

Annual Meeting of the WHO Child & Adolescent TB Working Group

# Engagement, Screening, Contact Investigation & Prevention in a High-transmission MDR-TB Setting Experiences from Papua New Guinea



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# Acknowledgements & Funding



**No conflicts of interest to declare**

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\*All images are used with consent, including children and adolescents

# TB in Papua New Guinea (2021)

- Incidence 424 (340 - 517) per 100,000
- **Treatment coverage 68%** (56 – 85)
- TB notifications & outcomes

<b>Pulmonary</b>	<b>53%</b>
<b>Bac+</b>	<b>36%</b>
<b>Child</b>	<b>23%</b>
Success rate	74%
Case fatality	13% (8 – 19)

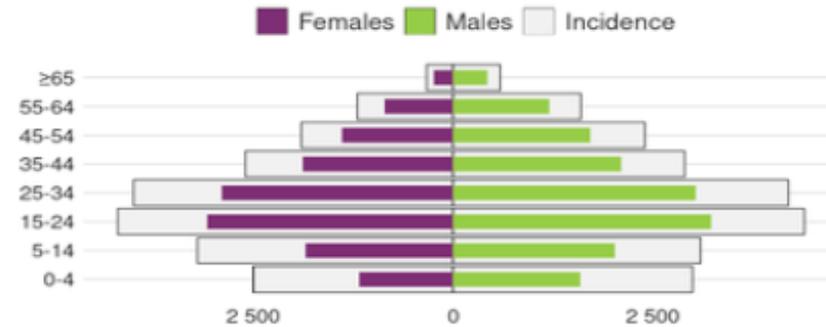
MDR-TB 481 cases

New	4% (1.6 – 8.4)
ReTx	23% (27 -42)

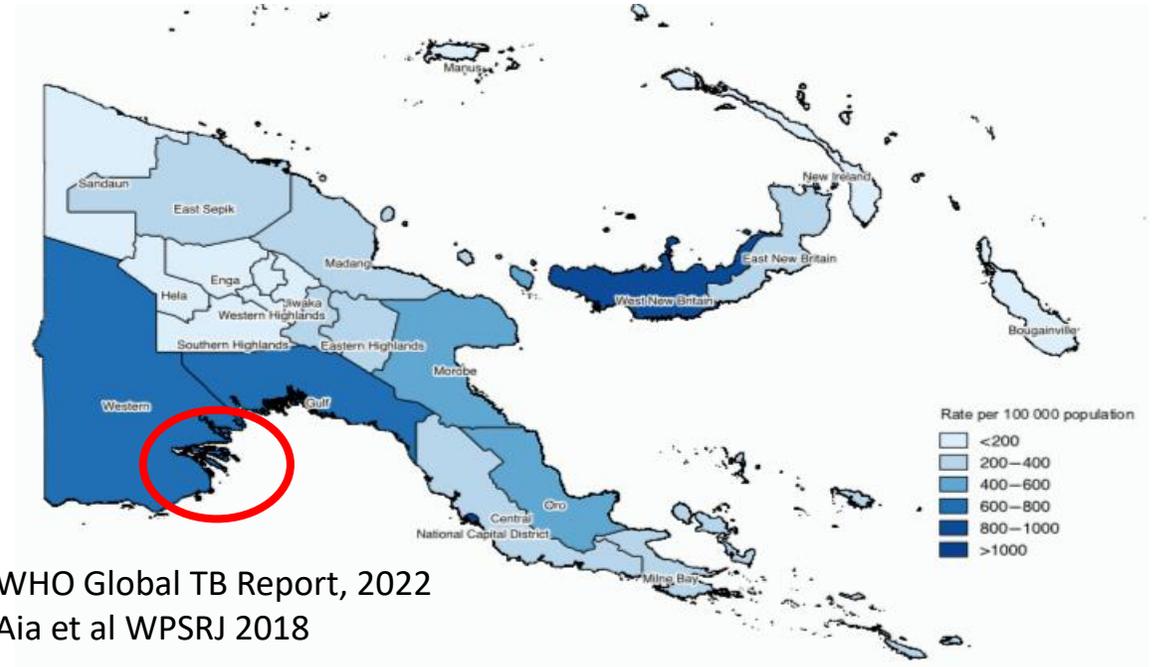
Success rate 70%

## Incidence, Notified cases by age group and sex, 2021

(Number)



