

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

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**TB**  
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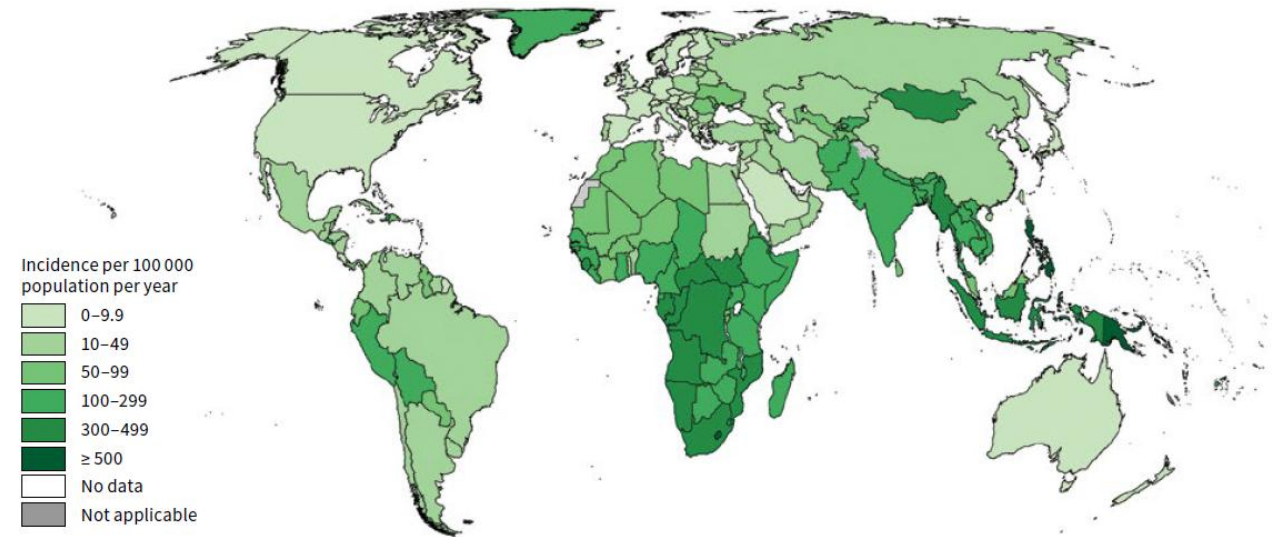


## Temporal trends analysis of prevalence and risk factors of cavitory lung disease in people with drug-resistant TB

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# Background

- Tuberculosis (TB) remains a major global health challenge, causing 10.7 million new cases and 1.23 million deaths in 2024<sup>1</sup>
- Drug-resistant TB (DR-TB) continues to drive morbidity and mortality<sup>2</sup>
- Lung cavitation is associated with **higher bacillary burden, increased transmission, poor drug penetration, treatment failure, and relapse**<sup>3</sup>
- Advances in molecular diagnostics (NAATs) and novel DR-TB regimens have improved early detection and treatment outcomes<sup>4</sup>



**Figure 1:** Estimated TB incidence rates at country level, 2024<sup>1</sup>

# Study Rationale

- 
- The effect of advances in molecular diagnostics and newer TB regimens on the prevalence and burden of cavitary DR-TB remains unclear
  - Evaluating current trends and risk factors is essential to determine whether cavitary disease remains a significant clinical and public health concern

# Objectives

1. Determine the prevalence and temporal trends of cavitory disease among patients with DR-TB presenting for care at CAPRISA SCRS between 2011 and 2024.
2. Identify risk factors associated with cavitory disease in DR-TB patients.
3. Evaluate the association between cavitory disease and treatment outcomes, including unfavourable outcomes and mortality.
4. Assess whether advances in TB diagnostics and treatment have influenced the burden of cavitory disease in DR-TB.

