



# TB in children; experiences from a low to middle income country, Papua New Guinea



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# Papua New Guinea (PNG)

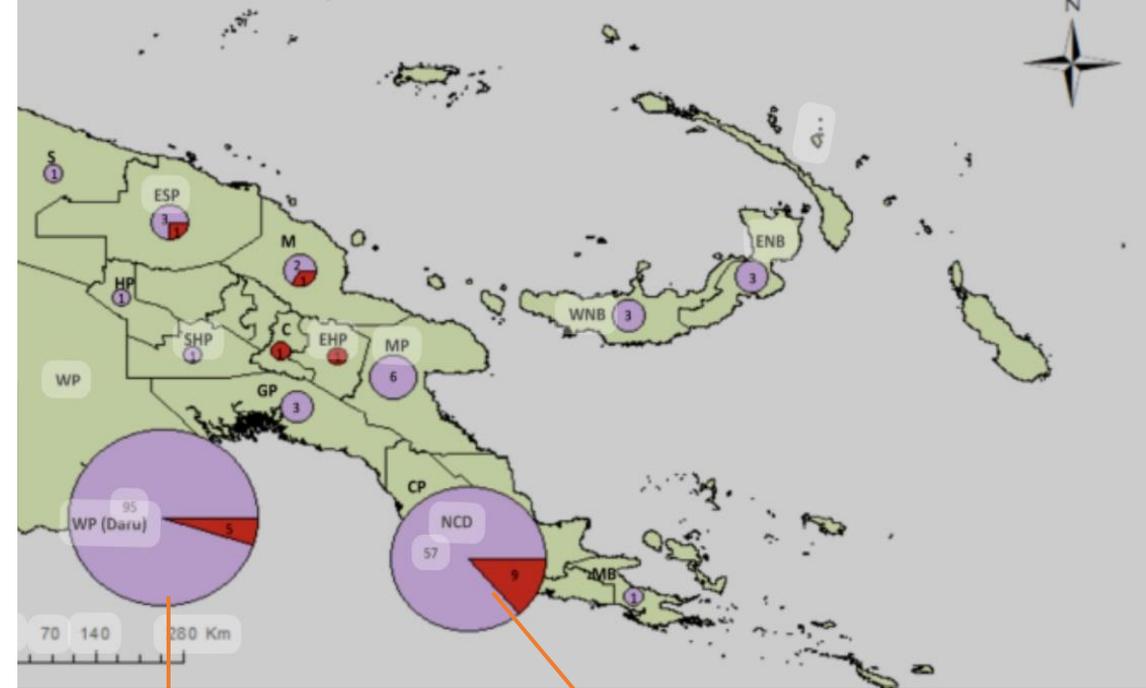
- Situated in the south western Pacific and directly north of Australia
- Largest country in the Pacific with a population of almost 9 million people
- Known for its rugged mountainous terrains and it's vast scattered islands
- Known for it's variety of cultures and it's biological diversity
- A land of different tribes with well over 800 different native languages
- Set backs with our delivery of health services in view of difficult geographical terrains and different cultural beliefs and language barriers
- Common language- PNG 'Tok pisin'



# TB in PNG

- TB incidence: 432/100,000  
(7th worldwide)
  - ~30,000 cases/year
  - 26% of total reported TB cases occur in children (highest worldwide)

The majority of children diagnosed with MDR reflect that of adults. Most are currently in Daru and Port Moresby, but are reported throughout PNG