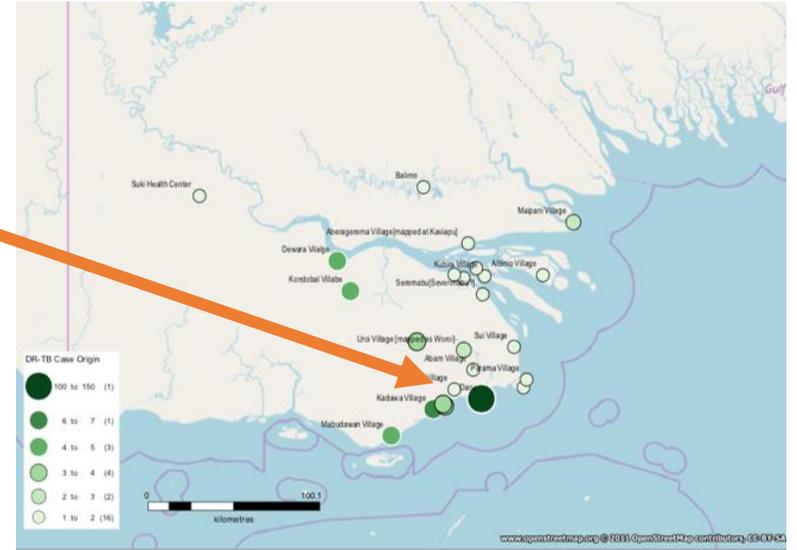
## TB case notification by province, PNG, 2016



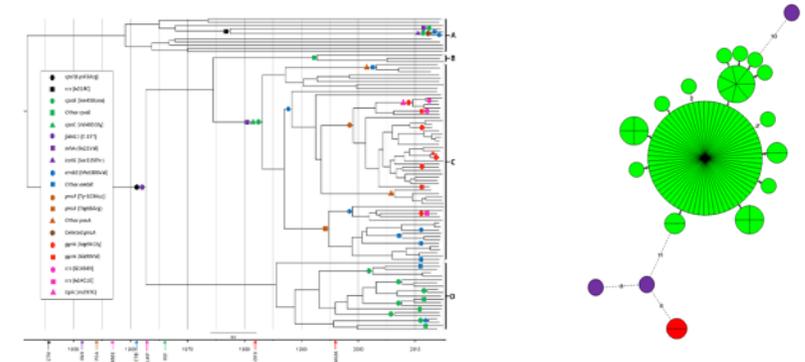
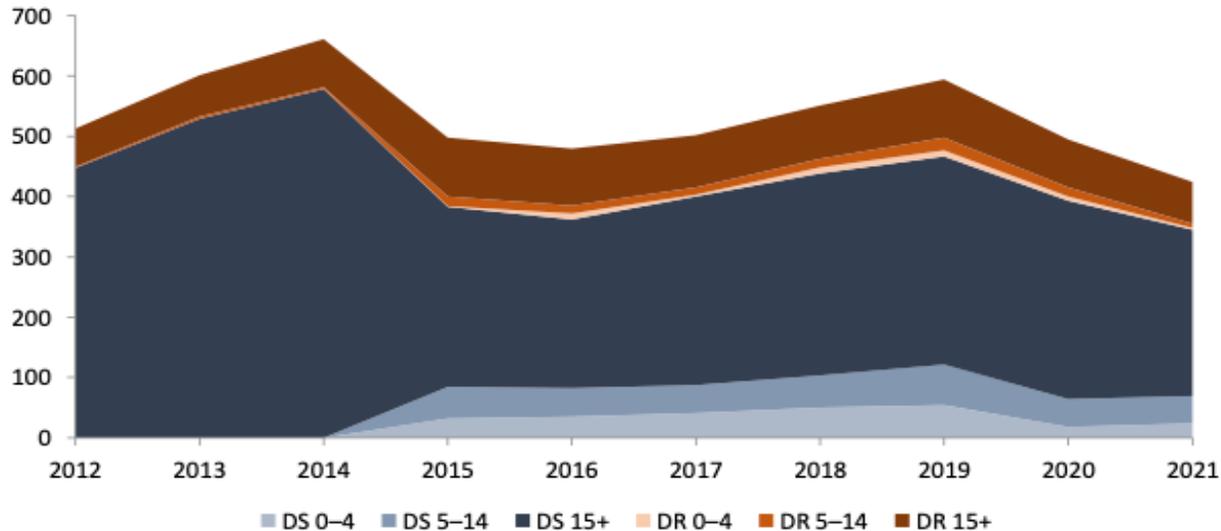
WHO Global TB Report, 2022  
Aia et al WPSRJ 2018

# Unprecedented rates of MDR-TB in Daru, South Fly District, Western Province, PNG

- TB case notification rate of 2,600 per 100,000 population
- 70% of all TB notifications are in Daru residents
- 68% of TB notifications are <35 years
- MDR-TB case notification rate of 600 per 100,000
- **One in five TB cases are MDR/RR TB**



New TB Enrolments by Age



Multi-clonal evolution of multi-drug-resistant/extensively drug-resistant *Mycobacterium tuberculosis* in a high-prevalence setting of Papua New Guinea for over three decades

