



Title	低蔓延国であり続けるために市民とともに学ぶ
Author(s)	
Citation	
Version Type	VoR
URL	https://hdl.handle.net/11094/91048
rights	
Note	

The University of Osaka Institutional Knowledge Archive : OUKA

<https://ir.library.osaka-u.ac.jp/>

The University of Osaka

Strengthening Urban Tuberculosis Program in Kathmandu Metropolitan City by Active TB Case Finding 3 Year Project (2022-2024) by MoFA

The Japanese Society for Tuberculosis and Nontuberculous Mycobacteriosis
10 June 2023

A. Shimouchi^{1, 4}, R.S. Gopali¹, D.N. Sharma¹, B. Maharjan², P.R. Bhattarai¹, Y. Shrestha¹,
R. Timlisina¹, I. Onozaki^{3, 4}, K. Okada^{3, 4}

Japan Anti-Tuberculosis Association (JATA), Nepal Office¹

Japan-Nepal Health & Tuberculosis Research Association (JANTRA)²

JATA, International Program³

The Research Institute of Tuberculosis, JATA⁴

Background

Population : Nepal: 30million, Kathmandu City: 1.7 million

TB prevalence in Kathmandu Valley : 276/100,000 in 2018-19.

Notification in 2019, 136/100,000 in KTC.

At national level, 54% of TB patients were not detected.

72% of confirmed TB patients with abnormal chest X-rays (CXR) had no symptoms.

Currently active TB case finding (ACF) with symptomatic screening is being conducted nationwide.

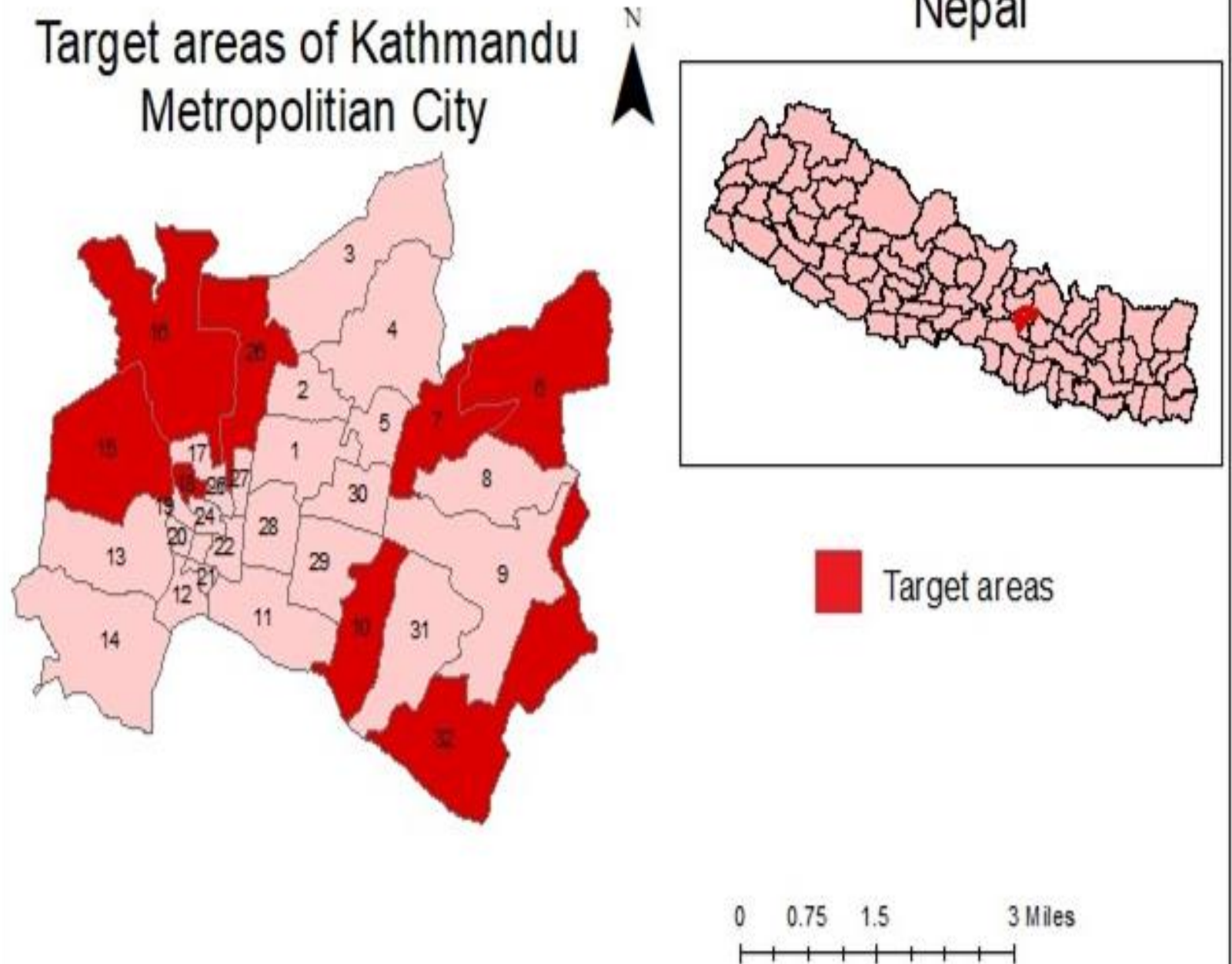
Therefore, active TB case finding using CXR should increase TB case detection.

It is the first time to introduce in the country.

The Project site (**red**)

urban DOTS clinics
with high TB case
loads and higher
number of risk and
vulnerable populations.
factories, monasteries
senior citizens' homes
congregate settings
slum areas

8 out of 22 DOT clinics
prioritized



Objective:

To strengthen the urban TB program in Kathmandu Metropolitan City.

Output 1:

Number of notified TB patients is increased.

Output 2: Patient centered care and support is strengthened.

Output 3: Monitoring and supervision is improved.

TB Case finding

Indicators

1. Number of patients diagnosed with TB is increased by 10% in KMC (in 3 years).
1,830(2019) to 2,008 (2022) by 9.7% (3% per year)
2. Yield of TB patients by mobile team (ACF) is **over 1%**.

