



Methodological Assessment of Regional Monitoring Networks in Kenya: A Cost-Efficiency Randomized Field Trial

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Abstract

The development of regional monitoring networks in Kenya aims to enhance environmental and health surveillance through a coordinated network of sensors and data collection points. A controlled experiment was conducted in two regions, with random assignment to treatment (enhanced network) or control groups. Data were collected over six months using advanced IoT sensors and statistical regression models. The enhanced monitoring network achieved a 20% reduction in operational costs while maintaining data accuracy, indicating cost savings without compromising on quality. This randomized field trial demonstrated the potential for cost-effective regional monitoring networks by balancing resource investment with service delivery performance. Further studies should investigate scalability and long-term sustainability of these networks to ensure their continued effectiveness in diverse settings. The empirical specification follows $Y = \beta_{0+\beta} p X + \text{varepsilon}$, and inference is reported with uncertainty-aware statistical criteria.

Keywords: *Kenyan, Geographic Information Systems, Randomized Controlled Trials, Sensor Networks, Data Analytics, Precision Medicine, Environmental Health Surveillance*

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