

**Vuka! Let's unite towards
a TB-free world!**

9th SA
TB
Conference
8 – 11 June 2026

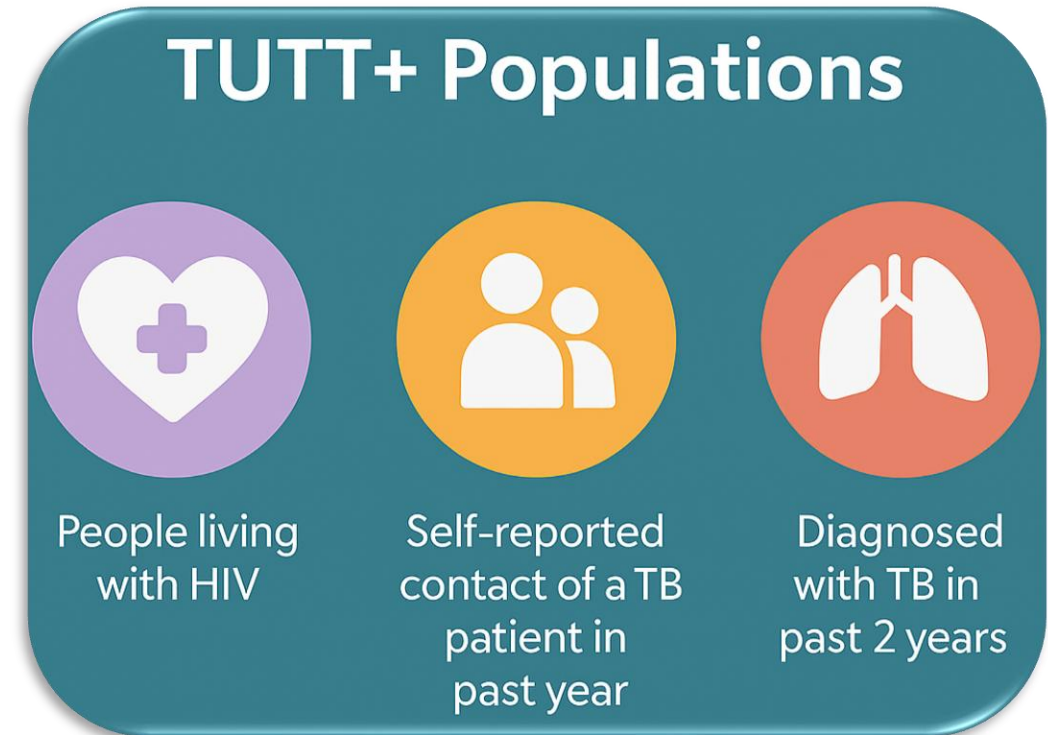


**Pooling sputum specimens of people at high risk
of TB reduces costs of Xpert Ultra TB testing:
Results from the TUTTPlus study in South Africa**

C Ramushu, S.V. Omar, BA. Nonyane, L. Genade, A. David, A. Bulane, S.A. Meehan,
M.P. Mohlomonyane, R. Berhanu, L. Scott, L. Lebina, D. Evans, N. Martinson

BACKGROUND

- Scaling up TB testing is essential, but molecular test costs remain a barrier.
- Pooling sputum samples can reduce the number of tests needed without significantly affecting diagnostic accuracy.
- However, its effectiveness for broad community screening—especially among high-risk TUTT populations—is not well understood, and most reports focus only on cartridge savings.



BACKGROUND



South Africa's National Department of Health

- End TB Campaign
- Targeting a massive scale-up in TB testing to 5 million people for the 2025/26 financial year.
- Roughly an 85–100% increase

9 March 2026 – **WHO recommends near point-of-care tests, tongue swabs, and sputum pooling for TB diagnosis**

This new edition recommends for the first time:

“Pooling of sputa as a diagnostic strategy for the initial detection of TB and rifampicin resistance using low-complexity automated NAATs with the potential to improve turnaround times and costs when resources are constrained.”

