African Transportation Engineering

Methodological Evaluation of Water Treatment Facilities Systems in Ghana Through Multilevel Regression Analysis for System Reliability Assessment

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Published: 18 January 2000 | **Received:** 22 November 1999 | **Accepted:** 29 December 1999

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DOI: 10.5281/zenodo.18715938

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Abstract

Water treatment facilities in Ghana need robust evaluation to ensure reliability and sustainability. A multilevel regression model was employed with fixed effects at the national level and random effects at sub-national levels, accounting for geographical variability. The multilevel model revealed significant differences in system performance across regions, indicating that local conditions influence treatment effectiveness. Multilevel regression analysis provides a nuanced understanding of water treatment facility reliability in Ghana. Policy makers should tailor interventions to regional needs based on the findings from this study. water treatment facilities, multilevel regression, system reliability, Ghana The maintenance outcome was modelled as $Y\{\} = beta0 + beta1\,X\{\} + ui + varepsilon\{\}$, with robustness checked using heteroskedasticity-consistent errors.

Keywords: *Geographic, Multilevel, Regression, Sustainability, Infrastructure, Evaluation, Reliability*

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