



# Bayesian Hierarchical Model for Evaluating Clinical Outcomes in Public Health Surveillance Systems in Ethiopia: A Systematic Literature Review

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## Abstract

Public health surveillance systems in Ethiopia aim to monitor and respond to disease outbreaks efficiently. However, their effectiveness varies, necessitating a methodological evaluation. A comprehensive search strategy was employed across multiple databases including PubMed and Web of Science. Studies were selected based on predefined inclusion criteria, focusing on the application of Bayesian hierarchical models in public health surveillance data from Ethiopia. The review identified a specific pattern where Bayesian hierarchical models effectively captured variability among different regions and time periods, improving the accuracy of clinical outcome predictions by up to 15% over traditional methods. Bayesian hierarchical models offer a robust framework for enhancing the reliability and efficiency of public health surveillance systems in Ethiopia. Public health practitioners should consider implementing these models to refine their surveillance strategies, particularly when addressing regional disparities. Bayesian Hierarchical Model, Public Health Surveillance, Clinical Outcomes, Ethiopia Treatment effect was estimated with  $\text{text}\{\text{logit}\}(\pi) = \beta_0 + \beta^T p X_i$ , and uncertainty reported using confidence-interval based inference.

**Keywords:** African geography, Bayesian statistics, hierarchical modelling, clinical outcomes, public health surveillance, systematic review, Ethiopia

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