Arnold Bainomugisa,<sup>1,2</sup> Evelyn Lavu,<sup>3</sup> Stenard Hiasihiri,<sup>4</sup> Suman Majumdar,<sup>5</sup> Alice Honjepari,<sup>4</sup> Rendi Moke,<sup>6</sup> Paison Dakulala,<sup>6</sup> Grant A. Hill-Cawthorne,<sup>7</sup> Sushil Pandey,<sup>8</sup> Ben J. Marais,<sup>7</sup> Chris Coulter<sup>8</sup> and Lachlan Coin<sup>2,\*</sup>

## PNG SUPPLEMENT

The emergency response to multidrug-resistant tuberculosis in Daru, Western Province, Papua New Guinea, 2014–2017

L. Morris,<sup>1</sup> S. Hiasihiri,<sup>2</sup> G. Chan,<sup>2</sup> A. Honjepari,<sup>1</sup> O. Tugo,<sup>3</sup> M. Taune,<sup>3</sup> P. Aia,<sup>4</sup> P. Dakulala,<sup>4</sup> S. S. Majumdar<sup>2</sup>



## Supplement: Foundations for Pillar 3 of the End TB Strategy in Papua New Guinea - building capacity in operational research



### INTRODUCTION

- 4-5** The SORT IT model for building operational research capacity: the experience of TB service providers in PNG  
P. Aia, S. S. Majumdar, W. Pomat, N. Tefuarani, S. M. Graham, P. Dakulala

### 6 EDITORIAL

- Building operational research capacity in Papua New Guinea and the Pacific Islands  
K. Viney, K. Bissell, P. C. Hill

### ORIGINAL ARTICLES

- 7-14** The emergency response to multidrug-resistant tuberculosis in Daru, Western Province, Papua New Guinea, 2014-2017  
L. Morris, S. Hiasihri, G. Chan, A. Honjepari, O. Tugo, M. Taune, P. Aia, P. Dakulala, S. S. Majumdar
- 15-21** Drug-resistant tuberculosis diagnosis since Xpert® MTB/RIF introduction in Papua New Guinea, 2012-2017  
E. K. Lavu, K. Johnson, J. Banamu, S. Pandey, R. Carter, C. Coulter, P. Aia, S. S. Majumdar, B. J. Marais, S. M. Graham, J. Vince
- 22-28** Impact of GxAlert on the management of rifampicin-resistant tuberculosis patients, Port Moresby, Papua New Guinea  
J. K. Banamu, E. Lavu, K. Johnson, R. Moke, S. S. Majumdar, K. C. Takarinda, R. J. Commons
- 29-35** Implementation of screening and management of household contacts of tuberculosis cases in Daru, Papua New Guinea  
A. Honjepari, S. Madiowi, S. Madjus, C. Burkot, S. Islam, G. Chan, S. S. Majumdar, S. M. Graham
- 36-41** Outcomes in children treated for tuberculosis with the new dispersible fixed-dose combinations in Port Moresby  
V. Apis, M. Landi, S. M. Graham, T. Islam, J. Amini, G. Sabumi, A. M. Mandalakas, T. Meae, P. du Cros, H. D. Shewade, H. Welch
- 42-46** A retrospective study of tuberculosis outcomes in Gulf Province, Papua New Guinea  
I. Moses, S. Main, R. J. Commons, B. Robertson, A. Mek, M. Gale
- 47-53** The effects of decentralisation of tuberculosis services in the East New Britain Province, Papua New Guinea  
A. Maha, S. S. Majumdar, S. Main, W. Phillip, K. Witan, J. Schulz, P. du Cros
- 54-60** TB treatment delay associated with drug resistance and admission at Daru General Hospital in Papua New Guinea  
E. Hapolo, J. Ijai, T. Francis, P. du Cros, M. Taune, G. Chan
- 61-65** Challenges in TB diagnosis and treatment: the Kavieng Provincial Hospital experience, Papua New Guinea  
K. Sodeng, A. Botu, M. Semmie, M. Yoannes, H. D. Shewade, R. Commons, S. M. Graham, P. du Cros
- 66-71** A mortality review of adult inpatients with tuberculosis in Mendi, Papua New Guinea  
K. Vakadem, A. Anota, M. Sa'avu, C. Ramoni, L. Comrie-Thomson, M. Gale, R. J. Commons
- 72-76** Gaps in tuberculosis care in West Sepik Province of Papua New Guinea  
T. Kelebi, K. C. Takarinda, R. Commons, B. Sissai, J. Yowe, M. Gale
- 76-82** Successful implementation of bedaquiline for multidrug-resistant TB treatment in remote Papua New Guinea  
M. Taune, P. Ustero, S. Hiasihri, K. Huang, P. Aia, L. Morris, S. Main, G. Chan, P. du Cros, S. S. Majumdar