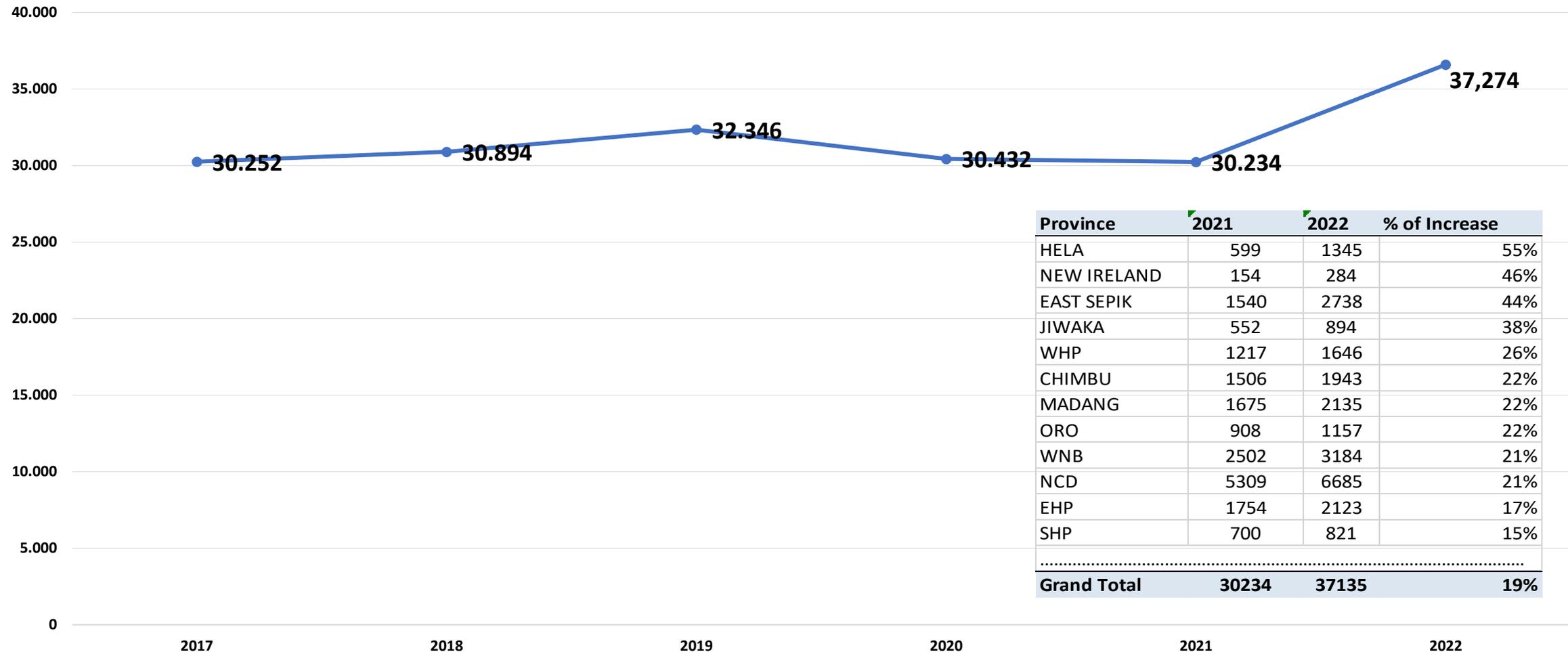


Source: BMC Infectious disease

Daru, Western Province  
CNR= >2,000/100,000

Port Moresby  
(National Capital District)  
CNR = 1,117/100,000

# PNG TB Case Notification Trend: 2017-2022



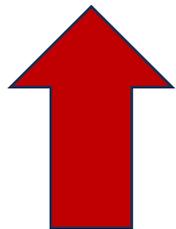
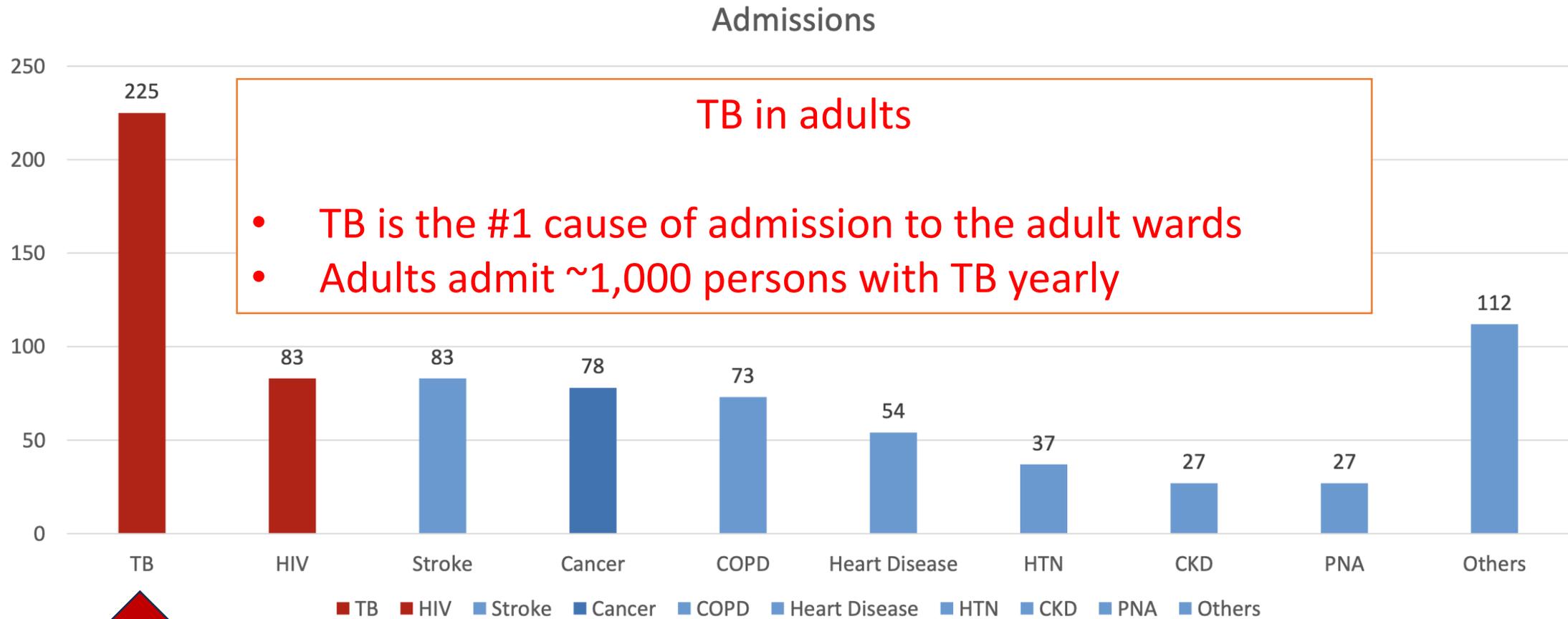
- An CNR increase of 19% in 2022 from an average increase of 6-7% over the 5 years. Slides courtesy of NTP/WHO

