📊 HOSPITAL ANALYTICS DASHBOARD - REPORT

📘 Introduction

Healthcare organizations increasingly rely on data analytics to monitor patient flow, optimize operational efficiency, control costs, and improve quality of care. Hospitals collect large volumes of patient, treatment, and billing information, but without proper analysis, these insights remain untapped.

This Power BI project transforms raw hospital data into an interactive analytics dashboard that supports strategic decision-making across patient engagement, financial performance, claim processing, and geographical distribution of services.

📌 Project Objective

The main objectives of this project are:

1. To create a unified Power BI dashboard for patient, claim, and revenue insights.
2. To analyse operational efficiency through encounter types, weekly patient flow, and gender trends.
3. To evaluate financial performance using cost distribution, charge decomposition, and revenue indicators.
4. To provide location-based insights using geographic mapping and city-wise ranking.
5. To empower decision-makers with interactive slicers (Ethnicity, Weekday, City, Country, Patient Type, Charges).

📂 Data Sources

Sources :

- 📅 https://mavenanalytics.io/data-playground/hospital-patient-records

❓ Problem Statement

Hospitals often struggle with:

- Limited visibility into daily/weekly patient volumes
- Difficulty tracking gender-wise trends and encounter types
- Weak understanding of charge distribution across cities
- Lack of clarity in claim status allocations (high/medium/low cost)
- Inefficient monitoring of revenue performance vs targets
- No consolidated system that connects patients, geography, and financials into a single source of truth.

📄 Key Attribute Details

Attribute Name	Data Type	Description
PATIENT_ID	Text	Unique identifier for each patient in the dataset
BIRTH_DATE	Date	Birth date (Year/Month/Day) of the Patient.
MARITAL	Text	The patient's marital status
CATEGORY	Text	Represents the patient's race or demographic category
ETHNICITY	Text	Specifies the ethnic background of the patient.
GENDER	Text	Gender of the patient
CITY	Text	City where the patient resides
STATE	Text	State of residence
COUNTRY	Text	Country name for high-level geographical segmentation
STATE ID	Integer	Numeric identifier for the state
FULL NAME	Text	Patient's full legal name
ADMISSION DATE	Date	Hospital admission or visit date
ENCOUNTERCLASS	Text	Type of clinical encounter
BASE_ENCOUNTER_COST	Currency	Cost before insurance claim
CLAIM_COST	Currency	Total claimed amount
BALANCE_CLAIMCOST	Currency	Pending or unpaid claim amount
CLAIM_STATUS	Text	Classification of claim (Low/Medium/High)

🧹 Data Preprocessing Steps

1. **Data Collection:**
   Gathered data of https://mavenanalytics.io/data-playground/hospital-patient-records from Maven Analytics Portal
2. **Data Consolidation:**
   Combined monthly Excel sheets, removed subtotals and redundant rows.
3. **Automation (Macros):**
   Automated repetitive formatting tasks like column alignment and styling.
4. **Data Cleaning (Power Query):**
   Filled missing values, standardized text formats, corrected data types.
5. **Data Transformation:**
   Added calculated flag columns and harmonized field names.
6. **Data Integration:**
   Appended cleaned datasets into a unified dataset of https://mavenanalytics.io/data-playground/hospital-patient-records for visualization.

❖ Calculated Measures

- Total Patients = COUNTROWS(patients)
- Total Claimcost = SUM(encounters[CLAIM_COST])
- Total Cities = COUNTA(patients[CITY])
- Total Charges = SUM(procedures[MEDICAL CHARGES])
- Total BaseCost = SUM(encounters[BASE_ENCOUNTER_COST])
- Total BaseCost = SUM(encounters[BASE_ENCOUNTER_COST])
- Avg Cost per Day = DIVIDE(SUM(procedures[MEDICAL CHARGES]), SUM(procedures[Days_Admitted]))
- Average Claimcost = AVERAGE(encounters[CLAIM_COST])
- Average Charges = AVERAGE(procedures[MEDICAL CHARGES])
- AVERAGE BASE COST = AVERAGE(encounters[BASE_ENCOUNTER_COST])

