The Child-Mortality–Fertility Link

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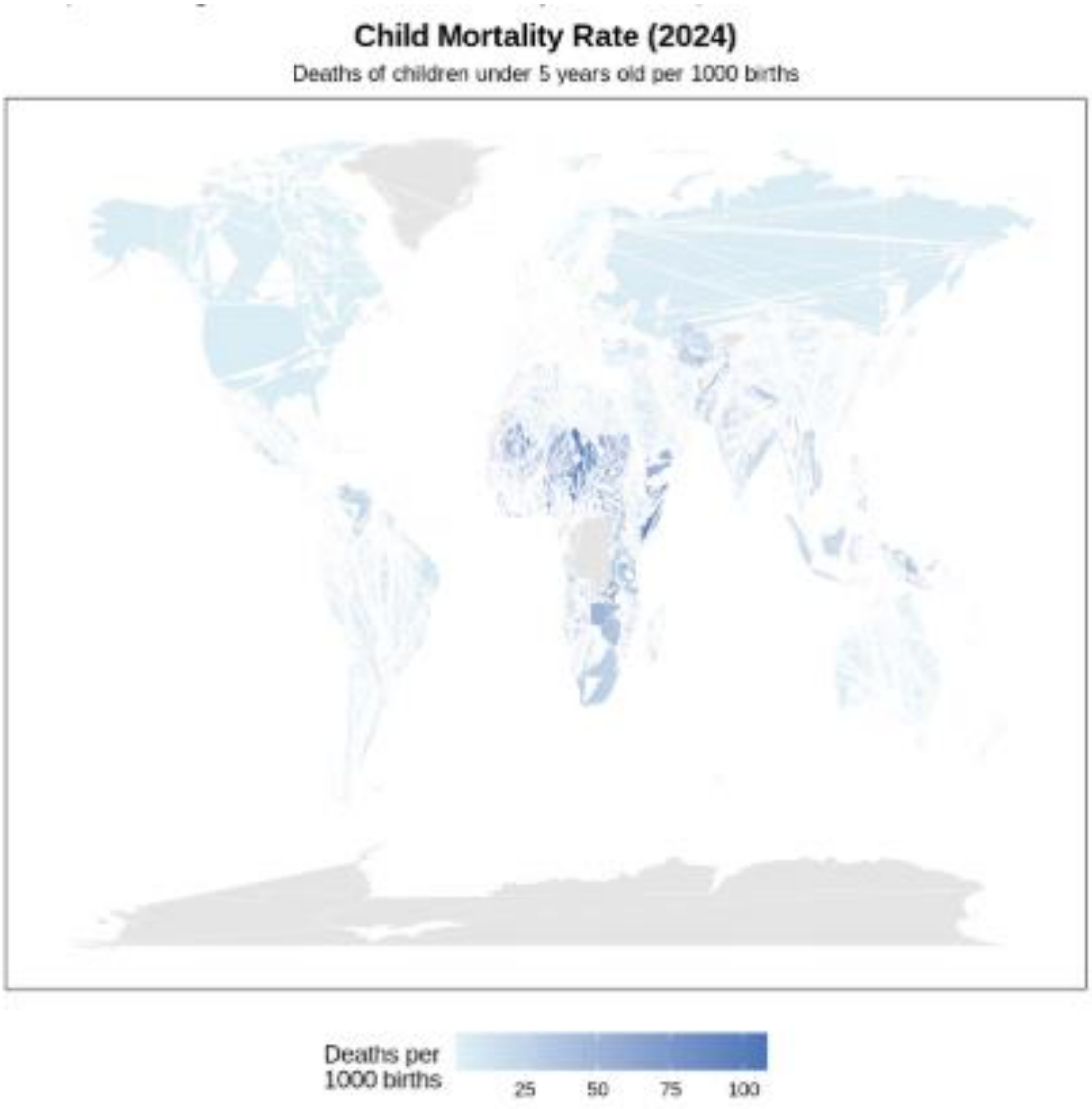
18.05.2025

