



# Bayesian Hierarchical Model for Assessing Risk Reduction in Nigeria's Public Health Surveillance Systems

Abimbola Adekoya<sup>1,2</sup>, Fayemi Ajayi<sup>3</sup>, Ifeyinfa Ogunlana<sup>4,5</sup>, Kehinde Oladipo<sup>4,6</sup>

<sup>1</sup> University of Maiduguri

<sup>2</sup> Department of Public Health, University of Ibadan

<sup>3</sup> University of Abuja

<sup>4</sup> Department of Surgery, University of Maiduguri

<sup>5</sup> Nigerian Institute of Social and Economic Research (NISER)

<sup>6</sup> University of Ibadan

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**Correspondence:** [aadekoya@hotmail.com](mailto:aadekoya@hotmail.com)

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## Author notes

*Abimbola Adekoya is affiliated with University of Maiduguri and focuses on Medicine research in Africa.*

*Fayemi Ajayi is affiliated with University of Abuja and focuses on Medicine research in Africa.*

*Ifeyinfa Ogunlana is affiliated with Department of Surgery, University of Maiduguri and focuses on Medicine research in Africa.*

*Kehinde Oladipo is affiliated with Department of Surgery, University of Maiduguri and focuses on Medicine research in Africa.*

## Abstract

Public health surveillance systems in Nigeria are crucial for monitoring infectious diseases and ensuring timely interventions. However, their effectiveness can be improved by assessing risk reduction strategies. A Bayesian hierarchical model was employed to analyse surveillance data from multiple regions. The model accounts for spatial and temporal variations, providing a nuanced understanding of disease patterns and intervention impacts. The model indicated that targeted vaccination campaigns significantly reduced the incidence of measles by approximately 50% in monitored areas over one year. Bayesian hierarchical models offer a robust method for assessing risk reduction in public health surveillance systems, enhancing their efficiency and effectiveness. Public health authorities should prioritise implementation of these models to improve disease control and resource allocation. Bayesian Hierarchical Model, Public Health Surveillance, Nigeria, Measles Reduction 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:** *Sub-Saharan, Bayesian, Hierarchical, Surveillance, Evaluation, Intervention, Epidemiology*

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