

Hospital Healthcare Management Analytics

Power BI Dashboard Project

Tools Used: Power BI, Power Query, DAX, Excel

Domain: Healthcare Analytics

1. Project Overview

Healthcare organizations generate significant volumes of operational data related to patient care, staffing, departmental operations, and resource utilization. Effectively analyzing this data is essential for improving patient flow, optimizing resource allocation, and enhancing overall operational efficiency.

This project leverages Power BI to analyze hospital healthcare management data and develop an interactive dashboard that delivers insights into patient visits, bed utilization, length of stay, emergency room (ER) wait times, and treatment costs. The dashboard is designed to support data-driven decision-making for hospital administrators and operational teams.

2. Business Objectives

The primary objectives of this project are to:

- Analyze inpatient and outpatient visit trends
- Monitor average length of stay and ER waiting times
- Track bed occupancy and utilization patterns
- Evaluate department-level operational performance
- Provide actionable insights to support hospital management decisions

3. Data Source

- Source: Hospital Healthcare Management Dataset (Excel)
- Granularity: Patient-level visit records

Key Data Elements:

- Patient demographics (age, patient type)
- Visit details (visit date, length of stay, ER time)
- Department and staff information
- Bed attributes and occupancy status
- Treatment cost data

4. Data Preprocessing (Power Query)

Data preparation and transformation were performed using Power Query Editor in Power BI to ensure data accuracy and consistency.

Key preprocessing activities included:

- Promoting the first row as column headers
- Removing duplicate and inconsistent records
- Standardizing data types across all fields
- Renaming columns for clarity and business relevance
- Creating supporting dimension tables
- These steps ensured the dataset was clean, reliable, and optimized for analytical reporting.

5. Data Modeling

A star schema data model was implemented to support efficient querying and scalable reporting.

Fact Table:

- Fact_Patient_Visit
- Contains patient encounter-level metrics such as length of stay, ER time, and treatment cost

Dimension Tables:

- Dim_Staff – staff identifiers and role information
- Dim_Department – department-level attributes
- Dim_Bed – bed type and occupancy status
- Dim_Date – calendar attributes for time-based analysis

Relationships:

- One-to-many relationships from dimension tables to the fact table
- Single-direction cross-filtering to ensure optimal performance and accurate filtering behavior.

6. Measures & KPIs (DAX)

Key performance indicators were developed using DAX to enable dynamic and interactive analysis:

- Total Visits
- Inpatient Visit Count
- Average Length of Stay
- Average ER Time
- Average Treatment Cost
- Occupied Beds Count
- Distinct Beds Utilized

These KPIs support flexible analysis across departments, time periods, and patient types.

7. Dashboard Design & Visualization

The Power BI dashboard was designed with usability and clarity in mind and includes:

- KPI cards highlighting key operational metrics
- Department-wise and date-wise trend visualizations
- Bed utilization and occupancy analysis
- Interactive slicers for department, date, and patient type
- A clean and consistent layout to enhance user experience

The dashboard enables rapid insights and supports effective operational monitoring.

8. Key Insights

- Certain departments consistently exhibit higher bed occupancy rates
- Inpatient visits contribute significantly to overall treatment costs
- ER waiting times vary notably across departments and peak periods
- Length-of-stay trends indicate opportunities for process optimization

9. Business Impact

This dashboard enables hospital leadership to:

- Optimize bed allocation and reduce patient congestion

- Improve patient throughput and ER operational efficiency
- Monitor departmental performance in near real-time
- Support informed, data-driven operational decisions

10. Conclusion

This project demonstrates an end-to-end Power BI analytics workflow, encompassing data preparation, dimensional modeling, KPI development, and dashboard visualization. It reflects real-world healthcare analytics use cases and highlights the ability to convert raw operational data into meaningful, actionable insights.

11. Future Enhancements

- Implementation of predictive analytics for patient volume forecasting
- Development of role-based dashboard views for different stakeholders