

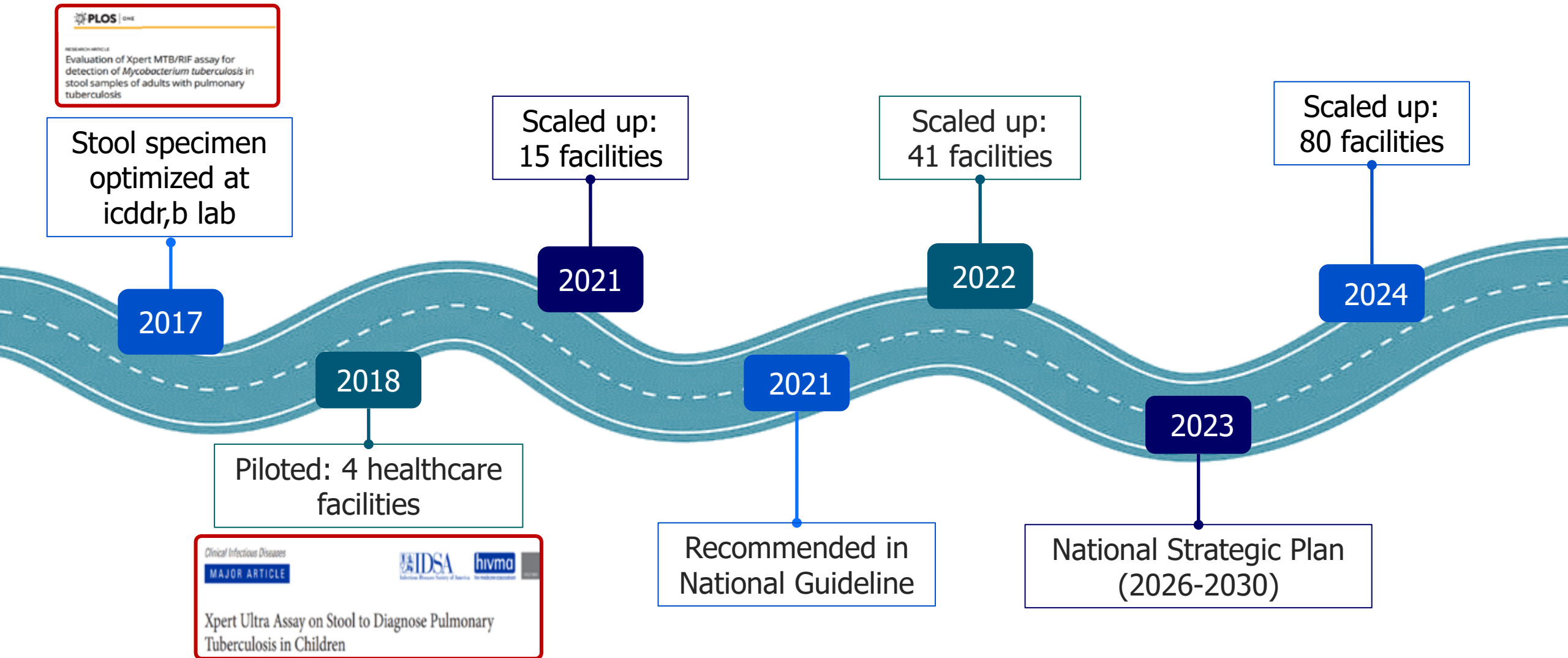
Pioneering Stool Testing in Bangladesh

Dr. S M Mazidur Rahman
Associate Scientist, icddr,b

16 January 2025

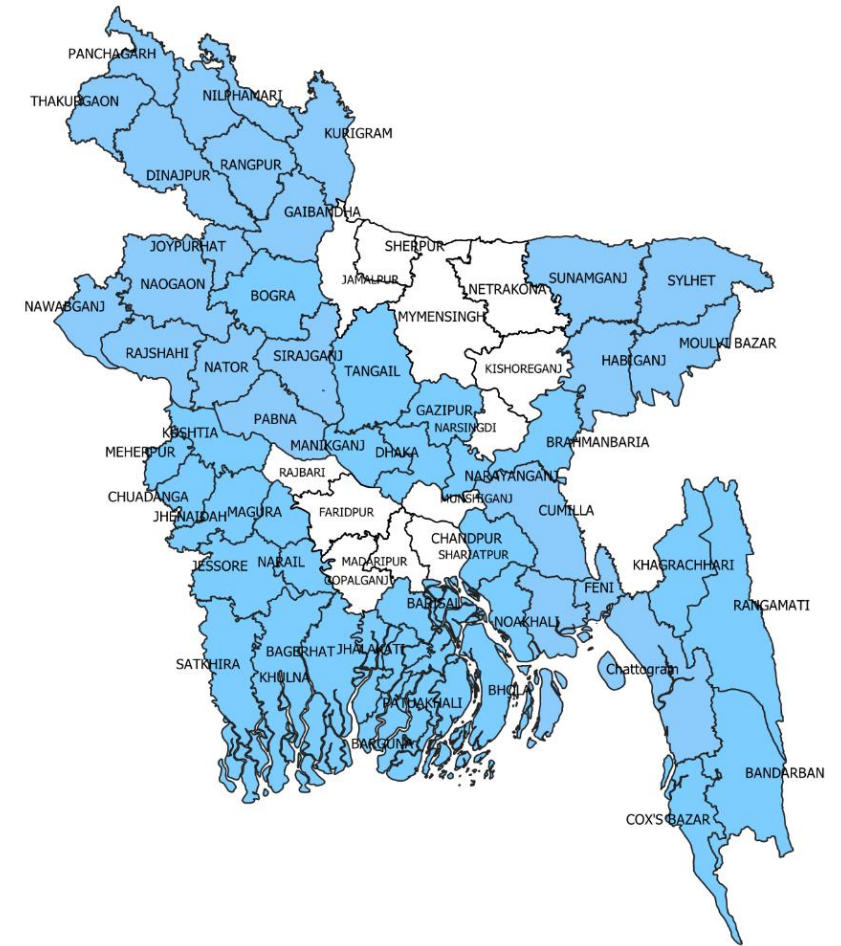


Journey of stool Xpert test in Bangladesh



Area coverage across the country

- **USAID's ACTB Activity since 2021**
- **Facility based Active Case Finding** approach for missing childhood TB detection
- **Coverage:**
 - **ACF done in 350 facilities**
 - **Stool testing in 80 facilities in 50 districts**



