Optima TB

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Optima TB is a tool to help national decision-makers, program managers and funding partners achieve maximum impact with the funding available for a country's tuberculosis (TB) response, primarily through allocative efficiency and planning for financial sustainability.

Features and functions

Optima TB is a quantitative tool that can provide practical advice to governments to assist with optimal programmatic investments in national or sub-national TB responses. It combines an epidemiological model of TB transmission and disease progression integrated within a flexible economic and financial analysis framework that can be used to identify the most cost-effective intervention mix to achieve the greatest health impact. The *Optima approach* has also been used extensively to inform policy-makers in the search for allocative efficiency in HIV control and malaria, and is now being applied to the control of tuberculosis. The Optima analyses are driven by the policy questions. If a full allocative efficiency study is desired, the Optima approach involves the following key stages:

1) Assess the **burden of disease** over time, for each population group, and for each disease sequelae/state (through data synthesis and epidemiological modelling).
2) Specify the **efficacy and effectiveness of interventions**, which have the potential to reduce incidence, morbidity and mortality (as well as determine the costs required to deliver services to different coverage levels).
3) **Define strategic objectives** and national priority targets – as well as the logistic, ethical and/or political constraints around achieving these objectives – across the entire population and by disease area.
4) Use a formal **mathematical optimization algorithm** around the constructs from the previous steps to assess the optimal allocation of a given level of resources to best achieve the objectives to reduce disease burden, subject to the defined constraints.

Like Optima HIV and Optima Malaria, the Optima TB tool contains a formal quantitative model that is a deterministic, population-based epidemic model, encapsulated within an intervention and costing framework.

Key features of the epidemiological model include:

- Drug-sensitive (DS), multidrug-resistant (MDR) and extensively drug-resistant (XDR) forms of TB
- Representation of smear positive and smear negative forms of TB;
- Early and late forms of latent TB;
- An 'Immune state', representing vaccinated or partially immune individuals with reduced susceptibility to infection;
- Spontaneous self-healing;
- Acquired resistance through failed or defaulted treatments;
- Ability to include comorbidities, as well as comorbidity-specific treatments (e.g. HIV and ART, diabetes and insulin, etc).

Interventions can be chosen from a default list of World Health Organization (WHO)-recommended guidelines. Additionally, interventions can also be user-defined to represent country-specific variations or disaggregated into different service modalities. Each intervention can be specified to target populations and requires cost data and coverage levels. Additionally, diagnostic programs can be quantified by specificity and sensitivity, while treatments can include adherence levels.

How the tool helps Country Teams

Optima TB has several features that make it particularly relevant for country stakeholders, including numerous policy, program and research questions that can be addressed with the tool:

- How close is a country to its NTP targets under current funding, both with and without optimal allocation of current expenditure?
- How much funding is required, and/or what programmatic coverage levels are required, to meet NTP targets?
- What is the optimal implementation combination of different service delivery modalities to attain these programmatic levels at minimal cost?
- What have been the impacts of past program implementation, by program/funding source?
- What is the expected future impact of policy or program implementation scenarios?
- What is the projected future trajectory of a country's TB epidemic with and without investment in specific programs, or with/without attaining program-specific targets?
- What is the impact of moving to new drug regimens for targeting MDR-TB and XDR-TB?
- How can programmes move towards more active case finding?
- Improving testing and/or treatment amongst high-risk groups? (i.e. prisoners, migrants)
- Impact of care and co-treatment for patients with co-infections (i.e. for PLHIV, impact of testing vs treatment vs IPT vs ART)

Time needs

To get the most out of an Optima TB analysis, national monitoring and evaluation experts and other partners should run the model jointly with trained experts from the Optima Consortium and associated development partners.

Time and technical assessment (TA) needs vary:

- A new, full Optima study led by the Optima Consortium without country Ministry of Health engagement will take a moderate amount of time (4-8 weeks). We note that there are occasions when this may be appropriate but we strongly recommend country engagement for any country-related decisions.
- A new, full Optima study conducted with full engagement from the country Ministry of Health will take a longer amount of time (three–four months of TA but over six–nine months).
- Existing Optima TB projects can be leveraged in future, saving time and effort.

Advantages

- Serves a range of specific purposes for optimized TB resource allocation, prioritization, evaluation and analysis of long-term financial space.
- Provides assistance to national governments in determining the optimal allocation of their TB resources between different interventions.
- The Optima TB framework is flexible and the analytical scope is highly extensible, allowing the tool to be configured to accurately capture a country's tuberculosis epidemic and perform levels of analysis.
- Scenarios allow exploration of alternative interventions; targeting specific populations of interest; epidemic trends (e.g. trends in MDR cases)
- Is suitable for facilitating inter-disease allocations when used with complementary tools (i.e. between different diseases)

Limitations

- The outcome of this analysis may not always be popular and considerations of equity or other political implications will need to be addressed outside this tool.

Data requirements

Country partners complete the Optima TB data entry spreadsheet, containing data fields for epidemiological, programmatic and financial data for each population group and geographical region as desired. Where data are missing, assumptions may be made; however, the more high-quality the data, the more reliable the final results and recommendations.

Default epidemiological values for infectivity and disease progression are included based on reviews of global estimates, which could be updated to reflect either sub-national, national or regional values. Fitting the model projections against a country's reported data can be done using a manual or an automated fitting process.

Table 1. Data requirements for Optima TB

Population parameters
Population counts
Transitions between populations
Non-TB deaths
TB-related deaths
New notifications of active TB
Prevalence (estimates)
Testing of active TBv
Treatment of active TB
Co-morbidities
Epidemiological parameters
Progression rates for latent and active forms of TB
Infection rates
Intervention parameters
Unit cost per each intervention
Coverage for each intervention
Saturation coverage of each intervention
Impact of intervention on infectiousness or progression of TB
Specificity and sensitivity of diagnostic interventions
Duration and adherence of treatment regimes