



# **Treatment-decision algorithm of child TB: evaluation of WHO algorithm and development of Indonesia algorithm**

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*Child TB working group meeting  
Bali, 11 November 2024*

# INDONESIA



## Population

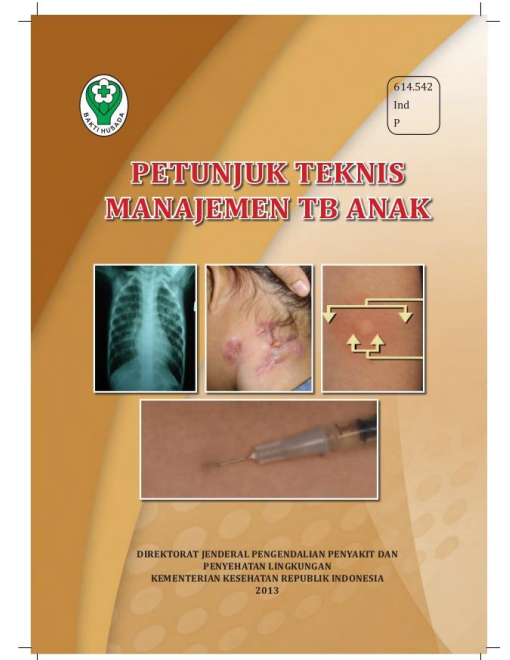
- Total: 284,115,494
- Children aged < 15 yrs: 25%

## Geography

- 5 million Km<sup>2</sup>
  - East to West: 3,200 miles (5,100 km)
  - North to South :1,100 miles (1,800 km)
- **17,800** islands (>7,000 are uninhabited)
- Varies in:
  - Resources
  - Geographic condition
  - Culture
  - Social-economy

# Introduction of Indonesia scoring system for child TB in 2006

Parameter	0	1	2	3
Contact with TB patient	Unknown	-	Smear negative OR smear unknown OR based on history	<b>Smear positive</b>
TST	Negative	-	-	<b>Positive</b>
Nutritional status	Good	W/H < 90%, or W/A < 80%	W/H < 70%, or W/A < 60%	-
Fever	No	≥ 2 weeks	-	-
Cough	< 3 weeks	≥ 3 weeks	-	-
Lymph node enlargement	None	multiple, ≥ 1 cm, painless	-	-
Bone, joint	Normal	Swollen	-	-
Chest X-ray	Normal	Suggestive of TB	-	-



- Based on literature review and expert opinion/consensus
- Total score > 6 → TB disease