# Paediatric Ward at Port Moresby General Hospital (PMGH)

- 150 paediatric beds / 3,000 admissions
  - TB is the 3<sup>rd</sup> leading cause of admission (~13% of all admissions)
- 900 children started on TB treatment yearly (outpatient + inpatient)
  - 450 admitted
  - 10% in-hospital mortality for children diagnosed with TB if admitted
  - Present with severe disease,
  - 7% with HIV (new/CLHIV)
  - 40% with moderate/severe malnutrition



# Q1 (Jan-March 2023) Top 10 Admissions at PMGH (Adults)



Others: malaria, typhoid, dengue, liver disease, AGE etc

Slides courtesy of Dr. John Kamokom (PMGH)

Source: Q1 2023 Internal Medicine Audit  
PMGH

Unit 2 Jan 2023 data not updated

**Table 1. DESCRIPTION OF 444 CHILDREN STARTED ON DSTB TREATMENT AT PMGH IN THE FIRST 6 MONTHS OF 2023**

Indicator	Description	Total (n=444)	%
Treatment site/ Catchment area	PMGH TB Clinic	92	21%
	Other (BMU outside of PMGH)	352	79%
Province or Origin	NCD	239	54%
	Central Province	105	24%
	Other/Unknown	20	5%
Inpatient vs Outpatient diagnosis (N=389)	Inpatient diagnosis	210	47%
	Outpatient diagnosis	179	40%
Presence of malnutrition (n=347)	Moderate malnutrition	59	13%
	Severe malnutrition	93	21%
	<b>Overall (Mod + severe)</b>	<b>152</b>	<b>34%</b>
Xpert testing completed	Yes	271	61%
Xpert testing results OVERALL	MTB detected; RR not detected - overall	73/444	16%
Xpert testing results among those tested (n=252)	MTB detected; RR not detected – among children who received xpert testing	73/271	27%