OBJECTIVES

- Highlight the value of sputum pooling to reduce the number of molecular TB tests while maintaining full individual coverage and diagnostic accuracy.
- This study compared the cost per person tested and the cost per TB diagnosis using pooled and individual testing.



Abstract 308

Assess concordance between pooled and individual Xpert
MTB/RIF Ultra results

METHODS – LABORATORY



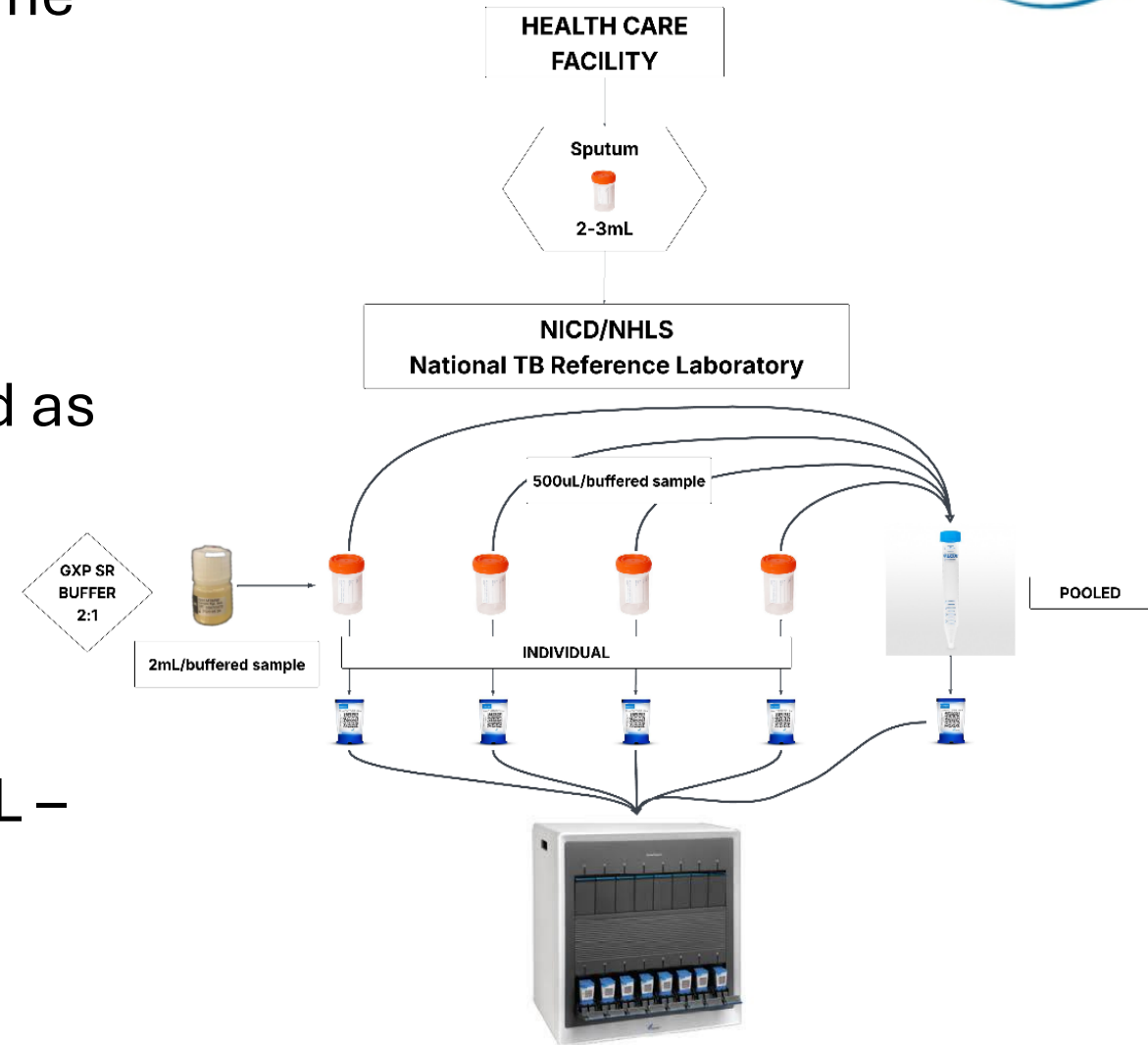
- Enrolled adult outpatients Sep 2024 – June 2025
- A minimum of 2 ml of sputum collected

