

Pathways to HIV/AIDS Epidemic Control

Harriet Nuwagaba-Biribonwoha, MBChB, PHD

Assistant Professor, Columbia University, Mailman School of Public Health

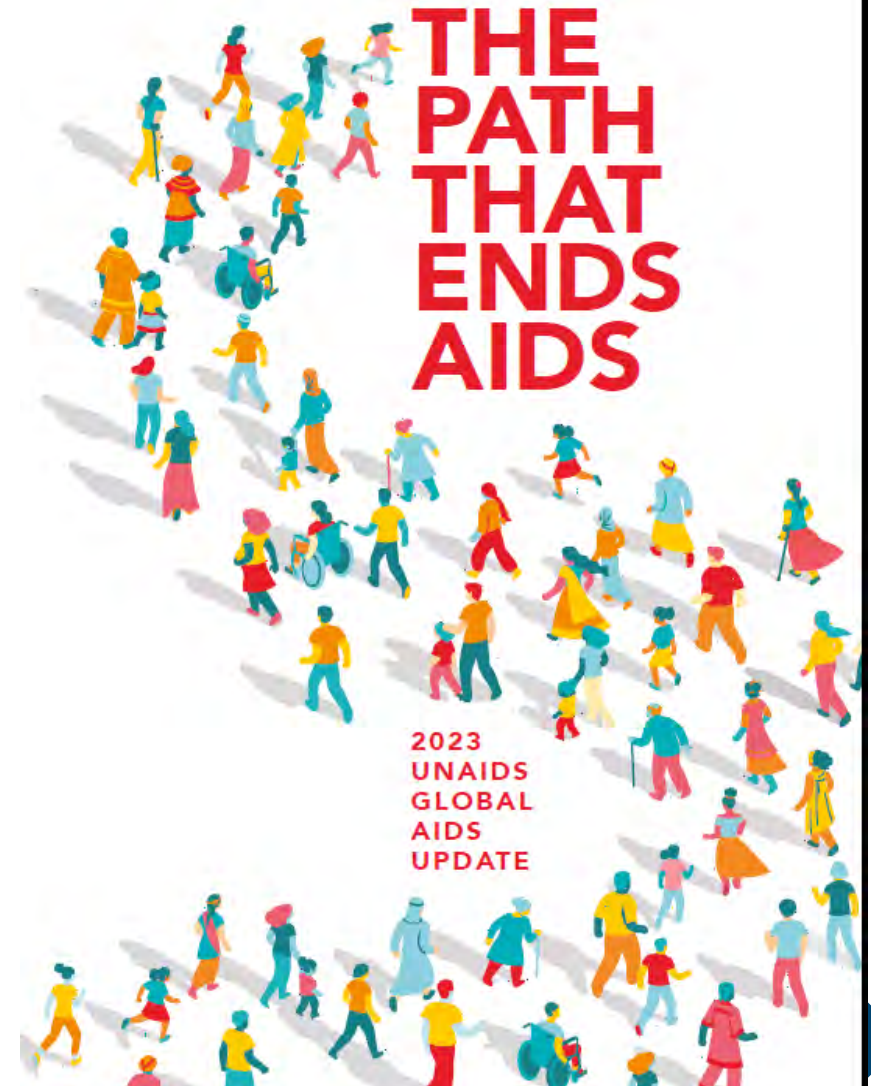
Research Director, ICAP at Columbia University, Eswatini

CRS Leader, Eswatini Prevention Center Clinical Research Site

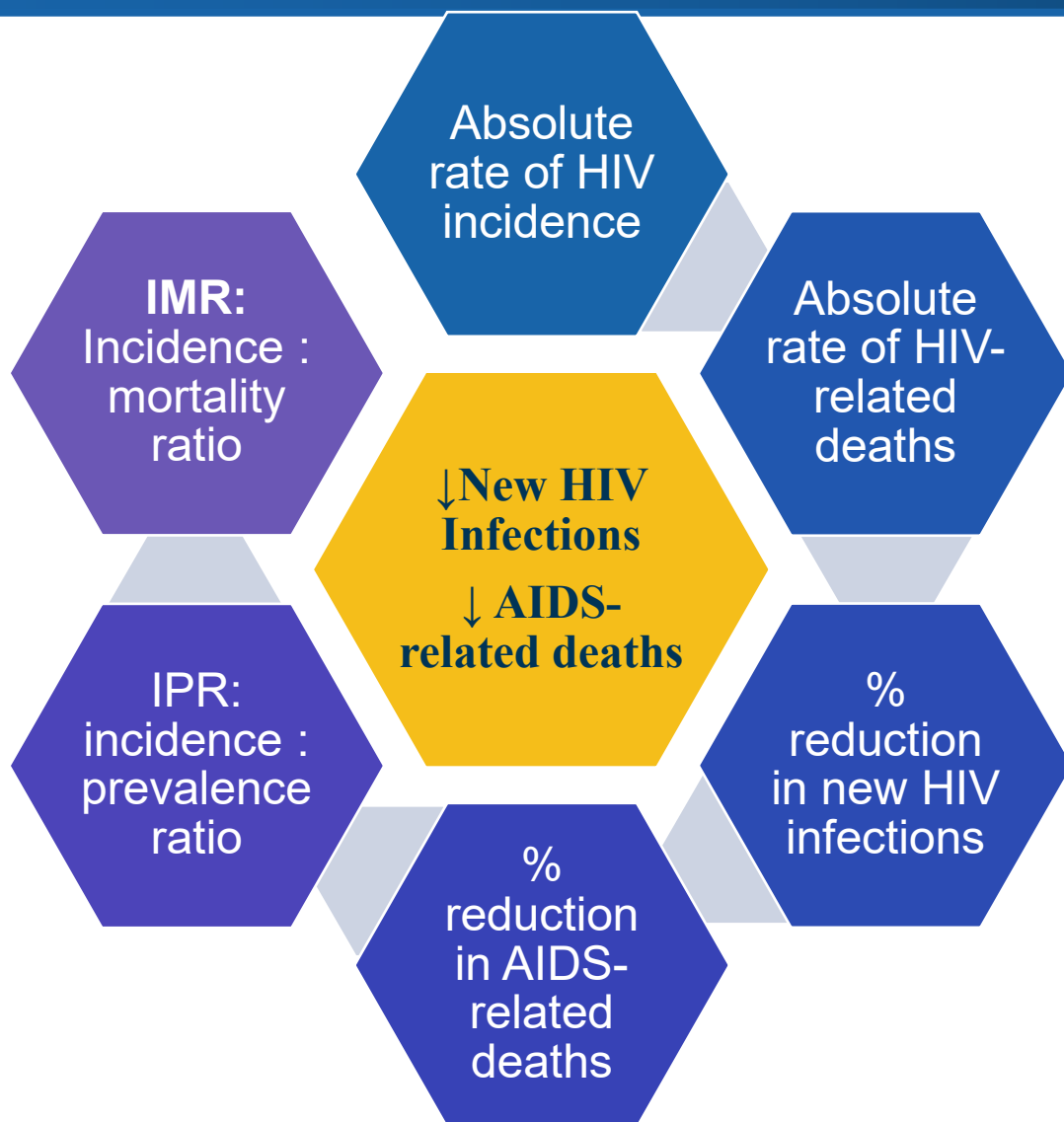


Outline

- Review some* pathways to HIV/AIDS epidemic control
 - Population viral load suppression
 - Robust combination HIV prevention
- Future directions



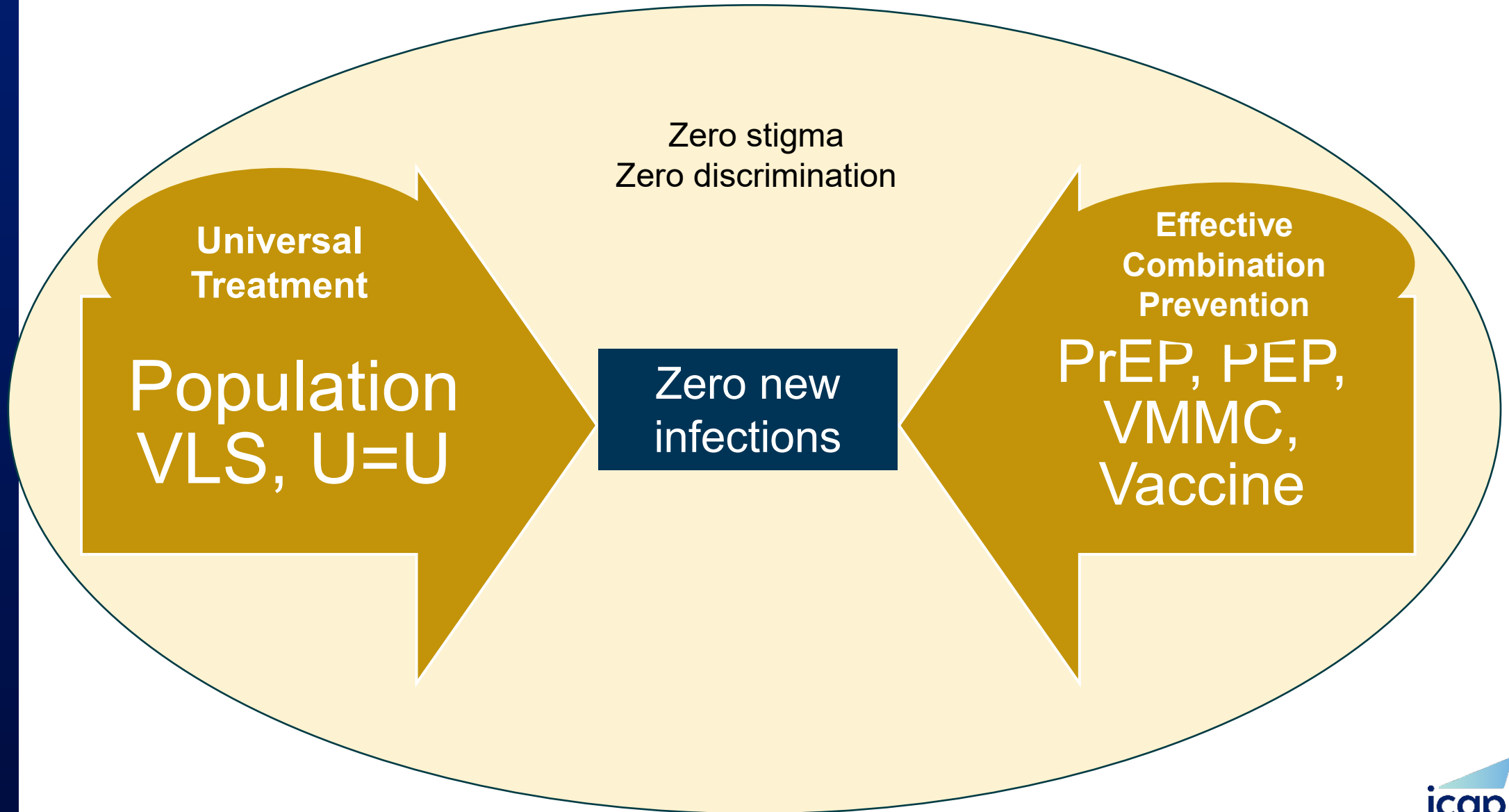
What is HIV/AIDS epidemic control?



