Healthcare Data Analysis with NHS Report

1. ## Data Cleaning and Structuring (using sql)
   o Preprocess the internal healthcare dataset.

Ans: The preprocessing include

- Checking and handling missing values
- Standardizing column names
- Converting data types (if needed)
- Filtering irrelevant or outlier data

Check count of null in each column: from the result none of the column has an empty value.

Converting data: The date table is formatted to the normal sql date format.

Filtering irrelevant or outlier data: No irrelevant or outlier was detected.

Organize structured healthcare records, including diagnoses, costs and treatments.

Ans: Few explanation of the output

- **Hypertension (F32)** was treated with medication for 4 sessions, costing a total of £1214.93, with a £303.73 average per session. The patient had 3 visits and 1 follow-up.
- **Type 2 Diabetes (F32)** also received medication, same duration, totaling £1052.81. 2 visits, 2 follow-ups.
- **Type 2 Diabetes (M54)** was treated via surgery, total cost £997.51, 3 visits, 1 follow-up.
- **Back Pain (F32)** treated with therapy, total cost £988.51, 4 visits, and 0 follow-ups.
- **Type 2 Diabetes (I10)** treated with therapy, total £987.31, 2 visits, and 2 follow-ups.

2. ## SQL-Based Querying and Trend Extraction
   o Use SQL to identify high-frequency diagnoses treatment, treatment description, and cost trends.

Ans: Few explanation of the output

High-Frequency Diagnosis & Treatment Summary

1. **F32 (Depression)** – Most common treatment: **A1 Medication**
   o **11 cases**, Avg. Cost: £261.10, Total Cost: £2,872.13
2. **J45 (Asthma)** – Frequent treatment: **D4 Medication**
   o **9 cases**, Avg. Cost: £273.35, Total Cost: £2,460.18
3. **M54 (Back Pain)** – Common use of **C3 Diagnostic Imaging**

- o **9 cases**, Avg. Cost: £241.36, Total Cost: £2,172.27
4. **M54 (Back Pain)** again – also treated with **D4 Imaging**
    - o **8 cases**, Avg. Cost: £286.36, Total Cost: £2,290.88
5. **J45 (Asthma)** – also treated with **B2 Medication**
    - o **8 cases**, Avg. Cost: £288.80, Total Cost: £2,310.36

Analyze patient outcomes by age group, gender, and regional location

Ans: The response was generated in a csv file.

3. NHS Benchmark Comparison
   - o Compare treatment costs with NHS Tariff Payment System data

Ans:

Summary of NHS Tariff Comparison:
Cost_Comparison
Above Tariff   31138
Below Tariff   18777
At Tariff   4500

- **31,138 treatments** cost **more than the NHS standard (Above Tariff)**.
- **18,777 treatments** cost **less than the NHS standard (Below Tariff)**.
- **4,500 treatments** matched the **exact NHS tariff rate (At Tariff)**.

Conclusion: Most treatments were above the NHS cost benchmark, indicating higher healthcare spending.

4. Geographic Health Pattern Analysis
   - o Identify trends such as regional prevalence of certain conditions.

Ans:

Region	Diagnosis_Description	Case_Count
29 Manchester	Type 2 Diabetes	26
23 London	Hypertension	25
7 Bristol	Depression	22
12 Glasgow	Depression	22
2 Birmingham	Depression	19

The top 5 most common health conditions by region are:

- **Manchester:** Type 2 Diabetes (26 cases)
- **London:** Hypertension (25 cases)
- **Bristol:** Depression (22 cases)
- **Glasgow:** Depression (22 cases)

- **Birmingham:** Depression (19 cases)

Depression appears frequently across multiple regions.

