Responding to an evolving epidemic to sustain long-term HIV epidemic control

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CQUIN 8th Annual Meeting
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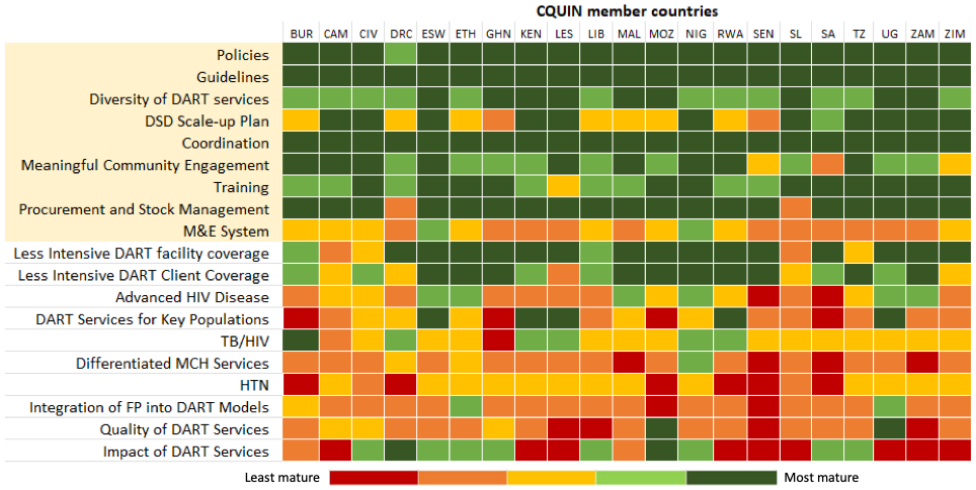
CENTER for COMMUNICABLE DISEASE DYNAMICS
HARVARD T.H. CHAN SCHOOL OF PUBLIC HE

Disclosures

- No relationships with pharmaceutical or medical commodity companies to disclose
- I have never administered an HIV test to a client
- I have never managed a facility or community HIV testing programme
- I have never developed or implemented a national HIV testing strategy

A great convergence in Sandton

2024 differentiated ART CMM Summative Results: Data arranged by country

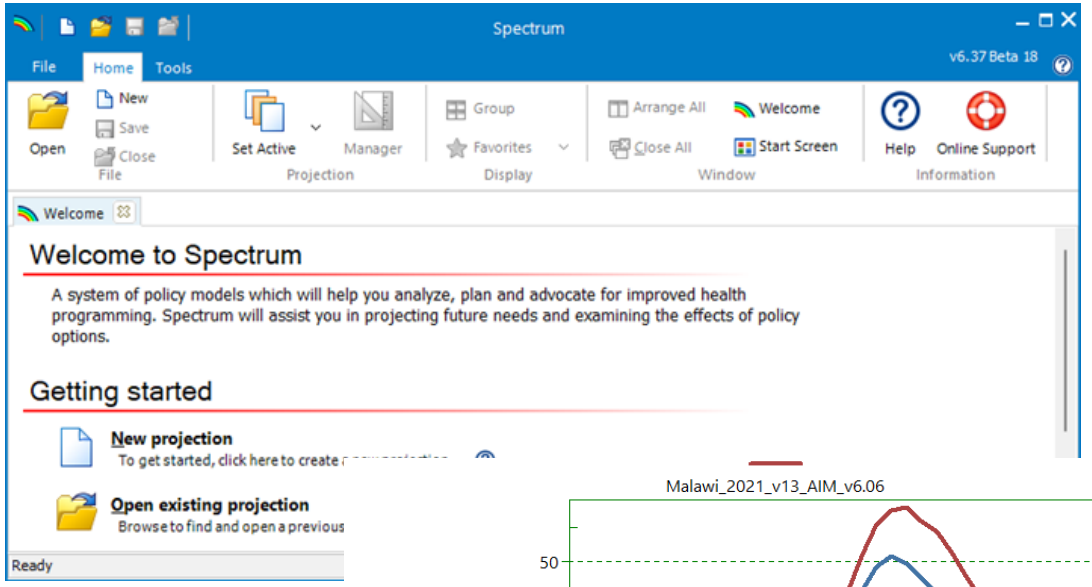


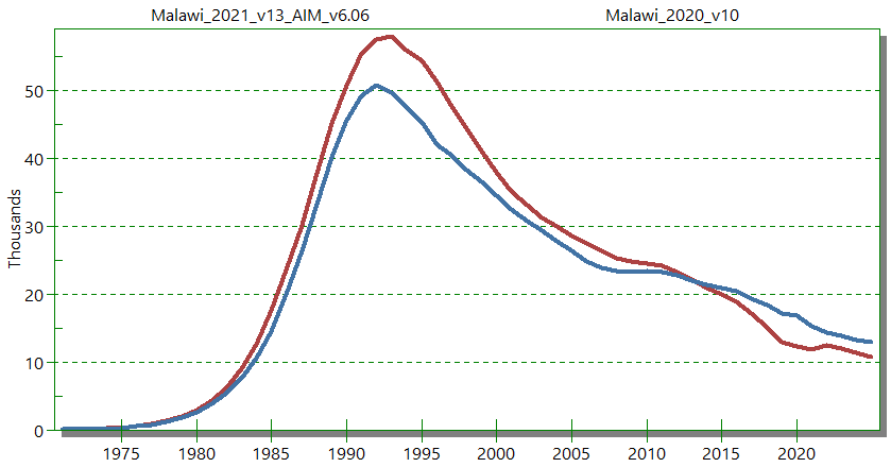
CQUIN
HIV Coverage, Quality, and Impact Network

Southern Sun
SANDTON

A great convergence in Sandton

THECAPITAL Hotel Group





	1975	1980	1985	1990	1995	2000	2005	2010	2015	2020
Malawi_2021_v13_AIM_v6.06	0.30	2.90	17.56	50.82	54.51	38.05	28.64	24.48	19.91	12.28
Malawi_2020_v10	0.25	2.65	14.47	45.73	45.32	34.49	26.39	23.43	20.88	16.86

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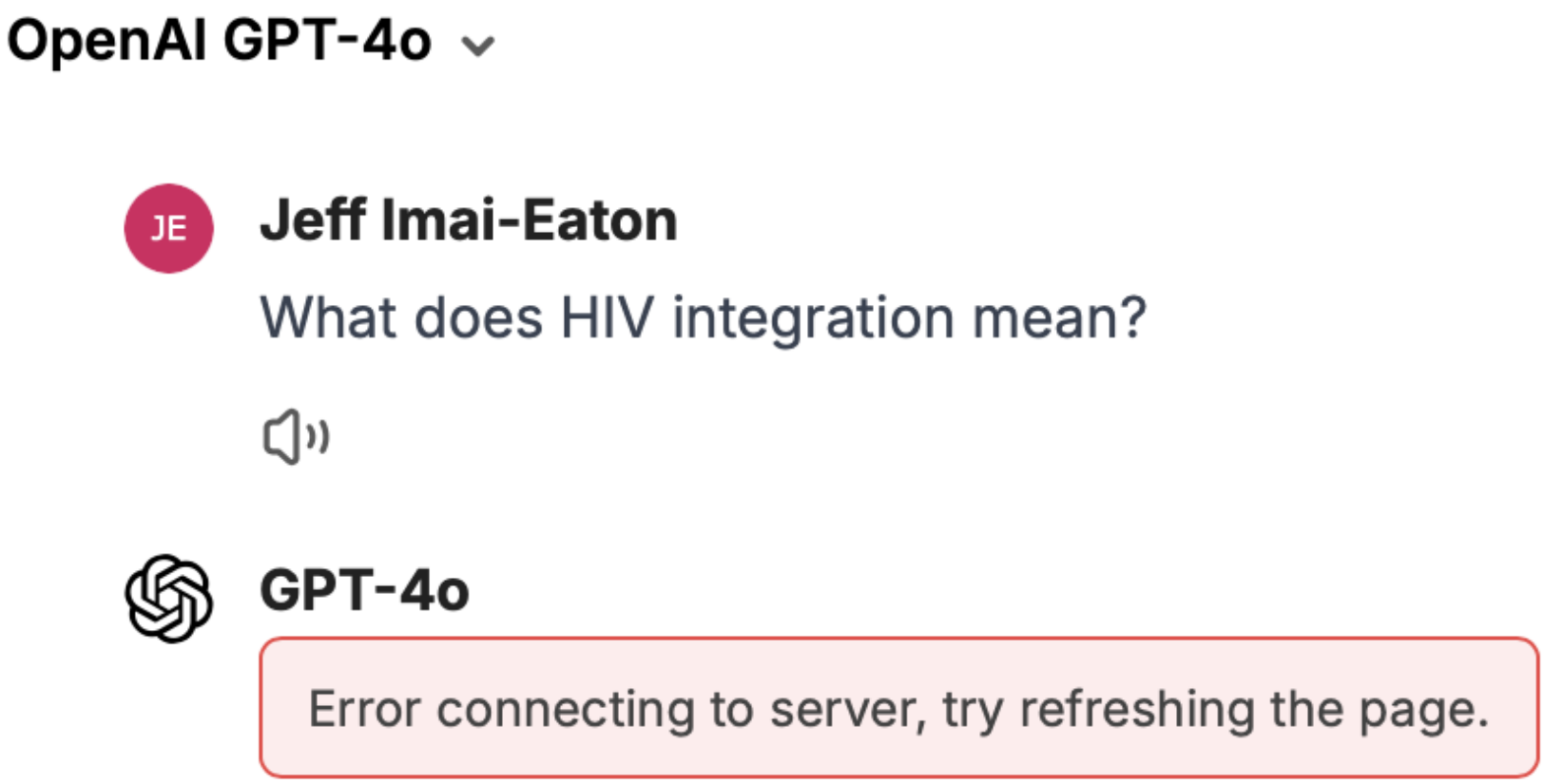
I tried Peter E.'s challenge…



Key messages

1. Plan for the HIV epidemic **10 years from now**, not 10 years ago

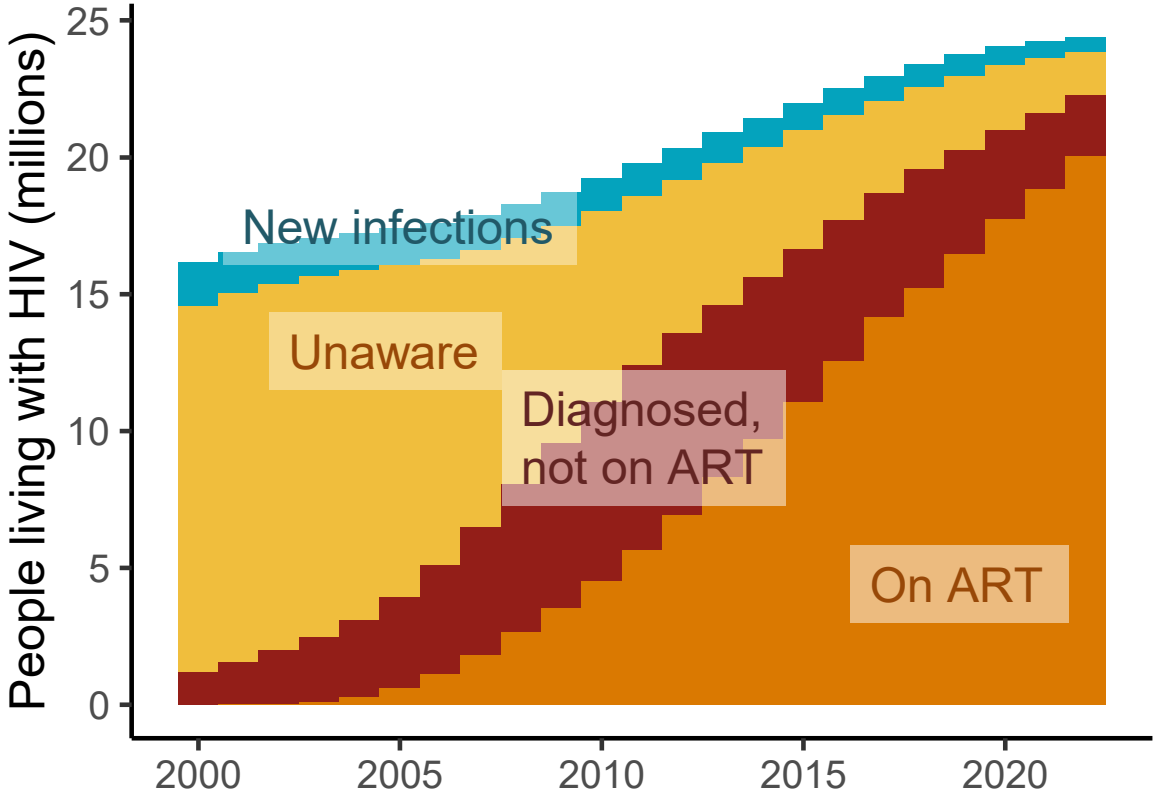
2. **Follow the virus:** adapt care, treatment, and prevention through focusing on among whome **prevalence of unsuppressed HIV** is changing

3. **Think long-term:** sustained effective treatment and prevention for *decades* to come

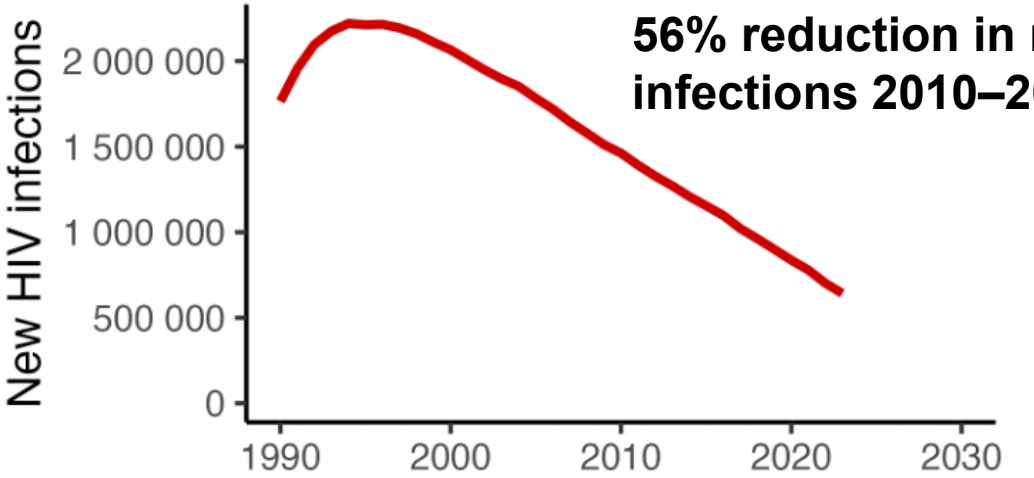
4. **No silver bullets:** Narrowly targeted interventions challenging at current stage of the epidemic
   - Efficient: Focused (resource) intensive services for small populations with disproportionate risk
   - Large impact: Diffuse and occasional nature of HIV transmission; treatment interruption → reach large population with moderate risk

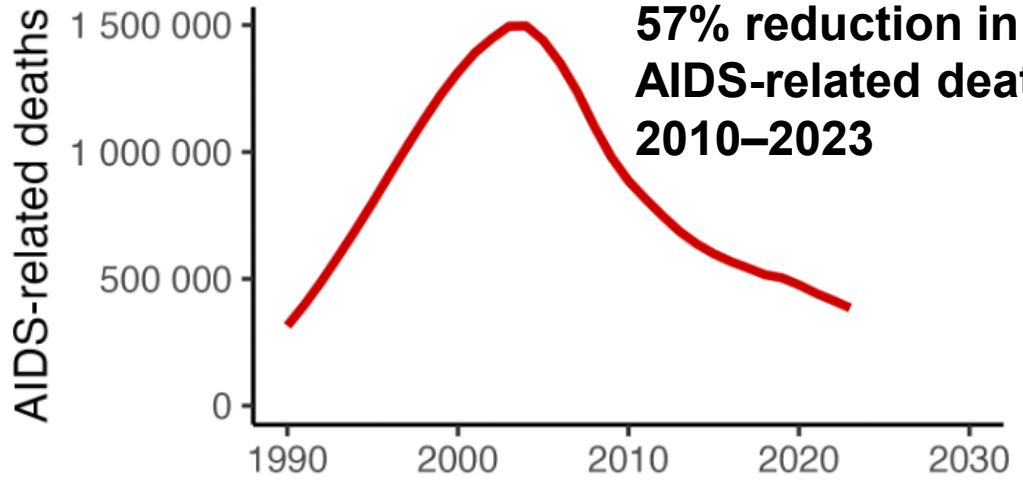
HIV Trends in East, West, Central, and Southern Africa

Adults living with HIV: Sub-Saharan African countries, 2000-2022



Source: UNAIDS 2023 epidemiological estimates.

