Power-Distribution Equipment Systems Risk Reduction in Uganda: A Multilevel Regression Analysis

James Kasangali[1,2]**, Grace Odong**[3,4]**, Erick Agaba**[1,2]**, David Nabasajja**[5]

[1] Busitema University

[2] Department of Civil Engineering, Makerere University, Kampala

[3] Medical Research Council (MRC)/UVRI and LSHTM Uganda Research Unit

[4] Department of Sustainable Systems, Makerere University, Kampala

[5] Department of Electrical Engineering, Medical Research Council (MRC)/UVRI and LSHTM Uganda Research Unit

Author notes

James Kasangali is affiliated with Busitema University and focuses on Engineering research in Africa.
Grace Odong is affiliated with Medical Research Council (MRC)/UVRI and LSHTM Uganda Research Unit and focuses on Engineering research in Africa.
Erick Agaba is affiliated with Busitema University and focuses on Engineering research in Africa.
David Nabasajja is affiliated with Department of Electrical Engineering, Medical Research Council (MRC)/UVRI and LSHTM Uganda Research Unit and focuses on Engineering research in Africa.

Abstract

Power distribution equipment systems (PDES) play a critical role in ensuring reliable electricity supply to households and industries in Uganda. A multilevel regression analysis was conducted using data from 100 randomly selected communities across Uganda. The model includes variables such as socioeconomic status and climate variability. The multilevel regression revealed significant effects of community socioeconomic status (SES) on PDES system reliability, with a reduction in failure rates by approximately 25% for every unit increase in SES index. This study provides evidence that socio-economic factors significantly influence the operational stability of power distribution systems. Recommendations include targeted investments and capacity building programmes to support communities with lower SES indices. Develop tailored energy access strategies, enhance community engagement, and allocate resources effectively to improve PDES reliability in underserved areas. Power-Distribution Equipment Systems, Multilevel Regression Analysis, Risk Reduction, Uganda The maintenance outcome was modelled as $Y\{\} = beta\,0 + beta\,1\,X\{\} + ui + varepsilon\{\}$, with robustness checked using heteroskedasticity-consistent errors.

Keywords: *Sub-Saharan, rural electrification, multilevel modelling, risk assessment, infrastructure maintenance, power distribution systems, geographic information systems*

ABSTRACT-ONLY PUBLICATION

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