# Indonesia scoring system for child TB (2006)

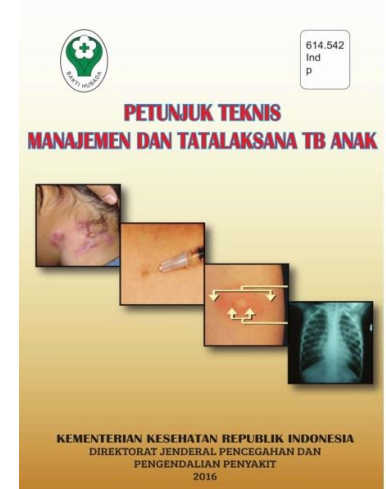
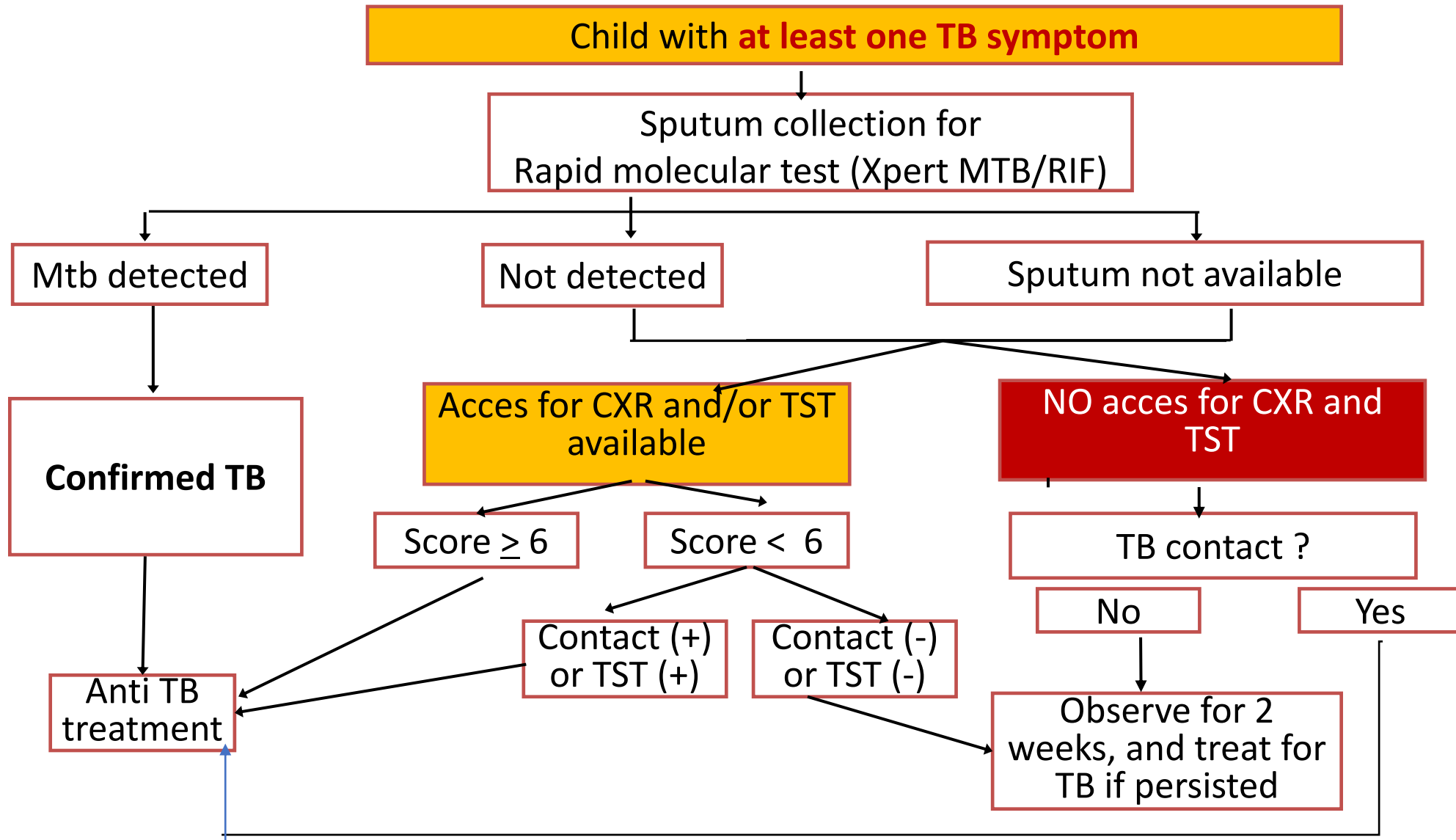
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## Limitation:

