Experiences of implementing WHO recommendations on TB diagnosis in children (TACTiC)

WHO-KNCV-MSF capacity building workshop

April 28-30, 2025

Almaty, Kazakhstan

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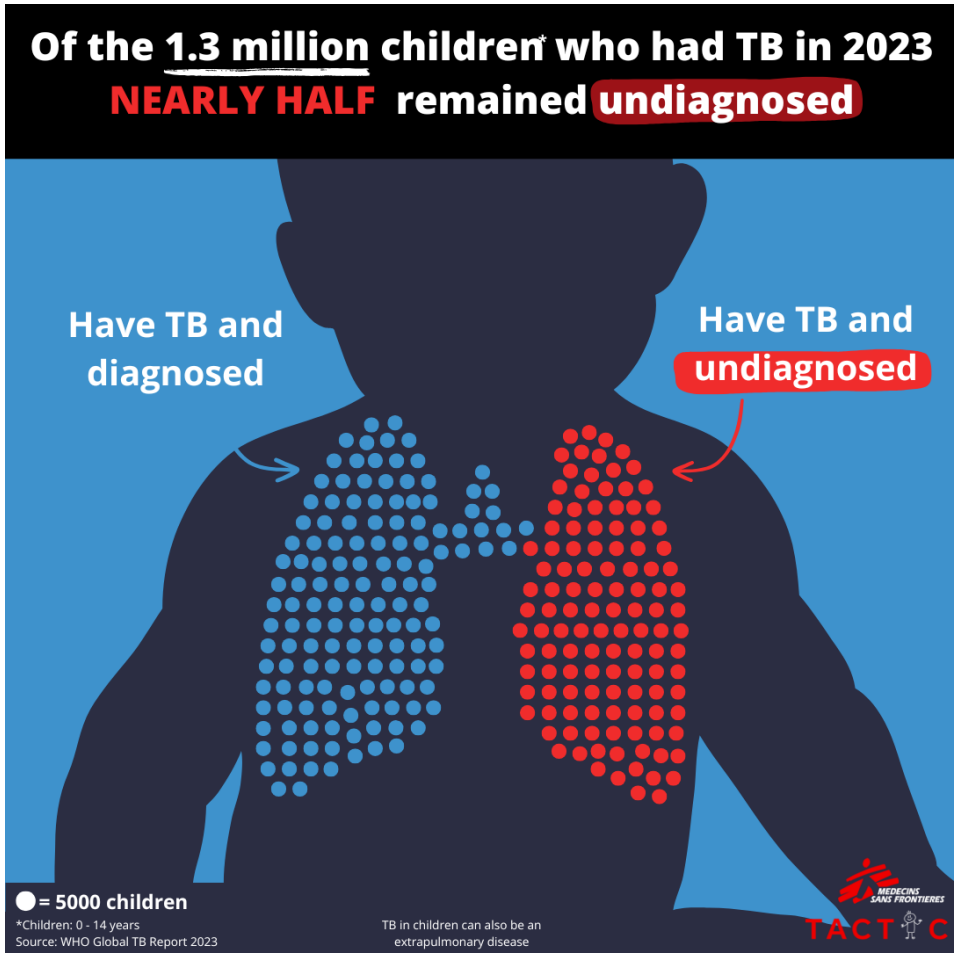
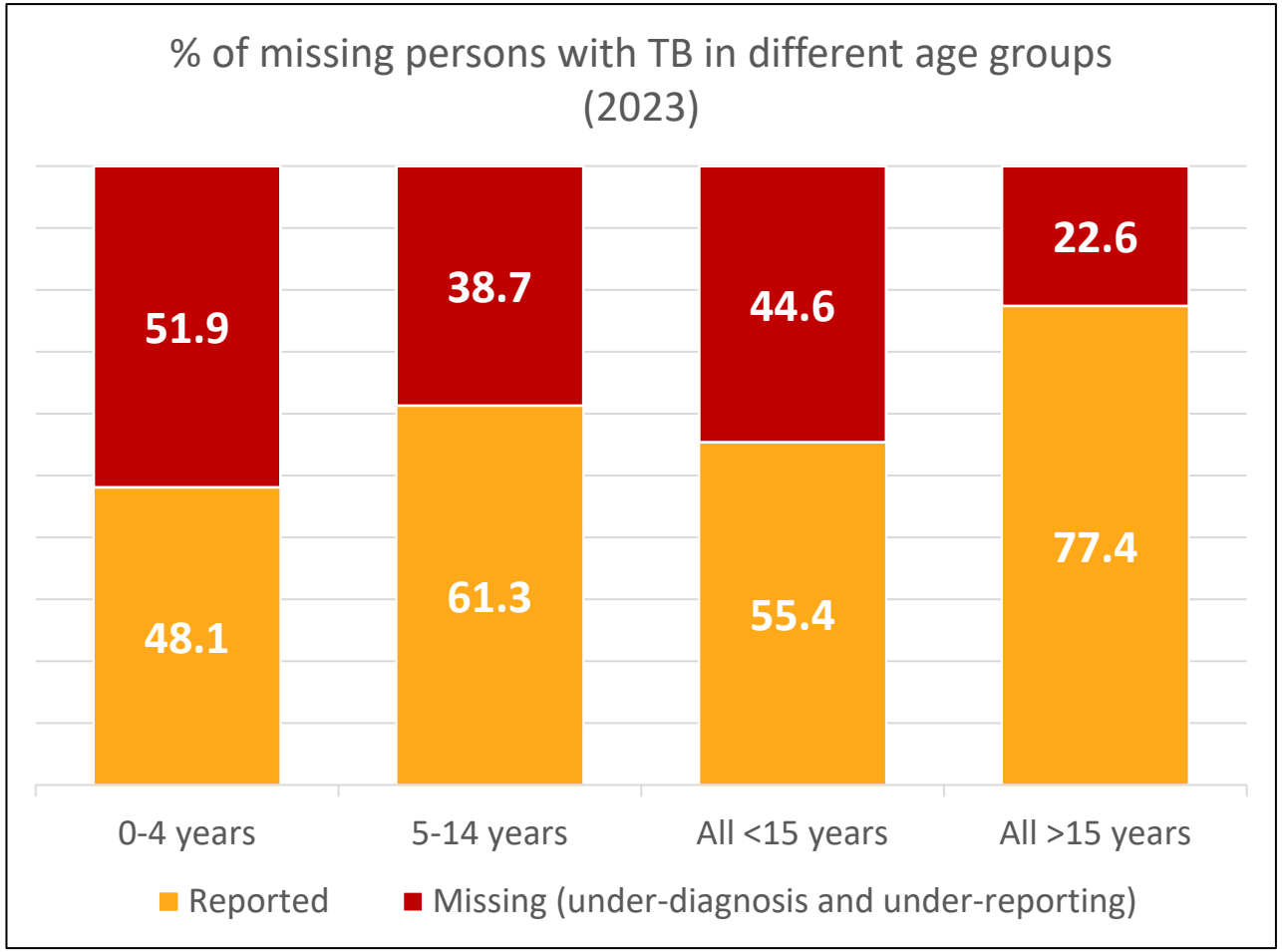
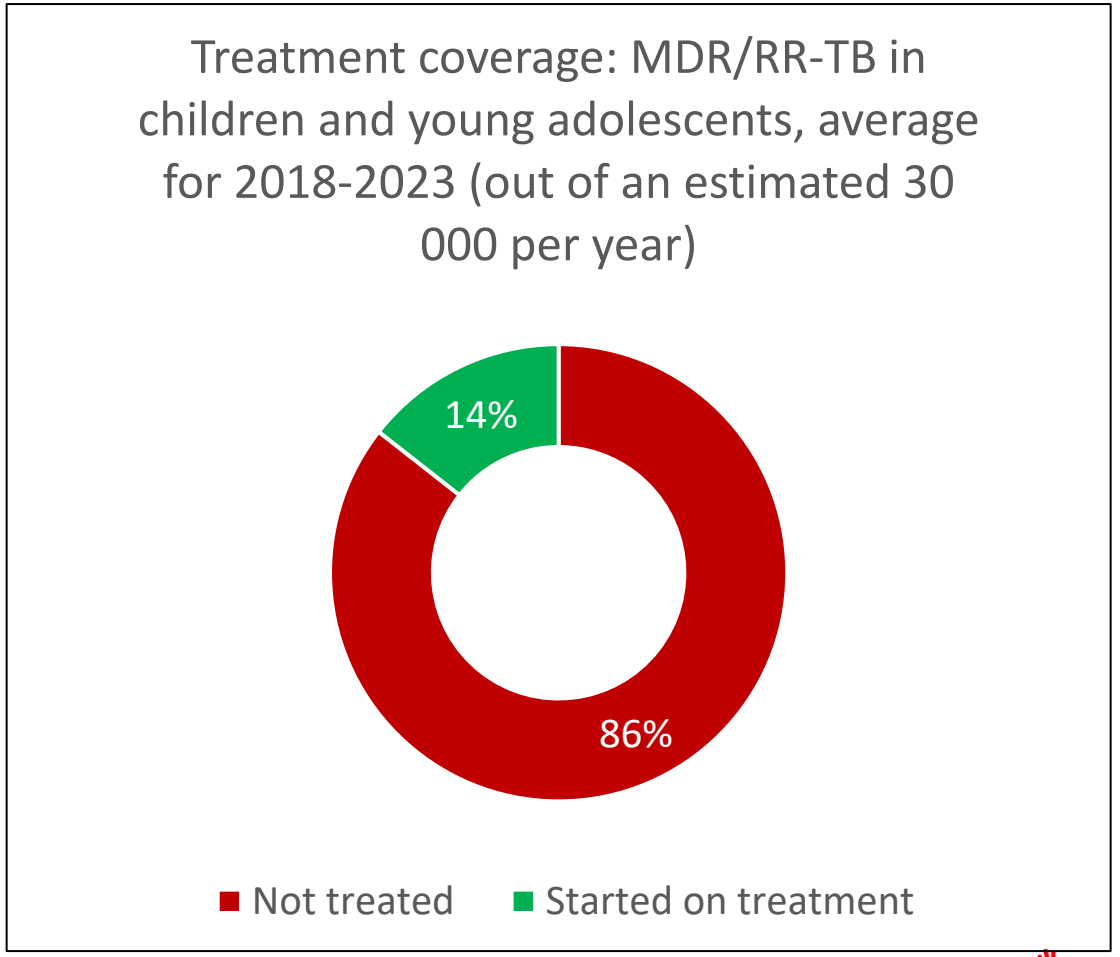


