HOSPITAL PERFORMANCE ANALYTICS DASHBOARD

Executive Summary

An interactive Power BI solution that analyzes hospital admissions, revenue, and patient demographics to support data-driven operational and strategic decisions.

Project Overview

The project showcases a fully interactive dashboard built to monitor and analyze hospital performance metrics using real-world healthcare business scenarios. An integrated dashboard designed to analyze hospital operations, patient demographics, department efficiency, doctor performance, and revenue trends. The focus of this project is to demonstrate business intelligence skills, data modeling, and visual storytelling using Power BI for data-driven healthcare decision-making.

The dashboard enables stakeholders to:

- Track patient volume, revenue, treatment cost, and length of stay
- Analyze admission trends by time and day
- Compare department-level and doctor-level performance
- Understand patient demographics and regional distribution
- Identify revenue and cost drivers across treatments

Objectives

The primary objective of this Power BI project is to transform raw hospital operational data into actionable business insights through interactive visual analytics.

→ Key goals of this dashboard include:

- Monitoring overall hospital performance KPIs
- Analyzing admission trends over time
- Comparing department-wise efficiency and revenue
- Evaluating doctor performance and workload
- Understanding patient demographics and regional spread
- Identifying treatment-level revenue and cost drivers

→ Key Business Questions Addressed

This dashboard is designed to answer critical healthcare business questions such as:

- How are patient admissions trending month-over-month?
- Which departments generate the highest revenue?
- Which doctors handle the most patients and revenue?
- Are certain departments experiencing longer lengths of stay?
- What is the demographic profile of hospital patients?
- Which treatments contribute most to hospital revenue?

Dataset Overview

The dataset includes the following key components:

- Admissions Data – Admission dates, discharge dates, length of stay
- Treatment Data – Treatment type and cost
- Patient Data – Age, age group, gender, region
- Doctor Data – Doctor names and specialization
- Department Data – Hospital departments
- Date Data – Calendar attributes for time analysis

Data Model & Relationships

A star schema–based data model was designed in Power BI to ensure optimal performance and analytical flexibility.

→ Key characteristics of the data model:

- Fact Tables: Admissions, Treatments
- Dimension Tables: Patients, Doctors, Departments, Date
- One-to-many relationships between dimensions and fact tables
- Proper date relationships to support time intelligence analysis

<u>Fact Tables</u>

1. Admissions

- AdmissionID
- PatientID
- DoctorID
- DepartmentID
- AdmissionDate
- DischargeDate
- LengthOfStay

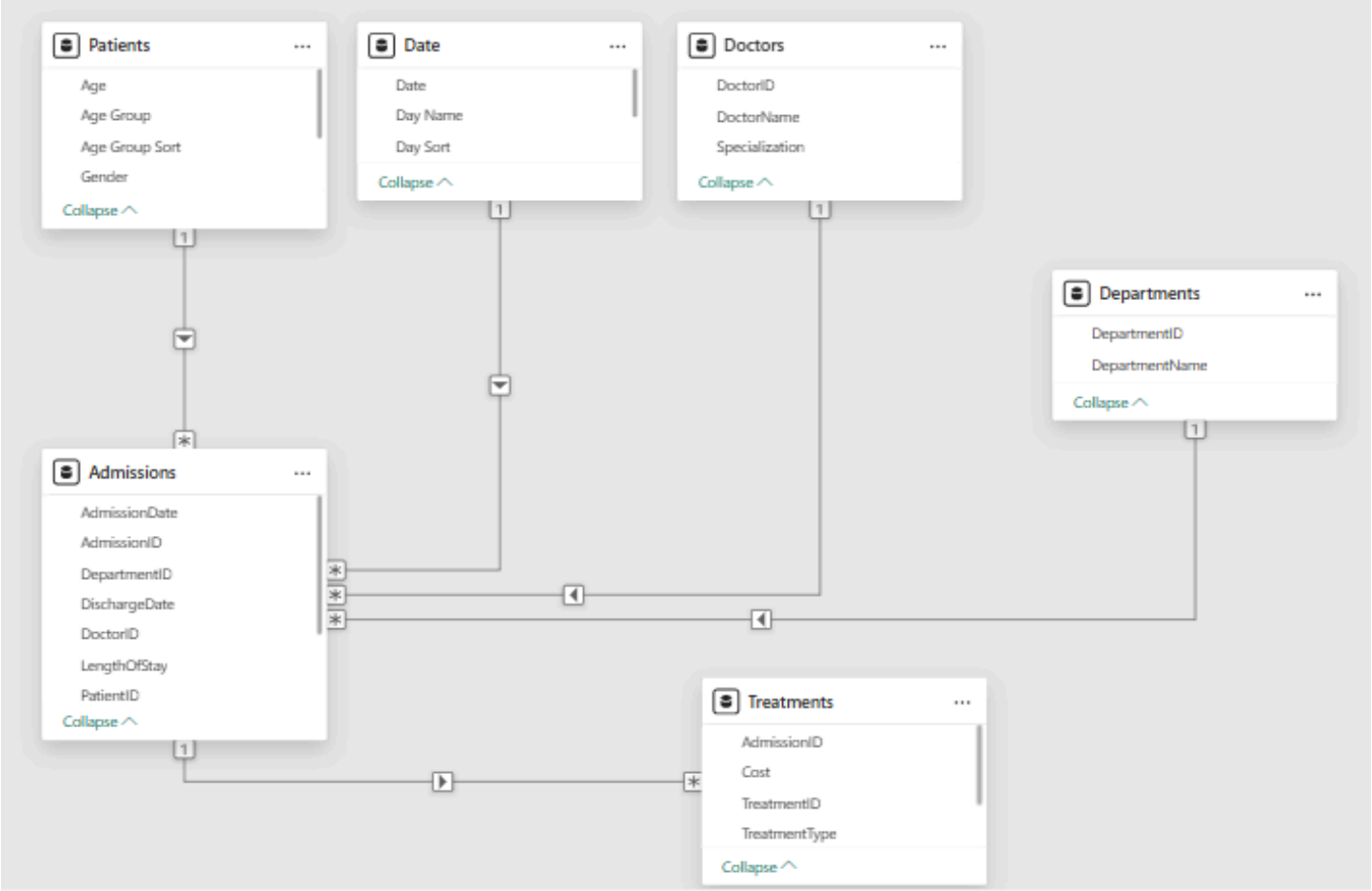
2. Treatments
- TreatmentID
- AdmissionID
- TreatmentType
- Cost