### SHORT COMMUNICATIONS

- 83-85** A pilot model of patient education and counselling for drug-resistant tuberculosis in Daru, Papua New Guinea  
T. Adepoyibi, T. Keam, A. Kuma, T. Haihuie, M. Hapolo, S. Islam, B. Akumu, K. Chani, L. Morris, M. Taune
- 86-88** Tuberculosis treatment unmasking leprosy: management of drug-resistant tuberculosis and leprosy co-infection  
G. Kama, G. K. L. Huang, M. Taune, R. Arura, L. Morris, B. Kombuk, A. Marome, D. P. O'Brien

**SORT IT**  
Improving health systems through research



World Health Organization



For research on diseases of poverty  
UNICEF • UNDP • World Bank • WHO

A woman and a young child are sitting on a patterned rug outdoors. The woman is holding a clipboard and drawing a face on a piece of paper. The child is pointing at the drawing. In the background, other people are visible, including a child sitting on the rug and a woman standing. There are green plastic chairs and a yellow and red tray on the rug.

Household contact screening and  
management  
Daru, Papua New Guinea  
2018-2020

# Household Contact Investigation - Implementation Timeline

Start date	Activity
March 2016 – September 2017	Contact tracing began for XDR-TB and MDR-TB cases* Additional HR, tools developed
October 2017	Systematic contact tracing for DS-TB and provision of TPT (6H) to <5 contacts Community PT clinics established
2018	Systematic screening for active TB
November 2018	Community Engagement, Training, SOPs, Human Resources (educator, nurse)
January 2019	New TPT regimens under OR: 3RH for eligible DS-TB contacts & 6LFX for eligible MDR-TB contacts
March 2020	Contact investigation program stops due to COVID-19 pandemic
April 2022	Program Restarts post pandemic
November 2022	Scale-up of TPT to older children, adolescents & adults

\*Honjepari, Madiowi et al. Public Health Action 2019

# Implementation of the new model of care (2019)

## Community Engagement



## Tools and SOPs → Electronic record system

**DARU HOUSEHOLD TB MAPPING TOOL** v. 1.4

Date HMT initiated: \_\_\_\_\_ DART site: \_\_\_\_\_ Name of IC: \_\_\_\_\_ TB Number: \_\_\_\_\_  
 IC's Age: \_\_\_\_\_ Sex:  M  F Address: \_\_\_\_\_ Duration of symptoms: \_\_\_\_\_ weeks Household ID: \_\_\_\_\_  
 Other family members with TB: \_\_\_\_\_  
 IC Gene-Xpert result: MTB  Detected  Not Detected  Invalid  Rif resistance  Detected  Not Detected  Indeterminate  
 Type of TB:  PTB  EPTB  Pattern of resistance for IC:  DR-TB  MDR-TB  pre-NDM-TB  NDM-TB  
 IC smear result:  Neg  1+  2+  3+  scanty  not done  2SD:  Yes  No  
 Verbal consent obtained for home visit:  Yes  No Date home visit:  N/A  N/A

Children 5 Years and under															
Name and Surname	Age	Sex	Spaced TB/C	Spaced TB/C	IC C 1	IC C 2	IC C 3	IC C 4	IC C 5	IC C 6	IC C 7	IC C 8	IC C 9	IC C 10	IC C 11
1.															
2.															
3.															
4.															
5.															
6.															

Consent definition: Any person who has lived in the same house and/or spending time with the index case over the past 2 weeks. Relatives for not starting treatment. To use acceptance, do not use DR/MDR/NDM/PTB & TB Bed  
 Neg: TB symptoms:  Cough more than 2 weeks,  Fever more than 2 weeks,  Night sweats more than 2 weeks,  Weight loss/loss of appetite,  EPTB a any symptom of EPTB (marked 2), spine swelling  
 Susceptible to IC:  Yes  No  Unknown  No  
 TB treatment:  Already on treatment mark 'Y' enter date treatment commenced  Not on treatment  Enter date commenced



