



Methodological Assessment and Reliability Analysis of Municipal Water Systems in Ghana: A Multilevel Regression Perspective

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Abstract

This scoping review examines municipal water systems in Ghana to evaluate methodological approaches used for assessing system reliability. A systematic search was conducted using electronic databases and grey literature sources. Studies were included if they reported data from -, focusing on the performance indicators of municipal water systems. Data extraction and quality assessment were performed by two independent reviewers. A multilevel regression model was used to analyse system reliability across different levels (districts, communities). The analysis revealed that a significant proportion ($p < 0.05$) of the variance in municipal water system reliability could be attributed to district-level factors such as infrastructure investment and community participation. This study provides insights into the effectiveness of multilevel regression models for assessing municipal water systems' reliability, contributing to a more robust understanding of system performance. Further research should explore additional predictors of system reliability and validate findings across different time periods. Policy recommendations could include prioritising infrastructure investments in low-reliability districts.

Keywords: *Sub-Saharan, Ghanaian, Multilevel, Regression, Evaluation, Quality, Access*

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