Real-World Evidence to Assess the Feasibility of Low-Dose CT Lung Cancer Screening in the Brazilian Unified Health System (SUS)

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1 Background & objective

35,380 new lung cancer cases per year in Brazil, 2026–28[3]

31,237 lung cancer deaths in Brazil in 2023[3]

−20% lung cancer mortality with LDCT vs chest X-ray (NLST)[1]

Lung cancer is a leading cause of cancer death in Brazil, and most cases are diagnosed at advanced stages. LDCT screening of high-risk people cut lung cancer mortality in NLST[1] and NELSON[2], but evidence on implementing it in middle-income universal health systems is limited.

Objective. To evaluate the feasibility of an organised LDCT lung cancer screening strategy within SUS, informed by real-world operational data and economic modelling.

2 Methods: screening pathway

1. **Risk-based eligibility**: Online risk tool: NLST criteria (55–74 years, ≥30 pack-years, current smoker or quit ≤15 years) or PLCOm2012 risk ≥1.7%[4].
2. **Mobile LDCT unit**: Community outreach with a mobile CT unit, integrated with smoking-cessation counselling[5].
3. **Standardised reporting**: ACR Lung-RADS v1.1 categories; results delivered by teleconsultation.
4. **Organised follow-up**: Category-driven pathway to diagnosis and treatment at Barretos Cancer Hospital:

1–2 annual LDCT	3 LDCT at 6 months
4A LDCT at 3 months ± PET-CT	4B/4X work-up and biopsy

3 Methods: decision-analytic model

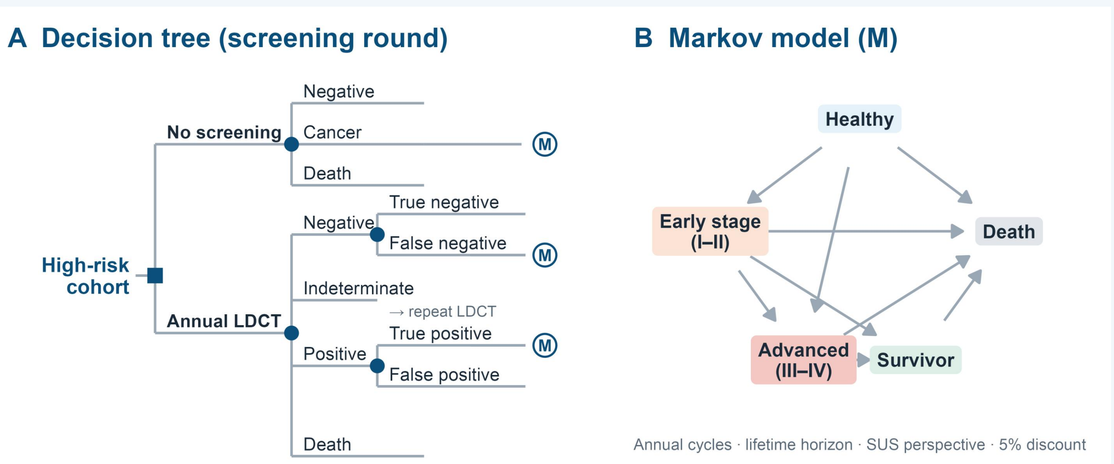

Figure 1. Each screening round (decision tree) feeds a lifetime Markov model.

- **Comparators:** annual LDCT screening vs usual care (symptom-driven diagnosis).
- **Costs and outcomes:** SUS reimbursement tables (DATASUS/SIGTAP); QALYs from published EQ-5D utilities.
- **Uncertainty:** deterministic and probabilistic sensitivity analyses (CHEERS 2022).