## Patient-centred education & counselling (peer-led model)



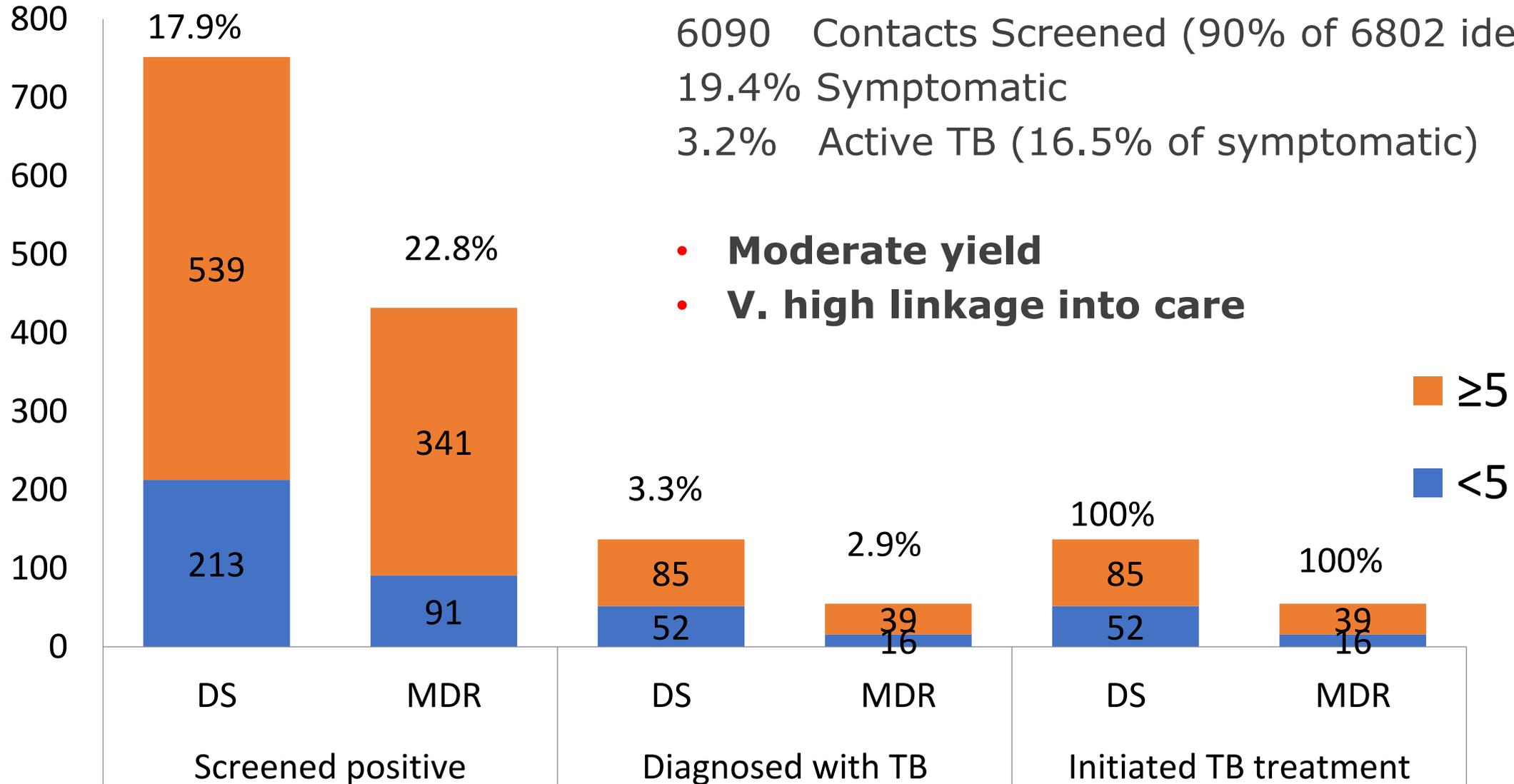
## Tuberculin skin testing (TST) and novel regimens



