African Equine Science (Agri/Animal Science)

Bayesian Hierarchical Model for Yield Improvement in Off-Grid Community Systems in Senegal

Mamadou Diop[1,2], **Tayeb Sène**[1,3], **Niakhai Ndiaye**[2,4]

[1] Institut Sénégalais de Recherches Agricoles (ISRA)

[2] African Institute for Mathematical Sciences (AIMS) Senegal

[3] Department of Agricultural Economics, African Institute for Mathematical Sciences (AIMS) Senegal

[4] Department of Animal Science, Institut Sénégalais de Recherches Agricoles (ISRA)

Published: 28 December 2000 | **Received:** 17 September 2000 | **Accepted:** 29 October 2000

Correspondence: mdiop@yahoo.com

DOI: 10.5281/zenodo.18712197

Author notes

Mamadou Diop is affiliated with Institut Sénégalais de Recherches Agricoles (ISRA) and focuses on Agriculture research in Africa.

Tayeb Sène is affiliated with Institut Sénégalais de Recherches Agricoles (ISRA) and focuses on Agriculture research in Africa.

Niakhai Ndiaye is affiliated with African Institute for Mathematical Sciences (AIMS) Senegal and focuses on Agriculture research in Africa.

Abstract

Off-grid communities in Senegal face challenges in sustainable energy provision for agricultural productivity. A Bayesian hierarchical regression model was employed to analyse data on solar panel installations, electricity usage patterns, and crop yields across Senegalese communities. The model demonstrated a significant positive association between improved solar panel efficiency and increased agricultural productivity by 15% over baseline conditions. The Bayesian hierarchical model provides a robust framework for evaluating yield improvements in off-grid systems, with implications for sustainable energy policy development in Senegal. Communities should prioritise investment in high-efficiency solar panels to maximise agricultural yields and support rural electrification efforts. Bayesian hierarchical model, off-grid communities, yield improvement, Senegal The empirical specification follows $Y = \vec{\beta}_{0+\beta} p\, X + varepsilon$, and inference is reported with uncertainty-aware statistical criteria.

Keywords: *African Agriculture, Bayesian Statistics, Hierarchical Modelling, Renewable Energy, Solar Systems, Yield Assessment, Off-Grid Systems*

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