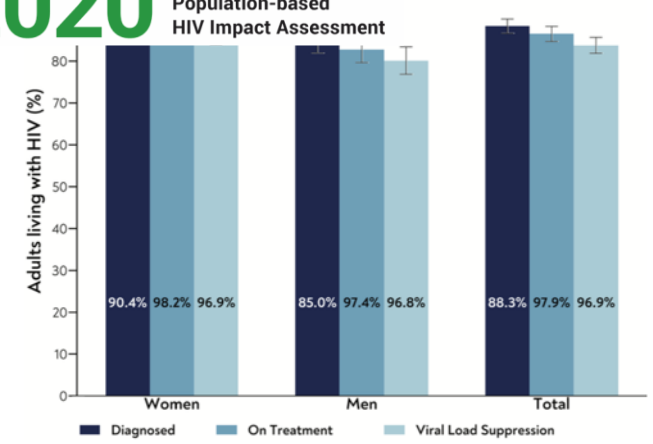




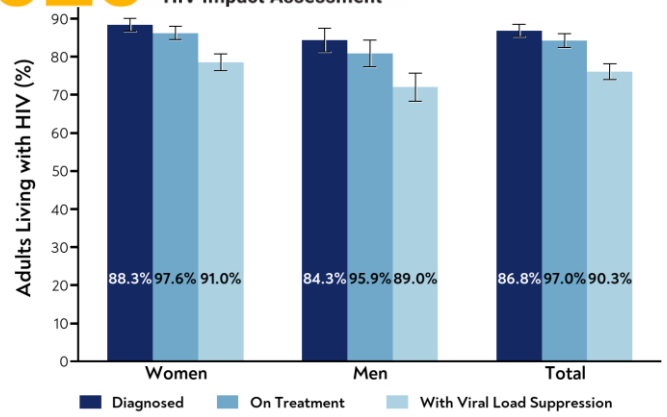
Source: UNAIDS 2024 epidemiological estimates.

Countries attaining 95-95-95: 2030 targets in reach

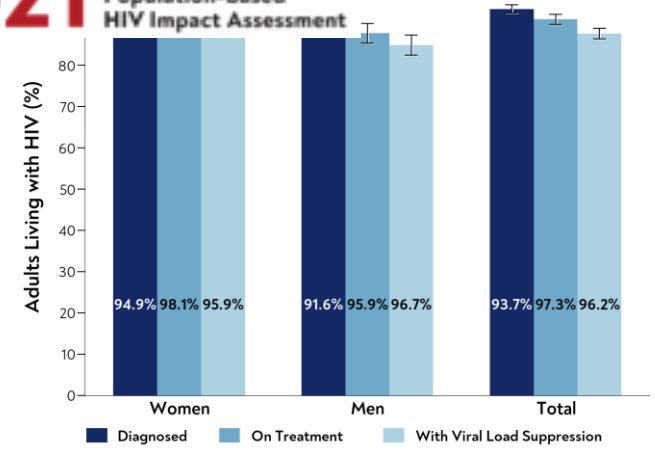
MPHIA 2020
Malawi
Population-based
HIV Impact Assessment

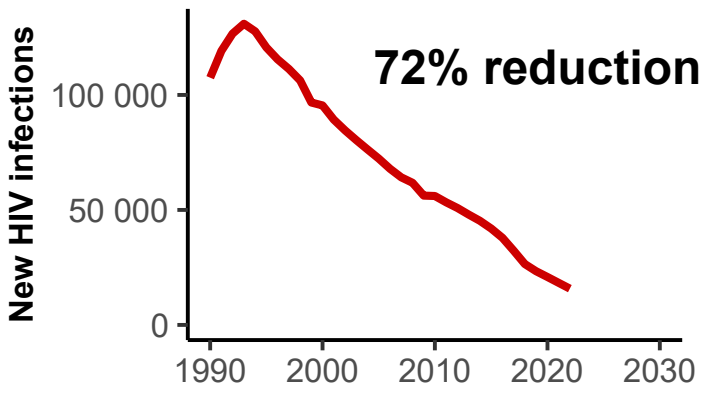


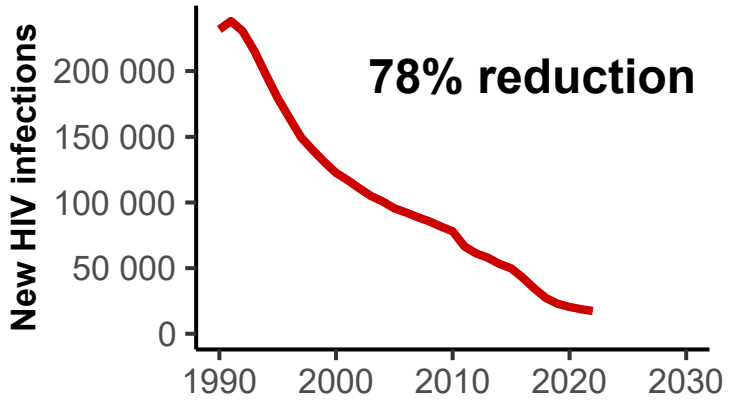
ZIMPHIA 2020
Zimbabwe
Population-based
HIV Impact Assessment

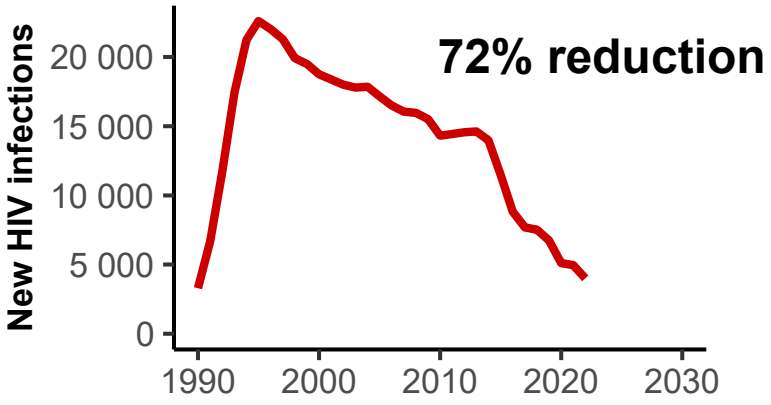


SHIMS3 2021
Eswatini
Population-based
HIV Impact Assessment



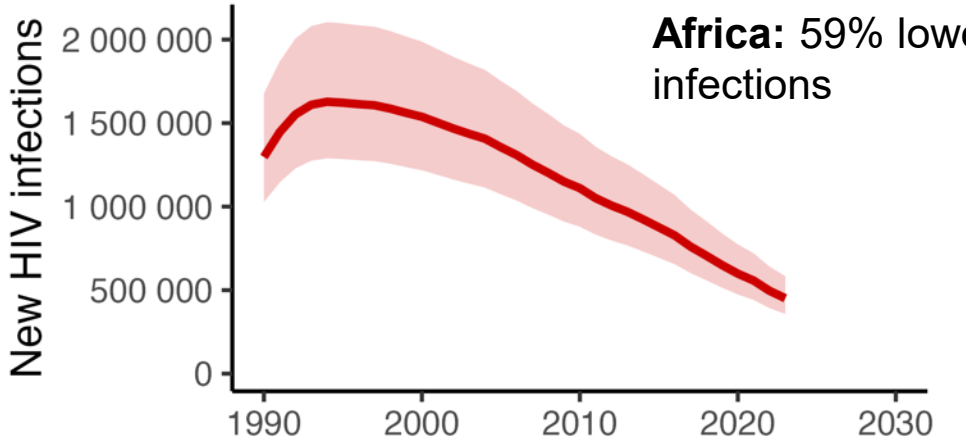




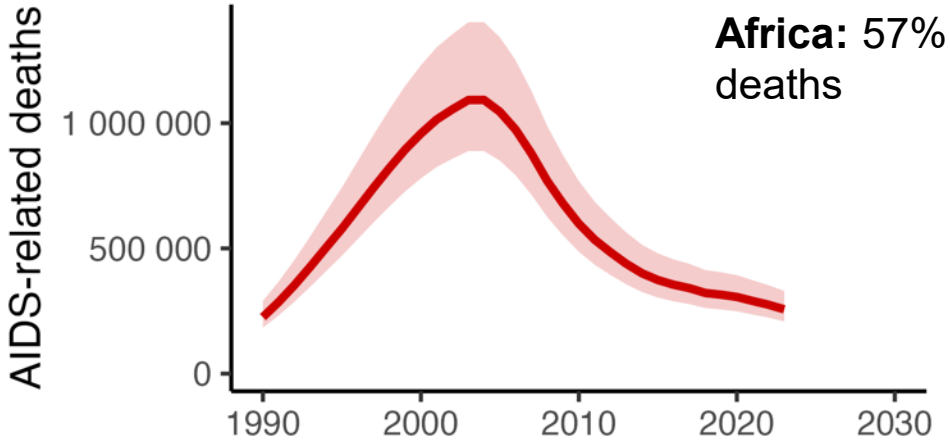


Source: PHIA surveys and UNAIDS 2023 epidemiological estimates.

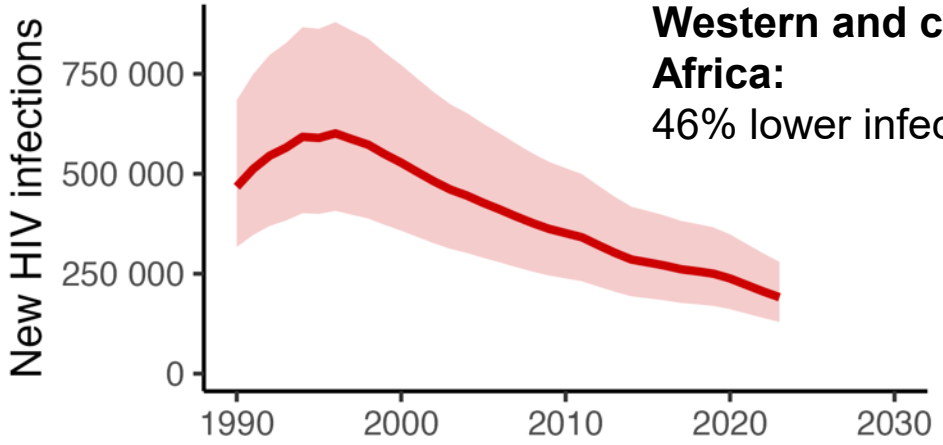
But unequal progress across the region and countries



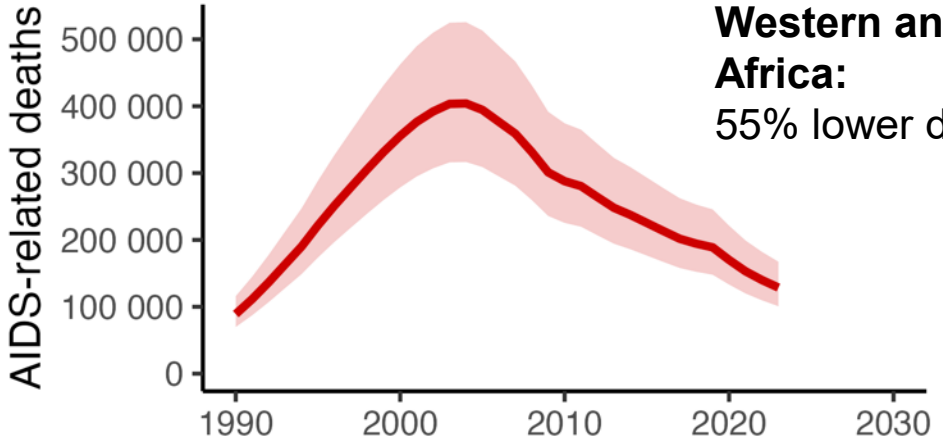
Eastern and southern Africa: 59% lower infections