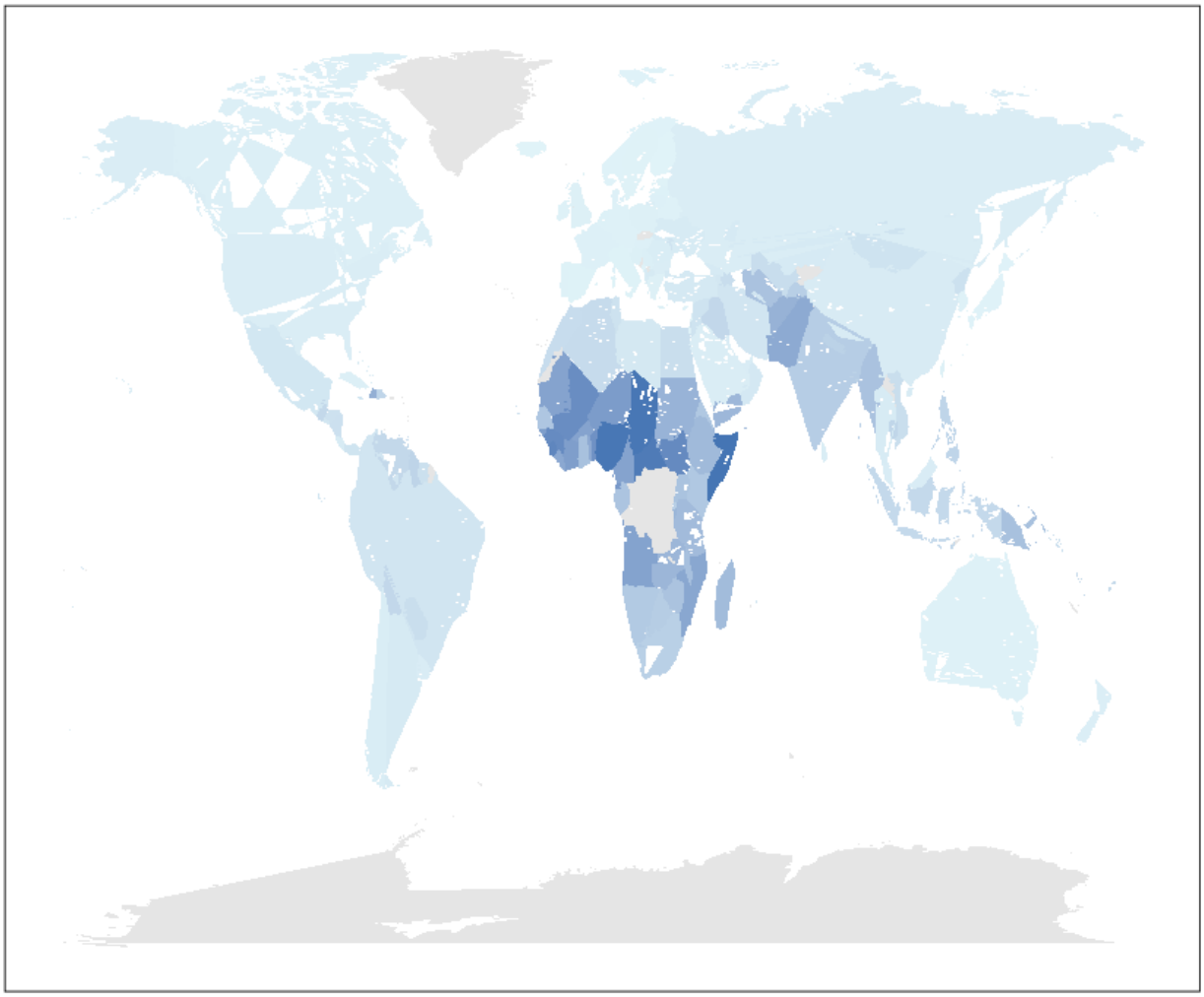
This short report documents the exploratory analysis I carried out in Workshop 2 to examine the relationship between fertility rates and under-five child-mortality rates across countries. It summarises the data-visualisation workflow I followed, highlights the key statistical result, and includes my reflection on the usability of the AI tool I employed (Julius.ai)

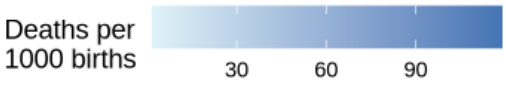
The images included are the first and refined iterations of the child-mortality map and fertility rate maps where I used prompt-tuning to improve colour scale.



