# Comparison of HIV self-test distribution modalities in western Kenya: a mathematical modeling study

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- Background
- Methods
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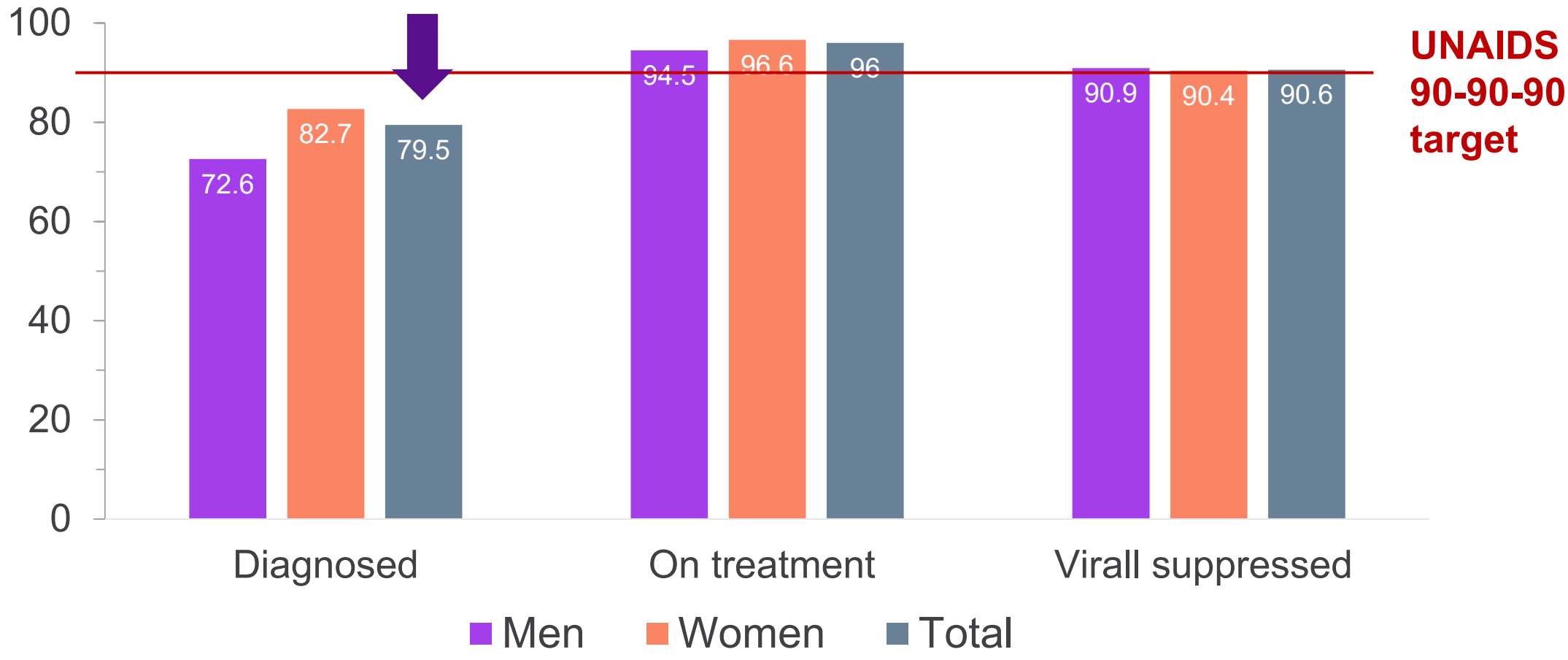
# ~20% PLHIV still not aware of their HIV status in Kenya



