

UNITAID-PSI  
HIV SELF-TESTING AFRICA

# Value of secondary distribution of HIV self-test kits to male partners of female sex workers

V Cambiano<sup>1</sup>, E Sibanda<sup>2</sup>, M Morrison<sup>3</sup>, T Shewchuk<sup>3</sup>, G Garnett<sup>3</sup>, H Thirumurthy<sup>4</sup>, L Bans-Matharu<sup>1</sup>, P Revill<sup>5</sup>, F Cowan<sup>6</sup>, F Terris-Prestholt<sup>7</sup>, J Busza<sup>7</sup>, S Napierala<sup>8</sup>, C Johnson<sup>9</sup>, K Hatzold<sup>10</sup>, EL Corbett<sup>7</sup>, A Phillips<sup>1</sup>.

1. University College London, London, UK; 2. CeSHHAR, Harare, Zimbabwe; 3. Bill and Melinda Gates Foundation, Seattle, US; 4. University of Pennsylvania, US; 5. University of York, York, UK; 6. Liverpool School of Tropical Medicine, Liverpool, UK; 7. London School of Hygiene and Tropical Medicine, London, UK; 8. RTI International, San Francisco, US; 9. World Health Organization, Geneva, Switzerland; 10. Population Services International, Washington, US;

## BACKGROUND

As the proportion of people diagnosed with HIV increases, the cost-effectiveness of any form of HIV testing declines, making it important to identify targeted strategies that offer value for money. Distribution of HIV self-tests (HIVSTs) to partners of female sex workers (FSWs) having condomless-sex is feasible and can reach men at high risk of HIV.

## METHODS

We simulated 685 setting-scenarios for adult HIV epidemics and care programmes typical of southern Africa using a dynamic-transmission model (see Table), with projections 50 years from 2020. For each setting-scenario, we compared outcomes:

- under continuation of current testing policy
- by also providing HIVSTs to FSW to distribute to their partners (if age>18 and having condomless-sex).

We assessed the epidemiological impact and cost/disability-adjusted life-year (DALY) averted. We assumed that ~63% of eligible partners of FSW would receive an HIVST, that 80% of partners of FSW testing positive with an HIVST would have confirmatory testing by a health care worker (HCW) within 1 year. We assumed a 3% annual discount rate, and cost-effectiveness threshold of US\$500/DALY averted. Several **sensitivity analyses** were conducted, assuming:

- (a) 20 years time horizon, partners of FSW receiving an HIVST),
- (b) 0% and 10% discount rate, (g) 50% of partners of FSW testing positive with an HIVST having confirmatory testing by 1 year,
- (c) cost/test kit distributed of US\$10, (h) lower background testing among FSW,
- (d) only FSWs who tested negative in the last year being eligible to distribute HIVST but a greater % of them doing so, (i) increased targeting of testing among FSW,
- (e) HIVST being available only for 10 years, (j) FSWs who distribute HIVST increasing their rate of testing.
- (f) a lower or higher uptake (% of eligible

**Table. Baseline characteristics of setting-scenarios at baseline (in 2019, n = 685)**

	Median (90% range) across setting-scenarios	Examples of observed data
<b>Population size</b>		
15-64 (in million)	10.0 (9.2 - 10.8)	Zambia (2018): 8.2m; Malawi (2018): 9.8m; Zimbabwe (2018): 7.8m;
Eligible men (in 1000)*^	371.9 (29.1-1,339.1)	
<b>HIV prevalence</b>		
Overall, 15-49	9.4% (3.0% - 22.6%)	Zimbabwe DHS (2015): 14%; Tanzania (2011): 5%; Uganda (2011): 9%;
Eligible men^	17.0% (5.3% - 54.4%)	Lesotho (2014): 25%;
<b>HIV incidence (per 100 person years)</b>		
15-49	0.70 (0.07 - 1.95)	Malawi MPHIA (2015-16): 0.37%; Zambia ZAMPHIA (2016): 0.66%;
Eligible men^	5.44 (1.29 - 65.5)	Zimbabwe ZIMPHIA (2016): 0.45%; Swaziland: 2.4%; KZN Mbongolwane and Eshowe (Huega): 1.2%;
<b>Prevalence of undiagnosed HIV</b>		
15-64	1.9% (0.4% - 4.8%)	Malawi: 2.9%; Zimbabwe: 3.8%; Zambia ZAMPHIA (2016): 4.0%;
Eligible men^	6.7% (1.8% - 35.0%)	Rwanda (Nsanjimana): ~0.3%;**
<b>Proportion tested in past year</b>		
Men 15-49	14% (9% - 22%)	Zimbabwe DHS (2015): 36%; Namibia DHS (2013): 38%; Nigeria DHS (2013): 10%;
Eligible men^	13% (8% - 20%)	
<b>Percentage of tests resulting in HIV diagnosis</b>		
15-64	2.8% (0.5% - 7.8%)	6%-55% depending on group (Sharma et al). Estimates susceptible to bias due to re-diagnosis of people who do not report previous diagnosis.
Eligible men^	10.1% (0 - 37.5%)	
<b>Of HIV positive people, % diagnosed</b>		
Men 15-49	70% (61% - 85%)	Malawi MPHIA (2015-16): 73%, 76% in women, 67% in men; Zambia ZAMPHIA (2016): 67%, 68% in women, 62% in men; Zimbabwe ZIMPHIA (2016): 74%, 77% in women, 70% in men; KZN Mbongolwane and Eshowe (Huega): 75%; Maman: 77%; Gaolathe: 78%;**
Eligible men^	60% (31% - 75%)	

