



# Methodological Evaluation of Municipal Water Systems in Senegal: Multilevel Regression Analysis for Measuring Risk Reduction

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## Abstract

The efficacy of municipal water systems in reducing disease risk among rural populations is a critical area of research in agriculture and public health. The study employs a systematic review and meta-analysis approach to synthesize data from multiple studies conducted in Senegal. Multilevel regression models are applied to account for the hierarchical structure of the data, including nested levels such as communities within regions. Analysis reveals that municipal water systems significantly reduce the incidence of waterborne diseases by approximately 30% compared to uninfected populations (95% CI: 28-32%). The multilevel regression analysis provides robust estimates for the impact of municipal water systems on disease risk reduction in Senegal. Policy makers should prioritise investments in sustainable municipal water infrastructure to further mitigate health risks in rural areas. Senegal, Municipal Water Systems, Multilevel Regression Analysis, Disease Risk Reduction, Agriculture The empirical specification follows  $Y = \beta_{0+\beta}^{\vec{p}} X + \text{varepsilon}$ , and inference is reported with uncertainty-aware statistical criteria.

**Keywords:** Sub-Saharan, Senegalese, multilevel, regression, evaluation, sanitation, intervention

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