ACCELERATING TB DETECTION IN PRISONS

PROJECT OVERVIEW

Nsawam and Kumasi, Ghana

February - July 2021

CAD4TB (Delft Imaging Systems)

Delft Imaging Ghana with National Tuberculosis Programme of Ghana

AI INTERVENTION

In 2020, Ghana was home to an estimated 44,000 people with tuberculosis (TB), but less than 30% of these were diagnosed and notified.[1] Identifying these missing cases, especially in key populations, will be key to ending TB in the country. The risk of TB disease in prisons has been shown to be a shocking **23x higher** than in the general population.[2] This is due to poor ventilation and sanitation, inadequate nutrition, overcrowding and the high co-occurrence of risk factors such as HIV among prisoners.[3] In addition, prisoners often lack access to key health care services, including those for TB.

Active TB case finding in prisons is crucial for facilitating early diagnosis and treatment and preventing spread of the disease among inmates. To accelerate the detection of TB among prisoners, Delft Imaging Ghana partnered with the National TB Programme (NTP) to deploy the artificial intelligence (AI) tool CAD4TB with a next-generation ultra-portable X-ray system (Delft Ultra) to identify people with TB in a medium-security prison in Nsawam, Eastern Ghana, and in Kumasi Central Prison.

> **" WE DON'T HAVE RADIOLOGISTS AVAILABLE IN A LOT OF SETTINGS IN GHANA, SO AI WILL BE VERY HELPFUL HERE. "**
>
> **– NICHOLAS SETOR KORTO,** RADIOGRAPHER, DELFT IMAGING GHANA

From 3 to 5 February 2021, Delft Imaging Ghana and the NTP screened inmates in Nsawam using chest X-rays taken with both an ultra-portable and a mobile X-ray system. With the results from the AI available in **less than a minute,** the project TB doctor could rapidly interpret the X-rays, assisted by AI, to decide which prisoners should receive a sensitive diagnostic test (Xpert). Everyone diagnosed with TB received treatment. Of the prisoners screened in Nsawam, only 25 X-rays were captured on the Delft Ultra.

After this initial success, prison screening campaigns continued with the NTP in Nsawam on 31 April–12 May 2021 and in Kumasi Central Prison on 21 June–2 July 2021, using the AI as well as Delft Ultra alongside a Stop TB van containing X-ray equipment.

PROJECT IMPACT

- **In Nsawam, 2,592 prisoners screened, 175 with Delft Ultra; 3 diagnosed and treated**
- **In Kumasi, 1,816 prisoners screened, 81 with Delft Ultra; 3 diagnosed and treated**

This leading-edge ultra-portable X-ray system is **more lightweight than alternative ultra-portable systems.** In general, the image quality was standard; however, **when taking X-rays of the minority of inmates with larger body size, the quality suffered** due to the device's limited power. The project radiographer found the new system very easy to set up and user-friendly. Using AI vastly accelerated TB detection and could be an important tool for screening key populations, such as prisoners, in settings where radiologists are not commonly available.

The NTP of Ghana continues to work with AI in its screening programmes and recently procured ultra-portable X-ray systems (Delft Light) from the Stop TB Partnership's GDF Catalog

> *AS A TB DOCTOR, I'VE SPENT A LOT OF MY LIFE REVIEWING CHEST X-RAYS FOR TB IN SETTINGS LIKE THIS. I THINK AI IS A WONDERFUL TOOL. IT WILL HELP FIND THE MISSING CASES IN TB, I AM CONVINCED ABOUT THAT.*

– DR. MAURITS VERHAGEN
MANAGING DIRECTOR, DELFT IMAGING GHANA

REFERENCES

1.   TB profile - Ghana. Geneva: World Health Organization; 2022 (https://worldhealthorg.shinyapps.io/tb_profiles/?_inputs_&lan=%22EN%22, accessed 17 February 2022).

2.   Getahun H, Gunneberg C, Sculier D, Verster A, Raviglione M. Tuberculosis and HIV in people who inject drugs: evidence for action for tuberculosis, HIV, prison and harm reduction services. Curr Opin HIV AIDS. 2012;7(4):345-53. doi:10.1097/COH.0B013E328354BD44

3.   Key populations brief - prisoners. Geneva: Stop TB Partnership; 2016 (https://stoptb.org/assets/documents/resources/publications/acsm/kp_prisoners_spreads.pdf, accessed 17 February 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.

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.