DATA CONSIDERATIOS FOR MODELS OF THE ECONOMICS OF CASE DETECTION

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TB-MAC meeting, Glion, 22nd September 2017

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BACKGROUND

Two year project in close collaboration with the NDOH, institutionalised through the SA TB Think Tank

Focus on TB case finding:

- Previous modelling efforts (NSP) assumed no financial or non-financial constraints
- However, both types of constraints do exist in the South African health system
- Substantial uncertainty on how interventions would look like in practice (setting, target population, algorithm)
- Strategy choice affects consequential costs of TB diagnostics and treatment

Which TB screening interventions would be cost-effective placed in the real-world of the South African health system?

CONCEPTUAL APPROACH – INCORPORATING CONSTRAINTS

- Constraints and/or the costs of 'relaxing' them are specific to each setting/intervention and must be identified and quantified to reflect real **opportunity cost**

- Our approach was designed to explore this issue **with decision-makers** (in a policy context) and as a **proof of concept (feasibility)**

- Three stages:
  - Examine cost-effectiveness assuming no constraints (unconstrained)
  - Examine cost-effectiveness considering real world constraints (constrained)
  - Incorporate the costs of relaxing those constraints (relaxing constraints)

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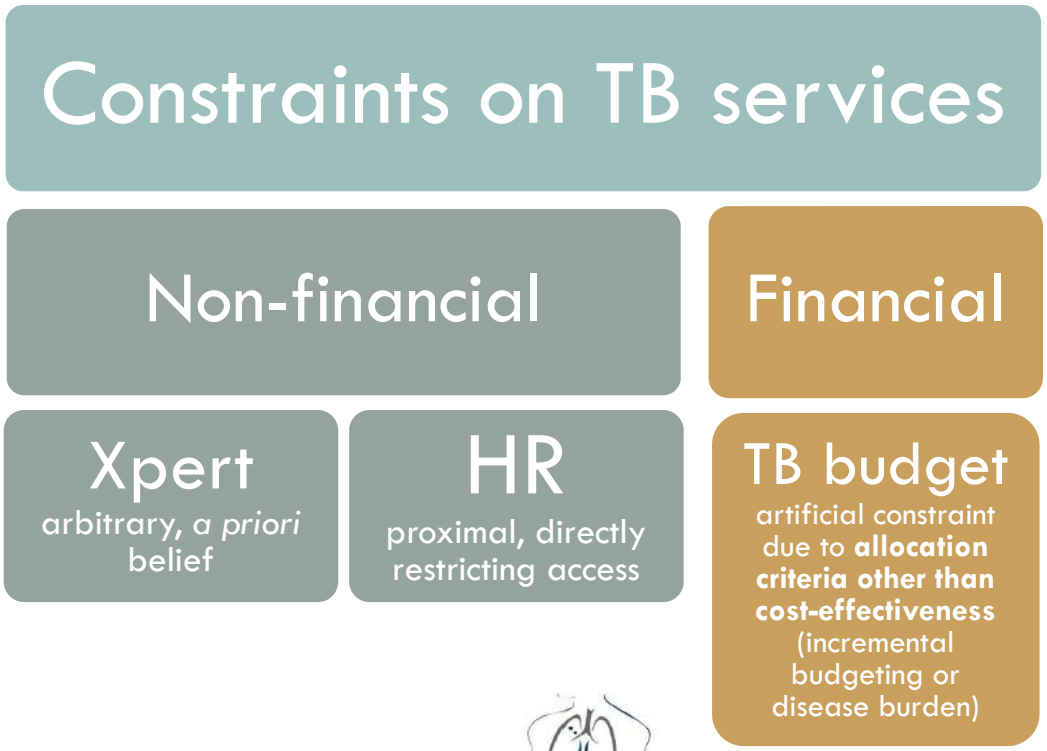
CONCEPTUAL APPROACH – CHARACTERISING CONSTRAINTS

1. Conceptual framework by Vassall and colleagues (2016) for adapting model-based evaluations to consider **supply-side constraints**
2. Constraints on TB services delivery in South Africa chosen from the literature and through discussions with NDOH



METHODS

The interventions

- TB control interventions to reach the targets laid out in the South African NTP 2017-2021
- Our focus is on facility-based case detection
  - Screening algorithms: what questions to ask, to whom and how
  - Test negatives: strengthening follow-up algorithm for HIV-infected

The model

- TIME transmission model investigating cost-effectiveness of NTP interventions between 2015-2035
- Costs and staff minutes per service and number of Xperts attached to transmission model output to **calculate financial and HR resource requirements under each scenario**

MODELLED INTERVENTION SCENARIOS

Status quo

- **1.** Continue current practice
- 80% Xpert coverage

- 14% follow-up of Xpert negatives (microscopy)

- WHO symptoms screen in 40% of HIV+ clinic patients

- Passive screening of HIV- patients (8% of all PHC attendees report prolonged cough)

Intervention scenarios

- **Xpert**
- **2.** 100% Xpert coverage
- **3.** 90% follow-up of Xpert negatives