Training/Sensitization



Physicians sensitized on stool testing



Field staff trained on sample collection and transportation

Performance of stool testing: ACTB working sites

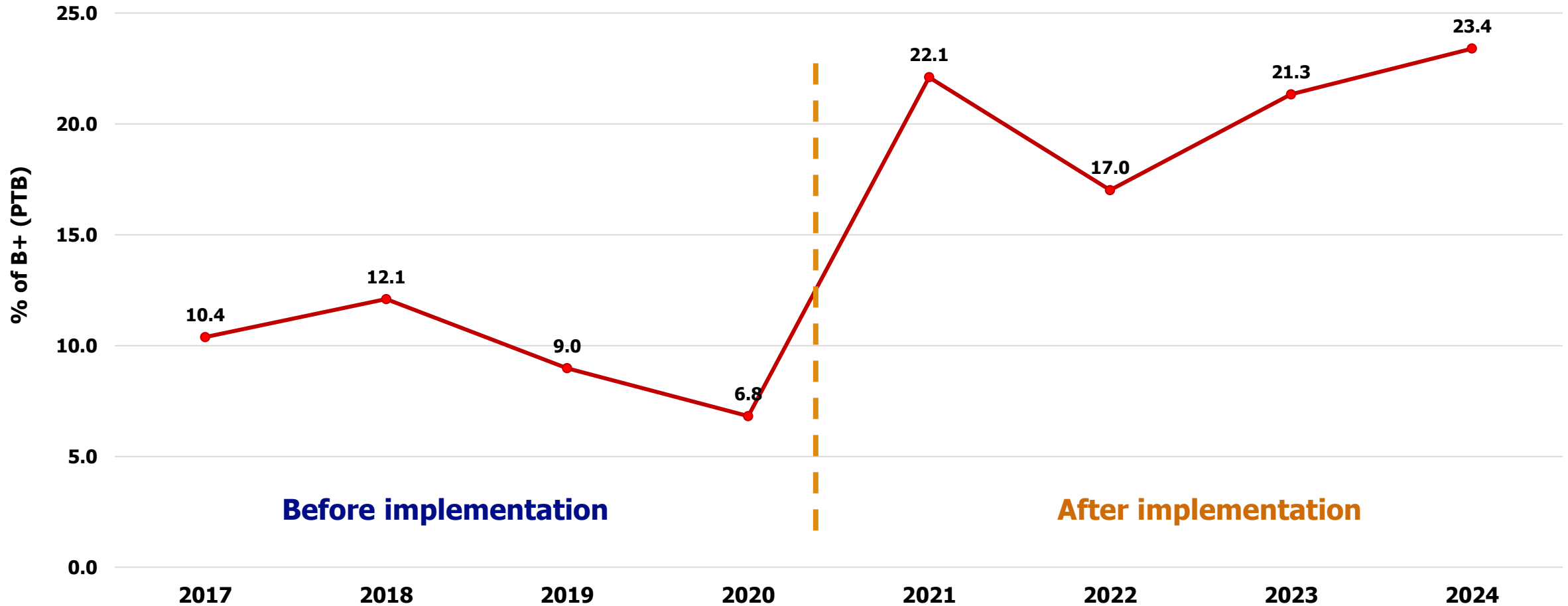
July, 2021 – December, 2024

	Stool tested, (n)	MTB detected, n (%)
Overall	33,333	1,356 (4.1)*
Age		
0-4 years	16,060 (48%)	609 (3.8)
5-14 years	17,273 (52%)	747 (4.3)
Non-determinate (initial)#		n (%)
Error		738 (2.2)
Invalid		413 (1.2)

*80% are 'Trace Detected' category; #After repeat testing found valid results

Bacteriologically positive cases among children aged under-five with PTB

Bacteriologically positive cases among children aged 0-4 years with PTB



Awareness and advocacy



Health Olympiad



Child TB Outreach



Rickshaw Campaign



Courtyard Meeting



ADVOCACY

Stool Testing Using Xpert Ultra: A Game Changer for Childhood Pulmonary Tuberculosis Diagnosis
A POLICY BRIEF
September 2024

Brief description
Globally in 2022, an estimated 1.3 million children (<15 years) developed tuberculosis (TB). This accounted for 8% of all notified TB cases. World Health Organization (WHO) reports that in high TB burden countries like Bangladesh, around 10% of all TB cases are expected to occur in children. However, Bangladesh's childhood TB notification rate has been only around 4% of all notified TB cases for over a decade. Despite advances in TB control, diagnosis of TB among children remains a challenge. Majority of children with pulmonary TB (PTB) remain undiagnosed and untreated, leading to high morbidity and mortality. Diagnostic challenges are at the core of the problem of low-case detection. Sputum is the usual sample for bacteriological tests for PTB. However, in case of children, amount of bacteria is less and sputum collection is difficult, making diagnosis challenging. Our research indicated stool as a promising alternative sample for diagnosis of childhood PTB using latest version of Xpert MTB/RIF (Xpert) assay, the Xpert MTB/RIF Ultra (Ultra) assay, due to its higher detection capacity than the current diagnostic methods.