Goal:

- Absolute rate of HIV incidence less than one per 10,000 adults per year
- 90% reduction in new HIV infections by 2030 from 2010 (UNAIDS)

Pathways to HIV/AIDS epidemic control



Population viral load suppression as pathway to epidemic control

UNAIDS Fast-Track Targets

by 2020

90-90-90

Treatment

500 000

New infections among adults

ZERO

Discrimination

by 2030

95-95-95

Treatment

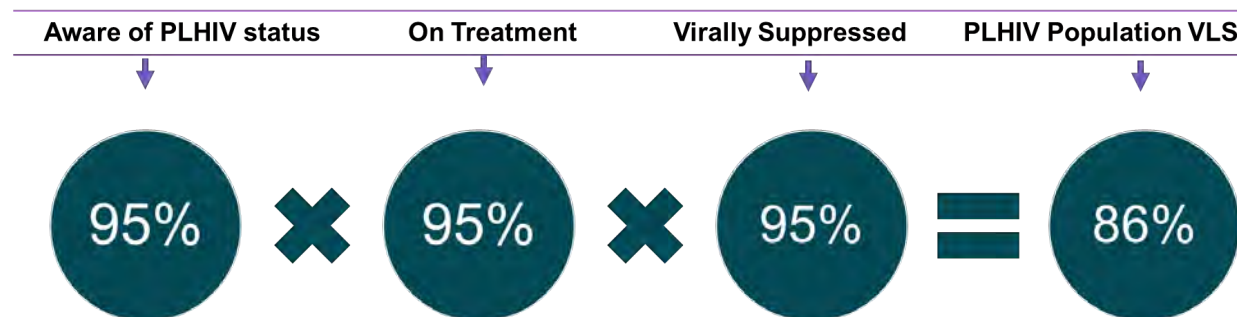
200 000

New infections among adults

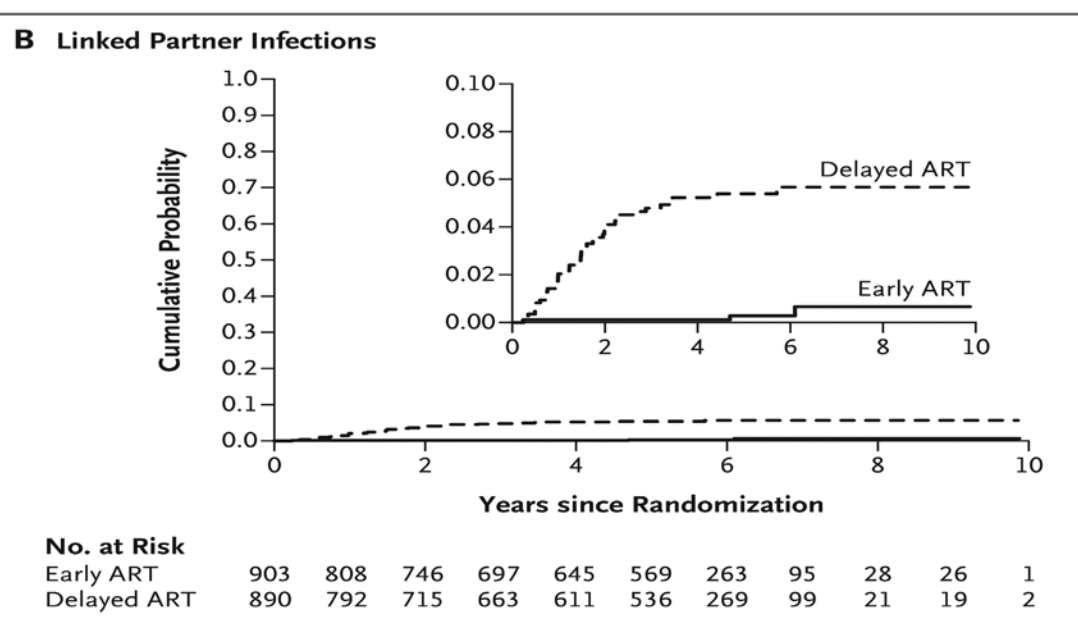
ZERO

Discrimination

- **First 95 (Diagnosed):** 95% of PLHIV know or are aware of their HIV+ status
- **Second (On Treatment):** 95% of those aware of their PLHIV status are on antiretroviral therapy
- **Third 95 (With VLS):** 95% of those on ART with viral load suppression



Early ART with viral load suppression minimizes sexual transmission: Evidence from HPTN 052



Linked partner infections

#	# of infections	Event rate/ 100 person years (95% CI)	Relative reduction with early ART
Early ART	3	0,07 (0,0-0,2)	↓ 93%
Delayed ART	43	1,03 (0,74-1,38)	

- No linked infections when participants were stably virally suppressed.
- Linked infections associated with high VL
- A substantial number of *unlinked* transmissions (36%): suggesting multiple sexual partners: *need to ensure diagnosis, treatment and VLS for all PLHIV.*

The risk of sexual transmission of HIV in individuals with low-level HIV viraemia: a systematic review



Laura N Broyles, Robert Luo, Debi Boeras, Lara Vojnov



Summary

Background The risk of sexual transmission of HIV from individuals with low-level HIV viraemia receiving antiretroviral therapy (ART) has important public health implications, especially in resource-limited settings that use

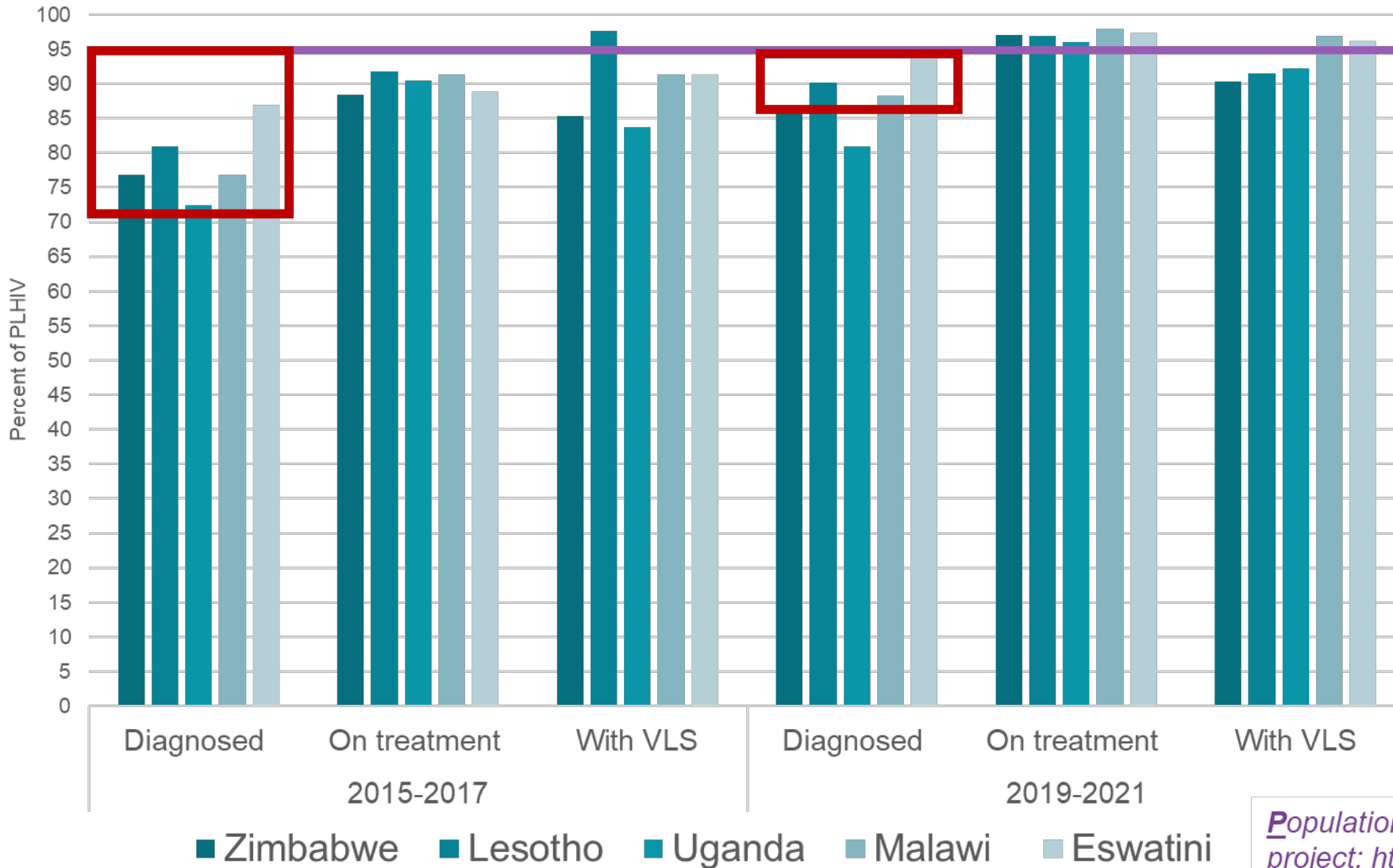
Published Online

July 23, 2023

<https://doi.org/10.1016/>

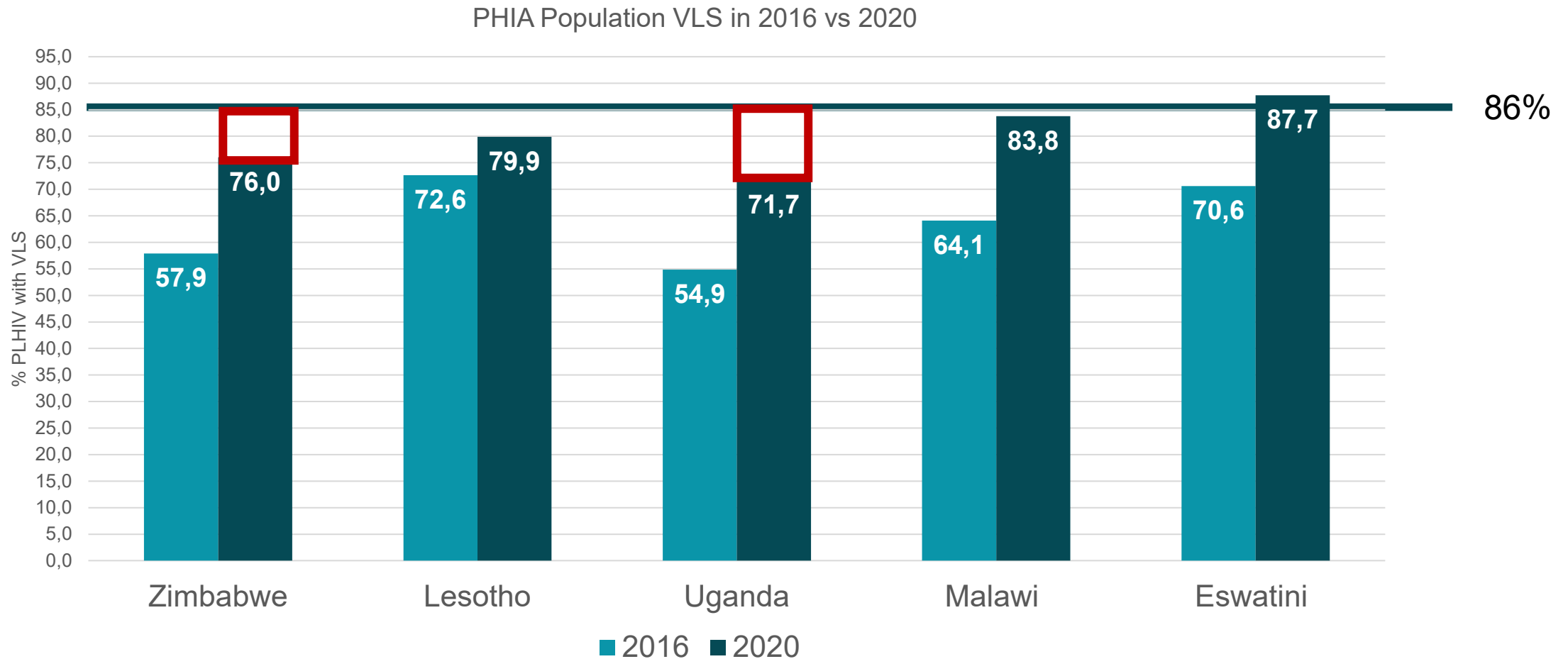
- 7762 sero-different couples from 25 countries
 - 323 transmissions, none among stably couples with stably suppressed PLHIV partners
 - Except for 2 infections where there was delayed VL testing
 - No transmissions when partner VL was <200C/mL

