

Assessment: Model-Based Geostatistics for Global Public Health

Objective:

Students are required to select one of the available REMO datasets and conduct a geostatistical analysis to investigate the spatial distribution of river blindness (onchocerciasis). The assessment should be structured as a comprehensive report addressing the following key components, aligning with the marking criteria.

1. Abstract (10%)

- Provide a concise summary of the report's content in an engaging style.
- Ensure clarity and brevity while summarizing key findings and conclusions.

2. Research Question and Background (15%)

- Clearly define the research question that will guide your geostatistical analysis.
- Provide relevant background material on river blindness, including its epidemiology, transmission, and impact on public health.
- Include specific background information on the selected country, discussing the disease burden, control efforts, and contextual factors.
- **Examples of Research Questions:**
 - *"What is the spatial distribution of river blindness prevalence, and how do environmental covariates such as rainfall and vegetation cover influence its distribution?"*
 - *"Can light lime emissivity be used as a socio-economic variable and how does it capture the variation in risk compared to other environmental variables?"*
 - *"How can we classify sub-national units into their corresponding prevalence class and inform intervention policies?"*

3. Methods and Code (20%)

- Utilize the available raster files to explore relationships between river blindness prevalence and environmental or socio-demographic covariates.

- Identify and justify which covariates exhibit the strongest association with prevalence.
- Develop a non-spatial Generalized Linear Mixed Model (GLMM) and assess residual spatial correlation.
- Provide a detailed explanation of the methodology, including model assumptions and statistical approaches.

4. Results (20%)

These are suggested steps that you can consider reporting in the Result section to address your selected research question.

- Fit the geostatistical model and provide parameter estimates in a well-formatted table (values up to three decimal places).
- Comment on the estimates and their implications for public health.
- Assess and present results with clear tables, figures, and maps.
- Carry out spatial prediction by creating a suitable grid within the country boundaries.
- If appropriate, draw inferences on the average prevalence for each administrative subdivision (using [rgeoboundaries](#) for shapefiles) and report point estimates and 95% prediction intervals in a summary table.
- Generate spatial prevalence maps to identify:
 - Hotspots where prevalence exceeds 20%.
 - Cold spots where prevalence falls below 5%.

5. Discussion and Conclusions (20%)

- Interpret the results in relation to the research question.
- Discuss the strengths and limitations of the study.

6. Presentation and Writing Style (15%)

- Ensure clarity, coherence, and logical flow throughout the report.
 - Use proper academic writing with minimal grammatical or spelling errors.
 - Follow consistent referencing and bibliographic formatting.
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Submission Requirements:

- The report should be no longer than **1,500 words**.
- Include relevant tables, figures, and maps to support the analysis.
- Code and methodological steps should be reproducible, with explanations for key steps.
- Submit both the written report and the associated R scripts.