USING ARTIFICIAL INTELLIGENCE TO DETECT TUBERCULOSIS IN CHILDREN

Image: IRD Bangladesh

PROJECT OVERVIEW

Mymensingh, Bangladesh **October 2019 – March 2021** **qXR (Qure.ai)** **IRD Bangladesh**

AI INTERVENTION

Of the 1.5 million people around the world who died from tuberculosis (TB) in 2020, almost 10% were children.[1] Bangladesh has one of the highest burdens of TB, with a significant proportion of cases **missed** – both undiagnosed and unreported – **particularly in younger age groups**.[2,3] Artificial intelligence (AI) is increasingly used to detect TB on the chest X-rays of adults. But its ability to detect TB in children has **never been rigorously tested**, a critical gap in knowledge about the cutting-edge tool.

TB REACH supported IRD Bangladesh to deploy **an army of trained health workers in public and private clinics in Mymensingh division** (population roughly 11 million) to find and treat children with TB, as well as their families. IRD Bangladesh will soon have sufficient data to resolve fundamental questions about the accuracy of AI-powered TB detection in children.

Project health workers screened children and their accompanying family members in the outpatient departments of more than 50 public and private health facilities. Those with symptoms of TB were offered a free chest X-ray to look for signs of the disease in the lung. Any sign of TB then triggered a highly accurate molecular test (Xpert). Anybody with a confirmed positive diagnosis was then treated for TB.

StopTBPartnership

- ✓ Established **a specialized center** for detection and treatment of TB in children.
- ✓ Screened **847,380** children
- ✓ Treated **2,215** children
- ✓ Almost **80%** of child TB cases notified in the area were due to project activities.

Contact investigation among contacts of a child with TB. Image: IRD Bangladesh

A **library of chest X-rays from children taken in selected health facilities** was read by the AI tool (qXR) and each result was compared to the corresponding diagnosis generated by the trusted molecular test. This will allow IRD Bangladesh to see how well AI can identify TB in children's lungs.

PROJECT IMPACT- NOT JUST NUMBERS

Selina and Shipon. Image: IRD Bangladesh

In June 2019, Shipon (aged 12 years) fell sick with a severe cough and fever. A local pharmacist misdiagnosed him as having a respiratory infection and provided some antibiotics. These proved ineffective. With Shipon's health worsening, his mother Selina took him to see a physician, whose diagnosis was no better.

Then a neighbour noticed the sick boy and suggested his mother take him to Mymensingh medical college hospital. There, an IRD screener straight away recognized the symptoms of TB. Shipon was evaluated, diagnosed accurately, and started on TB treatment.

Looking back, Selina, Shipon's mother, regrets how long it took to get a proper diagnosis**. "I wanted to tell my son's story so that others can understand that child TB is no joke and can happen to anyone"**.

Though formal analysis and publication of the results is pending, this will be a **landmark study and** could justify the much-needed **addition of AI to the toolkit for detecting childhood TB**. However, to make implementation in Bangladesh more feasible, the cost of AI products needs to be reduced, and there is a need to build awareness of the value of AI first. Going forward, IRD Bangladesh are keen to work with AI outside of the research environment, recognizing it has **potential in rural settings where there are no trained radiologists** to read chest X-rays from children and adults alike.

> *WE WILL LOOK FOR OPPORTUNITIES TO USE AI IN THE FUTURE, AND WE WOULD WANT TO WORK MORE WITH AI."*
>
> **– MAHFUZUR RAHMAN, PROJECT MANAGER, IRD BANGALDESH**

Contact investigation among contacts of a child with TB. Image: IRD Bangladesh

REFERENCES

1. *Global Tuberculosis Report 2021*. Retrieved November 5, 2021, from https://www.who.int/teams/global-tuberculosis-programme/tb-reports/global-tuberculosis-report-2021
2. Karim, Rahman, M. A., Mamun, S. A., Alam, M. A., & Akhter, S. (2012). Risk factors of childhood tuberculosis: a case control study from rural Bangladesh. *WHO South-East Asia Journal of Public Health*, *1*(1), 76. https://doi.org/10.4103/2224-3151.206917

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.

The views expressed in this publication are those of the authors and do not necessarily reflect those of the United Nations. The designations employed and the presentation of the material in this publication do not imply the expression of any opinion whatsoever on the part of UNOPS.

Stop TB Partnership