HEDIS / Stars Quality Measure Modeling & Validation

Sample Project – Synthetic Data

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Project Overview

This project demonstrates an end-to-end HEDIS-style quality reporting workflow using publication-safe synthetic data. The objective was to model numerator and denominator logic, validate outputs using SQL and Python, and produce stratified reporting aligned with Medicare Advantage / Medicaid quality operations.

The focus was on audit-minded, reproducible analytics suitable for recurring quality reporting cycles.

Measures Modeled (HEDIS-Style Logic)

1. Preventive Screening (Mammogram-Style Measure)

- **Denominator:** Active female members age 50–74 with a qualifying encounter
- **Numerator:** Mammogram screening within a 2-year lookback window

2. Diabetes Care – HbA1c Testing

- **Denominator:** Active members with diabetes condition flag
- **Numerator:** HbA1c test completed during the measurement year

Workflow

Synthetic Member & Events Data
→ Data Cleaning & Transformation
→ Numerator / Denominator Logic
→ SQL Recalculation & Validation
→ Stratified Equity Reporting
→ Visualization & Summary Outputs

Validation & Audit Readiness Approach

- Denominator and numerator integrity checks (numerator ≤ denominator)
- Date-window enforcement for measurement year and lookback logic
- Duplicate and missing value detection
- SQL recomputation to confirm Python outputs
- Reproducible workflow ensuring consistent results across runs

Sample Outputs

- Overall performance rates by measure
- Stratified rates by race to identify potential disparities
- Clean visualizations suitable for stakeholder reporting

Tools Used

SQL (SQLite)
Python (pandas, matplotlib)
Jupyter Notebook

Relevance to Medicare Advantage / Medicaid Quality

This project reflects workflows used in:

- HEDIS and Stars performance tracking
- Monthly and quarterly reporting cycles
- Equity stratification initiatives
- Quality improvement performance monitoring

All data used in this project is fully synthetic and safe for public sharing.