Activities

1. Conduct ACF by mobile team and local Female Health Community Volunteers(FCHV).
2. Develop **Standard Operational Procedure**(SOP) of ACF.

Method: New technologies for active case finding(ACF)

Introduce highly sensitive machines to detect TB patients



Ultra portable X-ray machine

TB-LAMP

GeneXpert

⇒ and **mobile ACF camp** has been conducted.

In addition to current **TB symptomatic screening** and ordinary visit of patients to medical facilities(passive case finding).

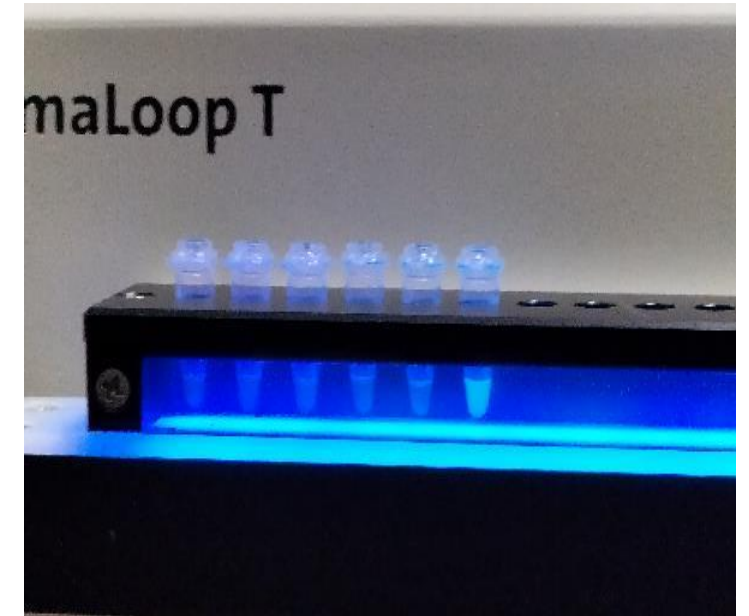
Introduction of TB-LAMP in JANTRA Clinic



Install of TB-LAMP to JANTRA lab.



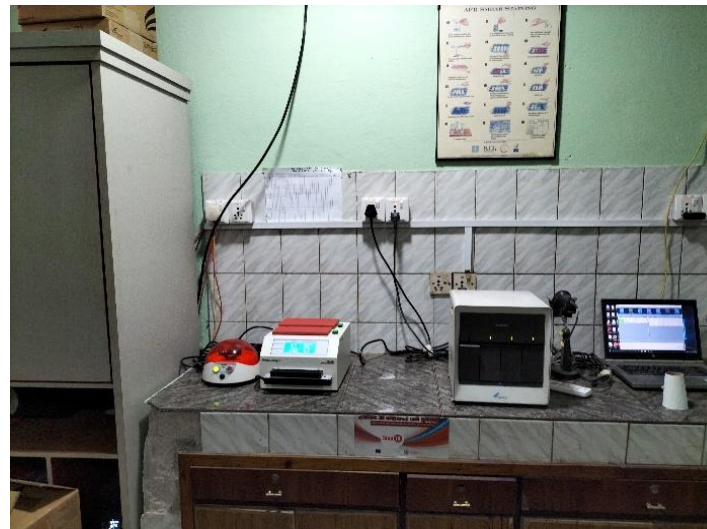
Man to man training



Demonstration of positive sample.



Waiting for the last step of TB-LAMP test.



TB-LAMP & GeneXpert

Sl. No.	Patient ID	Name	Date	Test Result	Remarks
2829	18-461	Shan	18-461	Not detected	
2830	18-461	Shan	18-461	Not detected	
2831	18-461	Shan	18-461	Not detected	
2832	18-461	Shan	18-461	Not detected	
2833	18-461	Shan	18-461	Not detected	
2834	18-461	Shan	18-461	Not detected	
2835	18-461	Shan	18-461	Not detected	
2836	18-461	Shan	18-461	Not detected	
2837	18-461	Shan	18-461	Not detected	
2838	18-461	Shan	18-461	Not detected	
2839	18-461	Shan	18-461	Not detected	
2840	18-461	Shan	18-461	Not detected	
2841	18-461	Shan	18-461	Not detected	
2842	18-461	Shan	18-461	Not detected	
2843	18-461	Shan	18-461	Not detected	
2844	18-461	Shan	18-461	Not detected	
2845	18-461	Shan	18-461	Not detected	
2846	18-461	Shan	18-461	Not detected	
2847	18-461	Shan	18-461	Not detected	

Recording in Laboratory Register.



