# Evaluation of AI-based computer-aided detection for chest X-ray interpretation for TB diagnosis in children

Juno Min, MSF International

## Background

The diagnosis of tuberculosis (TB) is difficult in children. Chest X-ray (CXR) plays a critical role to support TB diagnosis, but countries with the highest TB prevalence often have the lowest availability of expert CXR readers, such as radiologists. AI-based computer-aided detection (CAD) technology is endorsed by WHO for CXR interpretation for TB in adults, but is not currently recommended in children. Because the CXR appearance of TB is different in children compared to adults, current CAD models that have been trained on adult datasets may not perform as well in children.

## Methods

This diagnostic study was nested in the TB ALGO PED study. The study cohort included 665 children under 10 years with symptoms of TB from study sites in Guinea, Niger, Nigeria and Uganda. All children had a frontal CXR which was analysed by CAD software trained and optimized for paediatric TB (qXR version 4.2.1, Qure.ai). The CAD results were compared to a reference standard of a consensus of three expert radiologist interpretations. To evaluate CAD performance, receiver operating characteristic (ROC) curves were generated and the area under the curve (AUC) was calculated overall and for each site.

## Results

The AUC of CAD for the entire study cohort was 0.76 (95% CI: 0.72-0.81), with AUC above 0.80 generally considered clinically useful. The AUC for Guinea, Niger, Nigeria and Uganda were 0.68 (0.42-0.94), 0.74 (0.68-0.80), 0.80 (0.70-0.90) and 0.87 (0.81-0.94), respectively. CAD performed better in sites with better image quality (technical factors and format).

## Conclusion

CAD shows fair performance for TB detection on CXR in children, compared to expert radiologist interpretation, and is not yet ready for clinical use. Results are promising and CAD models will continue to improve with increasing access to paediatric CXR datasets. With improvements, CAD could have a significant role to increase TB diagnosis in children.

CAD can support TB diagnosis but currently does not perform well enough for clinical use in children. Improvements to paediatric CAD models are needed to address the challenges of CXR interpretation for TB.