- **Screening**
- **5.** Cough triage in 100% HIV+
- **6.** Cough triage in 90% of all PHC patients
- **7.** WHO symptoms screen in 100% HIV+
- **8.** WHO symptoms screen in 90% of all PHC patients

Combination scenarios

- **Xpert**
- **4.** 2+3

- **Xpert + Screening**
- **9.** 4+6
- **10.** 4+8

MODELLED CONSTRAINED SCENARIOS

More restrictive

- **Budget:** current annual expenditure (adj. GDP growth)
- **HR:** current annual minutes on TB (adj. population growth)

Medium

- **Budget:** TB reprioritization of a static health budget during 2017-2021
- **HR:** extra minutes allocated to TB during 2017-2021 to match disease burden
- **Xpert:** ratio of annual Xpert tests to TB notifications capped at 20

Least restrictive

- **Budget:** TB reprioritization of a health budget that realizes full fiscal space during 2017-2021
- **HR:** as for medium, but adjusting growth after 2021 based on historical workforce growth

RELAXING THE HR CONSTRAINT

1. How many minutes are required to provide the extra services needed to achieve target coverage?
   - Difference between unconstrained and HR constraint scenario
2. What is the cost of those extra minutes?
   - Extra minutes needed / annual minutes per nurse = extra nurses needed
   - Extra nurses in public sector:
     - New graduates: Training costs per nurse (from SANC)
     - Nurses switching from private sectors once jobs are created (salary is higher in public sector in South Africa)
   - Hiring costs (10% mark-up)
   - Nurse cost per minute: salary scales from NDOH

EMPIRICAL ESTIMATION

Item	Data sources
• Costs of TB services (base case) and case-finding interventions	• Published literature • Ongoing trials (XTEND) • Primary data collection
• Staff minutes for delivering TB services and interventions	• Ongoing trials (MERGE)
• HR capacity (annual staff minutes available for TB)	• DHIS • South African Nursing Council
• TB budget	• NDOH expenditure reports • Fiscal space analysis (Remme et *al.* 2016)
• Xpert MTB/RIF	• Conditional grant budgeting process

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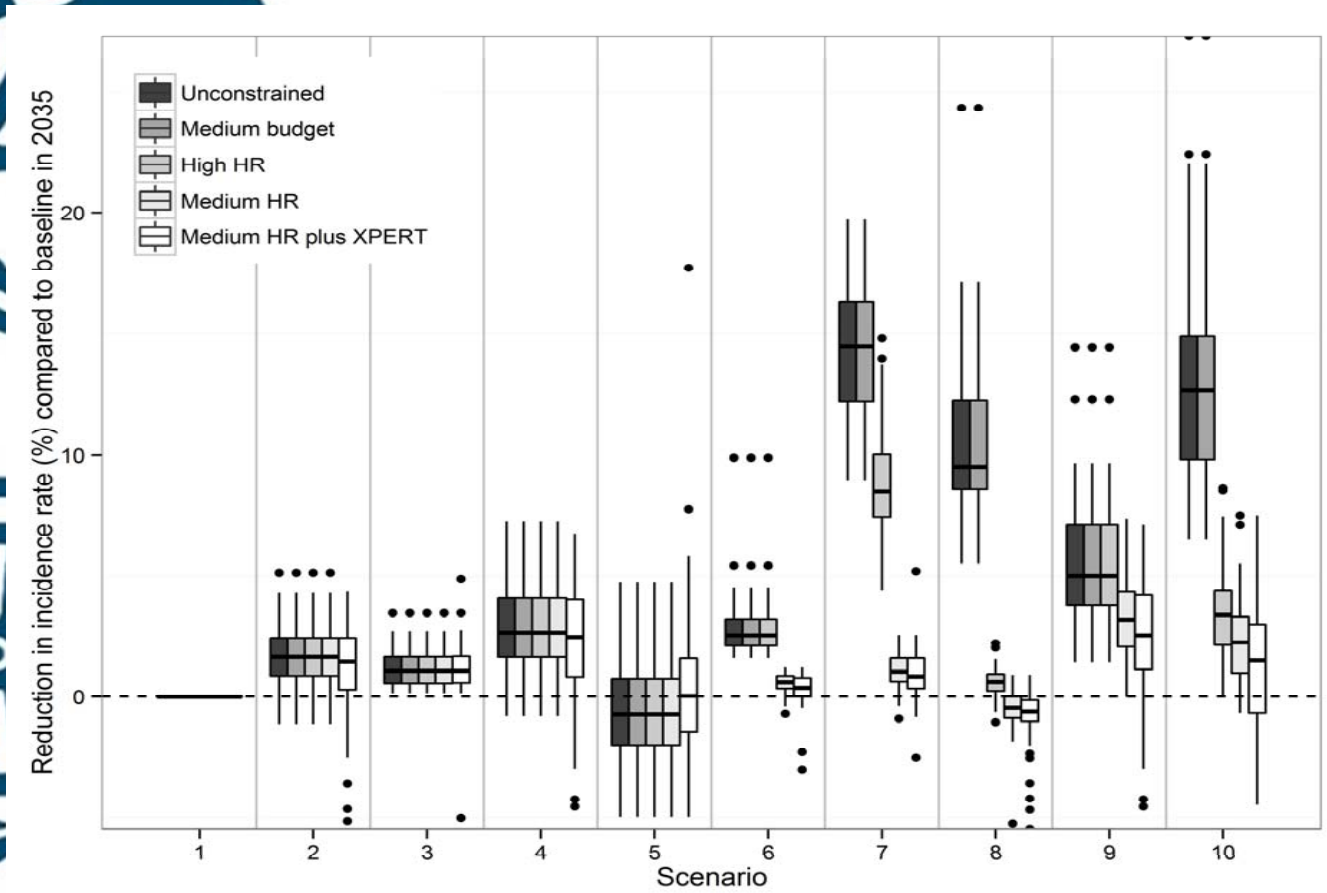
RESULTS

