World Health Organization
African Region

EXPANDED SPECIAL PROJECT FOR ELIMINATION OF NEGLECTED TROPICAL DISEASES

Webinar title: Geostatistical Modelling for Schistosomiasis Mapping and Impact Assessments

Executive Summary

This webinar convened representatives from national schistosomiasis programmes, technical partners, research institutions, and WHO to explore the role of geostatistical methods in strengthening data-driven decision-making for schistosomiasis control and elimination. The discussion was framed within the persistent data challenges across the African Region: incomplete and outdated datasets, limited spatial resolution of existing surveys, and the difficulty of identifying focal transmission where implementation unit–level aggregation masks local heterogeneity. Despite progress in expanding the use of the Schistosomiasis Community Data Workbook and increasing sub-IU coverage, more than half of sub-IUs across the region still lack recent empirical data, underscoring the need for more efficient and targeted approaches to data collection and analysis.

Geostatistical analysis was presented as a statistically principled method for synthesising existing survey data with spatial and environmental information to generate fine-scale prevalence estimates accompanied by quantified uncertainty. Rather than substituting for empirical data, geostatistical approaches extract additional value from data already collected by accounting for spatial correlation and identifying where remaining uncertainty is greatest, helping to direct further data collection.

Country experiences and reference cases — including Kenya (presented in detail), Ethiopia (reflected through inputs from the Ethiopian team), DRC, and Madagascar — illustrated practical applications in survey prioritisation, refining endemicity classification, and improving the allocation of limited resources. Participants highlighted operational efficiencies achievable through approaches such as adaptive sampling and precision mapping, which can substantially reduce sample sizes while improving the reliability of sub-district estimates. The Kenya case combined systematic empirical mapping across 32 counties (2020–2025) with geostatistical prediction on a 5×5 km grid, enabling classification of wards against the 2% and 10% prevalence thresholds. Predicted prevalence largely matched the empirical pattern, while higher uncertainty was identified in sparsely populated regions for targeted follow-up.

Lessons from malaria programmes illustrated how geostatistical methods have progressively been integrated into national and global decision-making processes when supported by standardised methodologies, transparent validation frameworks, and sustained investment in data systems and analytical capacity. Participants reflected on the differences in capacity and systems between malaria and schistosomiasis programmes, and underscored the need for analogous structures and coordinated efforts to support similar uptake in the NTD context.

Discussions emphasised that interpretation and application of geostatistical outputs remain operationally challenging, particularly in translating probabilistic estimates and uncertainty metrics into decisions framed against programmatic thresholds. Participants noted that survey observations themselves carry measurement error, sampling variability, and spatial bias, and that geostatistical analysis should therefore be understood as a method for extracting maximum information from imperfect empirical data.
A recurring theme was the need for standardisation. Participants highlighted the absence of agreed approaches for model validation, interpretation of uncertainty, and the application of outputs in decision-making, and there was a strong call for the development of consistent guidance to support appropriate use across countries and partners. Questions of governance — including ownership of analytical outputs and review and approval processes — were also identified as critical.

Participants further raised the growing importance of integration across NTD and other public health programmes, including aligning schistosomiasis surveys with other disease platforms, exploring integrated survey designs, and strengthening joint delivery models at community level. Embedding geostatistical outputs into existing programme tools and planning cycles, rather than creating parallel systems, was identified as essential for sustainability.

The WHO strategic framework for schistosomiasis monitoring and evaluation provided an important reference point, with participants emphasising the need to align analytical approaches with existing guidance, tools, and reporting systems. Ensuring coherence between geostatistical outputs and established programme processes was identified as a key requirement for successful integration.

A complementary programmatic perspective on the appropriate scope and limits of geostatistical modelling — covering programme ownership, sub-national capacity, the priority of strengthening diagnostic availability and routine surveillance, and the suitability of these methods at different phases of programme evolution (control, EPHP, EPHP surveillance) — was presented by Dr Pauline Mwinzi (ESPEN).

Overall, the webinar demonstrated strong interest in the application of geostatistical methods to support schistosomiasis programmes, alongside a clear recognition of the technical and operational challenges that must be addressed. There was strong consensus on the need for a regionally aligned approach that balances analytical innovation with empirical data collection, strengthens country capacity, and embeds geostatistical methods within existing programme structures. These themes will be taken forward to an in-person technical meeting aimed at developing a shared framework for the operational use of geostatistical methods in the African Region.

Key Takeaways

The Role of Geostatistical Analysis in Schistosomiasis Programmes

- Across the African Region, 57.3% of sub-implementation units (sub-IUs) currently lack recent survey data. Geostatistical analysis is a statistically principled method for synthesizing existing survey observations with spatial and environmental information; it extracts additional information from data already collected and quantifies where uncertainty is greatest, supporting more efficient targeting of further empirical work.
- Geostatistical methods can reveal focal transmission patterns that are masked by implementation unit-level aggregation. The Kenya experience demonstrated that fine-resolution prediction on a 5×5 km grid — derived from systematic empirical surveys conducted across 32 counties between 2020 and 2025 — enabled ward-level classification distinguishing transmission hotspots from low-risk areas, with predicted prevalence broadly consistent with empirical observations.
- Adaptive sampling strategies guided by model uncertainty can substantially reduce survey sample sizes while maintaining or improving the reliability of sub-district estimates, offering meaningful operational efficiencies for resource-constrained programmes.
- Survey observations themselves carry sampling variability, methodological inconsistency, and uneven spatial coverage. Geostatistical analysis is therefore most usefully framed as a method for getting the most out of imperfect empirical data, rather than as an estimate to be validated against an assumed survey “ground truth.”

Methodological and Operational Considerations

- Data quality, spatial distribution, and methodological consistency are prerequisites for robust analysis. Variability in data collection protocols across countries and time periods, combined with legacy datasets containing methodological inconsistencies and missing metadata, can affect the robustness of outputs and underscores the need for continued investment in data systems.
- There is no agreed regional standard for model validation, interpretation of uncertainty, or translation of probabilistic outputs into programmatic decisions. Without common guidance, outputs risk being over-interpreted, under-utilized, or applied inconsistently across countries.
- Lessons from malaria programmes show that the integration of geostatistical methods into routine planning depends on standardized methodologies, transparent validation processes, sustained investment in data systems and analytical capacity, and clear collaboration between national programmes, technical partners, and research institutions.

Integration, Communication, and Use of Outputs

- Effective use of geostatistical outputs depends on their integration into existing programme tools and decision-making processes — including platforms such as the SCH Community Data Workbook — rather than the creation of parallel systems.
- Clear communication of both predicted prevalence and associated uncertainty is essential. Areas of higher uncertainty are best understood as priorities for additional empirical data collection, not as a direct trigger for programmatic action.
- There is growing scope for integration across NTDs and other public health programmes, including aligning schistosomiasis surveys with other disease platforms, exploring integrated survey designs, and strengthening joint delivery models at community level.

Programme-Side Perspective and Way Forward

A complementary programmatic perspective on the appropriate scope and limits of geostatistical modelling — covering programme ownership, sub-national capacity, the priority of strengthening diagnostic availability and routine surveillance, and the suitability of these methods at different phases of programme evolution (control, elimination as a public health problem [EPHP], and EPHP surveillance) — was presented by Dr Pauline Mwinzi (ESPEN).

The webinar concluded with consensus on continuing this work through a dedicated in-person technical meeting to advance a regional framework for the appropriate use of geostatistical methods in schistosomiasis programmes, balancing analytical innovation with strengthened country-level data systems and capacity.