# Methods

## Retrospective cohort analysis of data from three studies conducted in Durban, South Africa

- A Retrospective Chart Review of Patients With M(X)DR-TB Commenced On Linezolid (**BLIX Study**)
- The Individualized M(X) drug-resistant TB Treatment Strategy Study (**InDEX Study**)
- Triage Test for All Oral DR-TB Regimen (**TRiAD Study**)

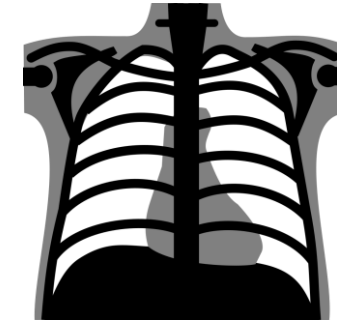


Adults with microbiologically confirmed **pulmonary DR-TB** recruited



### Baseline Data Collection

- Demographics
- Microbiological
- Radiographic



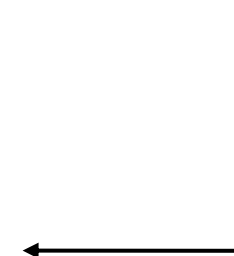
### Cavitation Assessment of CXR

- Presence/Absence
- Unilateral/Bilateral



### Statistical Analysis

- Temporal trends
- Poisson regression - Risk factors of cavitory TB
- Kaplan-Meier Curves - Time to favourable outcomes/mortality
- Cox Model - predictors of unfavourable treatment outcomes

