



# iSMART X-RAY: ARTIFICIAL INTELLIGENCE (AI)-ASSISTED CHEST X-RAY INTERPRETATION FOR EARLY TB DIAGNOSIS

## BACKGROUND

The largest gap in the TB care cascade is the diagnostic pathway, whereby patients are unable to access a TB test and receive a reliable TB diagnosis. Consulting multiple health care providers is consistently associated with diagnostic delays.

Artificial Intelligence (AI)-assisted diagnostic tools have the potential to reduce diagnostic gaps by influencing provider behavior. Previous AI-assisted tools have focused only on accuracy with limited understanding of the uptake and utilization of these tools in an operational setting.

World Health Partners (WHP) has identified an innovative solution to provide an automated AI chest X-ray reading tool that can detect multiple abnormalities including TB, enabling providers to reach a probable diagnosis quickly.

## INTERVENTION WORKFLOW

The CGC project integrates AI-assisted X-rays into existing private & public sector networks to improve early diagnosis of TB. The intervention consists of four different activities:

- **Mapping and engagement of providers:** Health care providers (AYUSH, RMPs, Chemists, MBBS and Physicians) are mapped and engaged based on TB symptomatic caseload; standard diagnostic and treatment practices; and referral networks.
- **E-vouchers for chest X-ray:** Healthcare providers generate and provide an e-voucher to TB symptomatic patients. The e-voucher system is a web application interface, designed and developed by WHP.
- **AI-assisted chest X-ray interpretation:** AI-interpreted chest X-ray and results are made available through web-application to the patient as well as to the healthcare providers.
- **Differential Diagnosis:** Providers utilise AI X-ray interpretations and additional diagnostic tests to arrive at differential diagnosis.

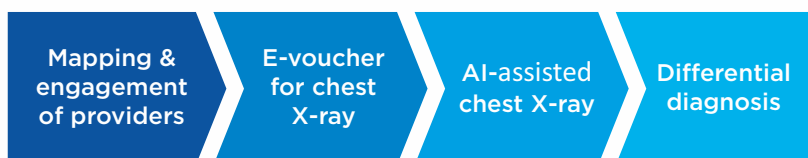


Diagram: Workflow of AI-assisted CXR

AI-generated Heat map on X-ray image



## KEY OBJECTIVES

1

Assess the uptake and utilization of AI-assisted X-rays across facilities with and without radiologists

2

Assess the uptake and utilization of AI-assisted X-rays across healthcare providers

3

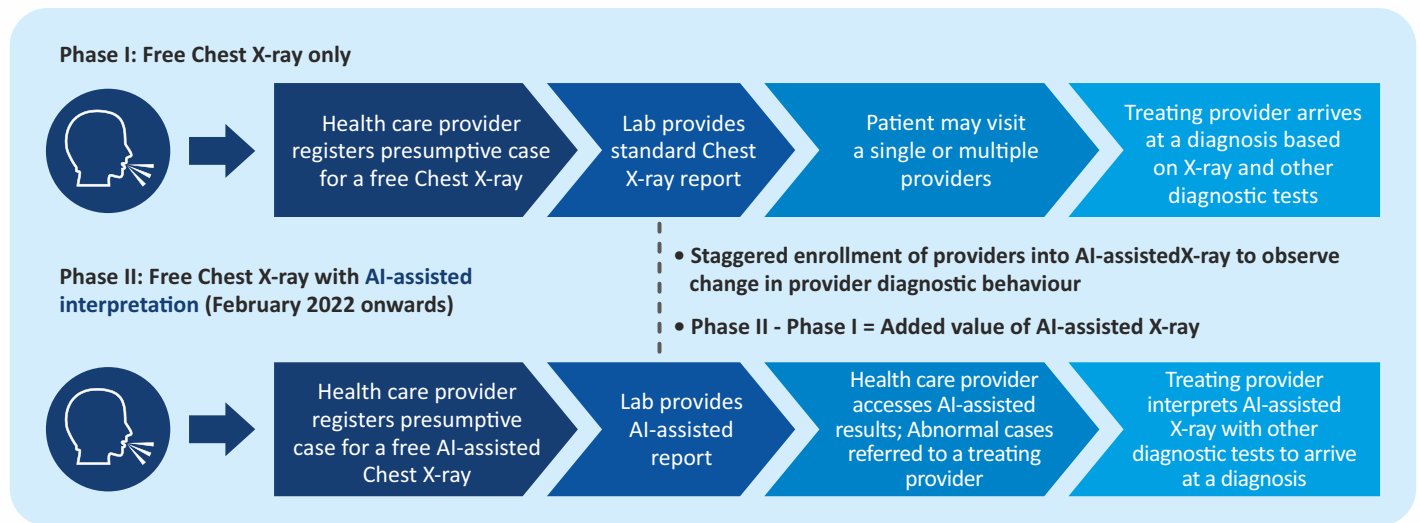
Reduce delay in patients accessing a TB diagnostic test

