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A Systematic Review of Artificial Intelligence Applications for Disease Diagnosis in Resource-Limited Healthcare Settings in Malawi, 2016

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Abstract

The integration of artificial intelligence into healthcare diagnostics presents an opportunity to address gaps in resource-limited settings. Malawi's healthcare system faces challenges including a shortage of specialist personnel and diagnostic infrastructure. A systematic assessment of AI applications within this specific context is needed. This systematic literature review aims to identify, synthesise, and critically evaluate published research on AI applications for disease diagnosis within Malawi's resource-limited healthcare settings. Its objectives are to map the technological and methodological landscape, assess reported performance, and identify key implementation challenges and enablers. A systematic search was conducted across major academic databases using predefined search strings. Studies were screened against inclusion criteria focusing on AI-driven diagnostic tools implemented or tested in Malawian healthcare contexts. Data extraction followed a standardised protocol, and findings were synthesised narratively due to the heterogeneity of the included studies. The review identified a limited but growing body of literature. AI applications were predominantly focused on diagnosing infectious diseases, particularly malaria and tuberculosis, using image analysis techniques. A prominent theme was the adaptation of models to compensate for limited data and lower-quality imaging equipment. Reported diagnostic accuracy was generally high, though often derived

from small, retrospective datasets. AI shows potential for supporting disease diagnosis in Malawi, primarily in augmenting specific diagnostic tasks for prevalent infectious diseases. However, the evidence base is nascent, characterised by a lack of large-scale, prospective validation studies and minimal reporting on real-world integration into clinical workflows. Future research should prioritise robust, prospective evaluations in clinical environments and develop frameworks for addressing data scarcity. Greater emphasis is needed on human-centred design, usability testing with local healthcare workers, and sustainable implementation models that consider infrastructure constraints. artificial intelligence, disease diagnosis, resource-limited settings, healthcare, Malawi, systematic review, GIS applications. This review provides a consolidated analysis of the current scope and limitations of AI for diagnostic support in Malawi, offering evidence to guide future research and implementation strategies in similar resource-limited contexts.