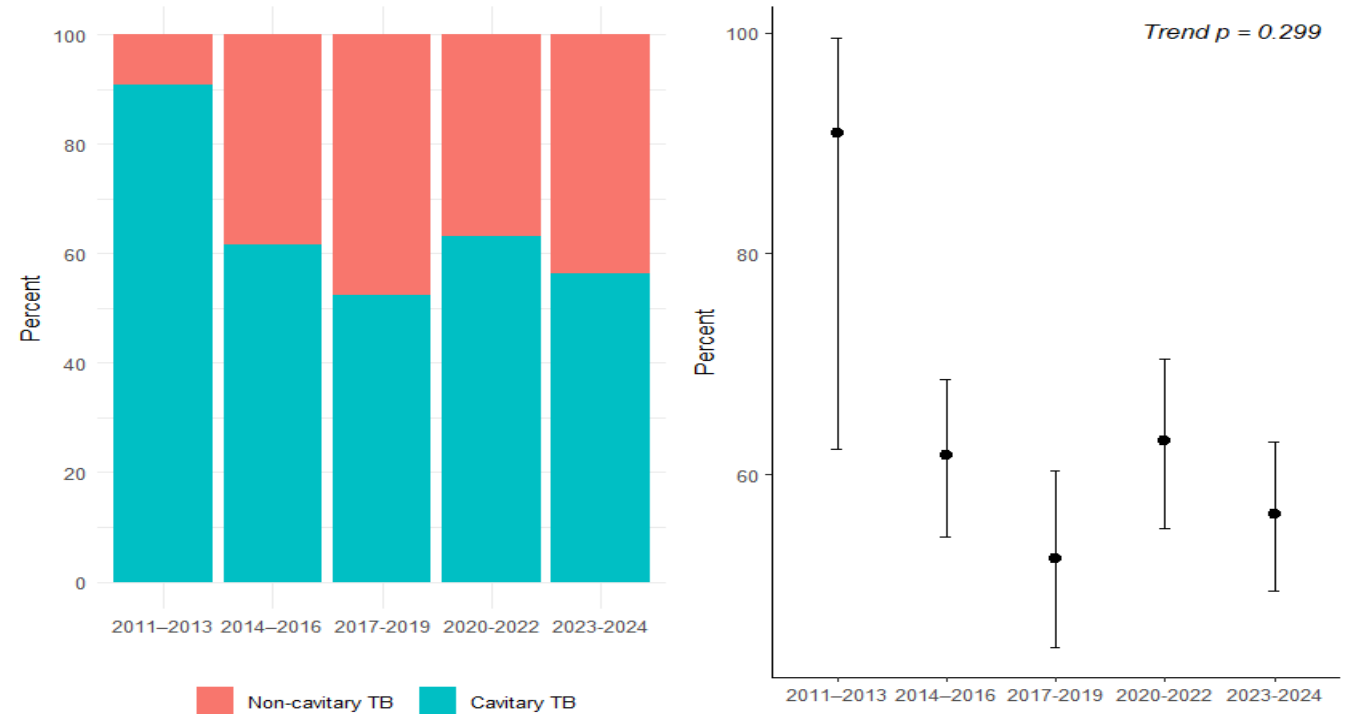


# Results

## A. High prevalence of cavitory disease among DR-TB patients

### Baseline demographic and clinical characteristics

- N = 684 DR-TB patients (2011–2024)
- 58.9% (403/684) had **cavitory TB**
  - ✓ Mean age: 35 years
  - ✓ 55% were male, and 45% were female
  - ✓ 60% had previous TB history
  - ✓ Had a higher mean count of CD4 (325 cells/mL<sup>3</sup>)
  - ✓ More frequent culture positivity & smear positivity (95%)
  - ✓ More common in HIV-negative and HIV-positive on ART (34% and 61%, respectively)
- No significant temporal trend observed for cavitory TB



**Figure 2:** Distribution of cavitation status (left panel); Prevalence (95% CI) of cavitory TB (right panel)



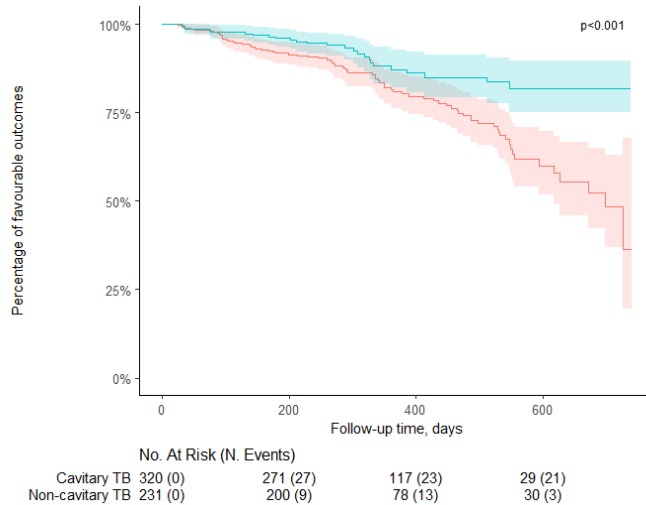
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**Table 1:** Modified Poisson regression modelling of risk factors of Cavitary TB

