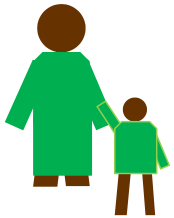
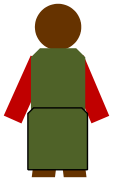
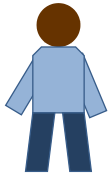
treat TB

Technology, Research, Education, and Technical Assistance for Tuberculosis

Virtual Implementation – modeling diagnostic options for TB and MDR-TB







Prof. Bertie Squire, LSTM

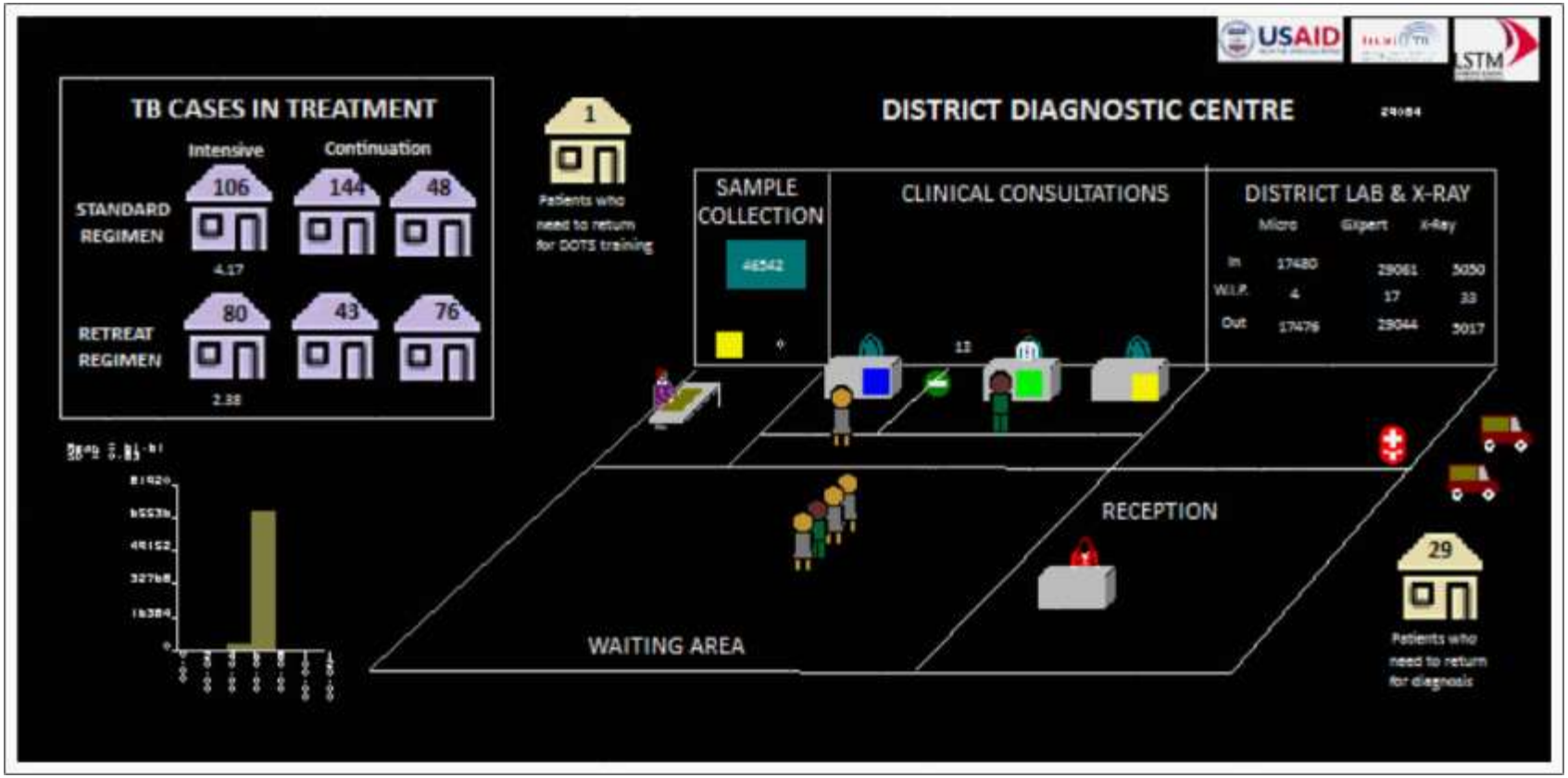
on behalf of Treat-TB modeling team

LSTM

