We are exploring patterns in hospital readmission rates across a numerous amount of facilities across the 5 regions of the United States. Specifically, our research questions asks

*What patterns exist regarding hospital readmission rates within various regions in the United States, and what are the diseases most commonly contributing to these readmissions?*

To answer, we analyzed the relationships between predicted, expected and observed readmission rates as well as investigated the specific diseases driving these readmissions. Here are our visualizations.

(optional) Our pre analysis correlation heatmap revealed a moderate correlation between predicted readmission rates and actual readmissions, serving as a foundational layer to answering the discrepancy between the two.

Our first visualization stands to be a **choropleth map** to visualize the average Excess Readmission Ratio (ERR) by state, with the interactive option to filter analysis by the 6 specific conditions. Because the ERR measures hospital specific readmissions to expected readmissions of comparable hospitals, it’s an insightful tool to see generally each states’ facility performance!

1. The map analysis under the CABG surgery shows states such as Wyoming and Alaska to stand out with the highest ERR values, indicating patients undergoing CABG surgery in these states are at a greater risk of readmission compared to the national averages of comparable hospitals and patients.
2. Heart Failure is the most prevalent condition contributing to hospital readmissions across all states except two! The map shows states in the Southeast and parts of the Midwest exhibiting above-expected readmission rates, with clusters of light orange/red indicating high ERRs.
3. On the positive side, we see the best management of Total Hip/Knee Arthroplasty Replacements through clusters of states in darker green, particularly in the Midwest, indicating lower-than-expected readmission rate.

Overall, we can see patterns of disparity and success, suggesting areas for targeted interventions or learning from successful management of hospital care.

Our third visualization, a **stacked bar chart** compares predicted and observed readmission rates across the 5 U.S. regions, showing minimal differences across the regions. For example, in the Southeast and Midwest, the predicted and expected rates align almost perfectly, while regions like the Northeast show only slightly larger differences. These small variations indicate that hospitals are performing close to their expected benchmarks, reflecting the accuracy of the prediction model. Overall, this suggests a consistent alignment in hospital performance across regions, with no significant over- or under-performance.

Our last analysis includes a **linear regression** combining the primary dataset of hospital readmissions with a dataset on health equity. This analysis explores the connection between health equity and hospital readmission rates, which ties directly to our research question. Health equity represents fairness in access to healthcare services, and understanding its impact helps identify regions where disparities might influence outcomes. The results show that health equity scores alone don’t strongly predict readmission rates, suggesting other factors also play a significant role. However, incorporating health equity into the analysis is important for identifying underserved areas and guiding efforts to improve healthcare outcomes and reduce readmissions.