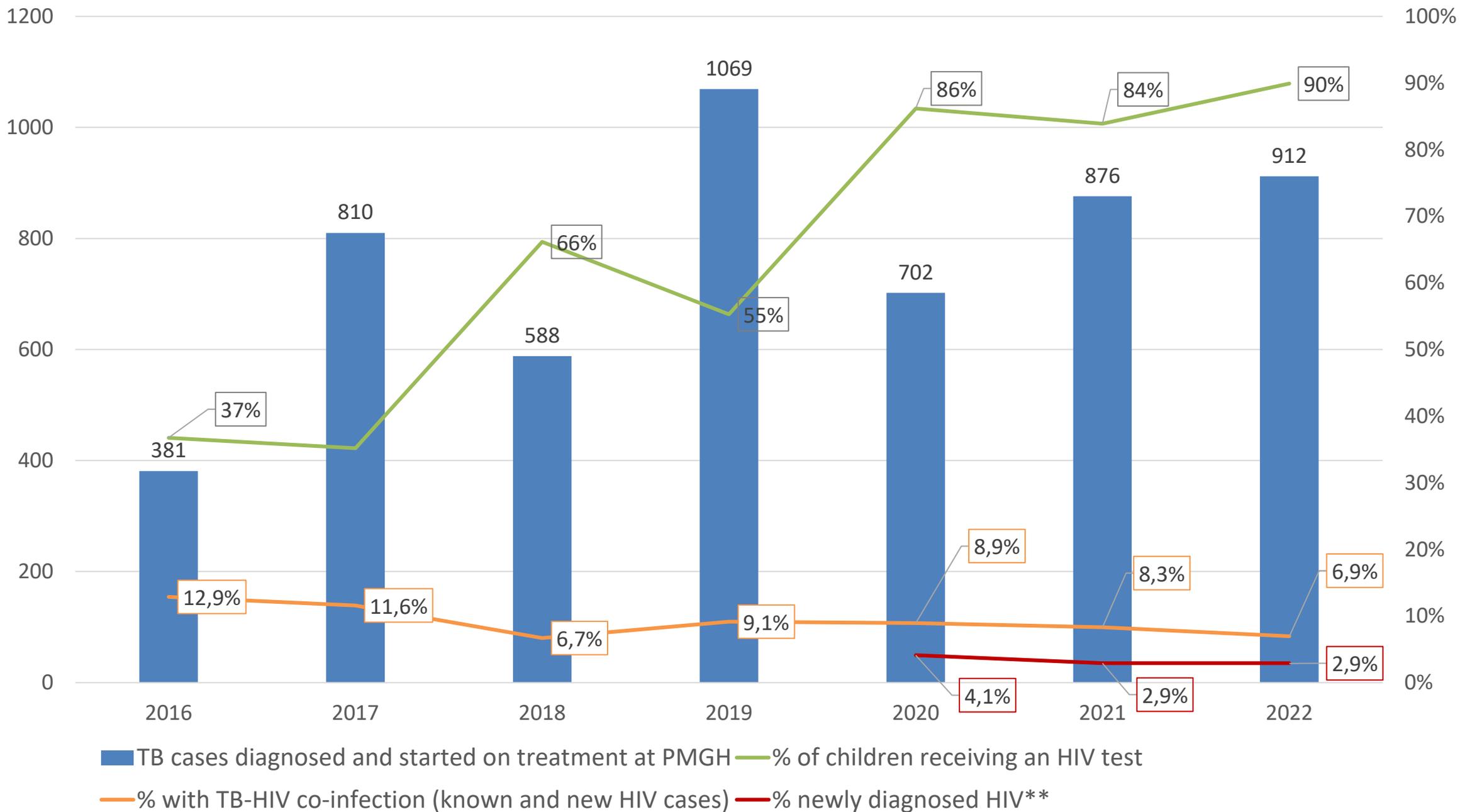
## Registration of TB Patients

PMGH serves as an entry point for TB diagnosis and initiation of treatment

Children are started on treatment and then discharged for registration at local BM

Goal is to register >80% of children diagnosed with TB

Figure 4. Rates of HIV testing for children diagnosed with TB at PMGH



**Table 1. X-pert testing and results for children diagnosed with DSTB at PMGH**

<b>DSTB</b>	<b>2016</b>	<b>2017</b>	<b>2018</b>	<b>2019</b>	<b>2020</b>	<b>2021</b>	<b>2022</b>
<i>TB cases diagnosed and started on treatment at PMGH</i>	810	588	1077	702	876	912	
<i># children receiving Xpert testing</i>	25	241	709	402	597	518	
<i>% of children receiving Xpert testing</i>	3%	41%	66%	57%	68%	57%	
<i># of cases bacteriologically confirmed by Xpert</i>	0	5	283	101	132	169	
<i>% of cases bacteriologically confirmed <b>overall</b></i>	0%	0.85%	283/1077 26%	101/702 14%	132/876 15%	169/912 19%	
<i>% of cases bacteriologically confirmed <b>among children tested</b></i>	0	2%	283/709 40%	101/402 25%	132/517 22%	169/518 33%	