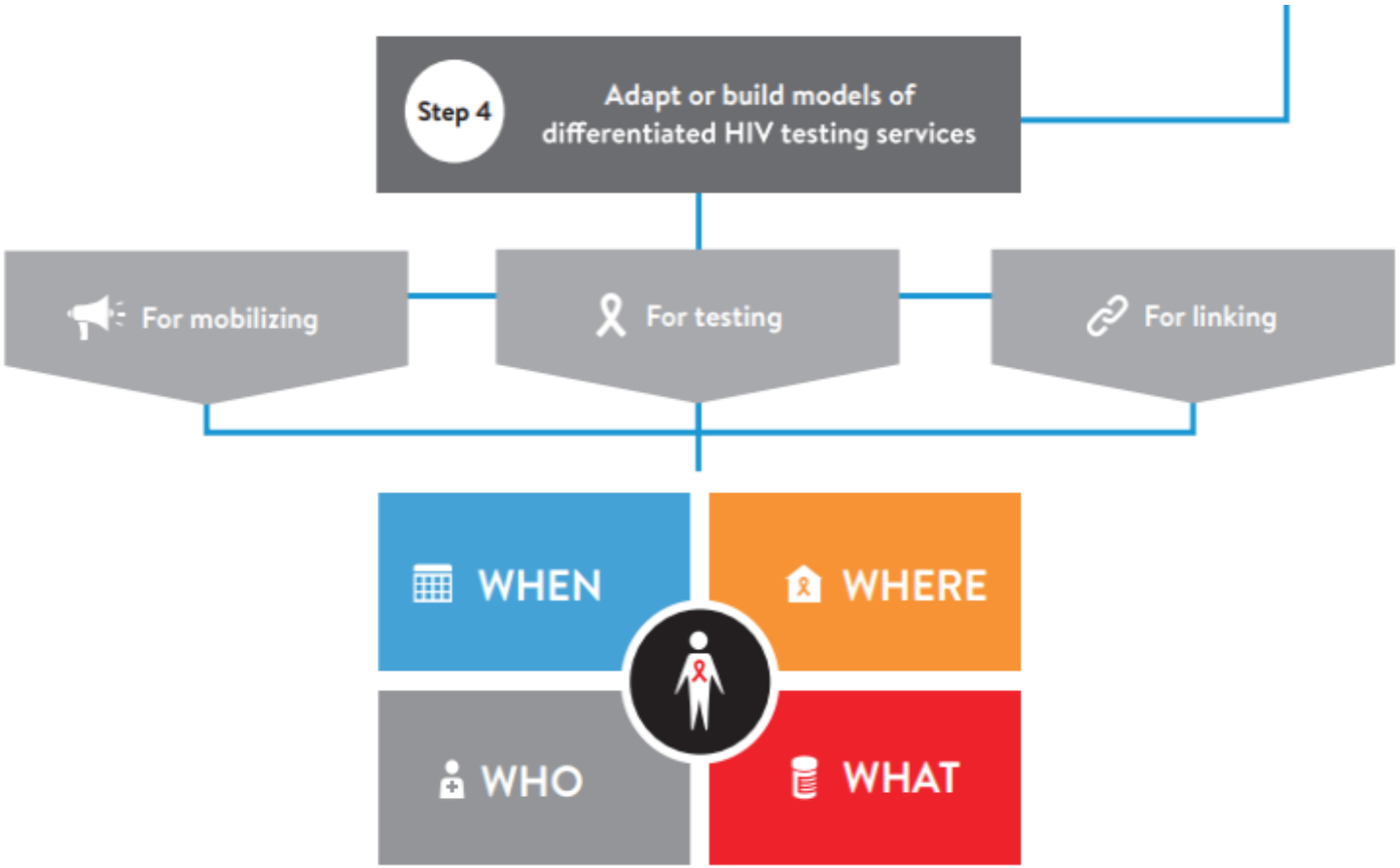

NASCOP. Kenya Population-based HIV Impact Assessment (KENPHIA) 2018: Final Report. Nairobi: NASCOP; August 2022.

