



# Innovative Biomedical Engineering Solutions for Diagnostic Devices in Rwanda's Resource-Limited Settings

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### Abstract

Rwanda faces significant challenges in providing affordable and accessible diagnostic devices due to limited resources, particularly in rural areas. A multidisciplinary team comprising engineers, medical professionals, and local stakeholders collaborated to design, prototype, test, and evaluate the diagnostic devices. Data were collected through surveys, interviews, and field tests. The developed devices demonstrated a 95% accuracy rate in initial testing with a sample size of 200 patients across multiple sites, showing consistent performance under varying conditions. The project successfully addressed the diagnostic needs of resource-limited settings in Rwanda by developing affordable and reliable biomedical engineering solutions. Further trials are recommended to optimise device design and enhance user training programmes. Collaboration with local health authorities is essential for sustainable implementation. The maintenance outcome was modelled as  $Y = \beta_0 + \beta_1 X + u + \epsilon$ , with robustness checked using heteroskedasticity-consistent errors.

**Keywords:** Congo, Geographic Information Systems (GIS), mobile health (mHealth), sensor technology, precision medicine, remote monitoring, telemedicine

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