Tuberculosis in children: what is the problem?





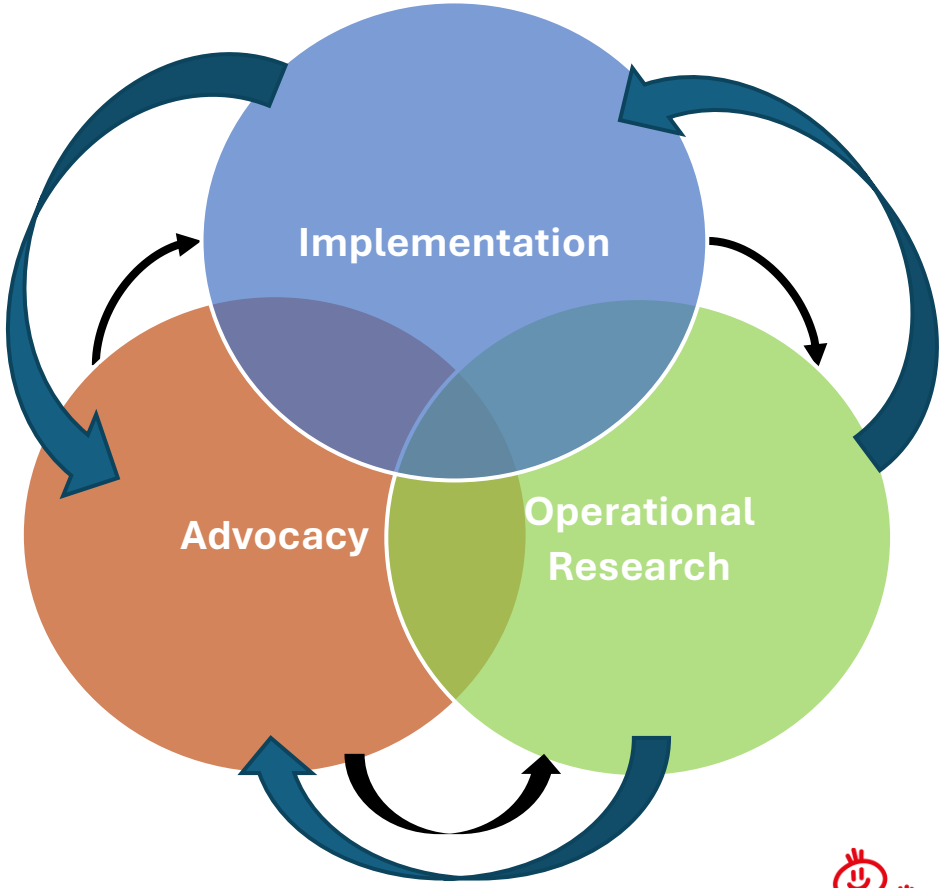
Images courtesy of the WHO Global Tuberculosis Programme: Kerri Viney, Sabine Verkuijl, Annemieke Brands and Tiziana Masini. Link to the WHO Global TB Report 2024: https://www.who.int/publications/i/item/9789240101531

WHO recommendations: a unique opportunity

More children diagnosed	Shorter treatments	Shorter prevention