Characteristics and Complementary Role of TB-LAMP and GeneXpert

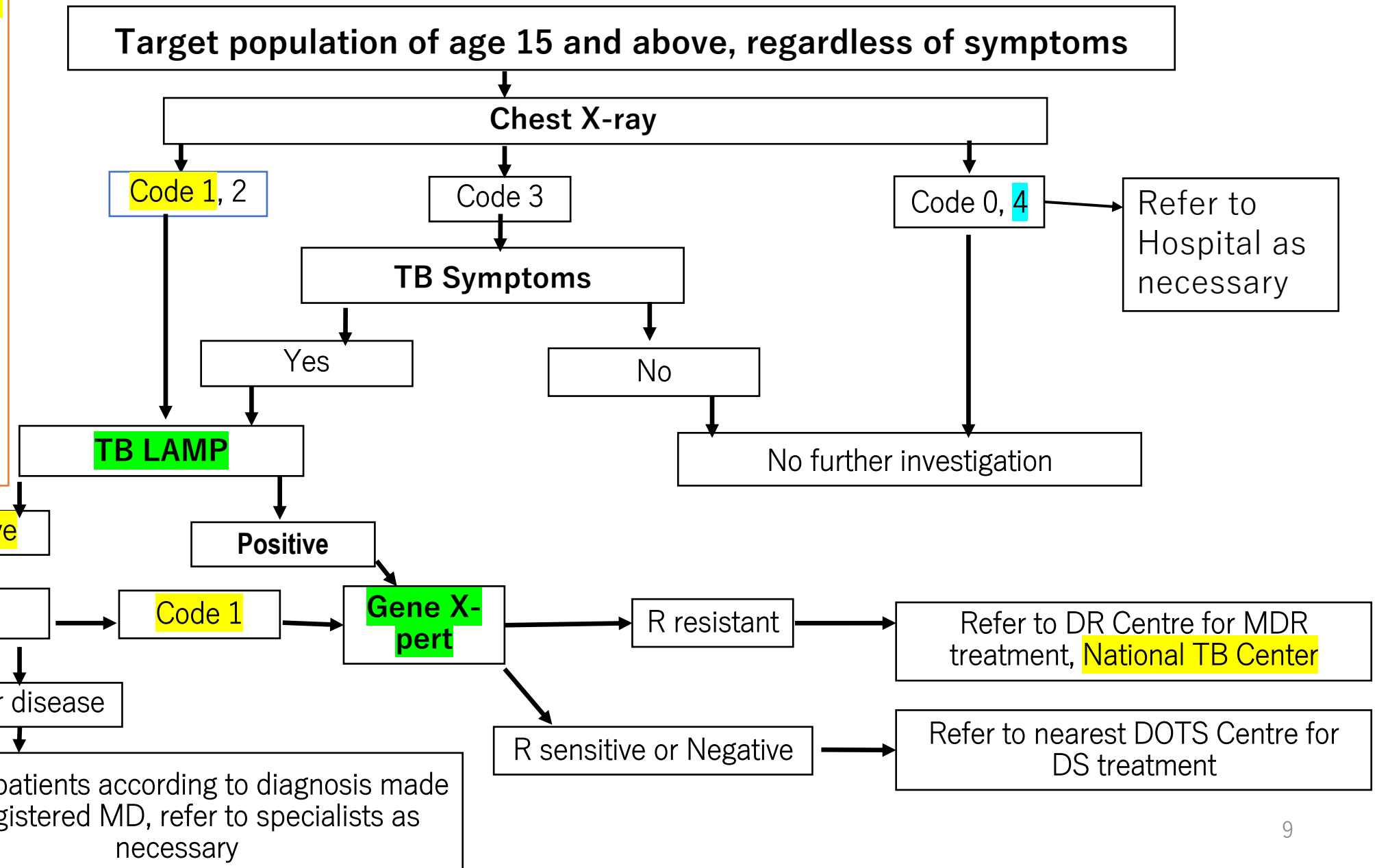


	TB-LAMP		Gene Xpert
Sensitivity :			
smear (+) sample	~100%	=	~100%
smear (-) sample		<~ =	
Susceptibility test of Rifampicin	No		Yes
Sample volume required for test	0.06 ml		3-5 ml
Number of samples tested at one time	14	>	4
Time required to obtain result	1.5 hours	<	2 hours

Therefore it is practical to use TB-LAMP as initial test for 10-20 sputum samples per day during ACF camp.

Algorithm for Community Based Active Case Finding

0. Normal
1. Active TB, probable (typical lesions such as infiltration, cavity)
2. Active TB, possible (difficult to distinguish active or inactive)
3. Old TB (fibrotic change, calcified nodules)
4. Non TB lesions and others (pleural thickening, bulla, emphysema, pneumonia, cancer)



Conduct of TB Screening by Chest X-ray

Preparation for ACF camp

1.Orientation for Female Community Health Volunteers (FCHVs)



25 FCHVs in a ward.
They are key persons
to invite people in the
community to ACF
camp.



Leaflet to invite a
person to ACF camp.

2. Awareness raising campaign for ACF in the community (JATA Staff, FCHV and other volunteers)



Individual
talk to
people



With banner



Speaker on
the bike



With miking
to a group

3. Scenes of ACF camp



Unique venue for ACF,
like court yard with Stupa



When a campaign is successful,
human relation in the community is
strong, many participants turn out.

4. Use of ultra portable digital chest X-ray



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



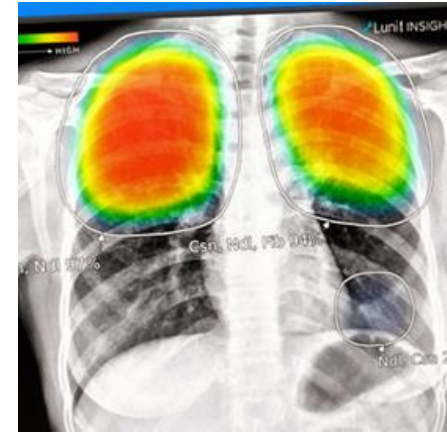
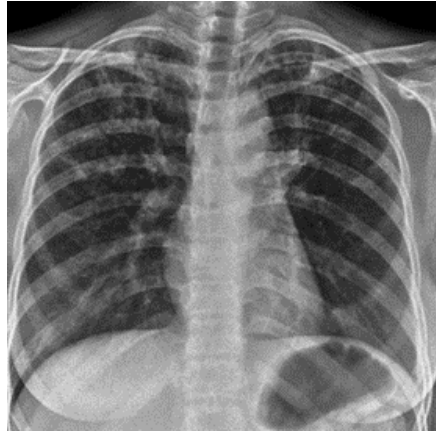
Radiographer and MDs are protected by lead shield from X-ray

5. ACF Camp in factories: All employees participate in health insurance.
They can attend their clinic as needed.

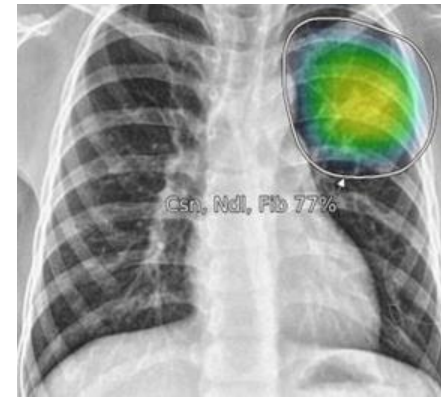
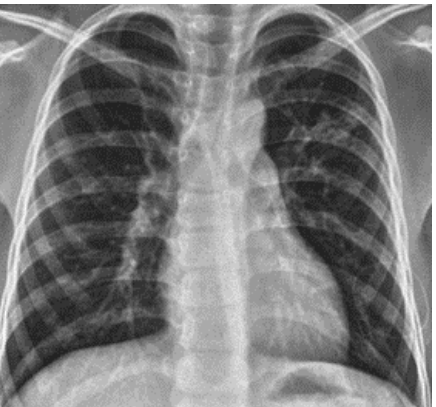


Because of Covid-19. Attendants wore masks in the room.

