Analysis of the Relationship between Global TB Treatment Coverage and HIV Mortality (2018)

By: Ester Nepolo – Generative AI for Work and Research

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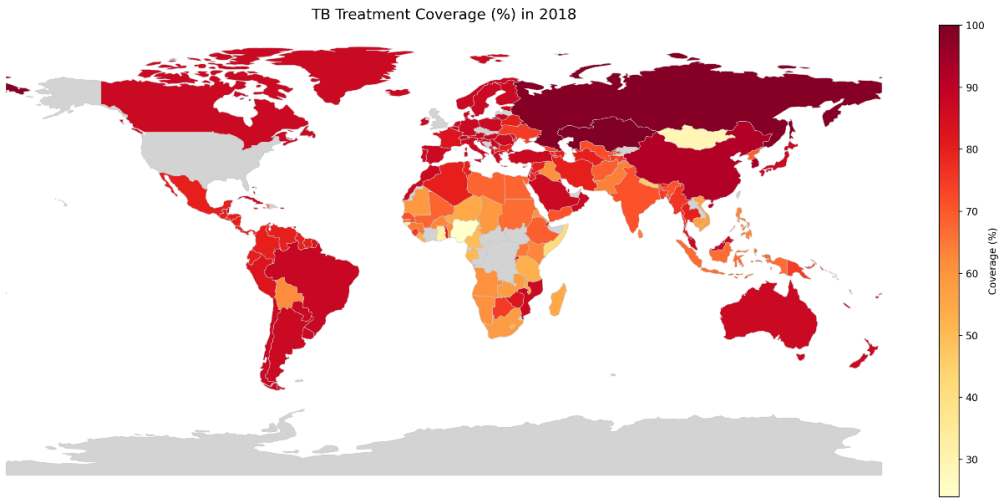
1. Introduction

This is an analysis of the relationship between TB Treatment Coverage and HIV-related deaths for 2018 using the datasets from Gapminder. The results are presented below.

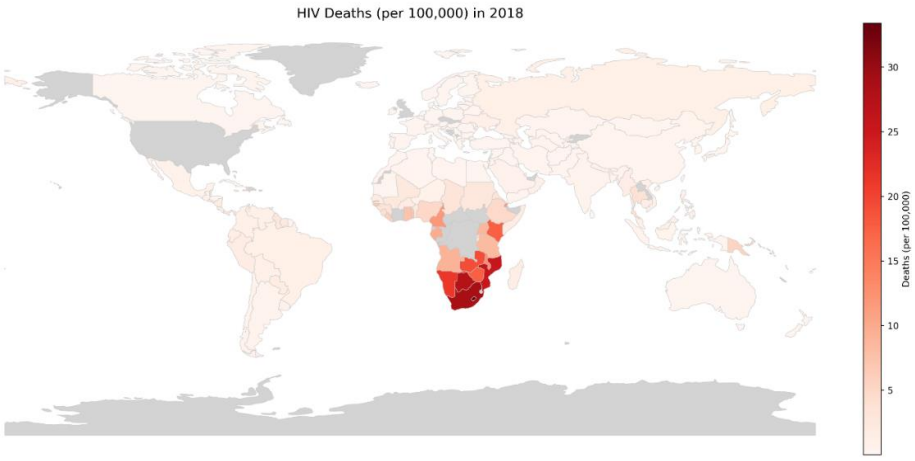
2. World Map Visualizations

Global TB Treatment Coverage (2018)



The map shows TB treatment coverage percentages across countries in 2018. Higher coverage (darker orange/red) indicates better access to TB treatment services.