Treatment decision algorithms with or without Xray Bacterial tests using stool samples Rapid treatment initiation	4 months treatment for non severe TB 6 to 9 month treatments for DR-TB	For household contacts: DS-TB: 3 months DR-TB: 6 months

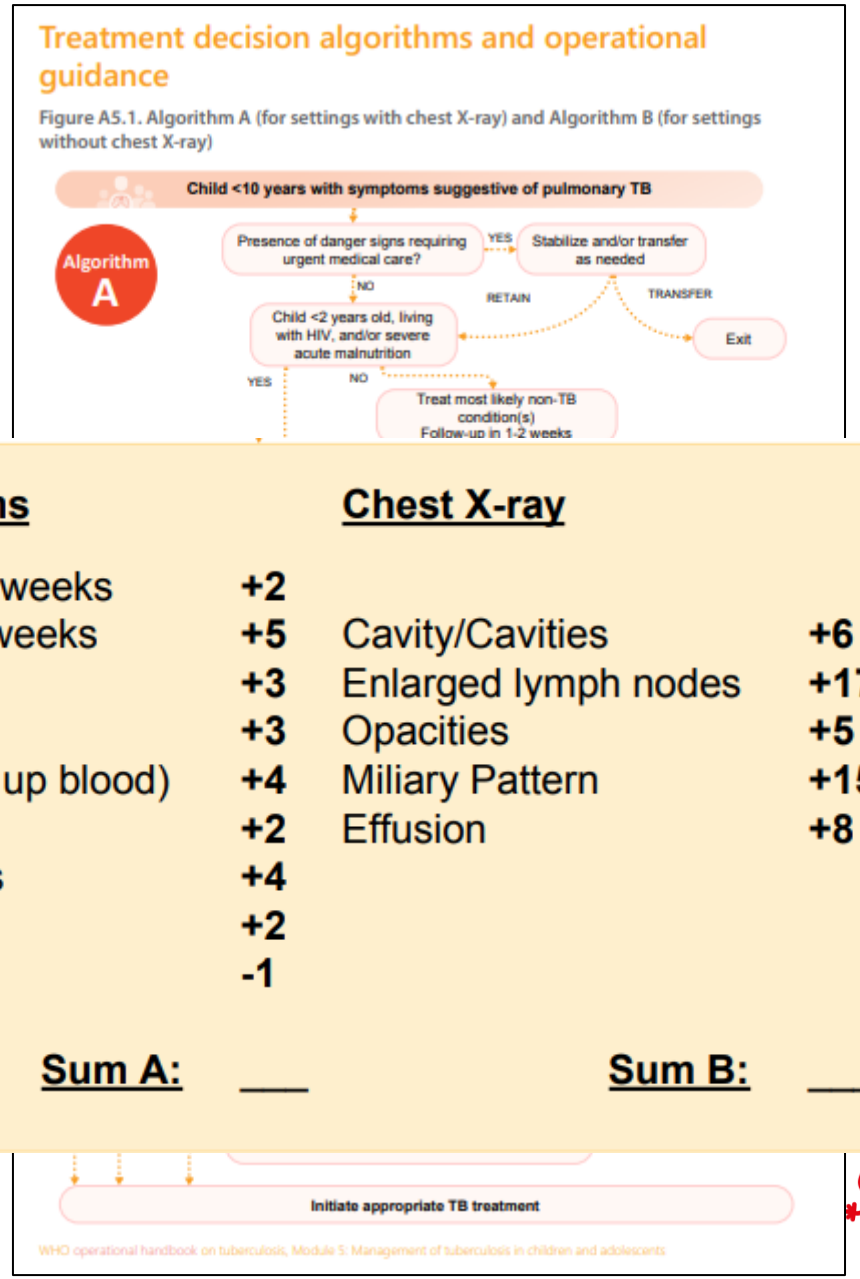
Our goal: reduce deaths from TB in children, by increasing the number of children put on treatment and prevention