6. ACF Camp in boarding school (primary and secondary school run by monastery for children from Himalaya). There was outbreak.



Initially targets are students age of 15 and over. However as a bacteriologically positive patient was found, students of lower age group were also screened as contact investigation.



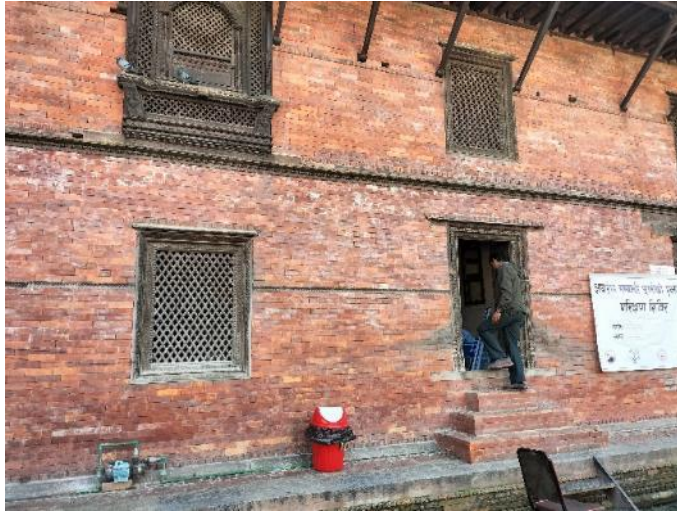
One patient bacteriologically negative was found.

Some students were not well nourished.
Outbreak of TB tends to occur in boarding schools.

Congregate setting

The Result of TB Camp in Monasteries & attached boarding schools in Kathmandu, 2022			
Participant		TB patient	Yield rate
Age	n	n	%
5-14	54	1	1.9%
15 - 24	652	11	1.7%
25 - 34	147	2	1.4%
35 - 44	104	0	-
45 - 54	62	0	-
55 - 64	27	0	-
65+	11	1	9.1%
Total	1057	15	1.4%

7. ACF Camp in Senior Citizens House



Entering X-ray room



Participants were waiting



Reception



Findings are explained immediately after X-ray is undertaken.

Congregate setting

Yield rate of TB patient in a senior citizen's house			
Age group	Participant	TB patient	Yield rate
15 - 24	4	-	-
25 - 34	8	-	-
35 - 44	1	-	-
55 - 64	4	1	25.0%
65+	79	5	6.3%
Total	96	6	6.3%
Bacteriologically (+) Pulmonary TB : 3			
Bacteriologically (-) Pulmonary TB : 3			

5. Immediate action for presumptive TB and diagnosed TB patient



If a participant is considered to be presumptive TB, sputum is taken on the spot. Sputum will be tested by TB-LAMP/GeneXpert **next day**.



If a participant is diagnosed as TB, he/she is referred to the nearest UHC to start treatment **within several days**.

Human resource for mobile ACF with chest X-ray

The list of project staff

- Technical Officer/Medical Officer – 1 (or 2)
- Field Coordinator/Program Coordinator – 1
- Program Support Coordinator - 1
- Radiographer- 1
- Laboratory technician - 1
- Field Officer - 1
- Social Mobilizers/Interviewers - 2
- Note: Urban Health Center staff: 2 and FCHV: 5
will be mobilized in the field sites

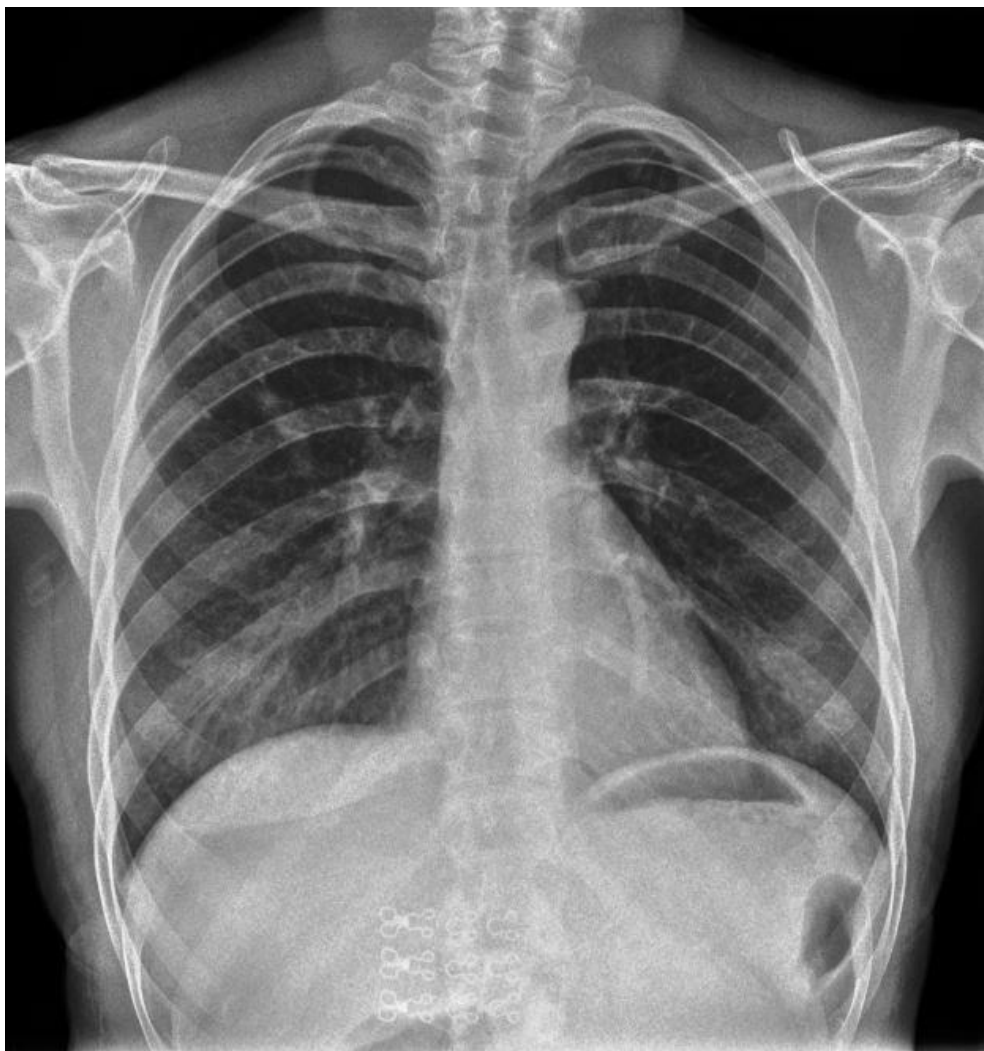
usually 25-50 persons/hour, 9 or 10:00-16:00, 150-200 participants per day
with 30 min. lunch break