\*2016 represents 5 months of data collection

**The true confirmation rate is somewhere in between the “Confirmed Overall” and “Confirmed among children tested”**

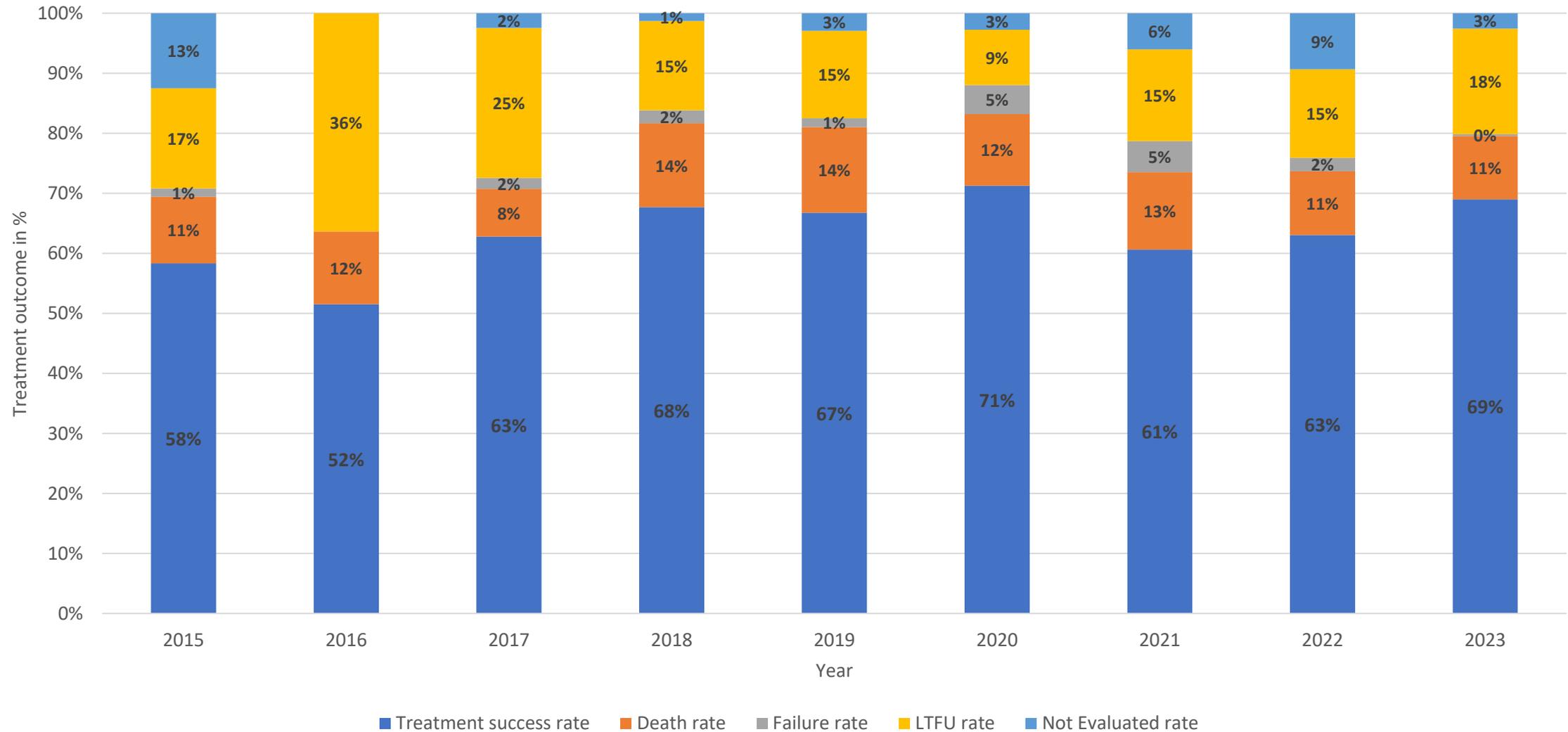
Drug resistant TB in PNG

# PNG- Estimates of MDR-TB among TB

- Among new TB cases: **4%**
- Among previously treated TB cases: **23%**
- Estimates of MDR/RR-TB Incidence: 24/100,000 population
- Estimated new MDR-TB cases for 2021 was 2,400 of which **only 535 (22%)** were detected.
- Estimated MDR/RR-TB treatment coverage in 2021 is 22%: The global average is 36% coverage

# DR-TB Treatment outcome rates

Treatment outcome of RR/MDR-TB



# Treatment outcomes for children with DRTB in PMGH

DRTB	2016	2017	2018	2019	2020	2021	2022	1H23	TOTAL
DRTB cases	13	19	33	21	39	29	35	14	214*
Treatment completed	9 (69%)	15 (78%)	25 (76%)	21 (100%)	27 (70%)	22 (75%)	30 (86%)		
Died	2 (15%)	3 (16%)	6 (18%)	0	6 (15%)	7 (24%)	5 (12%)		

\*Total = 214 cases since 2014 and 2015 (data not shown for those years)

