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TITLE: Tracking tuberculosis incidence: time to tool up.

Incidence of tuberculosis (TB) disease is a key metric for tracking TB burden and monitoring progress with control efforts. Incidence responsively measures success with primary prevention, is not muddied by different or changing disease duration, and is distinct from individual-level measures of programme success such as treatment outcomes. However, TB incidence cannot be directly measured. General population TB prevalence surveys are already challenging undertakings, and adding a longitudinal component is not feasible.

In their article in this issue of IJTLD, Pandey and colleagues¹ provide an example of a mathematical modelling approach to the problem of estimating TB incidence, applying their method to India - the country with the largest number of TB cases in the world. They incorporate an understanding of the natural history of TB in a simple model and use data on TB prevalence and annual risk of infection (ARI) to estimate TB incidence. They also suggest evidence of more intense transmission in urban settings and poorer access to care in rural settings; features it would be interesting to investigate further.

The familiar Styblo rules² can be thought of as a simple mathematical model providing a quantitative mapping between TB incidence, TB prevalence and ARI. However, the use of mathematical modelling in TB burden estimation is much less developed than in the HIV world, where various approaches have been studied and are a core component of the UNAIDS burden estimation process.³ This is partly because TB presents additional challenges compared with HIV: survey data are rarer and less precise, routine data are prone to poorly quantified biases, and the underlying natural history and epidemiology are subject to greater uncertainty. These issues are not insurmountable, but do require a principled approach and careful treatment in modelling analyses.

In common with the Styblo rules, Pandey and colleagues make use of data on ARI. ARI fell from favour as a tool for TB surveillance as limitations and difficulties of interpretation of the tuberculin skin test (TST) for latent TB infection (LTBI) emerged. However, as TB control improves and TB becomes rarer, TB prevalence surveys will become less feasible. Moreover, TB control programmes will need to place a greater emphasis on LTBI, providing another motivation for LTBI surveillance. Improved tests of LTBI that can identify recent infection, and those at greatest risk of developing TB, would be hugely useful tools for targeted preventive

therapy, but a test of recent infection would also be an important tool for surveillance. There are hints that the new QuantiFERON-TB Gold Plus test may be better able to identify recent infection;⁴ but we are still largely looking to the future, whereas the development of HIV incidence assays and methodological work supporting their use in surveillance is much further progressed.⁵

TB control is entering an exciting era. Achieving the End TB targets will require new tools; but effort to develop new methods of monitoring our progress will also be required. Diverse modelling approaches to synthesizing new and heterogeneous epidemiological data should be part of this effort.

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