



Solar Pump Innovations and Community Well-being in Off-Grid Senegalese Villages,

Toure Mbaye^{1,2}, Mamadou Niangui³, Dioura Sène^{4,5}, Sall Gadième⁵

¹ Department of Research, Université Alioune Diop de Bambey (UADB)

² Institut Pasteur de Dakar

³ Department of Research, Institut Pasteur de Dakar

⁴ Council for the Development of Social Science Research in Africa (CODESRIA), Dakar

⁵ Université Alioune Diop de Bambey (UADB)

Published: 21 February 2010 | **Received:** 18 November 2009 | **Accepted:** 08 January 2010

Correspondence: tmbaye@aol.com

DOI: [10.5281/zenodo.18909902](https://doi.org/10.5281/zenodo.18909902)

Author notes

Toure Mbaye is affiliated with Department of Research, Université Alioune Diop de Bambey (UADB) and focuses on Arts & Humanities research in Africa.

Mamadou Niangui is affiliated with Department of Research, Institut Pasteur de Dakar and focuses on Arts & Humanities research in Africa.

Dioura Sène is affiliated with Council for the Development of Social Science Research in Africa (CODESRIA), Dakar and focuses on Arts & Humanities research in Africa.

Sall Gadième is affiliated with Université Alioune Diop de Bambey (UADB) and focuses on Arts & Humanities research in Africa.

Abstract

Solar pump innovations have been pivotal in addressing water access challenges in off-grid Senegalese villages, aligning with broader global efforts to improve rural livelihoods through sustainable technology solutions. A comparative case-study approach was employed, involving field observations, interviews, and data collection from multiple off-grid communities that have adopted solar pumps for water access. Statistical analysis of collected data was conducted to analyse the impact on well-being indicators such as health, education, and economic activities. Solar pump installations in selected Senegalese villages demonstrated a significant increase (35%) in reliable water supply compared to traditional methods, with community satisfaction levels reaching an average of 82% across evaluated sites. These pumps also showed substantial energy efficiency gains, reducing operational costs by up to 40%. The study concludes that solar pump innovations have markedly improved the well-being of Senegalese communities, particularly in terms of water access and cost savings. Given the positive outcomes observed, further implementation of solar pumps is recommended as a viable solution for enhancing off-grid rural water access. Additionally, policy frameworks should be developed to support such initiatives and ensure equitable access across different regions.

Keywords: *Sub-Saharan, Technological Innovations, Sustainable Development, Participatory Evaluation, Community Empowerment, Renewable Energy, Gender Analysis*

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