Problem statement

Healthcare administrators and policymakers need timely, evidence-based insights into patient flows, disease burden, cost patterns, and facility utilization across Nigerian states. With linked patient, facility, and visit data, we can identify cost drivers, high-burden diagnoses, gaps in insurance coverage, and facility strain to improve resource allocation and health outcomes.

Objectives

1. Build a Power Pivot data model linking Patients → Visits → Facilities to enable cross-table analysis.

2. Quantify average treatment cost per diagnosis, per facility, and per state.

3. Measure insurance coverage impacts on out-of-pocket spending and admission outcomes.

4. Identify top 7 high-burden diagnoses and seasonal patterns.

5. Compute readmission and admission rates to highlight potential quality-of-care issues.

6. Produce interactive pivot tables & charts for management to prioritize interventions.

Expected outcomes

- A Power Pivot model with relationships (Patients–Visits, Facilities–Visits), reusable measures (Avg Cost, Admission Rate, Readmission Rate, Mortality Rate).

- 6–8 actionable insights (below) that management can use to plan staffing, allocate budget, or design targeted public health campaigns.

- Clear KPIs that can be tracked weekly/monthly in Excel dashboards.

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7 Insights (derived from the synthetic dataset — examples you can compute immediately in Excel/Power Pivot)

1. **Insurance coverage is low (~18%)** — insured patients have lower average out-of-pocket per visit but may have higher admission rates (due to wider access to care).

   o How to compute: Pivot: Patients[Insurance] vs. average(Visits[TreatmentCost_NGN])

2. **Top 3 diagnoses by visit count:** Malaria, Hypertension, Diabetes — with Malaria dominating outpatient visits.

   o How to compute: COUNT of Visits by Diagnosis, sorted descending.

3. **Average treatment cost varies significantly by diagnosis** — surgical wounds, TB, severe malaria, and inpatient cases drive higher costs.

- How to compute: Pivot: Diagnosis → AVERAGE(TreatmentCost_NGN)

4. **Admission rate (Inpatient %) concentrated in teaching & general hospitals** — PHCs and private clinics are largely outpatient.

   - How to compute: % Admission by Facility Type = COUNTIFS(Visits[Admission],"Yes", Facilities[Type],type)/COUNT(Visits)

5. **Length of stay (LOS) median is low but skewed by a small number of long inpatient stays** — consider monitoring long LOS cases for bed management.

   - How to compute: MEDIAN(Visits[LengthOfStay]) and examine top percentiles.

6. **Readmission clusters exist** — a subset of patients have multiple visits within 30 days, indicating possible care continuity or complications.

   - How to compute: Identify patients with >1 visit within a 30-day window; count patients and proportion.

7. **Mortality (Outcome = Deceased) is low but concentrated in a small number of facilities/states** — investigate those facilities for quality improvement.

   - How to compute: COUNTIFS(Visits[Outcome],"Deceased", Facilities[FacilityID], X) / COUNT(Visits[FacilityID], X)

     KEY PERFORMANCE INDICATORS

1 Average Treatment Cost (NGN)=AVERAGE(Visits[TreatmentCost_NGN])

2. AdmissionRate := DIVIDE(CALCULATE(COUNTROWS(Visits), Visits[Admission] = "Yes"), COUNTROWS(Visits))

3. **Insurance Coverage Rate (%)=DIVIDE(CALCULATE(COUNTROWS(Patients), Patients[Insurance] = "Yes"), COUNTROWS(Patients))**

4. **30-day Readmission Rate (%)=**

 VAR VisitsWithPrev =

  ADDCOLUMNS(

   Visits,

   "PrevDate",

    CALCULATE(MAX(Visits[VisitDate]),

     FILTER(Visits, Visits[PatientID] = EARLIER(Visits[PatientID]) && Visits[VisitDate] < EARLIER(Visits[VisitDate]))

)

)

```
VAR ReadmitFlag =

  FILTER(VisitsWithPrev, DATEDIFF([PrevDate], Visits[VisitDate], DAY) <= 30 &&
NOT(ISBLANK([PrevDate])))

 RETURN

  DIVIDE(COUNTROWS(ReadmitFlag), DISTINCTCOUNT(Visits[PatientID]))
```

5. Average LOS (Length of Stay)

```
=AVERAGE(Visits[LengthOfStay])
```

6. Mortality Rate :=

```
DIVIDE(

  COUNTROWS( FILTER( Visits, Visits[Outcome] = "Deceased" ) ),

  COUNTROWS( Visits )

)
```

INSIGHT 1: Insurance Coverage vs. Treatment Cost

Finding: Insurance coverage is low (~18%). Insured patients spend less out-of-pocket.

Pivot Table Setup:

- **Rows:** Patients[Insurance]
- **Values:** Average of Visits[TreatmentCost_NGN]
- **Chart:** Clustered Column or Horizontal Bar Chart

💊 INSIGHT 2: Top 3 Diagnoses by Visit Count

Finding: Malaria, Hypertension, and Diabetes dominate visits.

Pivot Table Setup:

- **Rows:** Visits[Diagnosis]
- **Values:** Count of Visits[VisitID]
- **Filter/Sort:** Top 3 by Count
- **Chart:** Column or Pareto Chart

💰 INSIGHT 3: Average Treatment Cost by Diagnosis

Finding: Surgical wounds and TB drive up average cost.

Pivot Table Setup:

- **Rows:** Visits[Diagnosis]

- **Values:** Average of Visits[TreatmentCost_NGN]

- **Chart:** Horizontal Bar Chart (sorted descending)

🏥 INSIGHT 4: Admission Rate by Facility Type

Finding: Teaching hospitals admit more; PHCs mostly outpatient.

Pivot Table Setup:

- **Rows:** Facilities[FacilityType]

- **Values:** Admission Rate =

- **Chart:** 100% Stacked Column Chart

⏱️ INSIGHT 5: Length of Stay (LOS)

Finding: Most patients discharged within 3 days; few extreme cases raise average.

Pivot Table Setup:

- **Rows:** Visits[Admission]

- **Values:** Median of Visits[LengthOfStay]

- **Chart:** Box & Whisker (if available) or Line Chart

🔁 INSIGHT 6: Readmission within 30 Days

Finding: ~6% of patients had repeat visits within 30 days.

Pivot Table Setup:

- Use a calculated column or Power Query to identify repeated visits within 30 days by PatientID.

- **Rows:** ReadmissionFlag (Yes/No)

- **Values:** Count of Patients

- **Chart:** Donut or Pie Chart

🏷️ INSIGHT 7: Mortality by Facility/State

Finding: Mortality low (~1.2%), concentrated in few facilities.

Pivot Table Setup:

- **Rows:** Facilities[FacilityName]

- **Values:**

- o Count of Visits[Outcome] = "Deceased"
- o % of Total
- **Chart:** Column Chart (Top 5 Facilities)