USAID FROM THE AMERICAN PEOPLE

Virtual Implementation

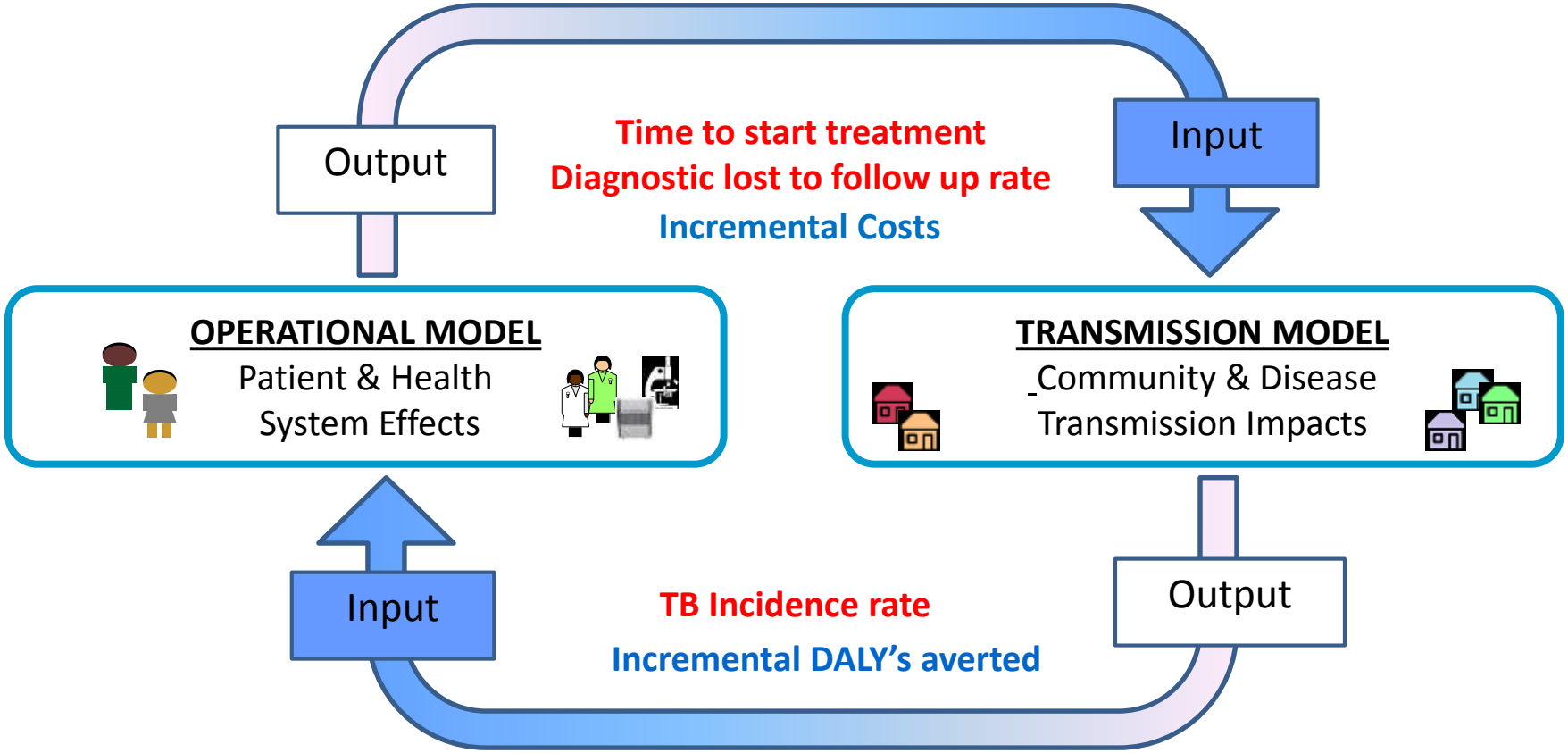
- *WHAT is virtual implementation? – Treat-TB Tanzania model for diagnostic centre*



Langley I, Doulla B, Lin HH, Millington K, Squire B (2012). Modelling the impacts of new diagnostic tools for tuberculosis in developing countries to enhance policy decisions. Health Care Manag Sci 2012;15: 239–53.

