CAPSTONE PROJECT

PROJECT TITLE

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OUTLINE

- **Problem Statement**

- **Proposed System/Solution**

- **System Development Approach** (Technology Used)

- **Algorithm & Deployment**

- **Result (Output Image)**

- **Conclusion**

- **Future Scope**

- **References**

PROBLEM STATEMENT

Problem statement 36: Tracking Maternal Health Progress Toward SDG 3.1: A Global Data Analysis

The Challenge:

The Sustainable Development Goal 3.1 aims to reduce the global maternal mortality ratio to less than 70 per 100,000 live births by 2030. Monitoring progress towards this goal requires analyzing country-wise data on maternal mortality and associated health indicators such as antenatal care coverage, births attended by skilled personnel, adolescent birth rates, and healthcare expenditures. Despite global efforts, maternal health outcomes vary drastically between regions and income groups, raising the need for data-driven insights into the factors influencing maternal health.

PROPOSED SOLUTION

- **Data Collection:**Use AI Kosh dataset with indicators like MMR, ANC coverage, skilled birth attendance, adolescent birth rate, and health expenditure.

- **Data Preprocessing:**Clean data, handle missing values, and perform feature engineering to categorize by region and income level.

- **Analysis & Modeling:**
Use EDA and statistical methods to identify trends and correlations.
Apply regression or clustering to assess impact of indicators on MMR.

- **Visualization & Dashboarding:**Build interactive dashboards using IBM Cognos to visualize country-wise SDG progress and health indicator trends.

- **Deployment:**Deploy on IBM Cloud Lite using Watson Studio and Cloud Object Storage for scalability and accessibility.

- **Evaluation:**Measure insight clarity and system usability; improve continuously through feedback.
- **Result:**Identify high-risk regions, enable informed decisions, and support progress monitoring for SDG 3.1.

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SYSTEM APPROACH

System Requirements
- *Hardware:* Intel i5, 8 GB RAM, 20 GB storage (GPU optional)
- *Software:* IBM Cloud Lite (Watson Studio, Cognos), Python 3.9+, Jupyter Notebook
- *Data Inputs:* MMR, ANC coverage, skilled birth attendance, adolescent birth rate, health expenditure, region/income group

Libraries Required
- pandas, numpy – data processing
- matplotlib, seaborn, plotly – visualization
- scikit-learn, statsmodels – analysis/modeling
- ibm-watson-machine-learning – IBM Cloud deployment

Workflow
- Data collection & preprocessing
- Exploratory data analysis (EDA)
- Visual insights & dashboarding (Cognos)
- Insight generation & recommendation for policy action

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ALGORITHM & DEPLOYMENT

Algorithm Selection

Used statistical modeling and regression-based analysis (not ML-heavy) to uncover key health indicators affecting maternal mortality. Chosen for its interpretability and suitability for small, structured datasets.

Data Input

Takes maternal health data: MMR, ANC coverage, skilled birth attendance, adolescent birth rate, and healthcare expenditure. Includes region and income classification for contextual analysis.

Analytical Logic

Performs correlation and regression analysis to evaluate relationships between indicators and MMR. Uses clustering to group countries with similar profiles and identify outliers or high-risk zones.
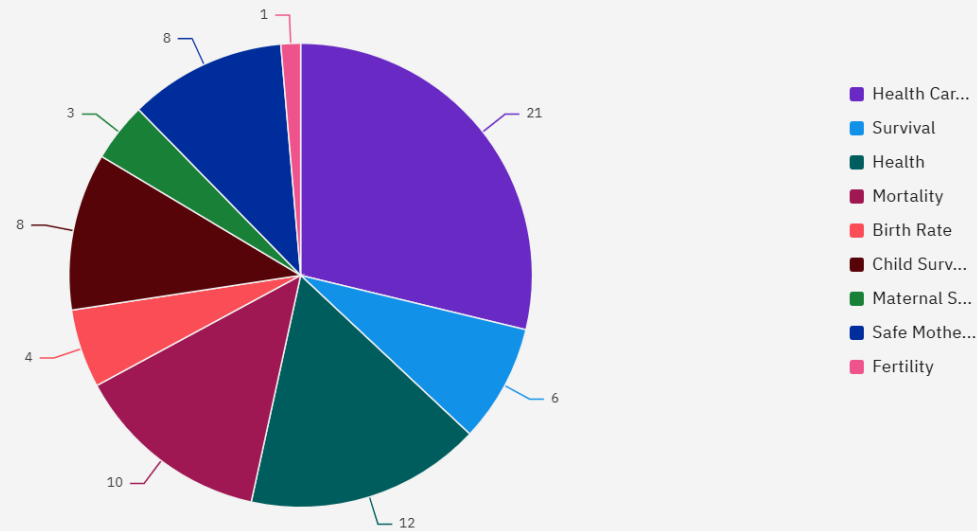
Output

