African Veterinary Imaging

Bayesian Hierarchical Model for Measuring Yield Improvement in Municipal Water Systems of Uganda: A Methodological Framework

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Abstract

Recent studies in municipal water systems have highlighted the need for improved yield measurement methods to enhance efficiency and sustainability. The proposed method utilizes Bayesian statistical techniques within a hierarchical framework to account for variability in data at different levels of aggregation. This approach incorporates prior knowledge about system performance and dynamic factors influencing yield. The Bayesian hierarchical model provides a robust method for assessing yield improvement in municipal water systems, offering actionable insights to stakeholders aiming for sustainable agricultural productivity enhancements. Stakeholders are encouraged to implement the recommended improvements based on the model's findings to maximise yield and minimise operational costs. The empirical specification follows $Y = \beta_{0+\beta}^{\rightarrow} p\, X + varepsilon$, and inference is reported with uncertainty-aware statistical criteria.

Keywords: *Sub-Saharan, yield gap, stochastic models, hierarchical analysis, Bayesian inference, econometrics, precision agriculture*

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