Individual

- **Xpert Ultra sample** processing followed as per manufacturer (SR buffering 2:1)

Pooling

- From each buffered sample 500 uL was transferred to the pooled sample (700 uL – for a 3-pool size)
- We evaluated pool sizes of 3, 4, and 5
- Individual and pool samples run concurrently



METHODS – COST ANALYSIS

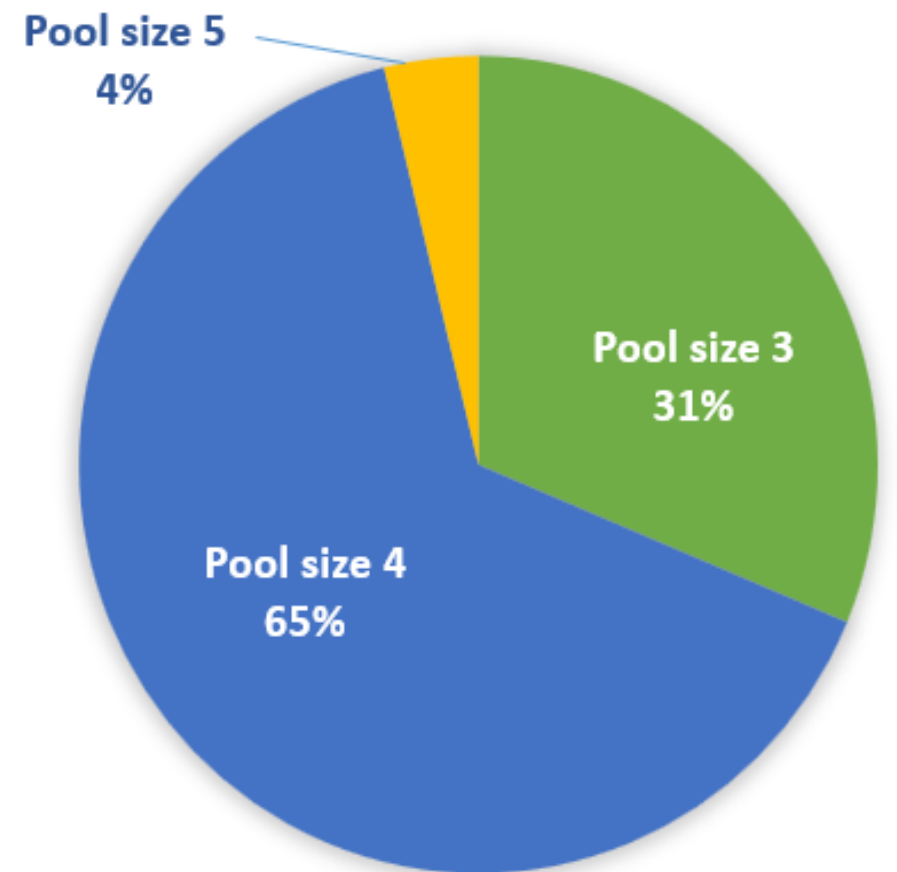


- Results & characteristics from the TUTT Plus study – Provider perspective
- Ingredient-based & top-down approach – based on expert opinion or literature (biosafety equipment, PPE, equipment)
- Time and motion at a Routine and the Reference laboratory
- Cost per test
- GeneXpert = USD \$12,97 (current country price) (2025 USD)
- Staff salaries (South Africa Public Sector – Technologist & Supervisor)
- **Direct costs for pooling versus individual compared**
 - **Cost per person tested**
 - **Cost per TB positive diagnosis**

Assumptions: Pooled test results were manually recorded and verified. No changes to lab staff or equipment. “Trace” or invalid result for the pool – the individual samples in the pool were retested.