Returns insights on most influential health indicators and visual trends. Enables identification of at-risk regions and supports policy recommendations—no complex ML pipeline required.
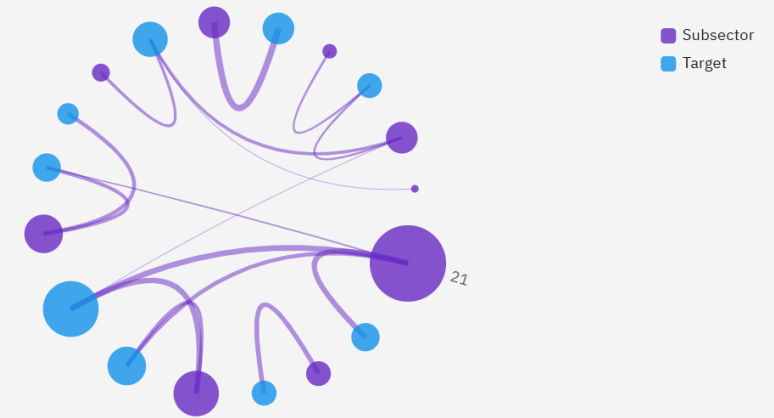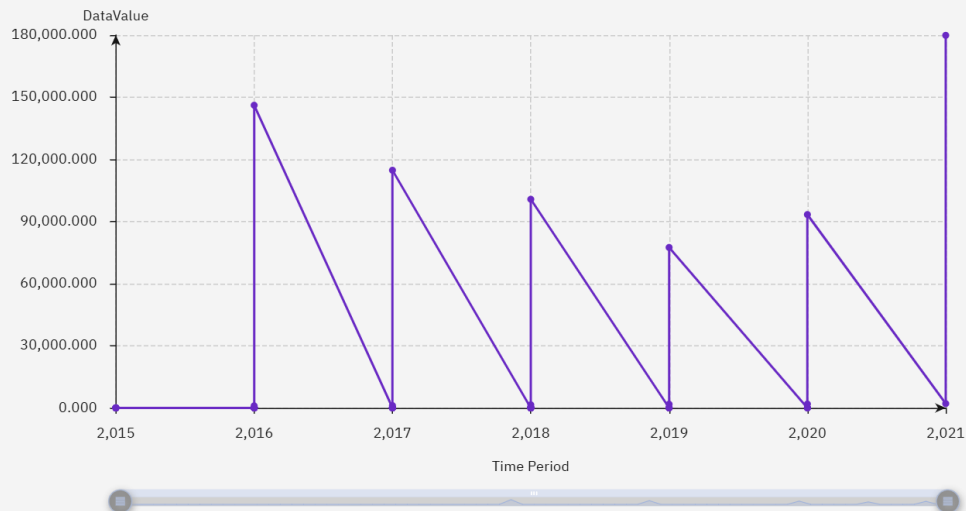