Piloting stool as an alternative sample
In 2017, stool processing method was first optimized for testing with Xpert at the Mycobacteriology Laboratory in icddr,b, using stool sample from adults with TB. The sample could detect around 90% TB bacteria while testing with Xpert. This method was then applied in a study conducted by icddr,b under the USAID-funded Research for Decision Maker's Activity (RDMA) in 2021. A total of 447 hospitalized children with PTB symptoms were enrolled from four hospitals in Dhaka between January 2018 and April 2019. Both stool and induced sputum were collected and tested using Ultra. The positivity of stool samples was two times higher (13.4%) than that of induced sputum (4.3%). About 80% stool samples resulted 'trace detected'. Stool, using Ultra, detected an additional 7.2% children with PTB. The findings of this pilot study were published¹ in an international peer reviewed journal.

Scaling up at large health care facilities of Dhaka city
Based on preliminary findings, a scale-up study was conducted with funding from Stop TB Partnership at 15 selected hospitals in Dhaka between November 2020 to December 2021. This study also indicated that stool was found to be superior (11%), compared to the respiratory specimens (i.e. gastric lavage/induced sputum (4%)) for childhood PTB diagnosis. Similar to the pilot study, the majority of children (80%) with stool Ultra positive results were 'trace detected' and two-thirds of them were advised for anti-TB treatment by physicians. Moreover, being an easy-to-get sample, stool of children was the 'specimen of choice' for treating physicians. Stool testing with Ultra also helped physicians attain bacteriological evidence and take clinical decisions for TB diagnosis.

Ultra as a tool for childhood TB detection
As TB detection rate of Ultra is higher¹, it can detect minimal amount of bacteria. Bacterial load is usually low in children and Ultra was found to be useful for PTB diagnosis in this group. Subsequently, WHO has recommended Ultra testing using stool samples to diagnose PTB in children. The ease of using Ultra is similar to Xpert. Ultra results provide an additional category, namely, 'trace detected', which means very low amount of bacteria are present in the sample. Majority of stool samples tested by Ultra fall under this category (trace detected).

Footnote:
1. Zhadra G, Venkatesh S, Schiller L, Khatib M, Deshpande N, Samanthar S, et al. Xpert Ultra versus Xpert MTB/RIF for pulmonary tuberculosis and rifampicin resistance in adults with presumptive pulmonary tuberculosis. *Cochrane Database Syst Rev*. 2022;2:CD016970.
2. Rahman SM, Ibrahim JT, Ahmed S, Khan S, Hossain S, Hossain S, et al. Evaluation of Xpert MTB/RIF assay for detection of Mycobacterium tuberculosis in stool samples of adults with pulmonary tuberculosis. *PLoS One*. 2013;8(12):e82303.
3. Khan S, Rahman SM, Ahmed S, Islam M, Banu H, Dewanda M, et al. Xpert Ultra Assay on Stool to Diagnose Pulmonary Tuberculosis in Children. *Clin Infect Dis*. 2019;78(12):2181-84.

USAID **Stop TB Partnership** **icddr,b**

Ultra: a Game Changer for Tuberculosis Diagnosis
September 2024

Lessons learnt

- When tested with Ultra, stool shows higher levels of detection than respiratory samples.
- Diagnosis with stool is more convenient, especially among under-5 children, since collection of respiratory sample is difficult.
- Some paediatricians had reservations regarding TB diagnosis for children with 'trace detected' results.

Recommendations

- Physicians may advise stool testing by Ultra for PTB detection in children, especially for younger children and in rural healthcare facilities, where respiratory sample collection is challenging.
- For 'trace detected' stool Ultra results, physicians may consider clinical features for PTB diagnosis.
- The National Tuberculosis Control Programme may service and capacitate healthcare facilities across the country for stool testing with Ultra for children.

USAID **Stop TB Partnership** **icddr,b**



Bangladesh Experience on Introducing and Scaling Up of Simple One Step Stool Sample Testing to Diagnose Childhood TB

Sarder Tanzir Hossain
Diagnostics Technical Director

USAID Tuberculosis Diagnostic Network Strengthening Activity, FHI 360



Background



In late 2022, USAID's Infectious Disease Detection and Surveillance (IDDS) project supported NTP to train the staff of NTRL and RTRL on a **Simple One Step (SOS) stool processing method** using GeneXpert for childhood TB detection



Implementing GeneXpert testing on **stool samples in Bangladesh shows promise** for improving the diagnosis of pulmonary TB in children who can't produce sputum



Sarder Tanzir, IDDS, FHI 360 conducting training on extrapulmonary TB and stool sample processing for GeneXpert and culture. Photo Credit: Md. Monirul Islam/FHI 360.