# HIV self-testing to close the testing gap

- Since 2016, WHO has recommended HIV self-testing (HIVST) as an strategy to reach UNAIDS targets to end HIV by 2030.[1]
- HIVST costs US$1 to the public sector in low- and middle-income countries.
- HIVST distributed worldwide
  - 102 countries have HIVST policies
  - 38 countries actively implementing HIVST
- However, the uptake and distribution of HIVST have been slow at the population level.
  - 4% ever self-tested for HIV in Kenya[2] and 1.2% in Zimbabwe and Malawi[3]

1 WHO/HIV/2016.21 (2016)
2 Mwangi *et al.*, BMC Public Health; 22:643 (2022)
3 Johnson *et al.*, BMC Public Health; 20:779 (2020)

# How to distribute HIV self-testing kits?




- **Where**
  - Communities
  - Facilities
  - Workplace/educational establishment
- **Who**
  - Partners through secondary distribution
  - Peers through social network
  - Other high-risk groups
  - General community

The International AIDS Society, DSD for HIV: a decision framework for HIV testing services (2022)

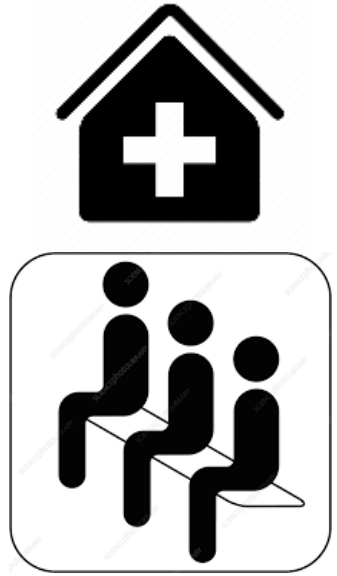
# HIVST distribution modalities

Antenatal Care (ANC)

Secondary distribution through pregnant women at antenatal care visits to male partners

New Index

Secondary distribution through new index patients to partners



Facility

Distribution at outpatient facilities

**What is the effect of HIVST distribution modalities on population-level HIV epidemic in western Kenya?**

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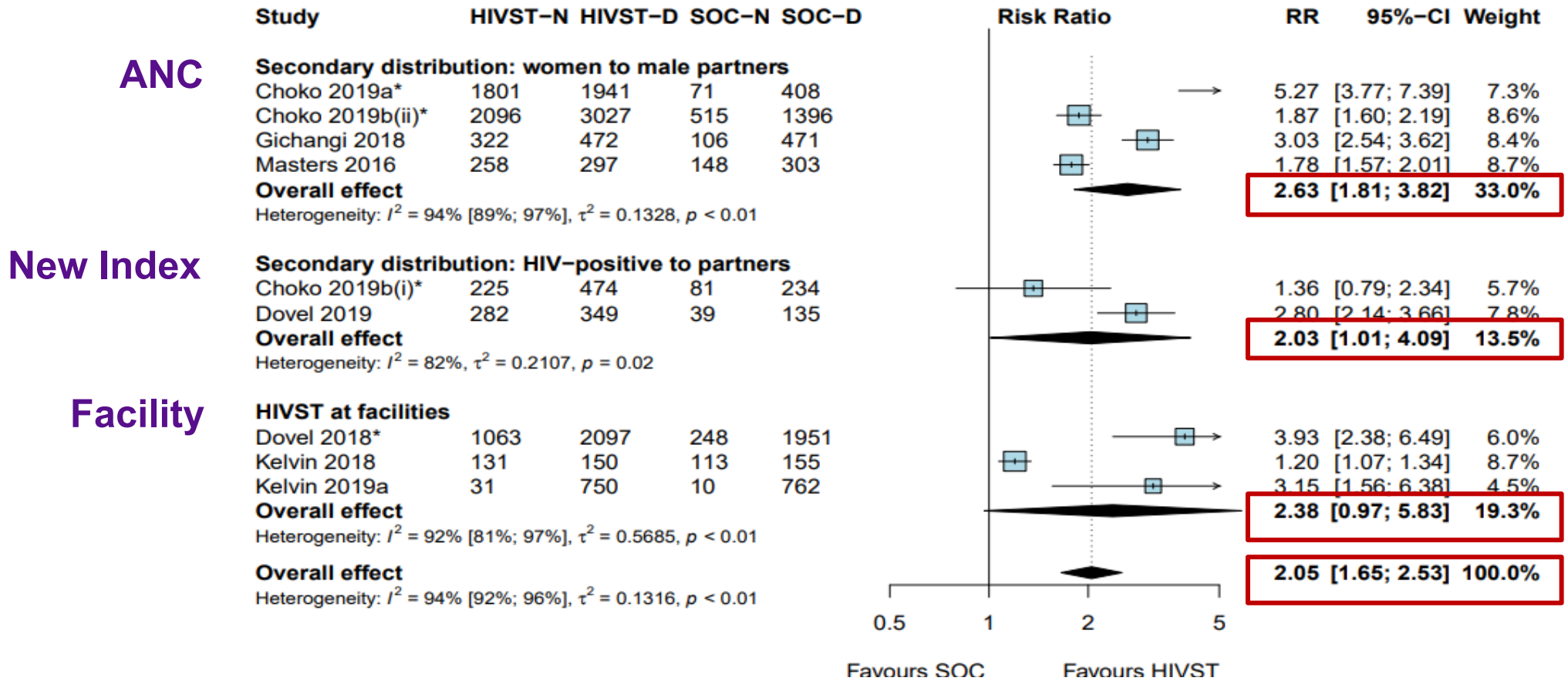
# Model setting: western Kenya