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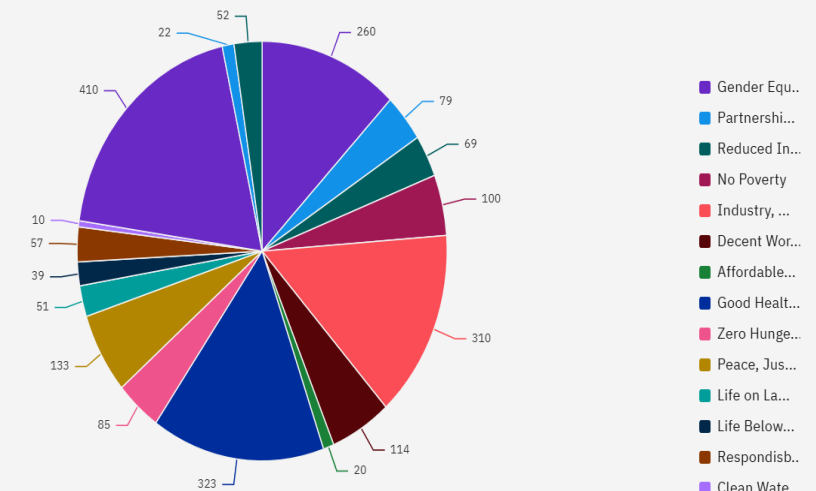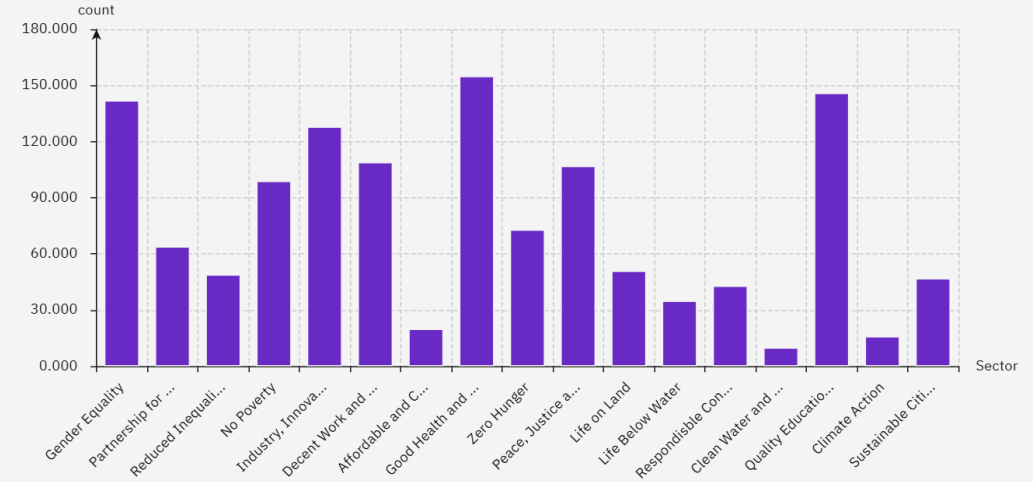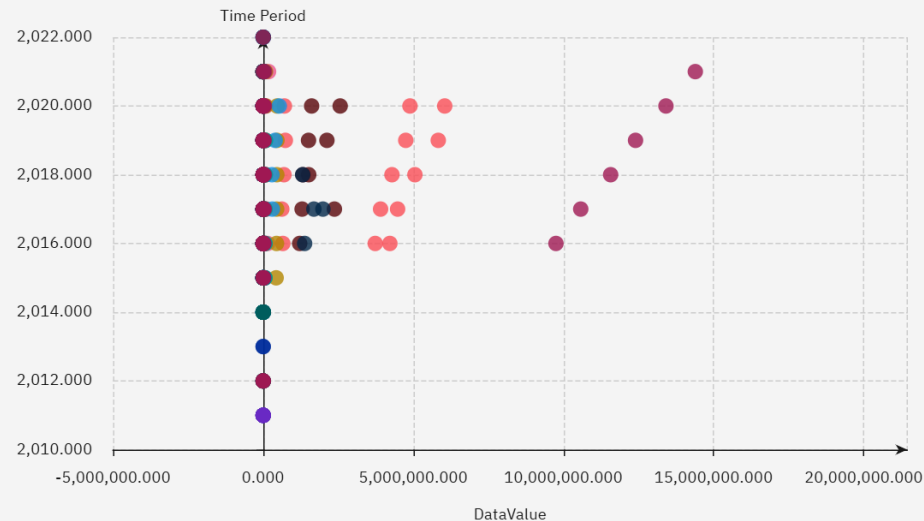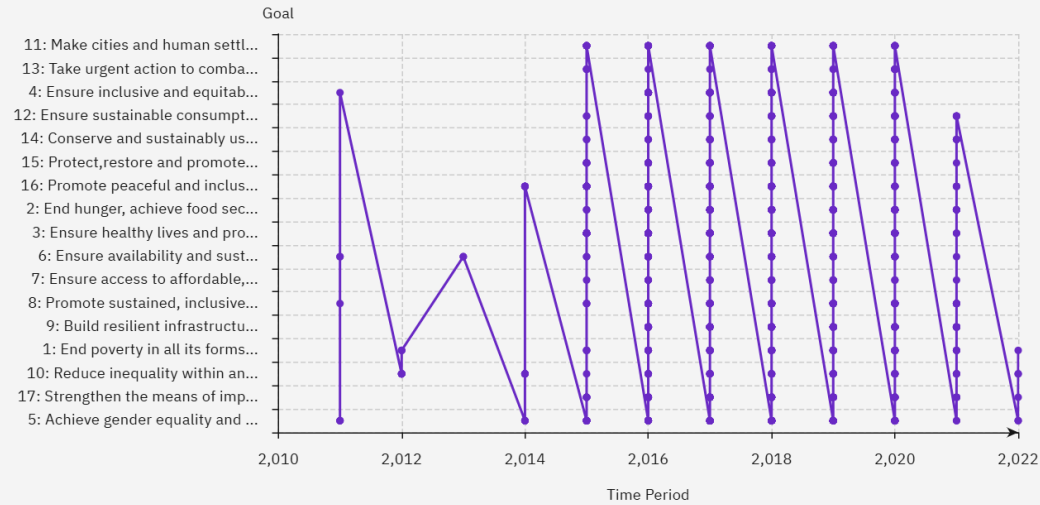
RESULT