Use of Computer-aided Detection(CAD) Artificial Intelligence(AI) System

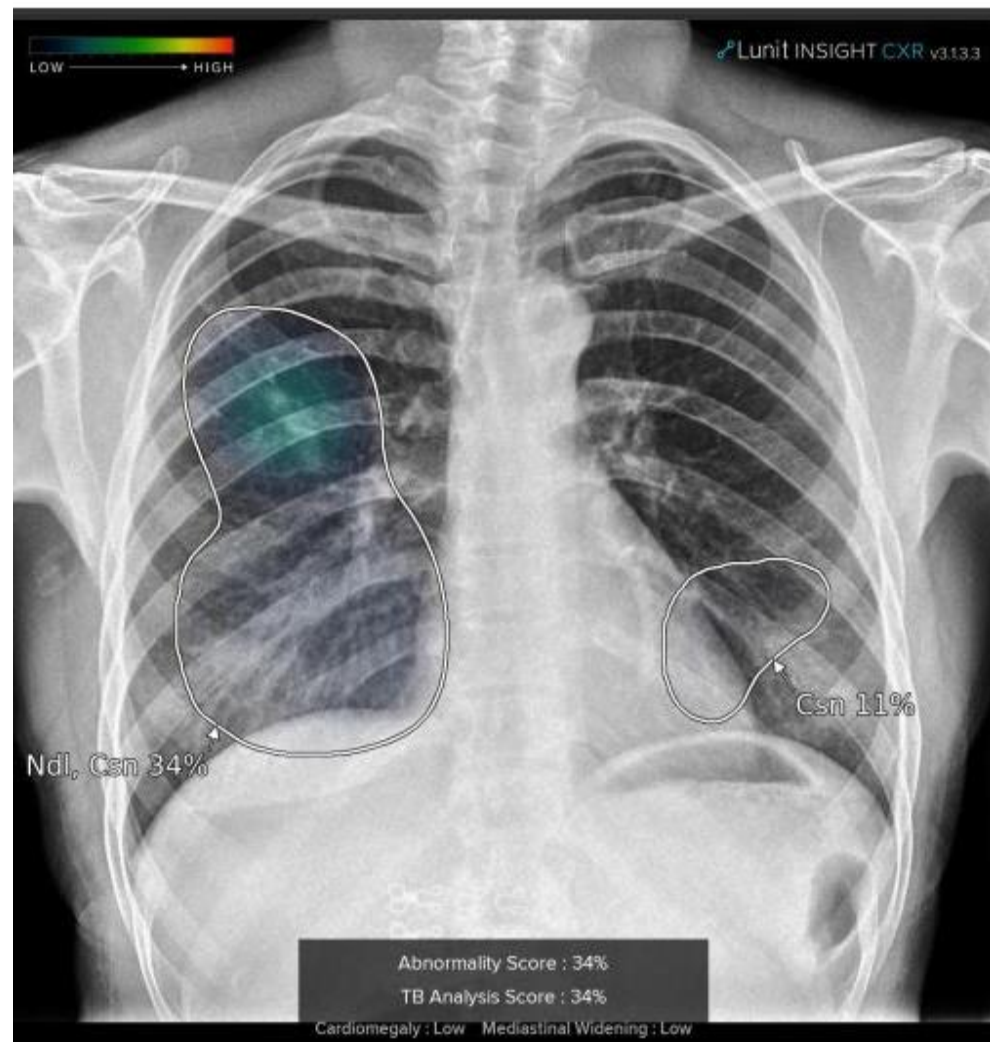
To consult with AI only when we need **reference** to take sputum sample for bacteriological examination.

In future, TB screening will be done by AI without MD to decide sputum sample to be taken or not.

But final decision to treat them as TB would depend on MD's decision.