❖ Calculated Tables

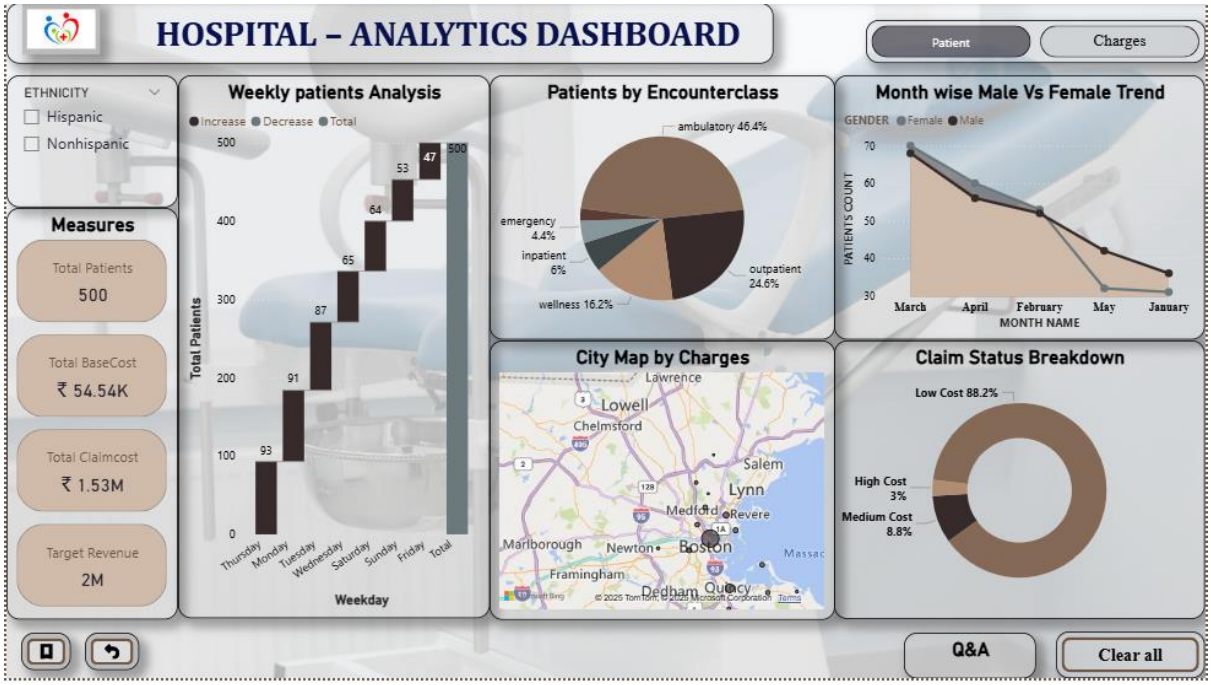
- **Calendar Table:**
  The Calendar table provides a complete date structure with Year, Quarter, Month, and Date fields. It enables accurate time intelligence (YTD, MTD, QTD) and ensures all measures work consistently across time.
- **Measures Tables:**
  The Measure Values table stores all DAX measures used in the dashboard, such as totals, averages, revenues, and ranking metrics. It keeps all calculations organized in one place, making the data model cleaner, easier to manage, and more efficient.

❖ Calculated Columns

- **CLAIM_STATUS** = IF(encounters[CLAIM_COST] >= 20000, "High Cost",IF(encounters[CLAIM_COST] >= 10000 && encounters[CLAIM_COST] < 20000,"Medium Cost","Low Cost"))
- **BALANCE_CLAIMCOST** = encounters[CLAIM_COST]-encounters[BASE_ENCOUNTER_COST]

📊 HOSPITAL ANALYTICS DASHBOARD

Dashboard 1: Patient & Claim



📍 Patient & Claim Dashboard Insights

1. Weekly Patients Analysis

- Highest patients recorded on Friday (500 patients)
- Strong upward trend after midweek
- Monday & Tuesday show lower patient inflow
- Helps plan staffing and appointment availability