- Epidemiological MODelling (EMOD)-HIV, an agent-based HIV epidemiological model fit to HIV epidemic and population data in Nyanza, Western Kenya
- Highest HIV prevalence in Kenya in 2018 (PHIA)
  - Male: 8.3%
  - Female: 16.6%

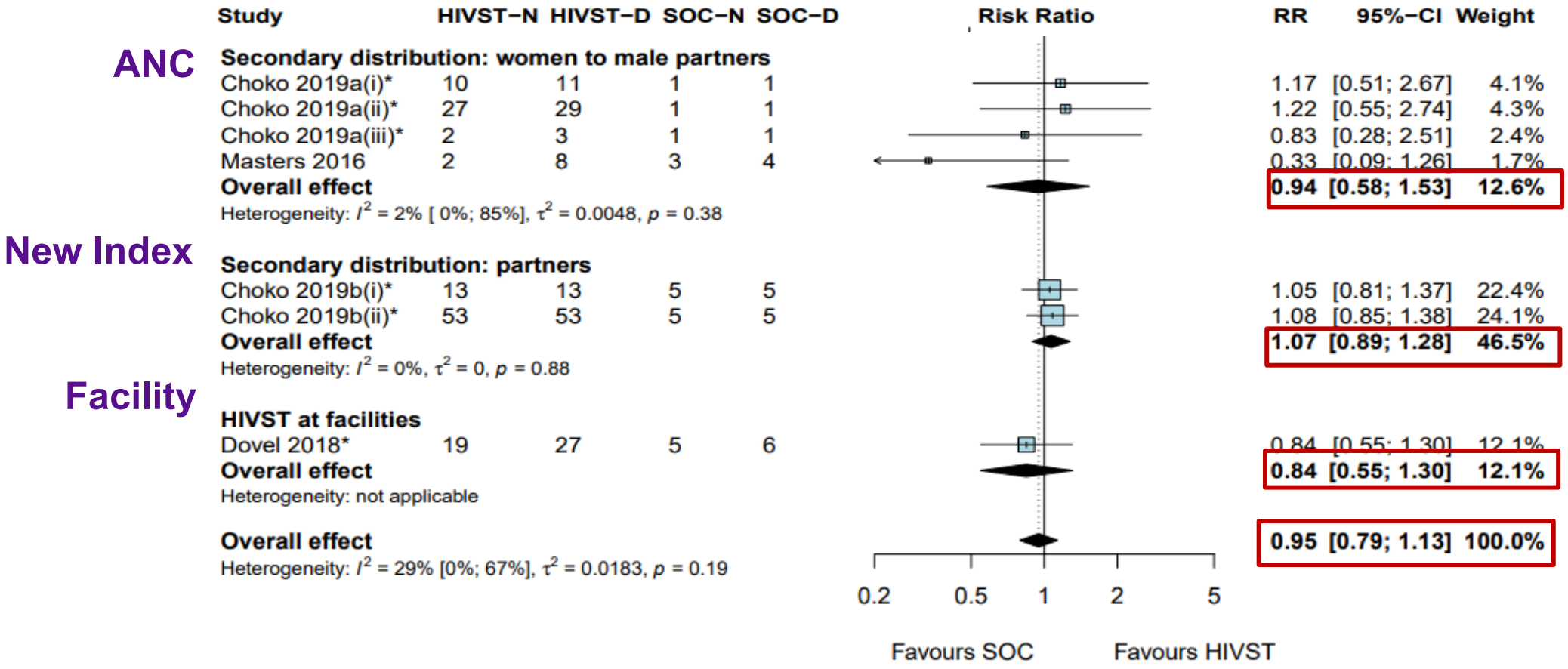

- Population size (age 15+ years): 3.6 million (2019 census)
- % tested for HIV and received results in the past 12 months, aged 15-64 years (2018 KENPHIA)
  - Men: 55.8%
  - Women: 66.2%
- Three ways for HIV testing:
  - Symptomatic testing
  - Women at antenatal care (ANC) visits (12 weeks pregnant)
  - Voluntary testing at and after sexual debut

# Effect of HIVST on HIV testing uptake: meta-analysis




**The uptake of HIV testing in those receiving HIVST was two times higher than in the standard of care.**

# Effect of HIVST on linkage to care: meta-analysis




**The linkage to care in those receiving HIVST was similar to that in the standard of care.**

# Model scenarios and assumptions

## HIVST distribution

- Baseline
  - No HIVST distributed

- Three HIVST distribution strategies
  - ANC: Secondary distribution through pregnant women at antenatal care visits to male partners
    - Maximum two current partners with the longest relationships
  - New Index: Secondary distribution through new index patients to partners
    - Maximum two current partners with the longest relationships
  - Facility: Distribution at outpatient facilities

## Assumptions

- HIVST uptake based on the meta-analysis from the RCTs in sub-Saharan Africa
- Linkage to care is ~5% worse in HIVST compared to counterfactual
- HIVST distribution between 2022 and 2052 over 30 years

