WORLD BANK GROUP
Health, Nutrition & Population

2018 SKILLS BUILDING PROGRAM

BIG DATA, ARTIFICIAL INTELLIGENCE AND DECISION SCIENCE IN HEALTH AND NUTRITION

Defining objectives and constraints in Optima TB

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Objectives: achieving maximum impact

- Optimizations can be set to identify budget allocation to:
  - minimize **new active TB infections**
  - minimize **TB-related deaths**

- Weighting between infections and deaths can be specified, e.g. 5 to 1 deaths to infections.

- Other objectives can be set depending on context

- **Different objectives will result in different budget optimizations**

Recommendation: single objective to ease interpretation

- Recommend selecting a single objective with multiple outcomes
  - Identify allocation to minimize **active TB incidence**
  - Identify allocation to minimize **TB deaths**
  - Identify allocation to minimize **DALYs**
  - Identify allocation to minimize **active DS/MDR/XDR TB prevalence**

- Highlight or present the optimal allocation for a single objective for a single outcome, e.g. by 2035 reduce TB incidence by 90% compared with 2010

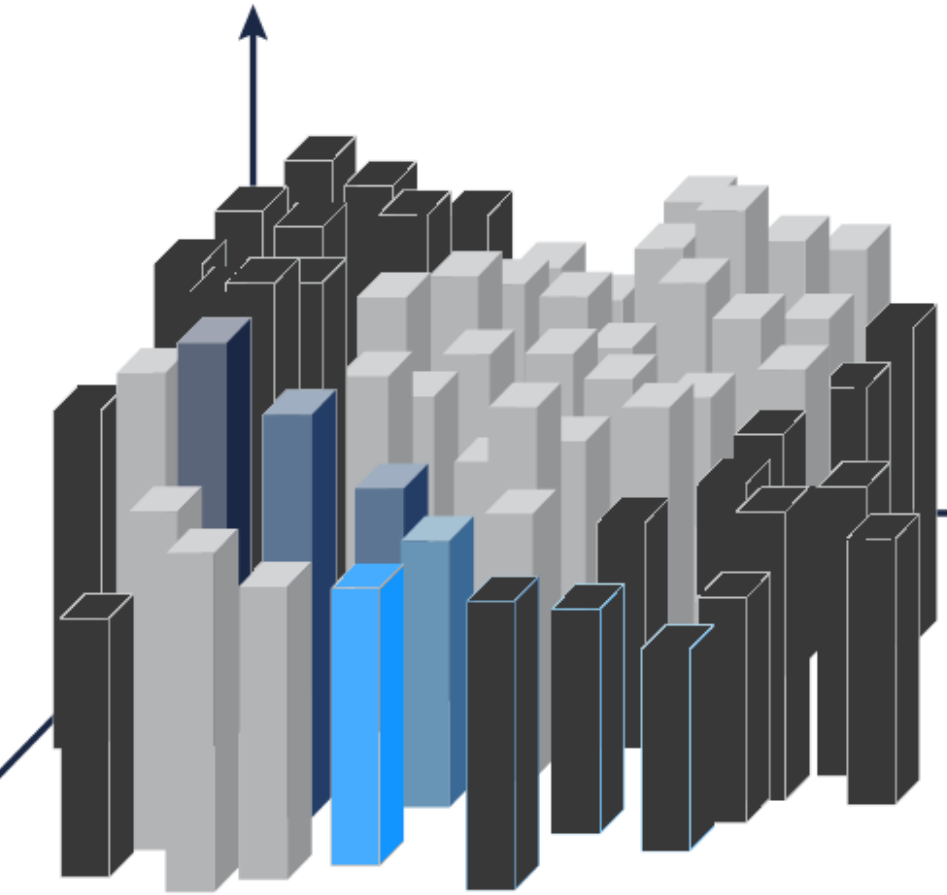
Time horizons matter

Optimal allocations can sometimes be very different over different time horizons:

- If the objective is to minimize TB-related deaths by **2020** → may prioritize funding to immediately scale-up treatment programs
- If the objective is to minimize TB-related deaths by **2035** → may also prioritize programs that prevent new TB infection

How to balance short-term with long-term impacts is an important decision in setting objectives.

Constraints: ethical, economic, logistic, political



With constraints for treatment

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Constraints are important, but should be limited

- If all commonly requested constraints were incorporated, there would be limited or no change in funding allocation
  - Little to no change towards achieving the objective

- Recommendations
  - Analyses be as unconstrained as possible
  - No one on treatment be removed from treatment
  - Add constraints around funding mechanisms
    - Donor-based program targeting policies
  - Reasonable scale-up/down periods (with allowance for as large changes as possible)

Constraints for reallocating program funding

Minimum and maximum spending constraints can be included in the optimization process

	Min % of most recent budget	Max % of most recent budget
BCG Vaccination	100%	100%
Testing: TST, LPA and solid culture tests	100%	100%
Mass screening (including X-ray)	50%	70%
Active case finding: key populations	100%	120%
Hospital-based treatments for DS, MDR-TB and XDR-TB	30%	50%
Palliative care	40%	40%
Involuntary isolation for MDR-TB and XDR-TB	20%	50%

Reallocating from most recent to optimized budgets

Scaling up programs can often not be implemented immediately, especially for large increases.
The optimization process allows for this, by limiting the amount of scale up or down per year.

- To reflect the reality of program implementation, changes in program funding between most recent and target funding levels were capped at either
  - a maximum of 30% per year, for existing programs
  - a maximum of 15M (equivalent to around US$1M), for new programs for the first year, and 30% in subsequent years

  until the target level for the program funding was reached

Limitations of Optima TB analysis

- Analysis does not determine the implementation efficiency of programs
  - Additional implementation efficiencies, such as reductions in drug prices, could result in different resource allocations
  - Scenarios can be used in Optima TB to explore the effect of different implementation efficiencies where significant uncertainty exists
- Effects outside the TB endpoints are not modelled
  - non-health benefits, human rights, ethical, employment and psychosocial impacts are not considered
- Analysis results are only as reliable as the data and assumptions used to generate them

QUESTIONS?