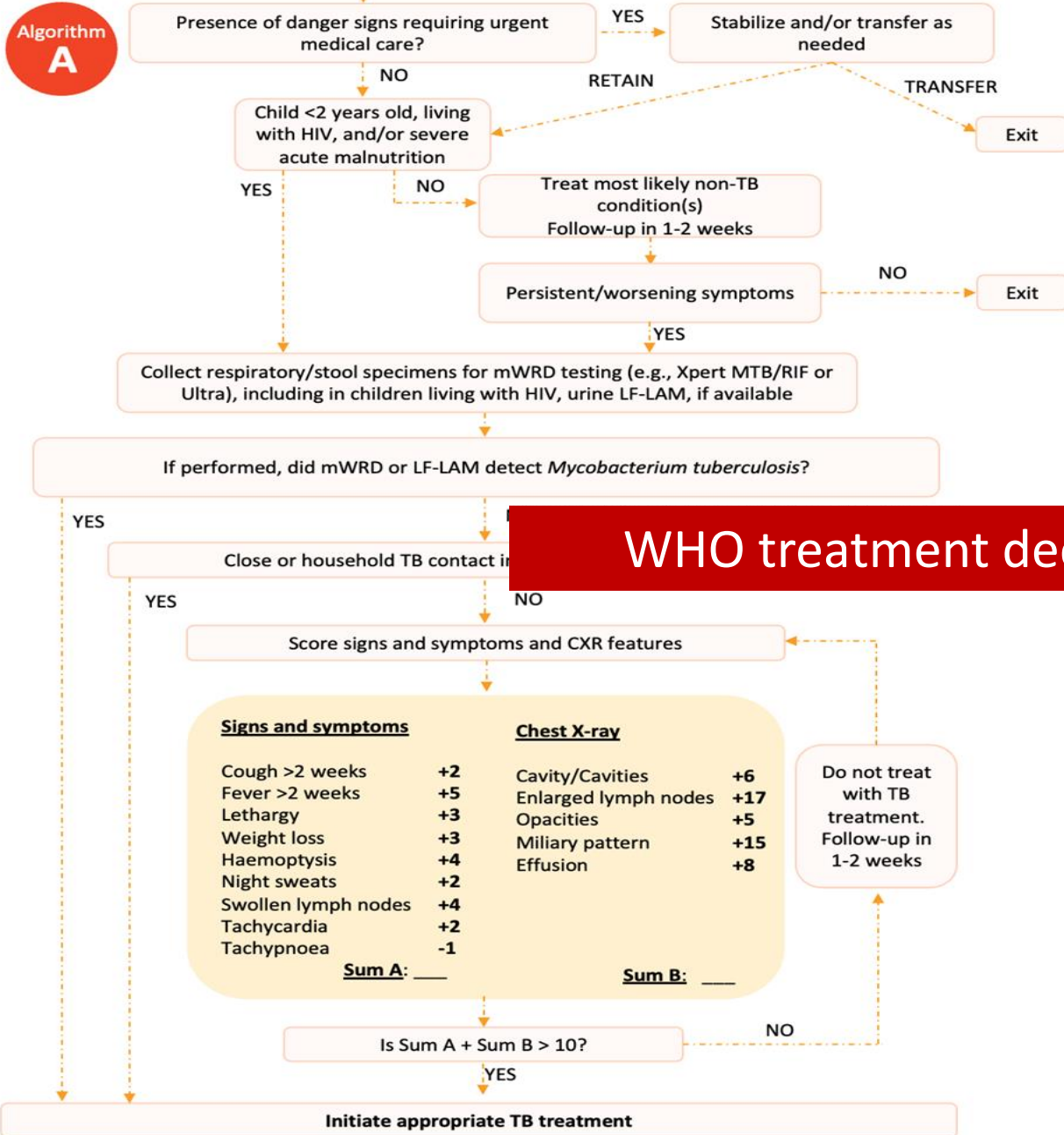
- **asymptomatic** children with close contact (3) & positive TST (3) → score = 6 → TB disease
- TST and CXR are **not available** in most primary health centre

