



# Longevity and Coverage Analysis of Remote Monitoring Systems for Safe Drinking Water in Addis Ababa Slums,

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## Abstract

This study addresses a current research gap in Computer Science concerning Remote Monitoring of Water Supply Systems for Safe Drinking Water in Addis Ababa Slums: Longevity and Coverage Analysis in Ethiopia. The objective is to formulate a rigorous model, state verifiable assumptions, and derive results with direct analytical or practical implications. A structured analytical approach was used, integrating formal modelling with domain evidence. The results establish bounded error under perturbation, a convergent estimation process under stated assumptions, and a stable link between the proposed metric and observed outcomes. The findings provide a reproducible analytical basis for subsequent theoretical and applied extensions. Stakeholders should prioritise inclusive, locally grounded strategies and improve data transparency. Remote Monitoring of Water Supply Systems for Safe Drinking Water in Addis Ababa Slums: Longevity and Coverage Analysis, Ethiopia, Africa, Computer Science, methodology paper This work contributes a formal specification, transparent assumptions, and mathematically interpretable claims. Model estimation used  $\hat{\theta} = \operatorname{argmin}\{\theta\} \operatorname{sumiell}(y_i, f\theta(\xi)) + \lambda \operatorname{Vert}\theta \operatorname{Vert}^2$ , with performance evaluated using out-of-sample error.

**Keywords:** *Geographic, Sub-Saharan, Monitoring, IoT, Data Analytics, Sensor Networks, Geographic Information Systems*



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