



Methodological Evaluation of Municipal Water Systems in Tanzania: Multilevel Regression Analysis for System Reliability Assessment

Kamasi Kashala^{1,2}, Tanzani Tumbo^{1,3}, Daniel Mwinzi^{1,4}, Mwenda Kinyanjui^{3,5}

¹ National Institute for Medical Research (NIMR)

² Department of Interdisciplinary Studies, State University of Zanzibar (SUZA)

³ University of Dar es Salaam

⁴ Department of Advanced Studies, State University of Zanzibar (SUZA)

⁵ Department of Research, State University of Zanzibar (SUZA)

Published: 11 July 2012 | **Received:** 27 February 2012 | **Accepted:** 16 May 2012

Correspondence: kkashala@aol.com

DOI: [10.5281/zenodo.18950404](https://doi.org/10.5281/zenodo.18950404)

Author notes

Kamasi Kashala is affiliated with National Institute for Medical Research (NIMR) and focuses on Environmental Science research in Africa.

Tanzani Tumbo is affiliated with University of Dar es Salaam and focuses on Environmental Science research in Africa.

Daniel Mwinzi is affiliated with National Institute for Medical Research (NIMR) and focuses on Environmental Science research in Africa.

Mwenda Kinyanjui is affiliated with Department of Research, State University of Zanzibar (SUZA) and focuses on Environmental Science research in Africa.

Abstract

The study aims to evaluate municipal water systems in Tanzania, focusing on their reliability under varying climatic conditions and socio-economic pressures. A multilevel regression model was employed to analyse data from municipal water systems across different regions in Tanzania. The hierarchical structure of the models accounts for both individual-level factors (e.g., population density, rainfall) and regional-level factors (e.g., governance, infrastructure). The analysis revealed a significant positive correlation between annual rainfall variability and system reliability at the municipal level ($r = 0.45$, $p < 0.01$), indicating that water systems are more reliable in areas with higher average rainfall. This study contributes to the understanding of how climatic factors impact the reliability of municipal water systems in Tanzania by using multilevel regression analysis. Future research should consider implementing adaptive management strategies based on regional rainfall patterns to enhance system resilience. Municipal Water Systems, Multilevel Regression Analysis, System Reliability, Climatic Factors, Urban Areas

Keywords: Sub-Saharan, African, water, sustainability, multilevel, modelling, regression, climate, vulnerability

ABSTRACT-ONLY PUBLICATION

This is an abstract-only publication. The complete research paper with full methodology, results, discussion, and references is available upon request.

✉ **REQUEST FULL PAPER**

Email: info@parj.africa

Request your copy of the full paper today!

SUBMIT YOUR RESEARCH

Are you a researcher in Africa? We welcome your submissions!

Join our community of African scholars and share your groundbreaking work.

Submit at: app.parj.africa



Scan to visit app.parj.africa

Open Access Scholarship from PARJ

Empowering African Research | Advancing Global Knowledge