The output consists of interactive visualizations displaying trends in maternal mortality and its key influencing factors across regions and income groups. These visuals help identify high-risk areas and support data-driven policy decisions.

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CONCLUSION

This project provides a data-driven approach to monitor and evaluate global progress toward SDG 3.1. By analyzing key maternal health indicators—such as antenatal care, skilled birth attendance, adolescent birth rates, and healthcare expenditure—the system identifies critical gaps and regional disparities. Leveraging IBM Cloud Lite tools for analysis and visualization, the solution enables policymakers and stakeholders to track trends, prioritize interventions, and make informed decisions. The approach ensures continuous, transparent monitoring without relying on complex machine learning models, making it scalable, explainable, and impactful.

FUTURE SCOPE

Integration of Real-Time Data: Incorporate real-time health reports, live birth records, and emergency response stats for dynamic monitoring.

Predictive Modeling: Extend the system with machine learning models (e.g., time series forecasting) to predict future maternal mortality trends.

Geo-Mapping: Use GIS tools to visualize high-risk regions and map healthcare facility access.

Mobile Dashboard: Develop a mobile-friendly version of the dashboard for use by on-ground health workers and policymakers.

Cross-SDG Linkages: Expand the system to analyze how other SDGs (e.g., education, poverty) influence maternal health outcomes.

REFERENCES

- Government of India – Sustainable Development Goals: National Indicator Framework v3.1 (2021)
https://data.gov.in

- World Health Organization – Maternal Mortality Fact Sheet
https://www.who.int/news-room/fact-sheets/detail/maternal-mortality

- IBM Cloud Lite Documentation – Watson Studio & Cognos Dashboard Embedded
https://cloud.ibm.com/docs

- United Nations – Sustainable Development Goal 3: Ensure Healthy Lives
https://sdgs.un.org/goals/goal3

- scikit-learn: Machine Learning in Python
https://scikit-learn.org

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