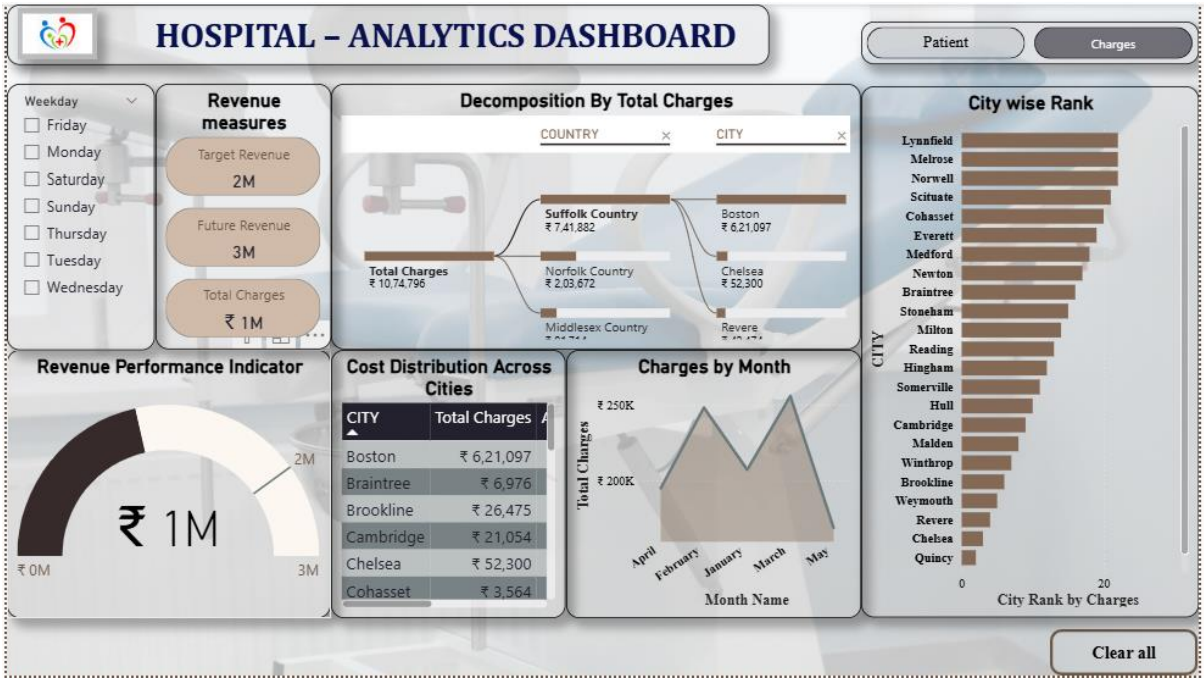
2. Patients by Encounter Class

- Ambulatory accounts for the highest share (≈ 46%)
- Outpatient is the second-most used class (≈ 24%)

- Indicates high demand for walk-in treatments and non-admission services

3. Male vs Female Trend (Monthly)
   - March shows the highest patient count
   - Female and male trends follow a similar decline toward May
   - Indicates seasonal fluctuations or campaign-driven traffic
4. Claim Status Breakdown
   - Majority of claims lie in Low Cost (88%)
   - Medium (8.8%) & High Cost (3%) claims are significantly lower
   - Indicates efficient cost management and fewer expensive treatments
5. City Map by Charges
   - Higher billing clusters observed in areas like Boston, Chelsea, and Cambridge
   - Geographic visualization helps monitor region-wise service consumption
   - Useful for planning hospital outreach or expansion
6. KPI Summary
   - Total Patients: 500
   - Total Base Cost: ₹54.54K
   - Total Claim Cost: ₹1.53M
   - Target Revenue: 2M

❖ Revenue & City Performance Dashboard



📍 Revenue & City Performance Dashboard Insights

1. Revenue Measures

- Target Revenue: 2M
- Future Revenue: 3M
- Total Charges: 1M
- Indicates progress toward goals and forecasting potential

2. Decomposition Tree (Charges by Country → City)

Breakdown by Country and then by specific cities:

- Suffolk Country: Highest contributor
    - Boston
    - Chelsea
- Norfolk Country
- Middlesex Country

This helps identify high-value zones and underperforming areas.

3. City-wise Rank by Charges

Top-performing cities:

1. Lynnfield
2. Melrose
3. Norwell
4. Cohasset
5. Everett

Provides clear insight into geographical revenue hierarchy.

4. Charges by Month

- Revenue fluctuations across Jan–May
- Peaks during March, dips in May
- Helps forecast and allocate resources seasonally

5. Cost Distribution Across Cities

- Boston leads with ₹6,21,097
- Cambridge and Brookline follow
- Supports financial and operational decision-making

📜 Key Insights & Summary

Operational Insights

- Friday is the busiest day; staffing should align accordingly.
- Ambulatory and outpatient services are most in demand.
- Gender distribution is consistent across months.

Financial Insights

- Low-cost claims dominate, reducing financial risk.
- Major revenue is concentrated in a handful of cities.
- Total charges (1M) lag behind future revenue targets (3M).

Geographical Insights

- Boston metro region shows highest charges.
- Several smaller towns still generate meaningful contributions.

📘 Conclusion

This Power BI analytics solution provides hospital administrators with a comprehensive, interactive, and data-driven view of patient activity, cost structures, claim status, and revenue performance.

By combining operational, financial, and geographical insights into a single dashboard, decision-makers can:

- Improve resource planning
- Optimize revenue strategy
- Strengthen patient engagement
- Monitor claim cost efficiency
- Prioritize high-performing cities

The result is a scalable, professional BI system that enhances transparency and supports evidence-based decision-making.