5. Visualization and Reporting
   o   Use Power bi to build dashboards comparing internal and NHS data on diagnoses, treatment cost, and service efficiency
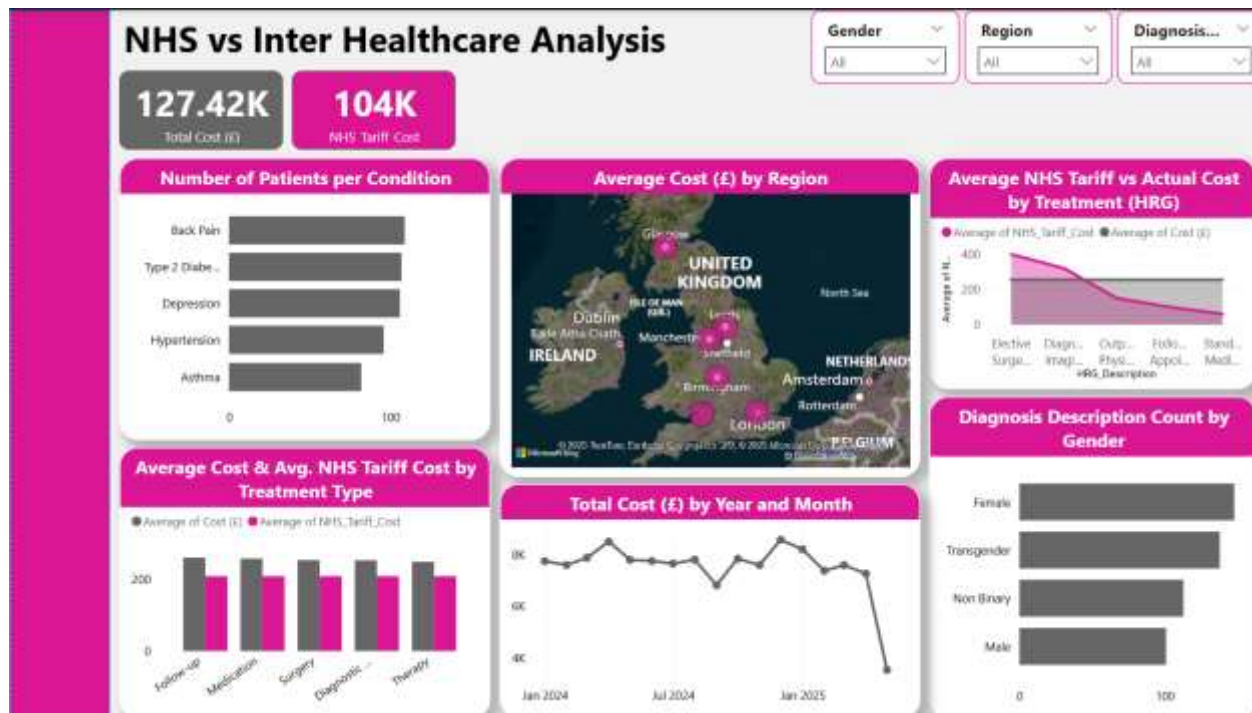
POWER BI INTERPRETATION

Objectives:

1. See which health conditions are most frequent.
2. Compare internal treatment cost with NHS standard cost.
3. Compare average treatment cost across UK regions to identify cost variations. Spot high-case regions.
4. Compare gender with diagnosis description
5. Overall cost / NHS tariff cost.

Add slicers for dynamic filtering:

- Gender
- Region
- Age Group
- Diagnosis
- Treatment Type

Interpretation

- **Total Cost (£):** £127.42K - the actual total healthcare cost across all treatments.
- **NHS Tariff Cost (£):** £104K the expected or standard cost set by the NHS for the same services.
- **Meaning:** Actual costs are higher than NHS estimates.

Charts Breakdown

1. Number of Patients per Condition

Shows how many patients have each health issue:

- Most common: Back Pain, Type 2 Diabetes, Depression.
- Less common: Asthma.

2. Average of Cost (£) by Region (Map)

This map shows:

- Which UK regions spend the most on healthcare.

3. Average NHS Tariff vs Actual Cost by Treatment (HRG)

Compares actual costs to NHS tariffs by treatment type:

- Pink line: NHS tariff (expected).
- Purple bar: Actual cost (what was spent).
- Example: Elective Surgery cost is much higher than NHS expectations.

4. Average Actual vs NHS Tariff Cost by Treatment Type

Breaks down treatment types like:

- Shows how each treatment's real cost compares with NHS tariff.

5. Monthly Cost Trend Over Time

Line chart showing monthly healthcare costs over time (from Jan 2024 to early 2025):

- Costs fluctuate but mostly stay between £6K–£9K.
- A dip in cost is seen in the most recent months.

6. Diagnosis Frequency by Gender

Shows how different genders are diagnosed:

- Females have the highest number of diagnoses.
- Other genders like Transgender and Non-Binary also represented.

Filters (Top Right)

You can filter the data by:

- **Gender**
- **Region**
- **Diagnosis Description**

Conclusion:
The analysis reveals that diagnosis patterns vary across genders, with some conditions being more common in one gender than the other. This insight can help tailor healthcare interventions more effectively.

Recommendation:
Healthcare providers should use gender-specific trends to improve diagnosis accuracy and target health education programs to the right audience.