ACCELERATING TUBERCULOSIS ELIMINATION IN RURAL CAMBODIA USING AI AND ULTRA-PORTABLE

Image: KNTA

PROJECT OVERVIEW

Siem Reap Province, Cambodia

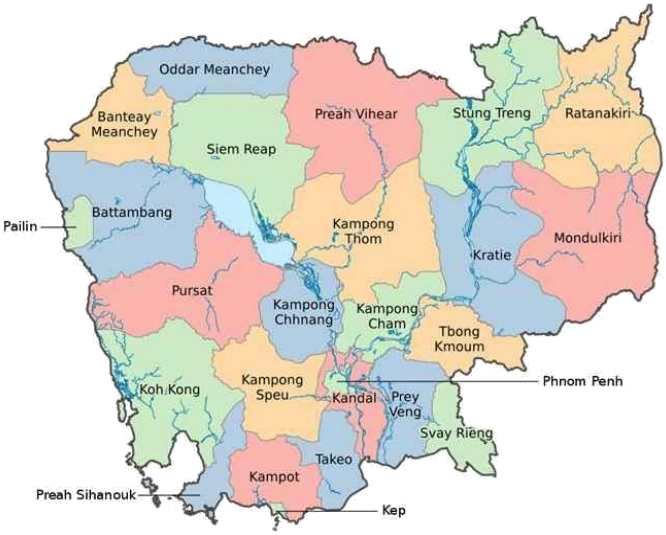
November 2020–September 2021

Lunit INSIGHT CXR (Lunit)

Korean National Tuberculosis Association (KNTA)

AI INTERVENTION

Cambodia is one of the few countries globally that met the milestone of reducing TB incidence by 20% before 2020.[1] Despite this, the country remains on the World Health Organization's (WHO) watchlist, with an estimated 46,000 people with TB in 2020, of which a little over 60% were reported.[2] Furthermore, TB prevalence remains **higher in rural areas** due to barriers in accessing services.[3]