Virtual implementation – What is it about?

- *bringing together operational, transmission, and cost effectiveness modelling*



Combining the outputs to calculate the Incremental Cost Effectiveness Ratio (ICER)

Lin HH, Langley I, Mwenda R, et al. A modelling framework to support the selection and implementation of new tuberculosis diagnostic tools. Int J Tuberc Lung Dis 2011; 15: 996–1004.

Example from Tanzania

- *The Lancet – Global Health 2014*

Assessment of the patient, health system, and population effects of Xpert MTB/RIF and alternative diagnostics for tuberculosis in Tanzania: an integrated modelling approach

Ivor Langley*, Hsien-Ho Lin*, Saidi Egwaga, Basra Doulla, Chu-Chang Ku, Megan Murray, Ted Cohen, S Bertel Squire

Lancet Glob Health 2014; 2: e581–91

See Comment page e554

Summary

Background Several promising new diagnostic methods and algorithms for tuberculosis have been endorsed by WHO. National tuberculosis programmes now face the decision on which methods to implement and where to place them in the diagnostic algorithm.

Methods We used an integrated model to assess the effects of different algorithms of Xpert MTB/RIF and light-emitting diode (LED) fluorescence microscopy in Tanzania. To understand the effects of new diagnostics from the patient, health system, and population perspective, the model incorporated and linked a detailed operational component and a transmission component. The model was designed to represent the operational and epidemiological context of Tanzania and was used to compare the effects and cost-effectiveness of different diagnostic options.

Findings Among the diagnostic options considered, we identified three strategies as cost effective in Tanzania. Full scale-up of Xpert would have the greatest population-level effect with the highest incremental cost: 346 000 disability-adjusted life-years (DALYs) averted with an additional cost of US$36·9 million over 10 years. The incremental cost-effectiveness ratio (ICER) of Xpert scale-up ($169 per DALY averted, 95% credible interval [CrI] 104–265) is below the willingness-to-pay threshold ($599) for Tanzania. Same-day LED fluorescence microscopy is the next most effective strategy with an ICER of $45 (95% CrI 25–74), followed by LED fluorescence microscopy with an ICER of $29 (6–59). Compared with same-day LED fluorescence microscopy and Xpert full rollout, targeted use of Xpert in presumptive tuberculosis cases with HIV infection, either as an initial diagnostic test or as a follow-

*Contributed equally

Liverpool School of Tropical Medicine, Liverpool, UK (I Langley MSc, Prof S B Squire MD); Institute of Epidemiology and Preventive Medicine, National Taiwan University, Taiwan (H-H Lin MD, C-C Ku BS); National Tuberculosis and Leprosy Programme, Dar es Salaam, Tanzania (S Egwaga MD, B Doulla MSc); Department of Epidemiology, Harvard School of Public Health, Boston, MA, USA (Prof M Murray MD, T Cohen MD); and Division of Global Health Equity, Brigham and Women's Hospital, Boston, MA, USA (T Cohen)

