Policy Brief

HEALTH TECHNOLOGY ASSESSMENT OF AI-ASSISTED (DEEPCXR) CHEST X-RAY INTERPRETATION FOR PULMONARY TUBERCULOSIS SCREENING

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Recommendations

- DeepCxR is most effective when used as a triage tool within multi-step diagnostic workflows that include confirmatory tests like Nucleic Acid Amplification Test (NAAT).It is a clinically acceptable, cost-saving alternative to radiologist-interpreted chest X-rays for TB screening in India.
- With further improvements in specificity, it can play a key role in TB detection. However, to ensure impact, it should be thoughtfully integrated into existing diagnostic systems to enhance coverage, cost-efficiency, and accuracy.

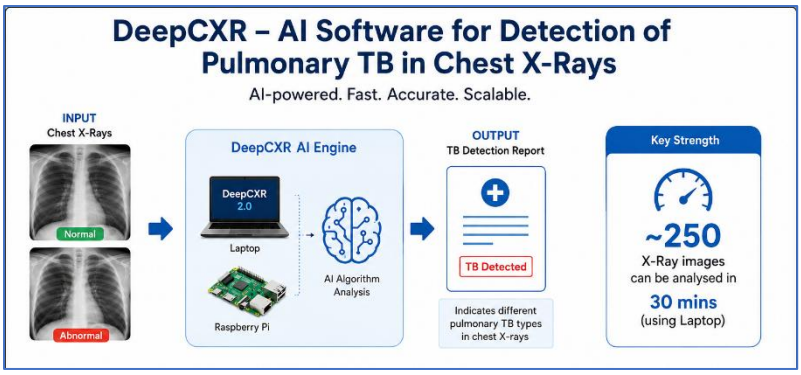
Background:

- Tuberculosis (TB) remains India's leading public health challenge, with persistent diagnostic gaps in underserved areas. TB screening is a high priority for the National TB Elimination Program (NTEP) in India.
- DeepCxR, an AI-based chest x-ray tool, which employs AI-driven pattern recognition to detect TB-related abnormalities and provides instant results.
- As it offers a scalable solution to radiologist shortages, evaluating its cost-effectiveness is key to informing national TB policy.

Key Findings

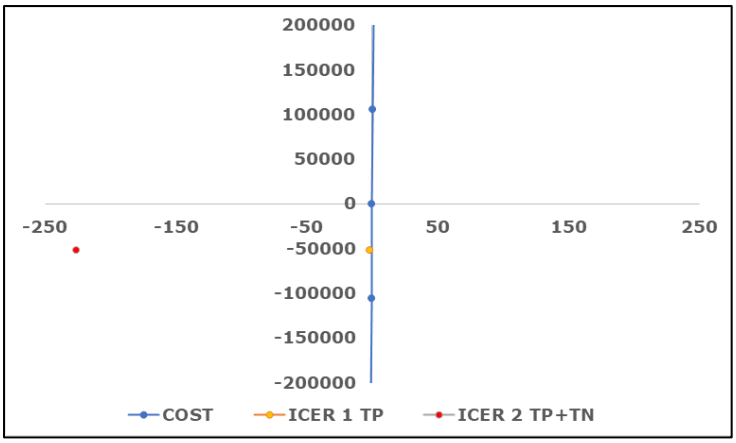
- DeepCxR demonstrated sensitivity of 85.9% and specificity of 62.6% versus standard radiologist-interpreted digital chest X-ray (sensitivity 87%, specificity 89%). This device detected nearly as many true TB cases (128.78 vs. 130.5 per 1,000 screened) but resulted in more false positives and overall fewer correct classifications (227 fewer per 1,000 screened).
- ICER shows the extra cost saved for each additional missed TB case or incorrect diagnosis. DeepCxR saves about ₹ 29,757 for each missed case.
- DeepCxR offers scalable implementation, particularly in settings with scarce radiological expertise. It can be rapidly deployed and interpreted, streamlining the screening process in high-volume or rural settings.

PICO	Description of the components
Population	Adults with presumptive TB: Cough or fever >2 weeks, weight loss, and haemoptysis
Intervention	Deep CxR – AI-based chest X-ray interpretation tool
Comparator	Conventional digital chest X-ray interpreted by radiologists
Outcomes	Diagnostic accuracy and cost-effectiveness (cost per true case detected, cost per true positive case detected)



Results:

Metric	Deep CxR	Radiologist Interpretated Digital CXR
Sensitivity (%)	85.9	87
Specificity (%)	62.6	89
True Positive (TP)	129	131
True Negative (TN)	532	757
False Positive (FP)	318	94
False Negative (FN)	21	20



CE Plane for DeepCxR

Strategy	Cost (₹)	Incremental cost (in INR)	Effectiveness (True Positives)	Incremental Effectiveness (True Positives lost)	Incremental Cost (₹)
Deep CXR	247,747	-51,330	**129**	**-2**	29,757 saved per TP missed
Radiologist	299,077		131		

Conclusion:

- DeepCxR is less effective (85.9% Sensitivity and 62.6% Specificity), but also less costly (51,330 INR cost-saving per 1000 individuals screened) than standard radiologist interpretation. Although it offers significant cost savings, health systems must carefully weigh this benefit against a substantial increase in misclassification and false positives, as outlined in the study.
- Additionally, the Incremental Cost—₹ 29,757 per additional TB case missed, and shows that the trade-off is predominantly one of cost reduction at the expense of a small reduction in effectiveness.
- Therefore, it is best deployed as a triage tool within multi-step algorithms, including NAAT, balancing affordability with diagnostic accuracy. If its accuracy improves, DeepCxR could play a key role in AI-based TB detection under NTEP. Structured integration into existing diagnostic pathways is recommended to expand reach and efficiency.

References:

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