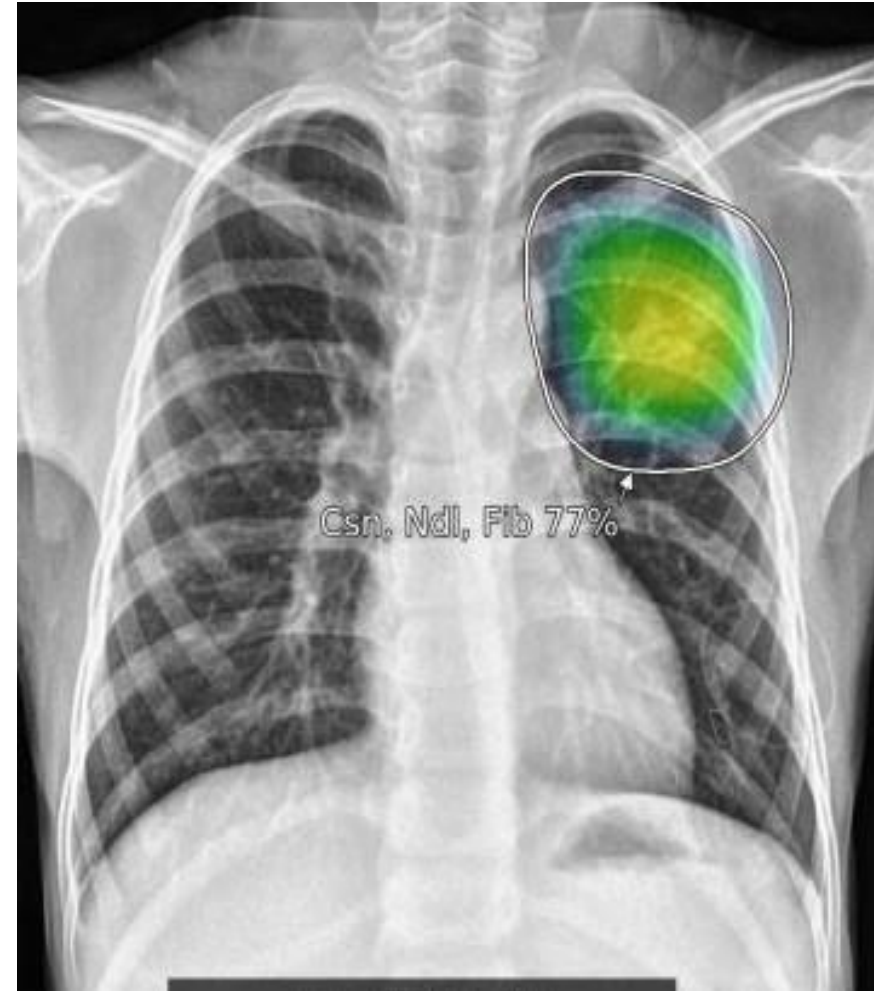
Wife, without symptom
TB-LAMP(-), GeneXpert(+)



AI image
If typical to TB, subtle change is recognized.



13 y.o. male TB-LAMP(+), GeneXpert(-)
He had cough, produced only 1 ml sputum.



AI image



5 y.o. F. contact of PBC



She had fever but could not produce sputum. She was diagnosed as clinical TB with chest X-ray.

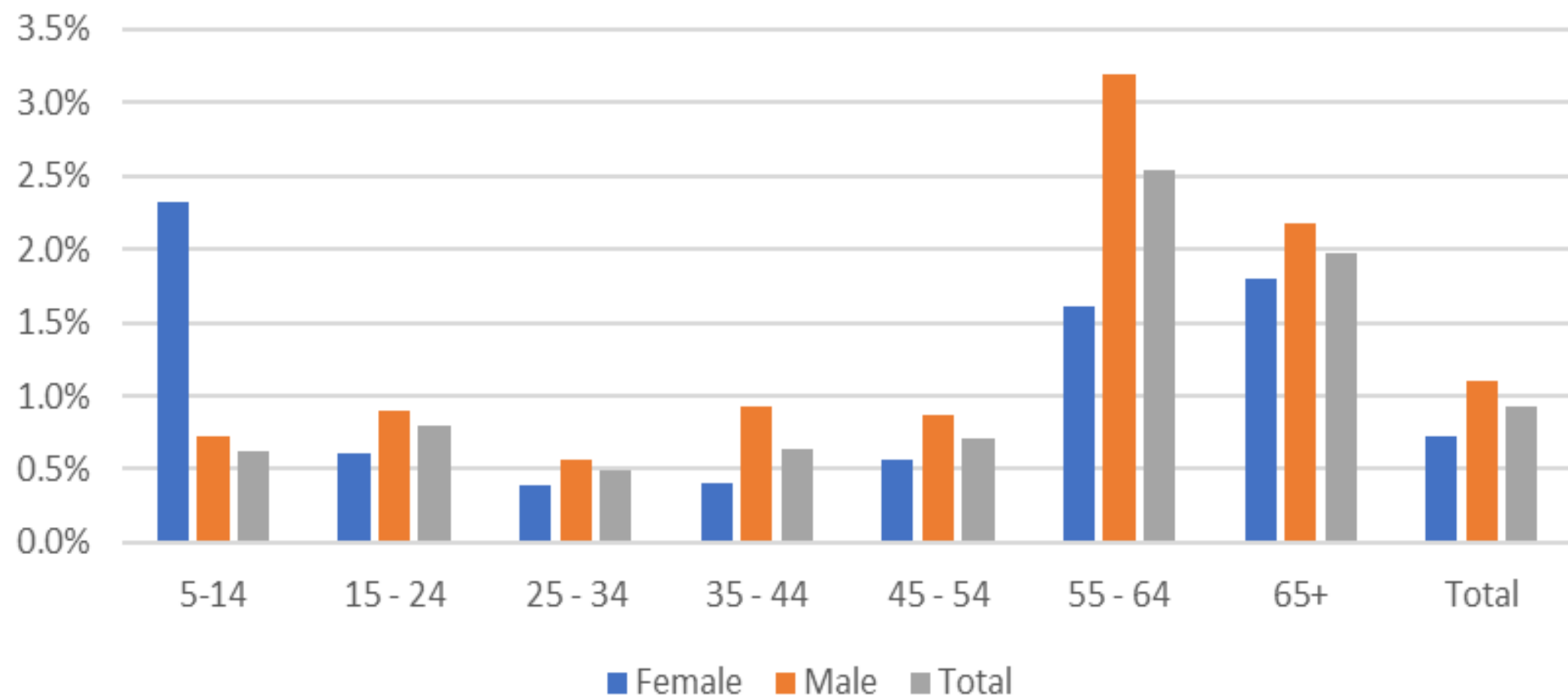
Result

Summary of ACF, Kathmandu City

July 2022-May 2023

Participant	10491		
Presumptive TB	638	6.1%	
Bacteriologically (+) Pulmonary TB	25	0.2%	All RFP sensitive
Bacteriologically (-) Pulmonary TB	72	0.7%	
all TB	97	0.9%	

Yield rate of all TB patient by sex & age by CXR ACF in Kathmandu City, July 2022-May 2023



Yield rate of TB patients in CXR ACF camp in Kathmandu City, July 2022-May 2023

Category of group	population	TB patient diagnosed	Yield rate (%)	95% CI *	P-value**
a) Congregate settings including monasteries	3485	43	1.23	[0.92-1.66%]	between a) and b) 0.803
b) community residents including slum areas	2219	25	1.13	[0.76-1.66%]	between b) and c) 0.027
c) Factories, Community residents and community mixed with residents and factory workers	4787	29	0.61	[0.42-0.87%]	between a) and c) 0.0027 ***
Total	10491	97	0.92		

Congregate settings: monasteries, senior citizens' homes, orphanages, care centers for disabled and prisons.