# Diagnosis algorithm for child TB – Indonesia (2016)

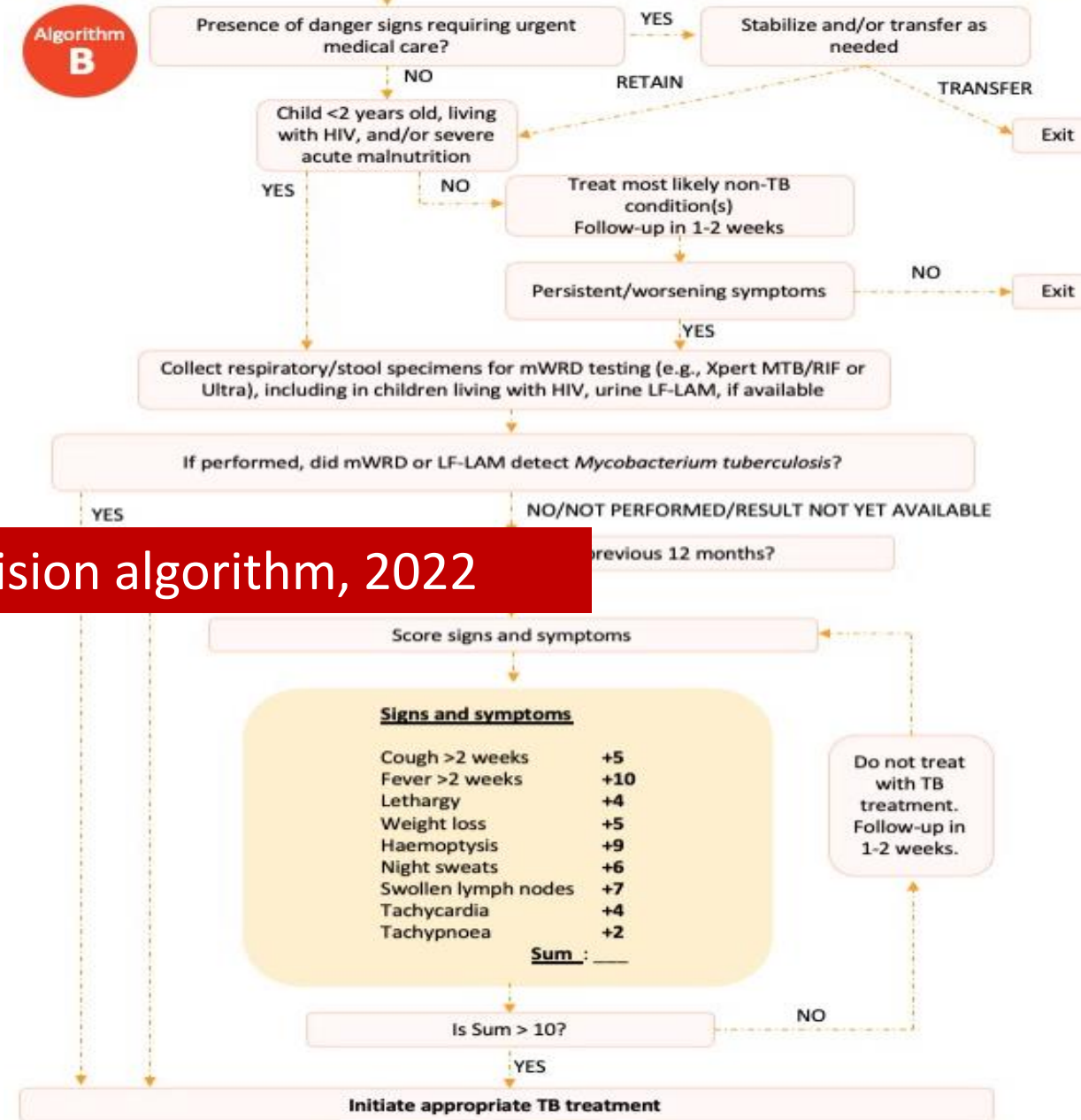




### Child <10 years with symptoms suggestive of pulmonary TB



### Child <10 years with symptoms suggestive of pulmonary TB



WHO treatment decision algorithm, 2022

# Objectives

1. To evaluate the WHO 2022 treatment decision algorithm and the Indonesia algorithm (2016)
  - ✓ **compare the number & proportion** of patients who were decided to have TB: using the WHO 2022 treatment decision algorithm vs using the Indonesia algorithm (2016) vs doctor's decision
  - ✓ To evaluate **the agreement** between the WHO 2022 treatment decision algorithm, the Indonesia algorithm (2016) and doctor's decision
2. To develop new algorithm for child TB in Indonesia

# Methods

**Study design** : Retrospective study

**Time** : Feb – June 2023

## Setting:

- Indonesia; 5 provinces (West Sumatra, West Java, Yogyakarta, East Java, and West Nusa Tenggara)
- Eight district hospitals and two province hospitals






# Methods

## Subjects:


- Children aged < 10 years
- No comorbid condition, except HIV
- Suspected or diagnosed as pulmonary TB by attending doctors from January to December 2022:
  - Z03.0 (observation of suspected tuberculosis)
  - A15 (respiratory tuberculosis, bacteriologically and histologically confirmed)
  - A16 (respiratory tuberculosis not confirmed bacteriologically, molecularly or histologically)
  - A19 (miliary tuberculosis)

# Methods


Children aged < 10 years who were evaluated for pulmonary TB by attending doctors in the site hospitals  
Jan – Dec 2022



Retrospective data collection from medical records: symptoms, signs, history of contact, TST, CXR, Xpert MTB/RIF, final diagnosis



A panel expert (consist of 3 pediatricians) made the final diagnosis using the WHO algorithm and the Indonesia algorithm



