Modelling the population–level impact of a national HIV self–testing strategy among key populations in Côte d'Ivoire

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BACKGROUND & AIM

- **Scaling-up of HIV self-testing** (HIVST) among key populations (KP) such as female sex workers (FSW), their clients, and men who have sex with men (MSM), **may reduce the diagnostic gap in West Africa** (30% of PLHIV are still undiagnosed): among KPs directly receiving the test and populations benefiting from secondary distribution

- The ATLAS program[1] (funded by Solthis/Unitaid) implements an HIVST distribution strategy among KP in southern Côte d'Ivoire since July 2019

This study aims to **combine data from the ATLAS program with a mathematical model to predict the potential impact of a national HIVST strategy among KP in Côte d'Ivoire** on:
A. New diagnoses and antiretroviral treatment (ART) initiations
B. New HIV infections

METHODS

1) Deterministic model of HIV transmission and different testing modalities among key and lower-risk populations aged 15–59 years old in Côte d'Ivoire.
- Parameterized following a review of demographic, behavioural, HIV and intervention data in Côte d'Ivoire and calibrated to HIV prevalence (Figure 1), % PLHIV ever HIV tested, % diagnosed (Figure 2), % treated, and # tests / % positive tests over time.

Figure 1: Empirical (dark and grey dots) and model-fitted (blue shades) HIV prevalence in different risk groups over time
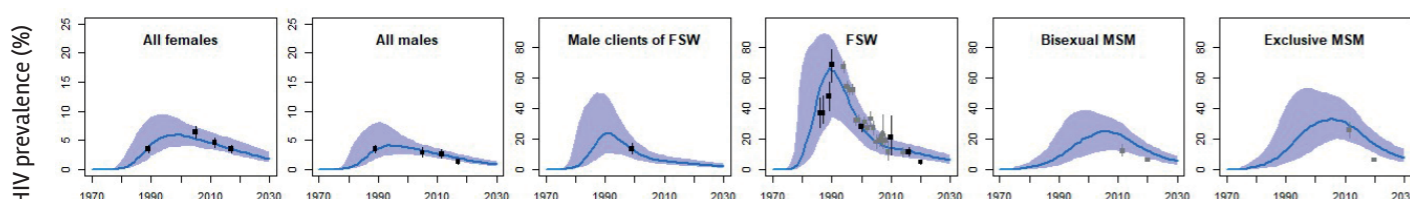
2) Plausible HIVST "base case" scale-up scenario over 10 years
Using ATLAS interim distribution, "coupons" survey2 data and literature review. We assumed that:
- 440,000 HIVST are distributed annually from 2020 onward (~10% of all HIV tests in the country in 2020)
- 29%, 22%, 23%, 9%, and 18% of HIVST are used by FSW, their clients, bisexual MSM, exclusive MSM, and lower-risk populations, respectively
- Re-testing among diagnosed PLHIV; time between reactive HIVST and confirmation test = 3 months; time between confirmation test and ART initiation = 1 month; HIVST sensitivity/specificity = 95/99%

RESULTS

A) Impact on HIV diagnosis coverage and ART initiations among KP

The proposed national HIVST strategy could:
- Increase % of all PLHIV diagnosed from 79% without HIVST to 81% after 10 years (Figure 2), from 67% to 87% among FSW and from 63% to 94% among MSM (Higer increase among KP due to higher number of HIVST distributed and lower coverage among KP in 2020).
- Over half (55%¬; 41–70¬%) of all new infections prevented over 10 years would be among lower-risk populations; this proportion increasing over time, reflecting the longer-term indirect effects of prioritizing KP and larger population size (Figure 3).
- Lead to ~7000 additional ART initiations compared to no HIVST (~650 HIVST needed to be distributed for one additional ART initiation)

