

THE INTRODUCING NEW TOOLS PROJECT (iNTP)

Transforming TB Detection: Implementing Ultra-portable X-ray and CAD Software in the Democratic Republic of the Congo



Background

The Democratic Republic of the Congo (DRC) is among the World Health Organization's 30 high tuberculosis (TB) burden countries. In 2021, 305,000 people fell ill with TB, and approximately 50,000 people died. Significantly, nearly 30% of those who contracted TB were never diagnosed or notified, resulting in them being "missing people with TB."¹

In response to this critical public health concern, there is growing recognition of the potential that innovative tools hold to revolutionize TB detection. This is demonstrated by the Stop TB Partnership's Global Plan to End TB which advocates for the use of such promising tools, as they hold the capability to transform TB diagnosis and find these "missing people with TB."² Among these promising tools are ultra-portable digital X-ray systems and artificial intelligence-powered software for the computer-aided detection (CAD) of TB.

¹ World Health Organization. Global TB Report 2022. Available from: <https://www.who.int/teams/global-tuberculosis-programme/tb-reports/global-tuberculosis-report-2022>

² Stop TB Partnership. The Global Plan to End TB 2023-2030. Available from: <https://www.stoptb.org/global-plan-to-end-tb/global-plan-to-end-tb-2023-2030>

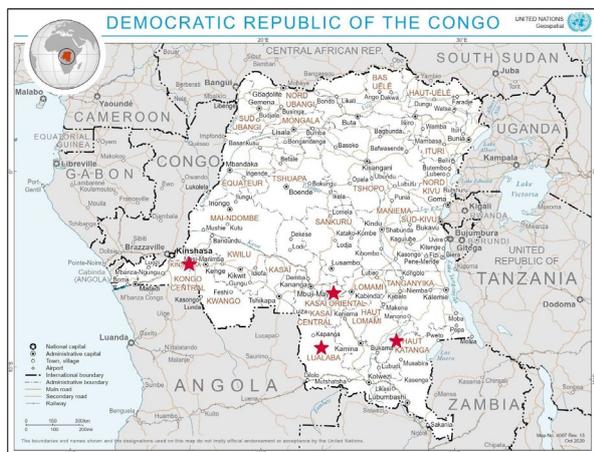
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Figure 1: Map of DRC with stars indicating the four provinces where ultra-portable X-ray and CAD systems have been deployed



Source: Based on United Nations Map

Chest X-ray is a highly sensitive tool for TB screening, able to identify both symptomatic and asymptomatic people with TB. However, challenges may arise due to variations in interpretation by radiologists as well as a scarcity of radiologists, particularly in countries with a high TB burden. To address these challenges, CAD software can play a crucial role. This software can improve the accuracy and consistency of TB screening results from X-rays. Additionally, there are now ultra-portable X-ray systems that can be taken to remote and hard-to-reach areas. This expansion of screening services can lead to more people getting the right diagnosis and treatment, ultimately improving their health outcomes.

The *Introducing New Tools Project* (iNTP), a collaborative effort between the United States Agency for International Development (USAID) and the Stop TB Partnership, has implemented these innovative tools in high TB burden countries. The DRC National TB Program (Programme National de Lutte contre la Tuberculose or PNLT) received eight ultra-portable X-ray systems with CAD software under the iNTP. These advanced systems were deployed across four provinces in DRC, namely Kinshasa, Kasai-Oriental, Haut-Katanga and Lualaba.

Planning and Implementation of Ultra-portable X-ray and CAD

The PNLT selected the Delft Light ultra-portable X-ray system along with the CAD4TB version 7 software from the Stop TB Partnership's Global Drug Facility (GDF) catalog. The package included a comprehensive four-year training, maintenance, and support program, all provided at costs negotiated by GDF.

The equipment arrived in DRC in March 2022, and an intensive three-day training program was conducted in the same month. The training, which involved key stakeholders from the PNLT as well as eight radiographers (one from each site), was jointly delivered by the Stop TB Partnership, the manufacturer Delft Imaging and the USAID Infectious Disease Detection and Surveillance project (IDDS). The training sessions utilized a hybrid format, combining remote theory sessions with practical on-site training to ensure the radiographers were proficient in setting up and effectively utilizing the ultra-portable X-ray systems with CAD.

Despite challenges related to delays in transporting the equipment within the country, the units were successfully installed on-site in July and August 2022. Stop TB Partnership in-country consultants traveled to each site to aid in the installation process and refresh the radiographers' skills on how to use the system. The systems were deployed in health facilities across the

four provinces as well as a prison in Makala, targeting underserved and high-risk populations.

Across all facilities, X-ray and symptom screening were used in parallel, with individuals who scored above the threshold of 40 and/or displayed symptoms being referred for follow-on confirmatory testing.



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Project Impact

The iNTP screening activities have demonstrated significant potential in finding missing people with TB using ultra-portable X-ray with CAD. As of June 2023, a total of 11,180 individuals had been screened in DRC. Among those screened, over 4,250 people displayed an abnormal chest X-ray. Altogether, this led to the diagnosis of 2,302 people with TB.

11,180

individuals were screened

4,265

displayed abnormal chest X-ray results

2,302

individuals were diagnosed with TB

Lessons Learned

The implementation of new technology in healthcare settings comes with its challenges. One of the most notable challenges encountered during the project in DRC was equipment malfunctions, leading to a halt in implementation at one site and slowed operations at another. The timely resolution of such issues was crucial to ensure the continuous functioning of the screening activities. As part of the lessons learned, discussions with the manufacturer and their local agent were initiated to explore the possibility of setting up an in-country spare part store to minimize turnaround times and avoid disruptions in screening activities.

Another challenge faced during implementation was a shortage of workforce at certain sites, due to sickness and lack of motivation. As only one radiographer was trained for each site, the unavailability of the trained personnel resulted in temporary operational halts. Addressing workforce motivation issues in the short term was achieved by covering travel costs for affected staff members. In the long term, discussions continue at the PNLT to explore strategies for training additional radiographers and implementing incentivization methods to maintain a dedicated and motivated workforce.



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Looking Forward

The success of the project has highlighted the effectiveness of using ultra-portable X-ray with CAD in the fight against TB. The PNLT plans to continue utilizing the eight units and aims to procure additional digital X-ray systems with CAD software to extend screening efforts and find more missing people with TB. The implementation of these innovative tools offers hope for improved TB detection and care in DRC and reinforces the importance of continued advancements in TB management to achieve better public health outcomes.



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For more information on the introducing New Tools Project, visit:

<https://www.stoptb.org/accelerate-tb-innovations/introducing-new-tools-project>

