Hospital Data Analysis Using Microsoft Azure SQL Database and Azure Data Studio

This report provides a comprehensive analysis of the hospital dataset, conducted using **Microsoft Azure SQL Database** and **Azure Data Studio**. The analysis covers key aspects including hospital distribution, performance ratings, procedure costs, and the relationship between cost and quality across different facility types.

Data Import and Setup

To begin the project, I imported the dataset into **Microsoft Azure SQL Database** using the **Insert Wizard** in **Azure Data Studio**. This tool provided an intuitive interface that allowed me to easily insert the data into the SQL tables by mapping columns from the CSV files directly to the database schema. By utilizing the **Insert Wizard**, I ensured that the data was correctly mapped and imported into the corresponding tables with proper data types.

Once the data was successfully imported into the **Azure SQL Database**, I performed the necessary data analysis using **Azure Data Studio**. After executing queries, I exported the results to **Excel**, which allowed me to further analyse the data in a readable and accessible format.

1. Hospital Distribution by Facility Type and State

The distribution of hospitals by **Facility Type** and **State** provides insights into the concentration of different hospital types across various regions. **Government** and **Private** hospitals are the most widely distributed across states, with **Church** and **Unknown** types being less common. **Government** hospitals are particularly concentrated in certain states, indicating their broader reach, while **Private** hospitals, though fewer, tend to offer higher-cost services.

2. Average Ratings by Facility Type

The average ratings for various hospital types, including **Overall Rating**, **Mortality Rating**, and **Safety Rating**, highlight significant differences in performance. **Private** and **Proprietary** hospitals generally receive higher **Overall Ratings**, indicating a higher perceived quality of service. However, **Government** hospitals show lower average ratings, especially in areas like **Mortality** and **Safety**. This suggests that while **Private** hospitals may offer higher quality, **Government** hospitals still play an essential role in providing healthcare services, albeit with potential areas for improvement in patient care.

3. Average Procedure Costs by Facility Type

The analysis of **Heart Attack**, **Heart Failure**, **Pneumonia**, and **Hip Knee** procedure costs across different **Facility Types** reveals notable trends. **Private** hospitals consistently report higher average costs for **Heart Attack** and **Heart Failure** procedures compared to **Government** hospitals, which offer more cost-effective solutions, especially for procedures like **Pneumonia** and **Hip Knee**. These findings indicate that while **Private** hospitals may be associated with higher costs, they also often provide specialized care that may justify the additional expense.

4. State-wise Comparison of Procedure Costs

A comparison of procedure costs across states uncovers significant regional variations. States such as **Alabama** exhibit higher procedure costs, with **Heart Failure** and **Pneumonia** procedures reaching average values of **£13,481** and **£14,822**, respectively. In contrast, states like **Alaska** show much lower procedure costs, suggesting a potential difference in healthcare pricing and access depending on geographic location.

5. Hospital Ratings Distribution

The distribution of **Overall Ratings** across hospitals reveals that a large proportion of hospitals are rated **2** (mid-range performance), while others are rated **3**, suggesting satisfactory performance. However, there is also a considerable number of hospitals with low ratings (**-1**), indicating a need for further investigation into the factors contributing to underperformance in certain facilities.

6. Performance of Facility Types in Specific Procedures

The analysis of performance in **Heart Attack** and **Heart Failure** procedures indicates that **Private** and **Proprietary** hospitals generally perform better than **Government** hospitals in these areas. **Church** hospitals, on the other hand, show relatively lower performance, highlighting potential areas for improvement in patient care and treatment outcomes.

7. Hospitals with the Highest Cost Procedures

The identification of hospitals with the highest procedure costs underscores significant disparities in pricing. Some hospitals, like **Memorial Hermann Texas Medical Center**, report extremely high costs for **Heart Attack** procedures, reaching **£29,670**. These hospitals may provide specialized or high-end services, which could explain their higher costs, but they also highlight the variations in healthcare pricing across different institutions.

8. Procedure Cost vs Quality (Heart Attack)

The relationship between **Heart Attack** procedure costs and quality ratings shows that hospitals with higher costs often correlate with better quality ratings, though there is variability across the dataset. A large number of hospitals report **Unknown** quality ratings, which may indicate inconsistencies or gaps in how quality is assessed and reported. This variability presents an opportunity for healthcare administrators to explore the factors influencing both cost and quality across different facilities.

Conclusion

The analysis conducted using **Microsoft Azure SQL Database** and **Azure Data Studio** provides valuable insights into hospital performance, cost structures, and quality metrics. Key findings include:

- **Cost-Effectiveness**: **Government** hospitals offer more cost-effective solutions for procedures like **Pneumonia** and **Hip Knee**, while **Private** hospitals tend to have higher costs for procedures like **Heart Attack** and **Heart Failure**.
- **Quality Improvement**: There is room for improvement in **Mortality** and **Safety Ratings**, particularly for **Government** and **Church** hospitals, which can benefit from targeted initiatives to improve patient outcomes.

- **Regional Variations**: Significant regional differences in procedure costs suggest that healthcare pricing is influenced by geographic location, with some states having higher costs than others.
- **Performance Disparities**: **Private** and **Proprietary** hospitals tend to perform better in specific procedures, while **Church** and **Government** hospitals may need to enhance their care delivery to match the performance of other facility types.