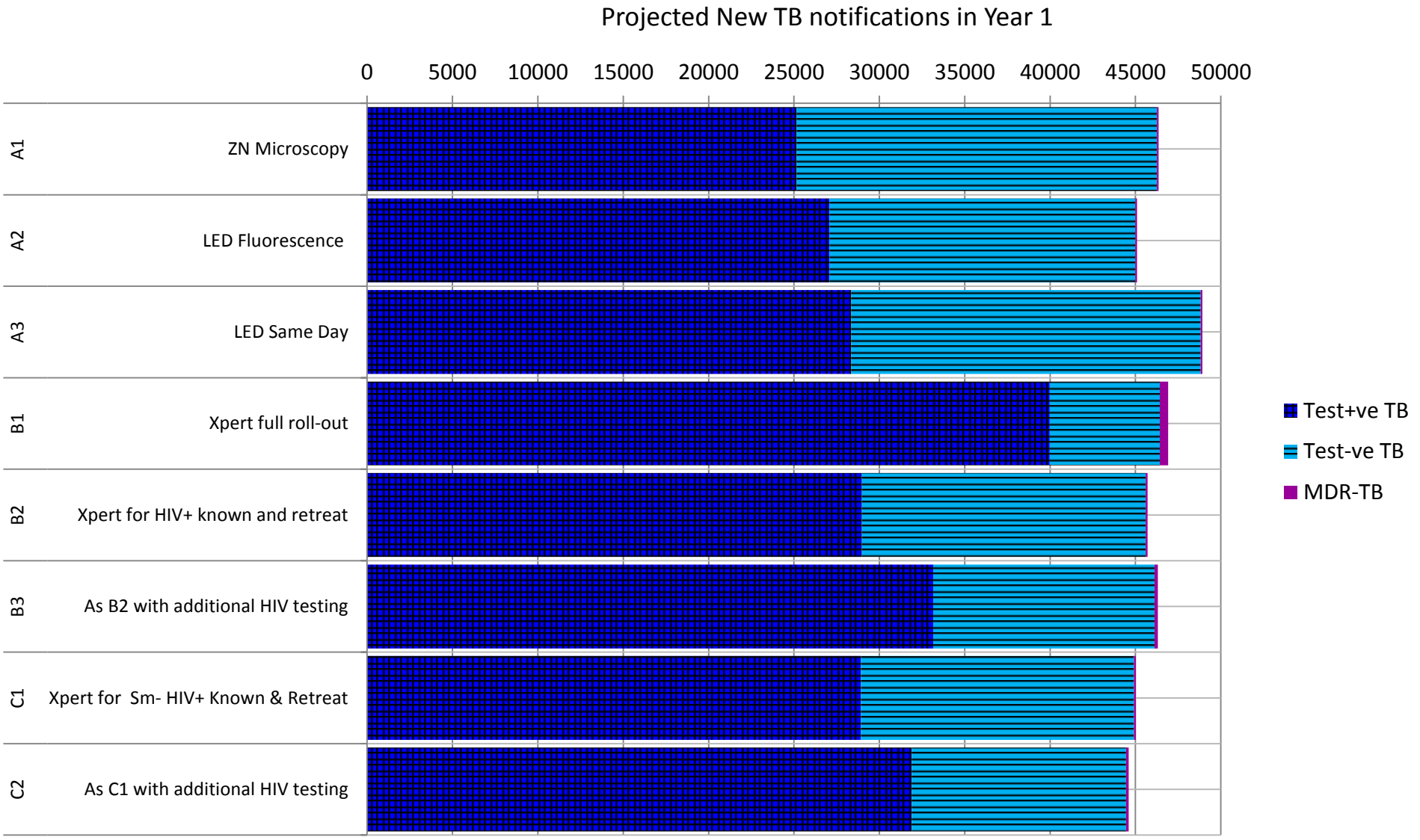
Correspondence to:
Dr Hsien-Ho Lin, Institute of Epidemiology and Preventive

Example from Tanzania
- Diagnostic Options Modelled

A1	Base Case – ZN Microscopy – 2 samples
A2	LED Fluorescence Microscopy – 2 samples
A3	Same Day LED Fluorescence Microscopy – 2 samples
B1	Full rollout of Xpert MTB/RIF to all new and retreatment TB presumptive cases - *1 sample*
B2	Xpert MTB/RIF as primary test for known HIV+ new TB presumptive cases, and all retreatment cases – *1 sample Xpert, 2 sample Microscopy*
B3	As B2, but with additional HIV testing prior to TB testing to increase proportion with known HIV status – *1 sample Xpert, 2 sample Microscopy*
C1	Xpert MTB/RIF as secondary test for smear –ve known HIV+ new TB presumptive cases and all retreatment cases *- 2 samples microscopy*
C2	As C1 but with additional HIV testing prior to TB testing to increase proportion with known HIV status – *2 samples microscopy*

