



Assessing the Adoption and Cost-Effectiveness of Urine-Diverting Dry Toilets in Windhoek's Informal Settlements

An Action Research Approach

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ABSTRACT

Informal settlements in water-scarce regions face significant sanitation challenges. Urine-diverting dry toilets (UDDTs) offer a potential non-sewered solution, but their sustained adoption and economic viability in such contexts are poorly understood. This study aimed to assess the adoption rates and cost-effectiveness of UDDTs implemented in Windhoek's informal settlements, and to identify key barriers and enablers influencing their sustained use. An action research methodology was employed, involving three iterative cycles of planning, implementation, observation, and reflection. Mixed methods were used, including household surveys, focus group discussions, direct observation of toilet conditions, and a comparative cost analysis against conventional sanitation options. Adoption was moderate, with 62% of households using the UDDTs correctly six months post-installation. Key barriers included cultural perceptions of handling excreta and maintenance complexities. The cost-benefit analysis demonstrated that UDDTs were 30% more cost-effective over a ten-year period compared to communal ablution blocks, primarily due to reduced water and sewerage costs. UDDTs present a technically and economically viable sanitation alternative for water-scarce informal settlements, but their success is contingent on addressing socio-cultural acceptance and ensuring accessible maintenance support. Future interventions should integrate continuous community-led hygiene promotion, establish local maintenance entrepreneurs, and advocate for municipal policy to include UDDTs in formal sanitation planning and subsidy frameworks. sanitation, urine diversion, dry toilets, informal settlements, action research, cost-benefit analysis, Namibia This study provides a novel, empirically grounded cost-effectiveness model for UDDTs in an African informal settlement context and demonstrates the utility of action research for co-producing practical sanitation solutions with communities.

Keywords: *Action Research, Southern Africa, Sanitation, Informal Settlements, Cost-Effectiveness, Ecological Sanitation, Technology Adoption*

Article Highlights

Methodological Note

<ul style="list-style-type: none"> • Action research reveals a 62% correct-use rate for UDDTs six months post-installation. • Cost analysis shows UDDTs are 30% more cost-effective than communal blocks over a decade. • Key barriers include cultural perceptions of excreta and maintenance complexities. • Success requires integrating community-led promotion and local maintenance support. 	<p>Employed an action research framework with three iterative cycles of planning, implementation, observation, and reflection, using mixed methods including surveys, focus groups, and direct observation.</p> <p><i>This study provides a novel cost-effectiveness model for ecological sanitation in informal settlements.</i></p>
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