Compare the number, proportion and agreement of TB disease: WHO algorithm vs Indonesia algorithm vs attending doctor diagnosis

# Cohen's Kappa to evaluate the agreement

- 0 = no agreement
- 0.10–0.20 = slight
- 0.21–0.40 = fair
- 0.41–0.60 = moderate
- 0.61–0.80 = substantial
- 0.81–0.99 = near perfect
- 1 = perfect

# Results

Characteristics of participants		N = 523 (%)	
Age: median (range), years	4.1 (0.08 - 10.0)		
Age < 5 years	313 (59.8)	TB work-up performed	
Male	274 (52.4)		N = 523 (%)
Known HIV-positive*	7	Tuberculin skin test	435 (83.2)
Initial symptom		IGRA	3 (0.6)
Cough	382/466 (82.0)	Chest Xray	451 (88.2)
Fever	237/420 (56.3)	Smear microscopy	66 (12.6)
Poor weight gain/weight loss	239/364 (65.7)	Xpert/MTB/RIF assay	202 (38.6)
Contact with TB patient	101 (19.3)		

# Diagnosis of TB among participants (n=523)

Bacteriologically confirmed TB	13
▪ Attending doctors	371 (70.9%)
▪ Expert panel – WHO algorithm	295 (56.4%)
▪ Expert panel – 2016 Indonesia guideline	246 (47%)



		Dx - WHO algorithm		Total
		TB	Not TB	
Dx attending doctors	TB	242	129	371
	Not TB	53	99	152
Total		295	228	523

Cohen's Kappa 0.27 (Fair)

		Dx - Indonesia algorithm, 2016		Total
		TB	Not TB	
Dx attending doctors	TB	230	141	371
	Not TB	16	136	152
Total		246	277	523

Cohen's Kappa 0.45 (Moderate)

		Dx - Indonesia algorithm, 2016		Total
		TB	Not TB	
Dx WHO algorithm	TB	188	107	295
	Not TB	58	170	228
Total		246	277	523

Cohen's Kappa 0.42 (Moderate)

# OVERDIAGNOSIS BY ATTENDING DOCTORS ?

- No gold/reference standard → LIMITATION OF THIS STUDY
- The doctors might apply the algorithm differently to the expert panel
- The doctors did not use the Indonesia algorithm
- The doctors have had information that influenced the diagnosis but wasn't available or extracted from the medical records