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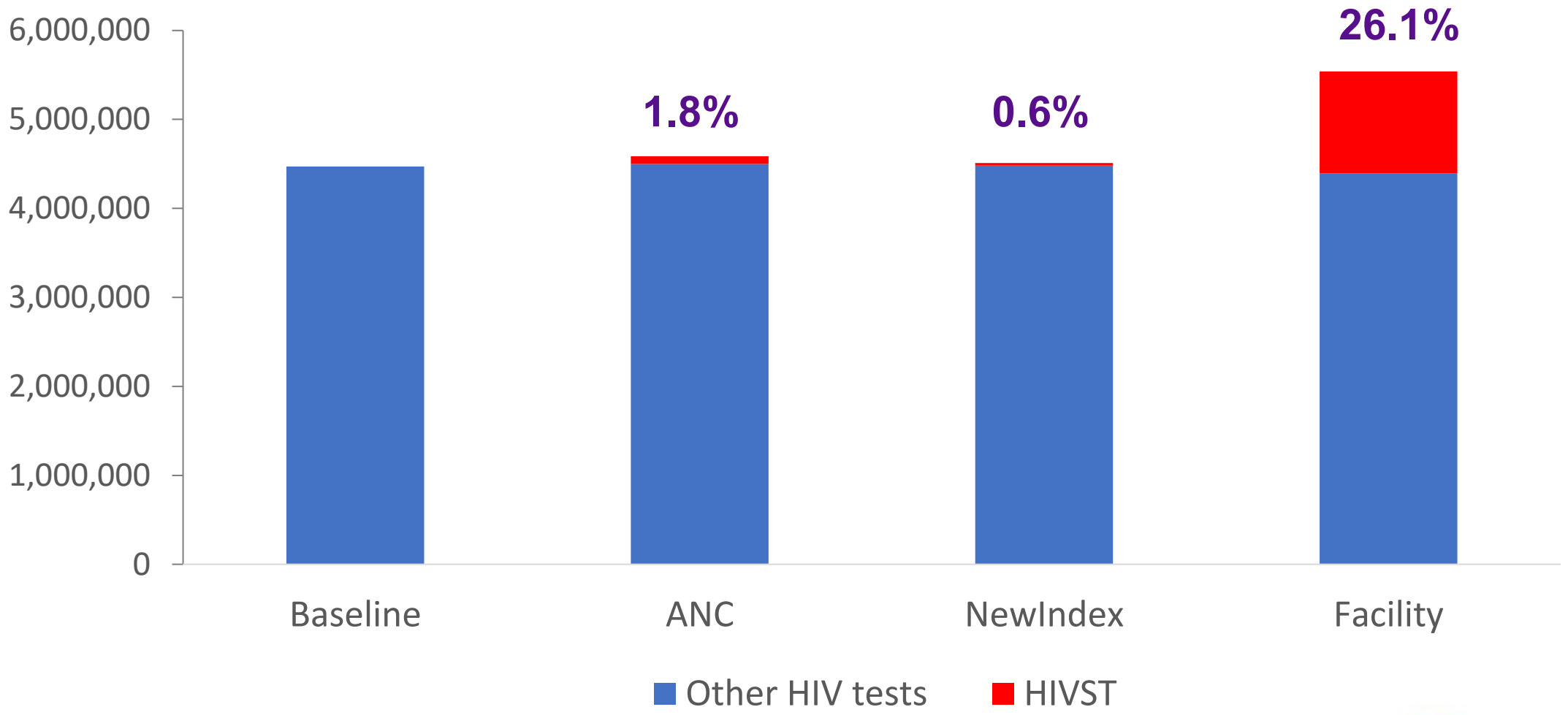
# Number of HIVST distributed by scenario

- **ANC**
  - Pregnant women who attend ANC visits: 2.8% (n=170,300)
  - Current male partners of ANC women: 1.5% (n=92,200)
  - ~84,500 HIVST per year