- **Implementation** of WHO recommendations: temporary support to strengthen capacity, training, technical and material support.
- **Operational research** in 5 sites: Feasibility, acceptability and validation of recommendations
- **National and international advocacy**: for implementation of recommendations and for research and development of new tools adapted to children.



Treatment decision algorithms

- Identify children with high risk of rapid TB progression
  - If high risk: investigate for TB and
  - If not high risk: treat for non-TB conditions and review after 1-2 w
- TB investigations: GeneXpert, TB-LAM chest X-ray
- History of contact with TB
- Score based on signs/symptoms and X-ray (Algorithm A) or only signs/symptoms (Algorithm B)



Interim results TB ALGO PED study

- Diagnostic performance and feasibility of implementing two new treatment decision algorithms (TDAs) for pulmonary tuberculosis in children

A doctor examines a sick child at an MSF-supported facility in Maiduguri, Nigeria.
Photo: Abba Adamu Musa/MSF

TB ALGO PED study – Design, sites and population

Four components

- a. Analysis of routine program data
- b. Prospective diagnostic study
- c. Feasibility and acceptability study
- d. Documentation of the implementation experience

Population: children with symptoms of TB under 10 years of age

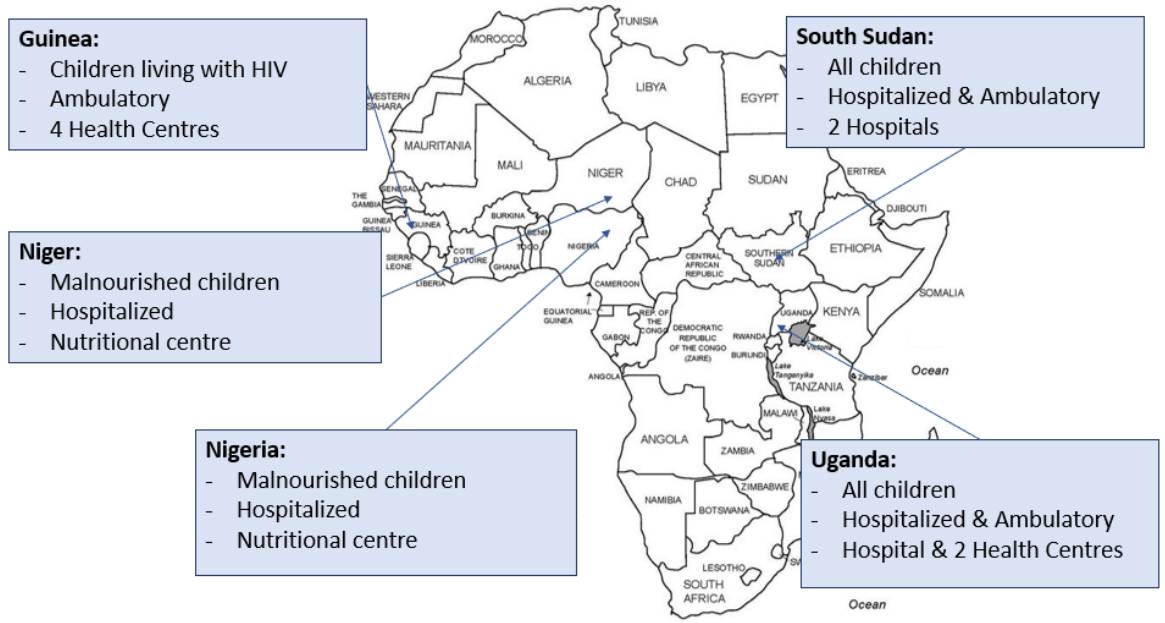
Guinea:
- Children living with HIV
- Ambulatory
- 4 Health Centres