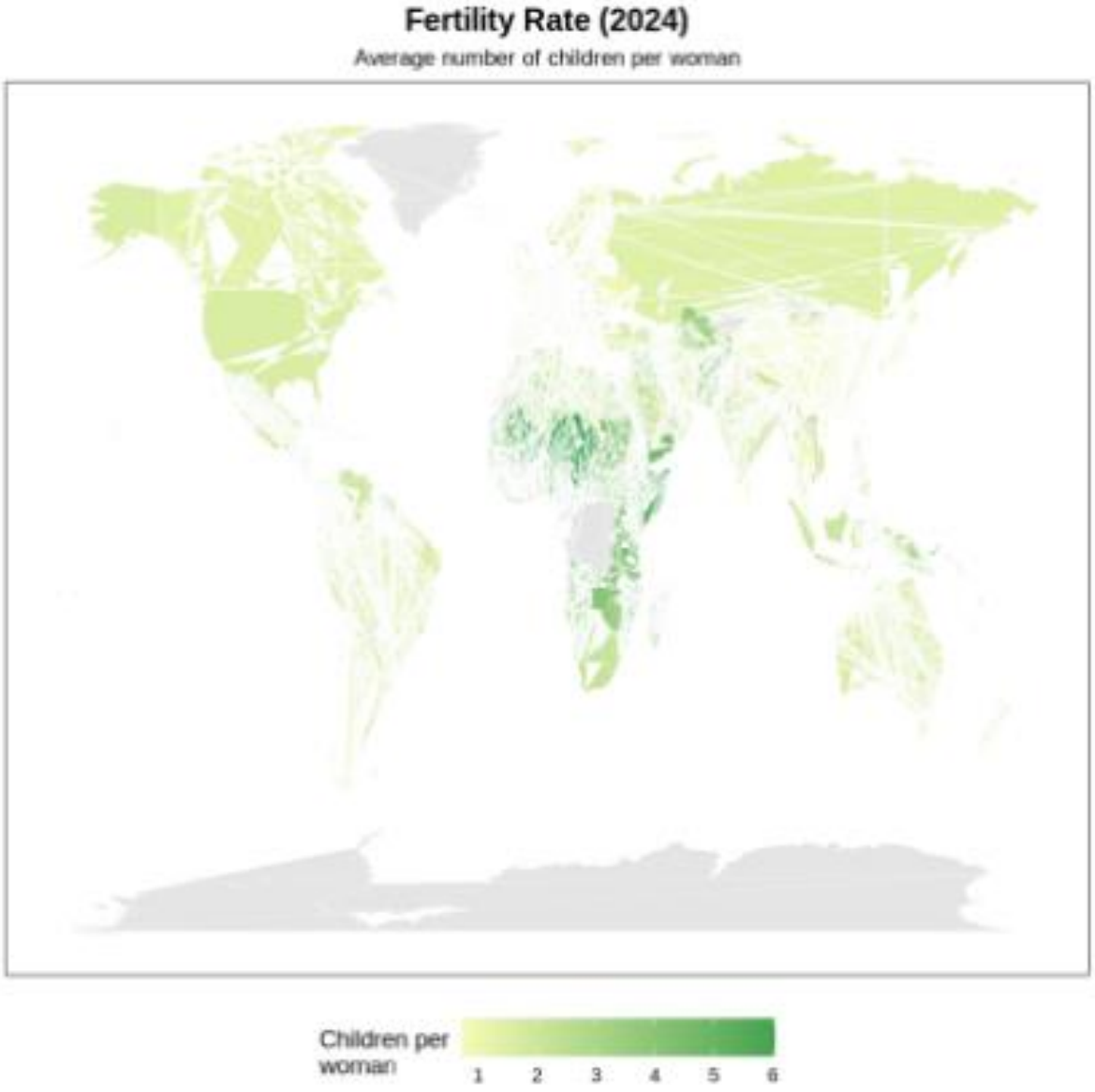
Child Mortality Rate (2019)