TB:tuberculosis, CXR: chest X-ray

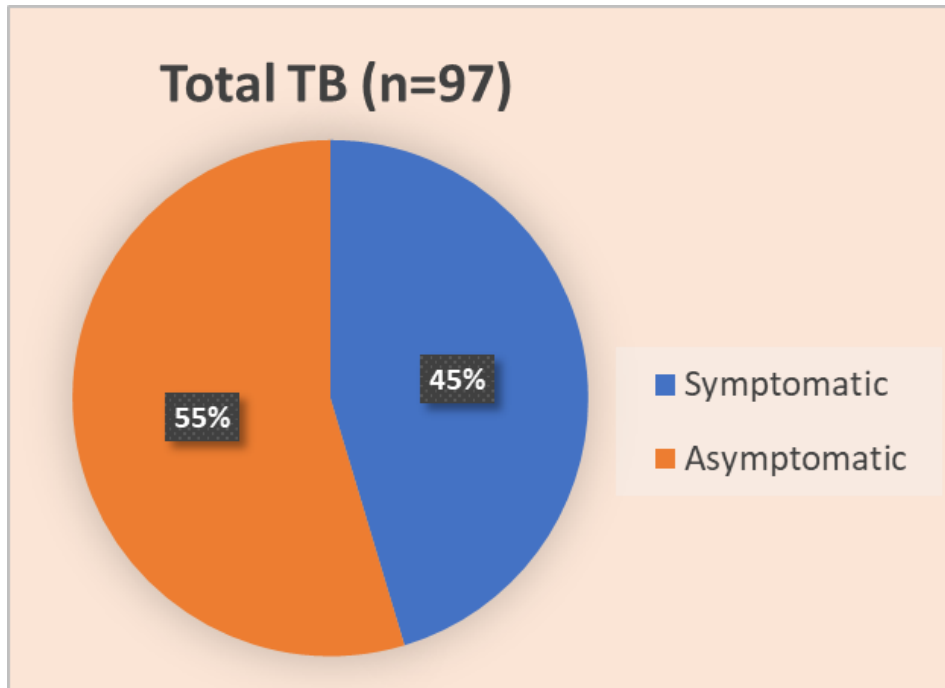
* 95% Confidence Interval by Wilson's method