Niger:
- Malnourished children
- Hospitalized
- Nutritional centre

Nigeria:
- Malnourished children
- Hospitalized
- Nutritional centre

South Sudan:
- All children
- Hospitalized & Ambulatory
- 2 Hospitals

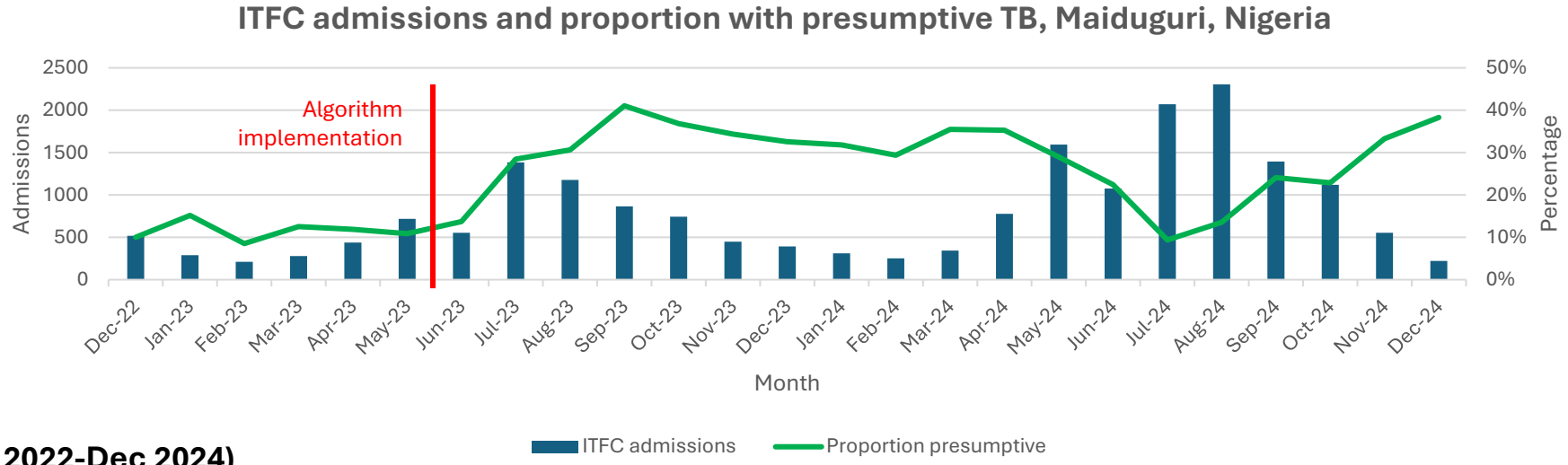
Uganda:
- All children
- Hospitalized & Ambulatory
- Hospital & 2 Health Centres



Cross-cutting lessons from the implementation of new treatment decision algorithms for pulmonary tuberculosis in children: results from the TB-ALGO-PED study