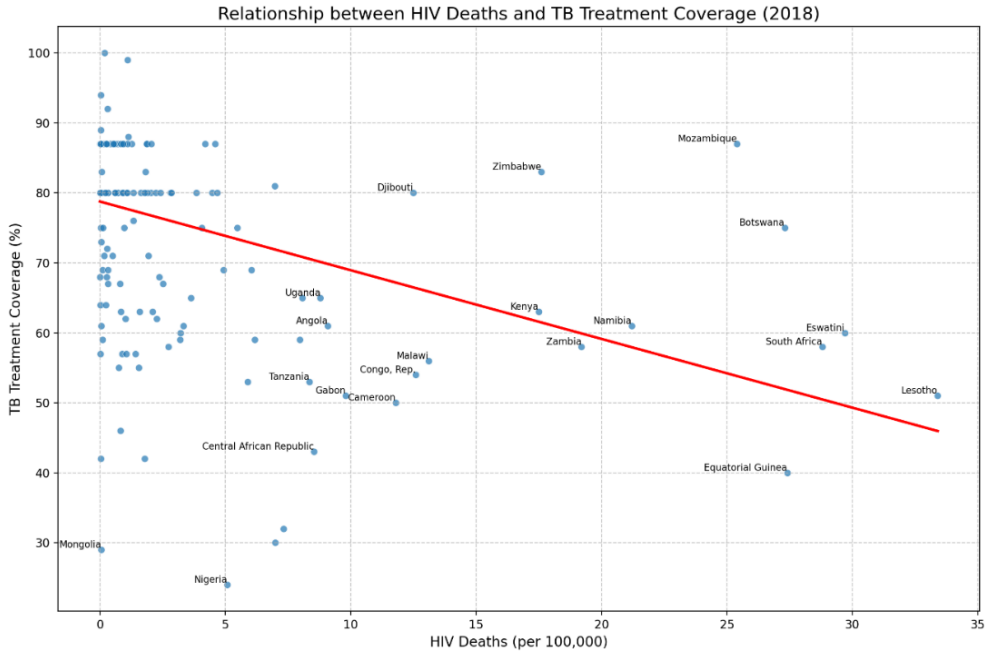
HIV Deaths (2018)



This map displays HIV-related death rates per 100,000 population in 2018. Darker red areas indicate higher HIV mortality.

3. Relationship Between Indicators

Scatterplot Analysis



Statistical Analysis

Pearson correlation coefficient (r): -0.4086

P-value: 0.0000

Spearman rank correlation coefficient: -0.4975

Spearman P-value: 0.0000

Interpretation

The analysis reveals a moderate negative correlation between HIV deaths and TB treatment coverage (Pearson's r = -0.4086, $p < 0.0001$). This statistically significant relationship suggests that countries with higher HIV death rates tend to have lower TB treatment coverage percentages.

The Spearman rank correlation coefficient (-0.4975) is even stronger than the Pearson correlation, indicating that this negative relationship holds true even when considering ranked values rather than absolute values, which helps account for outliers in the data.

This negative relationship could be explained by several factors:

1. **Healthcare system capacity**: Countries with high HIV burden may have strained healthcare systems that struggle to provide adequate TB treatment coverage.
2. **Resource allocation challenges**: Limited healthcare resources might be diverted to HIV treatment at the expense of TB programs in high-burden settings.
3. **Socioeconomic determinants**: Both indicators may be influenced by underlying socioeconomic conditions that affect overall healthcare delivery.
4. **Comorbidity challenges**: The TB-HIV co-infection presents unique treatment challenges that may reduce overall treatment coverage rates.

The scatterplot shows that several countries with very high HIV death rates (labelled on the plot) have TB treatment coverage below the global average. This visualization helps identify regions where integrated HIV-TB interventions might be most beneficial.

These findings highlight the importance of coordinated approaches to address both HIV and TB, particularly in high-burden countries where resources may be limited.

4. Reflections

Interacting with AI is not as complicated as it may have been perceived, you just need to know the right AI tools that you can interact with comfortably and will make your interaction easy. I chose Julius AI and it worked perfectly for me. It was surprising to see the model taking me a step-by-step until it reaches to the answer. So, you can interact with the model at different stages before you come to the final output. I have learned that AI need clear guidance for you to get a precise output and you need to review and refine until you are satisfied with the output.