African Journal of Addiction Medicine

Bayesian Hierarchical Model for Measuring System Reliability in Public Health Surveillance Systems in Ethiopia

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Published: 07 December 2007 | **Received:** 19 September 2007 | **Accepted:** 22 November 2007

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DOI: 10.5281/zenodo.18842380

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Abstract

Public health surveillance systems are essential for monitoring disease prevalence and guiding public health interventions in Ethiopia. A Bayesian hierarchical model was applied to assess system reliability across different regions in Ethiopia. The model accounts for variability between surveillance sites and temporal trends. The analysis revealed significant variation in system reliability, with some sites showing higher stability than others. This study provided insights into the robustness of public health surveillance systems in Ethiopia using advanced statistical modelling techniques. Interventions should be targeted towards improving the less reliable systems to enhance overall surveillance effectiveness. Treatment effect was estimated with $text\{logit\}(\pi)=beta0+\beta^{\rightarrow} p X_i$, and uncertainty reported using confidence-interval based inference.

Keywords: *Ethiopia, Bayesian hierarchical model, public health surveillance, reliability assessment, methodological evaluation, geographic information systems, spatial analysis*