# Current Regimens for DRTB in PNG

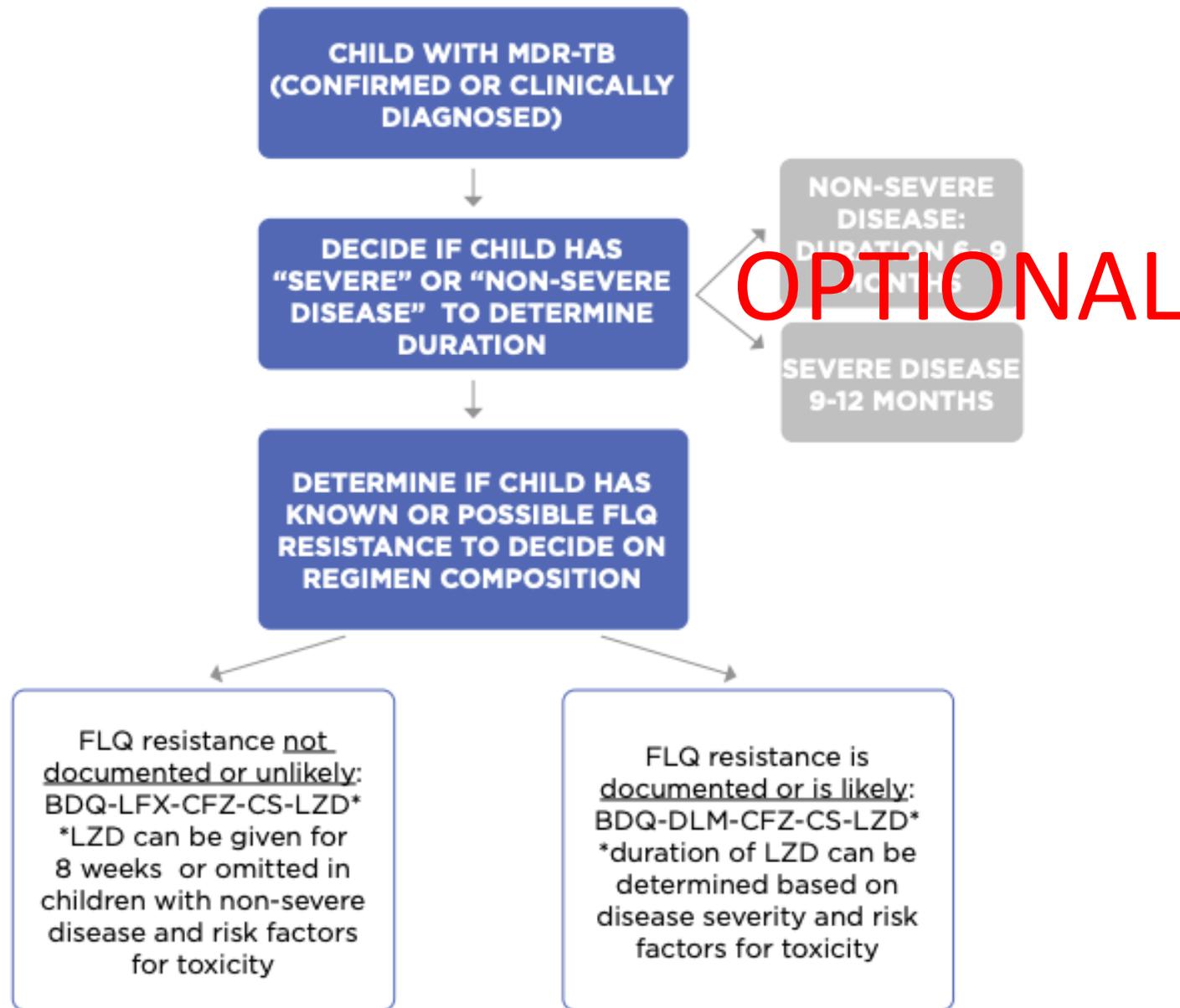
Pediatric regimens:

- (i) 6 BDQ-Lfx-Lzd-Cfz/12 Lfx-Lzd-Cfz (longer all-oral regimen)
  
- (ii) Adults: will introduce BPaL next year

**PNG SUPPLEMENT****Drug-resistant tuberculosis diagnosis since Xpert<sup>®</sup> MTB/RIF introduction in Papua New Guinea, 2012–2017**E. K. Lavu,<sup>1</sup> K. Johnson,<sup>1,2</sup> J. Banamu,<sup>1</sup> S. Pandey,<sup>3</sup> R. Carter,<sup>3</sup> C. Coulter,<sup>3</sup> P. Aia,<sup>4</sup> S. S. Majumdar,<sup>5</sup> B. J.**Table 2** Genotypic susceptibility of *Mycobacterium tuberculosis* strains in NCD, Daru, and other PNG provinces