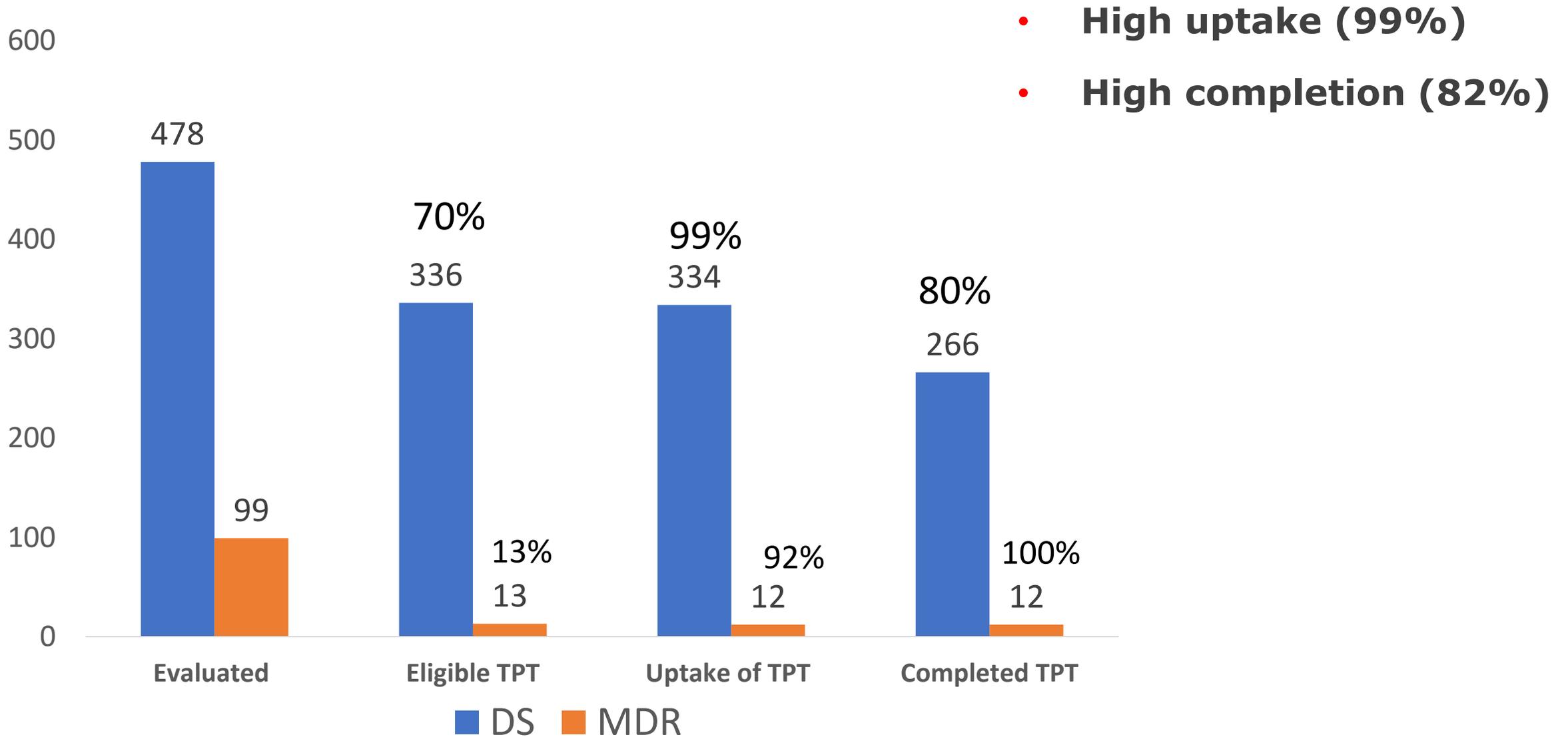
# Household contact screening in Daru. Oct 2017 – June 2020

781 Index cases  
 6090 Contacts Screened (90% of 6802 identified)  
 19.4% Symptomatic  
 3.2% Active TB (16.5% of symptomatic)

- **Moderate yield**
- **V. high linkage into care**



# TPT cascade of care for young child contacts per TPT regimen: 2017 – 2020



## TPT Outcomes for Child Contacts in Daru, Oct 2017 – Mar 2020 (n = 364)

TPT	Complete	Developed TB	Not complete	On treatment	Stopped by clinician	Total
6H	171 (78.5%)	0	34 (16.3%)	0	4	209
3RH	117 (81.8%)	0	24 (16.8%)	1	1	143
6Lfx	11 (91.7%)	0	0	1	0	12

