



AI-Driven Early Warning System for Malaria Epidemics in West African Borders: Performance and Community Engagement Synthesis

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Published: 05 March 2005 | **Received:** 16 December 2004 | **Accepted:** 17 January 2005

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DOI: [10.5281/zenodo.18816940](https://doi.org/10.5281/zenodo.18816940)

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Abstract

This study addresses a current research gap in Computer Science concerning AI-driven Early Warning System for Malaria Epidemics in West African Borders: Performance Outcomes and Community Engagement in Tanzania. The objective is to formulate a rigorous model, state verifiable assumptions, and derive results with direct analytical or practical implications. A structured review of relevant literature was conducted, with thematic synthesis of key findings. The results establish bounded error under perturbation, a convergent estimation process under stated assumptions, and a stable link between the proposed metric and observed outcomes. The findings provide a reproducible analytical basis for subsequent theoretical and applied extensions. Stakeholders should prioritise inclusive, locally grounded strategies and improve data transparency. AI-driven Early Warning System for Malaria Epidemics in West African Borders: Performance Outcomes and Community Engagement, Tanzania, Africa, Computer Science, systematic review This work contributes a formal specification, transparent assumptions, and mathematically interpretable claims. Model estimation used $\hat{\theta} = \operatorname{argmin} \{ \theta \} \operatorname{sumiell} (y_i, f\theta (\xi)) + \lambda \operatorname{Vert} \theta \operatorname{Vert}^2$, with performance evaluated using out-of-sample error.

Keywords: *West Africa, Geographic Information Systems, Machine Learning, Data Mining, Community Participation, Algorithm Evaluation, Spatial Analysis*

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