Eastern and southern Africa: 57% lower deaths



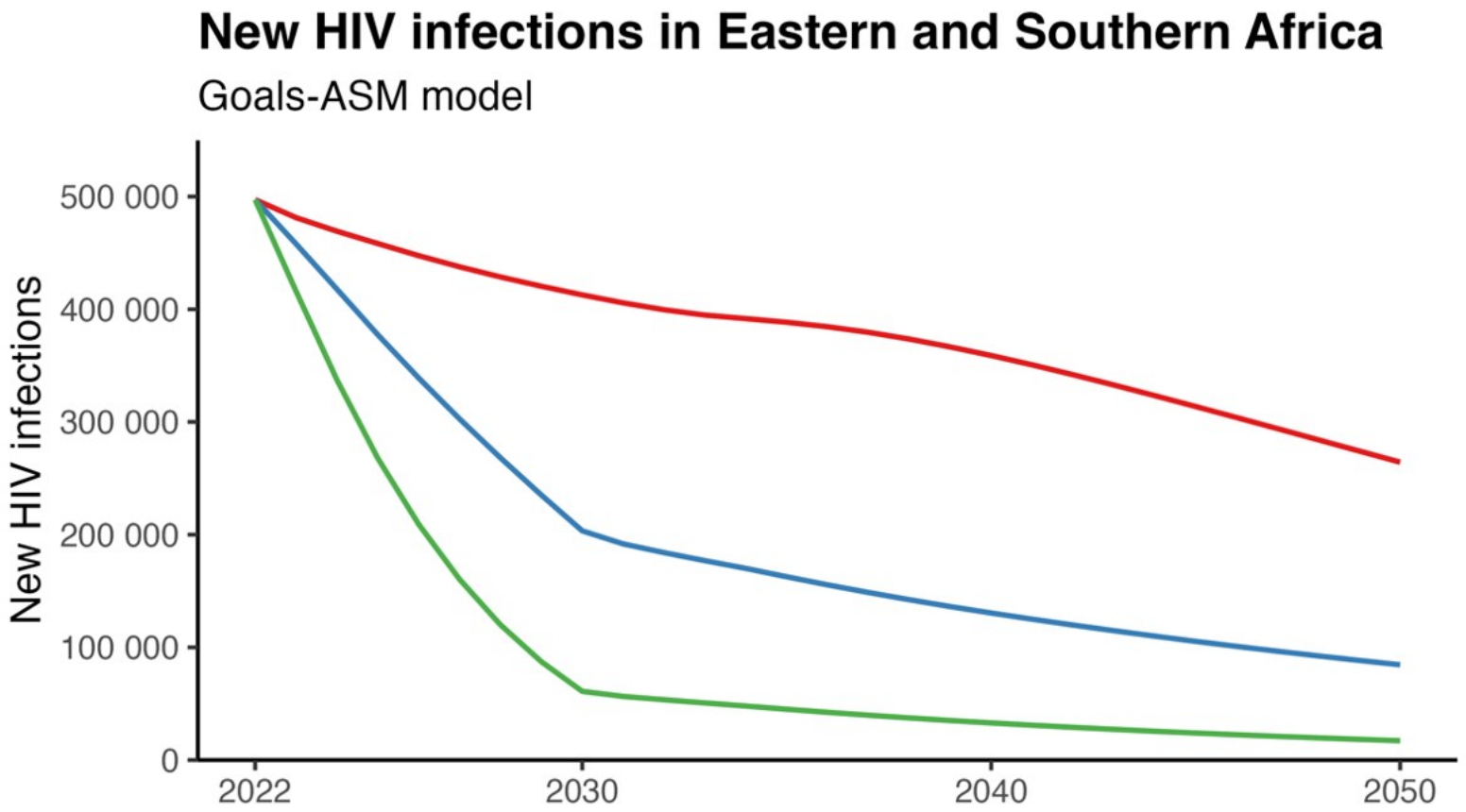
Western and central Africa:
46% lower infections



Western and central Africa:
55% lower deaths

Source: UNAIDS 2024 epidemiological estimates.

Achieving treatment and prevention targets can accelerate progress



Maintain current coverage (treatment AND prevention):

- 17% reduction between 2022-2030

All countries 95-95-95 by 2030 (+ current prevention coverage):

- 59% reduction by 2030

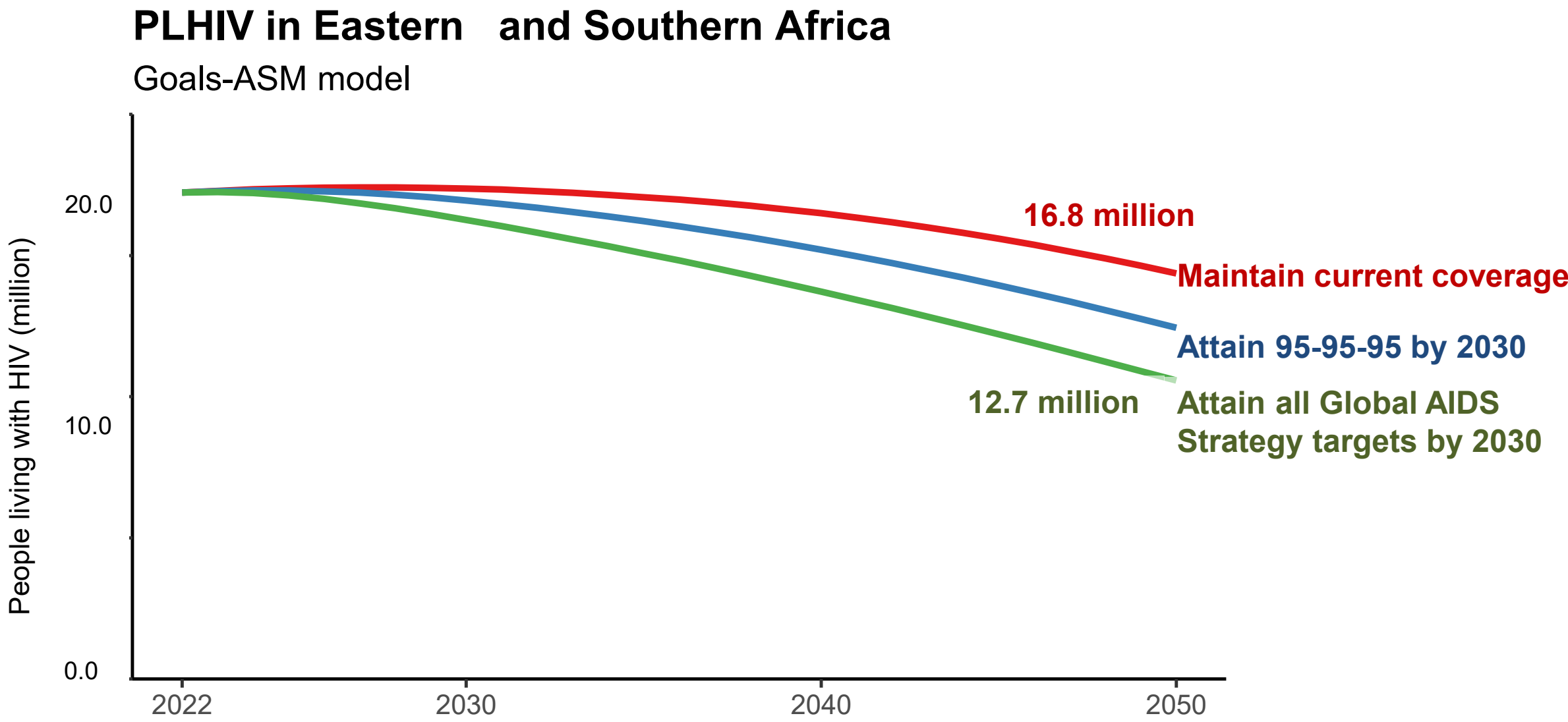
Attain all Global AIDS Strategy targets by 2030:

- 2022-2030: 88% reduction

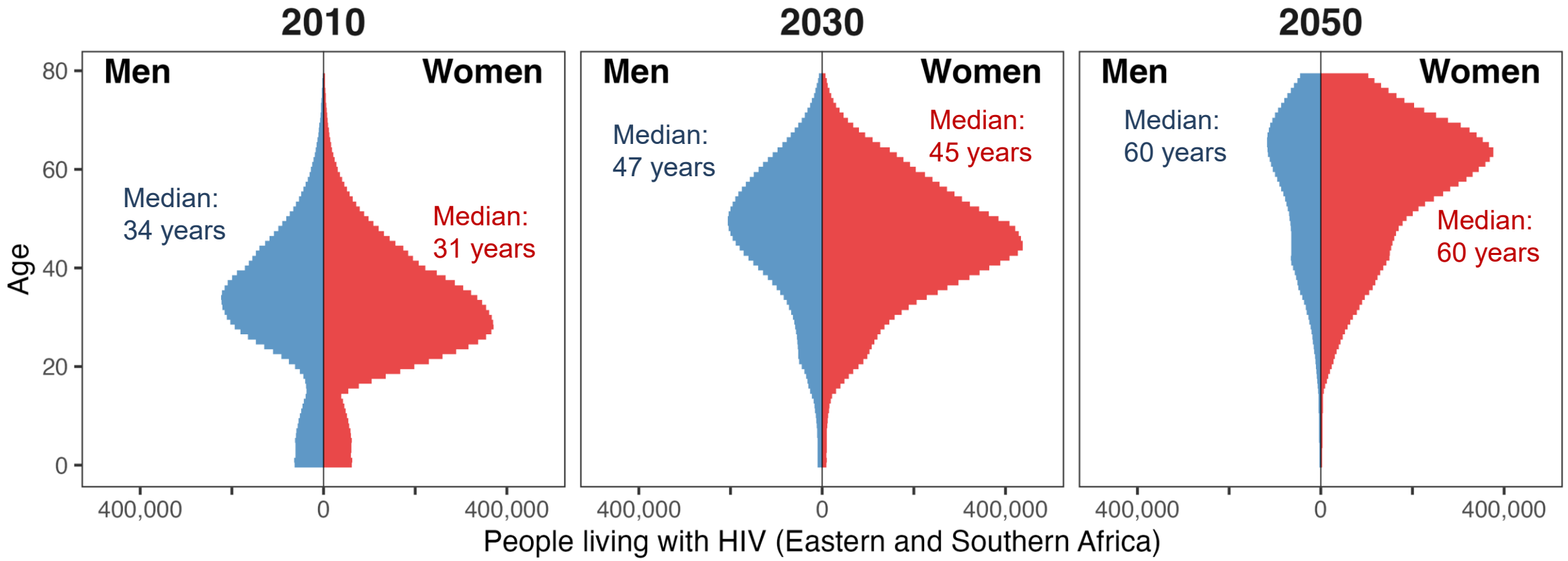
(very ambitious condom and other prevention targets)

John Stover, UNAIDS Technical Consultation, 20-21 July 2023

Large number of people living with HIV requiring services long into the future

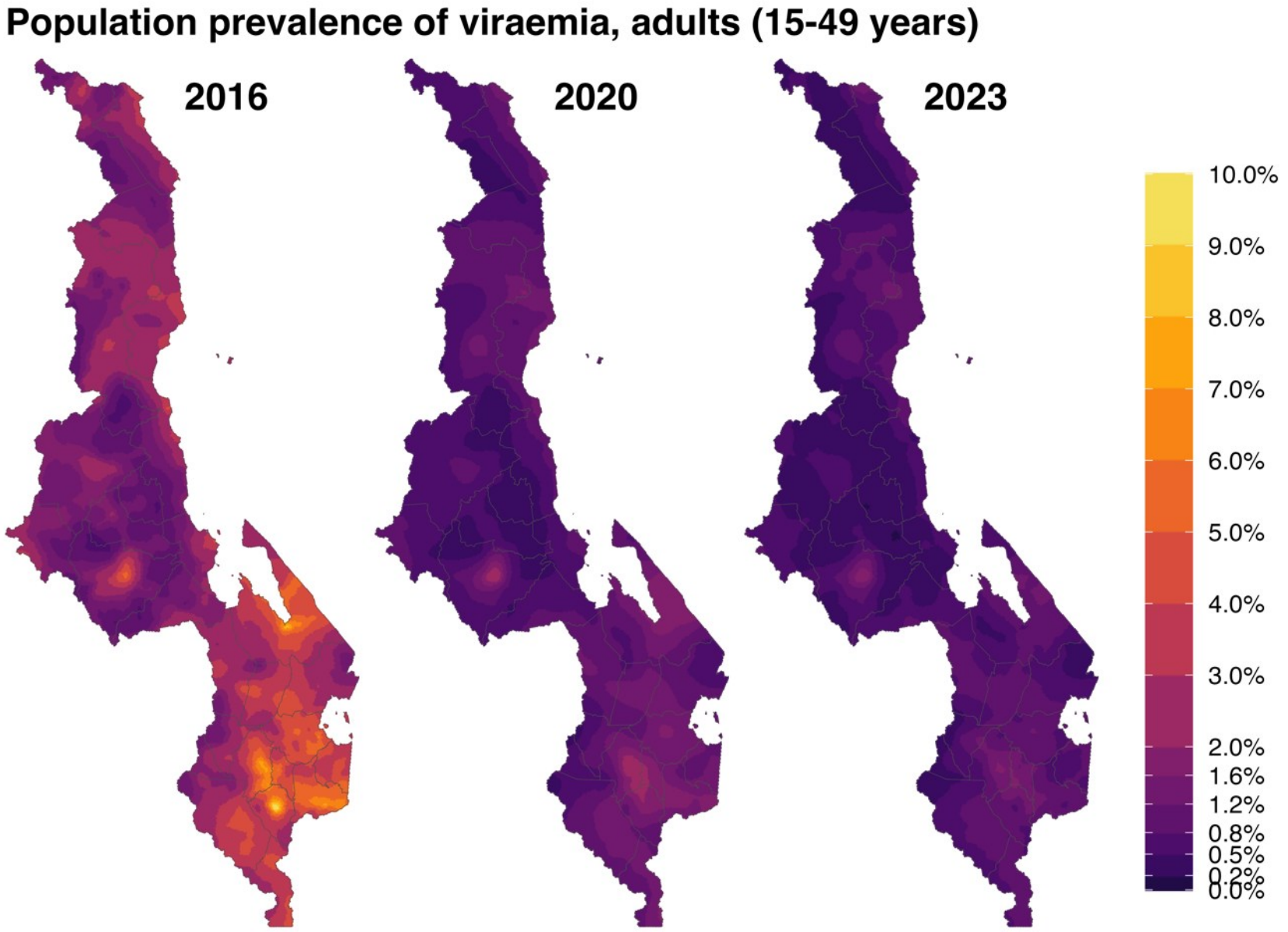


But a rapidly changing population with HIV



Vignettes of a changing HIV epidemic—the ‘hotspots’ are harder to find

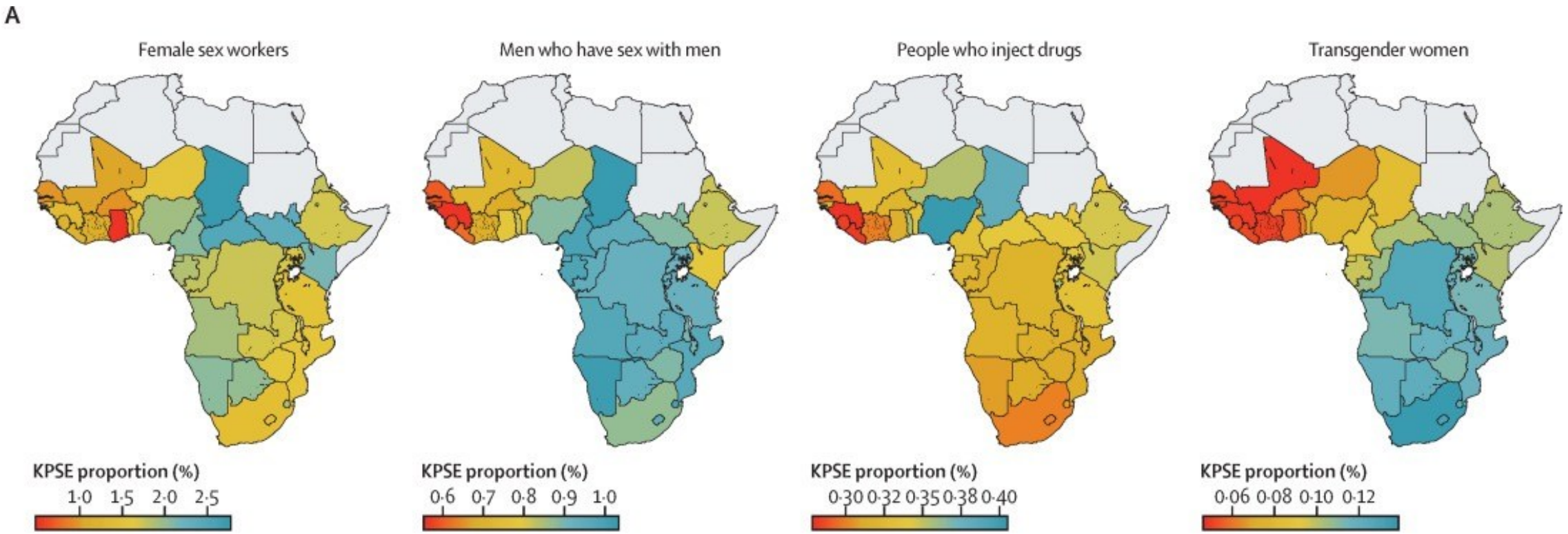
Malawi: geospatial epidemic 2016-2023



Population size, HIV prevalence, and antiretroviral therapy coverage among key populations in sub-Saharan Africa: collation and synthesis of survey data, 2010–23