4

Facilitate integration of AI-assisted X-rays into the national TB platform (Nikshay)

## INTERVENTION PHASES

Change in provider diagnostic behaviour is observed with a staggered enrolment of providers into the AI-assisted X-ray intervention. During Phase 1, we observe provider diagnostic behavior with free chest X-rays only, without AI interpretation. During Phase 2 we introduce AI-assisted X-rays to providers and observe changes in behaviour.



## OUTCOME MEASURES

CGC measures both patient- and provide level outcomes attributed to the intervention.

### Patient-level Outcomes

- Diagnostic delay.
- Treatment Initiation delay.

### Provider-level Outcomes

- Uptake of AI-assisted X-ray health care providers.
- Utilization of AI interpretation for clinical decision- making.
- Quality of diagnosis (differential diagnosis of pulmonary conditions).

WHP collaborates with a diverse group of stakeholders including Central TB Division, state and district NTEP

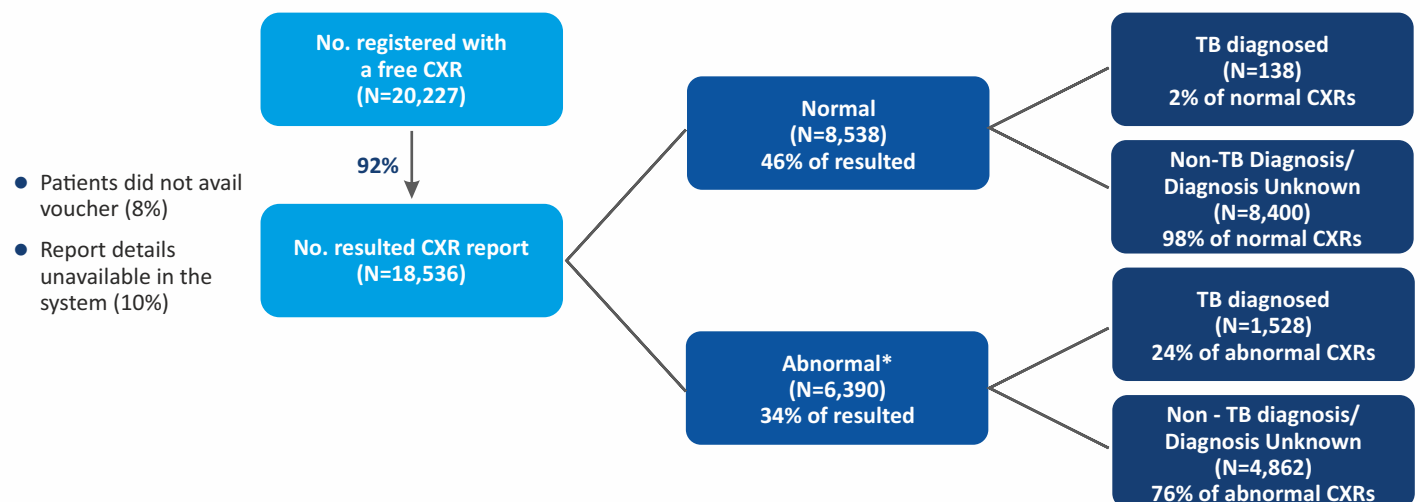
team, domain experts, and frontline workers to implement AI- assisted diagnostics and ensure system strengthening.