2015-2021: 95-95-95 Achievements among individuals 15+ years in 5 SSA Countries



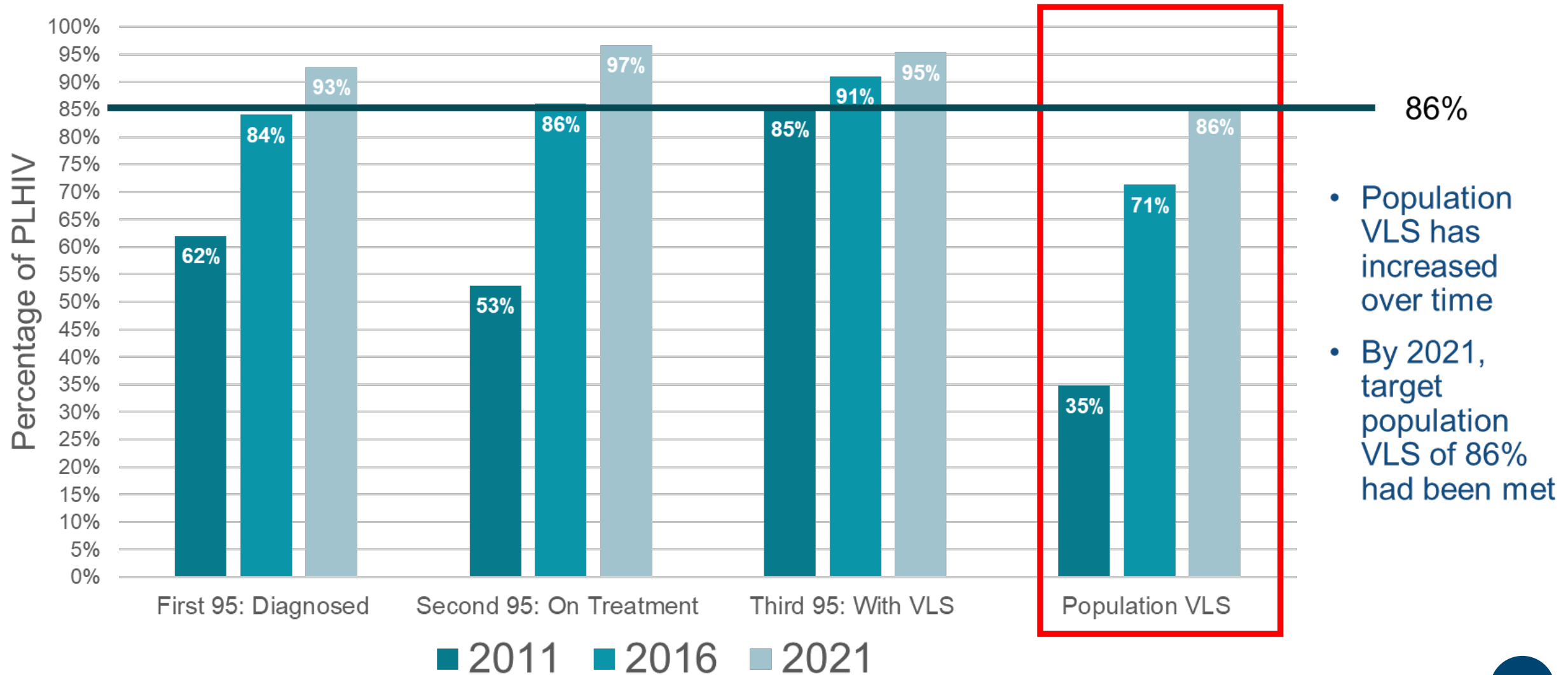
- All 5 countries did better on all 95's in a ~5-year period
- First 95 (HIV testing, awareness) is a persistent gap, yet a critical gateway to ART and population VLS

How are achievements in 95-95-95 translating to population VLS among ALL individuals 15+ years?

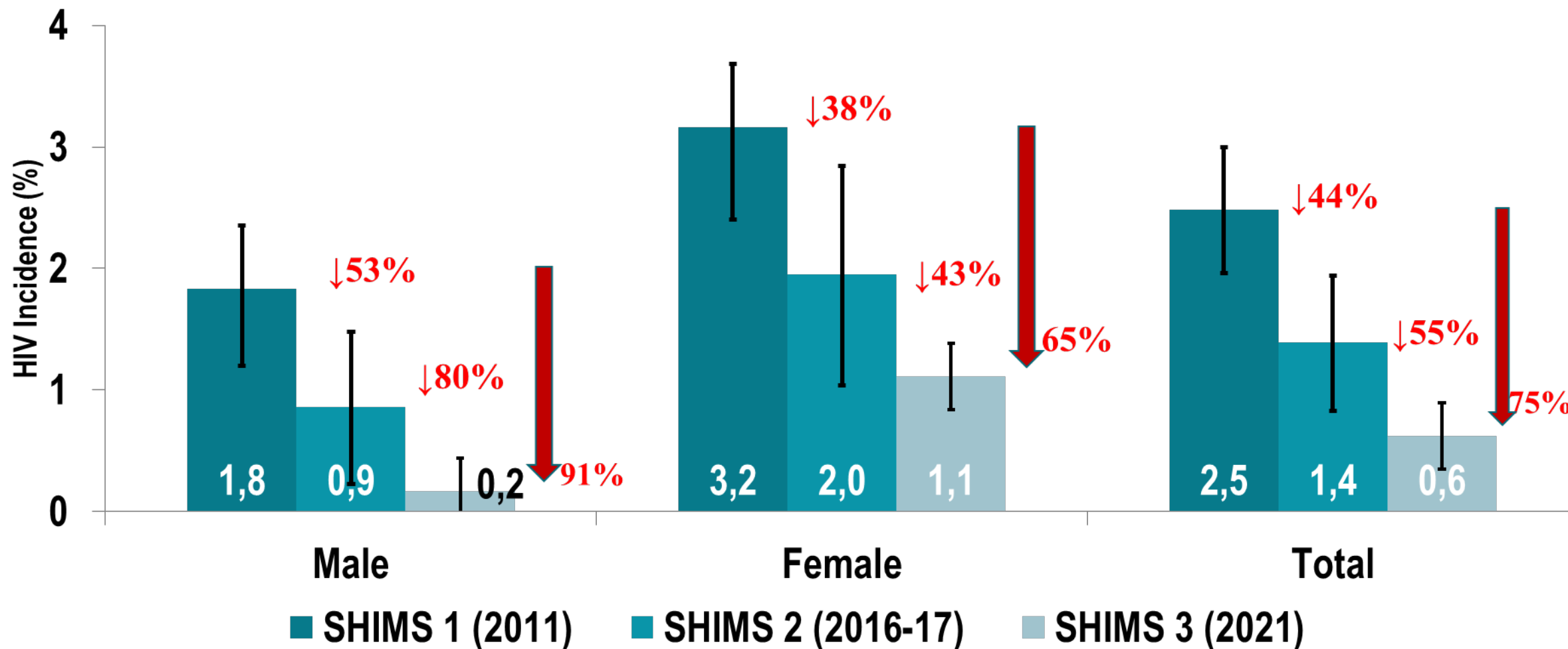


- There is progress towards achieving population VLS in the past~ 5 years among all countries
- >20% of the PLHIV population still capable of HIV transmission in several countries

Eswatini: 95-95-95 and Population VLS among adults 18-49 years (2011-2021)



Eswatini: HIV incidence among adults 18-49 years (2011-2021)



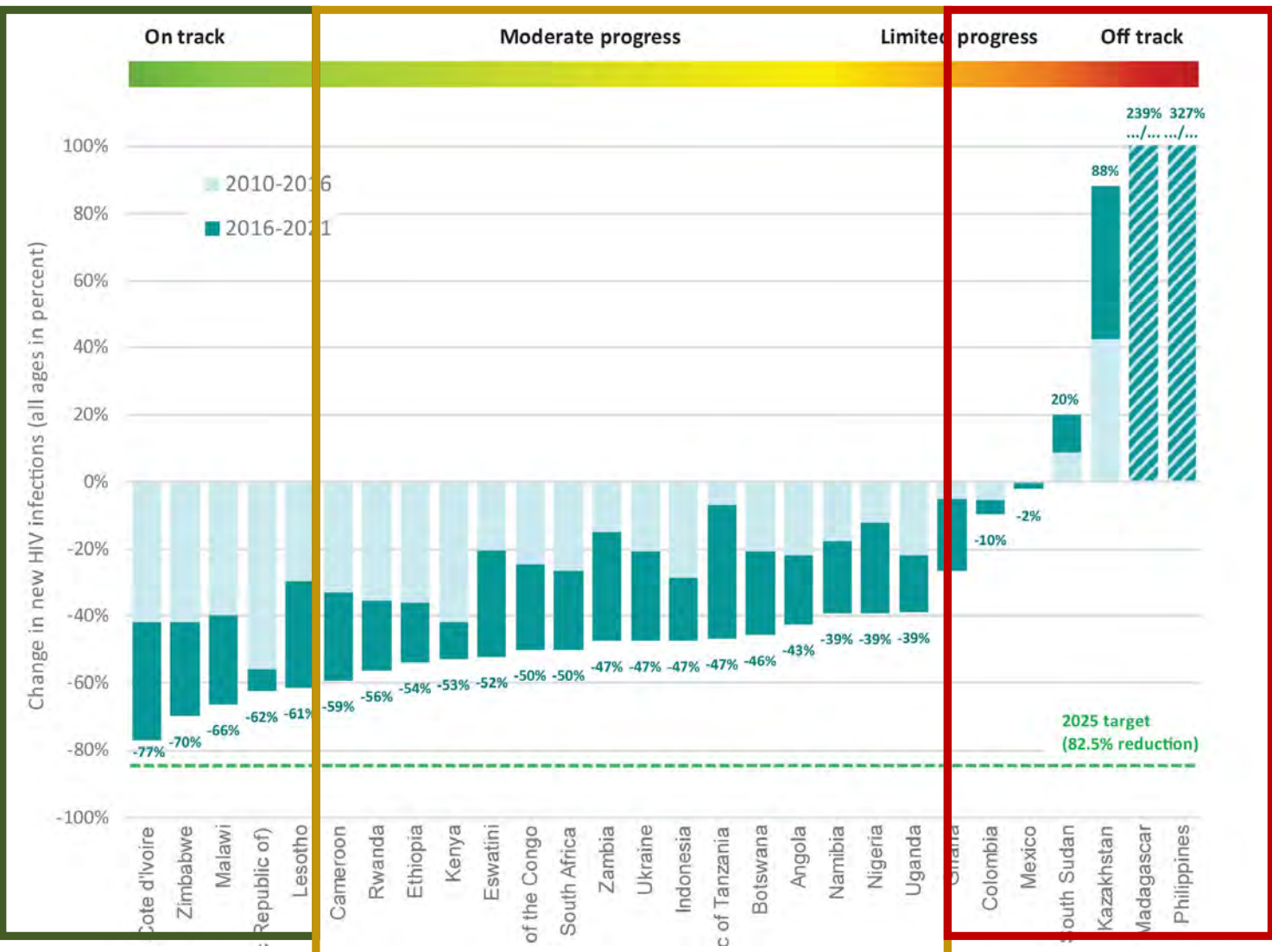
- Significant decline in HIV incidence among men and women 18-49 years
- Annual HIV incidence among young women still exceeds 1%

Are we there yet with population VLS?

	Men 15+ years	Women 15+ years	Children 0-14 years
Tanzania	93–91–89	98–97–95	72–72–66
Botswana	94–87–87	98–97–97	58–58–56
Zimbabwe	96–92–88	97–97–93	69–69–59
Rwanda	94–91–89	95–93–91	76–75–73
Kenya	93–89–84	95–95–92	84–84–74
Malawi	90–86–80	98–98–93	70–70–55
Namibia	91–86–80	97–94–90	76–76–68
Zambia	92–90–86	94–91–88	67–67–62
Uganda	88–80–75	92–87–83	71–71–60
Burundi	87–86–80	94–92–86	36–36–31

Source: UNAIDS Global AIDS Update 2023: The path that ends AIDS

Are we there yet with decline in new infections?