CONSTRAINTS' IMPACT ON TB INCIDENCE



1. Baseline
2. Increased Xpert utilisation
3. Adherence to Xpert negative algorithm
4. 2 + 3
5. Cough triage in 100% of known HIV+ clinic attendees
6. Cough triage in 90% of PHC attendees
7. Symptom screen in 100% of known HIV+ clinic attendees
8. Symptom screen in 90% of PHC attendees
9. 4 + 6
10. 4 + 8

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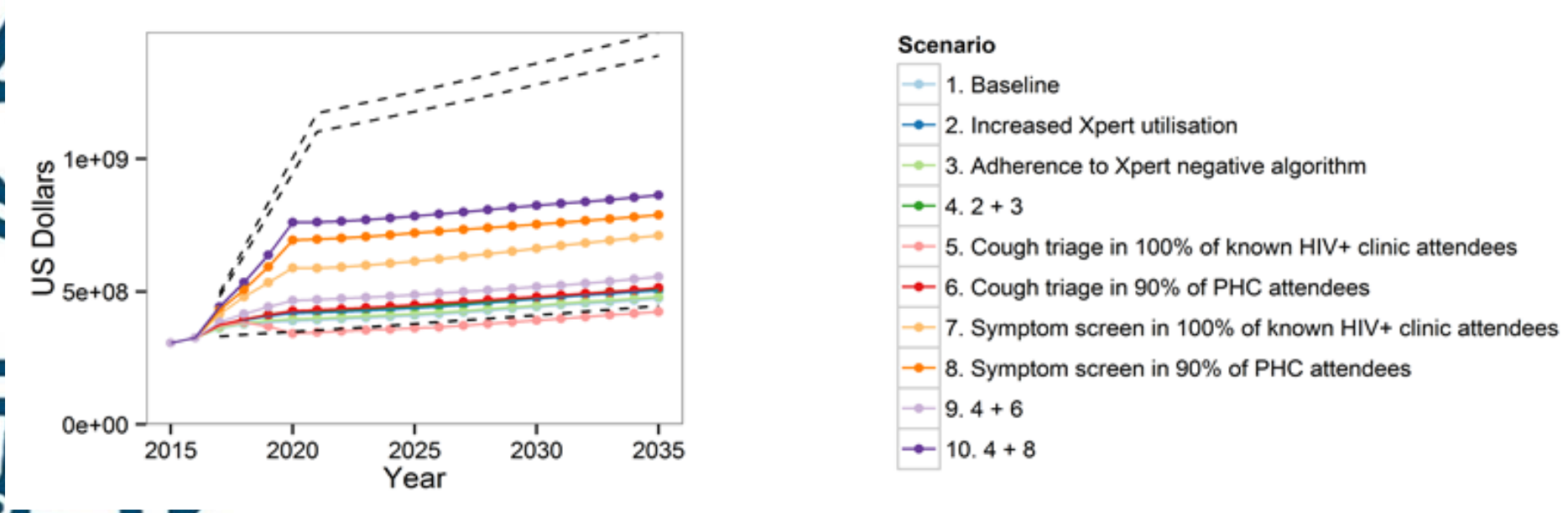
TOTAL COST PROJECTIONS COMPARED TO FINANCIAL CONSTRAINTS



- All intervention costs exceeded incremental budgeting
- However, if policy-makers accept a rapid increase in budget (influenced by disease burden) then interventions are potentially feasible

