Spatial Analysis of Public Health Data - Module HT23

Elective Module Title:	**Spatial Analysis of Public Health Data**
Institution:	**University of Oxford**
Program of Study:	**MSc Modelling for Global Health (JMGH)**
Question Release Date and Time:	**Friday 10th March 2023, 12 noon via Inspera**
Submission Date and Time:	**Friday 7th April 2023, 12 noon via Inspera**

Summative Assessment Question

For a number of locations in Nigeria you have been provided with observations of the proportion of people that test positive for soil transmitted helminth infection in 2014 [1], based on a number of individuals that are sampled at random from each location ("ESPEN_STH_data_cleaned_Nigeria.xlsx"). In addition, you have been provided with a covariate data frame at 5km resolution in Nigeria with various environmental and development variables that may be informative for modelling and predicting soil transmitted helminth prevalence ("covariates_5km_NGA.rds"). In addition, we have also provided two raster images with unimproved water ("IHME_LMIC_WASH_2000_2017_W_U.tif") and sanitation ("IHME_LMIC_WASH_2000_2017_S_O.tif") percentages in Nigeria in 2014. Lastly you have also been provided with an administrative areal shapefile at district level implementation unit level for Nigeria ("Nigeria_IUs_201812.shp"). Please note the linkage IU level identifier can be found in the point level data file provided above if option 2 is chosen and that can be linked to the provided shapefile for Nigeria.

Option 1. Geostatistical modelling of soil transmitted helminth prevalence data in Nigeria

Implement and validate a suitable Bayesian geostatistical model in R for soil transmitted helminth prevalence in this context. Be sure to describe and present all necessary exploratory analyses as well as specify the full formula for your proposed geostatistical model. Include interpretation of your model output/results. Discuss the implication of your findings for establishing or refining prevention strategies in this geographic context.

Option 2. Conditional autoregressive (areal) modelling of soil transmitted helminth prevalence in Nigeria

Using what you have learnt in the course, conduct suitable areal descriptive and inferential model-based spatial analysis of soil transmitted helminth prevalence in this setting. Include the full formula with explanation of terms for your proposed model. Please also include important exploratory analyses and visualisation of these data that informed the development of your model. Provide concise interpretive summary of your results. Discuss the implication of your findings for establishing or refining prevention strategies in this geographic context.

Please attach your cleaned and documented R script specifying all your data processing, visualizations and analyses.

The data files can be found in Spatial Analysis of Public Health Data page of Canvas: Data sets for exams : Spatial Analysis of Public Health Data (ox.ac.uk)

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[1] Source of the data: https://espen.afro.who.int/diseases/soil-transmitted-helminthiasis

<h1 style="color:red;text-align:center;">ASSIGNMENT REQUIREMENTS AND INSTRUCTIONS</h1>

Elective Module Assessment — Format Requirements

(i) These assessments will take the form of a written report to be structured like a scientific paper that must address the questions/issues raised in the respective exam questions.

(ii) The report document must be provided as a Word or PDF Document.

(iii) The report document should contain all computer code as supplementary information (annex(es)).

(iv) The word length for the report is 1,500 - 2,000 words with 2,000 words being the maximum permitted length (excluding bibliography, references, tables, annexes, and figures).

(v) The report should be typed using 12-point font size with a 2.5cm margin on the left-hand side of each page.

(vi) Reports should be submitted in English, with UK **not** US spelling.

(vii) Candidates should use either Harvard or Vancouver style referencing throughout.

Elective Module Assessment — Submission Requirements

(i) Candidates must submit two items for every module (when relevant) — namely, a piece of code or an application (app) plus a written report.

(ii) The code(s) or application element should be submitted in a ZIP file containing all relevant submission documents - all individual code files.

(iii) Elective submissions to be made via the University's approved online submission platform **INSPERA.**

(iv) Assignments must be anonymous and feature only your **University Candidate Number, not** your Student Number or your actual name.

(v) All assignments will be submitted through the **Turnitin,** the University's anti-plagiarism software. Reports will be assessed by those marking the work and any reports of concern will be sent to the Chair of the Examination Board.

Further Information

Students are reminded to consult their Examination Conventions in their Course Handbook (available in hardcopy & on Canvas: 2022-23 MSC Modelling for Global Health Course Handbook v2.2 Dec 2022: MSc Modelling for Global Health 22-23 (ox.ac.uk)) for further guidance on submission of assignments, penalties for late submission and poor academic practice, etc.

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