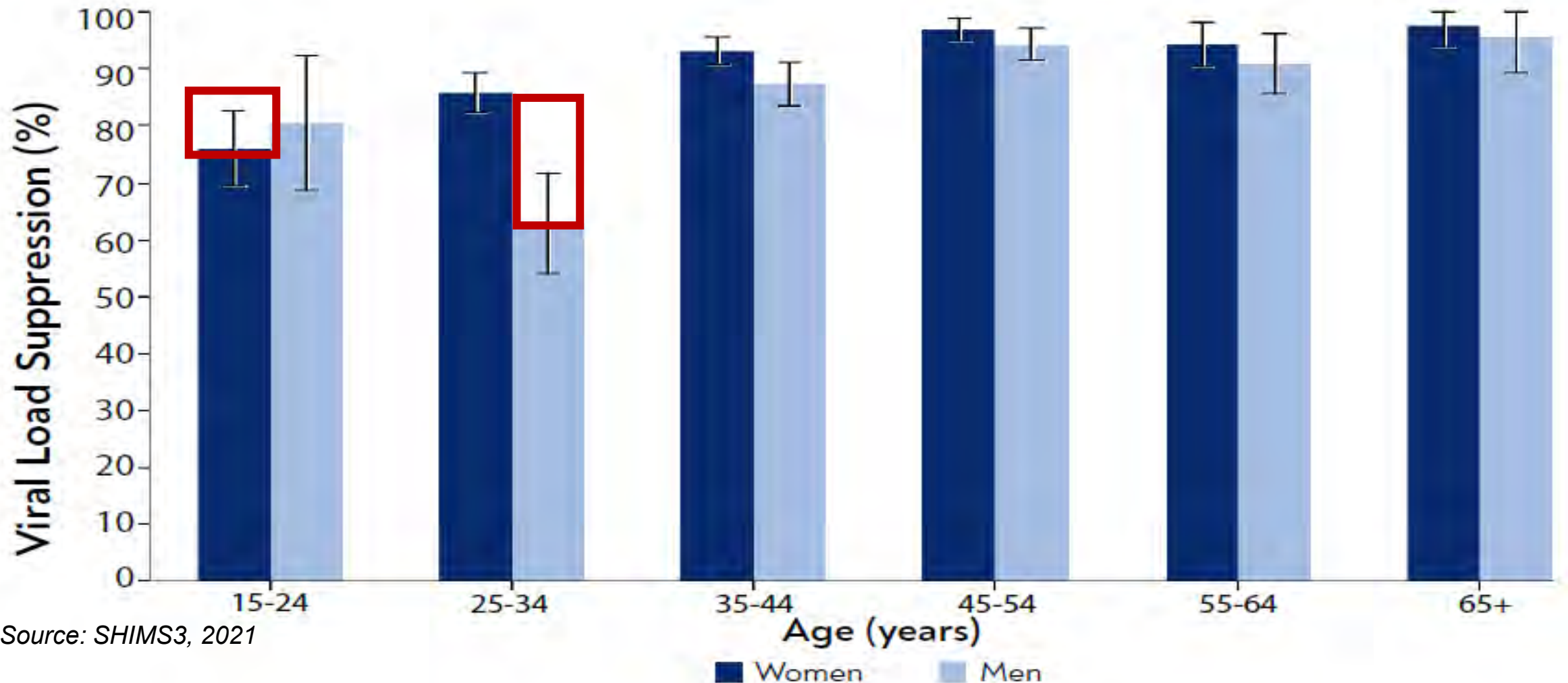
- Global HIV Prevention Coalition focus countries
- Between 2010 and 2021
 - A few countries on track: >60% ↓ in new infections
 - Many countries making moderate progress 30-60% ↓ in new infection
 - Some countries with limited progress or increase in new infections

Source: Global HIV Prevention Coalition: Change in the number of people acquiring HIV in Coalition focus countries, 2010–2021
<https://hivpreventioncoalition.unaids.org/wp-content/uploads/2023/05/2022>



The implications of not achieving the 'Last Mile' with population VLS

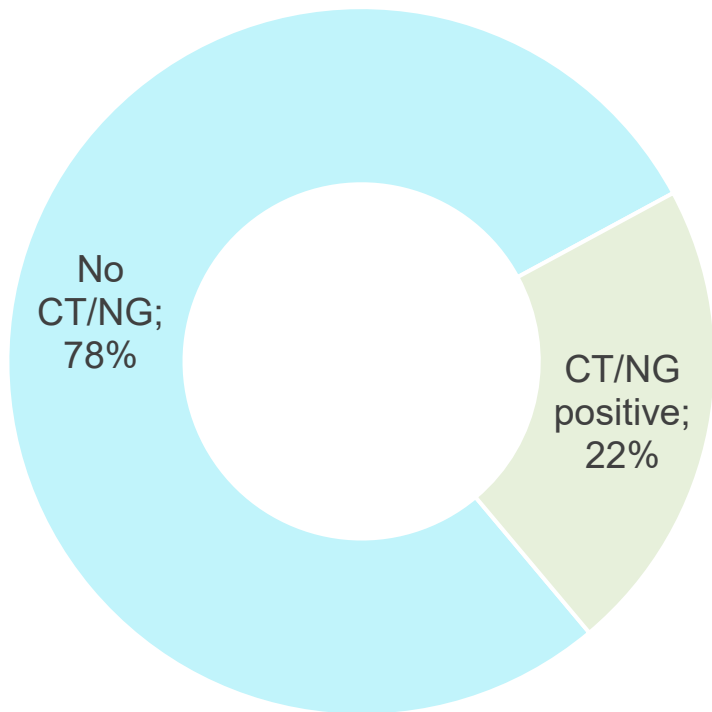
A 'few' unsuppressed PLHIV can potentially sustain HIV transmission...



Source: SHIMS3, 2021

The implications of not achieving the 'Last Mile'

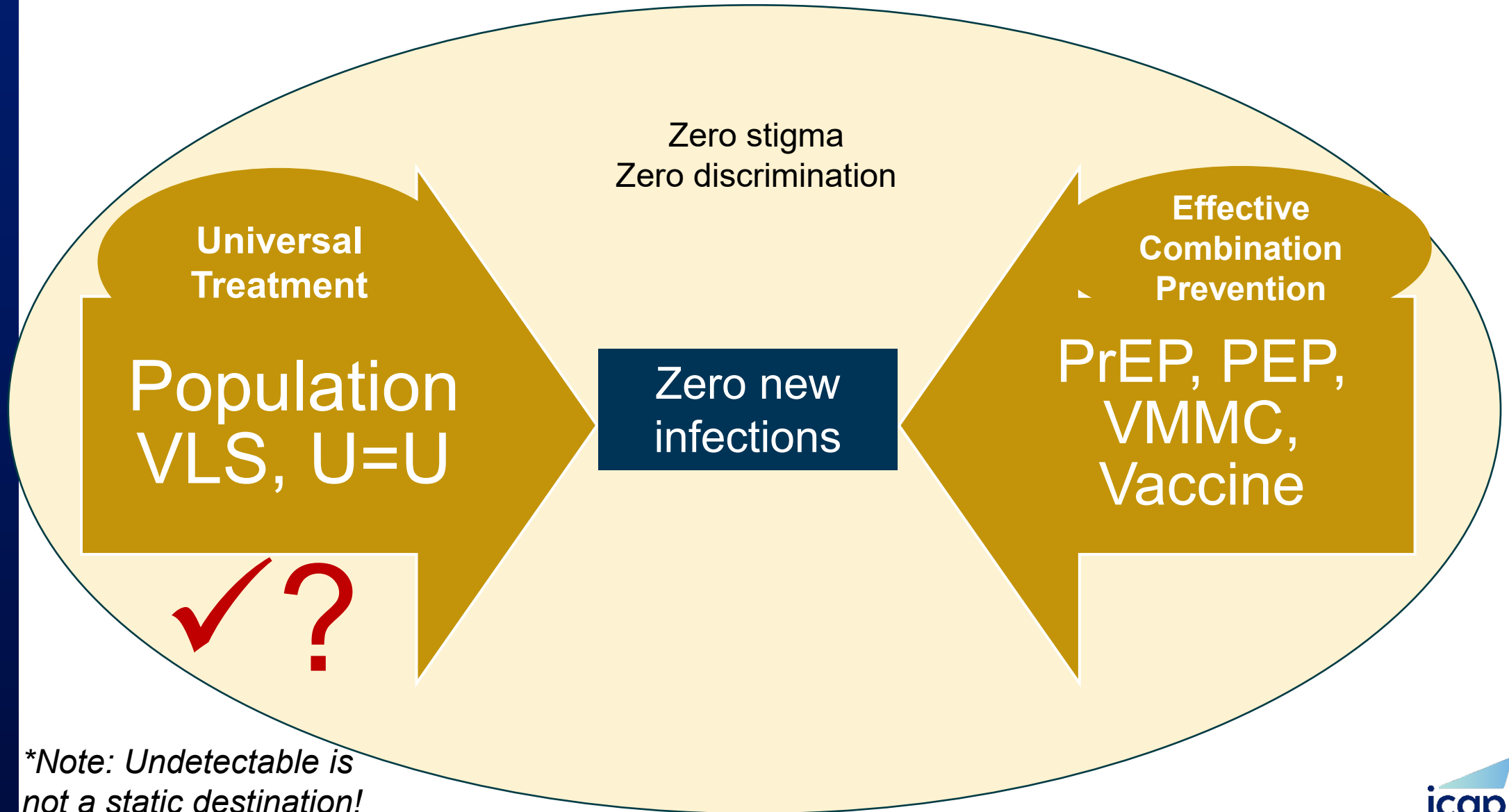
- STI point of care testing in outpatient clinics in Eswatini (feasibility study)
 - 7% of adults with CT/NG listed 27% of the partners
 - Only 50/102 (49%) of the partners were notified of STI diagnosis by partner



	STI participants with 1 partner	STI participants with 2 partners	STI participants with 3 partners	STI participants with 4+ partners
Participants	32	12	6	4
Partners	32	24	18	28

The table shows the relationship between the number of STI participants and the number of partners they have. The '4+ partners' column is highlighted with a red border. Arrows indicate that the number of partners is generally higher than the number of participants for each category.