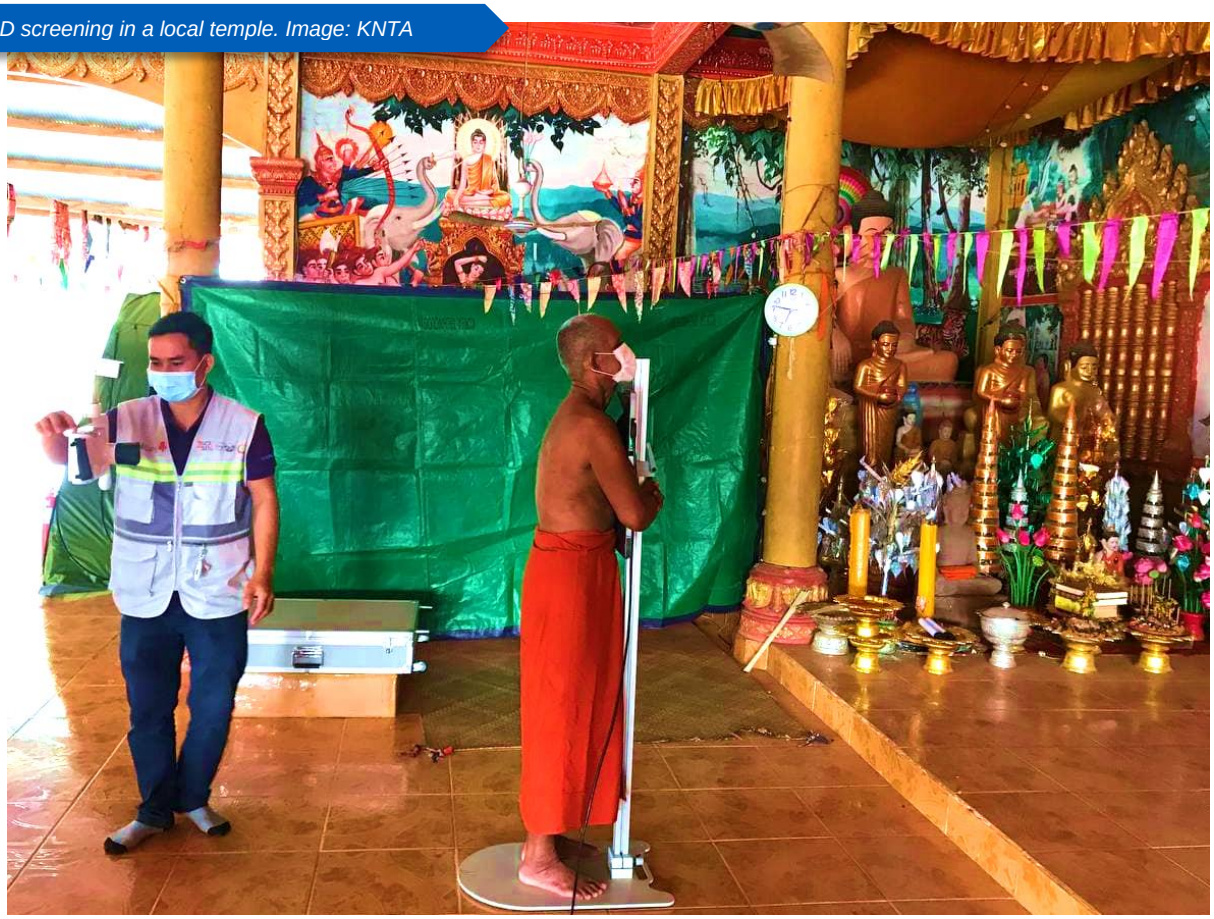


To ensure reductions are achieved universally in Cambodia, TB REACH supported KNTA and local partner Cambodia Anti-Tuberculosis Association to use **cutting-edge TB screening tools** to accelerate case identification in facilities and communities of hard-to-reach areas of Siem Reap Province, one of the poorest districts in the country.

The project team screened community members for TB in **isolated rural villages**, where **early experience demonstrated unmet need,** and then moved on to conduct facility-based screening in specific locations. Identified in consultation with local health care workers, these locations were reporting unusually low numbers of TB cases due to poor access to high-quality TB diagnostics and/or poor access to health care.

Using vans to journey over rough terrain, the mobile team transported a **high-tech ultra-portable X-ray system** (HDT MINE 2, South Korea) **with artificial intelligence** (AI) (Lunit INSIGHT CXR, South Korea), as well as highly sensitive molecular diagnostic instruments (GeneXpert) to the villages. Using these tools, screening camps were held in improvised locations such as schools and pagodas. Village chiefs were also educated about TB and volunteer community health workers directed community members to the project sites.

X-ray and CAD screening in a local temple. Image: KNTA



Everyone attending the screening sites was checked for TB symptoms and other health conditions before receiving a free X-ray read by the AI software. People thought to have TB based on the AI result received a diagnostic test immediately. The final diagnosis was made by doctors from Angkor Chum Referral Hospital, who assessed the X-ray and CAD images remotely. People with TB were then registered for treatment at their most convenient health facility.

Screening began on 18 November 2020, with camps held five days per week, assessing **80 people per day** on average. Facility-based screening began in June 2021 in response to the worsening COVID-19 pandemic.

PROJECT IMPACT

- ✓ **5,583 people screened by the project so far**
- ✓ **5,510 people screened with AI and ultra-portable X-ray**
- ✓ **97% of presumptive TB cases screened**
- ✓ **120 people diagnosed with TB**
- ✓ **80 people successfully treated, 3 still on treatment**
- ✓ **53% more cases detected as a result of AI**

> ***USING THE AI AND X-RAY TECHNOLOGY RESULTED IN 100% MORE TB CASES BEING DETECTED THAN SYMPTOMATIC SCREENING***

The portability of the X-ray and the speed at which results are available with AI were key to the success of the project. The new tools mean that screening can occur **in areas where expert radiologists are not available**, while the rapid AI result means that **diagnosis can be provided on the spot**. Despite a limited battery capacity, the ultra-portable X-ray lasts for 5–6 hours a day and produces good-quality images, although it works best in people who are not large in body size.

Both innovations have the potential to be **transformative** in Cambodia, where there are isolated mountainous communities and where many people with TB do not show any symptoms. By assessing the effectiveness of ultra-portable X-ray and AI to expedite TB screening, KNTA could lay the groundwork for the routine use of these tools to end the TB epidemic nationally.

X-ray and CAD screening in a local school. Image: KNTA

REFERENCES

1. Global tuberculosis report 2021. Geneva: World Health Organization; 2021 (https://www.who.int/teams/global-tuberculosis-programme/tb-reports/global-tuberculosis-report-2021, accessed 5 November 2021).

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3. Second national tuberculosis prevalence survey Cambodia, 2011. Phnom Penh: Cambodia Ministry of Health; 2012 (http://www.cenat.gov.kh/cenat/sites/default/files/files/documents/files/Second%20National%20Tuberculosis%20Prevalence%20Survey%2C%20Cambodia%202011.pdf, accessed 14 January 2022).

ABOUT THIS DOCUMENT

This document is one of a series spotlighting the experiences of these early implementers when using artificial intelligence (AI) / computer-aided detection (CAD), to highlight the added value of CAD for TB programmes and inspire prospective implementers to innovate. Funding for this project was provided by the Stop TB Partnership's TB REACH initiative, launched in 2010 by Global Affairs Canada. In 2012, TB REACH first worked with implementing partners to pilot CAD software. Since then, it has implemented three different CAD products in 13 different countries in sub-Saharan Africa, Latin America, Eastern Europe, and South and South-East Asia.