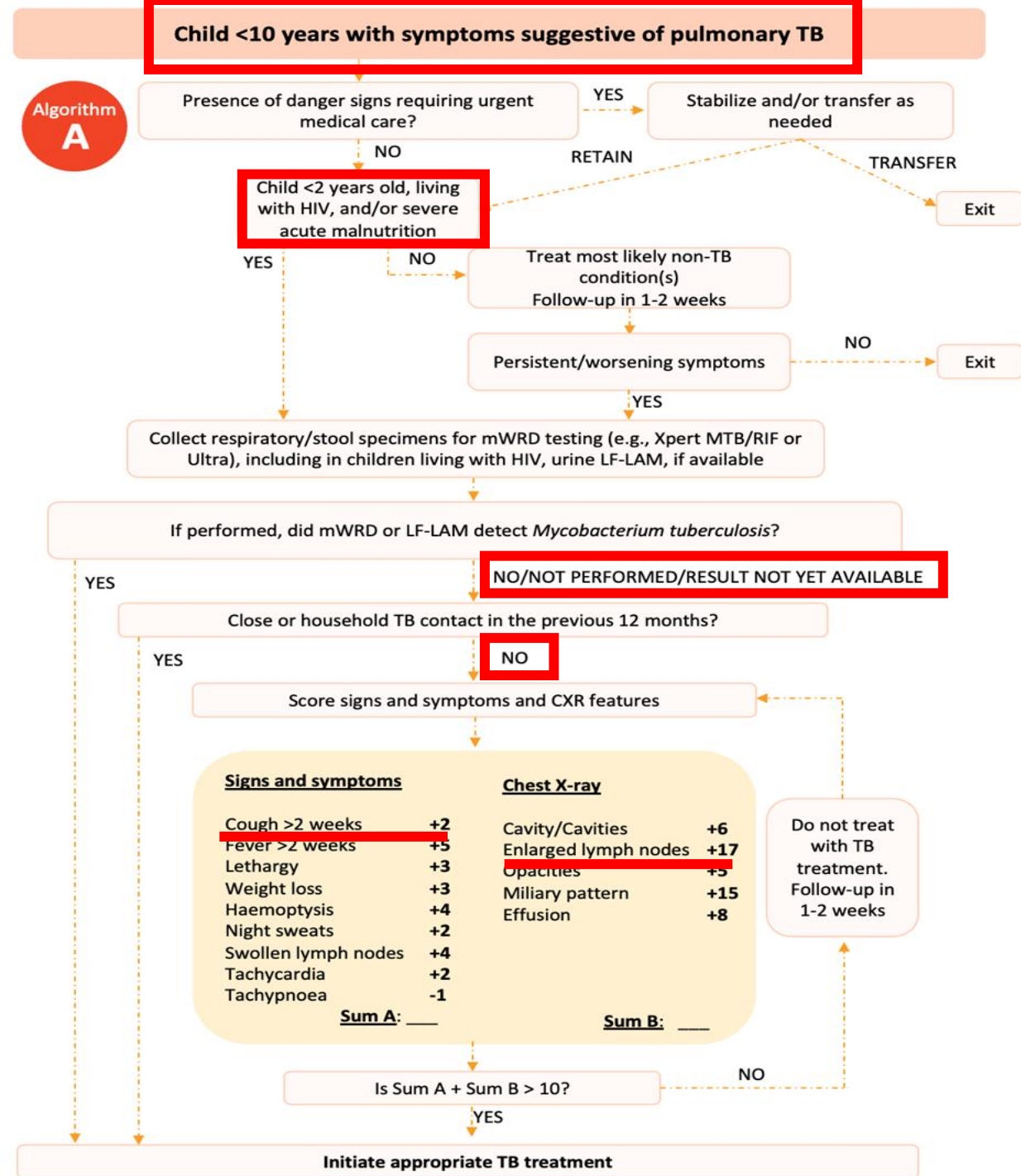
# POSSIBILITY OF OVERDIAGNOSIS FROM THE WHO ALGORITHM

- 18 months old boy with **chronic cough**
- **No danger signs**
- Sputum could not be collected
- **No history of contact** with TB patient
- CXR was interpreted as **enlarged hilar Inn**

Total Score= 19

- Cough = +2

- enlarged Inn = +17



# Chest X-ray in childhood TB: problems in the field



- Hilar lymph nodes enlargement is the most common radiological finding in the CXR of children with TB
- Inter and intra-observer agreement in interpreting hilar lymph node enlargement on the CXR was poor to moderate.
- Du Toit G, et al. Int J Tuberc Lung Dis 2002; 6: 814–817.
- Balabanova Y et al.. BMJ 2005; 331: 379–382.
- Zellweger J P et al.. Int J Tuberc Lung Dis 2006; 10: 1123–1126.

## Diagnostic CXR Atlas for Tuberculosis in Children – image library

### CHEST X-RAY CATEGORIES

Unacceptable technical quality

Normal

Uncomplicated lymph node disease

Cavitary disease

Complicated lymph node disease

Consolidation

Miliary TB

Pleural effusions

Welcome to the Diagnostic CXR Atlas for Tuberculosis in Children Image Library!

This online library has been developed to provide additional training material and support health professionals, trainers and educators to build capacity and confidence among those who interpret chest X-rays (CXR) from children presenting to healthcare services in high-tuberculosis (TB) burden countries with presumed TB.