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HUMAN RESOURCES CONSTRAINT

4. Xpert utilisation + Xpert negative algorithm
5. Cough triage in 100% of known HIV+ clinic attendees
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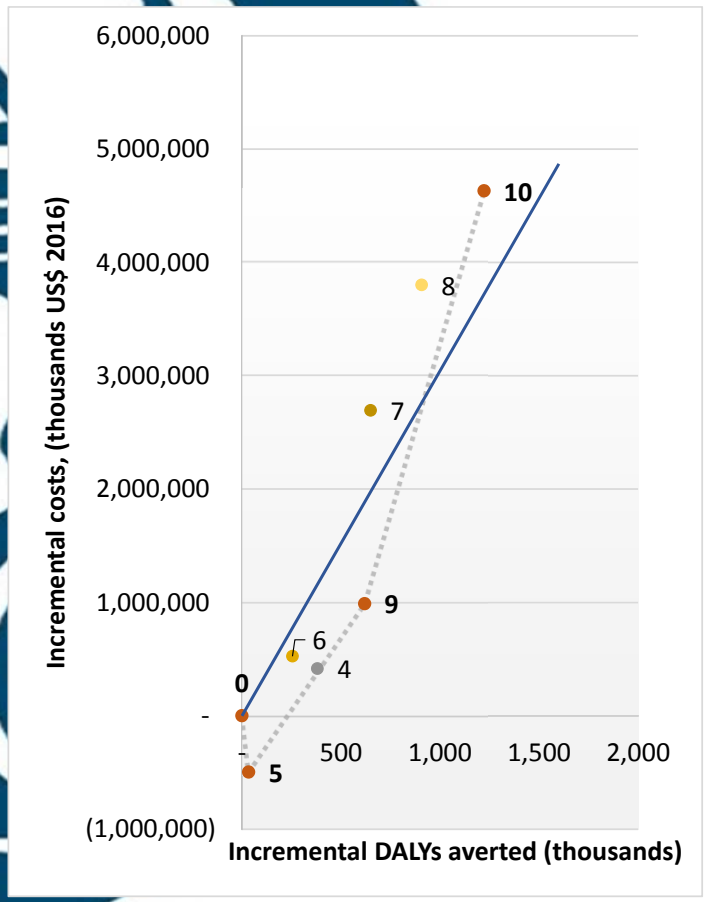
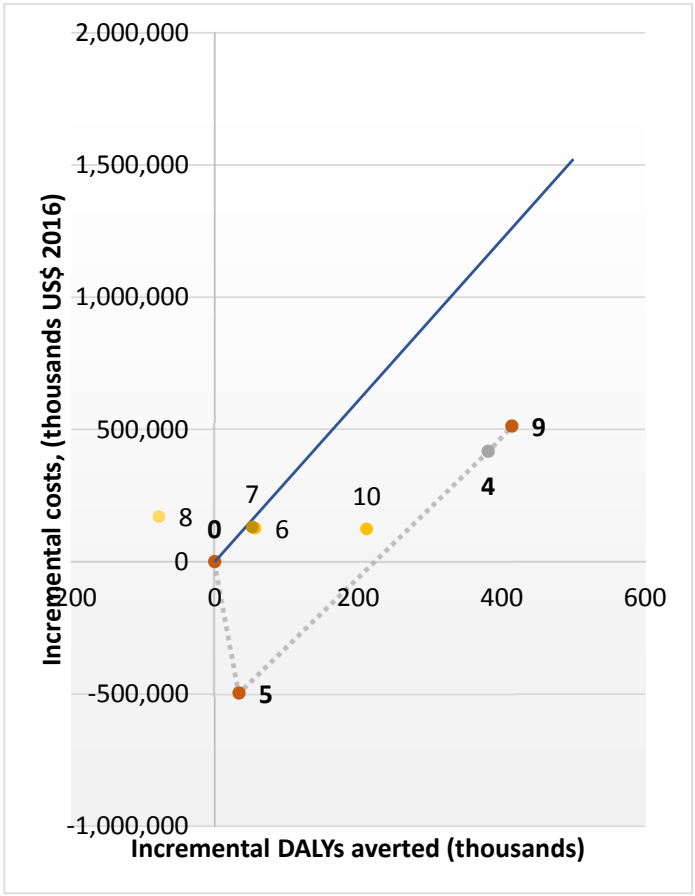
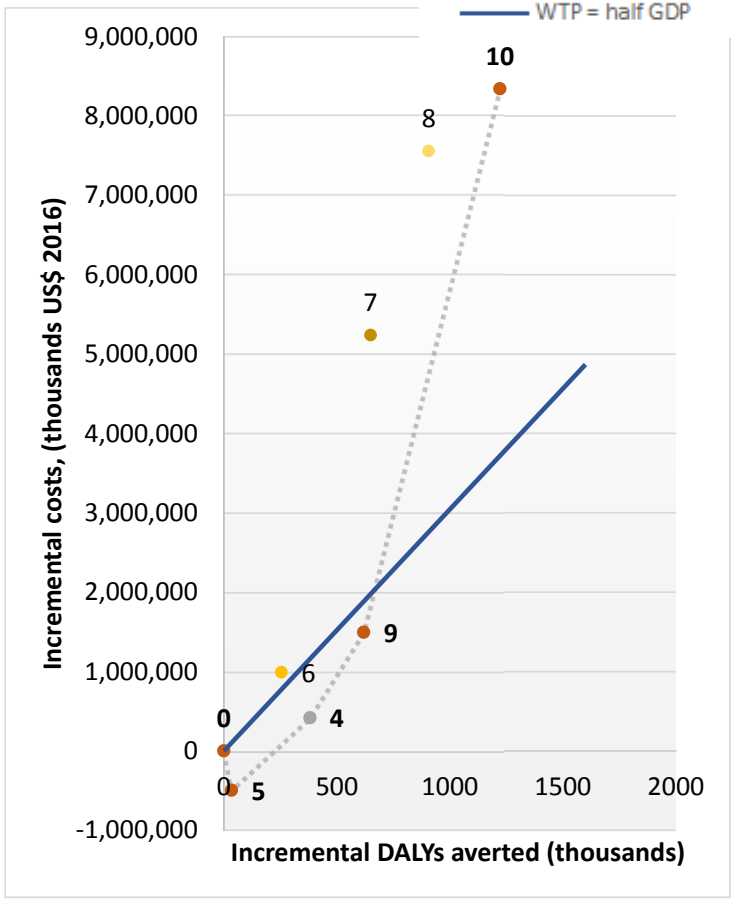