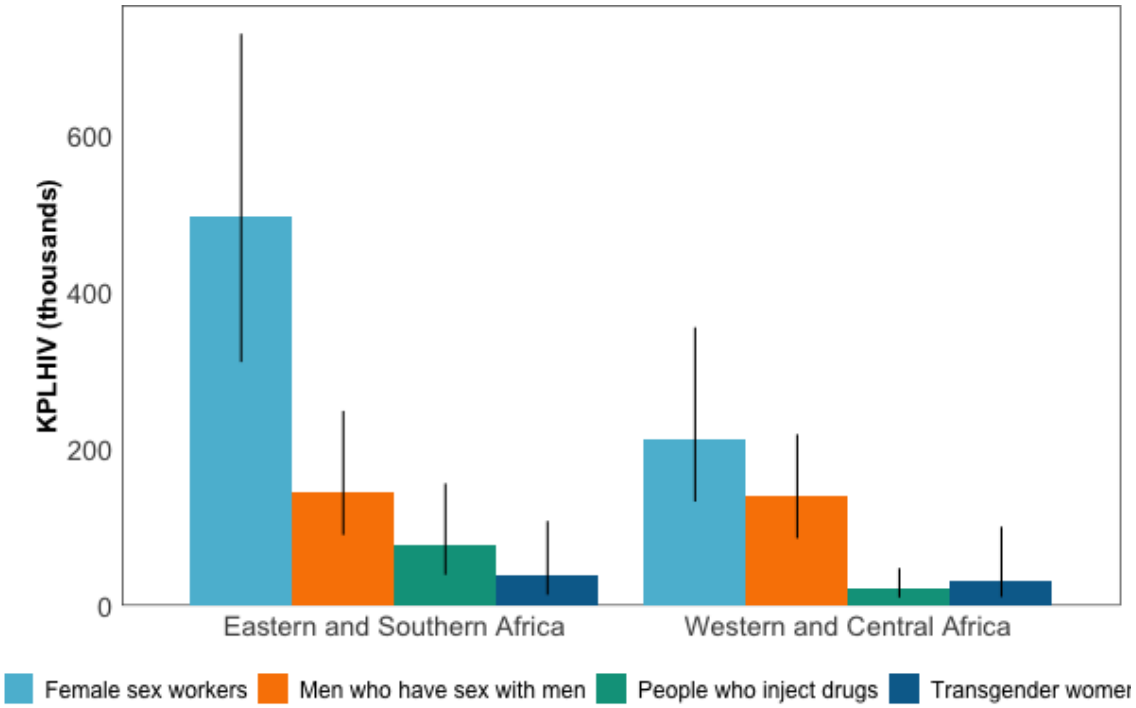
Stevens et al.

Lancet Glob Health 2024; 12: e1408–12



Stevens *et al.* Lancet Global Health 2024; https://doi.org/10.1016/s2214-109x(24)00236-5

Key populations are disproportionately affected by HIV in <u>all countries</u> in sub-Saharan Africa



Collation and synthesis key population size, HIV prevalence, and ART coverage survey data, 2010-2023

Female sex workers, men who have sex with men, people who inject drugs, and transgender women are

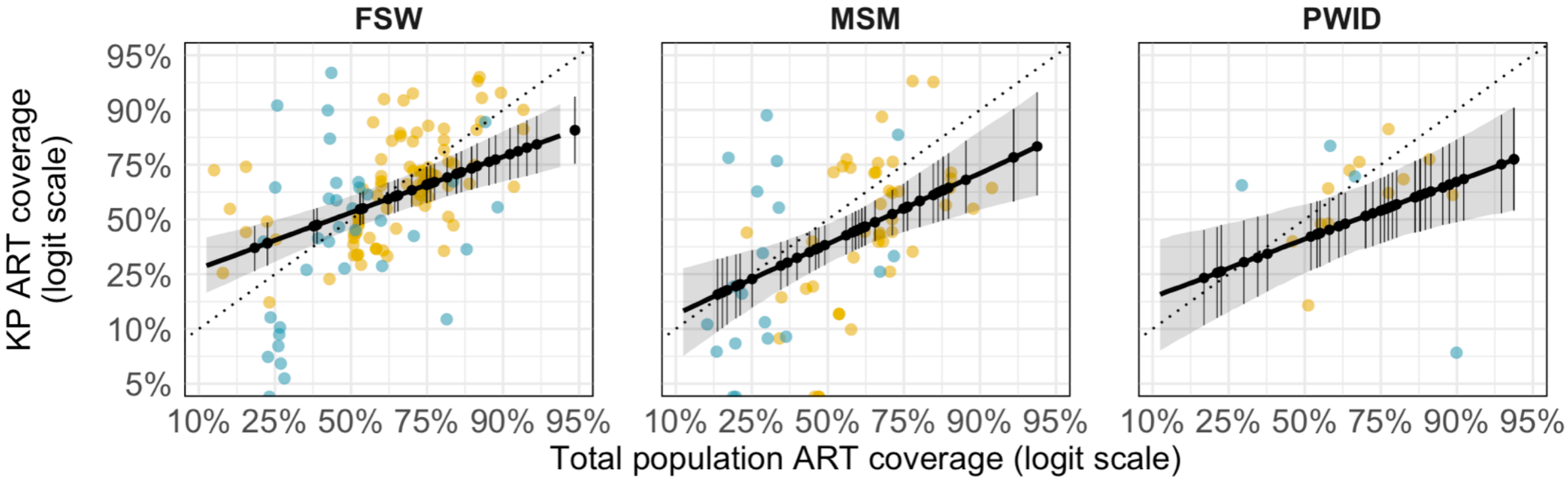
1.3% of adults **(95% CI 0.9-1.7%)** in sub-Saharan Africa

But comprise

- **5.0%** (3.6-7.0%) **of PLHIV in in Eastern and Southern Africa** and
- **12.0%** (8.4-17.4%) **of PLHIV in Western and Central Africa**

Stevens *et al.* Lancet Global Health 2024; https://doi.org/10.1016/s2214-109x(24)00236-5

ART coverage among key populations increased with total population ART coverage—but lags at high coverage

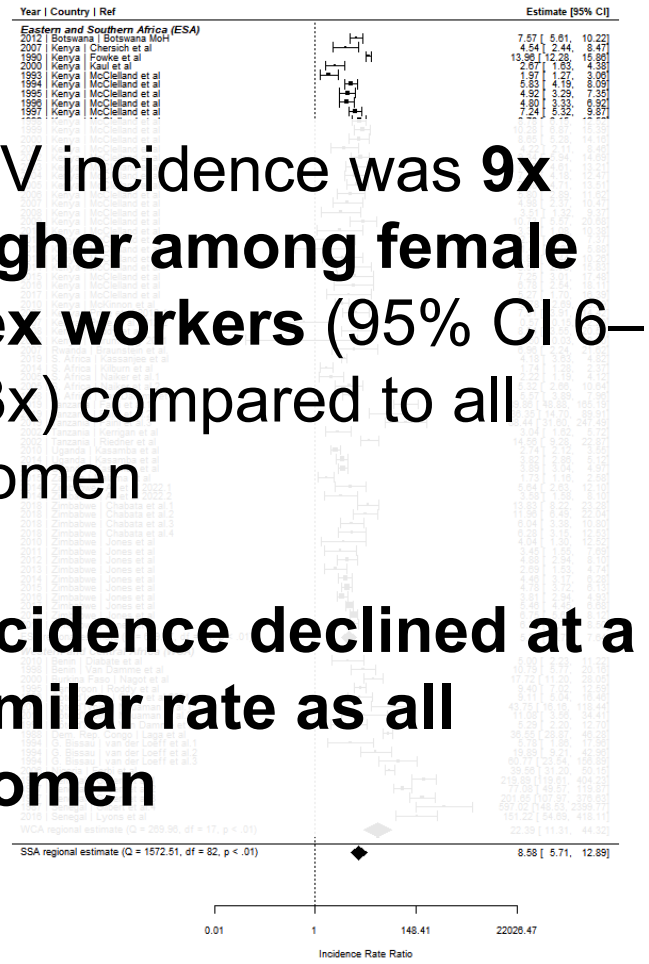


At 80% population ART coverage:

11% lower **11% lower** **13% lower**

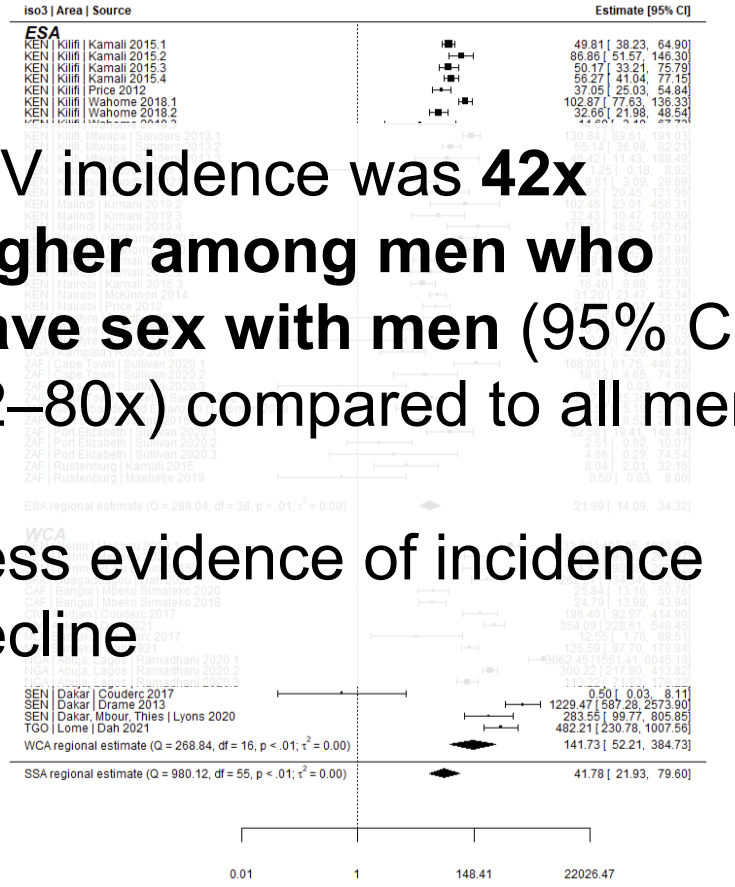
Stevens *et al.* Lancet Global Health 2024; https://doi.org/10.1016/s2214-109x(24)00236-5

Key populations experience disproportionately high HIV incidence



HIV incidence was **9x higher among female sex workers** (95% CI 6–13x) compared to all women

Incidence declined at a similar rate as all women



Less evidence of incidence decline

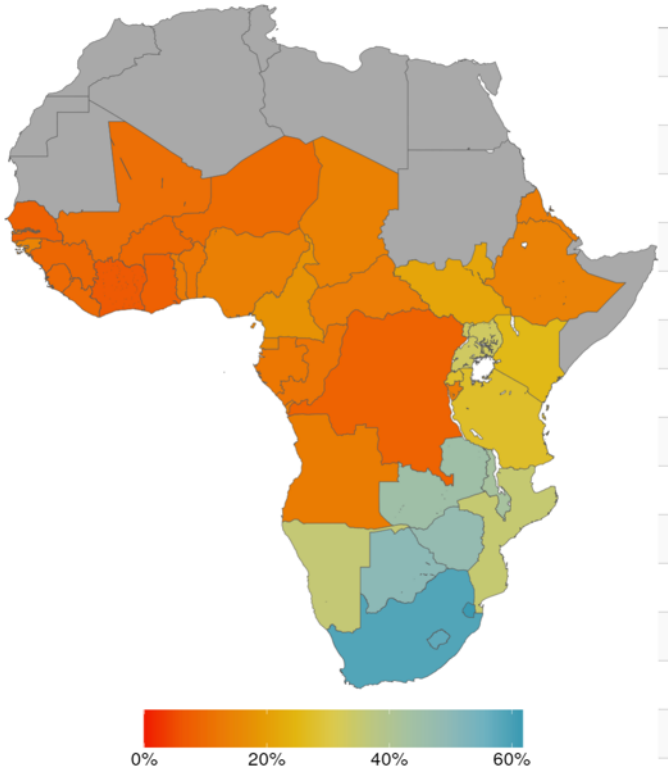
Jones and Anderson *et al.* Lancet Global Health 2024; https://doi.org/10.1016/s2214-109x(24)00227-4

Stannah *et al.* Lancet HIV 2023; https://doi.org/10.1016/s2352-3018(23)00111-x
Stevens *et al.* JAIDS 2024; https://doi.org/10.1097/qai.0000000000003321

Accessing key population summary data

KP Data | Introduction | Data | Estimates | Sources | About

Country: All countries | **Key Population:** FSW | **Indicator:** HIV prevalence | Download table



