

## Joint SEAR-WPR workshop to plan the accelerated implementation of new WHO TB policies



Experience of AI-CAD for screening in the Philippines, Cambodia, Nepal and India

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## AI-CAD to enhance TB screening at the primary care level , the Philippines

- A flat panel detector (FPD) was installed in the existing analog X-ray system at a health center by the courtesy of Fujifilm Corporation.
- AI- CAD was Lunit INSIGHT CXR 3 FF Modality (Version: 3.1.3.3).
- The primary target for this project was clients over 15 years of age who visited the health centre, regardless of the reason for the visit.
- The visitor was interviewed to check for the presence and duration of TB symptoms.
- Sputum examination with Xpert was performed using the result of the CAD scores and the radiologist's interpretation.

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# **RESULTS** :



## **Discussion and conclusion**

- Installation of a flat panel detector (FPD) and CAD in an existing analogue system has worked well for tuberculosis screening in a health centre.
- Digital radiography offers advantages such as high resolution images, streamlined workflow, and remote diagnosis capabilities.
- The ICF with AI-CAD contributed to early case detection of additional asymptomatic clients compared to the conventional passive case finding approach.
- Participation rates for chest x-ray with CAD and GeneXpert testing were 32.6% and 31.4%, respectively.
  - Analysis suggested that gender, economic status, area of residence, stigma and lack of knowledge about TB influenced participation.
  - Interviews revealed difficulties with sputum expectoration, burden of return visits, transportation costs and lack of perceived need as barriers.

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## Applicability of AI–CAD for pulmonary TB to community-based ACF

- AI-CAD (F-CAD) was retrospectively examined using a dataset of 8,386 CXR images and medical data of participants from community-based ACF in 13 districts in Cambodia.
- The F-CAD was developed as a prototype by FUJIFILM Corporation
- Target population: 1) persons aged 55 years or older, 2) persons with any TB symptoms, such as chronic cough, and 3) persons at risk of TB, including household contacts
- With a reference of Xpert-positive TB or interpretation by experienced chest physician , receiver operating characteristic (ROC) curves were drawn to evaluate the performance of AI-CAD.

[Okada et al. Tropical Medicine and Health (2024) 52:2, https://doi.org/10.1186/s41182-023-00560-6]









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【Okada et al. Tropical Medicine and Health (2024) 52:2, https://doi.org/10.1186/s41182-023-00560-6】

# Conclusions

- AI-CAD is applicable to community-based ACFs in high TB burden settings where experienced human readers of CXR images are scarce.
- The use of AI-CAD in developing countries has the potential to expand CXR screening in community-based ACFs with a significant reduction in human reader and laboratory workload.

[Okada et al. Tropical Medicine and Health (2024) 52:2, https://doi.org/10.1186/s41182-023-00560-6]







# Strengthening Urban Tuberculosis Program in Kathmandu Metropolitan City by Active TB Case Finding

- Target area: 8 out of 22 Urban Health Clinics with high TB caseload and higher number of risk and vulnerable populations: factories, slum areas, congregate settings
- Applied technologies: ultralight X-ray, AI-CAD, TB-LAMP, Xpert









[By the courtesy of Dr Akira Shimouchi]

## Use of ultra portable digital chest X-ray



MD can decide to take sputum sample or not immediately after reading the findings.

Radiographer and MDs are protected by lead shield from X-ray

[By the courtesy of Dr Akira Shimouchi]

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Inital









# Results

# ACF in slum area including homeless people



Age group	Participant	TB patient	Yield rate
15 - 24	62	0	() <del>-</del> ()
25 - 34	76	1	1.3%
35 - 44	81	3	3.7%
45 - 54	66	1	1.5%
55 - 64	35	1	2.9%
65+	28	2	7.1%
Total	348	8	2.3%

Bacteriologically (+) TB: 1

Bacteriologically (-) TB: 7 [By the courtesy of Dr Akira Shimouchi]

## Boarding school A



Boarding school A						
	Participant	TB patient	Yield rate			
5-14	448	3	0.7%			
15 - 24	201	5	2.5%			
25 - 34	19	0	-			
<mark>35 - 44</mark>	8	0	Ŧ			
45 - 54	4	0	-			
55 - 64	4	0	~			
Total 684		8	1.2%			

[By the courtesy of Dr Akira Shimouchi]

Bacteriologically (+) TB: 3 Bacteriologically (-) TB: 5

# Conclusion

- Active case finding with chest X-ray in community and community-based settings is effective especially for asymptomatic TB patients, both bacteriologically positive and negative TB.
- The combined use of TB-LAMP & GeneXpert for the proposed algorithm of ACF is practical and efficient as TB-LAMP is high throughput while GeneXpert can test for R-resistance.











### The Union

## FUJIFILM and JATA collaborative screening initiative in India

Duration in FY 2023-24: 10 months proposed

Portable X-ray FUJIFILM "FDR X-air"



### **OVERVIEW**



### Objective

REMOTE

**HEALTH CARE** 

To screen, diagnose and refer patients with TB and raise awareness in selected districts of Gujarat



#### Mission

Reach and sensitize approximately 1.6 million individuals, Screened 41,000+ for TB



#### **Focused Intervention Areas**

Industrial pockets, mining belts and villages around them and semi-rural places where incidence is high





## Project Geography

Two districts of Gujarat: 1) Banaskantha 2) Valsad



### Images of activities on location

community visit to invite people for health checks



The screening venue



Outside the mobile health screening van



Lung images using AI-CAD



X-ray photography inside the mobile screening van



Discussion at a local hospital





The algorithm we proposed to the government after this project

#### The scale we reached with this project

Reach : 1.6 million HRA : 41,716 X-Ray : 40,476 NAAT test : 5,532 TB : Positive 470

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## Summary of target group, detected TB and yield

Country incidence	Philippines 643/ 100,000 (2023)	Cambodia 274/ 100,000 (2020)	Nepal 229/ 100,000 (2023)	India 195/ 100,000 (2023)
Project period	November 2022 to May 2023 (6 months)	November 2018 to November 2021	July2022 to December 2024	2023-2024, (10months)
Target	Clients ≧15 y/o. visiting the health center, regardless of the reason:	Participants to community based ACF, ≧15 y/o with TB related symptom or risk of TB:	Participants to ACF at congregate setting, slum area, factory and community:	Banaskanth and Valsad districts in Gujarat, India :
N of target	1,626	8,519	36,000	1.6 million
CXR	481	8,253	34,278	40,476
NAAT done	120	1057	1961	5,532
detected TB (yield %)	24 <bac+: 17,="" 7="" clin="" dx:=""> (5.0% of CXR taken)</bac+:>	130 <bac+> (1.6%)</bac+>	All: 304 (0.89%), slum area: 68 (1.23%) congregate setting: 93 (0.99%)	470 (1.1% of CXR taken)