# ATLAS RADIOGRAFI TORAKS UNTUK DIAGNOSIS TUBERKULOSIS PADA ANAK

Sebuah panduan untuk interpretasi radiografi toraks

Edisi Kedua  
2022

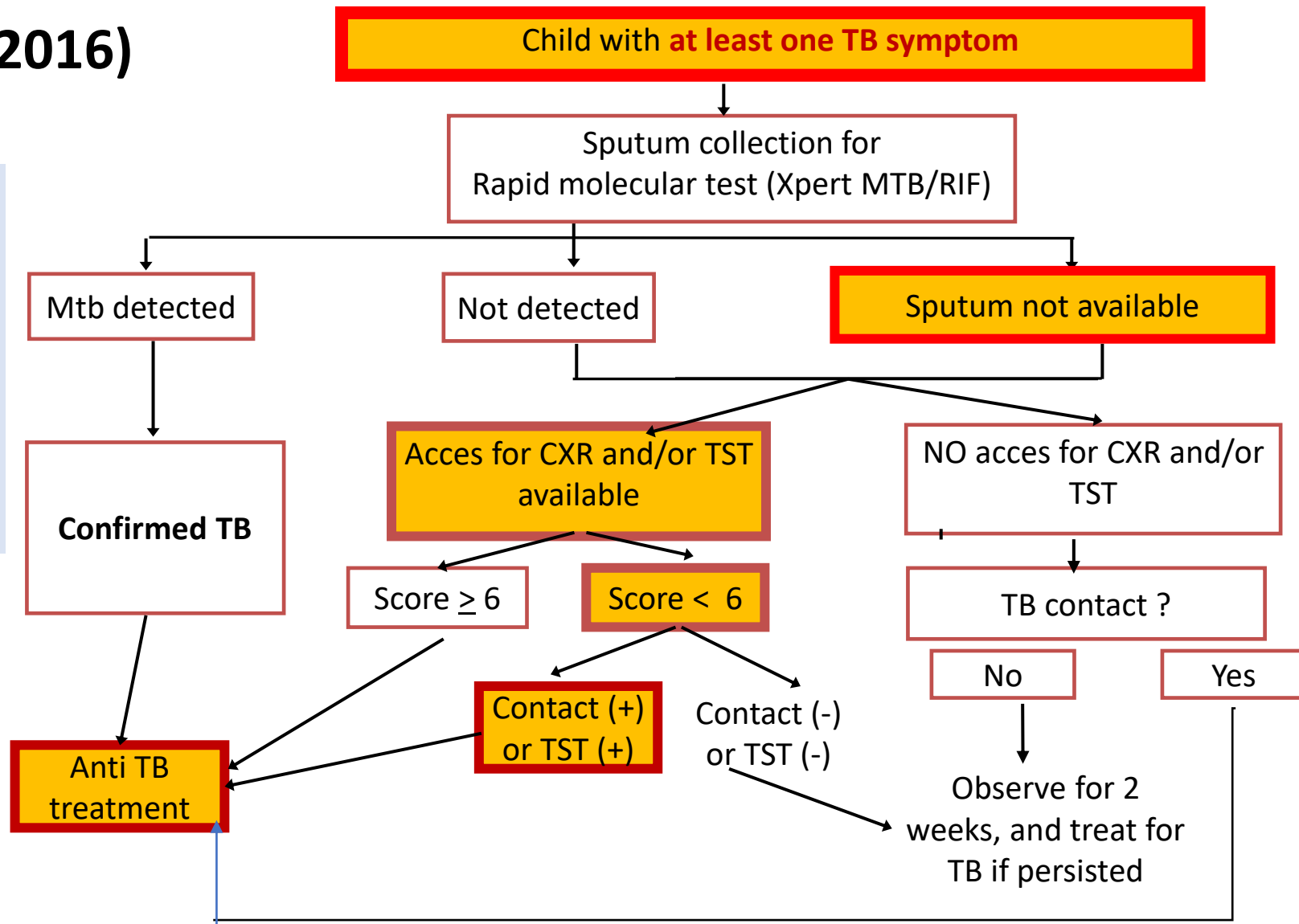
Has been translated to Bahasa Indonesia 😊



# POSSIBILITY OF OVERDIAGNOSIS FROM THE INDONESIA ALGORITHM (2016)

- 18 months old boy with **chronic cough**
- No danger signs
- Sputum could not be collected
- **No history of contact** with TB patient
- **Positive TST**
- **Normal CXR**

Total Score= 4  
 - Cough: +1  
 - Positive TST: +3  
 - Normal CXR: 0  
 → TB treatment