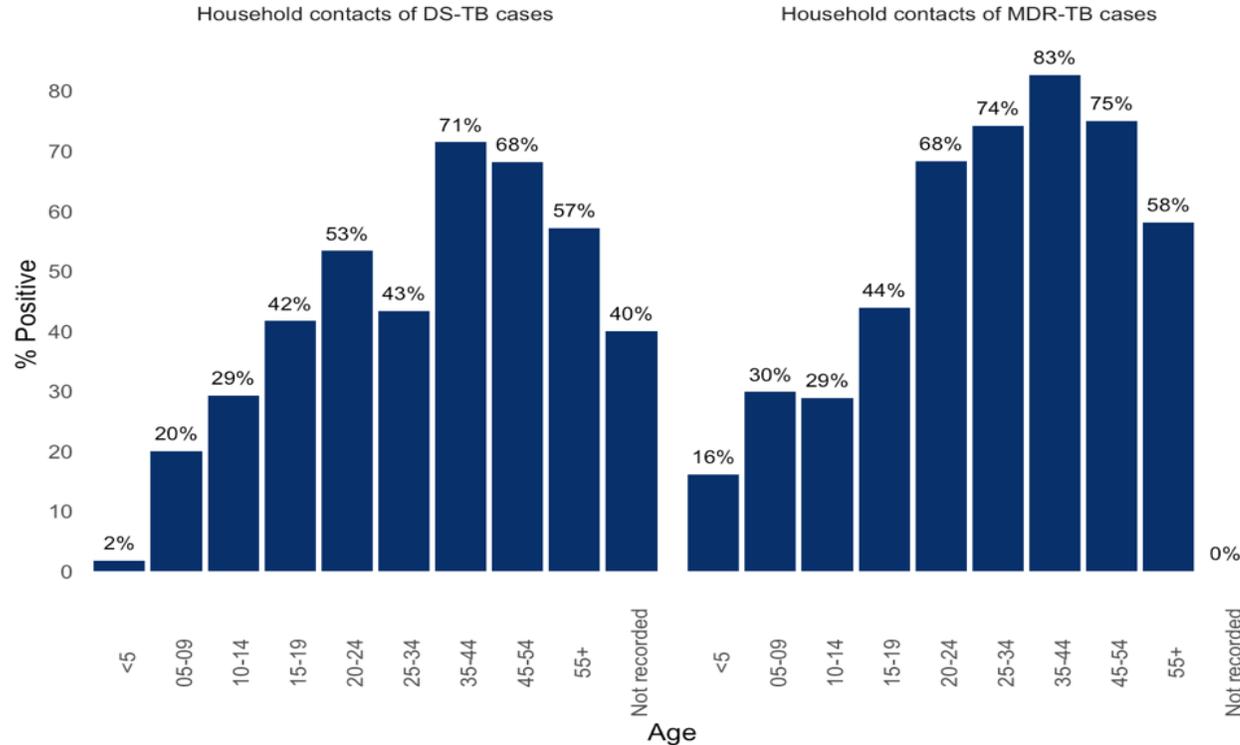
Reasons for Non-completion				
Regimen	Total	Adverse Event	LTFU	Not recorded
6H	34	5	24	4
3RH	24	9	23	1
6Lfx	0	0	0	0
	58	14 (24%)	47 (81%)	5 (9%)

- **82% Completion rate**

- **Well tolerated**

All AEs were Grade 1 and 2 (rash and gastrointestinal)

# Age-related prevalence of infection in household contacts



**DS-TB: 36%**  
**TST+**  
**(n=320)**

**MDR-TB: 47%**  
**TST+**  
**(n=562)**

## ***Suggests transmission is mainly outside households***

- High prevalence of LTBI in household contacts
  - Lower than expected in young children
  - Increases in adolescents
- Contacts have multiple index cases (DS and DR-TB)
- 20% of incident TB is MDR/RR-TB → household exposure doesn't mean infection with same strain

# Key findings

- Functional model of community-based household contact screening and management established with tools and protocols
- Good yield of active TB case detection in contacts, similar for contacts of DS and MDR TB cases, higher in young children
- High prevalence of infection (TST+) in MDR-TB household contacts increasing sharply with age
- High uptake and completion rate of PT
- To date, new regimens of 3RH and 6Lfx well tolerated



# Challenges and considerations

## Operational

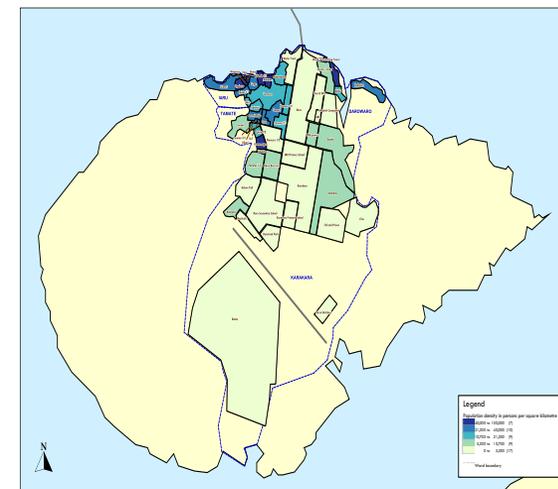
- Human resources needed
  - Dedicated team, community-based model, task shifting
- TST supply

## Social determinants

- Poverty, health literacy, food insecurity, service access
  - Engagement and building trust

## Households, re-identification and drug-resistance

- Poor civil registration coverage
- Tracking of contacts across multiple visits / locations
  - Screening, evaluation, treatment
- Linkage of contacts to multiple index cases
- Large, multi-generational households based on kinship and population movement