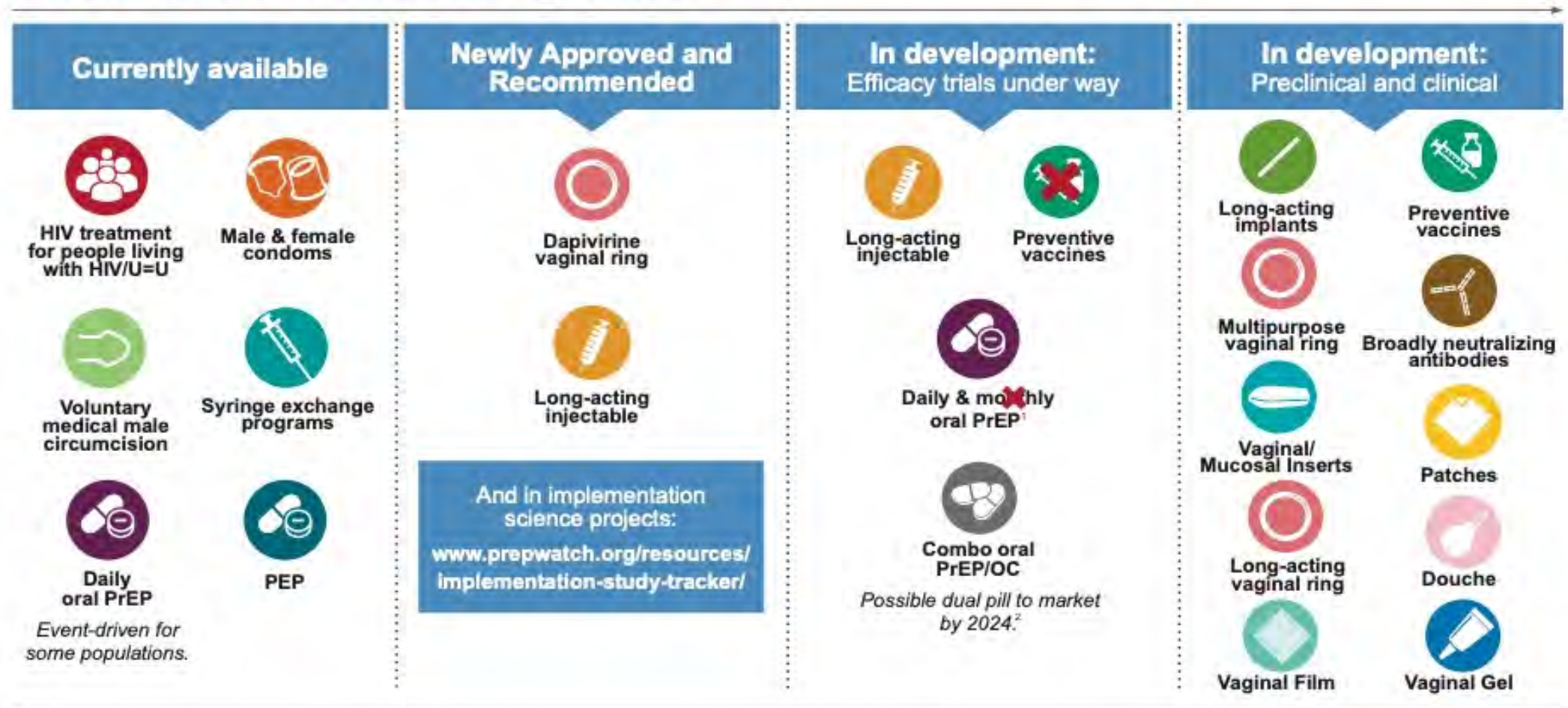
Pathways to HIV/AIDS epidemic control



**Note: Undetectable is not a static destination!*

More options for HIV Combination Prevention

The HIV Prevention Pipeline



¹In Oct 2019, US FDA approved F/TAF for adults and adolescents who have no HIV risk from receptive vaginal sex; still in development for cisgender women. required.

The ongoing (unmet) need for combination prevention

Less than universal condom use among sexually active individuals

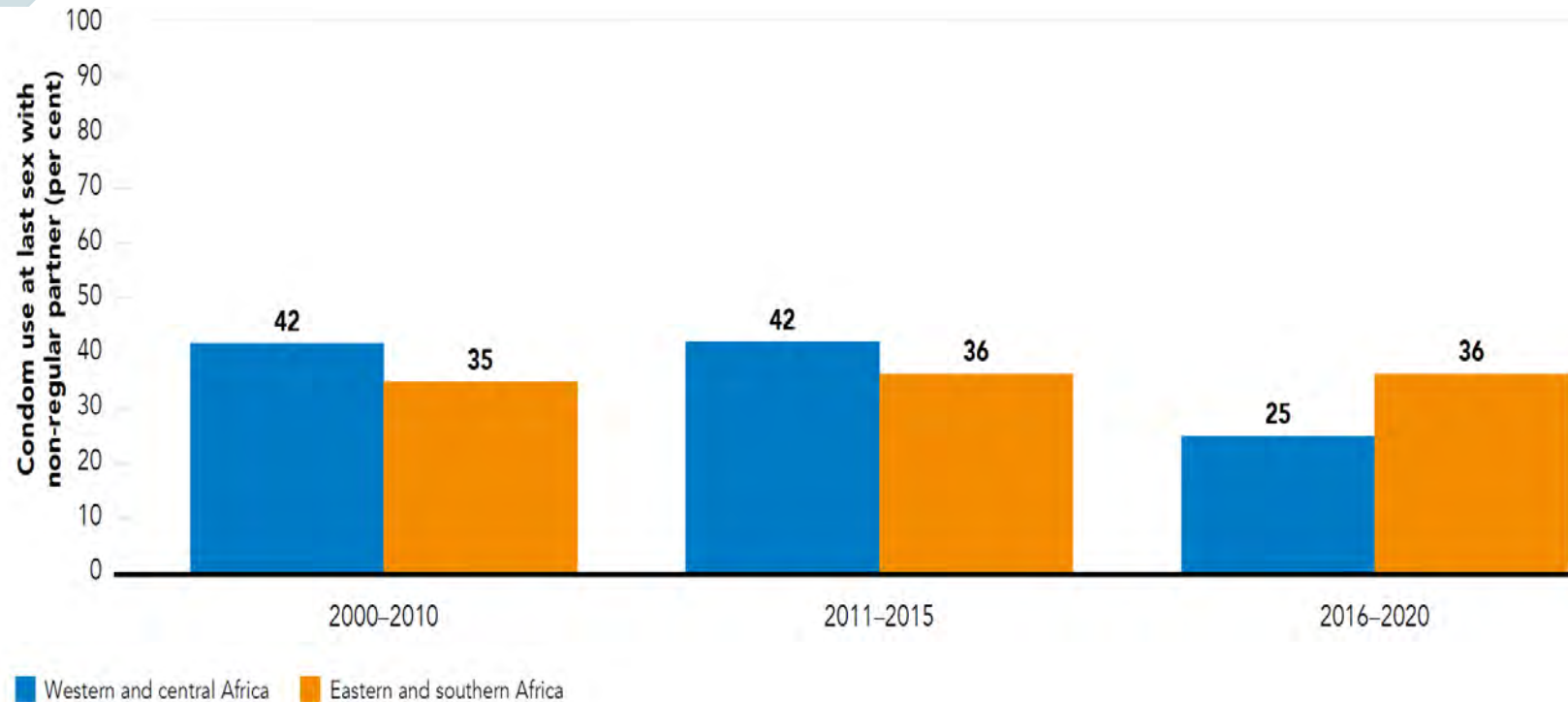


- × HIV
- × STIs
- × Pregnancy

Sub-Saharan Africa: Condom use at last sex among AGYW 15-24 years with non-regular partner

5,000,000,000

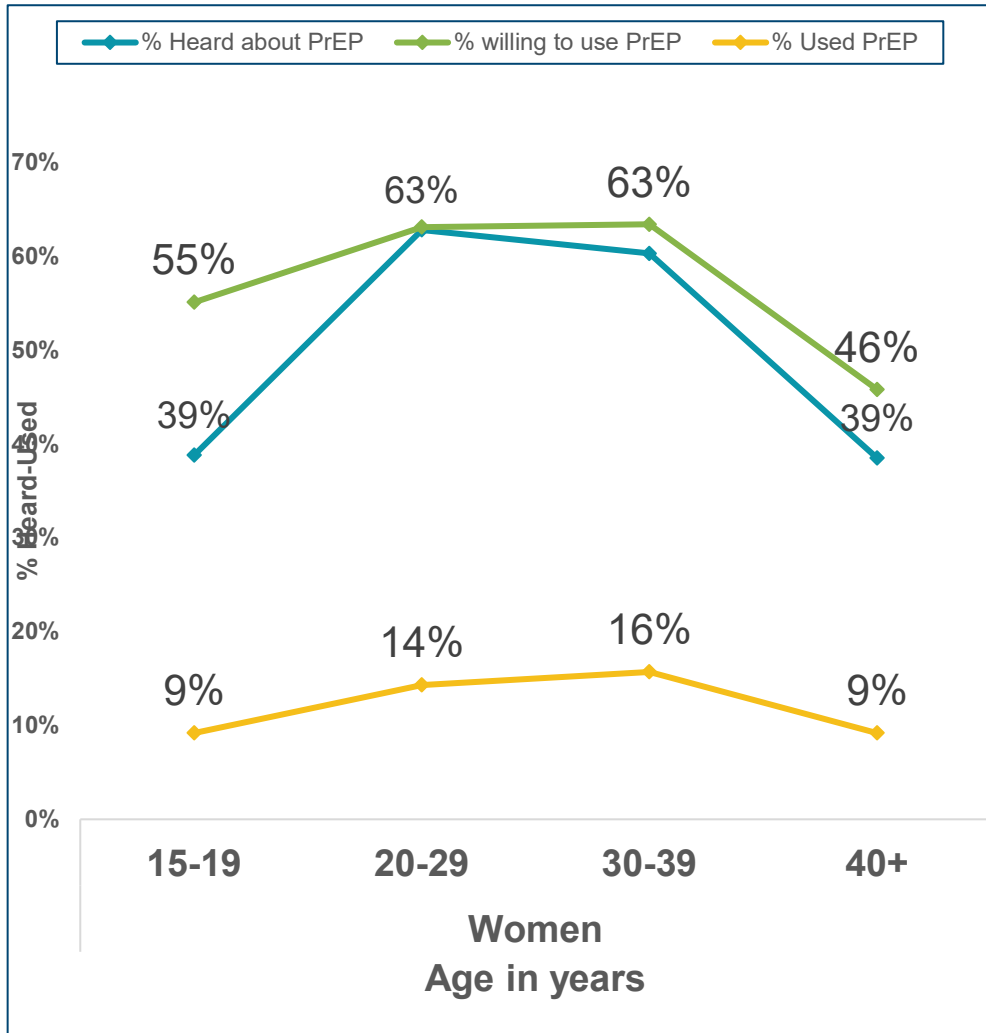
Male and female condoms procured by UNFPA and partners (2018-2022), most of which were provided to countries in sub-Saharan Africa.



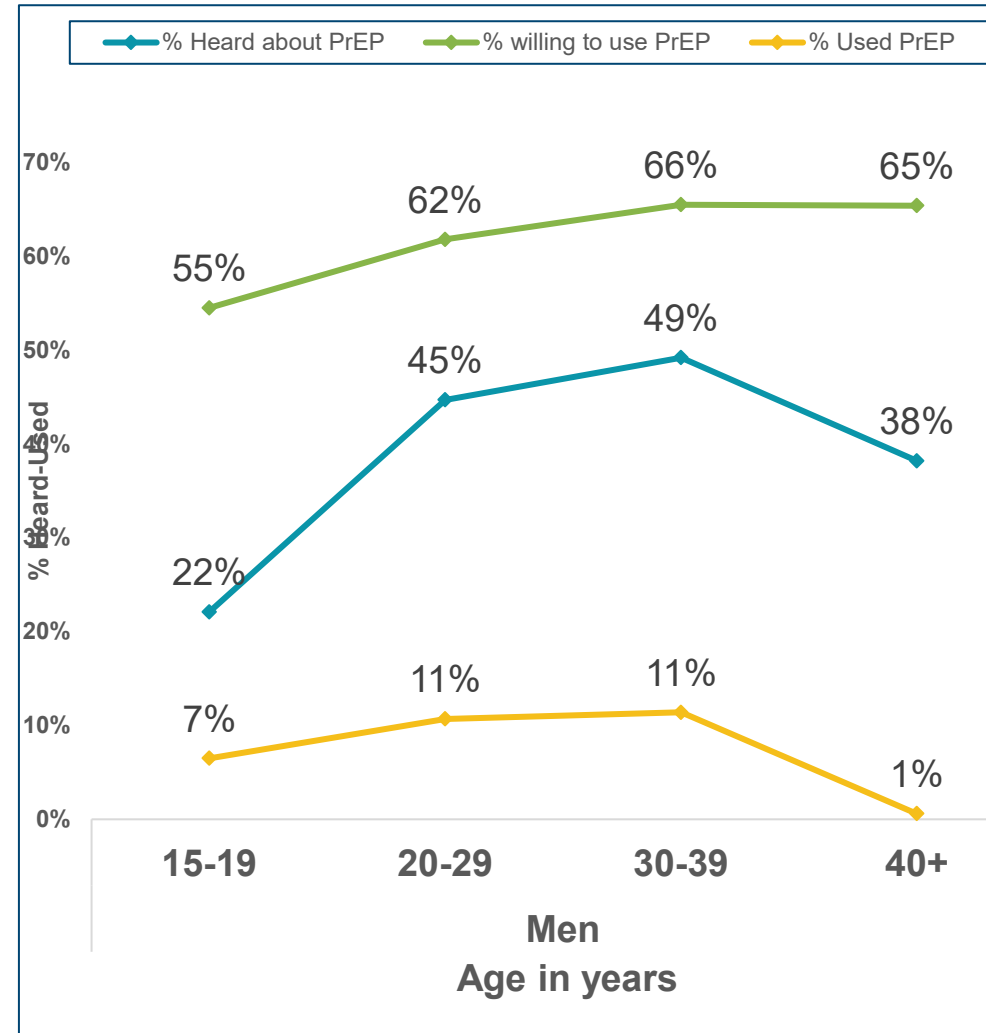
Is PrEP accessible?