Unconstrained



Medium HR constraint



Medium HR constraint, relaxed

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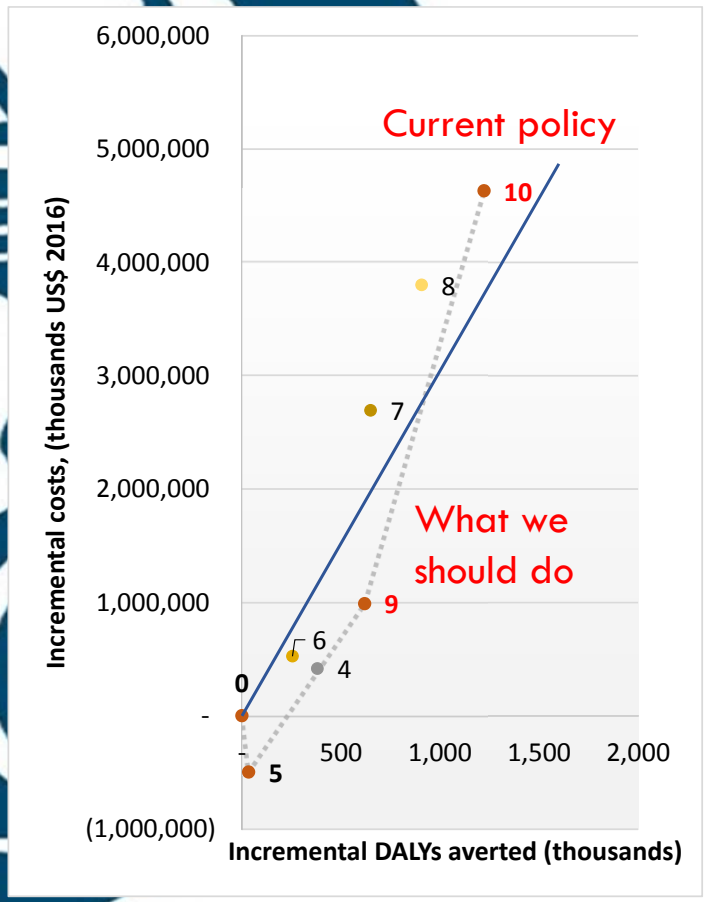

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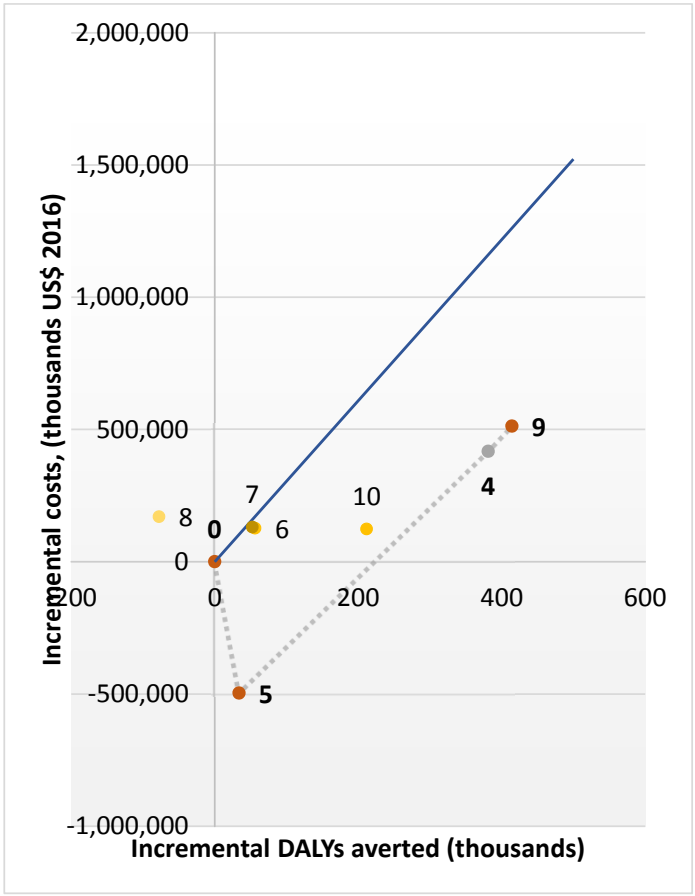