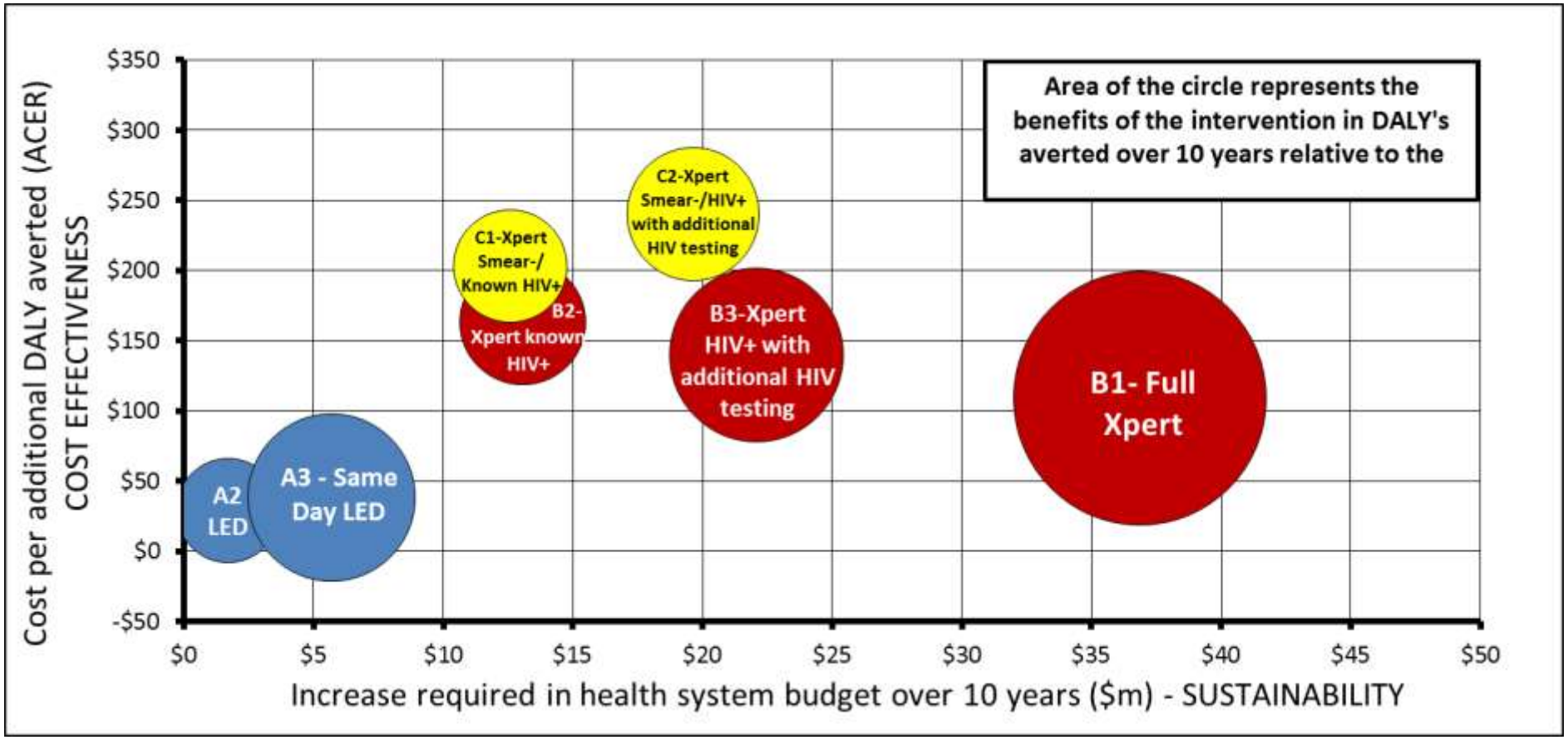
Example from Tanzania

- WHAT is the impact on projected TB notifications?



Example from Tanzania

- Combining outcomes in Cost Effectiveness Analysis



Virtual Implementation

Currently designed to help country-level decision making and uptake of new diagnostics

Could be used to help in refining target product profiles, recognising that tests are deployed within systems

Can be used for country-level decision making and uptake of new drug regmimens