PrEP knowledge, willingness to use PrEP among those HIV negative, and PrEP use by age and sex

Women



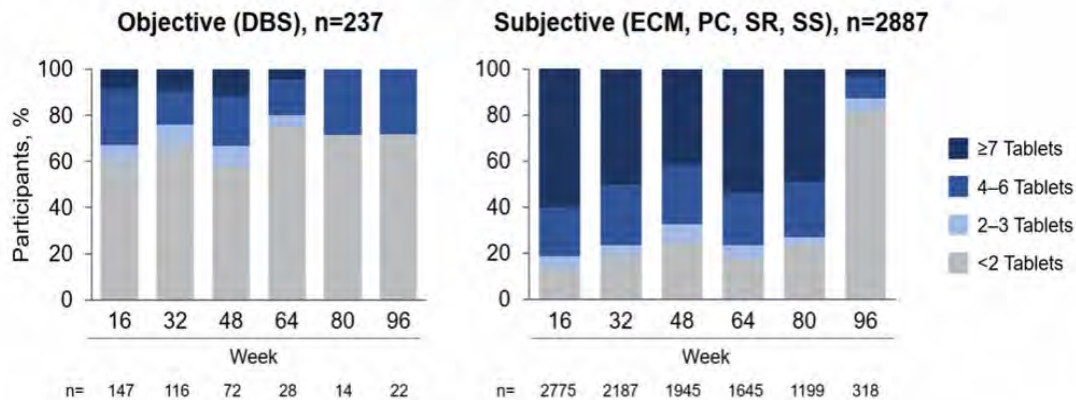
Men



PrEP Access vs PrEP use

- Compared objective oral PrEP adherence measures (plasma/DBS levels) to subjective measures (pill counts, self-report, electronic pill cap monitoring) in PrEP demonstration projects in Botswana, Kenya Uganda, South Africa, India, USA
- A pooled analysis of 6,296 women, 2,955 with objective adherence measures. Mean age 25 years.
- Overall HIV incidence: 32/6296 (0,72%)

Cross-sectional Objective and Subjective Adherence by Visit (n = 2955)

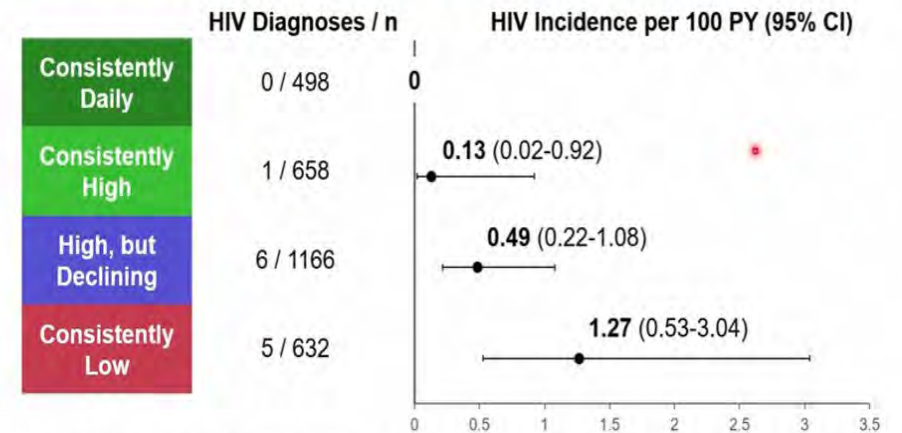


- By both measures, overall adherence declined over time
- Higher adherence reported with subjective vs objective measures

DBS, dried blood spot; ECM, electronic pill cap-monitoring; PC, pill-counts; SR, self-report; SS, study-reported adherence scale.

CROI; February 19-22, 2023; Seattle, Washington

HIV Incidence Rates Among Women with Available Adherence Data (n = 2955)



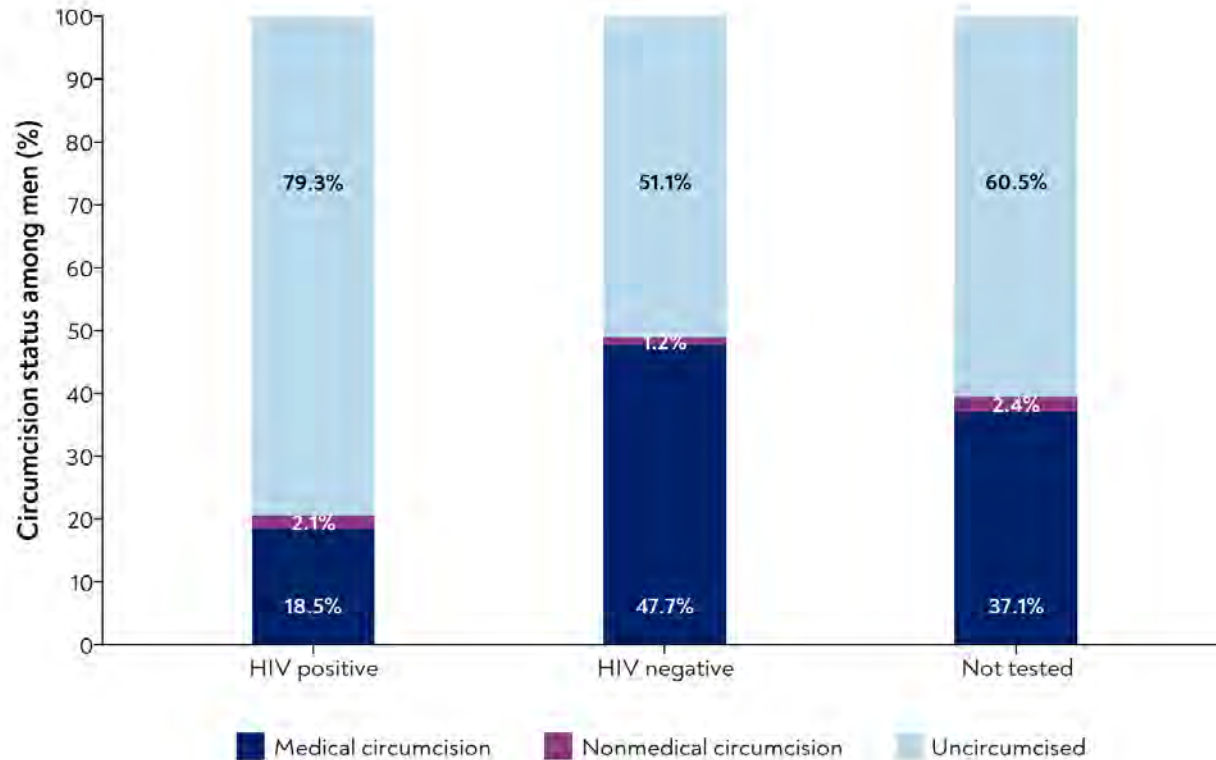
- Even with low incidence overall, higher patterns of adherence were directly associated with lower risk of HIV acquisition

Calculated by Poisson regression.

CROI; February 19-22, 2023; Seattle, Washington

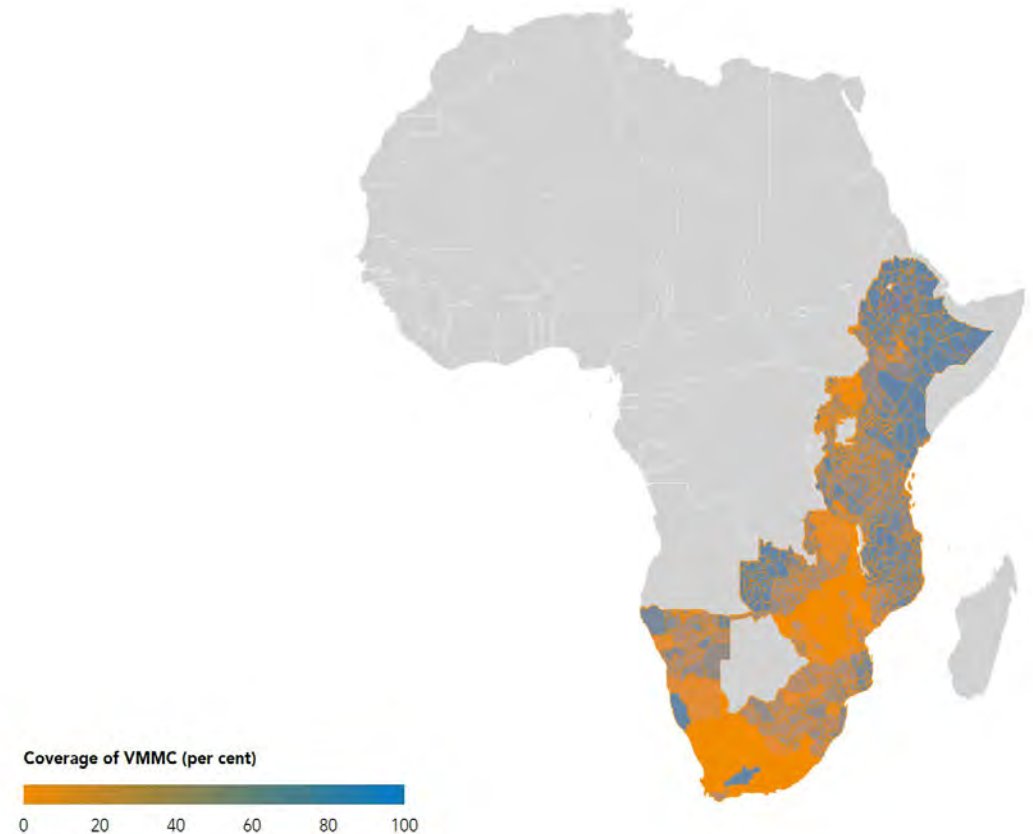
VMMC not at scale: A continuing missed opportunity

Eswatini: Self-reported male- circumcision status among men aged 15 years and older by survey HIV test result



