

COMPARISON OF POTENTIAL EFFECTIVENESS OF UNIVERSAL TESTING VERSUS INDEX TESTING: ESTIMATIONS AFTER 4 YEARS OF DATA FROM THE HPTN 071 (PopART) TRIAL

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BACKGROUND

UNAIDS 90-90-90

By 2020, the UNAIDS 90-90-90 targets aim to achieve 90% knowledge of HIV-positive status among all people living with HIV (PLWH), 90% treatment coverage among individuals diagnosed with HIV, and 90% of individuals on treatment achieve viral suppression.

To reach the first 90 target, different testing strategies have been developed during the past decade from facility-based service delivery to community-based and household-level testing models. The contribution of each of these models to the first UNAIDS 90 is unknown.

HPTN 071 (POPART)

PopART was a community randomized trial to measure the impact of offering a combined HIV-prevention package on the incidence of HIV. The HIV-prevention package included HIV-testing and was offered door-to-door to all community members (universal testing or UT) from January 2014 to December 2017 in 8 Zambian communities and 6 communities in Western Cape South-Africa.

PEPFAR ZAMBIA

Index testing (IT) and partner notification with a focus on high

prevalence settings are encouraged by PEPFAR and the Zambian Ministry of Health to increase coverage of knowledge of HIV status. IT and partner notification aim to test sexual partners of individuals diagnosed with HIV and patients that are registered at the HIV-clinic.

OBJECTIVE

Data collected from the 8 Zambian communities during the PopART universal testing approach were used as a denominator to estimate the potential impact of index testing and two other HIV-testing strategies on the number of people living with HIV that are aware of their status (UNAIDS 'first 90').

Index testing misses 86% of the PLWH diagnosed during universal testing



METHODS

UNIVERSAL TESTING IN POPART

A combined HIV-prevention package including HIV-testing, was offered to everybody living in the 8 PopART intervention communities in Zambia with a total of 400,000 population. Lay-counsellors called CHIps (Community HIV-care Provider's) delivered the intervention door-to-door. CHIps worked in pairs whereby every pair covered a zone of approximately 450 households. During one annual round, all households in the community were visited at least once. Households where nobody was at home at the first attempt, were approached repeatedly. All household members were enumerated and HIV-testing was offered to everyone present in the household. Again re-visits were used to offer the intervention to household members that were absent at earlier visits. This intensive door-to-door service delivery was repeated twice, giving a total of 3 annual rounds.

OTHER TESTING STRATEGIES

We studied the potential impact of 3 testing strategies as an alternative to UT.

- 1) Index-testing (IT) : we defined an index case as a participant who self-reported being HIV-positive before testing was offered at the home. We estimated the impact of IT by restricting data to household members of an index case. We compared acceptance and results of HIV-testing between this simulated IT approach and UT (gold standard).
- 2) One sweep (1S) is defined as a community door-to-door approach whereby one single attempt is made to visit a household and we offer testing to only those that are present at that single visit. No follow-up visits are made ("UT-light")
- 3) One sweep followed by index testing (1S+IT). A combination of the previous 2 strategies: those households identified having 1 or more PLWH in 1S, are followed up repeatedly to offer testing to all other household members

MEASURING IMPACT OF TESTING STRATEGIES

To study the potential impact of alternative testing strategies we used the data observed during UT and restricted the data to the subpopulation suggested by the testing strategy. The impact was measured with the following outcomes:

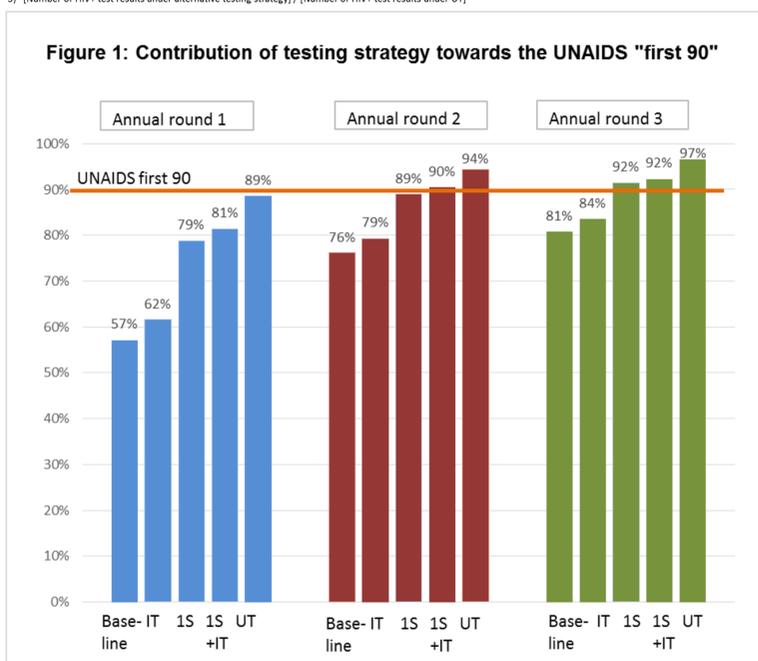
- HIV-positivity rate ("yield") i.e. number of HIV-positives found among those accepting testing
- Reduction in HIV-tests performed compared to UT
- Proportion of PLWH found compared to number of PLWH found under UT
- Contribution to the number of PLWH that know their status (UNAIDS first 90).