Deaths of children under 5 years old per 1000 births



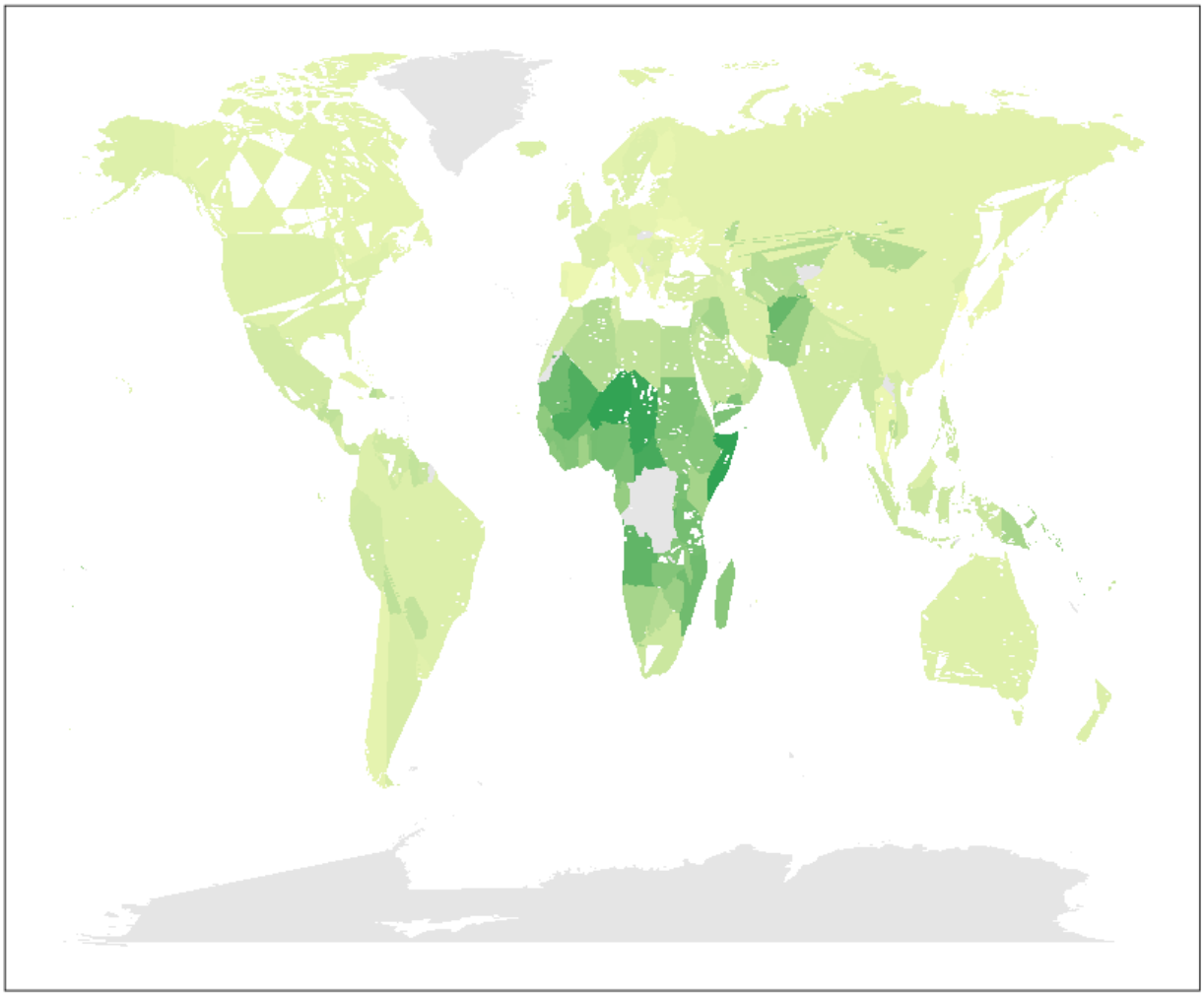


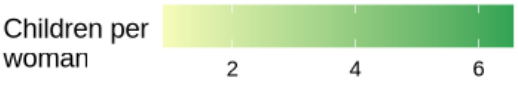
Below are the first and final iteration of the Fertility map I was able to obtain after refining the prompt.