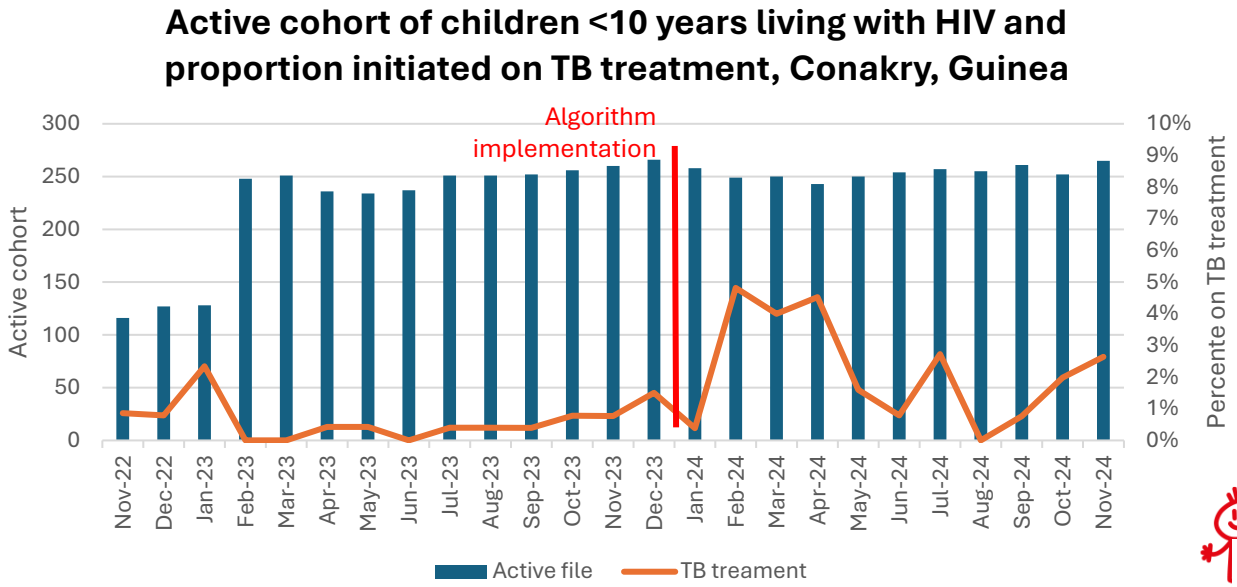
a. Analysis of routine data

- Increase in children diagnoses with TB and started on treatment <u>in all sites</u>



Children initiated on TB treatment (Dec 2022-Dec 2024)

	Before algorithm implementation % (95% CI)	After algorithm implementation % (95% CI)
Guinea	0.4 (0.3 – 0.7)	2.2 (1.7 – 2.8)
Niger	0.6 (0.4 – 0.8)	2.2 (1.8- 2.6)
Nigeria	2.9 (2.3 - 3.7)	3.4 (3.1 – 3.8)
South Sudan	1.8 (1.1 - 2.3)	4.8 (3.9 – 5.8)
Uganda	0.6 (0.2 - 1.6)	3.9 (2.6 – 5.7)



b. Prospective diagnostic study
Interim results – Characteristics of the population

	All children N=1613 n (%)	Guinea N=130 n (%)	Niger N=345 n (%)	Nigeria N=504 n (%)	South Sudan N=216 n (%)	Uganda N=418 n (%)
Female	741 (45.9)	70 (53.8)	157 (45.5)	211 (41.9)	108 (50.0)	195 (46.7)
Age, median years [IQR]	1.7 [0.8-3.0]	6 [3-8]	1.2 [0.8-1.9]	1.8 [0.9-3]	1.0 [0.6-1.5]	2 [0.9-5]
Hospitalized	1282 (79.5)	0	340 (98.6)	504 (100)	205 (94.9)	103 (24.6)
High risk of rapid TB disease progression	1400 (86.8)	130 (100)	341 (98.8)	498 (98.8)	211 (97.7)	220 (52.6)
- Severely malnourished	1162 (72.0)	21 (16.2)	342 (99.1)	499 (99.0)	206 (95.3)	94 (22.4)
- Age < 2 years	893 (55.4)	11 (8.5)	259 (75.1)	259 (51.4)	171 (79.2)	193 (46.2)
- Living with HIV	168 (10.4)	130 (100)	1 (0.3)	3 (0.6)	10 (4.6)	24 (5.7)

b. Prospective diagnostic study: Procedures

- Medical history & clinical exam
- GeneXpert MTB/RIF in stool, gastric aspirate, NPA, sputum, tongue swabs (depending on country)
- Determine TB-LAM in urine (results given to clinicians only for children living with HIV)
- FujiLAM in urine (3 countries, results not given to clinicians)
- Chest X-ray if available
- POCUS (South Sudan)
- MTB culture (Uganda)

