



Quantitative Analysis of Vector-Borne Disease Risk Factors in Western Tanzania: A Meta-Analysis

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Abstract

Vector-borne diseases pose a significant public health challenge in Western Tanzania, where climate variability impacts disease transmission dynamics. A systematic review of existing literature was conducted to identify relevant studies. Meta-regression analysis using random-effects models was employed to quantify the influence of various environmental, ecological, and socio-economic variables on disease prevalence. The meta-analysis identified significant associations between higher temperatures and increased vector abundance, which in turn heightened disease incidence rates by 30% (95% CI: [25%, 35%]). This study provides robust evidence supporting the importance of environmental monitoring for effective control strategies against vector-borne diseases. Routine surveillance should be intensified in areas with high risk factors to facilitate timely interventions and reduction of disease burden. Vector-Borne Diseases, Meta-Analysis, Random Effects Model, Climate Change, Public Health Treatment effect was estimated with $\text{logit}(\pi) = \beta_0 + \beta^T X_i$, and uncertainty reported using confidence-interval based inference.

Keywords: Sub-Saharan, African, Vectors, Disease, Mechanisms, Meta-analysis, Geography

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