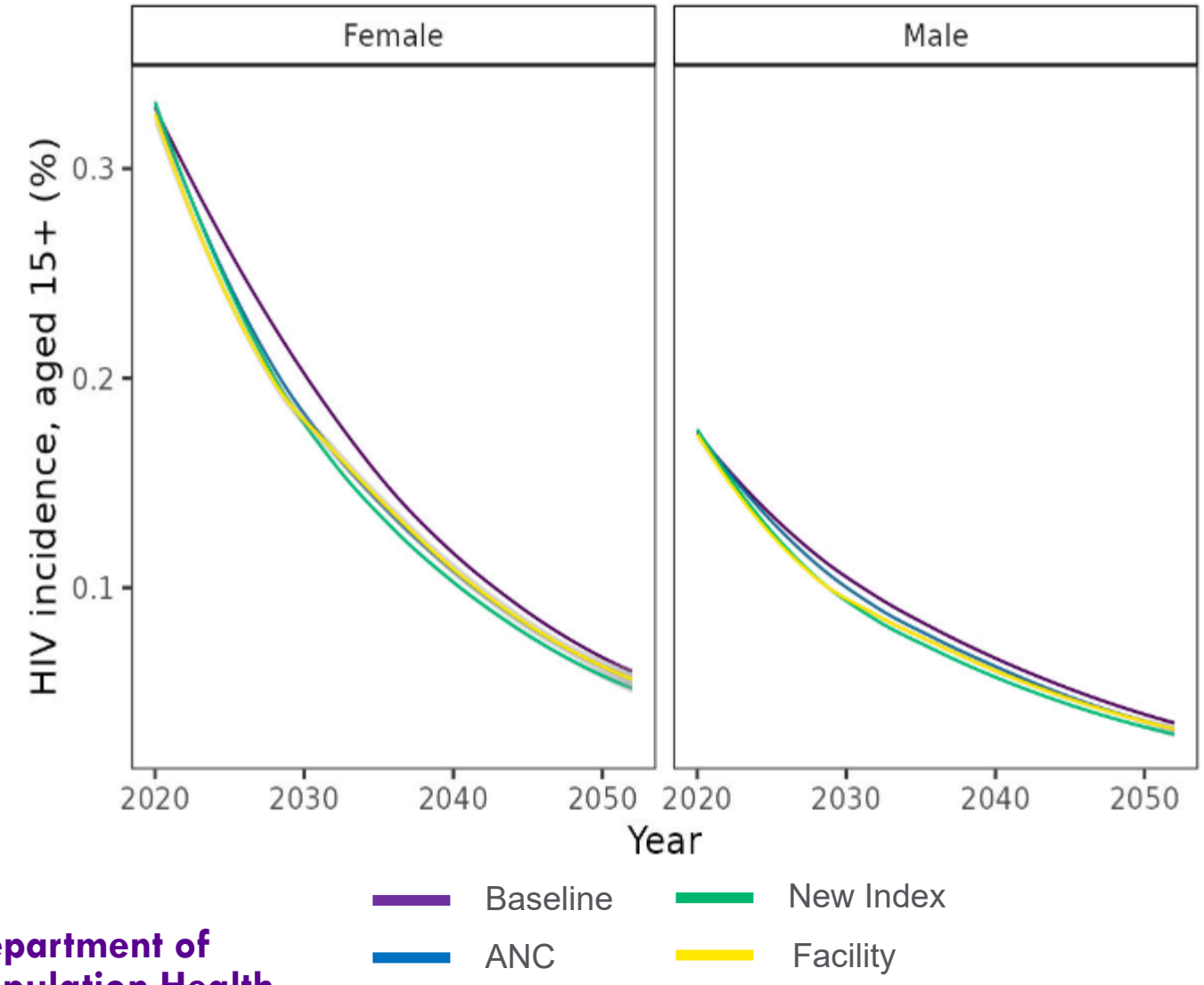
- **New Index**
  - New index patients: 0.3% (n=19,300)
  - Current partners of new index patients: 0.6% (n=37,800)
  - ~24,000 HIVST per year