### System Strengthening

- Integration with AI-assisted screening and diagnostic platforms with Nikshay.
- Guidance documents on the implementation of AI-assisted diagnostics in the public and private sector.
- Capacity-building of providers to effectively utilise AI-assisted diagnostics in clinical care.
- Evidence on the impact of AI-assisted diagnostics on the TB care cascade.

## iSMART ACTIVITY: CXR CONVERSION TO TB (pre-AI)

Symptomatic case registrations consistently increased from June 2021 to June 2022. 20,227 beneficiaries have registered on iSMART activity, 18,536 (92%) results reported. Out of this, 8,538 (46%) reported normal whereas 6,390 (34%) reported abnormal.

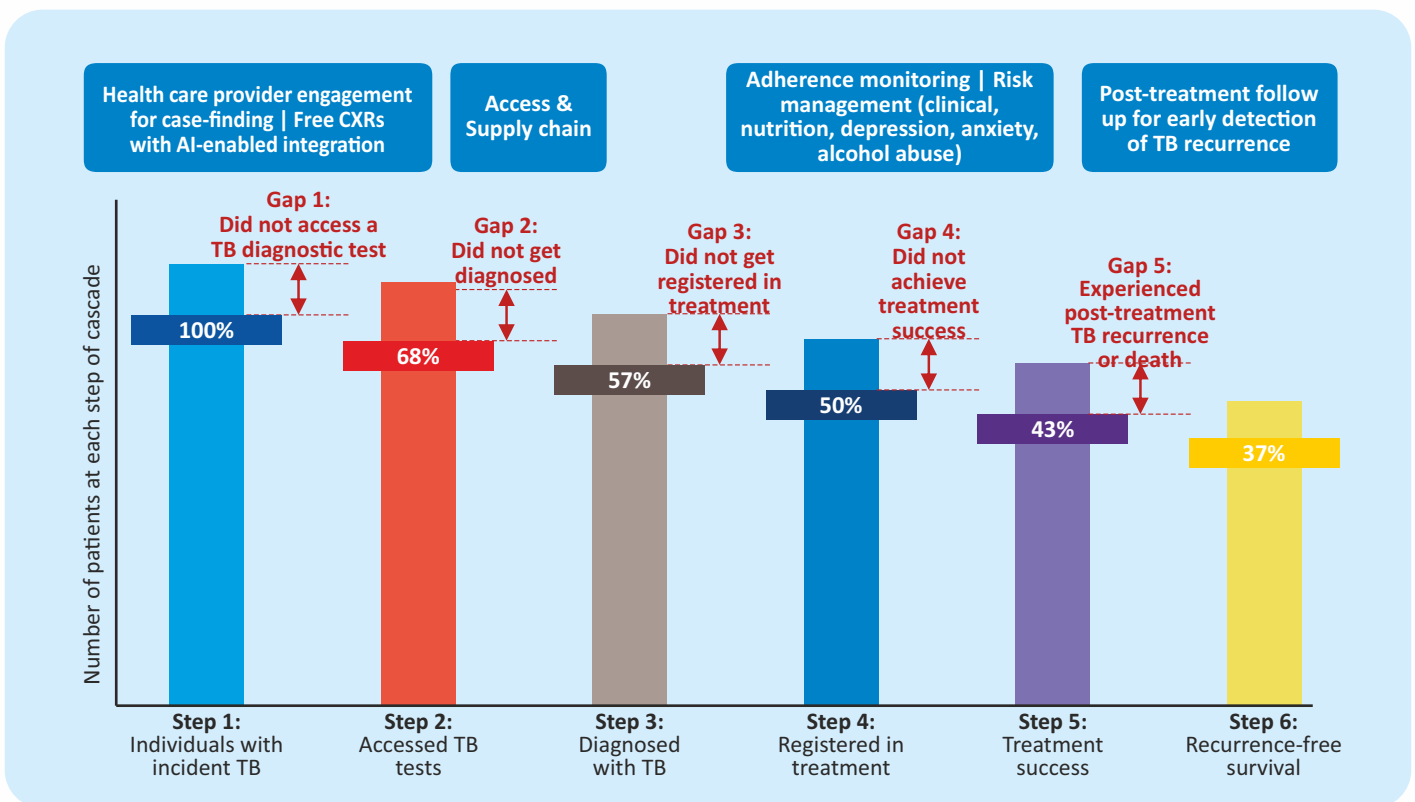


## EARLY LESSONS

- AI-assisted X-rays are likely of high value in facilities without radiologists.
- Infrastructure-related challenges such as internet connectivity and availability of DICOM can be critical barriers to uptake at the X-ray facility level.
- Patients may opt to avail X-rays in non-engaged facilities.

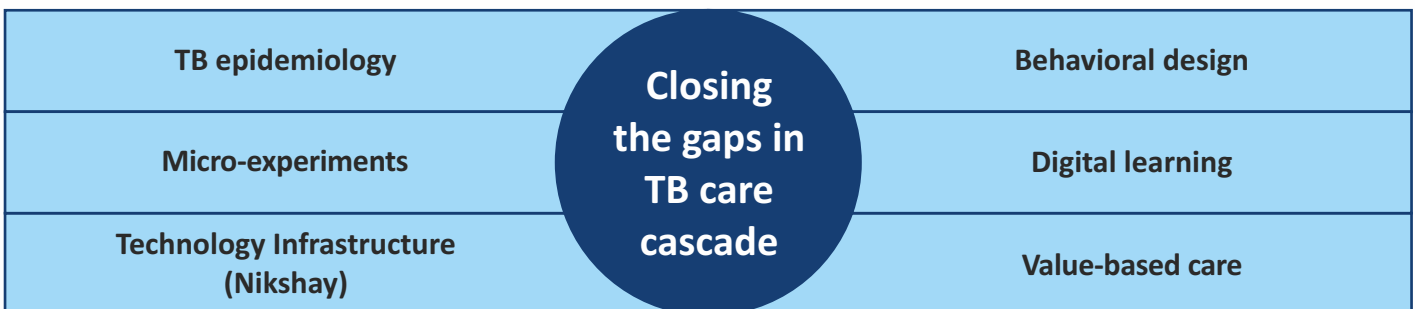
## ABOUT THE CGC PROJECT

Closing the gaps in TB Care Cascade (CGC) is a four-year (2020-2024) project funded by United States Agency for International Development (USAID) and is being implemented by World Health Partners (WHP) in four districts- Ranchi & East Singhbhum (Jharkhand) and Surat & Gandhi Nagar (Gujarat). The project will be further scaled-up to additional five states - Bihar, Uttar Pradesh, Sikkim, Punjab and Himachal Pradesh.



## METHODOLOGY FRAMEWORKS

Interdisciplinary approaches to address care gaps





World Health Partners (WHP) is a non-profit Indian society that sets up programs to bring sustainable healthcare within easy access to underserved and vulnerable communities. It innovatively harnesses already available resources more efficiently by using evidence-based management and technological solutions. WHP is best known for its programs focused on early detection and treatment of tuberculosis in urban and rural settings supported by community-based activities to ensure prevention. The organization uses all available resources - both in the public and private sectors to ensure that people living in any part of the country will have access to high-quality treatment. For more information, please contact: Ms. Prachi Shukla, Country Director, World Health Partners (WHP), A 151, Sector - 72, Noida - 201301, India, [info@whpindia.org](mailto:info@whpindia.org)

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