WHO Group	Anti-TB drug	% NCD strains susceptible (n = 66)	% Daru strains susceptible (n = 100)
Group A	Levofloxacin OR moxifloxacin	95	88
	Bedaquiline	98	100
	Linezolid	100	100
Group B	Clofazimine	98	100
	Cycloserine OR terizidone	100	100
Group C	Ethambutol	52*	44*
	Delamanid	100	100
	Pyrazinamide	61*	43*
	Imipenem-cilastatin OR meropenem, with clavulanic acid	Unknown	
	Amikacin	98	98
	Streptomycin	36	12
	Ethionamide OR prothionamide	38*	14*
	Para-aminosalicylic acid	98	100
–	High dose Isoniazid	27*	33*

# Practical guidance



Management of Multidrug-Resistant Tuberculosis in Children:  
**A FIELD GUIDE**

Fifth Edition, March 2022

Slides courtesy of Steve Graham and Ben Marais

# Snapshot of DR-TB children at PMGH

- 2014-2023 = 214 DRTB case (started on treatment)
- Confirmed bacteriologically (X-pert) = 160/214 (75%)
- Cultures sent = 128/214 (60%)
  - Culture positive 40/128 (30%)
  - Only 31/128 (24%) with DST results
- MDR contact identified overall = 70/214 (32%)
- Previously treated for TB = 93/214 (43%)
- No prior TB treatment history = 121/214 (56%)
  - 51/121 (42%) - Had an MDR contact
  - 70/121 (58%) - No MDR contact, No prior treatment history
    - 66/70 (95%) were X-pert confirmed RR
- HIV positive = 8/200 (4%)
- MAM/SAM = 39/168 (23%)