Source: SHIMS3, 2021

Sub-Saharan Africa: Coverage of VMMC among boys and men 15-49 years

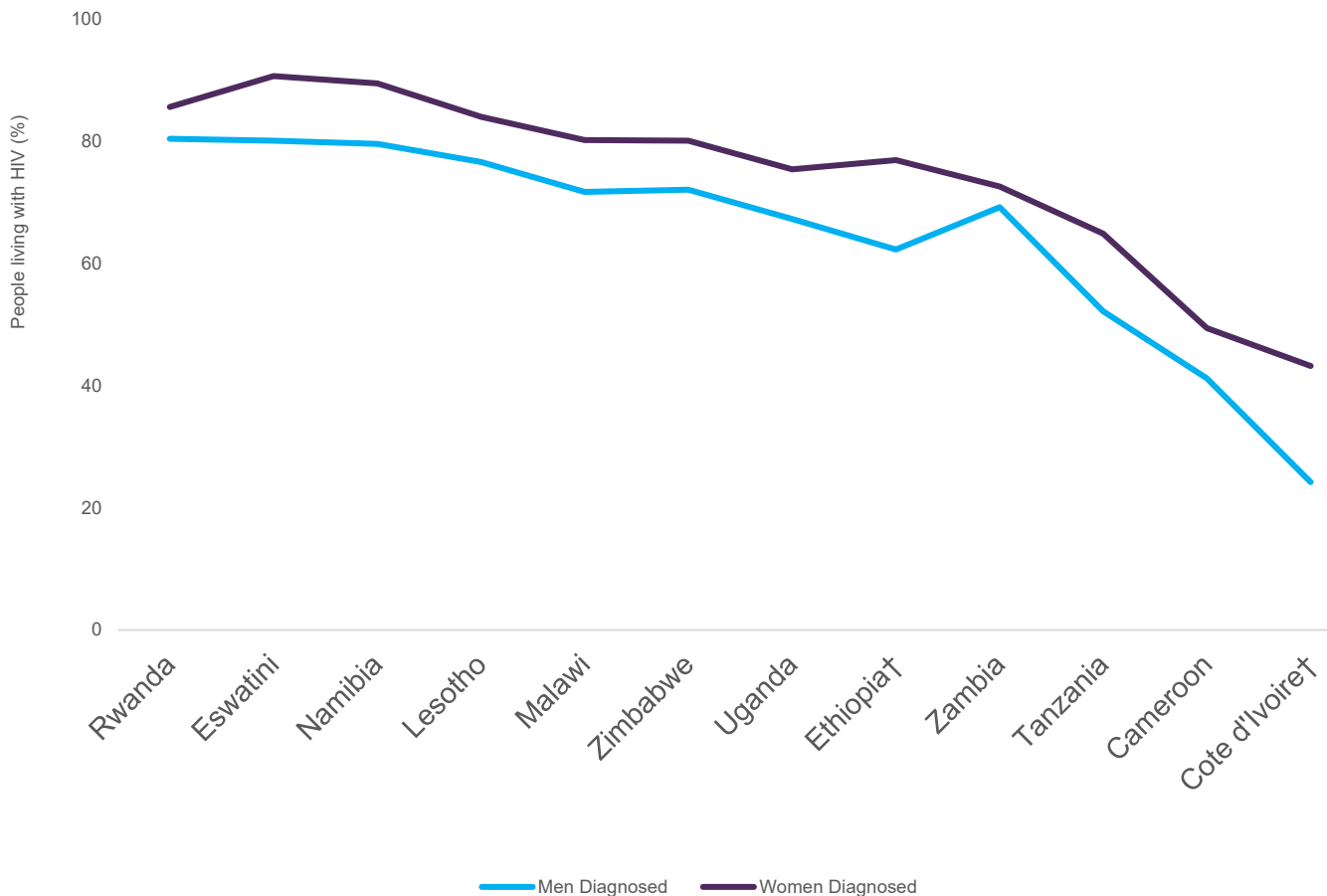


Source: UNAIDS Global AIDS Update: The path that ends AIDS



Future Directions: Minding the Program Gaps

Men lag behind women in awareness of HIV-positive status



- Consider expansion and enhancements in HIV self-testing
- DSD models incorporating HIV self-testing

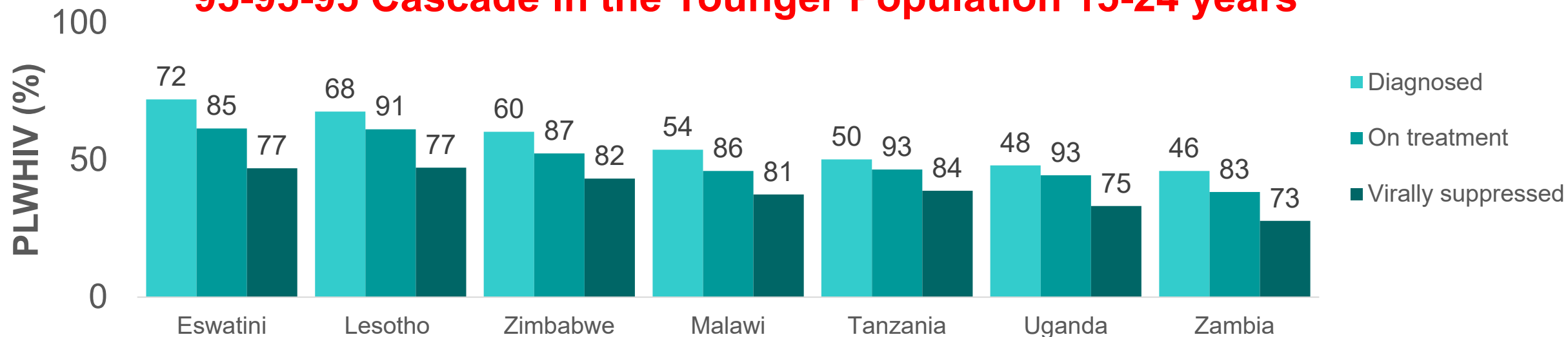
	Standard of care	HIV self-testing
Uptake of HIV testing (per 1,000)	371	901
Uptake of Couple HIV testing (per 1,000)	302	549

Source: <https://phia.icap.columbia.edu/>

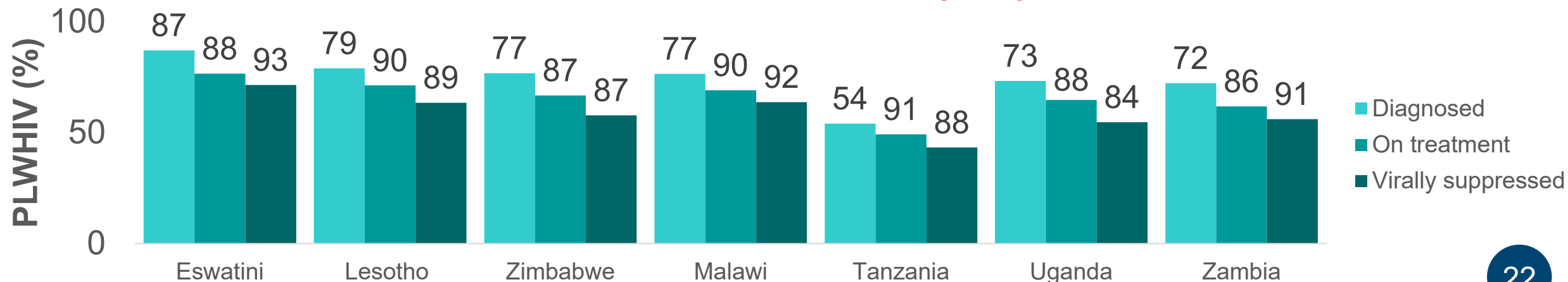
Source: Njau B, Damian DJ, Abdullahi L, Boule A, Mathews C (2021) The effects of HIV self-testing on the uptake of HIV testing, linkage to antiretroviral treatment and social harms among adults in Africa: A systematic review and meta-analysis. PLoS ONE 16(1): e0245498. <https://doi.org/10.1371/journal.pone.0245498>

Gaps: Youth as priority population

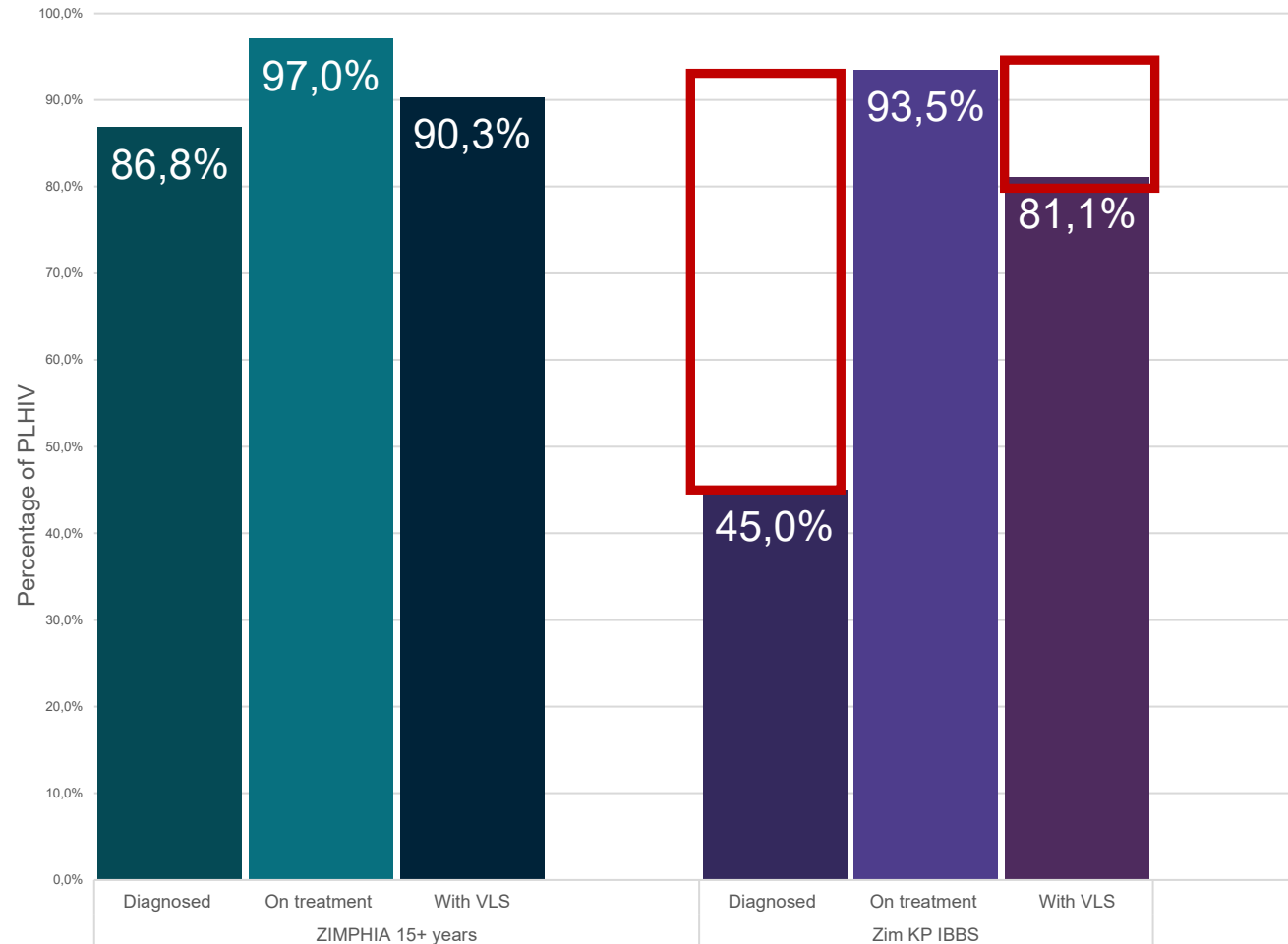
95-95-95 Cascade in the Younger Population 15-24 years



Older Population (25+)



Gaps: Key populations



- 2020 ZIMPHIA data in general population vs 2020 Zim BBS data
- 95's almost achieved in general population, <50% of KP know their HIV status
- Population VLS among KP lower than general population: continued potential of HIV transmission
- <50% KP had disclosed their PLHIV status to their partner

Exploring Differentiated Service Delivery Models for Prevention and Treatment



	Facility-based models	Community-based models
Group models	ART adherence clubs Teen clubs	Community ART Groups
Individual models	Fast Track, Collect & Go Appointment spacing	Community pharmacies Outreach models

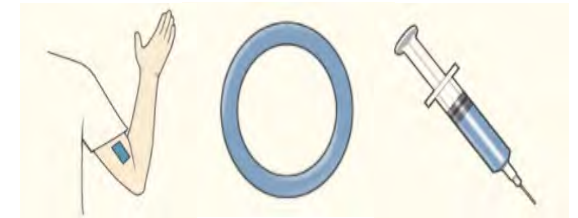
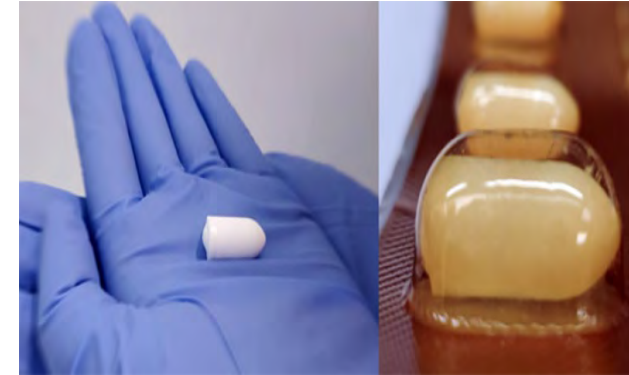