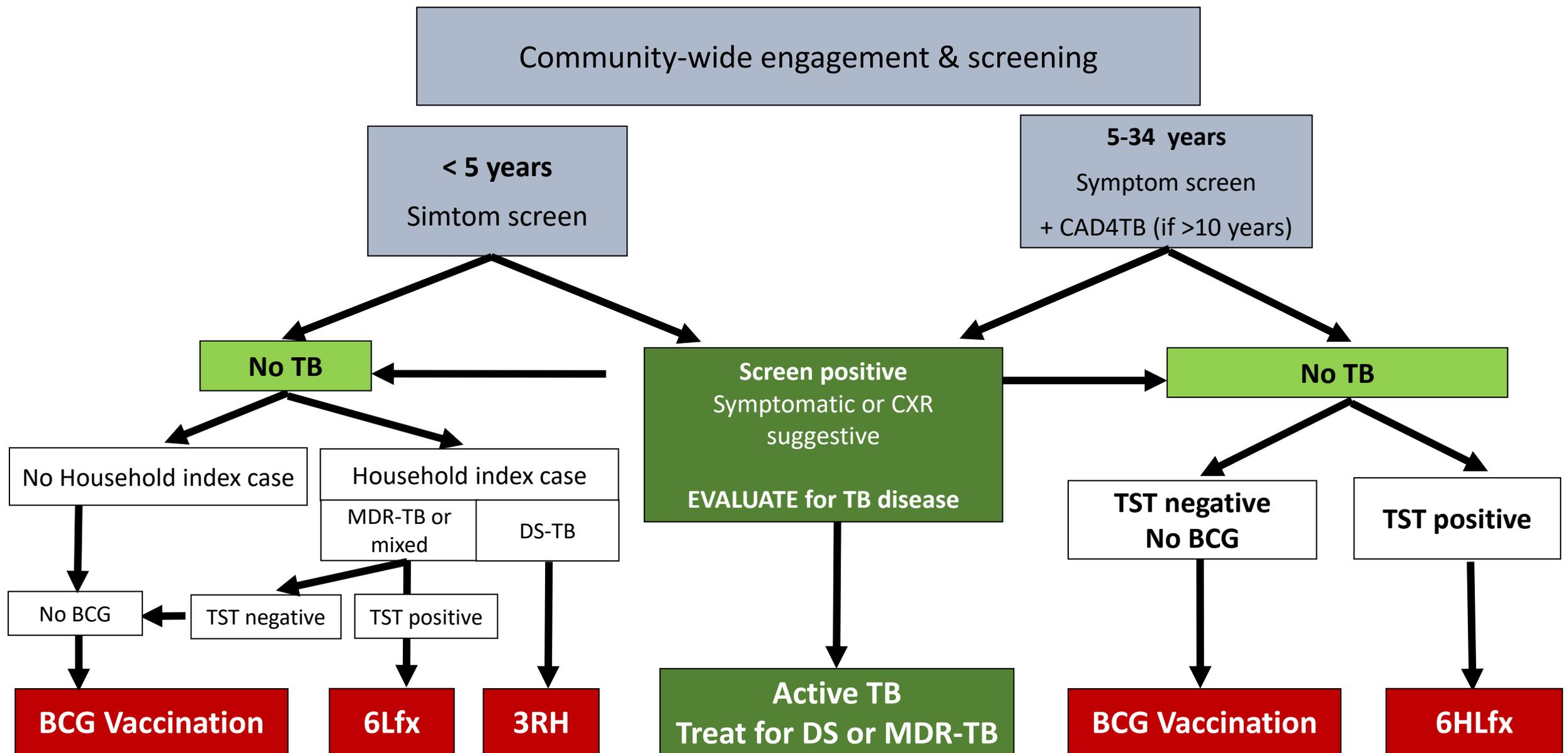
## Considerations for integrated detect-treat-prevent strategy by age

	< 5 years	5-14 years	15-34 years	35-54 years	55 years +
Potential impact on transmission	Minimal +/-	+	+++	++	+
Symptom screen	For all ages				
CXR if symptom screen negative	No	Uncertain	Yes		
Test for disease, sputum Xpert	From symptomatic (and CXR abnormal) if available		From all – symptomatic, CXR abnormal and asymptomatic if able to provide		
Test for infection	Not required	Recommended for TPT			
TPT indicated	TB-exposed and asymptomatic	Evidence of TB infection		Uncertain	
TPT preferred regimen	3RH or 6Lfx if MDR contact	Consider new regimen in high MDR setting: 6HLfx			
TPT safety	+++	+++	++	+	+

# Future directions – community wide intervention



# SWEEP-TB Daru: Proposed screening and diagnostic approach to community implementation in a high transmission MDR-TB setting



# **SWEEP-TB Daru** **Systematic Island-Wide** **Engagement & Elimination Project** **for TB in Daru**



**SWEEP TB  
OUT OF DARU!**

**HIMARA IMEHE GO TB  
KO'OMIRITI DARU RUDO**

**YUMI BUNG WANTAIM NA  
RAUSIM TB LONG DARU**





TB elimination requires engagement and collaboration with the affected community

**Engagement within our TB work:**

**Community Advisory Group**

**Community education**

**Peer education and counselling**

**Representation of people on treatment**

**TB survivor empowerment**

# Acknowledgement of the tireless work of the TB program staff and affected communities.