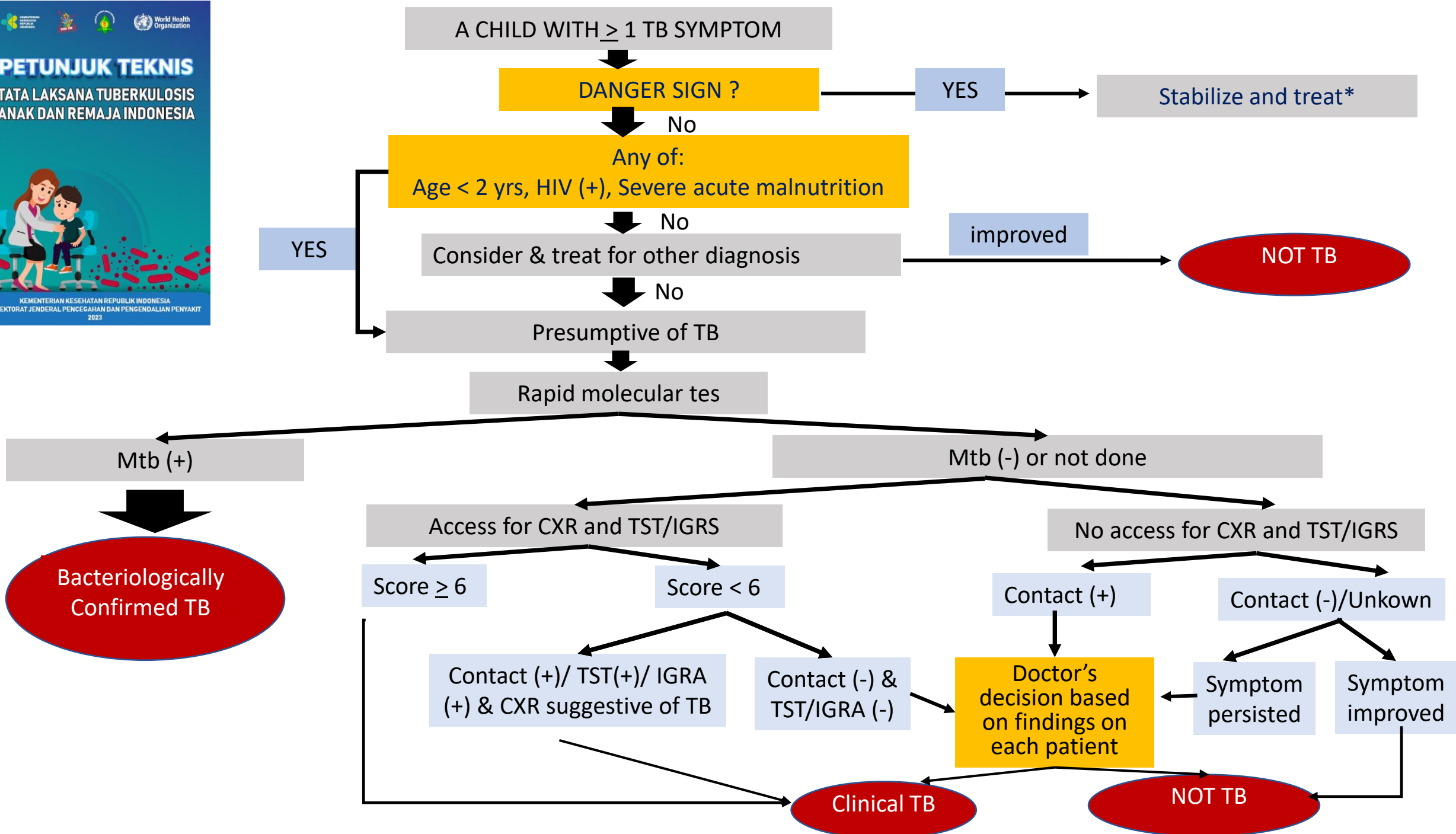




**PETUNJUK TEKNIS**  
**TATA LAKSANA TUBERKULOSIS**  
**ANAK DAN REMAJA INDONESIA**



KEMENTERIAN KESEHATAN REPUBLIK INDONESIA  
 DIREKTORAT JENDERAL PENCEGAHAN DAN PENGENDALIAN PENYAKIT  
 2023



## **Limitation of the study**

- No microbiology tests as reference standard
- Retrospective design
- No validation study for the Indonesia scoring system

The diverse characteristics of each patient and varying access to diagnostic tools require clinicians to make a clinical decision based on each patient's findings

# Acknowledgement

- Indonesian Pediatric Society
- NTP Indonesia
- WHO Indonesia

