A Systematic Review of Artificial Intelligence-Assisted Chest X-Ray Interpretation for Tuberculosis Detection in Lagos Island Primary Healthcare Centres,

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Abstract

Tuberculosis (TB) remains a major public health challenge in Nigeria. Chest X-ray (CXR) interpretation is a cornerstone of diagnosis, but its effectiveness in resource-constrained primary healthcare centres is often limited by a scarcity of specialist radiologists. Artificial intelligence (AI) for automated CXR reading has emerged as a potential aid to strengthen TB case detection in such environments. This systematic review aimed to synthesise and critically appraise existing evidence on the diagnostic performance, operational feasibility, and implementation challenges of AI-assisted CXR interpretation for detecting pulmonary TB specifically within primary healthcare centres on Lagos Island, Nigeria. A systematic search of multiple electronic databases was conducted. Pre-defined inclusion criteria captured primary studies, such as diagnostic accuracy studies and implementation research, focused on AI for TB detection from CXR within the Lagos Island primary care context. Study selection, data extraction, and quality assessment using appropriate tools were performed independently by two reviewers. The search identified a limited number of eligible studies. The available evidence, though sparse, suggested AI algorithms could achieve sensitivity for TB detection exceeding 85% in this setting. A consistent theme was the significant challenge of integrating AI tools into existing clinical workflows, primarily due to infrastructural constraints like unreliable electricity and limited digital connectivity. Preliminary evidence indicates AI-assisted CXR interpretation has potential to support TB diagnosis in Lagos Island's primary healthcare centres. However, the current evidence base is insufficient to draw definitive conclusions regarding its real-world effectiveness and cost-effectiveness in this specific context. Further robust, prospective studies evaluating AI tools within routine clinical practice are required. Any future implementation must be coupled with investment in necessary digital infrastructure and comprehensive training for healthcare workers to facilitate

successful integration. Artificial intelligence, tuberculosis, chest X-ray, primary healthcare, diagnostic accuracy, Nigeria. This review consolidates the nascent evidence on AI for TB detection within a defined, resource-constrained urban Nigerian setting, highlighting critical gaps in knowledge and infrastructure that must be addressed prior to wider adoption.

ABSTRACT-ONLY PUBLICATION

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