- Ease medication pick-up/access
- Peer support and encouragement
- Reduce facility visits (or promote more convenient visits)
- De-congest facilities, more focus on emerging issues: co-morbidities

Embrace New Tools and Technology: Multipurpose Prevention Technologies (MPTs)

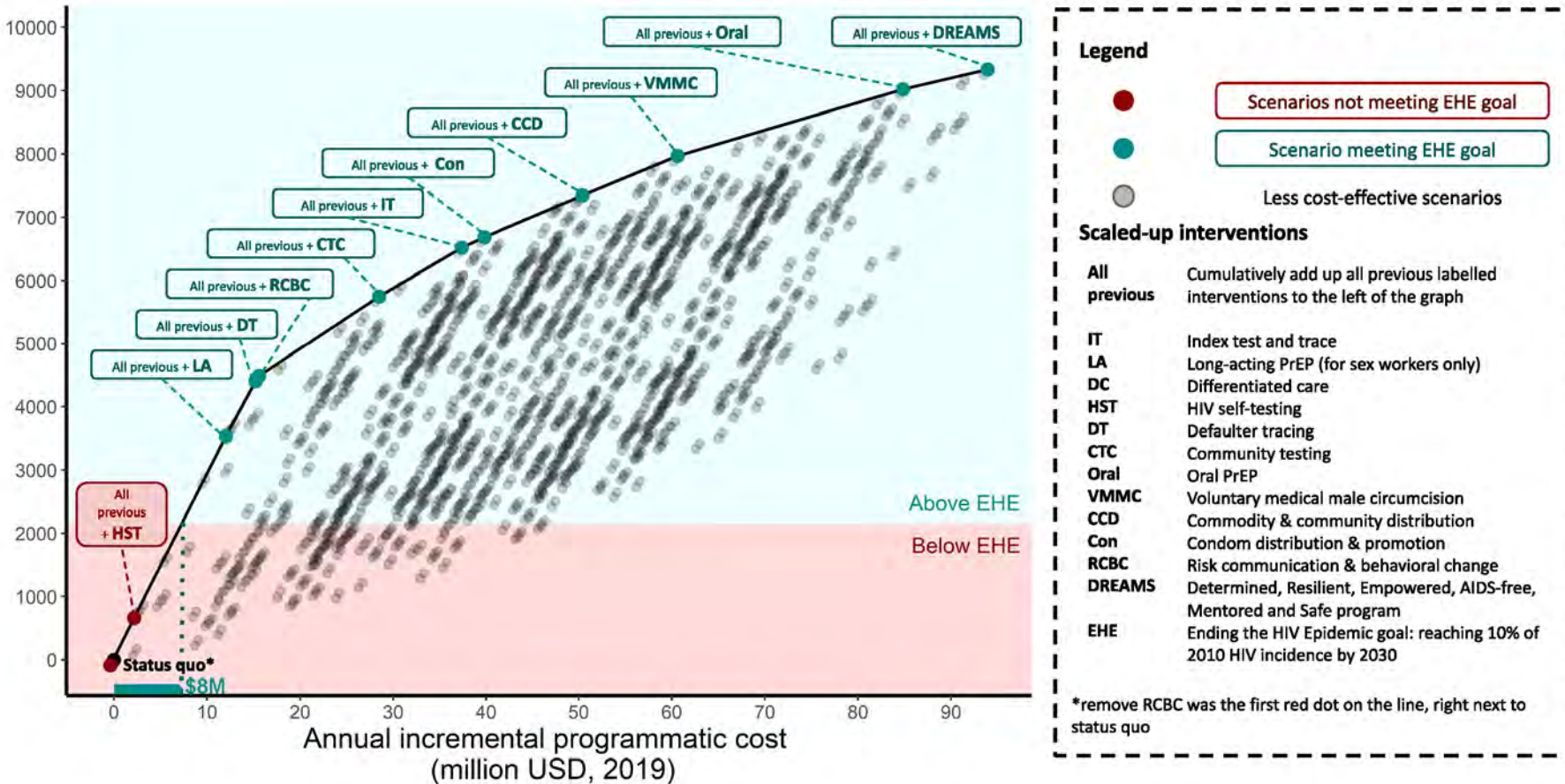
Pregnancy, Sexual Health, and HIV MPTs:

- A **dual-prevention pill** for the prevention of pregnancy and HIV
- A **vaginal ring** with the potential to prevent pregnancy, HIV and sexually transmitted infections
- **Injectables**
 - Shorten the time to real-world and scaled access to CAB-LA
 - Explore co-formulation with long-acting hormonal contraception
 - Expand PrEP education, sensitization, understanding uptake, reasons for non-uptake
- Continued investments in advancing **monoclonal antibodies and vaccines** development



Sustaining investments is crucial

Additional \$8M expanding HST, LA PrEP reaches EHE 2030 goal



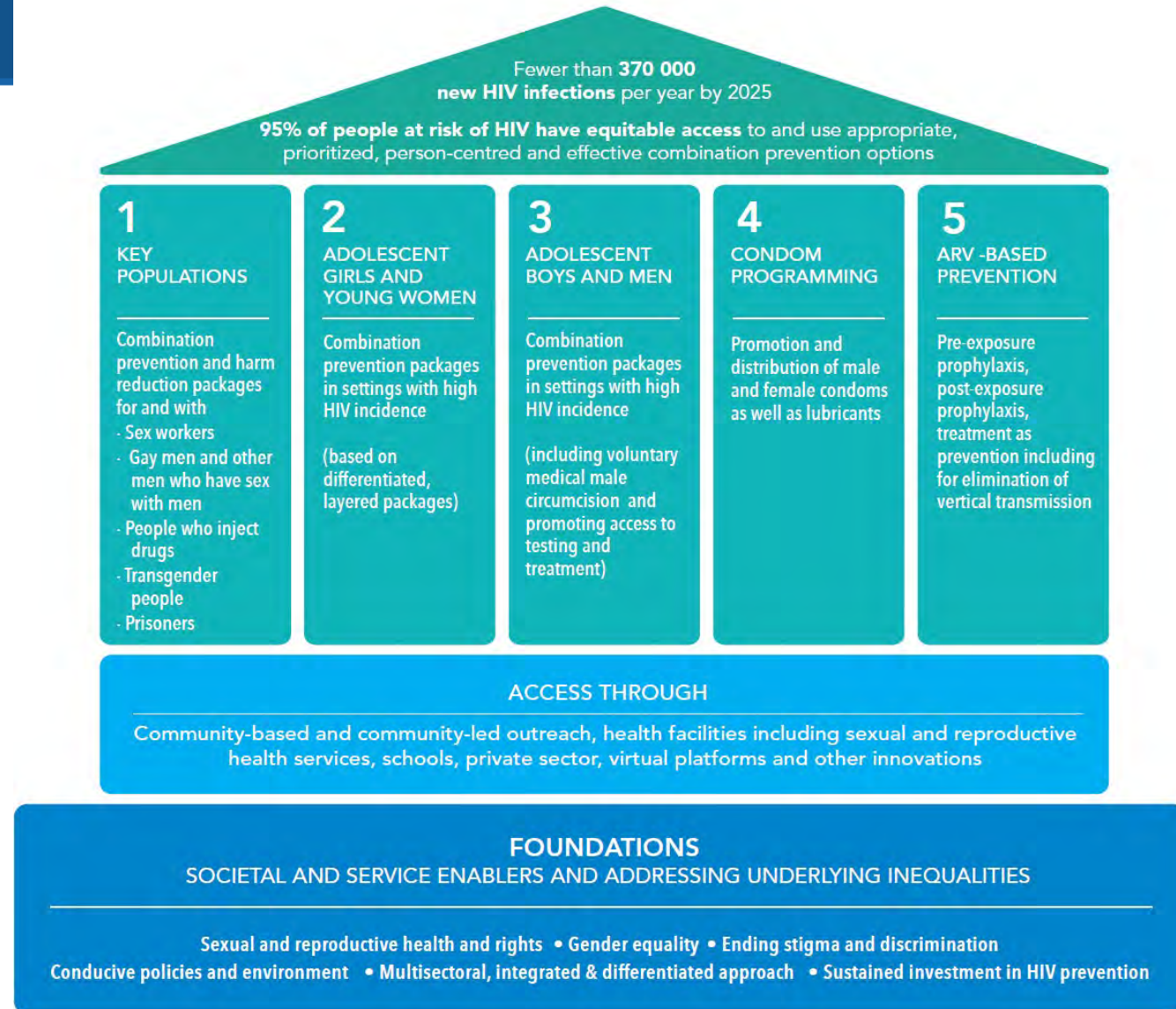
- Flatlined funding levels will hinder progress
- De-funding programs means 2030 targets will not be met

Source: Braithwaite RS, Charles D, Nuwagaba-Biribonwoha H, et al: Could long-acting medications facilitate “ending AIDS by 2030” in southern Africa? An allocative efficiency analysis (in-progress)

Summary

- Population VLS suppression and effective combination prevention are critical pathways to HIV epidemic control
- Focus on key and target populations is crucial as countries meet the 95-95-95
- Sustain gains in the 95-95-95: manage treatment fatigue, ART resistance, co-morbidities, maximize DSD opportunities
- New research to expand PrEP options is important
- Implementation science to understand real-world effectiveness, efficient delivery models and barriers

Pillars for the 2025 HIV Prevention Roadmap



Source: Global HIV Prevention Coalition, HIV Prevention Roadmap, 2025
<https://www.unfpa.org/publications/hiv-prevention-2020-road-map>

Middle East and Africa | Making sex safer again

Is the end of AIDS in sight?

The virus can be brought under control, but it's complicated

*‘... There are two main approaches to tackling the virus. One is to **invent** new medicines: ideally a cure or an effective vaccine. The other is to **reach more people with existing technology**’*

<https://www.economist.com/middle-east-and-africa/2023/09/17/is-the-end-of-aids-in-sight>

Acknowledgments



- Ministries of Health
- Ministry of Health in Eswatini for commitment to confronting the HIV epidemic and their ongoing support and guidance
- All the PHIA teams that enabled the conduct of these surveys
- ICAP teams in New York, Regional Office and Country offices
- Technical support from Centers for Disease Control and Prevention
- Funding from President's Emergency Plan for AIDS Relief (PEPFAR)

Overall support for the HIV Prevention Trials Network (HPTN) is provided by the National Institute of Allergy and Infectious Diseases (NIAID), Office of the Director (OD), National Institutes of Health (NIH), National Institute on Drug Abuse (NIDA), the National Institute of Mental Health (NIMH), and the Eunice Kennedy Shriver National Institute of Child Health and Human Development (NICHD) under Award Numbers UM1AI068619-15 (HPTN Leadership and Operations Center), UM1AI068617-15 (HPTN Statistical and Data Management Center), and UM1AI068613-15 (HPTN Laboratory Center). The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health. SHIMS2 implementation in Eswatini was supported by CDC Cooperative Agreements: Strengthening National Epidemiologic and Research Capacity to Improve Health Outcomes in the Kingdom of Eswatini under the President's Emergency Plan for AIDS Relief (PEPFAR) NU2GGH001271. PHIA's and SHIMS3 supported by the U.S. President's Emergency Plan for AIDS Relief (PEPFAR) through the U.S. Centers for Disease Control and Prevention under the terms of cooperative agreement #U2GGH001226. The contents of this site are the responsibility of ICAP and do not necessarily reflect the views of the United States Government.