Healthcare Data Analysis Dashboard

This interactive dashboard was developed in Power BI to extract meaningful insights from hospital visitor data, enabling better resource planning and decision-making. It utilizes DAX formulas, Power Query Editor, and robust data modeling techniques to analyze trends in patient demographics, visit behaviors, satisfaction levels, and service efficiency. By leveraging these visual insights, healthcare providers can enhance their service delivery and patient care experience**.**

## **Introduction**

Created an interactive dashboard using Power BI to reveal key trends in hospital visitor data for informed decision-making. Utilized DAX for insights into patient demographics and service usage, boosting operational efficiency and patient satisfaction. This dynamic data visualization tool incorporates data modeling principles and various data sources for effective data transformation. By implementing KPIs and utilizing Power Query, healthcare professionals can explore interactive visuals that enhance resource optimization and improve patient care quality through business intelligence.

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## **Key Technologies and Skills**

* Power BI
* Power Query Editor
* Data Analysis Expressions (DAX)
* Excel

## **Features**

## **Data Understanding:**

The healthcare dataset includes features like Date, ID, Gender, Age, Race, Moment (AM/PM), Weekday/Weekend, Admin Flag (Patient/Non-Patient), Department Referral, and Satisfaction Score. These fields allow for a detailed look at visitor demographics, visit timings, and department engagement, creating a strong basis for trend analysis and operational insights.

### **Data Preprocessing:**

* **Data Normalization and Imputation:** In the Power Query Editor, the dataset underwent an ETL (Extract, Transform, Load) process, which included normalization by splitting tables to enhance data organization and clarity. Missing values were addressed through imputation techniques, ensuring that the dataset remained robust and reliable for analysis while maintaining consistency across various features.
* **DAX Calculations and Data Modeling:** Data Analysis Expressions(DAX) were utilized to create calculated fields for aggregation, allowing for sophisticated analysis of the healthcare data. This facilitated effective data modeling by establishing relationships between tables, enabling comprehensive insights and enhancing the overall interpretability of the dashboard.

**Visit Trends and Patterns:**

* **Daily Visits:** The daily visitor trend shows a gradual increase from the start of each month, peaking towards the end, and then dropping on the last day. This suggests a higher influx of visitors in the final week of every month.
* **Monthly Visits:** From April to October, there was a noticeable increase in visitor counts, particularly during the summer and rainy seasons. This trend indicates that seasonal factors significantly impact hospital traffic.
* **Yearly Visits:** The Visitor counts increased by **5.8%** from 2019 to 2020, suggesting either an increase in health issues or growing trust in the hospital’s services. This rise may reflect both higher demand for healthcare and improved patient satisfaction.
* **Quarterly Visits:** The second and third quarters exhibited visitor volumes that were **53.9%** higher than the first and fourth quarters. This indicates that mid-year periods are busier, potentially due to seasonal illness peaks.

### **Time-Based Distribution:**

* **Moment Distribution:** Visitor flow is evenly split between AM and PM hours, with a slight **0.6%** increase during AM visits. This indicates steady demand throughout the day, likely from a mix of appointments and walk-ins.
* **Day of Week Distribution:** Visitor volumes peak on Mondays and Wednesdays, while Fridays have the lowest counts. This suggests a mid-week preference for hospital visits, possibly due to increased medical needs.
* **Weekday vs Weekend:** Weekday visits are **148.83%** higher than weekends, reflecting significant weekday traffic. This large difference is due to fewer staff or reduced hours on weekends, encouraging visits during the week.

### **Visitor Wait Time Analysis:**

* **Average Wait Time:** On average, visitors wait about 35 minutes, with **90.9%** experiencing waits between 20 to 60 minutes. This indicates a significant area for potential process improvement in reducing wait times.
* **Short Wait Times:** Only **9.1%** of visitors experience shorter wait times of 10 to 20 minutes. This low percentage highlights a clear opportunity to enhance service speed and overall patient satisfaction.

**Demographic Insights:**

* **Age Group Distribution:** Visitors of all ages (0 to 75) show similar frequency, while the 75+ age group constitutes only **5.04%**. This may reflect either fewer visits or a smaller demographic within this age range.
* **Race Distribution:** White and African American visitors comprise the majority, with Asians at a moderate count. Pacific Islander and Native American groups together account for **11.37%**, reflecting a diverse patient population.
* **Gender Distribution:** Male visitors outnumber females by **4.86%**, while the "Not Specified" category represents a minimal 0.26%. This slight gender disparity highlights the need for targeted engagement strategies.

**Satisfaction and Departmental Insights:**

* **Satisfaction Score Distribution:** The average satisfaction score is **5 out of 10**, indicating that most visitors have a neutral or average perception of the services, showing room for quality improvement.
* **Department Referrals:** General Practice and Orthopedics patients account for **30.75%**, while other departments, including Physiotherapy and Cardiology, represent **10.64%**. Notably, non-referred patients constitute a substantial **58.67%** of total visitors.
* **Admin Flag Distribution:** **50.04%** of visitors are fully registered patients, while **49.96%** are either visitors or individuals not registered for treatment. This indicates a significant portion of the hospital's traffic consists of non-registered individuals.