

Title: Active case finding and detection of TB Infection among incarcerated populations using an artificial intelligence-aided portable handheld X-ray machine in Himachal Pradesh, India

Background and challenges to implementation: TB in congregate settings, particularly prisons, is a significant health concern due to higher rates of infection compared to the general population, influenced by factors like overcrowding and concurrent health issues. The 100-Days End-TB campaign, launched by the Central TB Division, focused on screening vulnerable populations, including those in congregate settings. In the prison setting of District Mandi in Himachal Pradesh, the health administration successfully carried out AI-aided handheld X-ray based TB screening to diagnose TB disease among these incarcerated populations and detection and management of TB Infection through concerted efforts, effective stakeholder engagement and multi-sectoral coordination.

Intervention or response: in December 2024, the health department along with prison department, and community stakeholders planned a TB case finding campaign for incarcerated persons in District Mandi where they deployed an AI-equipped hand-held X-ray machine to screen 206 inmates. Samples of people presumed with TB were sent for upfront NAAT testing and diagnosed persons with TB were offered all services of the TB care cascade. Those without TB symptoms and with clear X-rays underwent a Cy-TB skin test. Those with TB infection positive incarcerated people put on TB Preventive Treatment and remaining were followed up in three months. The parameters assessed for this activity were (i) abnormal chest X-ray detection (ii) Asymptomatic TB diagnostic yield (iii) TB infection positivity. Data was analyzed using SPSS ver 22.

Results/Impact: Among 206 incarcerated people, 23 Asymptomatic showed Abnormal Chest X-ray reports through AI. Further NAAT testing confirmed 3 diagnosed (13% diagnostic yield) and put on anti-TB treatment. Of 203 incarcerated people who underwent the Cy-TB skin test, 72 (35%) tested positive for TB infection and were put on shorter regimen of TB Preventive Treatment. The remaining were followed up after 3 months with no breakdown to TB.

Conclusions: AI-enabled Handheld X-ray diagnosis of asymptomatic TB in Mandi prison setting, highlighted the significance of newer technologies and testing modalities to effectively detect the TB disease and infection risk in congregate settings.

Summary: AI-enabled TB screening in District Prison Mandi, Himachal Pradesh, identified asymptomatic TB cases using handheld X-ray and NAAT testing. The initiative, part of the 100 Days campaign, also revealed a high prevalence of TB infection. Findings highlight the importance of regular screening and preventive therapy in high-risk congregate settings like prisons.