Background



NTP *decentralized training on stool sample testing to the sub-district level* and began capturing programmatic data in July 2023



As of September 2024, **198** *GeneXpert sites perform stool sample testing*



Hands-on training on extrapulmonary TB and stool sample processing for GeneXpert and culture. Photo Credit: Asif Ikram/FHI 360.

Key Insights



Gradual **expansion of number of sites** performing stool GeneXpert tests from 112 (Q3 2023) to 198 (Q3 2024)



Total **tests per quarter increased from 1,287 to 5,961** indicating growth in testing capacity



Total **RR detected was highest in Q2 2024** (3 patients, 3.7%)

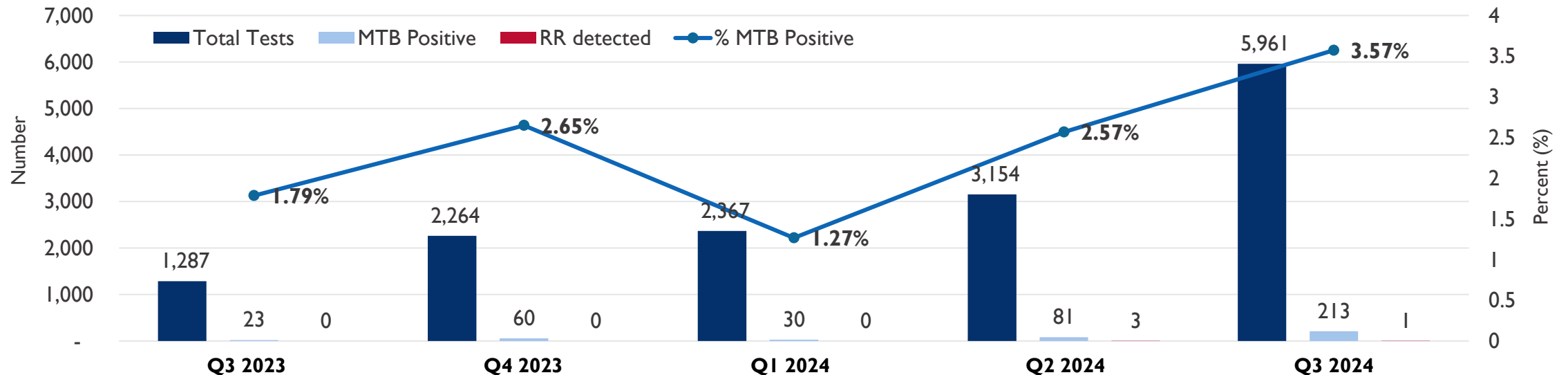


MTB positivity rate peaked in Q3 2024 at 3.57%



SOS has been proven to be **the most convenient method**

Stool-based Test Performance (July 2023-September 2024)



Source: NTP's MIS data

Conclusions and way forward

- Successful introduction and scale up of stool testing led to significant increase of B+ TB among under-5 children
- Healthcare providers acceptive of the approach
- Large scale of sensitization and awareness of childhood TB diagnosis
- Trace detected cases may be missed with SOS approach
- SOS useful at root level, whereas concentration method ensures better yield
- Ensure logistics support, training of lab and field staff
- Develop SOPs: screening and specimen collection & referral

This presentation is made possible by the generous support of the American people through the United States Agency for International Development (USAID). The contents are the responsibility of FHI 360 and icddr,b; and do not necessarily reflect the views of USAID or the United States Government.

icddr,b thanks its core donors for their ongoing support



Government of the People's Republic of Bangladesh

Canada 



USAID
FROM THE AMERICAN PEOPLE

