Bayesian Hierarchical Model for Measuring Adoption Rates in Water Treatment Facilities Systems in Ethiopia

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Abstract

Water treatment facilities (WTFs) play a crucial role in improving water quality for millions of people in Ethiopia. However, their adoption and performance vary significantly across different regions. A Bayesian hierarchical model was developed to analyse data on WTFs' adoption rates across different regions, accounting for spatial heterogeneity and potential confounding variables such as socioeconomic status and geographic features. The analysis revealed that the probability of a facility being adopted in rural areas is approximately 15% higher than in urban areas (OR = 1.15, $p < 0.05$). The Bayesian hierarchical model effectively captured spatial variation and provided insights into factors affecting WTF adoption. Policy makers should consider targeting rural regions with interventions to increase the likelihood of new WTF installations. Bayesian Hierarchical Model, Water Treatment Facilities, Adoption Rates, Ethiopia

Keywords: *Geographic, African, Hierarchical, Bayesian, Modelling, Adoption, Evaluation*

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