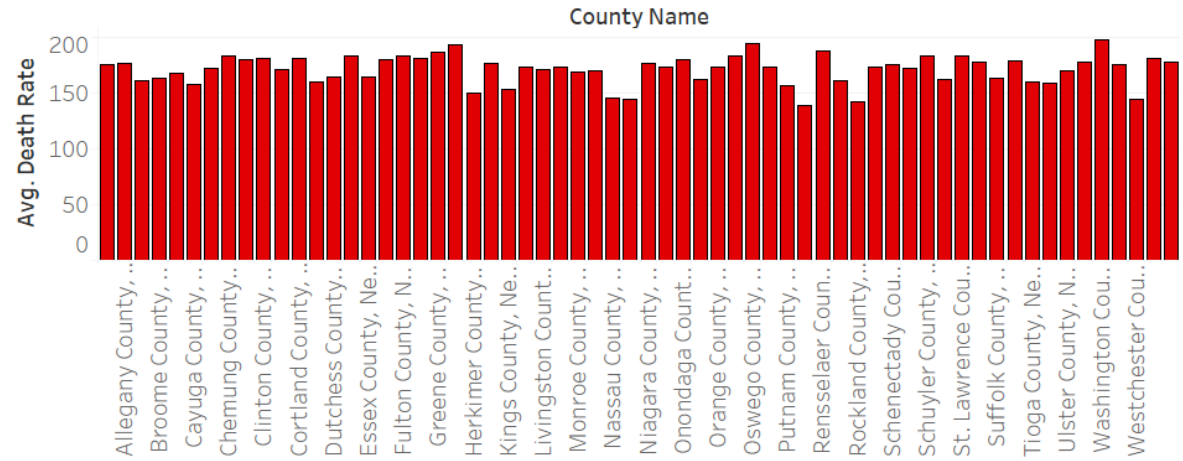
- **Incidence Rate**: Certain western and central counties have higher cancer incidence rates, indicating a need for enhanced screening and early detection initiatives in these areas.
- **Death Rate**: Higher death rates are concentrated in central and western parts of New York, where healthcare resources may be limited, making these regions a priority for healthcare support and intervention.

Recommendation: RRH should focus on enhancing healthcare infrastructure in high-mortality counties to improve access to diagnostics, treatment, and preventive care, thereby addressing healthcare disparities in underserved areas.

3. Detailed Analysis of County-Level Incidence and Death Rates



Countywise Death Rate of New York BarChart



An examination of county-level incidence and death rates reveals:

- **Incidence Rates**: Counties like Westchester and others show relatively high cancer incidence rates, underscoring the importance of consistent screenings and early detection programs.
- **Death Rates**: Higher death rates in several counties, particularly in low-income areas, highlight the need for comprehensive cancer care programs focusing on accessible and affordable treatment options.

Recommendation: For high-incidence counties, investments in screening and educational programs are essential for effective cancer management. In high-mortality counties, improving access to treatment facilities and initiating community health programs would be highly beneficial.

Business Strategy for Rochester Regional Health (RRH)

By implementing the above recommendations, RRH can establish itself as a leader in cancer care within New York by addressing the unique needs of high-incidence and high-mortality regions. Key steps include:

1. **Invest in Clinical Research and Trials**: Establish a dedicated research wing focused on cancer treatment innovations. This can attract patients seeking advanced care and enhance RRH's reputation in cancer research.
2. **Community Outreach and Education**: Launch educational campaigns in high-poverty, high-mortality counties to raise awareness about cancer prevention, screenings, and early symptoms. Educating these communities will promote proactive health behavior, potentially reducing future cancer rates.
3. **Expand Healthcare Access**: Increase healthcare facilities, particularly in western and central counties with higher death rates. Mobile clinics, telemedicine, and partnerships with local organizations could help RRH reach underserved populations.

These strategies will not only improve health outcomes in New York but also position RRH as a forward-thinking healthcare provider that actively addresses regional healthcare disparities.

Conclusion

This analysis of cancer incidence and mortality rates across New York State highlights the significant impact of socioeconomic factors, such as median income and poverty, on cancer outcomes. High-incidence and high-mortality counties, particularly in economically disadvantaged areas, reveal a need for targeted healthcare interventions. Recommendations for Rochester Regional Health (RRH) include expanding access to cancer screenings, improving treatment facilities in underserved areas, and launching educational campaigns to promote early detection and preventive care. By implementing these strategies, RRH can enhance community health, address regional healthcare disparities, and strengthen its role as a leader in cancer care across New York.