RESULTS

Table 1: HIV-positivity rate (yield) of all 4 testing strategies; number of HIV-tests used and number of PLWH identified comparing 3 alternative strategies with UT as gold standard

	Annual round 1			Annual round 2			Annual round 3		
	HIV+ rate (yield) ¹⁾	HIV-tests used compared to UT ²⁾	Tested HIV+ compared to UT ³⁾	HIV+ rate (yield) ¹⁾	HIV-tests used compared to UT ²⁾	Tested HIV+ compared to UT ³⁾	HIV+ rate (yield) ¹⁾	HIV-tests used compared to UT ²⁾	Tested HIV+ compared to UT ³⁾
Universal Testing (UT)	9,196 / 126,208 (7.3%)	NA	NA	4,601 / 103,213 (4.5%)	NA	NA	4,381 / 124,090 (3.5%)	NA	NA
Index testing (IT)	1,304 / 10,679 (12.2%)	10,679 / 126,208 (8.5%)	1,304 / 9,196 (14.2%)	804 / 11,018 (7.3%)	11,018 / 103,213 (10.7%)	804 / 4,601 (17.5%)	769 / 14,079 (5.5%)	14,079 / 124,090 (11.3%)	769 / 4,381 (17.6%)
One sweep (1S)	6,328 / 79,072 (8.0%)	79,072 / 126,208 (62.7%)	6,328 / 9,196 (68.8%)	3,235 / 75,469 (4.3%)	75,469 / 103,213 (62.7%)	3,235 / 4,601 (70.3%)	2,797 / 74,448 (3.8%)	74,448 / 124,090 (60.0%)	2,797 / 4,381 (63.8%)
One sweep + index testing	7,107 / 85,298 (8.3%)	85,298 / 126,208 (67.6%)	7,107 / 9,196 (77.3%)	3,603 / 79,406 (4.5%)	79,406 / 103,213 (73.1%)	3,603 / 4,601 (78.3%)	3,193 / 80,622 (4.0%)	80,622 / 124,090 (65.0%)	3,193 / 4,381 (72.9%)

Footnotes:
1) [Number tested HIV+] / [number of tests done]
2) [Number of tests performed under alternative testing strategy] / [Number of tests performed under UT]
3) [Number of HIV+ test results under alternative testing strategy] / [Number of HIV+ test results under UT]



In annual round 1, the HIV-positivity rate is higher under IT (1,304/10,679, 12.2%) than under the other testing strategies (7.3%, 8.0% and 8.3% for UT, 1S and 1S+IT respectively).

The number of test kits used under IT is 8.5% of the test kits used under UT (62.7% for 1S and 67.6% for 1S+IT). However IT misses 85.8% of the PLWH diagnosed during UT (31.2% for 1S and 22.7% for 1S+IT).

In annual round 2 and 3 the baseline coverage of knowledge of status among PLWH is higher after UT in previous round(s). As a result the HIV-positivity rate in all testing strategies decreases in annual round 2 and 3 compared to annual round 1. There are no major differences between annual round 1 and annual round 2 and 3 in terms of reduction in tests and proportion of undiagnosed PLWH compared to UT (see table 1).

Among participants of the intervention, IT would have resulted in an increased number of PLWH knowing their status (UNAIDS "first 90") from 57.2% before IT to 61.6% after IT. Other testing strategies show a larger rise in knowledge of HIV-positive status from 57.2% to 78.8% for 1S, 81.5% for 1S+IT and 88.6% for UT. A similar trend in contribution of the testing strategies to the "first 90" is seen in the annual rounds 2 and 3 but with higher baseline knowledge of status in round 2 and 3. After 1S, 1S+IT and UT, the knowledge of HIV-positive status among participants of the intervention achieves the UNAIDS first 90, whereas with IT alone it does not (see figure 1)

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CONCLUSION

Compared to other testing strategies, index testing results in a higher proportion of HIV-positives found per test performed and greatly reduces the number of HIV-tests used. However using index testing as the only strategy leaves many PLWH undiagnosed in the community and would be insufficient to reach UNAIDS "first 90" target.

The PopART UT approach was successful in meeting the "first 90" target. UT is often considered to be unaffordable, too labour intensive and too complex to be implemented as routine service delivery.

Offering door-to-door testing in a one-off sweep of visits to all households in the community ("UT-light") combined with subsequent index-testing, could be considered as a lower cost alternative and a realistic service delivery model with a substantial increase of the number of PLWH in the community that know their status but fewer PLWH will be diagnosed compared to UT.