\*: mean prevalence over 3 month periods in 2017; ^: In order to be eligible they need to have condomless sex with FSW, be aged 18 years old or more. \*\*:Survey estimates likely to be over-estimates due to undisclosed diagnosed HIV; (e.g. Kim et al.)

## CONCLUSION

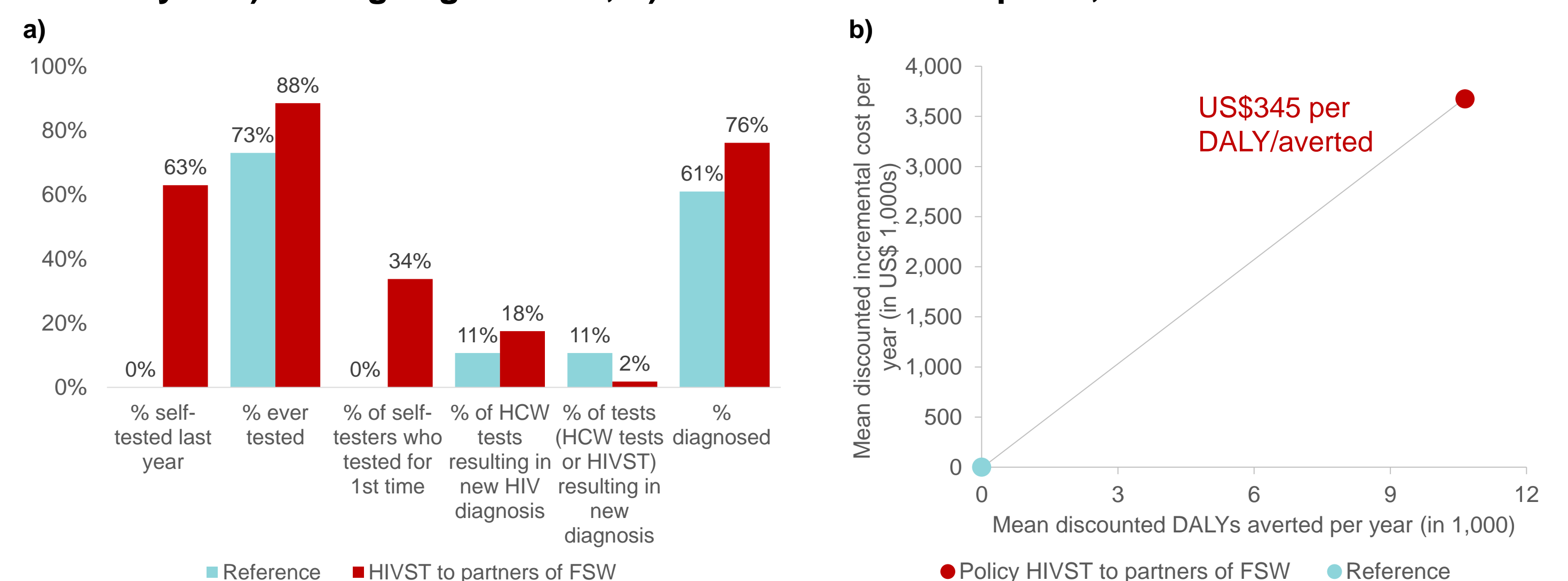
Given our assumed uptake for the secondary distribution of HIVST by FSW, this relatively small intervention, reaching around 4% of the adult population (in each 3 month period), is predicted to avert ~2,400 HIV infections/year, almost 3% of all HIV infections. On average it is cost-effective, with a cost per DALY averted of US\$345, when delivered at US\$5 per kit used.

Together with the time-frame considered and the discount rate used, the cost per HIVST kit

## RESULTS

In an adult population of 10 million in 2019, our assumptions result in 372,000 (median per 3 month; 90% range: 29,000-1,339,000) partners of FSWs being eligible to receive HIVSTs, representing 3.7% of the adult population. The average number of HIVSTs distributed/year (over the first 10 years) would be 695,100, with 34% of such HIVST tests being done in men who had never previously tested (See Figure a). The secondary distribution intervention would increase demand for HCW HIV tests by partners of FSWs from ~54,000 to ~60,000 tests/year and HIV-positivity among all HCW tests from 11% to 18%. This intervention would increase the proportion of partners of FSWs diagnosed from 61% to 76% and avert ~2,400 HIV infections/year (2.5% of all new infections; 95% CI: 1.2%-3.9%) over 50 years. Assuming a cost per partner of FSW HIV self-tested of US\$5, the intervention is on average cost-effective (US\$345 per DALY averted) and cost-effective in 65% of setting-scenarios.

