Zambia has one of the highest burdens of tuberculosis (TB), drug-resistant TB, and HIV/TB coinfection in the world.\(^1\) Large numbers of people with TB in Zambia are simply not diagnosed or reported. Of the estimated 59,000 people with the disease in 2020, only 40,726 were diagnosed and notified in the country.\(^2\) Sadly, underdiagnosis and reporting is especially true in children. The prevalence of TB in children in Zambia remains largely unknown, making up only 6% of national notifications despite childhood TB contributing 12% of the global TB disease burden.\(^3,4\)

TB REACH funded the Centre for Infectious Disease Research in Zambia (CIDRZ) to revolutionize provision of TB services to children in a peri-urban area of Lusaka – a region home to the country’s capital city and reporting the second highest number of TB cases nationwide.\(^5\) Here, CIDRZ pioneered the use of two cutting-edge tools – an ultra-portable X-ray system (Fujifilm Xair) connected to artificial intelligence (AI) TB detection software (CAD4TB) – to screen children and their families attending two health facilities.
In Kanyama and Chawama hospitals, CIDRZ worked hard to raise awareness of the signs and symptoms of childhood TB among people in outpatient departments. With this new knowledge, people attending departments across the hospital were able to come to a project focal point where free TB testing was available. Every weekday, children (from newborns to adolescents) and accompanying adults were screened for TB symptoms and given a digital chest X-ray using the ultra-portable equipment. The X-ray image was then read by both radiologists and AI, and the results were used by clinicians to decide whether further testing was necessary. If a child was diagnosed with TB, appropriate treatment was provided alongside supplementary nutritional support, and close family members were also screened.

Ultra-portable X-ray systems are substantially easier to transport than alternatives. It is even possible for a small team to transport them by hand. CIDRZ took advantage of this to respond to a request for help from a clinic with no X-ray resources over 15km from the Lusaka district. For one month, the project team routinely transported the entire X-ray system and AI to provide screening services at this third facility on weekends.

Since screening began, the project has resulted in a steady increase in the number of people diagnosed and reported with TB in the project areas.

**PROJECT IMPACT**

- 5,077 children screened, 490 of which were diagnosed with TB
- 4,625 adults diagnosed with TB
- 254% increase in TB cases notified in project areas

AI helped to identify TB in individuals who were asymptomatic or not yet showing symptoms, and so may not have otherwise been detected. Clinicians also felt the tool was helpful for enabling colleagues to consult on images remotely, as images uploaded to the online AI platform could be accessed by permitted colleagues from web browsers anywhere.
The data from this project will be important for shedding much-needed light on how well AI is able to detect TB in X-rays from children and could justify the much-needed deployment of AI for tackling the global TB burden in children.

REFERENCES


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 of 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 3 different CAD products in 13 different countries in Sub-Saharan Africa, Latin America, Eastern Europe, and South and South-East Asia.

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