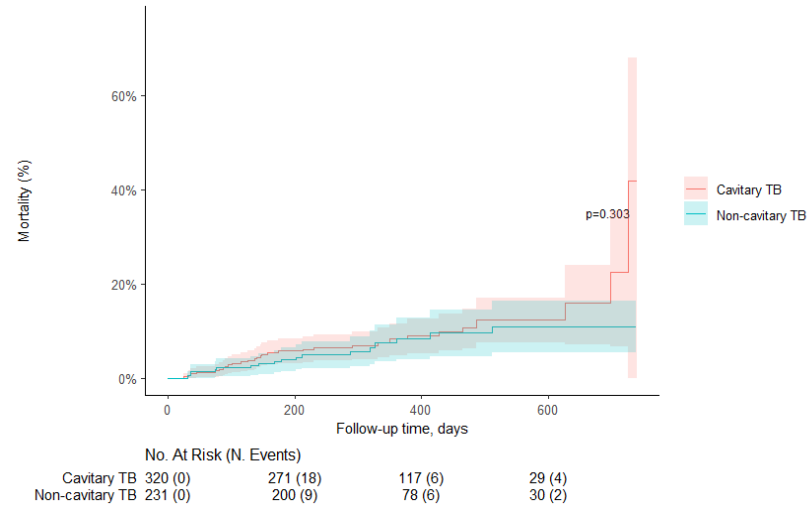
|                                                                                                                                              | Univariable                                     |            |         | Multivariable 1 (Primary Model) |            |         |
|----------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------|------------|---------|---------------------------------|------------|---------|
|                                                                                                                                              | PR                                              | 95% CI     | p-value | PR                              | 95% CI     | p-value |
| HIV Status                                                                                                                                   |                                                 |            |         |                                 |            |         |
| Positive (Yes ART)                                                                                                                           | 0.85                                            | 0.79, 0.93 | <0.001  | 0.77                            | 0.60, 0.97 | 0.028   |
| Culture Positivity                                                                                                                           |                                                 |            |         |                                 |            |         |
| Positive                                                                                                                                     | 1.28                                            | 1.11, 1.47 | <0.001  | 1.76                            | 1.09, 2.86 | 0.022   |
|                                                                                                                                              | Multivariable 2 (Adjusted Temporal Trend Model) |            |         |                                 |            |         |
| Treatment Year                                                                                                                               | aPR                                             | 95% CI     | p-value |                                 |            |         |
| 2011–2013                                                                                                                                    | —                                               | —          |         |                                 |            |         |
| 2014–2016                                                                                                                                    | 0.69                                            | 0.30, 1.57 | 0.373   |                                 |            |         |
| 2017–2019                                                                                                                                    | 0.58                                            | 0.25, 1.36 | 0.212   |                                 |            |         |
| 2020–2022                                                                                                                                    | 0.71                                            | 0.31, 1.65 | 0.432   |                                 |            |         |
| 2023–2024                                                                                                                                    | 0.67                                            | 0.29, 1.54 | 0.346   |                                 |            |         |
| Abbreviations: CI = Confidence Interval, PR = Prevalence Ratio, aPR = Adjusted Prevalence Ratio                                              |                                                 |            |         |                                 |            |         |
| Bolded p-values indicate statistical significance at the 5% level                                                                            |                                                 |            |         |                                 |            |         |
| Multivariable model 1 is the primary model, and adjusted for: Study ID, age, sex, HIV status, previous TB and culture positivity             |                                                 |            |         |                                 |            |         |
| Multivariable model 2 is the adjusted temporal trend model, adjusted for: Study ID, age, sex, HIV status, previous TB and culture positivity |                                                 |            |         |                                 |            |         |

# Results

## C. Cavitory disease predicts poorer treatment outcomes



**Figure 2:** Kaplan-Meier curve of favourable treatment outcomes stratified by baseline lung cavitation



**Figure 3:** Cumulative mortality in patients with cavitory and non-cavitory TB

- Cavitory TB strongly predicted treatment failure and poor outcomes.

**Table 2:** Cox model of unfavourable treatment outcomes

|                    | Univariable |            |              | Multivariable (Primary Model) |            |              |
|--------------------|-------------|------------|--------------|-------------------------------|------------|--------------|
|                    | HR          | 95% CI     | p-value      | aHR                           | 95% CI     | p-value      |
| <b>Cavitory TB</b> | 2.05        | 1.30, 3.23 | <b>0.002</b> | 2.18                          | 1.31, 3.60 | <b>0.003</b> |

Abbreviations: CI = Confidence Interval, HR = Hazard Ratio, aHR = Adjusted Hazard Ratio

**Bolded p-values indicate statistical significance at the 5% level**

**The Cox models were stratified by the individual study cohorts**

**Multivariable model is the primary model, and adjusted for: age, sex, HIV status, previous TB and culture positivity**

# What does this mean?

- **Cavitory disease remained highly prevalent in DR-TB patients from 2011–2024**, with no decline over time, despite advances in diagnostics and treatment.
- **Cavitation was associated with higher bacterial burden (culture positivity) and increased risk of unfavourable treatment outcomes**, supporting its role as a marker of disease severity and transmission potential.
- **HIV-positive patients on ART were less likely to have cavitory disease**, suggesting a possible protective effect of ART against severe pulmonary manifestations.

# What does this mean?

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- **Male sex, HIV-positive status without ART, and cavitory disease** predicted poorer treatment outcomes, identifying groups that may benefit from closer monitoring and targeted interventions.
  - Findings highlight the need for earlier identification of cavitory TB, consideration of individualized treatment approaches, and improved strategies to reduce transmission and poor outcomes in DR-TB populations.

# Conclusion



Cavitary DR-TB remains a persistent clinical challenge and may require risk-stratified management beyond standard treatment approaches

# Acknowledgements

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# References

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