**AI for Sustainable Development: Vaccine Coverage Prediction for Kenya (SDG 3)**

**Goal**

To support SDG 3: Good Health and Well-being, this project aims to predict 2025 vaccine coverage rates in Kenya for Measles (MCV1, MCV2) and Polio. The goal is to identify potential gaps in immunization among children and guide timely health interventions.

**Data Sources**

- WHO Kenya Vaccination Data: Actual doses administered for MCV1, MCV2, and Polio (2010–2024).

- IHME Global Health Estimates & Forecasts: Historical and projected vaccine coverage for 11 antigens, filtered for Kenya.

**Data Cleaning & Preparation**

- Extracted relevant years (2010–2024).

- Filtered data for Kenya and selected key antigens (MCV1, MCV2, Polio).

- Merged and reshaped datasets for modeling.

- Applied OneHotEncoding to handle categorical vaccine types.

- Combined historical data across sources for a unified training set.

**Machine Learning Model**

- Model Used: Linear Regression

- Input Features:

- YEAR (numerical)

- ANTIGEN (one-hot encoded)

- Target Variable: COVERAGE (% of population vaccinated)

The model was trained to learn coverage trends over time per vaccine type, then used to forecast 2025 vaccine coverage.

**Performance Metrics**

- Mean Absolute Error (MAE): 7.14

- R² Score: 0.78

**2025 Predictions**

Vaccine | Predicted Coverage (%)

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MCV1 | ~82–84%

MCV2 | ~76–78%

Polio | ~85–87%

**Insights**

- MCV2 lags behind MCV1 and Polio in coverage — this reflects known global trends in second-dose measles vaccination.

- Polio shows higher and more consistent coverage, possibly due to strong historical campaigns.

**Limitations**

- Linear model may not capture nonlinear shifts or outlier years.

- Predictions assume past trends continue — external factors (e.g., epidemics, funding) could affect outcomes.

**Next Steps**

- Test more advanced models (e.g., Random Forest, LSTM).

- Integrate demographic or regional data for deeper analysis.

- Deploy insights to health authorities for proactive action.

**Relevance to SDG 3**

This project offers a data-driven early warning system for under-vaccination risks. By predicting gaps before they occur, it empowers health agencies to meet immunization targets, reduce disease outbreaks, and uphold every child’s right to health.