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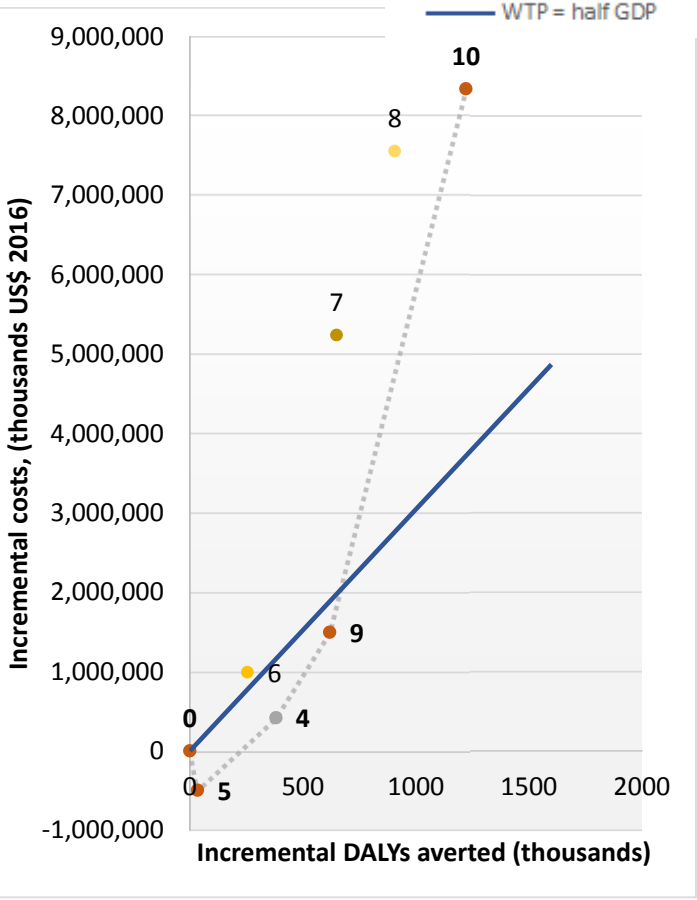

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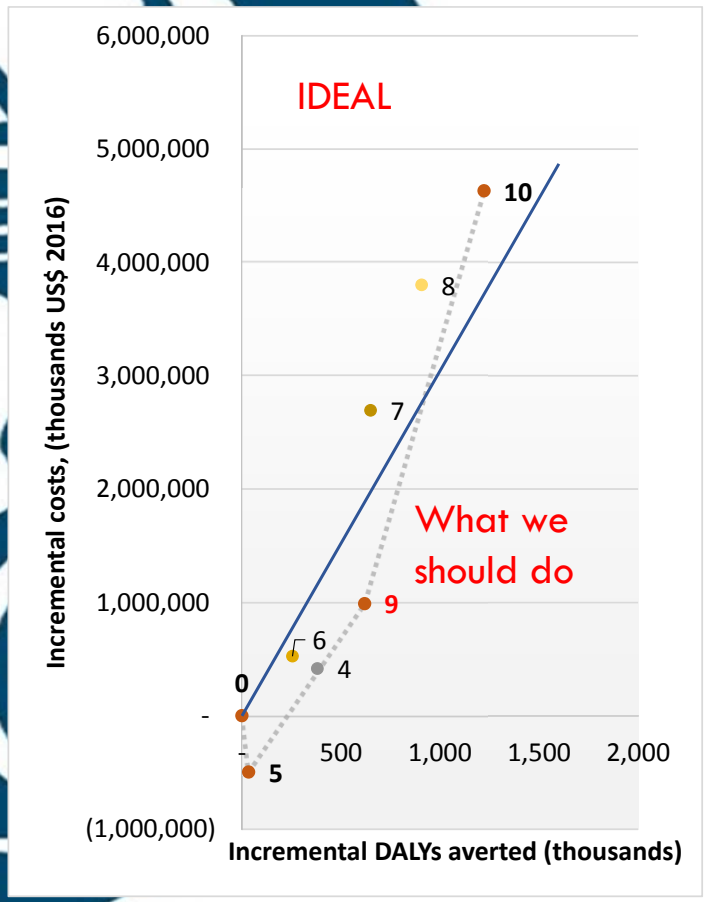

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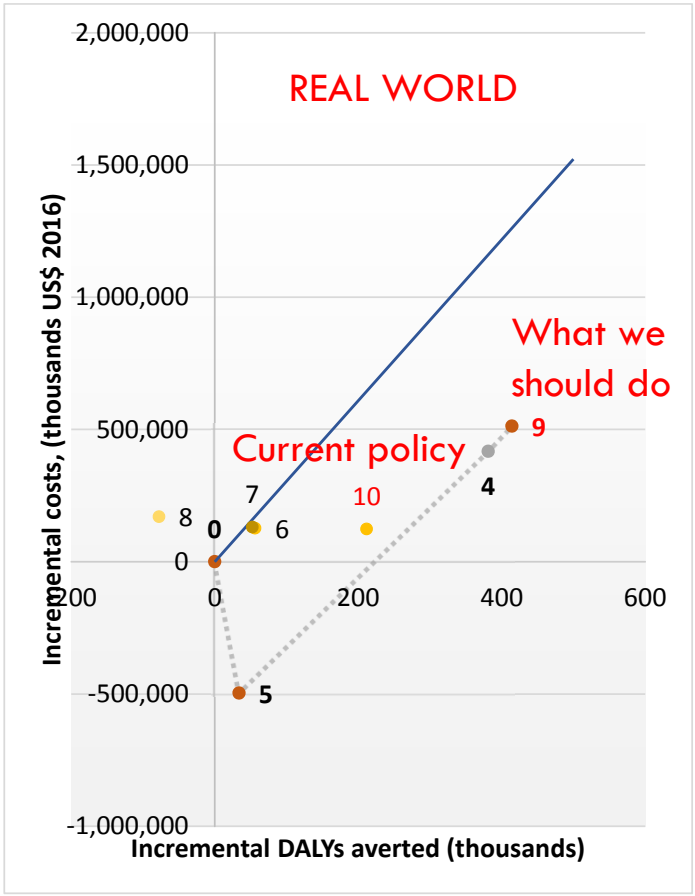