- **Facility**
  - ~1,147,000 HIVST per year

# Number of HIV tests per year

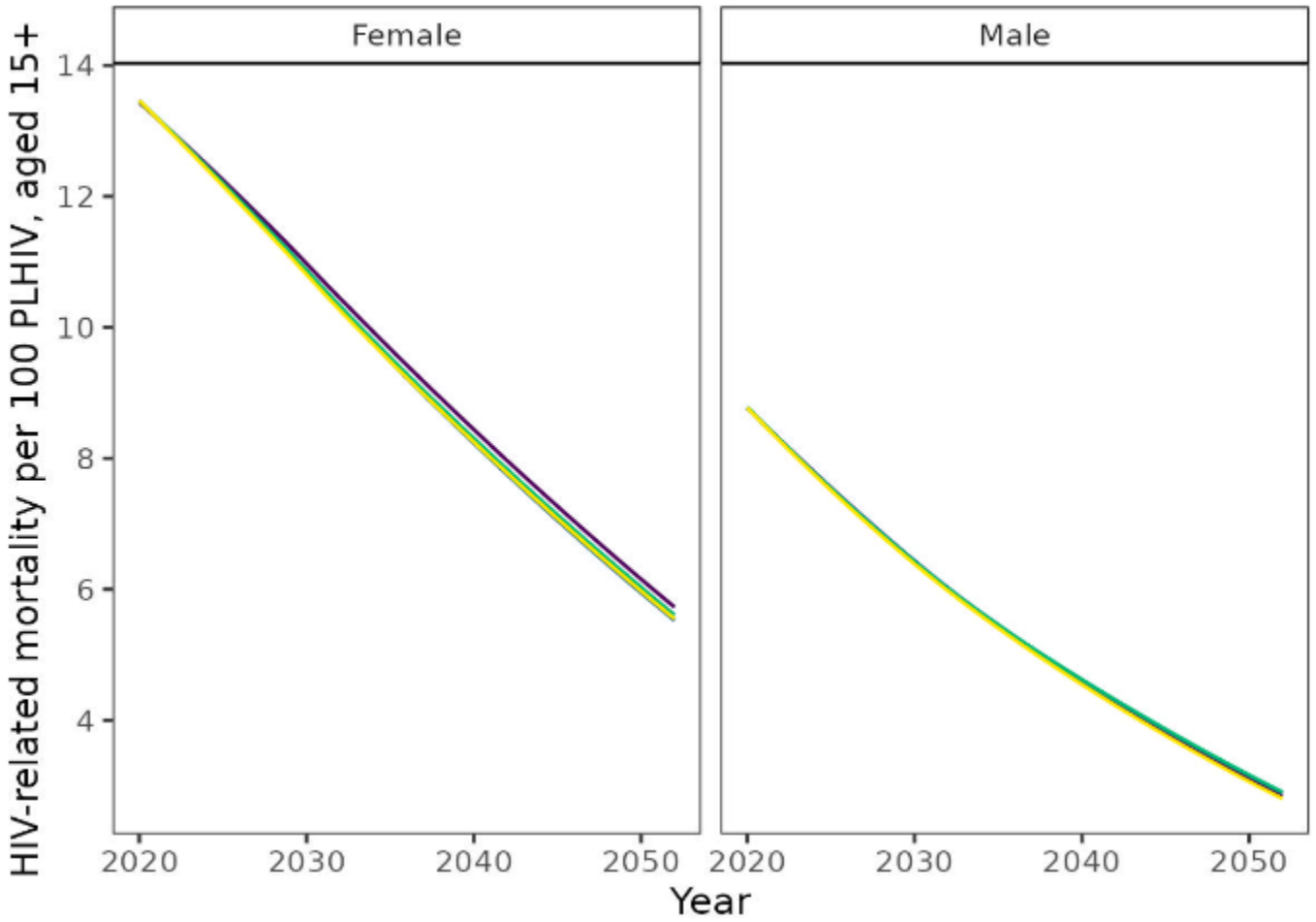


# New index modality averts the largest number of HIV infections




| Scenario | HIV infections averted in 2022-2052 | |
|---|---|---|
| Baseline | Ref | |
| ANC | 14,443 | 4.6% |
| New Index | 31,164 | **10.3%** |
| Facility | 27,751 | 9.8% |

# New index modality averts the largest number of HIV-related deaths




| Scenario | HIV-related deaths averted in 2022-2052 | |
|---|---|---|
| Baseline | Ref | |
| ANC | 10,954 | 1.4% |
| New Index | 34,912 | **4.6%** |
| Facility | 13,125 | 1.7% |

# How many HIVST are needed to avert one additional HIV infection or HIV-related death?

| | ANC | New Index | Facility |
|---|---|---|---|
| Number of HIVST per additional HIV infection averted | 173 | 22 | 1225 |
| Number of HIVST per additional HIV death averted | 228 | 20 | 2590 |

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# Discussion

- Secondary distribution of HIVST to partners through new index patients is most efficient and effective
  - Requires ~22 HIVST uptake to avert one additional new HIV infection
  - Reduces cumulative new HIV infections by 10% and HIV-related mortality by 5% over 30 years
- Empirically tested strategies for HIVST distribution could improve HIV diagnosis and health outcomes.
  - HIVST distribution at outpatient facilities reaches broader population but more targeted strategies might be needed.
- Further research is needed on HIVST distribution innovation.
  - Unprecedented manufacturing volumes are available in the wake of high COVID-19 rapid test demand.
  - E.g., HIVST could follow direct-to-consumer channels analogous to condom distribution.

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