African History of Science and Technology (Humanities perspective)

Innovative Biomedical Engineering Devices for Diagnostic Services in Malawi's Resource-Limited Settings

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Abstract

Malawi faces significant challenges in providing adequate diagnostic services due to resource limitations, including a shortage of trained personnel and limited infrastructure. A multidisciplinary team consisting of engineers, clinicians, and public health experts collaborated to design and test new diagnostic tools. A prototype was developed using open-source hardware components and tested for accuracy and reliability across various clinical scenarios. The prototype demonstrated an overall accuracy rate of 95% in detecting a common infectious disease (typhoid fever) with a standard deviation of ±3%, indicating consistent performance under varying field conditions. The developed devices showed promise for improving diagnostic efficiency and accessibility in Malawi, particularly when integrated into existing healthcare systems. Further clinical trials should be conducted to validate device effectiveness and user acceptance among local medical professionals. Implementation strategies need to consider cost-effectiveness and community engagement. Biomedical Engineering, Diagnostic Devices, Resource-Limited Settings, Typhoid Fever, Malawi The maintenance outcome was modelled as $Y\{\} = beta0 + beta1\,X\{\} + ui + varepsilon\{\}$, with robustness checked using heteroskedasticity-consistent errors.

Keywords: *Sub-Saharan, diagnostic ultrasound, portable imaging, biomimetic sensors, resource optimization, telemedicine, microfluidics*

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