Dimension Tables

1. Patients
- PatientID
- Age
- Gender
- Region
2. Doctors
- DoctorID
- DoctorName
- Specialization

3. Departments
- DepartmentID
- DepartmentName

4. Date
- Date
- Year
- Month



This modeling approach ensures:

- Accurate aggregations
- Efficient cross-filtering
- Scalable and maintainable analytics

Data Cleaning & Transformation

Before building the dashboard, the data was cleaned and transformed using Power Query.

→ Key data preparation steps included:

- Removing duplicates and invalid records
- Renaming columns for clarity and consistency
- Standardizing data types (dates, numeric fields)
- Creating derived columns (Age Groups, Month Name, Day Name)
- Filtering unnecessary columns for performance optimization

DAX Measures & Calculations

To enable dynamic KPIs and insights, multiple DAX measures were created.

These measures allow the dashboard to:

- Respond dynamically to slicers
- Support trend and comparison analysis
- Provide consistent business metrics

→ Key DAX Measures

1. `Total Patients = DISTINCTCOUNT(Admissions[PatientID])`
2. `Total Revenue = SUM(Treatments[Cost])`
3. `Total Admissions = COUNT(Admissions[AdmissionID])`
4. `Avg Treatment Cost = AVERAGE(Treatments[Cost])`
5. `Avg Length of Stay = AVERAGE(Admissions[LengthOfStay])`

Dashboard Pages & Visual Overview

Page 1: Executive Overview

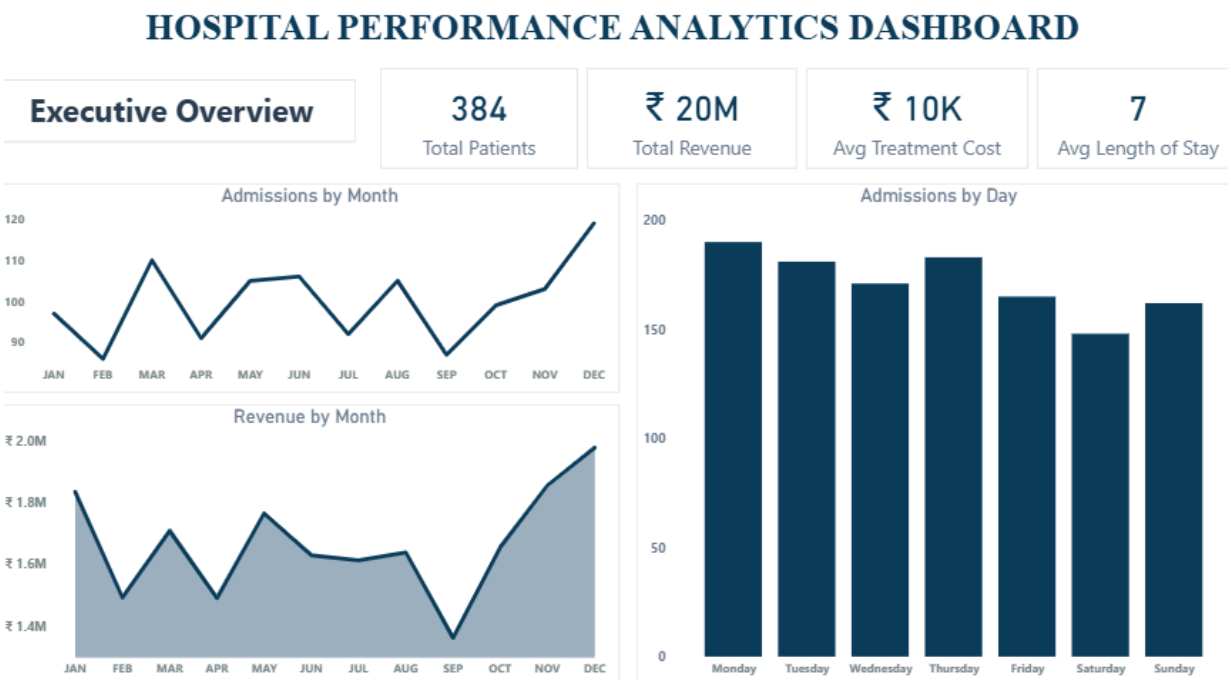
This page provides a high-level snapshot of overall hospital performance. It enables executives to quickly assess hospital health and performance trends.

