

Annex 7

Methodology to estimate the benefits of investing in health systems to reduce the burden of HIV, TB and malaria as well as other conditions

A modeling analysis was conducted using the Thanzi La Onse (TLO Model)¹ to estimate the health impact of recent investments on human resources for health (HRH), consumables and disease-specific programs for HIV, TB and malaria in Malawi. The TLO model is an individual-based simulation of the interactions between individuals and the health system. It includes representations of a wide range of disease and conditions, including malaria, HIV, TB, measles, childhood infections (e.g., acute lower respiratory infections, diarrhea), non-communicable diseases (including diabetes, hypertension, heart disease, cancers, stroke), and reproductive, maternal and newborn health.

This analysis evaluated the health and economic impacts of three investment approaches in Malawi over the period 2023-2029: (i) investments in broader health systems strengthening, (ii) scale-up of HIV, TB and malaria programs; and (iii) a combined approach integrating both (i) and (ii). For (i), the health system investments were: scale-up (6% per year) of primary health care workforce, scale-up (6% per year) in number of health care workers (matching recent scale-up rates), reductions in stock-outs of consumables so that every facility has the same performance of that of the facility currently at the 75th percentile for fewest stock-outs. For (ii), the HIV, TB and malaria program scale-up involved expanding the scale, scope and coverage of interventions for these diseases within the constraints of existing health system resources. Specifically:

- **HIV:** Increasing access to preventive treatment for HIV (for female sex workers and adolescent girls); increased retention on preventive or antiretroviral therapy; increased uptake of medical male circumcision; increased HIV testing during pregnancy, childbirth, or for newborns; increased annual testing rates for adults;

¹ Estimates of resource use in the public-sector health-care system and the effect of strengthening health-care services in Malawi during 2015–19: a modelling study (Thanzi La Onse). Hallett, T. B. et al. The Lancet Global Health 13, e28–e37, 2025.

and increased likelihood of viral suppression on treatment (through adherence support and longer-acting formulations).

- **Tuberculosis:** Expanded first-line GeneXpert testing; increased treatment success rates for drug-sensitive and drug-resistant infections (through earlier and more accurate diagnosis, faster referral and patient adherence); and expanded access to preventive therapy for people living with HIV and child contacts of active cases.
- **Malaria:** Increased uptake of testing; improved treatment success (through increased access to treatment and timely initiation); expanded coverage of indoor residual spraying in high-risk districts; and higher coverage of insecticide-treated mosquito nets across all districts.

Health outcomes were summarized using disability-adjusted life years (DALYs), total deaths and life expectancy, with DALYs providing a comprehensive measure of disease burden by combining years of life lost due to premature death with years lived with disability. Cost estimates incorporated standardized inputs for human resources, medical consumables and infrastructure. The return on investment (ROI) was based on the magnitude of incremental health benefits monetized using a value of a statistical life year (VSLY) of US\$834 for Malawi. The cost of implementing these changes, over and above the cost of incremental health system inputs, was unknown. Therefore, the computation was repeated for a range of hypothetical implementation costs.

Further details on the model, including source code and documentation, can be found at www.tlomodel.org.

The Global Fund commissioned the TLO modeling team² to conduct this study, which was undertaken by a professor of global health³ and a research fellow⁴ in the faculty of medicine at Imperial College London, and a research fellow⁵ at the University of York.

² The Thanzi La Onse (TLO) Model. <https://www.tlomodel.org>.

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