Introduction to Geostatistics and Tropical Data

Incorporating Model-based Geostatistics into the Tropical Data service

Trachoma is targeted for elimination by 2030. To achieve this, health ministries must demonstrate that active trachoma prevalence is below 5%, trachomatous trichiasis (TT) is below 0.2%, and there is a system in place able to identify and manage incident TT cases. While progress has been made, some districts continue to show persistent or recrudescent trachoma, where despite mass drug administration (MDA) treatment, trachoma persistently remains above the elimination threshold, or recurs above the threshold after treatment has stopped. Model-based geostatistics (MBG) is a valuable tool for disease risk assessment in resource-constrained settings. It predicts prevalence at specific locations by considering spatial factors, enabling more efficient monitoring and evaluation. Tropical Data is working with the WHO Collaborating Centre at Lancaster University to incorporate MBG into the Tropical Data platform.

MBG offers three key advantages for trachoma programmes:

Efficient Survey Design: MBG leverages spatial correlations to design more cost-effective Trachoma Impact Surveys (TIS) or Trachoma Surveillance Surveys (TSS). This is especially useful in districts with persistent or recrudescent trachoma, reducing the strain on budgets. For example, MBG has been used to design super-EUs, where multiple EUs are combined into one, allowing fewer clusters to be surveyed while maintaining the same level or even improved precision.

Improved Interpretation: MBG analysis provides statistical certainty about whether a district has achieved the elimination threshold. This helps programme implementers differentiate meaningful prevalence changes from sampling error.

Targeted Interventions: MBG identifies geographic areas with a high probability of exceeding prevalence targets, allowing more focused resource allocation. For example, it can aid in deciding whether to split districts, or whether to discontinue (MDA) in areas where the prevalence threshold has been met while directing efforts to where it has not.

To support these gains, MBG is being integrated within the Tropical Data platform. This will assist in survey design and prevalence prediction for trachoma, utilising existing data and allowing for the incorporation of relevant covariate information. This will help users design efficient surveys and assess the likelihood that true prevalence is below the target threshold.

To succeed, the project will require system development, resource creation, and integration into the Tropical Data platform. This includes project planning, epidemiological support, standardised training, data collection and

management, and collaboration with key stakeholders, including health ministries. While the focus is on trachoma, the methodology developed will have broader applications for infectious disease control.

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