MSF staff review the algorithm usage in a Health Center in Conakry, Guinée, 2024. Photo: Emily Briskin

b. Prospective diagnostic study: GeneXpert positivity rate among children tested

	Test done n	Positive result n	Positivity rate %
Any body sample	1337	37	2.8
Gastric aspirate	1022	28	2.7
Stool	1192	26	2.2
Nasopharyngeal aspirate	154	2	1.3
Tongue swabs	130	1	0.8
Sputum	50	0	0.0

b. Prospective diagnostic study:
Primary reason to start TB treatment following the algorithm cascade

	All children started on TB treatment N=430 n (%)	High risk of rapid TB progression N=401 n (%)	Not high risk of rapid TB progression N=29 n (%)	Nigeria N=109 n (%)	Guinée N=83 n (%)
Positive GeneXpert	29 (6.7)	28 (7.0)	1 (3.4)	14 (12.8)	1 (1.2)
Positive TB-LAM	24 (5.6)	24 (6.0)	-	0 (0.0)	21 (25.3)
TB contact	80 (18.6)	66 (16.5)	14 (48.3)	8 (7.3)	24 (28.9)
Algorithm score>10	297 (69.1)	283 (70.7)	14 (48.3)	87 (79.8)	34 (40.9)
- Algorithm score A	*109 (25.3)*	*105 (26.2)*	*4 (13.8)*	*31 (28.4)*	*23 (27.7)*
- Algorithm score B	*188 (43.7)*	*178 (44.4)*	*10 (34.5)*	*56 (51.4)*	*11 (13.3)*

Most of the children with positive Xpert (76%) or positive TB-LAM (63%) had also an algorithm symptom score >10

b. Prospective diagnostic study: **Diagnostic accuracy of the new treatment decision algorithms**

- *Interim results* (N=1354)
- Reference standard:
  - Confirmed and unconfirmed TB for sensitivity
  - Unlikely TB for specificity

Sensitivity % (95%CI)	Specificity % (95%CI)
91.3 (88.3-94.3)	87.6 (85.5-89.6)

- International Consensus Case Definitions for Intrathoracic TB in children (Graham et al. CID 2015)

c. Feasibility and Acceptability Study: Interim results

- Well accepted by health workers
- Important to repeat training and maintain integrated clinical practice.
- Helped overcome barriers associated with diagnosing TB
- However, barriers among caregivers persisted (stigma, misconceptions).

Healthcare facilities level:
- Chest X-ray and test **failures**
- Dependence on equipment in other healthcare facilities

- **Speeds up** treatment decision
- Gives more **autonomy** to health facilities
- **Workload** increased

Health workers level:
Lack of knowledge and difficulty to identify TB signs

- **Score** gives tangible evidence for decision making
- Increased feeling of **efficiency** and **autonomy**
- **Easy** for all staff to use
- Enhances **professional skills**

"You can save a life if we get those algorithms right"

Conclusions

- The treatment decision algorithms led to high proportion of children started on TB treatment, especially at their first assessment
- Algorithms' scores were very useful - score result was the main reason to start TB treatment
- History of TB contact was key - frequent reason to start TB treatment particularly among children who were not at high risk of rapid TB disease progression
- Diagnostic accuracy of the new WHO recommended algorithms was high
- Increase in presumptive TB detection and TB treatment after algorithms' implementation observed in all study sites
- Well accepted by health workers

Many thanks to our study participants, research team, and partners

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TB ALGO PED Study Web Page

TACTiC Policy report