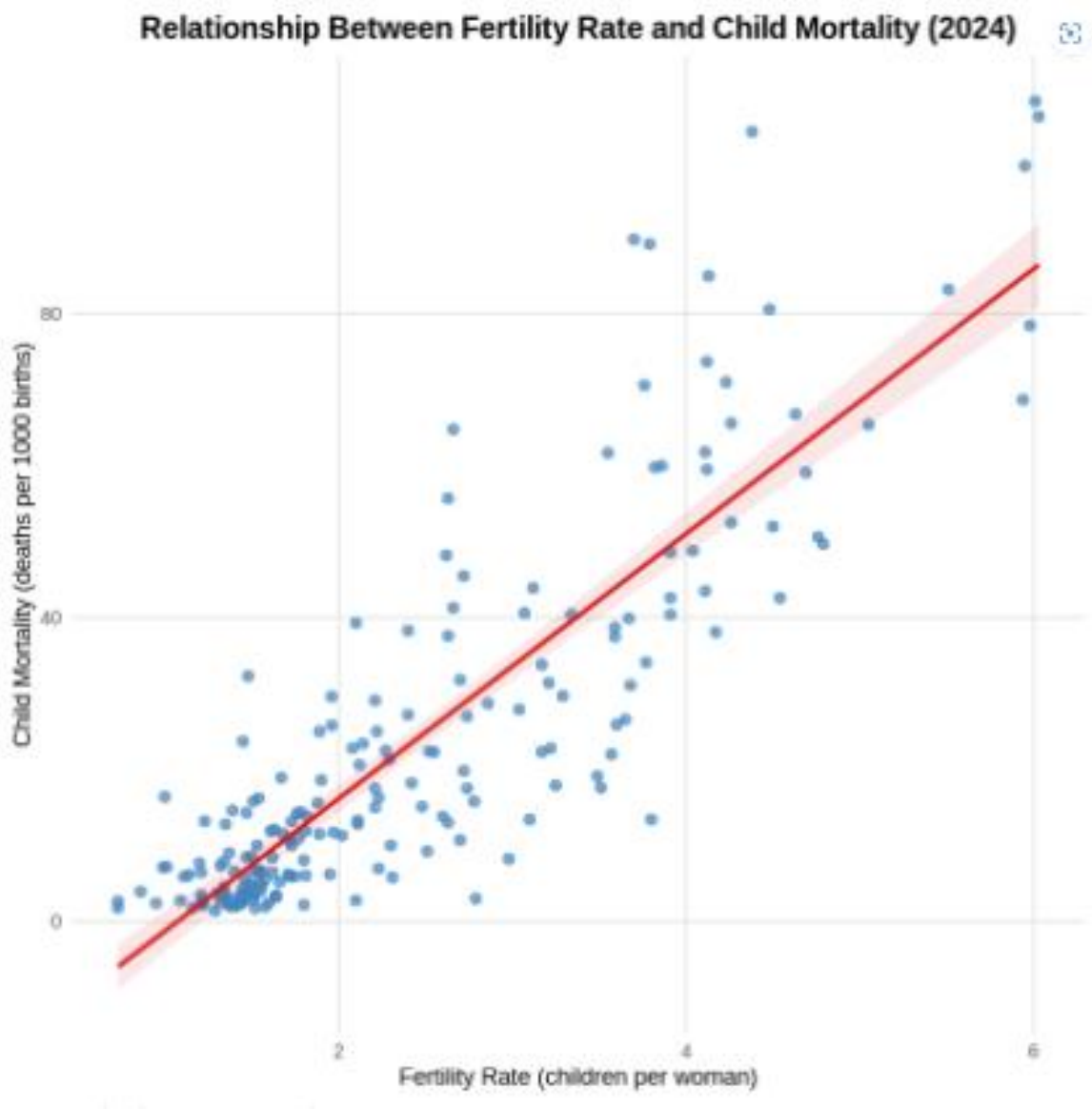


Fertility Rate (2019)

Average number of children per woman







Interpretation

The analysis reveals a strong positive correlation between fertility rate and child mortality, with a Pearson correlation coefficient of $r = 0.87$ (95% CI: 0.83-0.90). This statistically significant relationship ($p < 0.001$) indicates that countries with higher fertility rates tend to have higher child mortality rates.

Looking at both maps together, we can observe similar patterns - regions with higher fertility rates (particularly in parts of Africa and some areas of Asia) also tend to have higher child mortality rates. Conversely, regions with lower fertility rates (such as Europe, North America, and East Asia) generally have lower child mortality rates.

This strong correlation suggests several possible interpretations:

Both variables may be influenced by common socioeconomic factors such as healthcare access, education levels, and economic development.

Countries with better healthcare infrastructure likely have both better child survival rates and better access to family planning services.

There may be a bidirectional relationship where high child mortality can lead to higher fertility rates as families have more children to ensure some survive, while high fertility can strain resources and healthcare systems.

This relationship highlights the importance of integrated approaches to public health that address both reproductive health services and child survival interventions simultaneously.

Reflection

Was it easy? Yes, it was easy to interact with the AI tool however it was slow and stopped to ask if it should continue at one point which required a response from my side. It stopped a second time as there was insufficient RAM, I solved this by providing it with a memory boost of 32 GB. I also received a nerror message which I did not understand "It looks like the sandbox ran out of resources while running your code. How shall we continue?" but this was solved when I typed "yes". The maps also produced results which looked messy, and I tried several times to correct it with only modest results.

What was difficult? No, but I needed to play with it to get it working smoothly and it wasn't easy to diagnose the source of the error in the maps which I was not able to solve. I included the first and final version of the maps after several attempts to resolve the issue.

What was surprising? Yes, this tool has enormous potential. However, it required some handholding to guide the work and ensure it ran smoothy. Given the errors that arose, I would not trust the results without a thorough review from my side.

What did you learn? I learned that while AI tools such as Julius can be incredibly powerful for automating analytical tasks, they still require human oversight and guidance. However, the tool can also be resource-intensive and requires more memory than I anticipated.