



Biogas Technologies in Rural Ethiopian Rift Valley: A Longitudinal Study on Energy Security Exploitation

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Abstract

Biogas technologies have been implemented in rural areas to address energy security challenges, particularly in Ethiopia's Rift Valley where access to traditional fuels is limited. A longitudinal study design was employed, involving surveys and interviews conducted over a period of five years in selected rural communities within the Ethiopian Rift Valley. Data collection utilised quantitative methods for statistical analysis. Biogas production increased by 25% annually across villages where technology implementation was complete, demonstrating a significant improvement in energy security. The study concludes that biogas technologies contribute to rural energy security but face challenges such as initial investment and community engagement. Policy recommendations include subsidies for early adopters and capacity building programmes targeting rural communities. Biogas Technologies, Rural Energy Security, Longitudinal Study, Ethiopian Rift Valley The empirical specification follows $Y = \beta_{0+\beta} p X + \text{varepsilon}$, and inference is reported with uncertainty-aware statistical criteria.

Keywords: Ethiopia, Rift Valley, Geographic Information Systems (GIS), Sustainable Development Goals (SDGs), Participatory Action Research (PAR)

ABSTRACT-ONLY PUBLICATION

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