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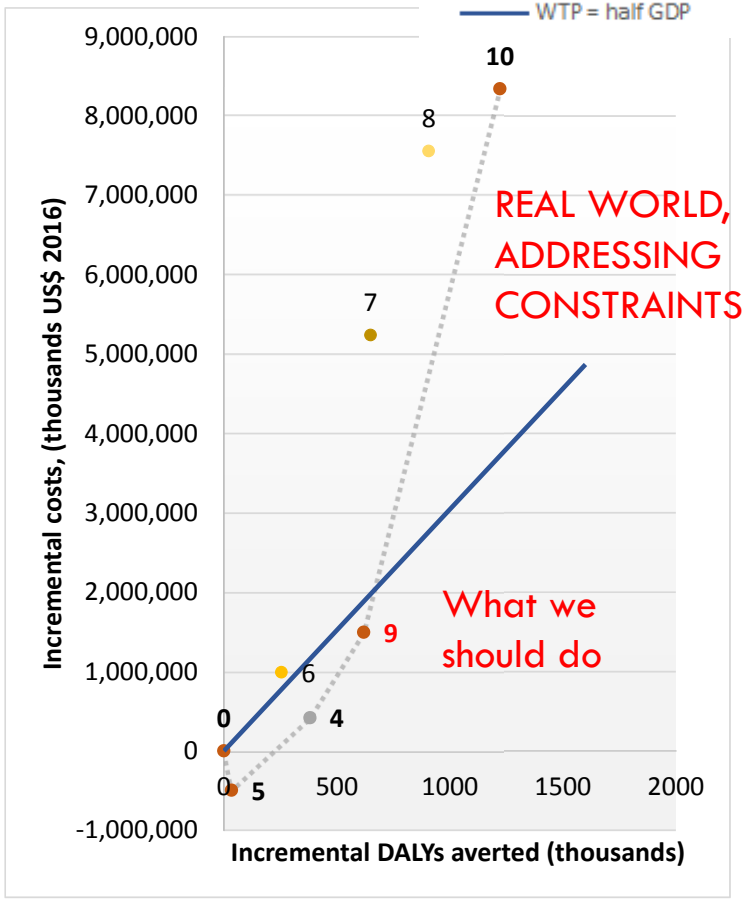

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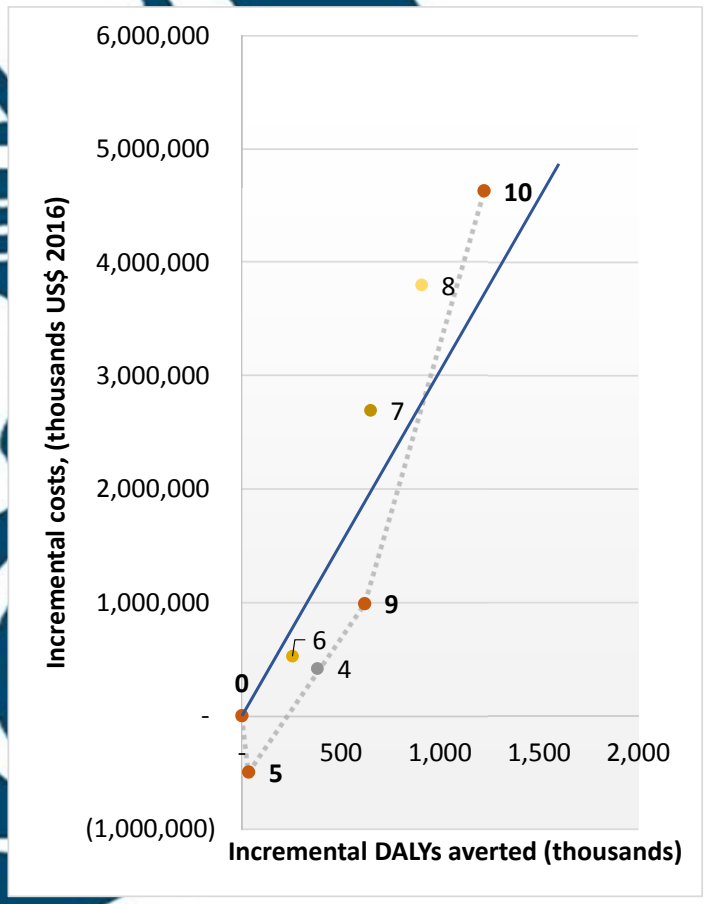