**Figures. a) Effect of secondary distribution of HIVST on intermediate outcomes (mean over 10 years) among eligible men; b) Cost-effectiveness plane;**

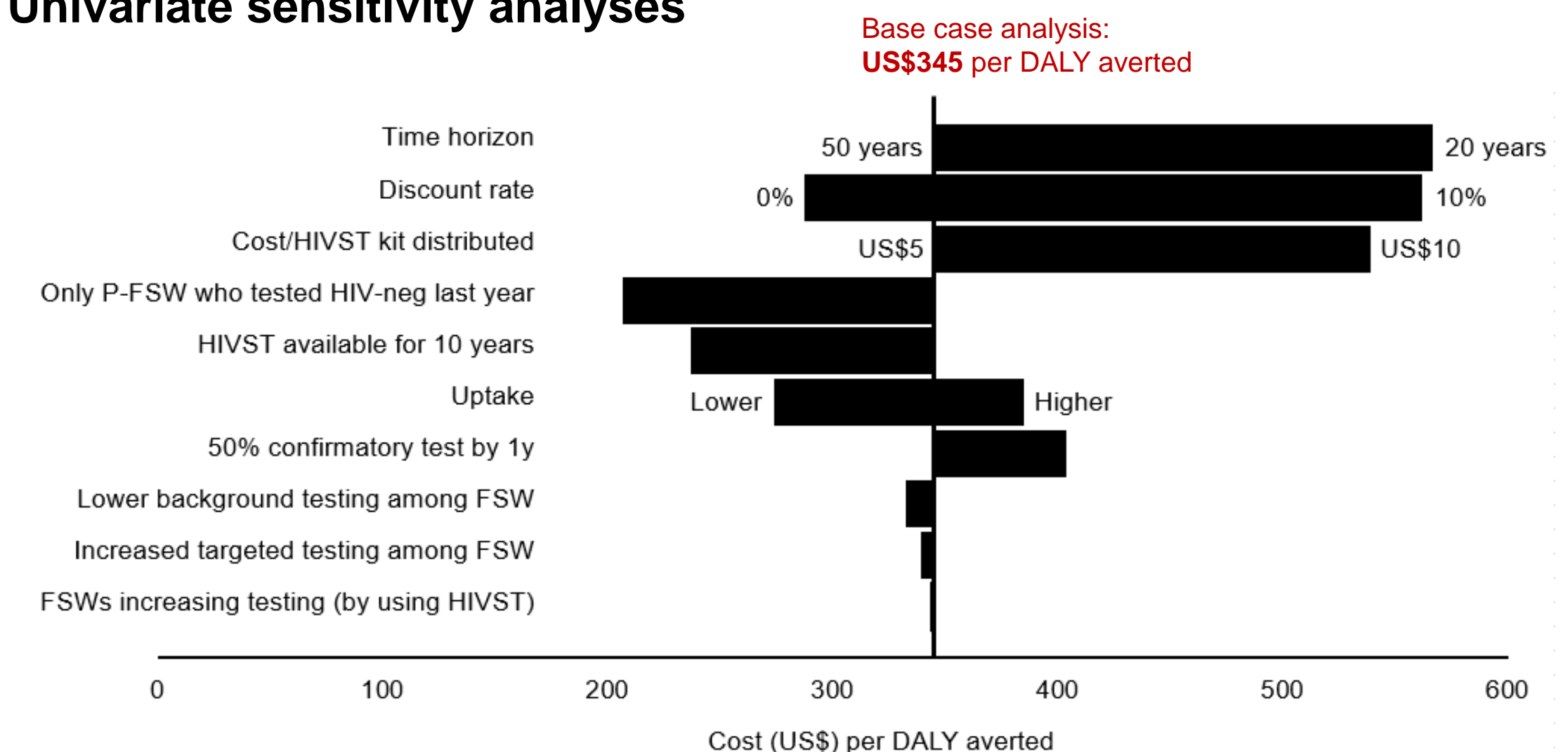


Among the sensitivity analyses that we considered (Figure c), the conditions that made the introduction of secondary distribution of HIVST to partners of FSWs not cost-effective were:

- considering a 20 year time horizon (instead of 50 years)
- a 10% discount rate (instead of 3%)
- cost per HIVST kit distributed of US\$10 (instead of US\$5)

Restricting the secondary distribution by FSW who tested negative in the last year improved the cost-effectiveness, but limited the health impact (data not shown); The same does limiting the secondary distribution of HIVST to the next 10 years or reducing the uptake of HIVST distributed. If the proportion of men with a confirmatory test by one year since the positive HIVST is 50% (instead of 80%) the intervention is still cost-effective, but again the health impact is reduced (data not shown).

**Figure c. Univariate sensitivity analyses**



distributed plays a crucial role in determining the cost-effectiveness.

While this intervention remain cost-effective when the chance of having a confirmatory test is reduced to 50%, the health impact is substantially reduced. Additional studies are evaluating the uptake of this modality in different settings. A detailed costing study of this modality would reduce the uncertainty around the cost-effectiveness of this strategy.