African Food Chemistry (Food Science)

Bayesian Hierarchical Model Evaluation for Measuring Reliability in Municipal Water Systems of Kenyan Cities,

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Abstract

This study evaluates municipal water systems in Kenyan cities by applying a Bayesian hierarchical model to assess reliability. A Bayesian hierarchical model was developed to estimate reliability metrics across different municipal water systems in Kenya. The model accounts for spatial and temporal variability using Markov Chain Monte Carlo (MCMC) methods. The model identified a significant variation in reliability among cities, with some systems showing a failure rate of up to 15% under normal conditions. Bayesian hierarchical models provide a robust framework for evaluating and improving municipal water system reliability in Kenya. Further research should explore the integration of real-time data into the model to enhance its predictive capabilities. The empirical specification follows $Y = \vec{\beta_{0+\beta}} \, p \, X + varepsilon$, and inference is reported with uncertainty-aware statistical criteria.

Keywords: *Kenya, Bayesian Hierarchical Model, Reliability Assessment, Statistical Methodology, Water Supply Systems, Spatial Analysis, Econometrics*

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