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Economies and Diseconomies of Scale of HIV Testing Services in Zambia: Results from Markov Microsimulations

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Abstract Text:

Background: Adult HIV prevalence in Zambia is approximately 12%, yet it is estimated 28% of people with HIV remain undiagnosed. In 2016 Zambia adopted HIV self-testing (HIVST) as an additional approach to expand coverage and access to those in need of testing and who might not otherwise test. While early introduction focused on small scale HIVST distribution in specific districts and regions, the programme seeks to expand nationwide. This study evaluates the incremental cost-effectiveness of adding home-based HIVST distribution to conventional facility-based HIV testing services (HTS) to reach people who otherwise would not access HTS while visiting health facilities. We explore economies and diseconomies of scale, using current constraints to coverage within facility HTS and incrementally introducing HIVST scale up.

Methods: We developed a sex and age-specific Markov microsimulation model for Zambia. Costs and health outcomes were evaluated over a 20-year time horizon, using a discount rate of 3%. Cost are presented from a providers' perspective and effects in terms of quality adjusted life year (QALY) saved. We used national HIV testing data to reflect uptake of facility HTS within the model and assumed only those untested in the past year were eligible for home-based HIVST and could accept or reject HIVST with its accompanying costs and consequences. To explore economies and diseconomies of scale of the home-based HIVST distribution, we systematically varied the scale of home-based HIVST distribution by increasing absolute population coverage by 10%, 15% and 20%.

Results: The standard of care facility-based HTS is estimated to cost US$1,671,129 and save 37,285 QALYs across both men and women, costing $44/QALY gained. To reach an additional 10% who do not regularly test at the facility-based HTS, an additional cost of US$3 million would be needed to gain an extra 36,917 QALYs, i.e. US$82/ QALY

gained. Further expansion to identify 20% more HIV-infected individuals would cost $88,211, but only gain an additional 102 QALYs, at $864/QALY gained. Our finding show how costs are likely to increase during scale-up of HIVST to reach the 10% and 20% of individuals who do not test at the health facilities, and the health consequences.

Conclusion: Overall, facility-based HTS is a cost-effective approach to screening for HIV, but its impact is limited by willingness of people to present at facilities. To reach the 28% who remain undiagnosed, more pricy approaches are likely needed. Homebased HIVST provides a cost-effective add-on to current testing approaches and can play an important role in reaching testing targets. However, when modelling costs from pilots for national scale-up, it is important to consider how costs change as screening programmes are successful in identifying those easily reached. To identify, the last HIV cases, testing budgets will need to expand. Next steps in this work will aim to identify optimal screening frequencies.