



Methodological Evaluation of Regional Monitoring Networks in Uganda: Quasi-Experimental Design for System Reliability Assessment

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Abstract

The effectiveness of regional monitoring networks in Uganda is crucial for ensuring reliable data collection in various scientific disciplines, including physics. A mixed-method approach was employed, combining quantitative analysis with qualitative assessments. The study utilised survey data collected from 10 regional monitoring stations across Uganda. The findings indicate that while the majority of network operations were functioning satisfactorily (85% confidence interval), there is a notable disparity in signal quality between north and south regions, necessitating targeted interventions. Inadequate investment in infrastructure has been identified as a significant challenge to system reliability across Uganda's regional monitoring networks. Investment in robust infrastructure upgrades and continuous training for network personnel are recommended to enhance overall system performance. regional monitoring, physics, reliability assessment, quasi-experimental design The empirical specification follows $Y = \beta_{0+\beta} p X + \text{varepsilon}$, and inference is reported with uncertainty-aware statistical criteria.

Keywords: *African geography, monitoring networks, reliability assessment, quasi-experimental design, sensor technology, data integrity, geographic information systems*

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