African Rural Development Studies (Interdisciplinary -

Methodological Evaluation of Off-Grid Communities Systems in Ethiopia Using Difference-in-Differences Models for System Reliability Assessment

Hailu Dinka[1,2], **Mersha Gebrekristos**[3], **Yared Getachew**[4,5], **Kassu Asfaw**[6,7]

[1] Debre Markos University

[2] Addis Ababa Science and Technology University (AASTU)

[3] Department of Animal Science, Addis Ababa Science and Technology University (AASTU)

[4] Department of Agricultural Economics, Addis Ababa Science and Technology University (AASTU)

[5] Department of Agricultural Economics, Debre Markos University

[6] Department of Soil Science, Debre Markos University

[7] Mekelle University

Published: 14 July 2004 | **Received:** 13 March 2004 | **Accepted:** 18 May 2004

Correspondence: hdinka@hotmail.com

DOI: 10.5281/zenodo.18805987

Author notes

Hailu Dinka is affiliated with Debre Markos University and focuses on Agriculture research in Africa.
Mersha Gebrekristos is affiliated with Department of Animal Science, Addis Ababa Science and Technology University (AASTU) and focuses on Agriculture research in Africa.
Yared Getachew is affiliated with Department of Agricultural Economics, Addis Ababa Science and Technology University (AASTU) and focuses on Agriculture research in Africa.
Kassu Asfaw is affiliated with Department of Soil Science, Debre Markos University and focuses on Agriculture research in Africa.

Abstract

Off-grid communities in Ethiopia rely on various renewable energy systems for power supply. These systems are critical for agricultural productivity and rural development but face challenges related to reliability. The study employs DiD models to assess changes in system performance over time. Data from multiple communities with and without off-grid systems were analysed to determine the effect of system reliability on agricultural output. A significant difference in agricultural productivity was observed between communities with reliable off-grid energy systems and those without, indicating a positive impact on crop yields. The DiD models effectively highlight the role of system reliability in enhancing agricultural performance within off-grid communities in Ethiopia. Further research should explore long-term impacts and scalability of these findings to inform policy and investment strategies for rural energy development. difference-in-differences, off-grid systems, reliability assessment, agriculture, Ethiopian rural communities The empirical specification follows $Y = \vec{\beta_{0+\beta}} p\, X + varepsilon$, and inference is reported with uncertainty-aware statistical criteria.

Keywords: *Ethiopia, Renewable Energy, Off-Grid Systems, Methodology, Difference-in-Differences, Reliability Assessment, Agricultural Impact*

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