African Botany Research (Core Life Science)

Solar-Powered Water Treatment Systems in Rural Ugandan Communities: A Meta-Analysis Six Months Post-Deployment

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Published: 22 April 2004 | **Received:** 13 December 2003 | **Accepted:** 03 April 2004

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DOI: 10.5281/zenodo.18788891

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Abstract

Solar-powered water treatment systems (SWTS) have been implemented in several rural Ugandan communities to improve access to safe drinking water. A comprehensive search was conducted using electronic databases and grey literature. Studies were selected based on predefined criteria and analysed using a random-effects model with robust standard errors. Six-month follow-up data indicated that SWTS significantly increased safe drinking water access by 35% (95% CI: 20-48%) compared to baseline conditions, highlighting the need for continued support and maintenance. The meta-analysis supports the efficacy of solar-powered water treatment systems in improving rural Ugandan communities' access to safe drinking water six months post-deployment. Further studies should investigate long-term sustainability and cost-effectiveness of these systems, with a focus on community engagement for optimal performance and user acceptance. Treatment effect was estimated with $text\{logit\}(\pi)=beta0+\vec{\beta} p X_i$, and uncertainty reported using confidence-interval based inference.

Keywords: *Sub-Saharan, intervention effectiveness, meta-analysis, rural health, water sanitation, randomized controlled trials, geographic information systems*

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