→ Key KPIs

- Total Patients
- Total Revenue
- Avg Treatment Cost
- Avg Length of Stay

→ Insights Covered

- Admissions trend by month
- Revenue trend by month
- Admissions by day of week

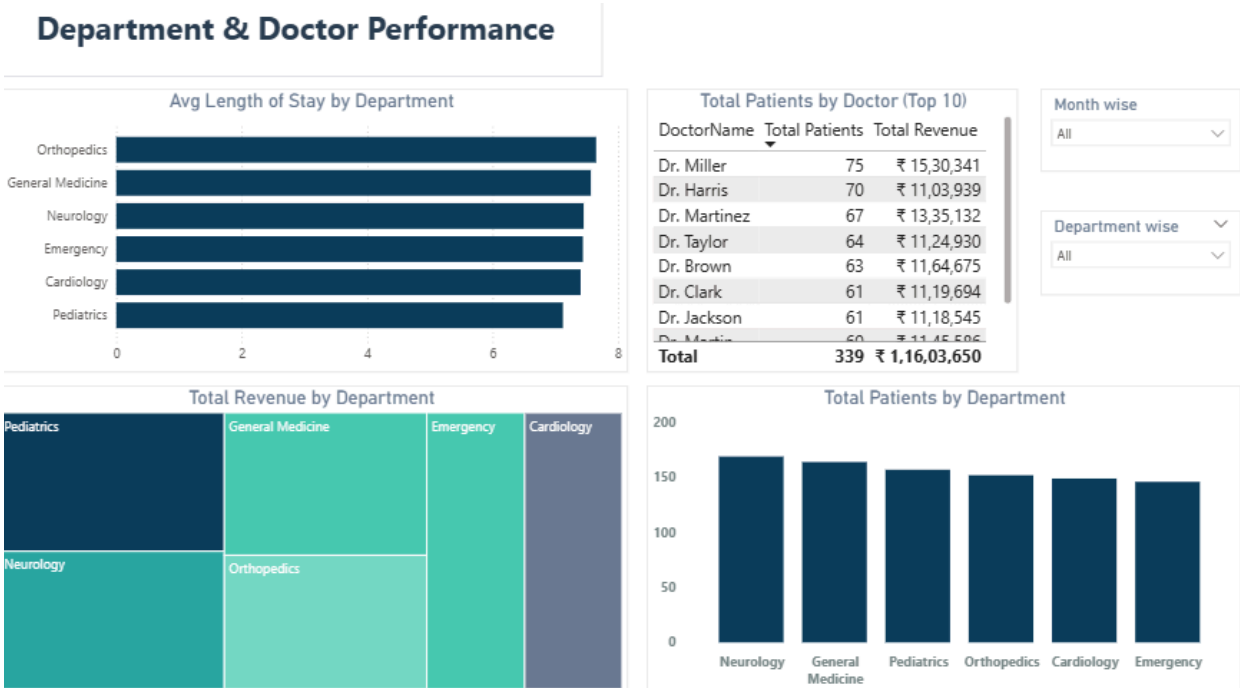


Page 2: Department & Doctor Performance

This page focuses on operational efficiency and performance evaluation. This view helps identify high-performing departments and doctors as well as operational bottlenecks.

