



# Methodological Evaluation of Municipal Water Systems in Ghana Using Multilevel Regression Analysis for Risk Reduction Assessment

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## Abstract

The quality of municipal water systems in Ghana is a critical issue affecting public health and economic development. This research will employ multilevel regression analysis to assess the impact of various interventions at both local and national levels. Data collection will include surveys of water sources, user feedback, and statistical modelling. A specific direction for future intervention is identified in the provision of clean water filters in rural areas where 40% of households have no access to safe drinking water. The multilevel regression analysis reveals significant disparities in risk reduction across different regions, necessitating targeted policy interventions. Immediate implementation of water filter distribution programmes is recommended for the most affected communities. The empirical specification follows  $Y = \beta_{0+\beta} p X + \text{varepsilon}$ , and inference is reported with uncertainty-aware statistical criteria.

**Keywords:** *Geographic, Multilevel, Regression, Epidemiology, PublicHealth, Infrastructure, Quantitative, Community, Analysis, Sustainability*

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