Figure 2: Empirical (dots) and modelled (blue lines) proportions of diagnosed PLHIV of different risk groups over 2000–2030. Dashed red lines = base case HIVST scenario.
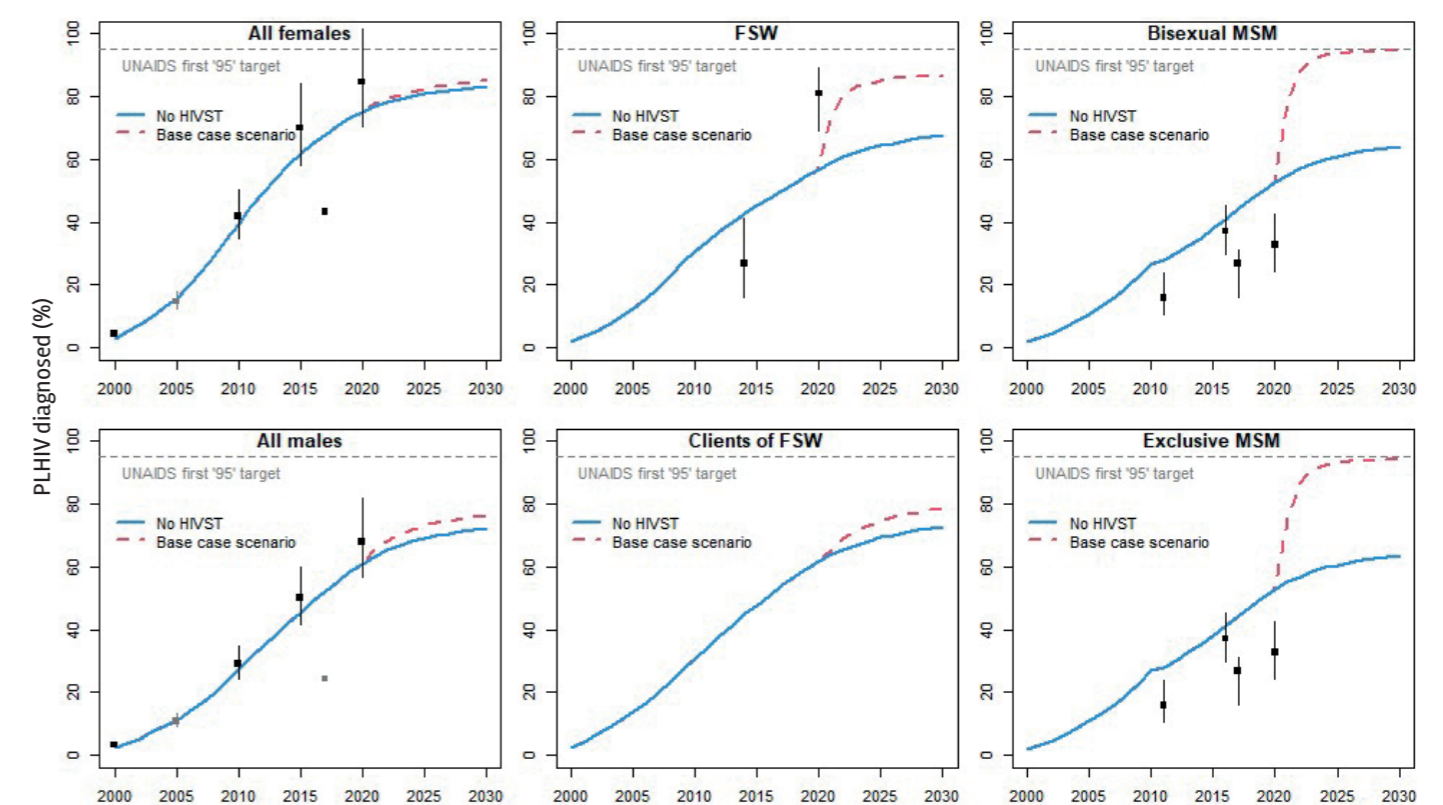

B) Impact on HIV incidence among every risk group

Over 10 years, a national HIVST strategy could:
- Decrease cumulative new infections by 6% (95%CI: 3–10%) overall, 10% (7–16%), 11% (7–21%), 40% (30–50%), and 44% (34–54%) among FSW, their clients, bisexual MSM, and exclusive MSM, respectively (results not shown).

Figure 3: median estimated fraction of new HIV infections prevented by a 10-year HIVST program which would occur in the different risk groups over the first two (left) and subsequent (right) years of intervention
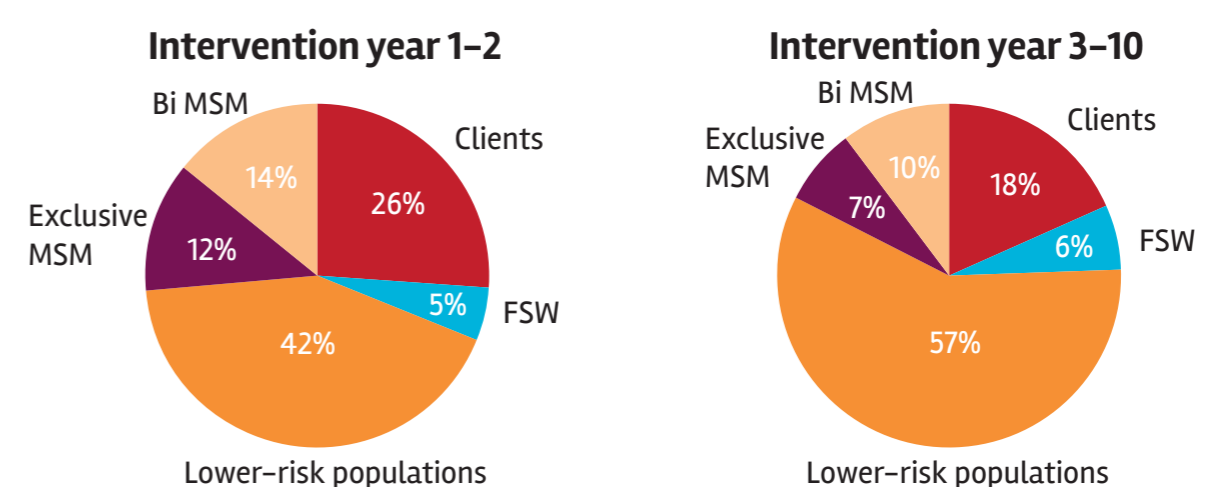
CONCLUSION

- A national HIVST distribution strategy may substantially impact the HIV epidemic in Côte d'Ivoire over 10 years and help reduce disparities in HIV burden by reaching key populations and addressing their unmet treatment needs, whilst reducing new HIV infections and deaths among lower-risk populations in the longer-term.
- If HIVST succeeds in diagnosing "hidden" populations (e.g. older MSM), then it could increase the strategy impact.
- Analysis relied on preliminary "real-world" data and HIVST literature, and our results could be too optimistic if challenges of HIV confirmation and engagement in care following reactive HIVST are underestimated.