Preventive therapy for child MDR contacts

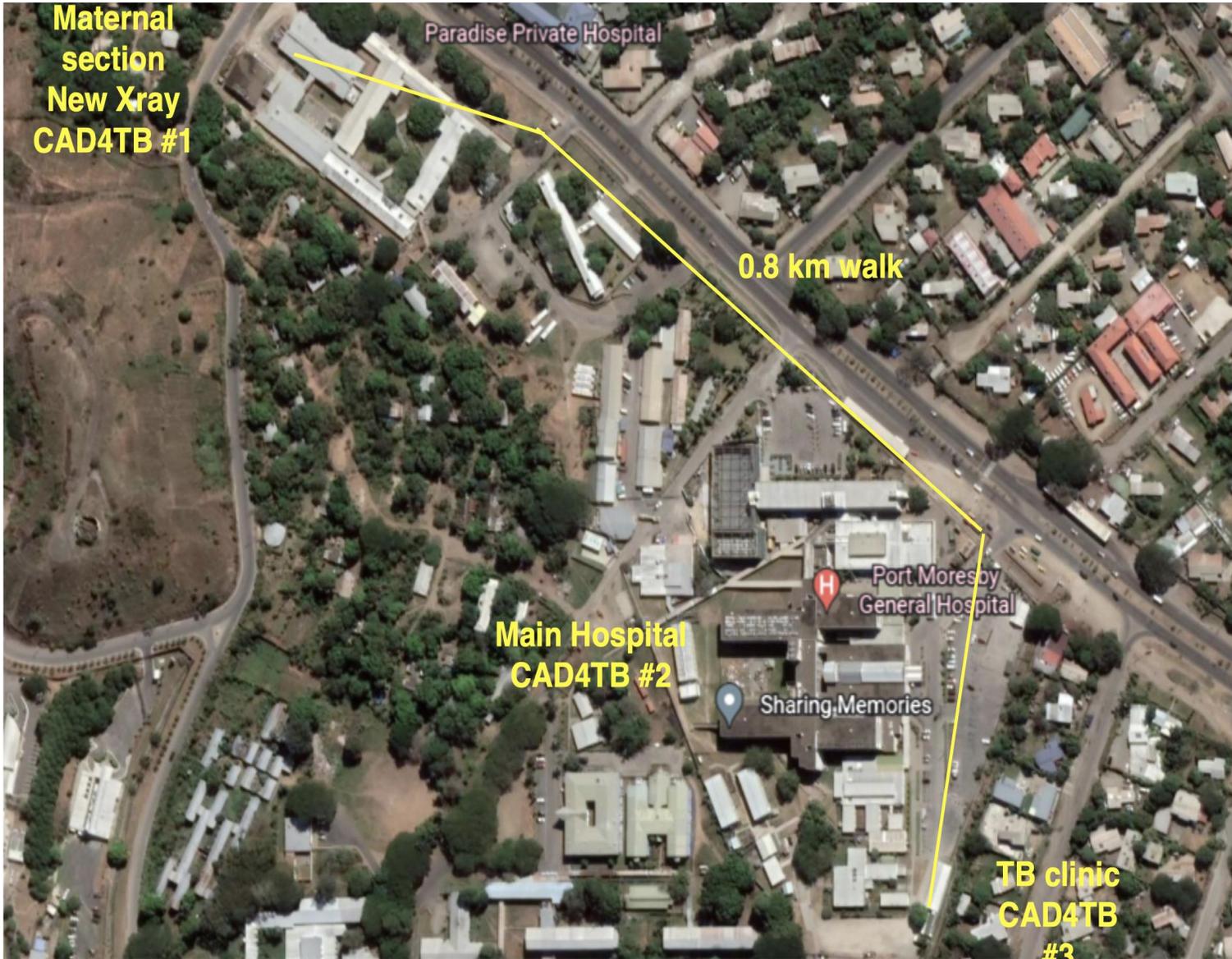
**Stop TB**  
**Partnership**



## TB Reach Grant “TB Free PNG”

- Maternal Newborn Child Health (MNCH) TB Program
- Family-centered TB detection and linkage to care for peri-natal women

# Introduction of radiology access to Maternity unit



20,000-30,000 screening  
CXR/year for TB at PMGH

AI software

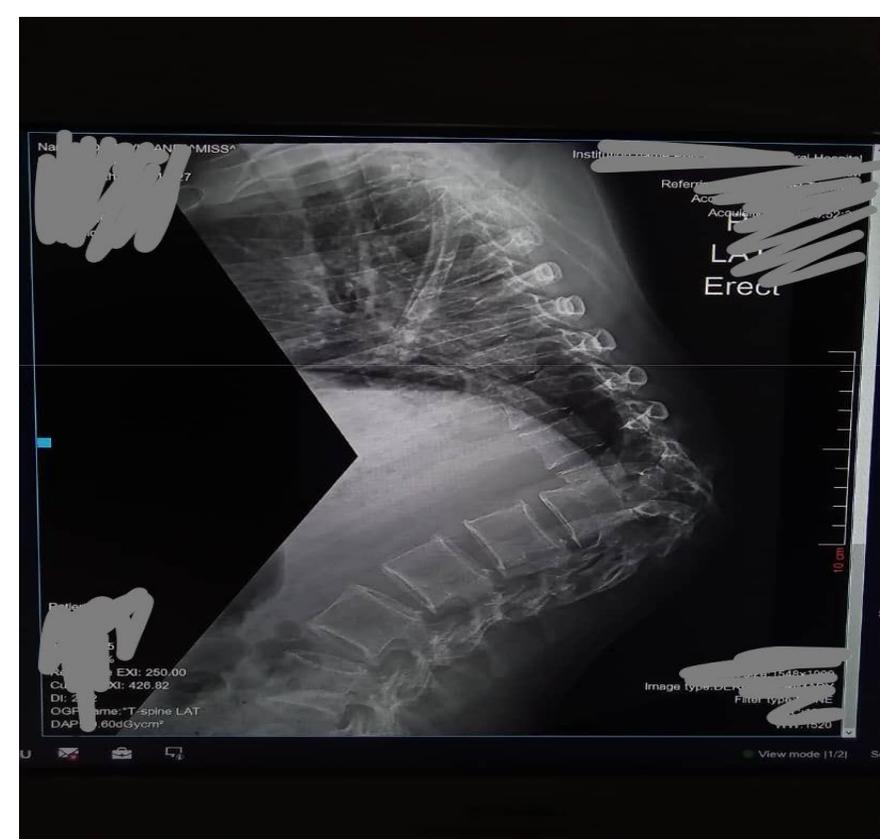
1. MinXray at maternity
2. Main hospital
3. TBC (containerized xray)





# TB Free PNG

- Scale up TB screening and diagnosis of pregnant and post-partum mothers
  - 77 moms with DSTB diagnosed, (1 MDR)
    - over last 4 months
  - Screen family members at home
  - Connection to community treatment supporters (NTP/WVI)
  - Introduction of CAD/AI software to PMGH (including pregnant women) expected 4Q23



TB Potts diagnosed in pregnant woman

# Acknowledgements

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- The Port Moresby General Hospital (PMGH)



Tenk yu tru!