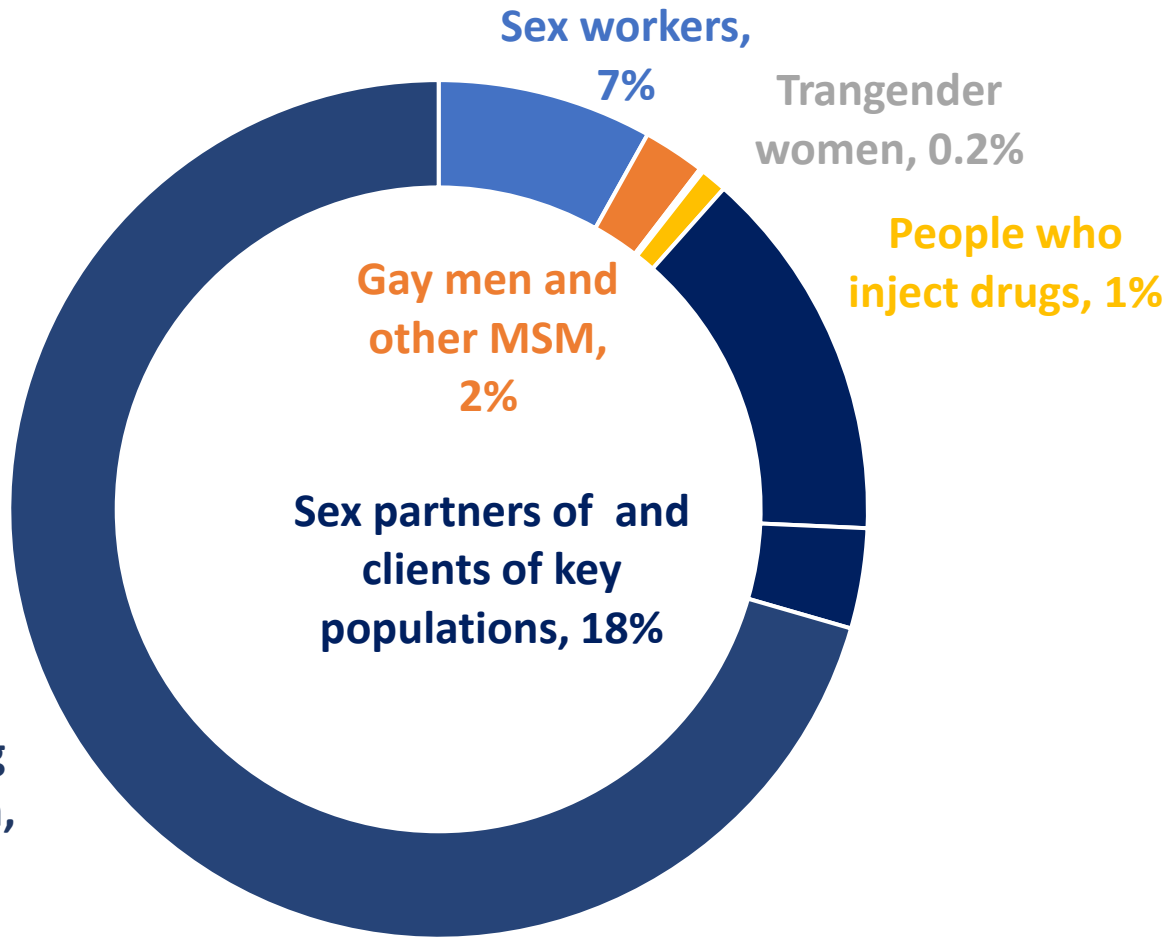
Country	KP	Indicator	Estimate (95%CI)
Zimbabwe	FSW	HIV prevalence	48.00 (39.20, 57.00)
Zambia	FSW	HIV prevalence	45.00 (37.80, 53.20)
Uganda	FSW	HIV prevalence	33.40 (25.50, 42.30)
Togo	FSW	HIV prevalence	12.60 (9.20, 16.90)
Tanzania	FSW	HIV prevalence	27.20 (20.50, 35.10)
South Sudan	FSW	HIV prevalence	21.50 (14.20, 30.60)
South Africa	FSW	HIV prevalence	58.80 (52.50, 65.00)
Sierra Leone	FSW	HIV prevalence	9.60 (5.30, 16.20)
Senegal	FSW	HIV prevalence	8.00 (4.70, 13.00)
Rwanda	FSW	HIV prevalence	27.50 (20.50, 35.90)
Nigeria	FSW	HIV prevalence	13.80 (10.30, 18.30)
Niger	FSW	HIV prevalence	10.20 (6.80, 15.10)
Namibia	FSW	HIV prevalence	35.60 (25.80, 46.40)
Mozambique	FSW	HIV prevalence	35.10 (26.80, 44.10)
Mali	FSW	HIV prevalence	10.40 (7.00, 15.60)
Malawi	FSW	HIV prevalence	42.60 (30.30, 54.50)

https://shiny.dide.ic.ac.uk/kp-data/

Stevens *et al.* Lancet Global Health 2024; https://doi.org/10.1016/s2214-109x(24)00236-5

Among whom are new HIV infections occurring?

Sub-Saharan Africa, 2022



- **Extremely disproportionate HIV vulnerability among key populations**
- **But large numbers of ongoing new infections among all population groups**

Korenromp *et al. JAIDS* 2024; https://doi.org/10.1097/QAI.0000000000003340

UNAIDS

No ‘silver bullets’ for narrowly targeted HIV prevention → require strategies that protect large populations with moderate HIV risk

- Consistent predictors of HIV incidence:
  - Non-cohabiting with primary partner, young age, curable STI, HSV-2, multiple partners
- But only low-to-moderate ability to differentiate those who subsequently acquired HIV *(systematic review)*

Jia *et al. J Int AIDS Soc* 2022; 25:e25861
https://doi.org/10.1002/jia2.25861

40-65% of population classified as ‘high risk’…

…to identify 75% of HIV infections

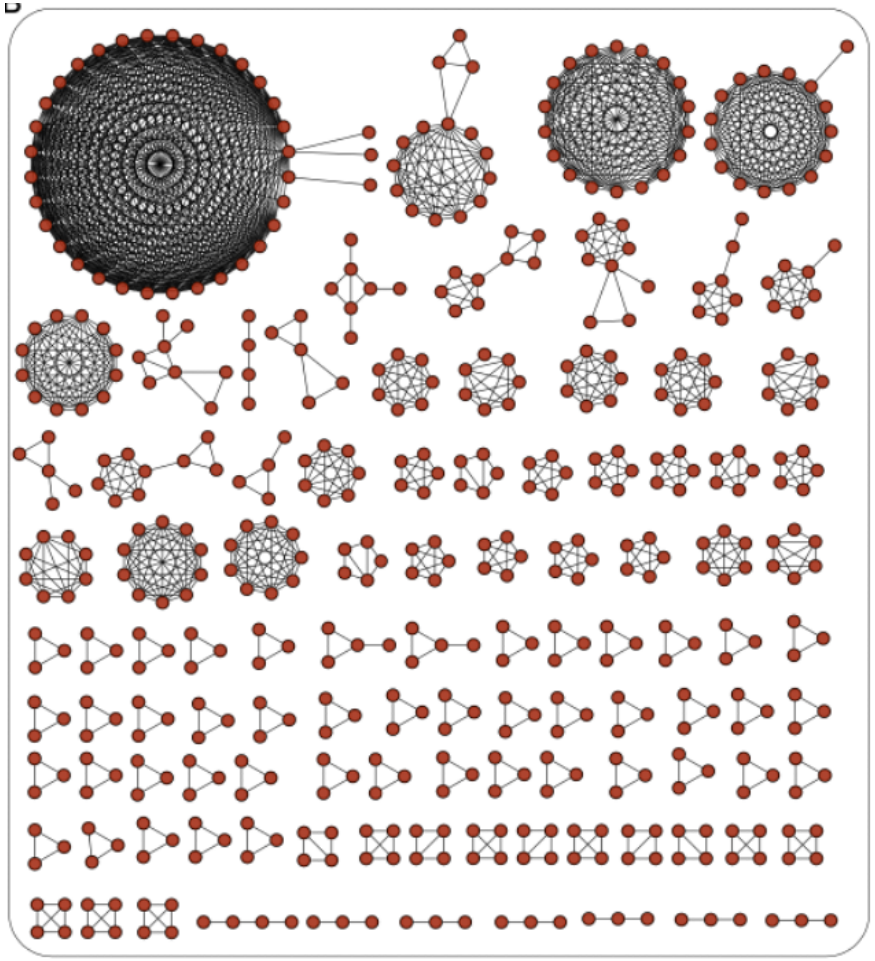
Individual risk behaviours added minimal predictive ability versus only geographic location and age
(Roberts *et al. Clin Infect Dis* 2022; https://doi.org/10.1093/cid/ciac069)

Small and diffuse HIV transmission clusters in Eastern and Southern Africa

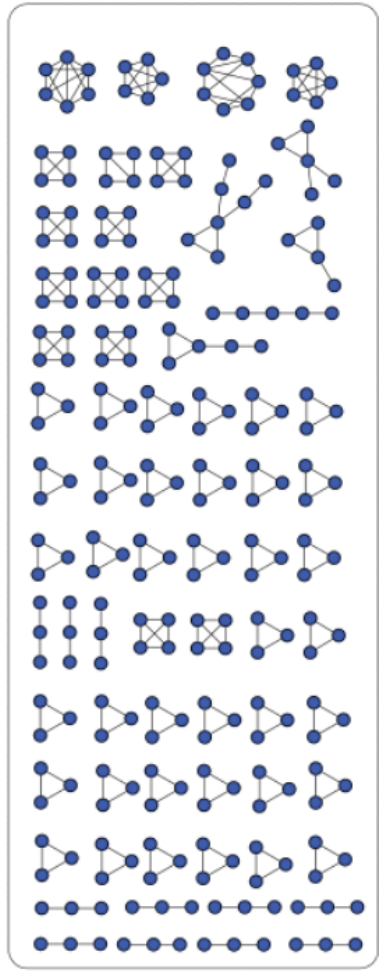
Clustering of HIV Transmissions: European compared to Zambian HIV epidemic

PANGEA HIV

Europe



Zambia



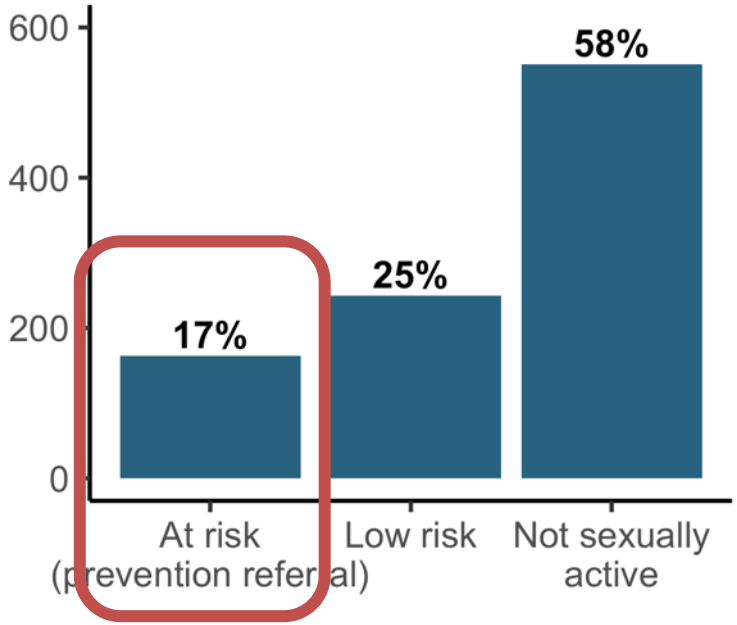
Abeler-Dörner *et al. in preparation*

Rapid change in individual risk and prevention needs

MANICALAND CENTRE for Public Health Research

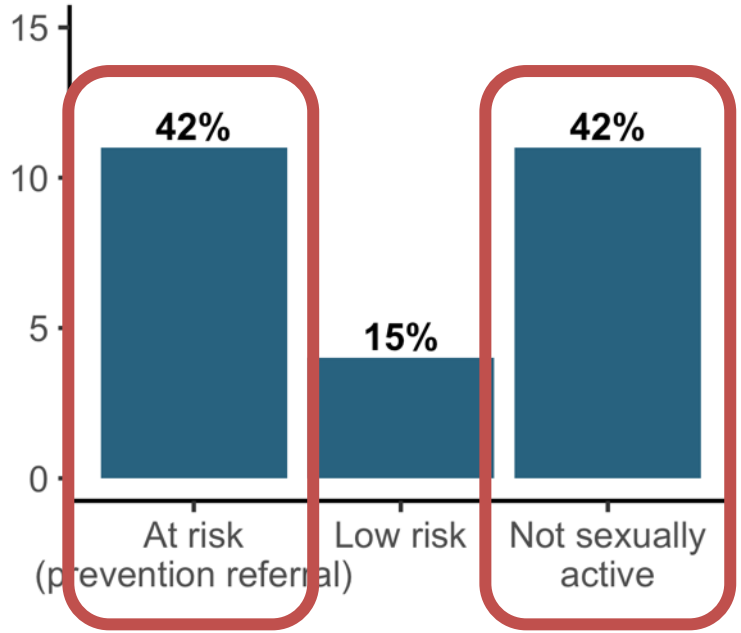
Moorhouse *et al.* medRxiv 2024
https://doi.org/10.1101/2024.09.10.24312897

Prevention group allocation
(n = 960 women 15-24y)



40% of infections among 17% 'at risk'

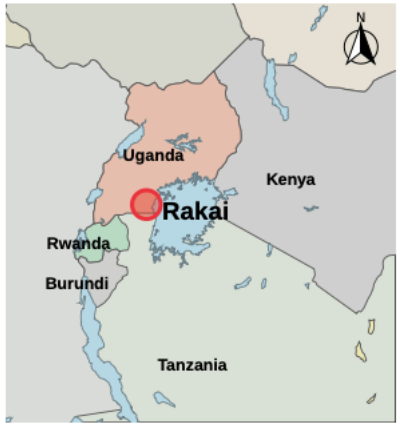
HSV-2/HIV infections
(n=26; 1 year follow-up)