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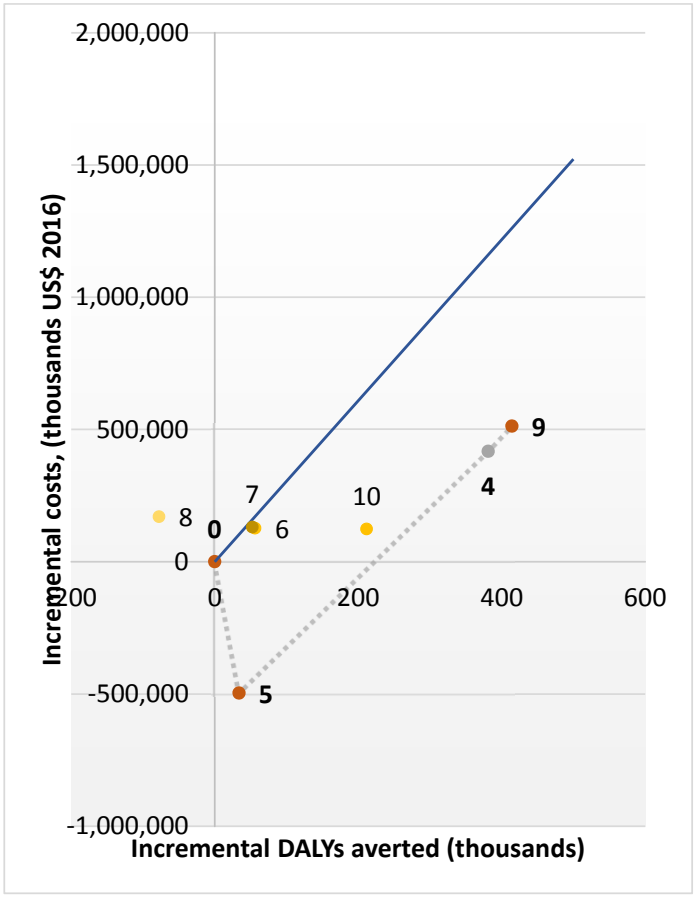

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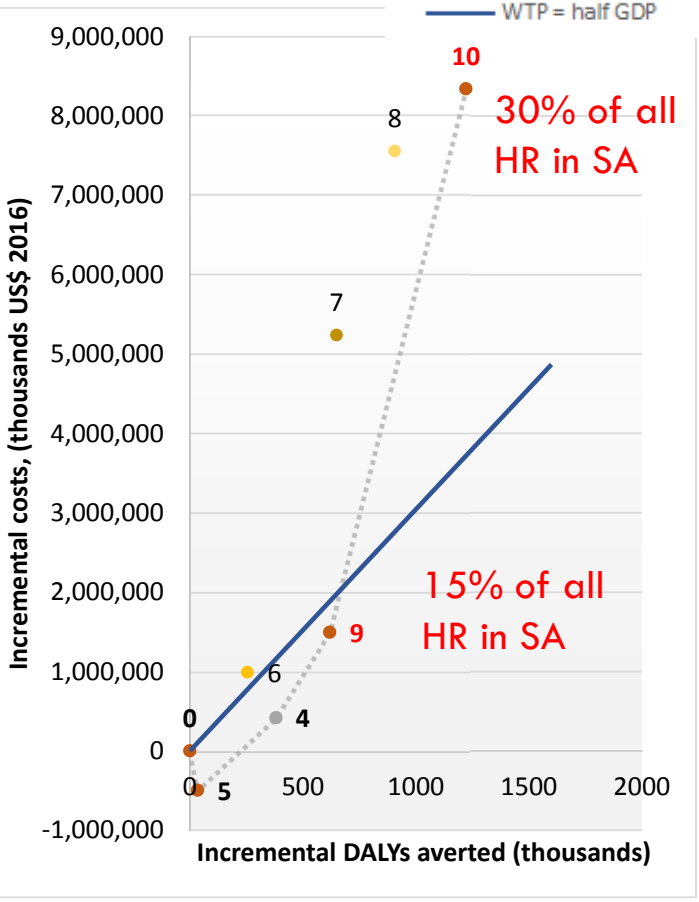

Medium HR constraint, relaxed

SUMMARY AND CONCLUSIONS

Illustrates that:

A) very effective interventions such as screening PHC patients using the WHO tool will remain unfunded without substantial reallocation (but tricky to achieve as reallocation means divestment)

B) allocating 15% of all of the current nurse time in SA to TB may be more cost-effective than current 9% (but likely to be infeasible)

C) reducing sector wide HR constraints increases ICER, but combining cough triage with strengthening the diagnostic algorithm is still cost-effective (and potentially SA could deliver some other interventions)

FOR DISCUSSION

Data availability and quality for constraints estimation

We have assumed that existing TB control activities continue as currently, and only new ones are reduced to satisfy the constraints

- In reality, if more coverage needed then existing activities would be reduced to compensate
- This would require rules for prioritising activities

We have considered a single change in intervention coverage in each scenario over time

- In reality, policies are dynamic and may be changed as capacity increases or decreases

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