** 2-sided Fisher's exact P value

*** Statistically significant when P value is less than 0.0167 with Bonferroni correction.

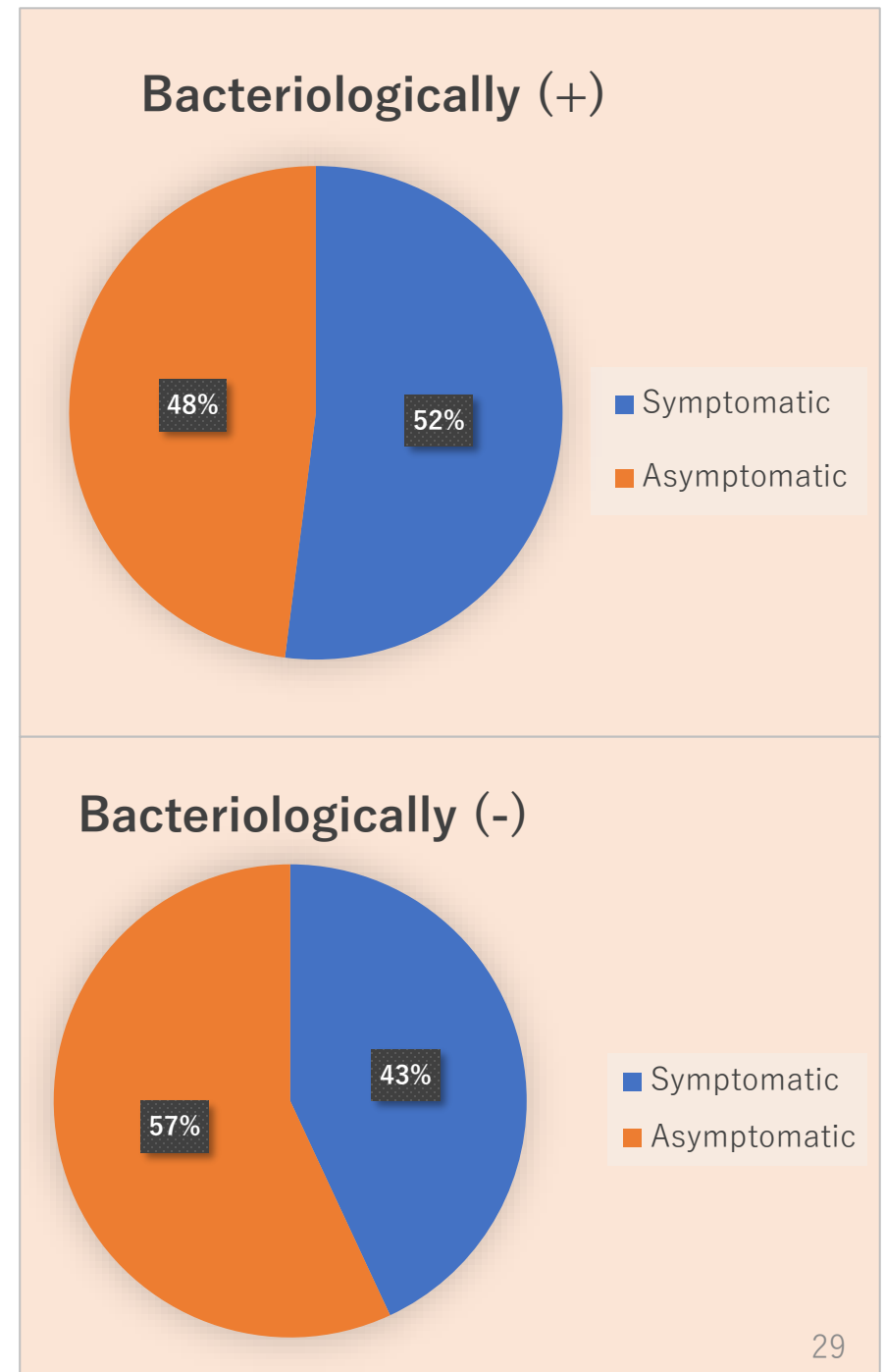
Analyzed by A.Ohkado,RIT/JATA

48% of bacteriologically confirmed patients had no TB symptoms



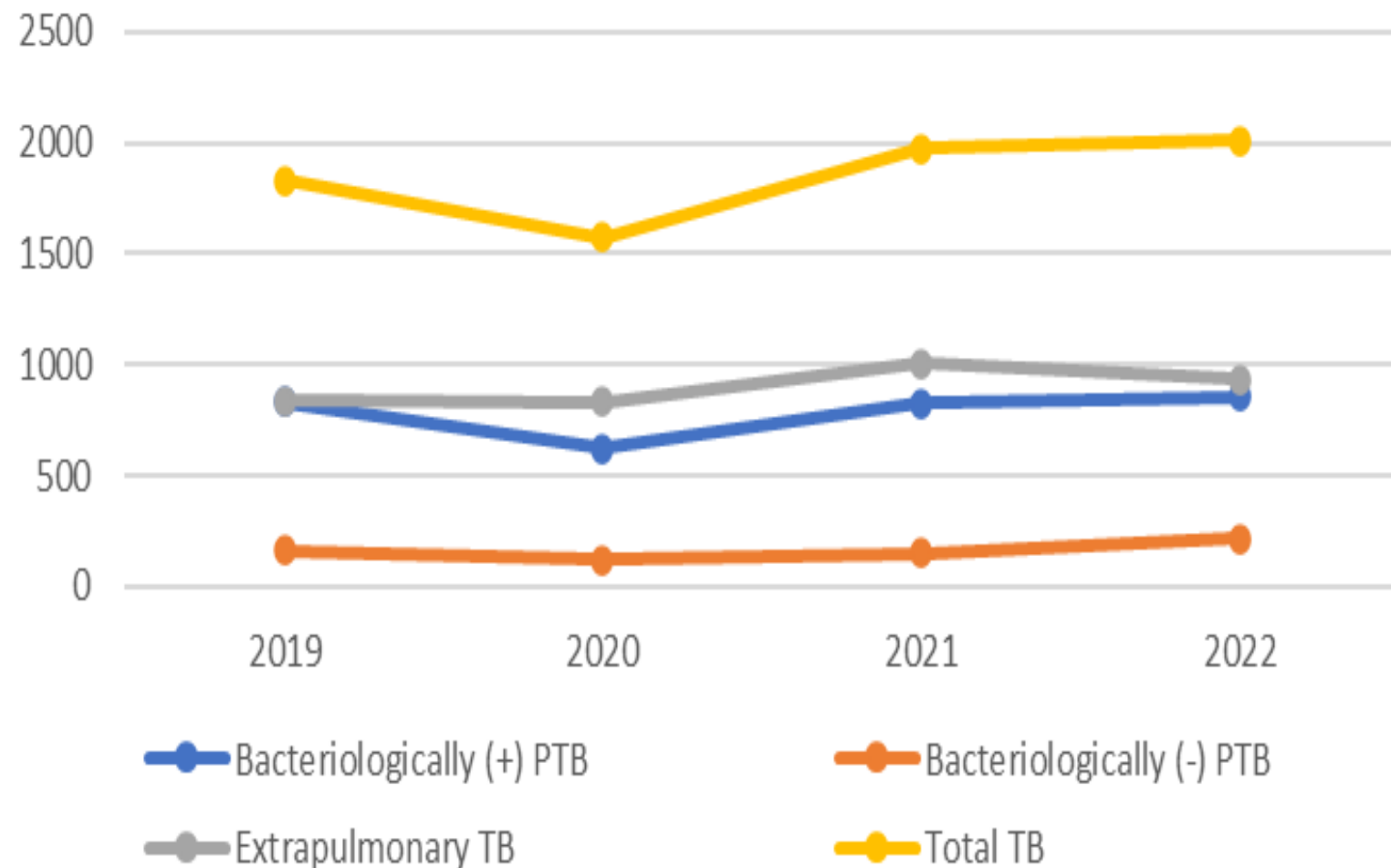
Bacteriologically(+): TB-LAMP and/or GeneXpert (+)

Bacteriologically(-): Dx by CXR, TB-LAMP (-),
GeneXpert: not done



Effects of the project

Ttrend of notified TB cases in Kathmandu City, 2019-2022



Contribution of ACF camp run by JATA Project

Category of TB Diagnosis	July - Dec 2021	July - Dec 2022		
	Kathmandu City	Kathmandu City	ACF camp	%
pulmonary TB (PTB), total	466	558	49	9.0%
Bacteriologically positive PTB (PBC)	401	430	19	4.4%
Bacteriologically negative PTB(PCD)	65	128	30	23.4%
Extra pulmonary TB	509	470	1	
Grand Total	975	1028	50	4.9%
		5.2% increase		

Discussion

- As half of TB patients had no symptoms, TB screening with CXR regardless of symptoms should significantly increase case finding.
- In systematic TB screening, the selection of targeted groups to whom health service is limited is key to maintain high yield rates of more than 1%.

Conclusion

- Active case finding with mobile chest X-ray in community and congregate settings is effective especially for asymptomatic TB patients, both bacteriologically (+) pulmonary TB and bacteriologically (-) pulmonary TB.
- Combined use of TB-LAMP & GeneXpert (both WHO recommended molecular test) for the proposed algorithm is cost efficient.
- TB screening with chest X-ray and symptomatic screening by skilled health workers are both needed to increase case finding further.



Thank you.

Positive rate of AI in different group					
	PBC	PCD	Presumptive TB incl. PBC,PCD	Presumptive TB excl. PBC,PCD	Control
total number of cases	9	18	124	97	124
number of AI positive cases	9	14	75	52	19
%	100	77.8	60.5	53.6	15.3

The above is the interim report. At least it means, if we depend on AI for selection of participants for sputum test, we may not miss PBC.