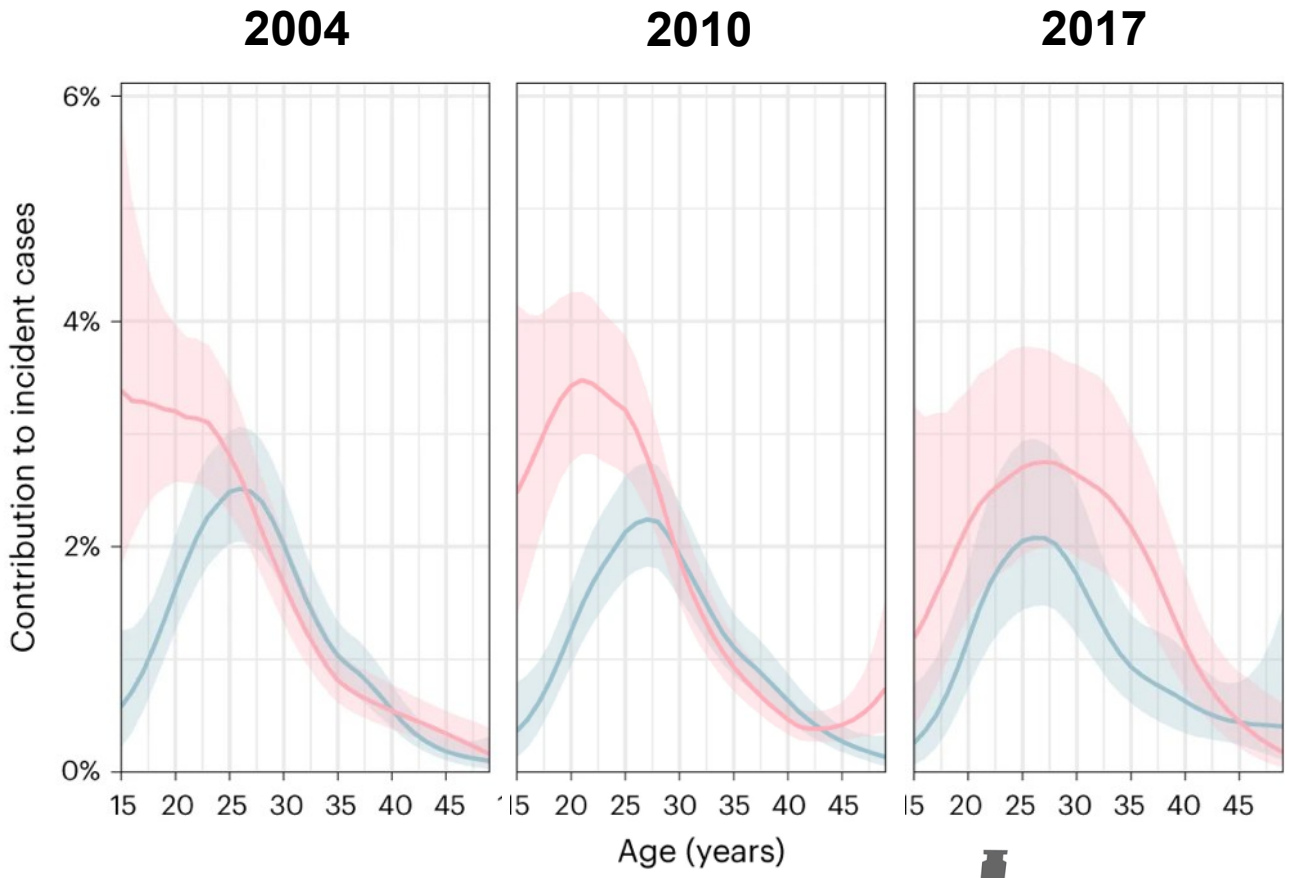
But—40% among AGYW 'not sexually active' at baseline assessment

In what age groups do most infections occur?

- **Infections increasingly spread across all adult ages**
  - Increasing share among 25+ years
- **Increasing share among women**
- **Men transmit HIV at ~4x higher rate than women**
  - Disproportionate transmission from men 25-39 years



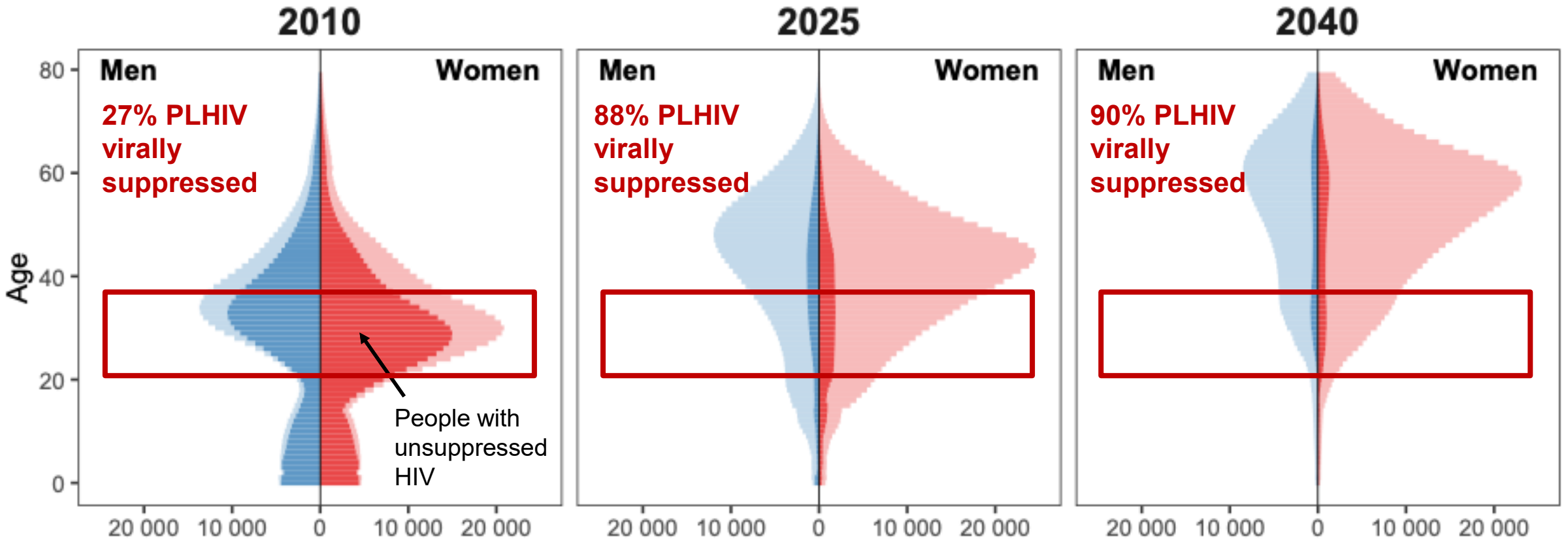
Rakai Clinical Cohort Study, southern Uganda



Monod *et al. Nature Microbiol* 2023; https://doi.org/10.1038/s41564-023-01530-8

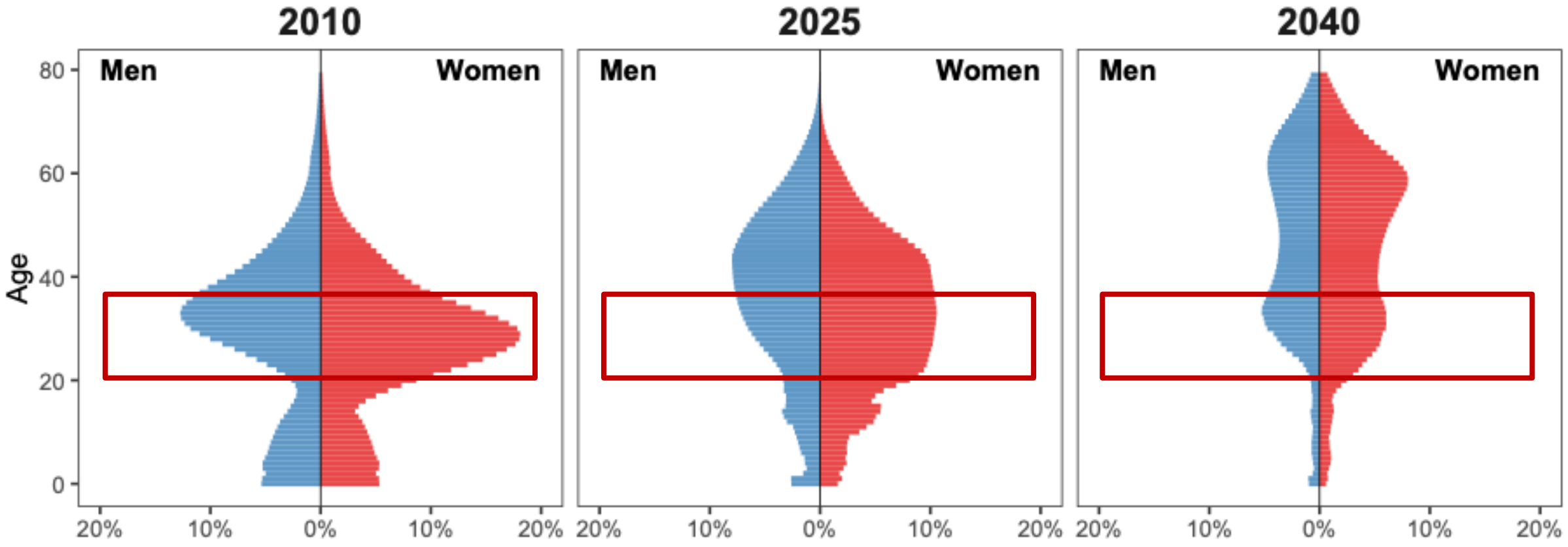
Rakai Health Sciences Program
Improved Health Through Research

Follow the virus: Ageing HIV population → aging population with viraemia → ageing partners at risk and population needing prevention



Follow the virus: Aging HIV population → aging population with viraemia → aging partners at risk and needing prevention

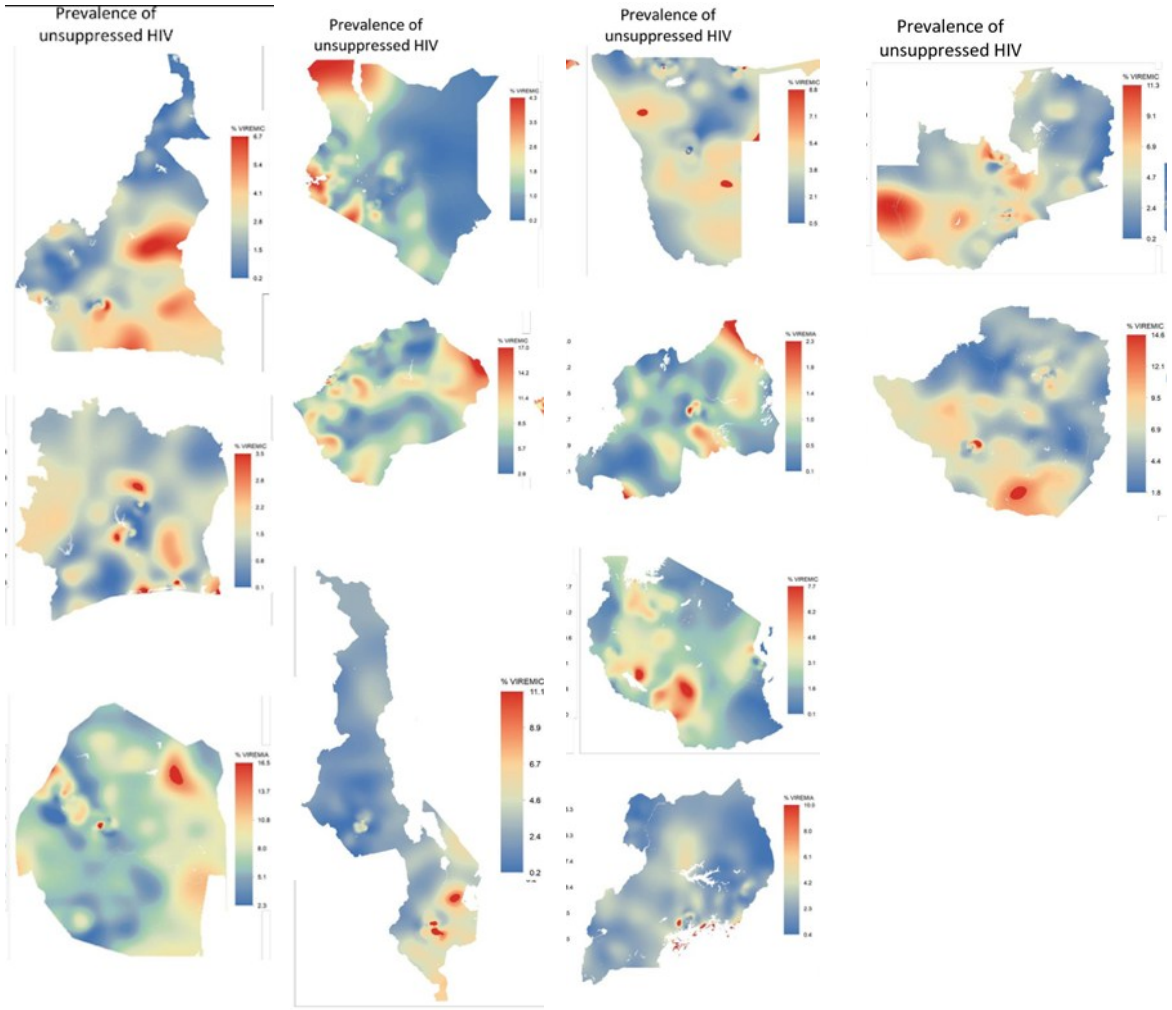
Age distribution of people with unsuppressed HIV



Follow the virus: Most new infections occur in communities with high prevalence of unsuppressed HIV

