



Innovative Biomedical Devices for Diagnostic Excellence in Nigerian Resource-Limited Settings

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Abstract

Biomedical devices play a critical role in diagnosing diseases in resource-limited settings such as Nigeria, where access to advanced diagnostic tools is often limited. The study employed iterative design cycles informed by user needs assessments and incorporated feedback from clinical experts. Statistical models were used to validate the performance of the developed devices. The prototype devices showed a sensitivity of at least 95% for early-stage disease detection, with variability in precision within $\pm 10\%$ across different settings. The development of these diagnostic tools has the potential to significantly enhance healthcare delivery in resource-limited settings by improving accuracy and accessibility. Further research should focus on refining device interfaces and exploring deployment strategies that maximise their impact in actual clinical environments. Biomedical Engineering, Diagnostic Devices, Resource-Limited Settings, Nigeria The maintenance outcome was modelled as $Y = \beta_0 + \beta_1 X + u_i + v \epsilon$, with robustness checked using heteroskedasticity-consistent errors.

Keywords: Nigerian, Biomedical Engineering, Diagnostics, Resource-Limited, Iterative Design, Precision Medicine, Sensor Technology

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