→ Insights Covered

- Avg Length of Stay by Department
- Total Patients by Department
- Total Revenue by Department (Treemap)
- Top 10 Doctors by Patients and Revenue
- Month-wise and Department-wise filtering

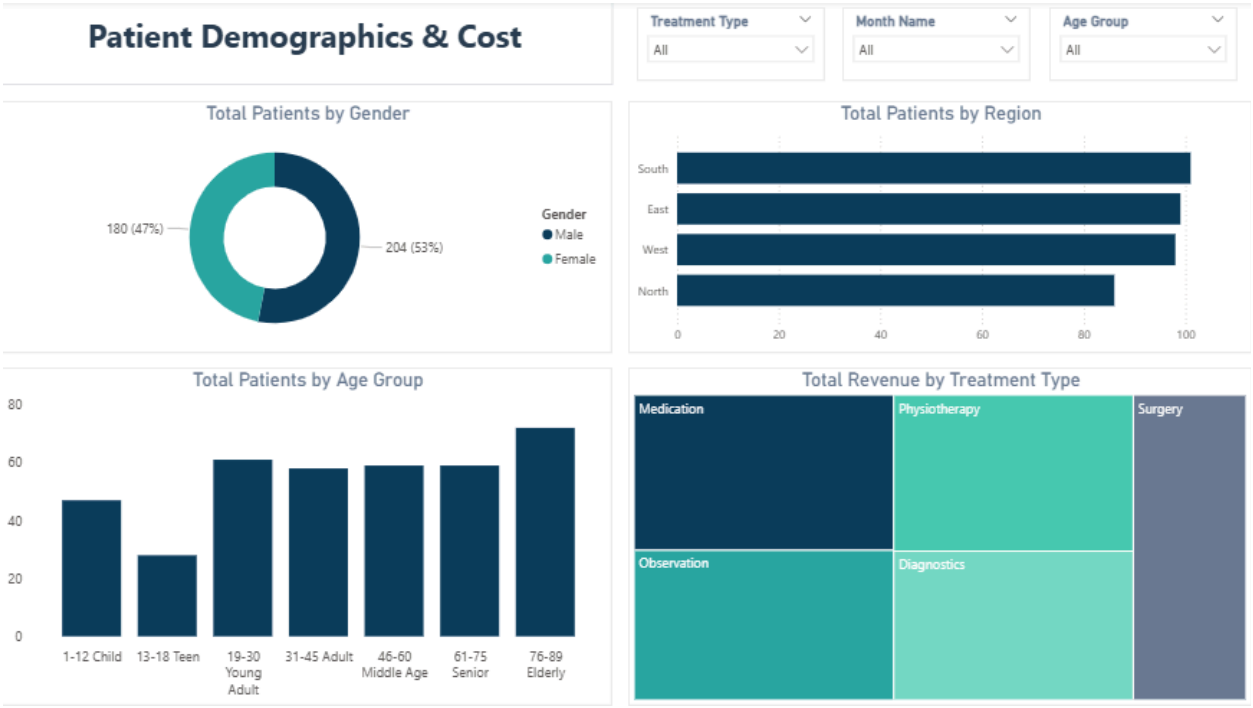


Page 3: Patient Demographics & Cost

This page analyzes patient profiles and treatment revenue distribution. It supports patient-centric planning and cost optimization.

→ Insights Covered

- Patient distribution by gender
- Patients by region
- Patients by age group
- Revenue by treatment type



Key Insights & Business Takeaways

1. Admissions & Revenue Trends

- Admissions and revenue show seasonal patterns.
- End-of-year months demonstrate higher activity.

2. Department Performance

- Some departments handle high patient volumes but generate lower revenue.
- Others generate higher revenue with fewer patients, indicating specialized treatments.

3. Doctor Performance

- A small group of doctors contributes significantly to patient volume and revenue.
- Performance varies by department and time period.

4. Patient Demographics

- Adult and elderly age groups form the majority of patients.
- Regional distribution highlights potential focus areas for outreach.

Tools & Technologies Used

- Excel — Data source
- Star Schema — Data modeling
- Power Query — Data cleaning & transformation
- DAX — Business calculations
- Power BI Desktop — Dashboard development

Conclusion

- The project demonstrates the effective use of hospital operational data to support informed business and clinical decision-making.
- By analyzing admissions, treatments, departments, doctors, and patient demographics, the dashboard uncovers key trends in patient volume, revenue contribution, treatment costs, and length of stay.
- Through a well-structured star schema and clearly defined KPIs, raw data is transformed into actionable insights that help identify performance drivers, operational inefficiencies, and utilization patterns.
- Overall, the solution enables stakeholders to improve capacity planning, performance management, and strategic decision-making within a healthcare environment.

Future Enhancements

- Add readmission rate and patient outcome analysis
- Implement doctor-level drill-through pages
- Introduce forecasting for admissions and revenue
- Add patient satisfaction metrics
- Apply Row-Level Security (RLS) for role-based access