4 Results: the real-world programme

~3,500 LDCT examinations, 2019–2024 (≈583/year)

0.9% cancer detection rate (31 lung cancers)

74% of biopsies confirmed lung cancer (31/42)

100% of cancers from Lung-RADS 4B (21) or 4X (10)

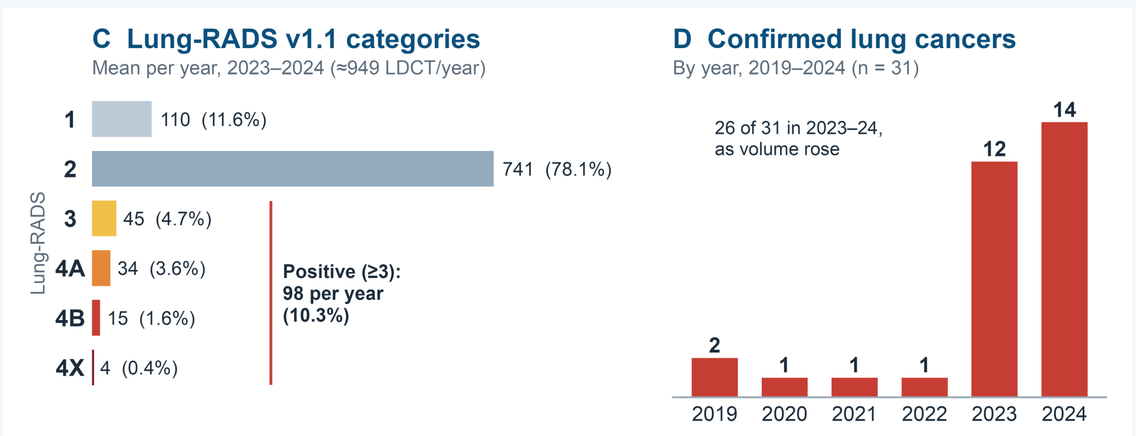

Figure 2. 89.7% of LDCTs were Lung-RADS 1–2; detection grew with volume.

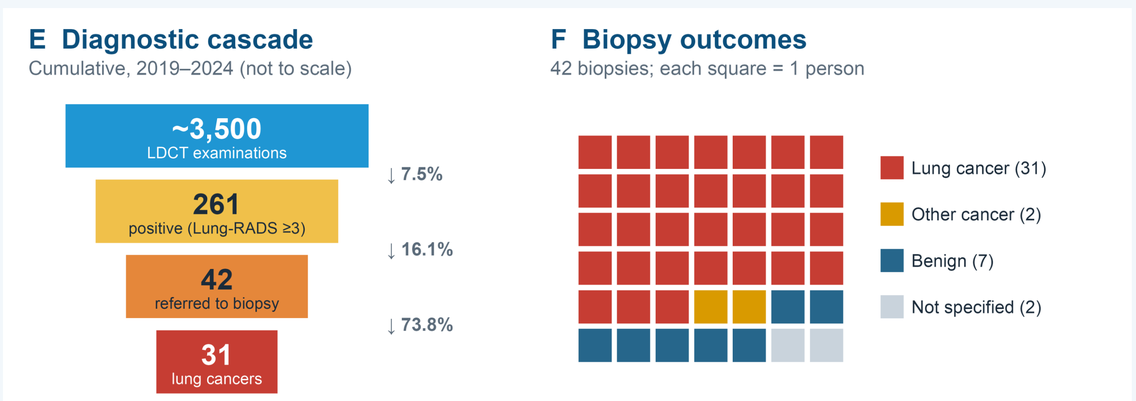

Figure 3. 7 of 42 biopsies (16.7%) were benign; 2 found non-lung cancers.

5 Results: economic model & readiness

More QALYs
Earlier diagnosis (stage shift) and lower lung cancer mortality.

Moderate investment
LDCT needs a moderate incremental investment over usual care.

Robust
Held across diagnostic performance, treatment costs and adherence.

From programme data to model inputs

Lung-RADS distribution and positivity	→ Screening-result branches (negative, indeterminate, positive)
Biopsy referrals and outcomes	→ True / false positives and diagnostic work-up
Cancer detection and stage at diagnosis	→ Entry into early- vs advanced-stage states
Adherence to rounds and follow-up	→ Repeat screening and follow-up uptake

Readiness for SUS: the programme established standardised pathways for radiologic follow-up, diagnosis and treatment, and risk-based eligibility prioritised the people most likely to benefit.

6 Conclusions

- **LDCT screening is operationally feasible in a Brazilian real-world setting**: ~3,500 examinations detected 31 lung cancers, all from Lung-RADS 4B/4X.
- **Structured eligibility, standardised Lung-RADS reporting and organised follow-up** are the building blocks for phased implementation in SUS.
- **Economic modelling supports LDCT as a plausible investment** and may inform screening policy in middle-income universal health systems.

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