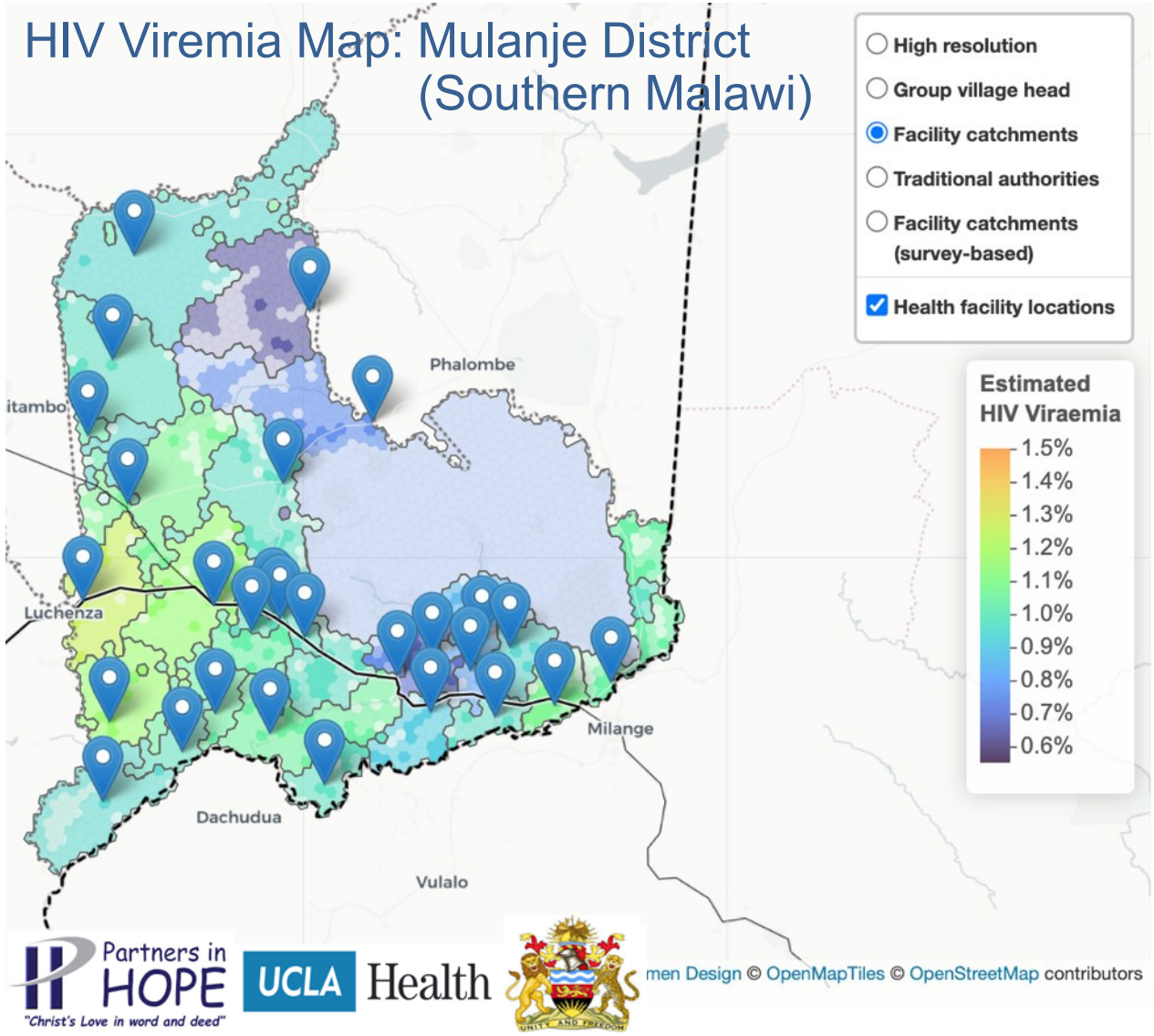
PHIA household surveys (2016-2019):

- **Unsuppressed HIV highly correlated with community HIV incidence (R^2 =0.92)**

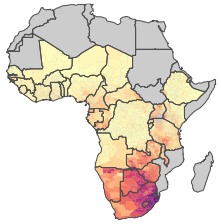


Hladik *et al.* PLOS One 2023; https://doi.org/10.1371/journal.pone.0275560

Community-level geospatial mapping



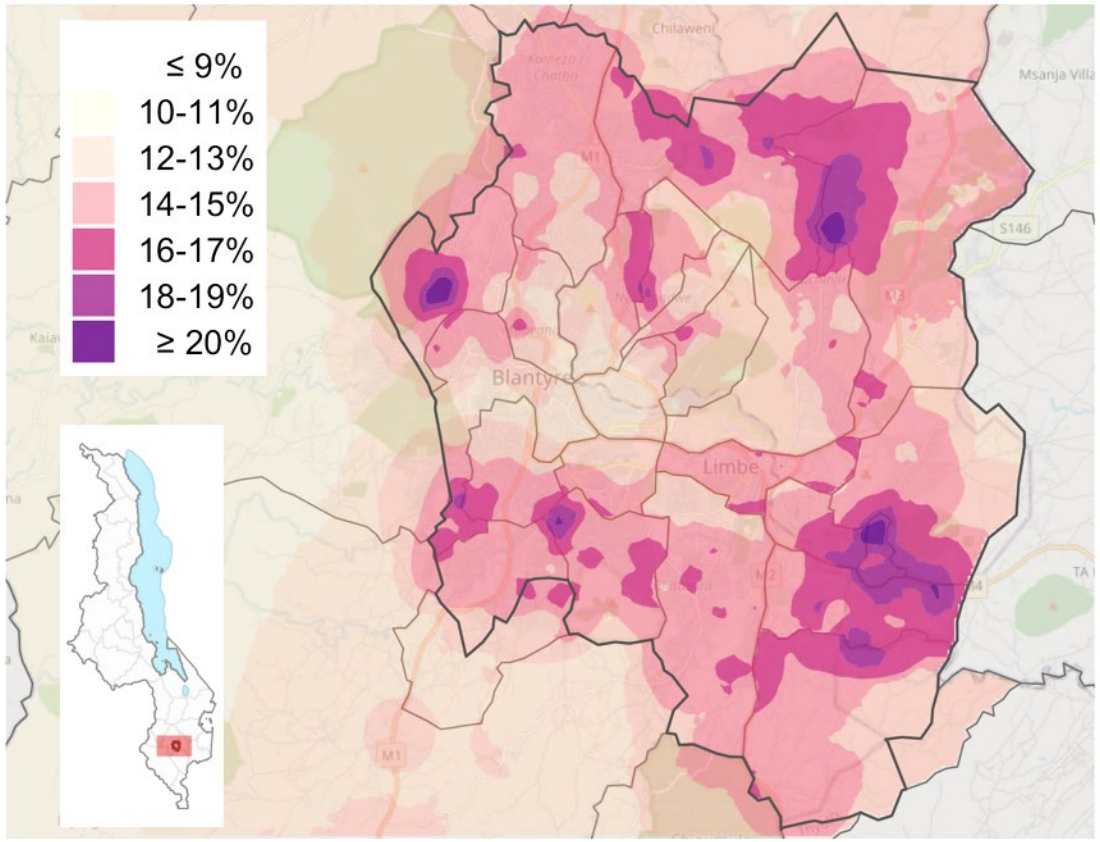
AIDS 2022



Large HIV variation in urban areas: Blantyre City, Malawi

(Abstract #1666; Rachael Burke)

HIV prevalence (15-49 years)



Across wards on Blantyre City (southern Malawi), HIV prevalence ranged between **13%** and **19.5%**

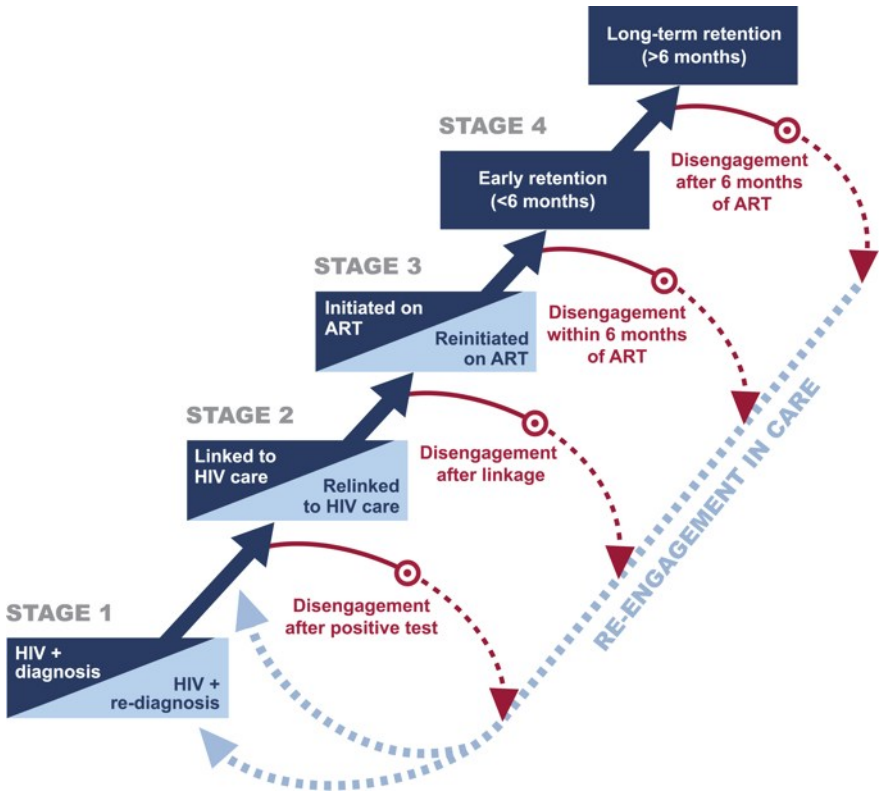
SA078: The Blantyre Prevention Strategy

Malawi-Liverpool-Wellcome Clinical Research Programme

BPS BLANTYRE PREVENTION STRATEGY

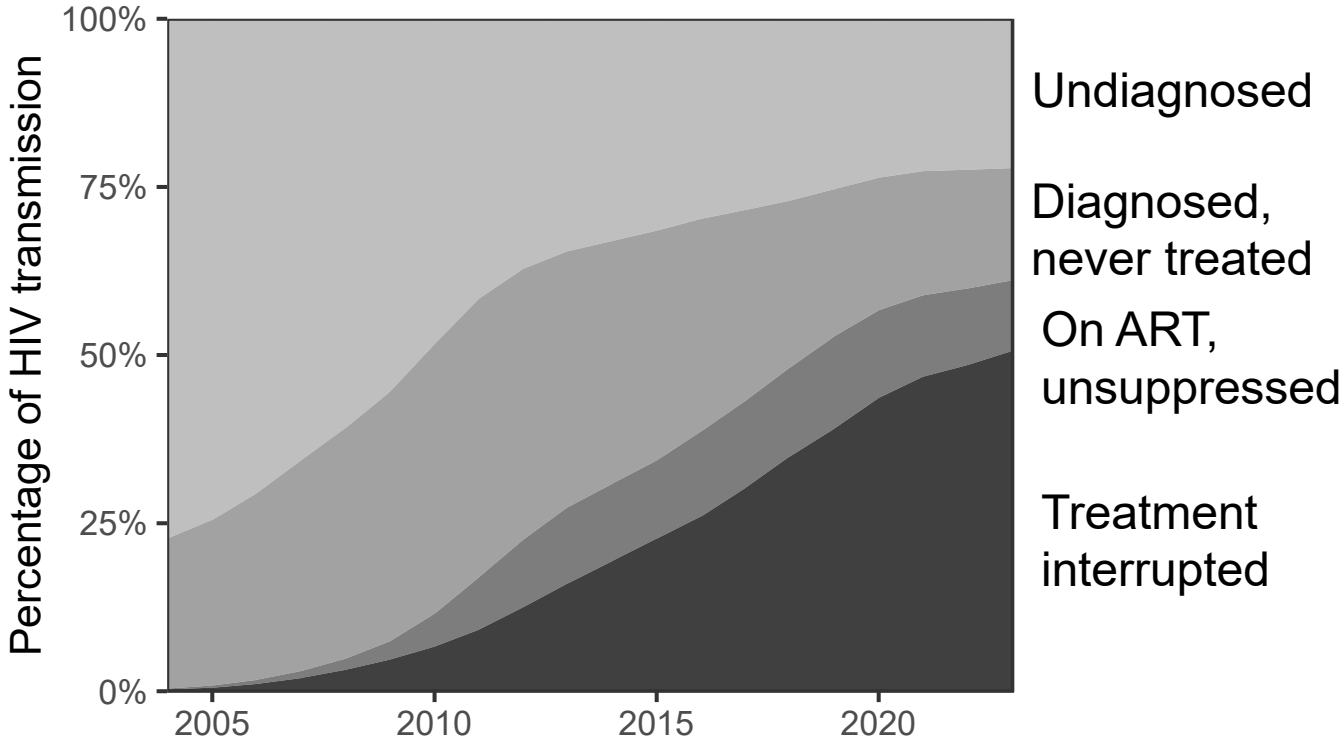
COOPER/SMITH

Follow the virus: Large an increasing share of HIV transmission among people who have interrupted treatment



Ehrenkranz *et al.* PLOS Med 2021; https://doi.org/10.1371/journal.pmed.1003651

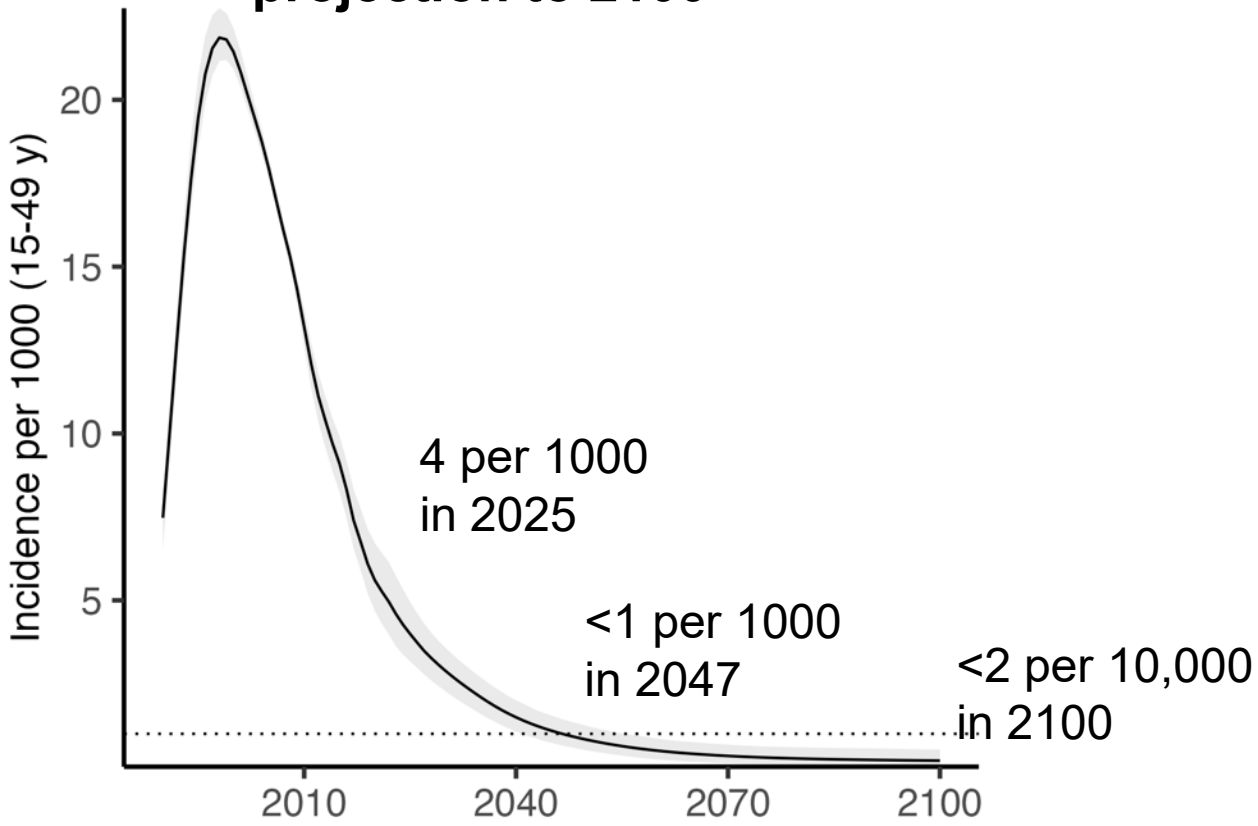
South Africa: **% of transmission** by care cascade stage (Thembisa 4.6)



