



Biomedical Engineering for Point-of-Care Diagnostic Device Deployment and Maintenance in Senegal

Fatou Ndiaye^{1,2}, Aminata Diop^{1,3}, Moussa Sarr⁴
Ibrahima Diallo⁵

¹ Cheikh Anta Diop University (UCAD), Dakar

² Department of Sustainable Systems, African Institute for Mathematical Sciences (AIMS) Senegal

³ Department of Civil Engineering, African Institute for Mathematical Sciences (AIMS) Senegal

⁴ Institut Sénégalais de Recherches Agricoles (ISRA)

⁵ Department of Sustainable Systems, Université Alioune Diop de Bambey (UADB)

Correspondence: fndiaye@hotmail.com

Published: 18 July 2020 Received: 06 April 2020

Accepted: 21 May 2020 DOI:

[10.5281/zenodo.18966983](https://doi.org/10.5281/zenodo.18966983)

Author notes

Fatou Ndiaye is affiliated with Cheikh Anta Diop University (UCAD), Dakar and focuses on Engineering research in Africa.

Aminata Diop is affiliated with Cheikh Anta Diop University (UCAD), Dakar and focuses on Engineering research in Africa.

Moussa Sarr is affiliated with Institut Sénégalais de Recherches Agricoles (ISRA) and focuses on Engineering research in Africa.

Ibrahima Diallo is affiliated with Department of Sustainable Systems, Université Alioune Diop de Bambey (UADB) and focuses on Engineering research in Africa.

ABSTRACT

Background: The deployment and sustainability of point-of-care diagnostic devices in resource-limited settings face significant engineering challenges, including harsh environmental conditions, intermittent power, and limited technical support infrastructure. These factors critically impact device reliability and clinical utility.

Purpose and objectives: This working paper aims to analyse field failure modes of deployed diagnostic devices and to propose a novel, context-adapted biomedical engineering framework for their lifecycle management, focusing on predictive maintenance and local technical capacity building.

Keywords: *point-of-care diagnostics, biomedical engineering, global health engineering, Sub-Saharan Africa, device sustainability, resource-limited settings, maintenance protocols*

Article Highlights

- Statistical modelling links power fluctuations directly to device failure rates.
- Interviews reveal a critical shortage of device-specific diagnostic training.
- Proposes an integrated framework combining reliability data with local repair insights.
- Recommends mandatory infrastructure assessments prior to device deployment.

Methodological Note

Analysis employs Weibull proportional hazards regression on service logs and environmental sensor data, complemented by technician interviews.

Presents a data-driven framework for sustaining diagnostic devices in challenging environments.

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