ENROLLED PARTICIPANT CHARACTERISTICS

Factor	Levels	% Total (n=2,559)
Gender	Males	29.3% (751)
Age, mean (SD)		39.9 years (11.5)
PLHIV		78.0% (1995)
TB in the past 2 years		24.0% (615)
WHO4SS (symptomatic)		23.2% (593)
Province	Limpopo	26%
	Western	36%
	Cape	38%
	KwaZulu-	
	Natal	



Distribution of pooling sizes evaluated

COST COMPARISON



	Unstratified	PLWH	Asymptomatic
Specimens collected	2888	1264	728
Number in pool	all pools combined	4	4
Total individual tests	410 (14.2%)	176 (13.9%)	76 (10.4%)
Pooling yield (%) (trace positive)	113 (27.6%)	37 (21.0%)	11 (14.5%)
Cost 2025 USD			
Pooling – Cost/person tested	\$6.07	\$6.02	\$5.48
(Cost / TB+ dx)	(\$155.00)	(\$205.58)	(\$362.73)
Individual – Cost/person tested	\$15.41	\$15.41	\$15.41
(Cost / TB+ dx)	(\$393.96)	(\$526.59)	(\$1020.16)

Cost difference % (95% CI) **-60.6%** **-60.9%** **-64.4%**

(-58.8 to -62.4) **(-58.2 to -** **(-60.9 to -**

Cost Drivers
Pooling vs. Individual

Lab testing
 83.9% vs. 84.2%

Staff time
 8.2% vs. 7.9%

LABORATORY IMPLEMENTATION EXPERIENCE



- Operators managed up to 4 batches per shift (48 samples or 16 pools in an 8-hour cycle).
- Buffered individual samples require processing within 4 hours, using this strategy as per the manufacturer's IFU.
- Accurate pool assignment based on HIV status and symptom stratification was critical to maintain diagnostic integrity.
- Contamination Risk limited, none observed in this study, demonstrating feasibility with proper training and controls.
- Current dependence on Xpert technology may limit scalability; a need exists for platform adaptability in wider implementation.
- Integration of a worksheet-based system into the Lab Information System improved traceability and reduced manual error.

Additional 98
8-hour days of
technologist
time for every
1000 pooled
sputa

Additional 654
Xpert Ultra
tests
(unstratified)

CONCLUSION

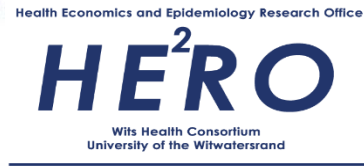
- Ultra-testing pooled sputum specimens is a cost-effective, accurate strategy for TB diagnosis, particularly for pool sizes of 4 for PLWH and asymptomatic individuals.
- Pooling samples can significantly increase testing capacity.
- This approach could facilitate scalable TB testing in resource-limited settings.



ACKNOWLEDGEMENTS



Gates Foundation



BETTER TOGETHER.



forward together
sonke siya phambili
saam vorentoe

TUTTPlus Presentations at the 9th SA TB Conference



Abstract Nr	Titles of other presentations and Posters
118	Evaluation of the role of tongue swabs to optimize TUTT implementation - An observational study (TUTTPlus) - KwaZulu Natal Data
287	Beyond Sputum: Perceptions of Emerging TB Diagnostics in South Africa through the TUTTPlus study
289	Laboratory- confirmed TB in outpatients at high risk for TB: with and without diabetes mellitus in the TUTTPlus Study
295	Rethinking Sputum Quality: Diagnostic Yield of “Salivary” Specimens Collected After Forced Cough Effort for TB Nucleic Acid Amplification Testing
307	Clinic referral cards, contact tracing investigations for tuberculosis screening in South Africa – A TUTTPlus Substudy - Poster
308	Pooling sputum specimens of people at high-risk of TB reduces testing burden without compromising diagnostic concordance. The TUTTPlus Study
342	Evaluation of the role of tongue swabs to optimize TUTT implementation -