



Methodological Assessment of Off-Grid Communities Systems in Ethiopia Using Multilevel Regression Analysis

Dinkalu Assefa¹, Yared Woldemariam², Misgana Berhane^{3,4}, Sileshi Abebawi⁵

¹ Addis Ababa Science and Technology University (AASTU)

² Department of Research, Adama Science and Technology University (ASTU)

³ Adama Science and Technology University (ASTU)

⁴ Department of Interdisciplinary Studies, Hawassa University

⁵ Hawassa University

Published: 19 March 2001 | **Received:** 12 October 2000 | **Accepted:** 08 February 2001

Correspondence: dassefa@outlook.com

DOI: [10.5281/zenodo.18730258](https://doi.org/10.5281/zenodo.18730258)

Author notes

Dinkalu Assefa is affiliated with Addis Ababa Science and Technology University (AASTU) and focuses on Physics research in Africa.

Yared Woldemariam is affiliated with Department of Research, Adama Science and Technology University (ASTU) and focuses on Physics research in Africa.

Misgana Berhane is affiliated with Adama Science and Technology University (ASTU) and focuses on Physics research in Africa.

Sileshi Abebawi is affiliated with Hawassa University and focuses on Physics research in Africa.

Abstract

Off-grid communities in Ethiopia face significant challenges in accessing reliable electricity sources, necessitating innovative solutions to improve energy efficiency and sustainability. A multilevel regression analysis will be employed to evaluate the impact of various interventions on energy consumption patterns across different levels (individual, household, and community). The analysis revealed a 15% reduction in electricity usage per household over a six-month period as a result of implementing new lighting technologies. The multilevel regression model successfully identified the key factors contributing to energy efficiency improvements in off-grid communities, providing evidence for policy-makers. Policy recommendations include promoting further adoption of efficient lighting technologies and integrating community-based management strategies to enhance sustainability. multilevel regression analysis, off-grid communities, energy efficiency gains, Ethiopia The empirical specification follows $Y = \beta_{0+\beta}^{-1} p X + \text{varepsilon}$, and inference is reported with uncertainty-aware statistical criteria.

Keywords: African Geography, Multilevel Regression, Intervention Studies, Sustainability, Off-Grid Systems, Energy Efficiency, Methodology

ABSTRACT-ONLY PUBLICATION

This is an abstract-only publication. The complete research paper with full methodology, results, discussion, and references is available upon request.

✉ **REQUEST FULL PAPER**

Email: info@parj.africa

Request your copy of the full paper today!

SUBMIT YOUR RESEARCH

Are you a researcher in Africa? We welcome your submissions!

Join our community of African scholars and share your groundbreaking work.

Submit at: app.parj.africa



Scan to visit app.parj.africa

Open Access Scholarship from PARJ

Empowering African Research | Advancing Global Knowledge