Moolla, *personal communication*
Johnson *et al.* JAIDS 2022; https://doi.org/10.1097/qai.0000000000002927

Long-term HIV incidence projection

South Africa: HIV incidence projection to 2100



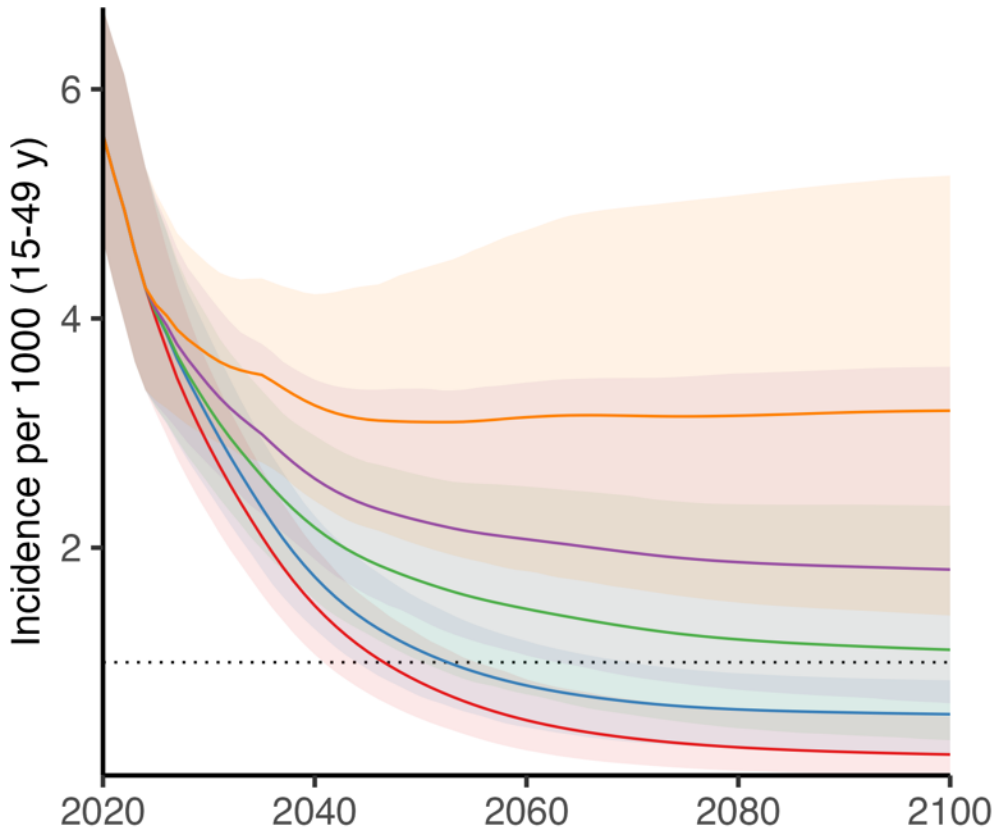
‘Status quo’ projection—maintaining current programme levels in perpetuity

- **Testing:** 40 tests per 100 adults each year (~20 million by 2040)
- **ART initiation and retention:** 86% adult PLHIV on ART
- **Condoms:** 25% of all sex acts
- **VMMC:** increasing to ~85% by 2040
- **PrEP:**
  - ~16% among FSW; ~16% among MSM
  - 5% among AGYW (higher risk)

Linganisa

Whittles et al. in preparation; Thembisa model v4.7; https://www.thembisa.org

Discontinue PrEP & VMMC; reducing condom usage



Modelled scenarios:

- **Sustain current HIV testing and treatment**
- **Discontinue other prevention from 2025**

Condom use reduces by 30% (+ discont. PrEP, VMMC)

Condom use reduces by 15% (+ discon. PrEP, VMMC)

Discontinue PrEP & VMMC

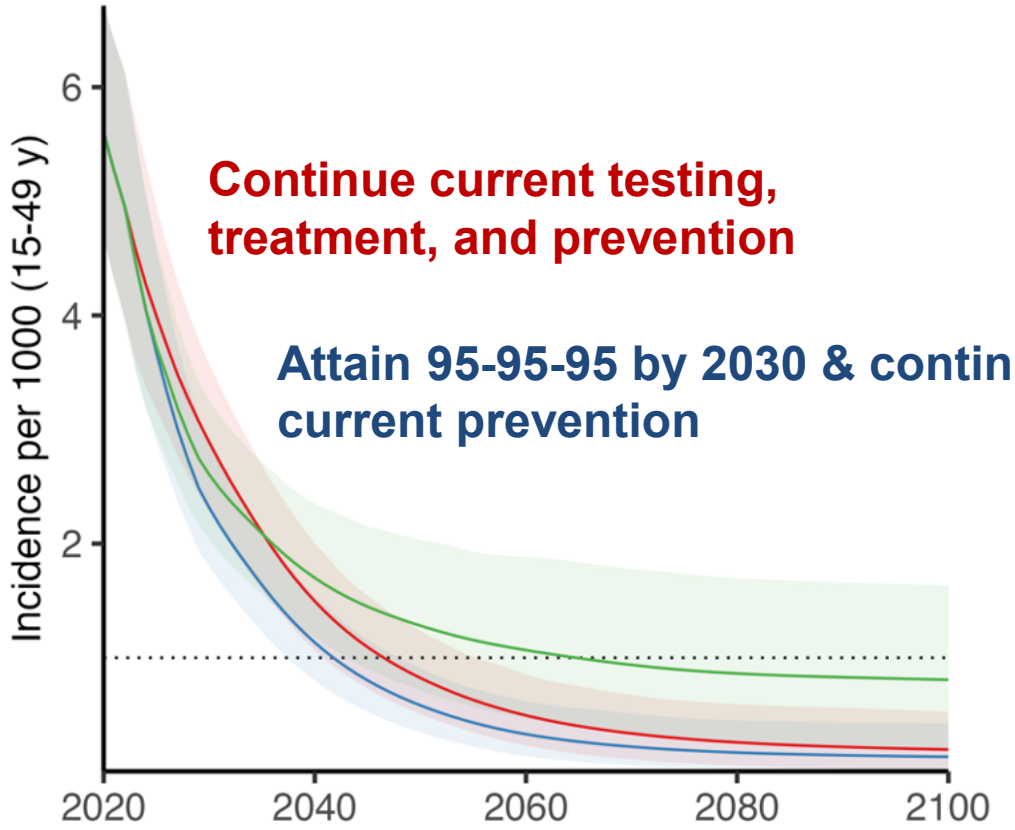
Discontinue PrEP (FSW, MSM, higher risk AGYW)

Continue current prevention and treatment levels

Whittles et al. in preparation; Thembisa model v4.7; https://www.thembisa.org

Long-term HIV incidence projection

Attaining 95-95-95 and sustaining HIV prevention

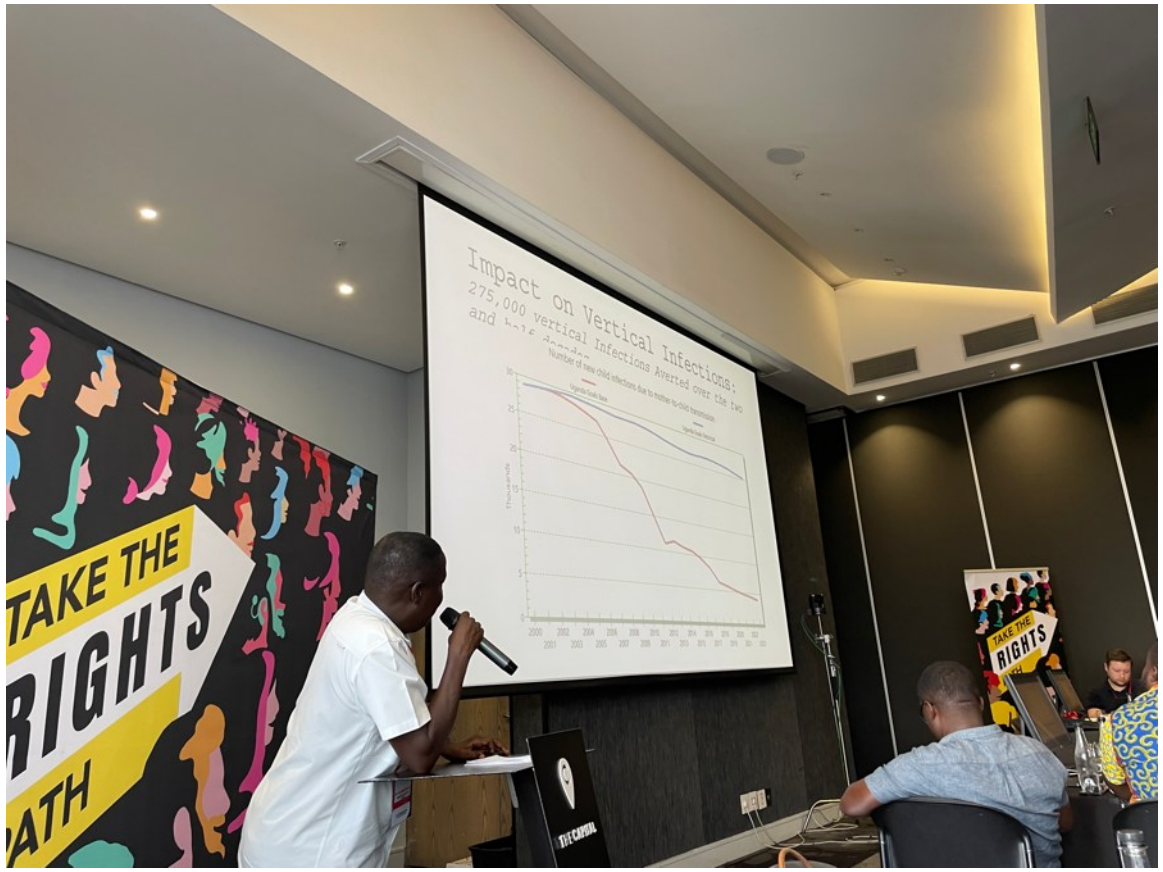


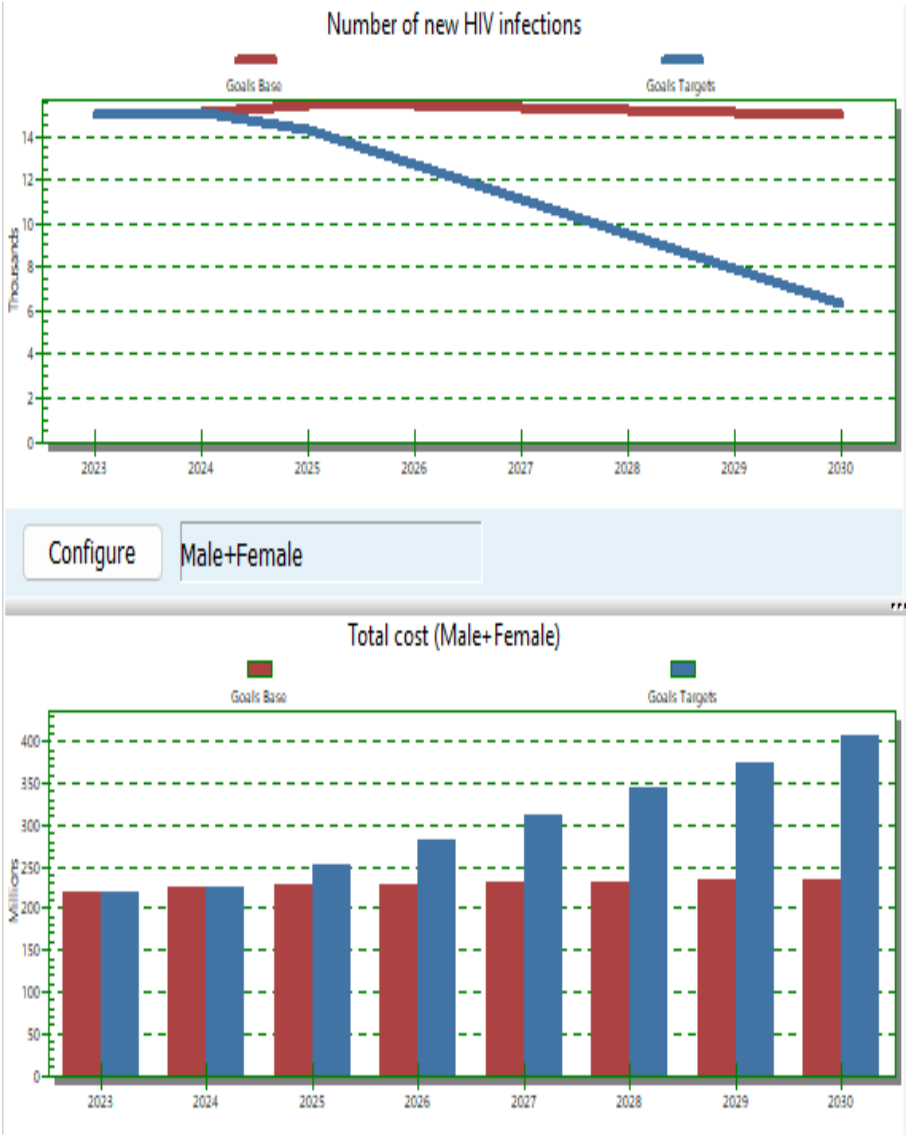
- **Attaining 95-95-95 accelerates incidence decline.**
- **Discontinuing primary prevention results in stable long-term HIV incidence**

Attain 95-95-95 by 2030 & discontinue PrEP and VMMC from 2025

Whittles et al. in preparation; Thembisa model v4.7; https://www.thembisa.org

Individual country scenario modelling — up tomorrow!





Key messages

1. Plan for the HIV epidemic **10 years from now**, not 10 years ago

2. **Follow the virus:** adapt care, treatment, and prevention through focusing on among whom **prevalence of unsuppressed HIV** is changing
   - Location, age groups, sociodemographic characteristics

3. **Think long-term:** sustained effective treatment and prevention for *decades* to come

4. **No silver bullets:** Narrowly targeted interventions challenging at current stage of the epidemic
   - Efficient: Focused (resource) intensive services for small populations with disproportionate risk
   - Large impact: Diffuse and occasional nature of HIV transmission; treatment interruption → reach large population with moderate risk